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Study of Outcomes of Intensive Care

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The research associated with this thesis abides by the international and Australian codes on human experimentation, the guidelines by the Australian Government's Office of the Gene Technology Regulator and the rulings of the Safety, Ethics and Institutional Biosafety Committees of the University.

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Abstract

Many studies show long-term outcome following critical illness involves reduced physical function, increased psychological symptoms, neuropsychological impairment and reduced quality of life compared with population norms. It is assumed these are a direct consequence of critical illness and critical care therapies.

The STudy of Outcomes of Intensive Care (STOIC) was designed to compare the long-term functional, neuropsychological and psychosocial recovery of intensive care unit (ICU) survivors (ICU patients) with non-intensive care, acute-care hospitalised controls. Secondary aims include identifying variables which predict outcome (for ICU patients only) at two years after ICU discharge.

Seventy-one survivors from two mixed medical-surgical ICU populations and seventy-two age- sex- matched non-ICU acute-care hospitalised controls, (selected from same hospital populations) were consecutively recruited at unit discharge. A broad test-battery incorporating standardised objective and subjective tests to measure functional, psychosocial, neuropsychological impairment together with patient self-report was used at six timepoints, across a two year period. Face-to-face, semi-structured interviews were conducted.

Data was analysed using mixed model regression. Thematic analysis drew subject themes from patient narratives. Pearson correlations were calculated to inform selection of variables for outcome prediction.

Preadmission scores reflect a state of chronic disability for both ICU patients and controls. Neither group reach complete functional independence during the study period. High levels of functional impairment are seen among controls, ranging between 56 - 85%. At two years following discharge mean functional test scores for both groups remain below preadmission levels.

Comparatively, ICU patients display lower levels of community integration throughout the study period.

There were no cases of Post-Traumatic Stress Disorder identified with both groups displaying low levels of anxiety and depression. Neuropsychologically, neither group achieved scores in the normative average range. A higher proportion of the ICU group were cognitively impaired at each time point. At two years following discharge, 21% of ICU patients and 16% of controls remain impaired in verbal, working memory. Several baseline variables were strongly correlated with impairment and mortality two years after unit discharge. Significant predictors include years of education, Mini Mental State Examination, Community Integration Questionnaire, Functional Independence Measure, and Charlson Age Comorbidity Index.

This study unexpectedly uncovers high levels of impairment for a non-ICU acute-care hospital population which have not previously been acknowledged whilst also demonstrating a correlation of high impairment among ICU patients. Baseline variables are capable of predicting clinically relevant outcomes two years after discharge. Clinicians, patients and carers are benefitted with the research of this paper, to be further informed of the possible after-effects associated with treatment for critical illness.

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List of Abbreviations

ACT	Adult Changes in Thought Study	**LOS**	Length of stay
ADL	Activities of Daily Living	**MASS**	Mean Age Scaled Score
APACHE	Acute Physiology & Chronic Health Evaluation	**MCS**	SF-36v2-Mental Health Component
ARDS	Acute respiratory distress syndrome	**MH**	Mental Health
ASS	Age Scaled Score	**MMSE**	Mini Mental Health Examination
BP	Bodily Pain	**NART**	National Adult Reading Test
CACI	Chronic age and comorbidity index	**PCID**	Post critical illness disease
CI	Confidence Interval	**PCS**	SF-36v2 -Physical Health Component
CAM-ICU	Confusion Assessment Method for ICU	**PF**	Physical Function
CCU	Critical Care Unit (used interchangably with ICU)	**PICS**	Post Intensive Care Syndrome
CIQ	Community Integration Questionnaire	**POCD**	Post-Operative Cognitive Dysfunction
DS	Digit Span	**POMS**	Profile of Mood States
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, 4th Edition	**PTA**	Post Traumatic Amnesia
FIM	Functional Independence Measure	**PTSD**	Post Traumatic Stress Disorder
FSIQ	Full Scale Intelligence Quotient	**QOL**	Quality of Life
GH	General Health	**RE**	Role Emotional
GOS	Glasgow Outcome Scale	**ROD**	Risk of death
HADS	Hospital Anxiety and Depression Scale	**RP**	Role Physical

HADS-A	Hospital Anxiety and Depression Scale-Anxiety	**SD**	Standard deviation
HADS-D	Hospital Anxiety and Depression Scale-Depression	**SF**	Social Function
HRQoL	Health Related Quality of Life	**SF-36v2**	Short Form 36 version 2
ICU	Intensive Care Unit (used interchangably with CCU)	**SIP**	Sickness Impact Profile
ICU patient	Participant admitted to a ICU unit; used interchangeably with case	**SNST**	Stroop Task
ICUAW	Intensive Care Unit Acquired Weakness	**SOFA**	Sequential Organ Failure Assessment
IES-R	Impact of Events Scale-Revised	**STOIC**	Study of outcomes of intensive care
IQ	Intelligence Quotient	**TMT-A**	Trailmaking Task - Test A
LNS	Letter Number Sequence	**TMT-B**	Trailmaking Task - Test B

CHAPTER 1

Introduction

Consideration of issues such as quality of life and physical disability often influence decisions surrounding treatment limitation. The burden of the illness whilst borne directly by patients, often flows on to their families and health and social service providers within the community. Uncertainty of patient outcomes after critical illness raises the issue of whether current treatments are providing acceptable outcomes, and questions the wisdom of the high investment in such treatment resourcing.[1]

Background to the problem

Historically, the discipline of Critical Care Medicine arose though times of epidemics and war, where the main focus were the management of ventilation support, resuscitation, shock and major trauma. Today the focus of health care delivery for critically-ill patients still lie in acute life-threatening conditions but the battle lines are not so clearly defined. While the threat of war and pandemics still exist, contemporary critical illness is borne, in the main from the multiplicity of acute on chronic illness.

This not so subtle change of critical care focus from treating victims of war and epidemic to maintaining an increasingly aging, chronically sick population means the need for improving clinical effectiveness and cost-efficiency is becoming increasingly apparent. From the days of 'saving a life no matter the cost', we are now struggling to intelligently devise processes to equitably limit life-saving efforts. Albeit shrouded by increasing fiscal constraint, 'patient treatment limitation orders' aims for informed admission to critical care units. Difficult treatment decisions once made solely by Intensivists are now being balanced by realistic lay public expectations. Healthcare providers are now mandated to partner with consumers to make decisions together.[2,3]

Arguably the expectation of first-world health care for most consumers, conjures up images of open-access to unlimited numbers of highly technologically advanced critical care units, serviced by the very best and brightest and committed health care professionals. There has

been very little consultation or thought devoted to equipping patients and families with meaningful information regarding long-term outcomes.[1] While the 'patient focus' idealology has been part of the hospital mission statement, there remains very little shared decision making or consumer involvement in the provision of critical care. While there is increased administrative pressure to optimise critical care beds, currently we do not hold an instrument which can predict morbidity of survivors of critical illness. With research showing high mortality rates and associated long-term impairments, it is the survivor who questions the value-for-service against quality of life. Survivors are concerned with real-life outcomes, how they and their families are able to live with the consequences of critical illness knowing a significant social cost is also carried by the greater community.

Similarly physicians and researchers are struggling, still heavily relying on mortality prediction models at unit admission and hospital discharge or at 28 days following admission, to help triage,[4] clarify treatment recommendations and assess outcome.[5,6 7] Only recently have clinicians questioned their actions in regard to the quality of life of patients and families, long-term. Providing life-saving treatment to patients without knowing their long-term outcome may not be providing appropriate care.

Consequently, long-term outcome information is not only fundamental if we intend to invite consumers to make informed decisions to accept or forego life sustaining treatment. In order to meet these challenges of critical-socio health reform, higher standards of health literacy are required by the patient, the medical community, the legal fraternity, health administrators and policymakers. The evolving context of critical health care mandates the blue-print for standardised outcome measurement design.

Previous research undertaking long-term follow-up of ICU patients have been criticised for such inconsistencies as varying test batteries, use of invalidated instruments, inconsistent follow-up timepoints, and patient populations and study design, including lack of control groups with lack of evidence of premorbid function. In 1997 Ridley[8] conducted a meta-analysis of outcome measures for adult critical care. It was concluded that it was impossible to reach a valid and reliable overview of the recovery of survivors of critical illness from the existing literature. Despite Ridley's observation of the difficulties comparing across studies, to date there is no standardised and validated procedure for monitoring patient progress

over time that enables the mapping and long-term recovery and the needs of the survivors of critical illness.

The diverse range of results in the literature highlights the lack of standardised approach. Research shows that survivors of critical care treatment suffer "post intensive care syndrome" (PICS).[9] This consists of wide variability of deficits across functional,[10,11] neuropsychological[12-18] and psychosocial[19,20] domains with associated diminished quality of life.[12,21-25] There is no accepted definition of what constitutes critical illness[9] or PICS, whether it is a chronic state of disability or merely a temporary state of dysfunction. Nor is PICS isolated to one specific diagnostic subgroup[18] or specific diagnostic criteria; yet studies into PICS describe a similar pattern of deficit.[3] Following critical illness, a high proportion of survivors suffer dramatic weight loss and weakness, are often unable to think, care for themselves independently, and subsequently endure long-term unemployment and isolation. Symptoms often persist for many years, resulting in a chronic state of disability, a state resembling a moderate form of dementia.[18] This is accompanied by an enormous emotional and physical burden for both patients and their relatives. Kress[1] also acknowledges that a downward trajectory of functional disability, whilst may be exacerbated by critical illness, may be predominantly driven by progression of underlying chronic disease. In which case, admission to ICU may not alter their ultimate outcome and may potentially induce greater disability or impairment.

The term PICS has been loosely derived from studies of varying methodologies, populations and levels of evidence. When designing a study battery for survivors of critical illness, a global assessment incorporating the complexity of critical illness sequelae, accounting for the cofounders such as diversity of ages, comorbidities and social supports is required. It has been suggested the strongest studies which measure outcome, methodologically, are those where self-report measures are used in conjunction with standardised clinical interview.[26]

This approach ensures a patient-centred approach superimposed on an inventory of standardised criteria and symptom severity. Comparing the outcomes of survivors of critical illness with hospitalised controls (who have not experienced critical illness) is important for the generation of accurate recovery curves surrounding illness rather than recovery curves of healthy general community populations. The wide variability of deficit in outcomes among

survivors, suggest PICS may be an extension of symptoms superimposed on a population already in a state of physical and psychological distress, but this is not proven. Very few studies use the hospitalised patient as a control population,[9] the majority using normative data or other critically ill diagnostic subgroups. The importance of a control group is highlighted by Johnson[27] stating without the controls, studies may erroneously over or under emphasise trends.

While there has been criticism of test batteries for incorporating instruments not validated among ICU patients and lack of consistency of follow-up methodology[7] it perhaps is a reflection of the phases of outcome measurement development. Long-term outcome measurement evolved initially among disease-specific populations, such as Acute Respiratory Distress Syndrome (ARDS)[14,28] which incur difficulties when applied to heterogeneous, general critically ill populations. A process for measurement is best achieved if it is built on fundamental themes signified relevant to survival and adaptation by this population. Understanding how patients and carers adapt their lives according to chronic disability seems essential in achieving a complete test battery which is pertinent and truly reflective of their experience. Methods such as symptom scaling, neuropsychological testing and narrative analysis are acknowledging a state of enquiry which cannot be currently universalised, where the comparative standard is not yet fixed.

Exactly what long-term outcome means and the ideal timepoints including the period of follow-up have been contested. Ridley[19] suggests that survivors of critically illness should be followed-up until their survival curves match those of a comparable or general population, estimated 1-4 years duration. From this, a plethora of studies of varying lengths and methodologies have emerged. Acknowledging studying long-term follow-up is logistically difficult, prohibitively expensive and often plagued with high attrition rates, the critical care community still calls for a universally sustainable, standardised outcome methodology. Currently there is no standardised process for follow-up.

Justification of the research

This study adds to the body of literature surrounding long-term outcomes after critical illness. It provides a broad description of morbidity, across functional, neuropsychological

and psychosocial domains. Patient self-report helps characterise recovery during the first 24 months following critical care discharge. Recruiting non-ICU acute-care hospitalised controls places the ICU patient onto an illness continuum acknowledging the existence of chronic states of ill-health and hospitalisation. Providing this controlled comparison will accurately define the as yet unresearched non-ICU, acute-care hospitalised population. It will also help determine if critical illness truly promotes the development of new cognitive impairment[29] or discover if the cognitive impairment is merely an extension of an unrecognised occult epidemic, surrounding chronic ill-health.

Predicting long-term outcome on admission will provide far reaching benefits on many levels. This study will assist patients and families make informed treatment choices to ensure appropriate care. Conversely, it will assist clinicians reduce the occurrence of inappropriate care, (being either unwanted or unnecessary).[30-32] Allocating limited resources to target early interventional rehabilitation will produce clinically and cost effective outcomes. These study findings will inform and potentially change current practice.

This study aims to:

Study Primary Aims

- Determine the incidence of functional, neuropsychological and psychosocial impairment of patients surviving critical illness 24 months following ICU discharge;

- Determine the level of functional, neuropsychological and psychosocial impairment of patients surviving critical illness over a 24 month period following ICU discharge;

- Track the functional, neuropsychological and psychosocial recovery of patients surviving critical illness over a 24 month period following ICU discharge.

Secondary Aims

- Determine baseline variables associated with outcome (not impaired, impaired and death) 24 months following ICU discharge;

- Examine common themes and characterise the subject's recovery during the first 24 months following ICU discharge.

Outline of the study chapters

In order to address the above study aims, this thesis have been divided into 6 chapters; introduction, background, methods, results, discussion and conclusion.

The main aim of the background chapter is to provide a thorough, narrative review of the literature highlighting the current context and significance surrounding issues relating to the recovery of intensive care survivors. These include issues relating to long-term study methodology; including the lack of a standardised test battery or time points. Many areas of deficits are discussed, including physical, neuropsychological and psychosocial impairments which are widely cited as common impairments in the critical care survivors. Study instruments are also discussed and reviewed. The literature reviewed, informed the current study design.

Chapter 3 describes the study model incorporating all areas of study methodology, procedural and analytical. Being a study of long term outcomes, it was important to incorporate instruments used locally and internationally, and possible, all instruments used are validated in the area of critical care. This chapter also outlines the control population; the recruitment of age- sex- non-ICU acute care hospitalised controls provides a novel approach in this area of research. Follow-up timelines are outlined and importantly, highlights the use of the premorbid (retrospective) data collection. Methods for statistical analysis are outlined in this chapter, incorporating descriptive statistics, mixed model analysis and predictive modelling. Narrative analysis and narrative trajectory analysis are described.

Chapter 4 outlines all results generated, detailing descriptive demographic characteristics and analyses. Extensive results are framed for the overall functional, neuropsychological and psychosocial recovery trajectories over a 24 month period. These include narrative,

thematic analyses and further, narrative trajectories which enhances the richness of the study data.

Chapter 5, the discussion, places the study's novel data into the context of the current body of research. Finally Chapter 6 provides an overall summary of all factors and issues identified with recommendations for potential areas of further research.

CHAPTER 2

Background

Search Methods

This literature review examined results, their relevance and utility in ICU and non-ICU, acute-care hospitalised patients. Relevant papers were identified and retrieved from a search using the bibliographic databases Medline, EMBASE, Cochrane Library, CINAHL, PsycINFO. Personal files and the reference lists of relevant review articles were hand-searched. The following search strategy was used. All terms (incorporating the Glossary of Terms) were mapped to the appropriate MeSH/EMTREE subject headings and "exploded", using, for example, ("intensive care units" or "critical care" OR "critical illness"). Search results were filtered for English-language. There were no limits regarding publication dates.

The literature review in this thesis employs a 'narrative' approach. This narrative review examines the evidence surrounding the functional, psychosocial and neuropsychological recovery of ICU survivors and non-ICU acute-care hospitalised controls across the pre-hospital to post-hospital continuum of illness. It reviewes the current evidence base for assessing a very wide range of factors; physical function, quality of life, psychosocial problems including anxiety and depression, community integration and neuropsychological measures relevant in these populations, intensive care unit utilisation, mortality, study methodology including time-points and study design.

To incorporate a thorough review of the literature across so many study areas within such an extensive study, lends to a narrative approach. The narrative review style allows for a more integrated overview, with a flow which incorporates all systematic literature reviews published within individual study areas. As with all literature reviews however, it is never possible to be certain that all studies are included as, for example, often negative studies are not published; authors, editors and reviewers being more inclined to give priority to large and/ or positive trials. However, all land-mark papers, systematic reviews / meta-analyses have been included and discussed.

Literature surrounding the outcomes of survivors of critical illness shows survivors commonly suffer ongoing cognitive, psychological and physical impairment. Over twelve years ago the European Society of Intensive Care Medicine recognised the importance of long-term follow-up of ICU patients recommending Health-Related Quality of Life (HRQoL)[6,33] as an all-encompassing endpoint, yet highlight the need for further methodological research in the area of long-term outcomes. A decade on, many authors have listed an extensive range of long-term impairments, broadly profiled as PICS. Currently no diagnostic criteria or universal definition exists or a standard to measure its outcome. Broomshead and colleagues[10] agree, emphasising this outcome data is urgently needed at all levels, by the individual, the healthcare system and society in general. Today the same fundamental problems of instrument design, insensitivity, validity[7,34] and study methodology[35,36] remain.

The majority of studies of long-term outcomes incorporate low-level evidence, predominantly observational studies. Systematic reviews surrounding quality of life highlight such challenges and limitations as inconsistent methodological frameworks, small sample sizes with high loss to follow-up.[37-39] Such factors reduce the generalizability of results and may lead to inaccurate inferences.

Currently, the central tenet of PICS is the presence of a diverse range of deficits across physical, neuropsychological and psychological domains with variable rates of recovery. Cognitive assessments of PICS sufferers describe impairments to attention[14,16,40-42] memory,[14,16,40,42-45] executive function,[14,16,41,42,46,47] mental processing speed,[14,16,41,43,46,47] visuospatial ability[14,16,43 41,48] and general cognitive decline.[14,16,41,44,46] Functional impairment in PICS includes weight loss, reduced muscle mass, myopathy and polyneuropathy, often termed critical illness polyneuromyopathy (CIPM)[49-51] resulting in muscle wasting and fatigue.[52, 53] Intensive care unit acquired weakness (ICUAW) broadly describes generalised weakness and muscle wasting, which can manifest itself as difficulty performing activities of daily living.[51,54] Kress[1] describes a spectrum of muscle, nerve and brain dysfunction directly attributable to critical illness and associated therapies. Psychological impairment commonly incorporates anxiety, depression,[55,56, 57,58] delirium[18] and post-traumatic stress disorder (PTSD).[19,26]

PICS is not isolated to one specific diagnostic subgroup. Patients suffering severe sepsis[17] multiple organ dysfunction,[59,60] ICU re-admission[61] and ARDS[28,62-64] describe the same pattern of physical and psychological deficit that persist after hospital discharge.[39] The outcome information derived from specific patient cohorts has limited applicability to the general, heterogeneous population.

The varying study methodologies make drawing across-study comparisons from the literature surrounding the outcome of ICU patients difficult. It is essential to design a test battery which is sensitive enough to detect the slightest impairment.[65] Currently the critical care outcome literature is based on studies with varying test batteries incorporating varied follow-up time points, homo- and heterogeneous patient populations and variable study design, including lack of control groups or evidence of premorbid function.[6,7,37,66] Variation between examiners, testing environments and residual effects of medications are factors which should be acknowledged and minimised. The literature includes a mix of subjective and objective tests and the use of invalidated instruments within the critically ill population. Wider considerations such as cultural and language diversity, floor and ceiling effects of tests, test sensitivity or the selection of parameters for evaluating tests, statistically or clinically, as a research community has not yet been decided. Practice effects of neuropsychological tests are often not considered (or declared) when planning or reporting test versions or the potential effects of intervals between test sessions in longitudinal studies. Currently there is no general consensus of appropriate timeframes for follow-up of survivors of critical illness.

Baseline or premorbid function is necessary to comparatively detect ongoing improvement or deterioration.[65] Dowdy and colleagues[37] stress in their meta-analysis, concerns regarding the lack of studies with true baseline data or data prior to ICU admission, highlighting the difficulty when interpreting decrements at follow-up. Ridley[8] argues follow-up timelines may be too short for a reliable assessment of the recovery and often a longer time is needed to get accustomed to new disabilities or states of impairment.[7]

Health Related Quality of Life

Health related quality of life (HRQoL) broadly reflects the causal influence of physical, psychological and cognitive components. Much of the early outcome work in ICU patients is derived from the ARDS population. One of the first studies of HRQoL in ICU patients was conducted in this population,[67] assessing HRQoL 3, 6 and 12 months after discharge. Despite recovery of lung function patients described impairments in HRQoL that persisted to 12 months and remained below levels of the normative, healthy population. Similarly, Jackson[15] showed the majority of his ARDS population had a moderate decline in HRQoL within the first year after discharge, followed by a long-term improvement. Notably, in those patients with a ICU stay of longer than two weeks, HRQoL at 12 months has been shown to be comparable to that of short-stay patients.[15]

Studies comparing the HRQoL in the general critical care population with a matched general population report clinically meaningful and statistically significant deficits (greater than 5 points) across all eight domains of the Short Form 36 Questionnaire (SF-36), in ICU survivors.[8,25,60,68, 69-71] However when comparing preadmission HRQoL (studies use proxy or retrospective data) to HRQoL 12 months post ICU discharge, there is clinically meaningful improvement (greater than 5 points) across all domains except for the General Health (GH) domain.[8,12,25,72] Only Role Physical (RP), Social Functioning (SF), Role Emotional (RE) show an initial clinically meaningful (>5-point) decrease at one month[25,72] before showing improvement. General Health perception did not show any clinically meaningful change throughout the 12 month study period, within any study. Hopkins[47] concludes the improvements in quality of life are uneven and are time and domain-specific. Although quality of life scores improve with time in most longitudinal studies, these often do not equate to clinically meaningful changes in function.[34] Studies assessing HQoL after critical care show clinically meaningful deficits[37] which improve over time[7,68] though long-term, health across these domains are worse than before admission[20,73,74] and also worse compared with general population norms.[58]

Many studies have since assessed quality of life at 6,[22,23] 9,[25] 12,[11,58,60] 18,[75] 24 months[20] and longer.[69,76] The deterioration in the patient's quality of life after ICU discharge found in most studies, occurred due to the physical impact of critical illness; finding that survivors were

unable to accomplish even the simplest of tasks without exhaustion due to such factors as muscle wasting, fatigue and impaired mobility. Kvale and colleagues[20] followed 346 ICU patients with an ICU length of stay of 24 hours or more, finding that six months post-discharge 32.4% were unable to continue pre-admission activities, 25% were unable to independently care for themselves, and 64.7% were unemployed, three times pre-admission levels. The authors found the most frequently diminished areas of health-related quality of life were those relating to work, recreation and sleep.

Interpreting recovery is complex. HRQoL is influenced by the patient's prior health status and their expectations for a return to premorbid functional status. Assessing HRQoL uncovers complex interactions. For instance, a patient who has sustained debilitating illness, but prior to the illness lived a sedentary life may report a more favourable outcome compared with a previously active person. Many patients suffer chronic disability and therefore carry a fixed degree of dysfunction prior to ICU admission. Wehler[12] and Graf[25] have shown that general ICU survivors who suffered multiple organ dysfunction have significantly lower (worse) SF-36 scores at baseline prior to admission (using retrospective patient or proxy responses) than population norms due to a higher burden of comorbid disease. At six month follow-up, 83-90% of survivors had regained their previous HRQoL and 94% were living at home with their families.[12]

Hospital mortality of survivors of critical illness in Australia and New Zealand is 16.1%, a decrease of 4% over 11 years.[77] However little is known about the long-term outcome or quality of life in the Australian and New Zealand intensive care survivor population.[78] Brooks and colleagues[79] concluded that 63% experienced poorer quality of life and more anxiety at 16 months post ICU discharge. Hackett[80] conducted an Australian / New Zealand study looking at outcomes after one year in patients with subarachnoid haemorrhage (SAH) using the SF-36. It was concluded a high proportion of long-term survivors of SAH experience ongoing deficits in high level neuropsychological functioning. This data was derived from a highly selected series of patients, often excluding those who were most severely impaired. Denehy and colleagues[81] studied physical function among survivors of an ICU admission greater than 5 days and demonstrated high levels of inactivity, with the majority not meeting international recommendations regarding physical activity.

Functional Outcome

A poor HRQOL is often a reflection of a poor functional outcome.[7] Many studies cite physical function as a commonly occurring impairment suffered following critical illness. Hayes and colleagues[7] saw physical functional status diminish during the first few months among survivors after critical care discharge with 40% losing more than 10kg body weight. They concluded that body weight may return to pre-admission levels between six and twelve months. Some degree of dependency in activities of daily living persisted in about half the survivors. Hough[82] looked at ICUAW, myopathy and neuropathy and steroids within the persistent lung injury and found 34% of patients developed neuropathy during hospitalisation, however this study failed to provide any long-term study follow up. Subsequent studies evaluating ICUAW and neuromuscular blockers (cisatracurium)[83]have looked at ICUAW as a secondary outcome, concluding there was no difference between the two groups in the area of muscle strength. Sidiras and colleagues[51] assessed physical function among 37 critically ill survivors at hospital discharge and at 8 months after discharge. The authors concluded the impact of ICUAW was greatest in the short-term, having a significantly longer ICU and hospital stay. Functional impairment when assessed using the Functional Independence Measure (FIM),[84] showed immediate deficits in functional ability with improvement at the eight month time point. The authors concluded ICUAW has a negative functional impact, prolonging their hospitalisation. Wehler[12] reports higher scores of impairment in the mental profiles than the physical profiles with 20% of ARDS survivors meeting standard self-reported criteria for PTSD.

To accurately meter the diverse range of functional effects related to critical illness, the STOIC study incorporates a functional measure while assessing quality of life. The current study uses validated tools over a longitudinal period of follow-up which allows adequate rehabilitation and recovery following discharge.

Neuropsychological Outcome

Both HRQOL and functional outcomes are influenced by cognitive function. The mechanisms surrounding the prolonged neuropsychological impairment seen among survivors of critical care are poorly understood[18] but are likely multiple with evidence suggesting sepsis,[17]

delirium[15, 85] hypoxaemia, [14,86,48,87,88] glucose dysregulation,[48] coagulopathic derangements,[14,89] systemic inflammation [90] and the effects of sedatives and narcotics [91] among other factors.

In the neuropsychological domain, founding work by Hopkins, Weaver and Pope[14] showed large cognitive deficits in ARDS survivors. In a cohort of 55 ARDS patients after mechanical ventilation, 100% of patients had unfavourable cognitive sequelae at hospital discharge reducing to 30% at one year, demonstrating cognitive dysfunction in the domains of memory, attention and concentration and later, processing speed and executive function. Further work by these researchers [44] found that after two years there was improvement however 70% of the cohort continued to perform 1.5 *SD* below normative population value. They also found high levels of anxiety and depression and PTSD.[92]

In the ARDS literature Rothenhausler[40] studied a cohort of 46 ARDS survivors, finding 25% suffered cognitive impairment (deficits were noted in the area of speed of information processing) and disability 6 years following hospital discharge and as a consequence, only 46% were able to return to full-time employment. Suchyta[42] also studied a cohort of ARDS survivors with sepsis for a mean of six years following hospital discharge. They found cognitive impairment in 75% of survivors. Subsequently other investigators have confirmed that ICU survivors are at high risk for cognitive impairment that may persist years after recovery from critical illness. Al-Saidi[45] assessed neuropsychological function prospectively in a cohort of 87 ARDS survivors following ICU discharge, finding 20% rated their memory as poor, with the majority unable to return to work.

Marquis[41] compared outcome of 33 ARDS survivors with other critically ill patients in a case-controlled study. At one year the ARDS patients were significantly more impaired in areas of executive function, mental processing speed, and attention than critically ill controls. The authors proposed factors such as the disease process or the ICU treatment course were contributors to the impairment.

Sukantarat and colleagues[46] further add to the literature, describing an association between critical illness and long-term cognitive impairment. They studied a cohort of 51 ICU survivors at 3 and 9 months after ICU discharge, finding 35% had impaired executive function at 3

months, improving at 9 months, however remaining impaired when compared to population norms. The study comparatively measured executive dysfunction and intellectual ability. The authors proposed the executive dysfunction was likely due to generalised brain injury rather than focal frontal lobe damage, usually associated with executive function.

Larson[93] examined 78 ARDS survivors, specifically assessing the relationship between ICU recall and cognitive function. The mean age of the cohort was 45 years and the study battery consisted of standardised neuropsychological tests, together with structured interview. The battery was administered to all survivors at hospital, and one and two years following hospital discharge, assessing general intelligence, attention, verbal and visual memory, processing speed, executive function and visuospatial abilities. Approximately 24% had no recall of their ICU experience and found there was greater magnitude of cognitive sequelae in the no-ICU recall group at hospital discharge, one and two year follow-up; scoring significantly worse in areas of general intellectual function, executive function, processing speed and verbal memory.

An episode of cognitive impairment may result in new and often persistent disability, in some cases even resembling dementia.[13,15, 17, 18] Studies to date indicate that cognitive function improves during the first 6 to 12 months after hospital discharge and remains consistent and disabling for up to 6 years after discharge.[94] This suggests that while some recovery occurs initially, chronic cognitive impairments persist in many patients.

Cognitive impairment has been reported extensively in the post-operative and anaesthesia population, commonly termed post-operative cognitive dysfunction (POCD).[95] POCD broadly describes a range of impairments of memory, learning, attention and processing speed, traits similar to those described in PICS. A meta-analysis of POCD among elderly surgical orthopaedic patients found no evidence of impairment, when compared with controls at 3 to 6 months post surgery.[96] When examining the effects of anaesthetic agents and the incidence of POCD, results of a meta-analysis of twenty-one studies found no statistical significance of the association of general anaesthesia and POCD.[95]

The association of cognitive dysfunction in patients following cardiac surgery is well documented with a reported incidence of 20 - 35% persisting for several months after surgery, thought to be associated with the effects of cardiopulmonary bypass during surgery.[97, 98,99, 100] Novel results reported by Rodig and colleagues[101] showed cardiac and noncardiac surgery patients self-reported significantly more cognitive impairment following surgery than pre-operatively.

To accurately meter the diverse range of neuropsychological effects related to critical illness, the STOIC study incorporates a broad test battery which assesses short-term working memory and executive function.

Psychosocial Outcome

Functional and neuropsychological impairment is often reflected in a poor HRQOL[7] and may be manifested in a multiplicity of psychological impairments or distress. Psychological problems associated with critical care have been widely reported, especially in the areas of delirium, anxiety, depression and post-traumatic stress.[102-104]

Delirium

Patients being supported by a ventilator receive numerous psychoactive medications for sedation and analgesia plus neuromuscular blockade to increase their comfort and tolerance of treatment modalities during the ICU stay. These medications, along with underlying co-morbidities, advancing age, and factors such as multiple-system illnesses place ICU patients at extremely high risk for delirium.[18] Severe psychological upset may present as nightmares and delusions and such consequences of critical illness may impinge on the quality of life.

Girard[13] studied delirium duration and long-term cognitive impairment. They showed an association between delirium and cognitive impairment in a study of 126 mechanically ventilated medical intensive care unit with an average age of 61 years. Using the Confusion Assessment Method for ICU (CAM-ICU) at 3 and 12 months post discharge, the duration of delirium was independently associated with long-term cognitive impairment; an increase in delirium of 1 to 5 days was associated with decline of almost seven points in the cognitive

battery mean score at 12 month follow-up ($p = 0.03$). Girard proposed it is possible that a significant proportion of the patients studied in non-ICU cohorts had undiagnosed dementia or mild cognitive impairment, a syndrome thought to be a precursor to dementia[105] or a progression of pre-existing disease. Delirium has been proposed as a marker of impaired brain reserve attributable to chronic disease or subclinical dementia among older patients.[106] Pandaharipande[18] found in a study of adults with respiratory failure or shock, that 74% developed delirium during their hospital stay. They found 34% of older and 24% of younger patients measuring cognitive impairment 2 *SD* below the population mean at 12 months; describing this level of impairment as similar to patients with moderate dementia.

Anxiety, Depression

Critical illness and ICU treatments expose patients to many stressors including respiratory insufficiency, discomfort with endotracheal tube suctioning, administration of exogenous catecholamines and delirium with associated psychotic experiences, all within the context of a limited ability to communicate and reduced autonomy. ICU survivors also face significant physical limitations during recovery.[6] From these experiences, the symptoms of anxiety and depression are a potential concern in ICU survivors. Anxiety and depression following critical illness negatively impacts HRQOL[107] and delays return to work.[108]

The reported prevalence of anxiety and depressive problems in ICU survivors ranges from 12 to 43% for anxiety[58,109] and between 10 and 30% for depression.[55-58,109] In examining anxiety and depression in patients with acute lung injury, 3 months after discharge Dowdy and colleagues[37] identified risk factors and predictors of preadmission depression, alcohol dependence, female sex, younger age and presence of cognitive sequelae. Davydow[103] examined the relationship between admission to the ICU and subsequent depression in pre-existing cohort of 3596 patients with diabetes in the pathways epidemiologic follow-up study of the group health cooperative. Of this cohort 98 patients were admitted to ICU and had completed premorbid assessments and assessment after ICU. Among these patients the point prevalence of probable major depression using the Questionnaire-9 was 14% compared with 6% in those without an ICU admission.

Davydow and colleagues[102] conducted a systematic review of depression in general intensive care unit survivors. Of the fourteen studies eligible studies, the prevalence of 'clinically significant' depression was 28% (n = 1213). The authors found that while age, sex, severity of illness at ICU admission were not consistent risk factors of post-ICU depression, early post-ICU depressive symptoms were a strong risk factor for subsequent depressive symptoms. They also conclude post-ICU depressive symptoms were associated with substantially lower HRQOL.

McKinley and colleagues[78] used the IES-R and SF-36 (MCS) to measure impaired mental health, anxiety, depression, stress and psychological distress. They found female gender, younger age and sleeping problems were associated with impaired psychological outcomes.

Post-Traumatic Stress Disorder

The diagnosis of acute PTSD, defined by the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV)[110],includes a set of symptoms experienced for at least one month and includes symptoms of dissociation, intrusion, avoidance and hyperarousal. Greater than one month yet less than three months defines acute PTSD and greater than three months terms chronic PTSD. Two reviews estimate that 5 – 64% of critical care patients may develop either PTSD or its associated symptoms that may endure for a number of years.[19,26] However the studies reporting on the rates of PTSD and PTSD symptoms in ICU survivors vary considerably in their case mix, demographic variables and method and timing of PTSD assessment.[19,26] A meta-analysis by Griffiths and colleagues[26] confirms existing research that severity of illness does not appear to be predictive of the development of PTSD.

High levels of anxiety and the development of PTSD are recognised as significant problems occurring following an ICU admission[55,111,112, 40,113] and may compromise patient recovery. These traumatic memories consist of clear and vivid recall of emotionally relevant experiences such as hallucinations and nightmares[111,114] but relatively little recall of factual events during their ICU stay.[114,115] It has been suggested by Schelling[111] that the number of adverse memories that patients can recall of the ICU is predictive of risk for PTSD. Jones[55]

hypothesised that even fragmentary explicit memories of real events in the ICU may reduce the emotional impact of delusional memories, by allowing the patient to question the reality of the delusions[114] and be protective against the development of PTSD-related symptoms.

Memories of vivid nightmares, hallucinations and paranoid delusions were prominent in a number of studies with patient recalling little to no memories for factual memories (such as suctioning).[116] Associations between delusional memories and psychological distress of ICU survivors have been mainly attributed to the strong vividness, long duration and high emotional content of these memories when compared with memories of real events.[117,118]

PTSD often coexists and interacts with anxiety and depression, and contributes to delayed recovery, suboptimal functional outcome, poor quality of life, sleep disorders and feelings of being detached from others.[119] Four studies support the association between delusional memories and PTSD related symptoms[55,120-122] while two studies support the association between delusional memories and anxiety and depression.[55,123]

Several observational studies have found sedative exposure in the ICU to be an independent predictor of PTSD symptoms after critical illness.[120,124-126] Pandharipande [127] [128] found that midazolam and other benzodiazepines promote ICU delirium, a leading candidate risk factor for PTSD after critical illness. Heavy sedation has found to be an independent risk factor for delirium.[128]

Treggiari and colleagues[129] conducted the first randomised controlled trial recruiting 137 patients to examine the psychological outcomes after mechanical ventilation among ICU patients with protocol-driven light versus deep sedation and found those in the light sedation group were less likely to report adverse psychological outcomes which confers the benefits of light sedation without causing psychological complications.

To accurately meter the diverse range of psychosocial effects related to critical illness, the STOIC study measures anxiety, depression, post-traumatic stress and levels of home and community integration.

Social and Economic Outcome of Critical Illness

Studies show surviving critical illness is often the start of prolonged rehabilitation, financial hardship and caregiver burden.[1] ICU patients may experience a deterioration of quality of life after returning home[130] increased mobility problems, pain and anxiety and depression, with families providing the ongoing care. Family members suddenly become informal carers; relationships are altered, often fuelled with financial strain and difficulty.

Economic consequences and burden is derived in the main, from ongoing post-hospital care. This can range from the need for long-term mechanical ventilation, the requirement of long-term acute-care, rehabilitation or skilled nursing facilities.[131,132] Both authors highlight factors fundamental to cost projection models, in the area of post hospital care. These include the ability to perform activities of daily living and hospital readmission. Functional ability and levels of independence are important variables when considering the economic consequences of survivors of critical illness.

Daly and colleagues[133] found over 40% of their sample of patients who required mechanical ventilation for more than three days required rehospitalisation. Implementing a multidisciplinary plan of ongoing care reduced the length of rehospitalisation stay by more than five days, with an estimated associated cost saving of $481,811.

Studies designed to reduce the economic burden associated with critical care survival focus on implementing such strategies as reducing physical debility by reducing sedation whilst in ICU[134] and increased early mobilisation. [135,136] Needham[134] showed by reducing sedative and analgesic doses while in ICU saw a reduction in number of cases of delirium (by 32%), a significantly higher level of function and a reduction in ICU and hospital days of 2.1 and 3.1 fewer days, respectively.

Return to work

Return to work is a proxy measure of functional status. It is a single-item global measure that has been used in many studies but does not appear to have a consistent format. In all papers[121,137-141 142-144] the mean ages of the participants ranged from 23 - 74 years with a ratio of male participants ranging from 29 – 86%. General ICU patients were followed-up in

13 papers and trauma survivors in eight. Construct validity was assessed in relation to age in 6 studies; 3 studies finding a statistically significant relationship and 3 failing to do so.

MacKenzie[145] also examined the relationship with gender, marital status and education. They found a significant association with education, but not with gender or marital status. Criterion validity was assessed by comparison with measures of impairment including the Glasgow Coma Scale (GCS) and mental functional status assessed using the Profile of Mood States (POMS), neuropsychological function assessed using the Trail Making Test - Trail A (TMT-A) and health-related quality of life assessed using the Sickness Impact Profile (SIP). Statistical significant associations were found with each measure (except for one dimension of the POMS in the study by Stambrook and colleagues[146]). None of the papers reported reliability. The responsiveness of the measure was not systematically assessed in any paper.

Hurel and colleagues[23] noted that employment status remained unchanged in 80% of subjects. However, there was a significant change in the level of work activity or employment capacity, from prior to after critical care. There was an in increase in the number of retired survivors and those on sick leave, and a decrease in the number of survivors in full- or part-time employment. Kriwanek and colleagues[147] showed that worsened employment status was noted by 25% of respondents in their study. MacKenzie and colleagues[145] noted that at one year following discharge, 17% of their patients were unable to work with Alho and Rokanen[148] reporting that 68% of their patients who were capable of returning to work had done so. Broome and colleagues[149] showed that 80% of individuals had been working before admission to critical care and of these, 70% had returned to work
within 10 months of discharge on average. Rowan[142] noted that 35% of survivors reported working full- or part-time before admission but of these, 42% were not working 6 months after discharge from critical care.

Overall, a fairly consistent pattern emerges. In the 16 studies that reported on the change in employment status, 11 found that over 70% of those in work before their critical care episode had returned to work. In some studies, the proportion resuming work was as high as 85-90%. In contrast, in some studies, work resumption proportions were as low as 45-55%, however these studies were predominantly of trauma victims.

Griffiths[104] showed at 12 months after discharge there is up to a 50% reduction in the number of patients who reported employment as their sole source of income. Families also report negative impacts financially and in the areas of employment up to 12 months following discharge.[104]

Residence

No attempt was made to identify the measurement properties of this single-item global measure outside critical care. Like 'return to work' this measure lacks a standardised format. There were 18 studies that reported using a place of residence as an outcome measure.[150-152,153,137] The mean age of participants ranged from 44 - 88 years with 47 – 75% of participants being male. Six studies reported on follow-up at 6 months and 12 months. Ten papers reported measuring this outcome at several time points. Two papers made reference to the assessment of construct validity[67,154] using the ages of patients, although neither paper explicitly tested for this type of validity. There were no attempts to assess criterion validity. There was no evidence for the assessment of reliability.

Residence and return to work are proxy measures that assume that those participants who have not reached a sufficient level of functional recovery are more likely to be institutionalised or to live at home with assistance and not able to return to work compared with those who have made a better recovery. There were 18 studies that reported using a place of residence as an outcome measure for critically ill patients.[137,150,152,153]

Study Methodology

Timepoints

The ideal timepoints for follow-up varies widely and is contested. Ridley[8] suggests that critically ill patients should be followed-up until their survival curves match those of a comparable / general population, estimating between one and four years. Drawing guidance from the largest study of quality of life in intensive care survivors, Niskaranen[155] and colleagues studied a cohort of 12 180 patients and found approximately 2 years was

needed for survival to parallel to that of the general population. Larson[93] also showed ARDS survivors showed significant group differences in general intellectual functioning, executive function, processing speed, and spatial skills at hospital discharge, resolving between the first and second year follow-up.

Premorbid / baseline factors

There are few studies which have gathered premorbid or baseline data prior to critical care admission in the area of cognitive function. Unlike functional and HQoL measures, cognitive test data cannot be obtained retrospectively or via proxy. Three studies[9,17,156] cite baseline data which allows a true control for pre-existing decrements.

Ehlenbach[9] evaluated the risk of incident dementia among 2,929 survivors of critical illness and acute hospitalisation, 65 years and older, not living in a nursing home at baseline. Their cohort was a subset drawn from the Adult Changes in Thought Study (ACT), a population based longitudinal study of aging and dementia. Patients were followed for approximately 6 years with cognitive screening performed using the Cognitive Abilities Screening Instrument. Of the ACT cohort, 1,601 had no hospitalisations, 1,287 subjects had one or more non-critical illness hospitalisations and 41 subjects with one or more critical illness hospitalisations. They discovered that acute care and critical illness hospitalisations were independently associated with incident dementia, (almost double for critical illness hospitalisation), compared with participants who did not required hospitalisation. Additionally global cognitive decline was more common among participants requiring acute care hospitalisation. While the authors recognise such study limitations as the lack of a gold standard definition of what constitutes critical illness, lack of standardised study methodology and loss to follow-up of ICU patients (numbers not reported), this study found an important association between acute care and critical illness hospitalisations with greater cognitive decline.

Iwashyna[17] studied the survivors of severe sepsis in older adults, within the same ACT cohort drawing additional links to Medicare data. The cohort consisted of 1194 patients with a mean age at hospitalisation of 76.9 years. Patients were followed for 8 years prior to severe

sepsis and 8.3 years afterwards. Severe sepsis was independently associated with substantial and persistent new cognitive impairment and functional disability among survivors. In fact severe sepsis is independently associated with a tripling in the odds of moderate to severe cognitive impairment and the acquisition of 1.5 new functional limitations in patients with no, mild or moderate pre-existing functional limitations after controlling for baseline function and trajectory. They noted a substantial worsening in the trajectory relative to before their sepsis hospitalisation and surprisingly, the negative effects of severe sepsis were greater in those patients with better baseline physical functioning. In those with no limitations before sepsis, a mean 1.57 new limitations and for those with mild to moderate limitations before sepsis, a mean of 1.50 new limitations were seen. In contrast, nonsepsis general hospitalisations were associated with fewer new limitations.

Barnato[156] used the population-based longitudinal cohort study of Medicare recipients to investigate the association of mechanical ventilation and disability. The parent study conducted in person interviews four times each year for 4 years including a mobility difficulty score and weighted activates of daily living (ADL) score. The patients were 65 and older and living in the community with pre hospitalisation and post hospitalisation interview. Survivors of hospitalisation with or without mechanical ventilation had similar levels of disability. The level of disability within both hospitalised groups was significantly greater than those who were not hospitalised. In adjusted analyses mechanical ventilation was associated with a 30% greater disability in ADL and a 14% greater disability in mobility.

Studies demonstrated that previously healthy patients who suffer critical illness tend to suffer greater deterioration in their HRQoL than individuals who had a lower HRQoL status prior to ICU admission.[24 11,12] These studies lead to the conclusion that health-related quality of life is influenced by premorbid health status or symptom load as well an individual's expectations for recovery. Dowdy[37] conclude in their review of the literature that age and severity of illness are predictors of physical functioning among ICU patients.

Pathogenesis of PICS

Emerging from the literature is a shift towards identifying the cause of PICS [52,157,158] while the mission to construct a universal test battery and validate instruments has been surpassed by

and large. Prognosticating the pathogenesis of PICS[52,157,158] has given rise to the consideration of possible factors including co-morbidities and chronic disease [12,157], malignancy,[159] duration of mechanical ventilation (greater than 50 days),[160] maximum Acute Physiology & Chronic Health Evaluation (APACHE) II score, length of ventilation, the number of surgical revisions, number of failing organs, [157] the duration of catecholamine therapy, [161] ICU re-admissions [61] and advanced age.[162]

Elderly

Multiple studies have examined the impact of age on outcome following critical care.[9] The literature suggests that age alone has little or no important effect on outcome from critical illness, with the exception of severe closed head injury and out-of-hospital cardiac arrest. However, Ridley [163] notes the presence of chronic disease is a major factor to consider when studying populations and longitudinally, age will influence quantity or quality or survival. In those patients with a prolonged ICU stay requiring more than two weeks ICU admission, HRQoL at 12 months has been shown to be comparable to that of short-stay patients. Similarly, Garrouste-Orgeas[4] agrees, stating projected outcomes should be based on physiological rather than chronological age. Currently, within this specific ICU subpopulation, existing studies carry bias making it more difficult to draw across study comparisons. Factors causing bias include selected ICU admission of the 'most-well' and exclusion of older patients from ICU admission based on age alone, the effect of social isolation and institutionalisation. Relevant outcomes, taking into consideration premorbid function is important to accurately reflect overall outcomes.

ICU Re-admission

Patients who are re-admitted to ICU are identified as a high-risk group in terms of hospital mortality, length of stay and resource utilisation. Conlon[61] studied 73 patients who survived their first ICU stay and were re-admitted during the study period. Using telephone interview they administered two functional outcome measures, the Glasgow Outcome Scale (GOS) and Karnofsky Index. Between 2 and 3 years after discharge, 43.8% of the cohort was followed-up. Of these, all showed moderate disability, that is were able to function independently but not return to work. Jones[164] found there were no between-group differences for

demographic variables, hospital length of stay, ICU length of stay, indices of illness severity, oxygen tension and inspiration variables, days receiving sedative, narcotic or paralytic medications, or estimated premorbid intelligence levels and outcome. The authors conclude these variables do not account for the group differences in group performances in cognitive performance.

The high economic cost associated with ICU and hospital readmission has been noted[1] with disease management programs being designed primarily to reduce the incidence and length of subsequent hospital readmission.[133] Daly and colleagues[133] showed a reduction of a more than a five day mean among a cohort of patients who required mechanical ventilation for greater than three days. This study showed a cost saving of greater than $480, 000.

Outcome Prediction

Determining the patient's risk of developing physical, cognitive and psychosocial (non-physical[1]) morbidity is important to enable comprehensive rehabilitation to start as early as clinically possible. The National Institute for Health and Clinical Excellence[3] instituted such tools as the short and comprehensive clinical assessment to identify patients who are at risk of developing physical and non-physical morbidity. These were constructed based on best-available evidence and clinical expertise however authors state there is no evidence indicating screening assessment tools improve outcomes (physical morbidity, cognitive dysfunction, swallowing and communication difficulties) among adults who have received critical care. However, based heavily on professional clinical judgement, the NICE clinical guideline endorsed a 'Care Pathway' to individualise and inform and guide post critical care outcome.

Kress and Herridge[1] discuss a 'spectrum' of clinical phenotypes for functional recovery citing precursors as prolonged mechanical ventilation and the very elderly. Chelluri[150] and Coombes[165] both note similar findings. These studies indicate poorer outcomes were associated with older age and greater comorbid illness.

Narrative / Thematic Analysis

Fundamental and relevant themes of survival and adaptation are often captured in the patient's narrative. By asking patients how they orientate their lives according to things that matter and to understand their process of adjustment to chronic disability, seem fundamental when measuring outcome. Thematic analyses also aim to reveal new patient perspectives that are unlikely to appear in standard questionnaires or health-related quality of life instruments. Using open-ended questions patients were asked to identify any problems is an attempt to derive understanding directly from the participant data. Narrative interview has been used to elicit people's stories and perspectives of being in the ICU.[166, 167,168,169, 117, 118] Narratives (and tools such as diaries) assist patients re-visit the critical care experience, often found struggling to decipher which experience was factual or unreal.[117]

Intensive care survivors often experience vivid dreams and delusions after discharge. Ely [170] and McNicoll[171] confirm the prevalance of delirium is high among ICU survivors and postulate the rate to be up to 80% of ventilated patients. 'Constructing the illness narrative'[168] helps survivors piece in the missing gaps around their ICU experience, after waking from extended period (days to weeks) from sedation.

The literature indicates that PICS is associated with variable deficits across physical, cognitive and psychological domains. To account for this heterogeneity of physical, functional and psychological disability, research must consider the whole disease-treatment pathway, encompassing the admitting diagnosis, co-morbidities, organ dysfunction, effect of ICU treatment and interventions, the patient's adjustment ability and the process of ongoing supportive care.[52] It has been suggested the strongest studies which measure outcome, methodologically, are those where research uses self-report measures in conjunction with standardised clinical interview.[26] This approach ensures a patient-centred approach to accurate diagnosis based on an inventory of standardised criteria plus symptom severity. The current study assess long-term outcome using a battery of objective and subjective tasks, including narrative, thematic analysis.

In conclusion, the literature suggests much variability across long-term follow-up study methodologies of critical care survivors. There is considerable variability in the literature in

the test batteries used to assess function, the nature of the populations being assessed, the type of instruments used, and in the time intervals used in longitudinal follow-up. Research to date indicates that while the greatest deficits are seen immediately following ICU discharge, survivors are seen to parallel to normative population data for up to 24 months. To achieve a true comparative baseline for recovery, premorbid (baseline) data is necessary. This thesis reports the results of a study that tracks patients from baseline (gathering retrospective baseline data), extending follow-up to 24 months after ICU discharge. A consecutive recruitment, general ICU population is utilised, using validated instruments where possible. This will ensure this study data are comparable with other studies and yet provide a baseline novel data set. Narrative analysis and narrative trajectories add to the richness of the data, building upon and humanising the outcome data.

CHAPTER 3

Methods

Participants

This longitudinal, observational, controlled, cohort study was designed to examine the functional, psychosocial and cognitive morbidity experienced by patients following critical illness.

From April through October 2006, 143 patients were recruited from two metropolitan hospitals, (one the sole tertiary referral centre) in Southern Tasmania. The cohort consisted of 71 survivors of critical illness from a mixed medical-surgical population, and 72 patients from both medical-surgical acute-care wards who did not experience critical illness controls. Both study ICUs were general medical and surgical ICUs.

Intensive care survivors were recruited consecutively on ICU discharge after which a restricted random sample of controls was matched by age and sex. Due to the high mortality rate among ICU patients, an expansion cohort was recruited, with an additional 10 individuals recruited in December 2007 to enable a dataset of fifty patients in each arm with complete 24 month outcome data. The consecutive enrolment strategy was again used. The aim was achieve a 2:1 match, that is, 1 ICU patient matched to 2 controls however due to financial constraints, a 1:1 match was used.

Inclusion criteria specified patients were to be ≥ 18 years of age, ICU patients requiring an ICU admission of ≥ 48 hours, APACHE II Physiological Component Score ≥ 10, and must reside within 90 minutes travel from the recruitment site. Controls were required to have had a medical or surgical acute-care ward admission ≥ 48 hours with no current ICU admission and must reside within 90 minutes travel from the recruitment site. We excluded patients who: failed to provide informed consent; who were unable to communicate with examiners because of sensory deficits or limitation in the use of English; neurosurgical patients, sustained a traumatic brain injury and were in a state of Post Traumatic Amnesia (PTA); and patients who were unlikely to survive 72 hours. (Table 1.0). As this study was an

observational study, all patients received standard care. Standard care patient's received was selected by their attending clinician and was based on current practice in their hospital.

Table 1.0 Inclusion / exclusion criteria		
Inclusion Criteria		**Exclusion Criteria**
ICU patients	**Controls**	**ALL**
≥ 18yrs		Failure to provide informed consent
APACHE II Physiological Component Score ≥ 10	Acute-care ward admission ≥ 48 hours (no ICU admission)	Subjects who are unable to communicate with examiners because of sensory deficits or limitation in the use of English.
ICU admission ≥ 48 hours		Neurosurgery patients
Reside within 90 minutes travel from recruitment site		Patients with traumatic brain injury, who are in a state of Post Traumatic Amnesia (PTA)
		Death imminent within 72 hours

Materials

Currently there is no validated and standardised test battery to evaluate the outcome of survivors of critical illness. For this study, a battery of tests was designed for face-to-face assessment of recovery of a heterogeneous group of ICU patients. Study design was informed by the outcome literature and aimed to maintain a standardised approach as much as possible (Tables 2.0; 3.0). Domains evaluated included functional, psychosocial and neuropsychological outcome. Assessments consisted of standardised objective and subjective instruments, (validated for use in the ICU patient population where possible), demographic, lifestyle questions and patient transcripts, themed to accurately reflect the patient's experiences. A global neuropsychological assessment measured visuo-conceptual, perceptual speed, cognitive flexibility, attention and task alternation, executive function and verbal working memory. Tasks with alternate versions were used where possible to minimise practice effects. Physical recovery assessed functional skills used for activities of daily living together with the patient's subjective assessment of their physical function. The

psychosocial domain considered levels of anxiety and depression, post-traumatic stress symptoms, the level of home and community integration together with the patient's subjective assessment. Timepoints were premorbid (retrospective data collected at the 1 month time point), 1, 3, 6, 12 and 24 months after discharge from critical care (ICU patients) and hospital (controls). Research personnel were trained in test administration to ensure a standardised approach, each taking approximately one hour in duration.

Information collected at each time point included demographic, lifestyle questions and patient narratives which were themed to accurately reflect the patient's experiences. Face-to-face, semi-structured interviews were conducted at each time point.

Test Battery

- Functional Measures

Physical functional recovery was an assessment of functional skills used for activities of daily living, and was assessed using the FIM, together with the patient's subjective assessment of their physical function, as a component score of quality of life measure Short Form-36 version 2 (SF-36v2) Physical Component Score (PCS). Additional lifestyle measures which reflect clinical meaning include mobility impairment, residential support and return to work. These criteria are used in current health care planning. In this study, Residential Support is defined as inpatients of acute care, inpatients of acute rehabilitation unit, nursing home residents or people living at home with a carer. Mobility Impairment is defined as patients hospitalised or people who are house mobile only. Employment capacity or Return to Work, reflects the patient's occupation (retired, employed, unemployed, and student), capacity (≥ 35 hours per week, < 35 hours per week, unemployed, disability pension) and employment status which reflect casual, permanent or self-employed status.

- *Functional Independence Measure*

The FIM provides a valuable metric which measures progress of functional skills used for ADL. [84] It assesses 18 ADL themes, including 13 motor items and five cognitive items, each scored on a seven point ordinal scale. Motor items cover personal care, sphincter control, mobility and locomotion. Cognitive items cover communication and social cognition. It is used extensively in Australia within areas of occupational therapy and rehabilitation medicine.[172] National data collected for rehabilitation medicine benchmarking and have shown acceptable levels of reliability and validity.[173] Dennis and colleagues[174] employed the FIM during a six month follow-up of Australian ICU patients concluding premorbid physical recovery was achieved within six months. This study use levels of impairment as used by Baguley [175] consisting of three categories: maximal assistance (score 18-54), indicating a mean FIM item score of three or less; moderate assistance (score 55-107), indicating a mean FIM item score of 4 or 5; and independent (score 108-126), indicating a mean FIM item score of 6 or more. These scores were based on hospital discharge FIM scores. This study considers the lower level of independence of 108 as the definition of impairment. Elliott and colleagues[176] warns within a review of instruments used in assessing physical function and activity for survivors of critical illness of possible ceiling effects.

- *Short Form Questionnaire 36 version 2*

Quality of life, as measured by the SF-36v2[177] has been used in a wide range of post-critical care outcome studies.[58, 137] It is one of the strongest of the existing generic measures and has been validated extensively,[6,7,37] The questionnaire has evidence of validity among ICU patients.[59]

The SF-36v2 is a 36-item multipurpose health survey that measures overall health, functional status and mental status. It measures 8 domains: physical functioning (PF), role limitations due to physical problems, bodily pain (BP), general health perceptions, energy/vitality (VT), social functioning (SF), role limitations due to emotional problems and mental health (MH), equating to two summary scales; physical component score (PCS) and mental component score (MCS). The most recent version of the survey[177] contains 11 questions, most consisting

of structured Likert-type responses. The improvements were introduced to correct deficiencies identified in the original version.

Current scoring recommendations are that the scores be standardised to a 0-100 range, converting the lowest possible score to 0 and the highest to 100. Scores are norm-based, mean = 50, SD = 10. When interpreting scores, 50 is considered average; 0-49 is below average; 51-100 is above average. Clinical significance is a five point improvement or decline in scores.

Factor analysis has validated the existence of eight scales which fall into either the Physical or Mental Health Components. In regards to construct validity, PF has been shown to be the best around measure of physical health and mental health is the most valid measure of mental health. Many reliability and validity[178] studies have been conducted on the SF-36 and in most, reliability coefficients have been greater than 0.70. Analyses have also produced evidence of content, concurrent, criterion, construct and predictive validity. Individual scales and summary measures have been useful in screening and measuring aspects of specific diseases and conditions.
The SF-36 has been used in a wide range of disease-related studies and can be useful in comparing the effects of different conditions or on individual or comparing patients to individuals in the general population. It can also be used in repeated measures of the same patients over time. It has been well validated in health service studies.[179,180] In the area of critical care, the SF-36v2 has been used extensively among varied cohorts including general medical, acute lung injury and ARDS patients.[11,25,38,48,112,181,182] Across these studies the mean SF-36 scores fell within ranges of 12 points or less for six domains and 20 points or less for the role physical and social functioning, indicating this population had significantly lower quality of life (QOL) versus a matched population norms in all domains. Deficits were greatest in the four physical domains, PF, RP, bodily pain (BP) and GH perceptions.

Additional lifestyle measures which reflect clinical meaning include Return to Work, Residential Support and Mobility Impairment. These criteria are factors which are used in current health care planning.

- *Return to Work*

Return to work is a proxy measure of functional status. It is a single-item global measure that has been used in many studies but does not appear to have a consistent format.
In this study, the return to work capacity reflects the patient's occupation (retired, employed, unemployed, and student), capacity (≥ 35 hours per week, < 35 hours per week, unemployed, disability pension) and employment status which reflect casual, permanent or self-employed status.

- *Residential Support*

In this study, Residential Support impairment is defined as inpatients of acute care, inpatients of acute rehabilitation unit, nursing home residents or people living at home with a carer.

- *Mobility Impairment*

Mobility Impairment is defined in this study as patients hospitalised or people who are house mobile only.

- **Psychosocial Measures**

To measure psychosocial recovery, this study uses instruments which are validated within the ICU population where ever possible and where this is not possible, incorporate instruments which are used clinically.

The psychosocial domain considered levels of anxiety and depression, assessed using the Hospital Anxiety and Depression Scale (HADS), post-traumatic stress symptoms, assessed using the Impact of Events Scale (Revised) (IES-R), the level of home and community integration assessed using the Community Integration

Questionnaire (CIQ). The patient's subjective assessment was assessed using the SF-36v2 Mental Component Score (MCS).

- *Hospital Anxiety and Depression Scale*

The HADS [183] is a self-assessment instrument developed to screen for mood disorders of anxiety and depression in non-psychiatric patients. The scale comprises of 14 items that are divided into two subscales, for which the participant rates each item on a four-point scale. The score range is 0 - 42, the higher the score, the greater the level of anxiety and depression symptoms. One scale contains seven items on depression, subscale scores range between 0 - 21, higher scores greater symptoms of depression and the other seven items on anxiety, subscale scores range between 0 - 14, higher scores greater symptoms of anxiety.

The HADS has been validated in the critical care population. [56,58,109,184] The reported prevalence of anxiety and depressive problems in ICU survivors ranges from 12 – 43% for anxiety and 10 – 30% for depression. [58,109] For the presence of depression, anxiety or both, the cut-off level of 19, as recommended by Spinhoven[185] was used. For the subscales anxiety or depression, the cut-off values of 11 or more were applied.[186] Score interpretation is defined as 7or less = non-case; 8-10 = doubtful case; 11 or more = definite case.

- *Impact of Events Scale – Revised*

The IES-R [187] provides a dimensional assessment of PTSD. Participants specify the frequency with which they have had intrusion-, avoidance-, and hyperarousal- related thoughts in the previous 7 days on a Likert scale. The IES-R an extension of Horowitz's IES[188] is a valid, 15-item, self-report disease-specific measure which assesses levels of subjective post-traumatic psychological distress and which provides specific measures of event intrusion, event-related avoidance and even-related hyperarousal, the key elements of post-traumatic stress disorder. The scores for the intrusion component of the scale range from 0 - 24, for the avoidance component, 0-32 and hyperarousal 0 - 24 with a total score between 0-88. The higher the score, the greater the level of distress indicated. For the identification of coping disorders, scores above the cut-off point of 35 were classified as a high level of PTSD-related symptoms.[189]

Weiss and Marmar[190] report the IES-R showed high internal consistency, with coefficient alphas ranging from 0.87 - 0.92 for intrusion, 0.84 - 0.85 for avoidance and 0.79 - 0.90 for hyperarousal. Test-retest correlation coefficients ranged from 0.57 - 0.94 for intrusion, 0.51 - 0.89 for avoidance and 0.59 - 0.92 for hyperarousal. The IES-R has been used in numerous studies of ICU survivors[26] with a wide variety of adult populations and has proved valuable in documenting the course of posttraumatic phenomena over time.[191] The STOIC case level for posttraumatic stress symptoms with a high probability of PTSD was a positive IES-R together with a case level of HADS – anxiety or depression of ≥11.

- *Community Integration Questionnaire*

The CIQ [192] is intended as a brief, general, reliable measure of an individual's level of integration into the home and community and is used widely in brain injury populations. The CIQ was developed for patients with traumatic brain injury and they suggest as the CIQ does not encompass all possible indicators of integration it is recommended it be used in conjunction with assessments of impairment, disability, environmental barriers and demographic descriptors. Most of the questions are directed at how the individual performs a specific activity within the household or the community. Responses usually indicate that the individual performs the activity alone, with another person or that the activity is typically performed by someone else. For some responses, the individual being assessed may find it difficult to decide which response fits best with how a particular activity is performed. The score range is 0 – 29, impairment classified as ≤ 6. Community Integration Questionnaire Impairment ≤ 6 (Score range 0 - 29; mean 11 *SD* 5.0).

- **Neuropsychological Measures**

Neuropsychological measures of global neuropsychological functioning incorporated in this test battery included assessment of auditory and working memory using the Letter Number Sequence (LNS) and the Digit Span (DS), and assessment of attention and information processing speed using the Trailmaking Task–Test B (TMT-B). Executive

function measures a range of executive abilities, such as planning, organisation, problem solving and non-verbal reasoning ability using the Stroop Task (SNST). Validated tests were used where possible. Weak evidence only exists for test validation (among ICU patients) for the Mini-Mental State Examination (MMSE)[193,194] TMT[138,140,193,195] and the HADS.[55-58] Demographic details including occupation, mobility, activities of daily living (ADLs), social situation, social supports, weight, alcohol and illicit substance consumption, medical and allied health services accessed after discharge, were collected and are detailed.

- *Mini Mental State Examination*

The MMSE is a brief screening test of cognitive mental state[196] which has the ability to distinguish between organic and functional psychiatric illness. The MMSE was originally designed for use with neurogeriatric patients, and comprises two parts (verbal and performance). The maximum score on the verbal subscale is 21 and, on the performance subscale, 9 with an overall score of 30. Lower scores, $\leq$ 23 represent cognitive malfunction, indicating probable dementia. The MMSE assesses orientation, registration, attention and calculation, visuoconstruction, recall and language. Criterion validity against the Wechsler Adult Intelligence Scale, 3rd edition (WAIS-III)[197] found significant association between the two measures. Inter-rater and test-retest reliability were satisfactory; 0.83 to 0.98. Two studies in critical care used this measure.[193,194] One study was based on trauma and the other on liver- or heart- transplant patients with mean ages between 36 and 46 years. There was no assessment of validity, reliability or responsiveness in either paper. The test is interviewer administered and takes approximately five minutes to administer. In this study, patients were deemed fit for neuropsychological tests by achieving a score greater than 24.

- *National Adult Reading Test*

An estimate of premorbid Intelligence Quotient (IQ) was obtained using the National Adult Reading Test (NART)[198]. This requires the participant to pronounce 50 short words of irregular pronunciation and can be used to provide an estimate of premorbid IQ as NART performance is largely resistant to the effects of neurological and psychiatric disorder. [199-201]

- *Letter Number Sequence Task*

The Letter-Number Sequencing subtest of the Weschsler Adult Intelligence Scale 3rd edition (WAIS-III) [197] is a well-standardised, brief test of auditory working memory. It tests the subject's ability to hold on to concurrent strings of numbers and letters. It has parallel versions, allowing re-test without use of the original test stimuli. *ASS* were calculated, higher scores show increased capacity with impairment classified as ASS ≤ 4, a level that is 2 *SD* below the mean. There is no published evidence of the LNS being used with ICU patients.

- *Digit Span Task*

The Digit Span subtest of WAIS-III[197] is a standardised measure of auditory-verbal short-term memory span requiring the subject to immediately recall an increasing sequence of numerical digits in forward and in reverse order. It has parallel versions, allowing re-test without use of the original test stimuli. Age scaled scores (ASS) were used, higher scores show increased capacity with impairment classified as an ASS ≤ 4, a level equivalent to 2 *SD* below the mean ASS. There is no published evidence of the DS being used with ICU patients.

- *Trailmaking Task – Test B*

Trailmaking Task-Test B is a visual-motor attention task measuring executive function and is comprised of two separate trails, part A and part B. [202] The TMT-B is a visual motor attention test that requires the subject to shift attention between two sets of stimuli and alternately sequence, a series of numbers and letters. Performance of TMT-B is dependent on various cognitive abilities, including visual-conceptual, perceptual speed, cognitive flexibility, attention and task alternation. Parallel test versions were used to minimise practice effects.[65] Four studies of critically ill patients were reported using the TMT. [138,140,193,195] The mean ages of participants ranged from 23-46 years, each paper reported on different populations within critical care. Three papers reported administering the TMT-B at 6 months and two papers at 12 months. Two papers administered the TMT-B at multiple time points. There is no evidence for the assessment of reliability or responsiveness in any of the papers reviewed.

- *Stroop Task*

The SNST[203] assesses verbal executive function, specifically selective attention, response inhibition, and information processing speed. The SNST requires the subject to suppress an automatic response (word reading) and generate a non-automatic response (colour naming), where the stimuli are colour words in different ink colours. A relative increase in time taken to perform the incongruent task compared with a simple word reading task is referred to as "the interference effect" and is considered a general measure of cognitive flexibility and control or executive functioning. These abilities decline with age and in dementia which has made the SNST a widely used test to evaluate various groups of patients with borderline established or altered brain pathology such as raised intracranial pressure.[204,127] The time taken to complete the task is measured in seconds, with higher scores equating to greater deficit. Study scores are displayed as a ratio of Stroop 3 to Stroop 2.

Table 2.0 Test Battery Key

Neuropsychological Tests					
Mini-Mental State Examination	Folstein, Folstein & McHugh (1975) Ref: #156	A brief 30-point tool assessing mental status	Global measure of orientation, registration, attention and calculation, visuoconstruction, recall and language.	Riether et al (1992); Frutiger et al (1991)	*Higher score is better* Maximum score 30; Cognitive testing cut-off ≤ 24; <24 possibly indicative of dementia
National Adult Reading Test	Nelson (1982) Ref: #158	The patient to pronounce irregular written words.	Pre-morbid intelligence	Griffiths et al (2007)	*Higher score is better;* Number of errors on the NART connects to FSIQ (full scale IQ)
Digit Span	Wechsler (1997) Ref: #157	Determines the longest strings of digit, both forwards and in reverse order, that can be held in working memory.	Verbal working memory	Not validated in ICU patients	*Higher score is better;* Raw scores age- sex- adjusted to form z scores; Mean=10 SD 3; Clinical impairment are 2 SD below the mean or ≤ 4.
Letter number sequence	Wechsler (1997) Ref: #157	Brief auditory divided attention task; measures working memory ability to hold on to concurrent strings of numbers and letters.	Executive function	Stanton et al (1983); Uzell et al (1987)	*Higher score is better* Raw scores age- sex- adjusted to form z scores; Mean=10 SD 3; Clinical impairment are 2 SD below the mean or ≤ 4.
Trailmaking B Test	Reitan (1958) Ref: #162	A visual motor attention task that shifts attention between two sets of stimuli. Examines a patient's ability to search for, and alternately sequence, randomly positioned numbers and letters	Assesses visual-conceptual, perceptual speed, cognitive flexibility, attention and task alternation	Riether et al (1992); McKee et al (1997)	*Higher score is worse* Raw scores in seconds
Stroop Test	Stroop (1935) Ref: #163	Visual cognitive inhibition	A general measure of cognitive flexibility and control or executive functioning.	Not validated in ICU patients	*Higher score is worse* Raw scores in seconds

Table 2.0 Test Battery Key (Continued)

Psychosocial Tests					
Impact of Event Scale-Revised	Weiss and Marmar (1997) Ref: #178	15-item, self-report disease-specific measure	Assesses levels of subjective post-traumatic psychological distress providing specific measured subscales: of event intrusion (0-32), event-related avoidance (0-32) and event-related hyperarousal (0-24). IES-R score: sum of subscales (0-88).	Eddleston et al (2000); Jones et al (2001); Scragg et al (2001); Cuthbertson et al (2004)	*Higher score is worse* ≥ 24 PTSD clinical concern; ≥ 33 probable PTSD; ≥37 severe PTSD
Hospital Anxiety and Depression Scale	Snaith (2003) Ref: #182	The scale comprises of 14 items that are divided into two subscales-each item rated on a four-point scale. Contains 7 items on depression and 7 on anxiety.	Screening tool for anxiety and depression.	Friman et al (1976); Lund et al (1985); Rowan (1992)	*Higher score is better* Individual anxiety and depression scores ≤7 = non-case; 8-10 = doubtful case; ≥11 = definite case
SF-36v2	Ware et al SF-36 (Ware 1993); QualityMetric Incorporated and Medical Outcomes Trust (2000) Ref: #165	Generic 36-item Quality of Life questionnaire	A multipurpose health survey that measures 8 domains overall health status, functional status emotional and mental health	Chrispin et al (1997); Ridley et al (1997)	*Higher score is better* 50 is average; 0-49 is below average; 51-100 is above average
Community Integration Questionnaire	Willer et al (1993) Ref: #177	Questions are directed at how the individual performs a specific activity within the household or the community.	A brief 15 question measure of level of integration into the home and community. 3 subscores home, social integration & productivity	Not validated in CCU patients. Designed for use following traumatic brain injury.	*Higher score is better* Total score range 0-29

Table 2.0 Test Battery Key (*Continued*)

Functional Measure					
Functional Independent Measure	Australasian Rehabilitation Outcomes Centre (2005) Ref: #171	18-item ordinal scale measures disability; motor domain consists of 13 items, cognitive domain consists of 5 items on a score from 1-7; 7=complete independence; 1=total assist	Measures the functional abilities of patients during rehabilitation	Used with all diagnosis within a rehabilitation population	*Higher score is better* Scores range from 18-126; physical items can be scored separately from cognitive items. Low scores most likely require discharge to facility; greater scores associated with home discharge.

- *Patient narrative*

Narrative interview were used to elicit people's stories and perspectives of being in the ICU ; to derive understanding directly from the participant data. The patient transcripts reliably represent the participants' experiences with subjectivity of the researcher minimised as much as possible.[205] The aims of the interview were to capture and understand the lived experience of critical illness and the patient variation of the overall experience. Narrative, thematic analysis has been used in conjunction with standardised clinical interview to increase methodological rigour.[26] This patient-centred approach complements the inventory of standardised criteria and symptom severity. Patient narratives were collected at each timepoint, one-to-one, face-to-face by experienced qualitative researchers unconnected to the patient's hospital care. Narrative interviews were conducted at each timepoint, 1, 3, 6, 12 and 24 months following discharge.

Interviews commenced with researchers asking patients to talk about their experience of critical illness and how it affected their life in any way they felt was important. After the narrative, researchers followed up themes patients raised using specific semi-structured probe questions to gain clarification if required (Appendix 8.0). Interviews were then transcribed verbatim into a computer word document and then coded separately. The transcription included pause and emphasis of words. Coding in this way provided a snapshot of the language used by the participant groups. The patient transcripts reliably represent the participants' experiences with subjectivity of the researcher minimised as much as possible. A thematic approach to analysis looks for patterns, meaning and potential points of interest in the data that maintains an honest interpretation by constant reference to the raw data source.[206]

- Thematic analysis

A thematic approach to analysis was used to ascertain themes from the patient narratives, looking for patterns, meaning and potential points of interest in the data that maintains an honest interpretation by constant reference to the raw data source.[206] A deductive method

of thematic analysis is one which investigates the transcripts and aims to interpret the data by looking beyond the descriptions given, to identify the meaning and implications arising from them.

Two researchers, blinded to patient characteristics, each independently scrutinised the same data transcripts. Interviews were systematically coded, extracting the most significant statements using a modified grounded theory approach so that data were explored for well-established as well as emergent themes. Second stage coding identified patterns from the initial first stage, until no new codes were found. During analysis meetings independently formulated meanings were discussed until agreement was reached. The resultant development of principle-overarching themes (constructs) was generated through a transparent process that can be traced back to the data found in the text and across multiple participant groups. Through this consensus process, overarching constructs were generated through a transparent process. The constructs of 'Physical Incapacity', 'Isolation' and 'Advice and Reassurance' were used as the narrative thematic framework.

From this framework, narrative trajectories were formed. To create longitudinal, trajectories of the narrative data, each narrative construct was placed into a trajectory framework[207-209] and categorised as 'positive', 'negative', 'mixed' or 'neutral.' The narrative constructs of physical incapacity, isolation and advice and reassurance were used. Each transcript was coded for positive, negative, mixed or no change on each theme. If the number of positive theme items clearly outnumbered the negative, the trajectory was coded as 'positive.' Conversely, if the number of negative theme items clearly outnumbered the positive, the trajectory was coded as 'negative.' If the number of negative and positive theme items were roughly equal, the trajectory was categorised as 'mixed;' and if no clear change was observed over time in the majority of theme items, the trajectory was categorised as 'neutral.' Although we structured coding by using three constructs, scientific and clinical judgement and discussion among coders and interviewers was a key part of the analytic process.

Procedures

- Recruitment

The researcher screened consecutive discharges from ICU's at both sites daily and following recruitment of ICU patients, matched controls from general medical and surgical wards for inclusion into the study. The patient and the nominated next-of-kin were approached by the researcher and were provided with a verbal explanation of the study. A written plain language information statement was also provided, time given for consideration, and all questions answered, after which the patient or next-of-kin gave written consent. The researcher introduced themselves to the patient, briefly explained the study and gave the patient a study information brochure prior to discharge. Consent for a follow-up phone call was obtained at this time after which the researcher contacted the patient by telephone 1 - 2 weeks post discharge. At this time the study was detailed and the first interview scheduled. The first interview was often conducted in the patient's home as the majority of patients suffered debility.

As the study focus was examining meaningful clinical outcomes of disease, it was expected that patients with poor outcome would be identified. The study involved the collection of information of a personal nature and researchers were sensitive to the needs, comfort and were respectful of possible participant dysfunction. There was a protocol of support systems for researchers to follow if participants requested help and was considered the duty of care as part of Good Clinical Practice Guidelines. Patients were referred, if necessary to their General Practitioner for further follow-up and review.

- Timeline

Study assessments were conducted by trained researchers (blinded to the disease status of each participant) at 1, 3, 6, 12 and 24 months post discharge. Retrospective premorbid data was collected at 1 month time point, using tasks which have been validated for this purpose (Table 3.0). Researchers were trained to conduct the interview, administer and score the tests by a neuropsychologist, guided by the study protocol and procedures. All

interviews were conducted face-to-face, in a quiet environment using a semi-structured format, lasting approximately one hour. Follow-up contact for participants consisted of a phone call / letter, one week prior to the scheduled reviews.

Table 3.0 Schedule of Events

Month	Baseline	1	3	6	12	24
MMSE	X					
NART	X					
Digit Span Task		X	X	X	X	X
LNS		X	X	X	X	X
TMT-B		X	X	X	X	X
SNST		X	X	X	X	X
IES-R		X	X	X	X	X
HADS		X	X	X	X	X
SF-36V2	X	X	X	X	X	X
CIQ	X	X	X	X	X	X
FIM	X	X	X	X	X	X
Mobility, Residence, Return to Work	X	X	X	X	X	X
Demographics	X	X	X	X	X	X
Patient narrative	X	X	X	X	X	X
Mortality		X	X	X	X	X

- **Informed consent**

At enrolment into the study, written informed consent was obtained from patients or their authorised surrogates. If consent obtained from a surrogate, written informed consent was obtained from the patient once competent. The STOIC study was approved by the Ethics Committee and hospital Management Boards (June 2005, Ethics Reference: H8250) in accordance with National Health and Medical Research Ethical guidelines.

- **Data handling**

It was emphasised that security and confidentiality of information would be maintained at all times. Every attempt was made to treat information gathering in a sensitive and

appropriate manner. The comfort and dignity of the participant was maintained throughout this process.

Data was collected and scored by researchers in hard copy, after which test scores were reviewed by a neuropsychologist and entered onto a database by a data entry employee onto a secure Filemaker Pro V7 database. All data and scores imported as electronic files underwent filtering, validity and range checks before being included. Data cleaning was performed prior to analysis.

- **Data sources / measurement**

Retrospective baseline data was collected from the patient together with their nominated carer, using instruments validated for this purpose and included the FIM, SF-36v2 and CIQ at one month time point. Subjective problems experienced prior to admission were also collected. Prospective data was collected relating to the participant's functional, psychological, cognitive and social situation at all other timepoints out to 24 months (Table 2.0). Outcome assessments were assessed with standardised instruments and self-report measures, only some of which have been validated for use in critical care research. Clinical data relating to medical history and current admission were collected from the patient's medical record and hospital information system.

Analytical Approaches

- **Statistical analysis**

Being a pilot study, apriori calculation of the sample size required for attaining statistical significance was not calculated. Admission numbers from the Level 3, tertiary referral centre, for the year 2009-2010, was 840 ICU admissions with 6.2% in-unit mortality. Based on these previous unit admission numbers, study recruitment targets were deemed realistic and achievable. Every attempt was made to minimise post-recruitment exclusions. Study numbers show no loss to follow-up except attrition due to death (Figure 1.0), across both groups at the 24 month time-point. Linear mixed models were used to compare outcomes

for ICU patients and controls at six sampling times using a battery of functional, neuropsychological and psychosocial tests. This method allows for the correlation structure of repeated measures of individuals, and missing data points. Patient group (case or control) and sampling time were treated as fixed effects, whilst individual effects were assumed to be random. The Kaplan-Meier method was used to generate time to event curves. Within the context of the interpretation of outcome measures, statistically significant results are reported and results are interpreted as to their clinically meaningful or real benefit.

Post hoc subgroup analysis was undertaken within four specified subgroups. Diagnostic subgroups included 'sepsis,' 'neoplasia,' 'trauma' and 'other'. T–tests were used to assess for statistical significance where group size allowed. This enabled further examination of the heterogeneous, medical-surgical population, for trends which may show specificity.

Pearson correlations among test outcomes and clinical data (prognostic variables) were calculated to assess for strong associations among factors and to inform selection of variables for prediction of outcomes. Group differences were used in this population as there is high variability in each.

Linear regression was used to determine the utility of pre-morbid and in-hospital and descriptive measures as predictors of mortality or cognitive and functional outcomes 24 months after admission.

Mixed model regression was used to generate test outcomes to examine group by time, age by time and sex by time analyses of cases, controls and subgroup of survivors within these. Results were adjusted for age and sex to remove effects on task performance.

Thematic analysis was used to analyse patient narrative's looking for patterns, meanings and potential points of interest in the data. At each study time point, patient narratives were transcribed, at the end of each interview. Thematic analysis was used in an attempt to derive understanding directly from the participant data. Narrative, thematic analysis has been used in conjunction with standardised clinical interview to increase methodological rigour[24]. This patient-centred approach complements the inventory of standardised criteria and symptom severity. Interrater reliability was not established.

Outcomes were profiled as 'not impaired', 'impaired' and 'deceased'. Levels of impairment were defined for six outcome measures which together reflect a broad and clinically relevant picture. Outcomes included quality of life components, PCS and MCS, DS, LNS, Mobility and Social Impairment. Recovery curves for levels of impairment within each outcome were analysed and linear mixed models were used to compare outcomes for ICU patients and controls at the six sampling times against the battery of functional, cognitive and psychosocial tests.

Univariate analyses showing significance were then used to inform a multivariable model (adjusting for multicollinearity, age and sex), to form a battery of tests which show significant relationships for the relative risk of impairment and death for ICU patients at 24 months. Mixed model regression applied premorbid and one month predictors to show outcomes of impairment and death at 24 months.

Data variables

Data variables included a broad set of demographic, clinical and outcome variables as below. These were collected with consent, from the medical record, including clinical and medication charts. All pathology results were accessed and validated via the electronic data system and entered onto the study database. APACHE and Sequential Organ Failure Assessment (SOFA) scores were calculated via electronic calculators and scores entered onto the study database (Table 4.0).

Table 4.0 Data variables from medical history

Demographics	age	**Clinical outcomes**	dialysis days
	marital status	ICU	ventilation days
	dependents		adverse events
	postcode		readmisison to CCU within 72 hours
	occupation, status, capacity		APACHE II and III on admission
Clinical outcomes	medical history		daily SOFA scores
(Preadmission)	medication history		neuromuscular blockers (mg/day)
	chronic diseases		narcotics (mg/day)
	dementia		sedatives (mg/day)
		Prospective	
	chronic neurologic disease	**outcomes**	days
	chronic neuromuscular disease		ICU
	psychiatric disorders		acute care
	depression		rehabilitation
	chronic drug abuse		discharge destination
	chronic alcohol abuse		mortality
Clinical outcomes	dialysis days		ICU discharge
ICU	ventilation days		hospital discharge
	adverse events		one month
	readmisison to CCU within 72 hours		three months
	APACHE II and III on admission		six months
	daily SOFA scores		12 months
	neuromuscular blockers (mg/day)		24 months
	narcotics (mg/day)		
	sedatives (mg/day)		

CHAPTER 4

Results

Study results will be presented to address the study aims.

Primary aims:

1. Track the functional, neuropsychological and psychosocial recovery of patients surviving critical illness over a 24 month period following ICU discharge;

2. Determine the incidence of functional, neuropsychological and psychosocial impairment of patients surviving critical illness 24 months following ICU discharge;

3. Determine the level of functional, neuropsychological and psychosocial impairment of patients surviving critical illness over a 24 month period following ICU discharge;

Analyses:

- Descriptive demographic characteristics including hospital interventions;

- Test scores (mean, *SD*), ICU patients and controls at each time point (survivors, deceased);

- Mixed model analysis of ICU patients and controls, sorted by mortality, case by time, sex and age effects (Coefficient; CI; *p* value) using linear regression;

- Test scores and subgroup analysis, grouping ICU patients and controls sorted into four diagnostic related groups post-hoc – 'sepsis', 'trauma', 'neoplasia' and 'other' (mean; *SD*; *p* value);

- Frequency (%) ICU patients: Controls; Not impaired, Impaired and Deceased;

Secondary aims:

1. Determine baseline variables associated with outcome (not impaired, impaired and death) 24 months following ICU discharge;

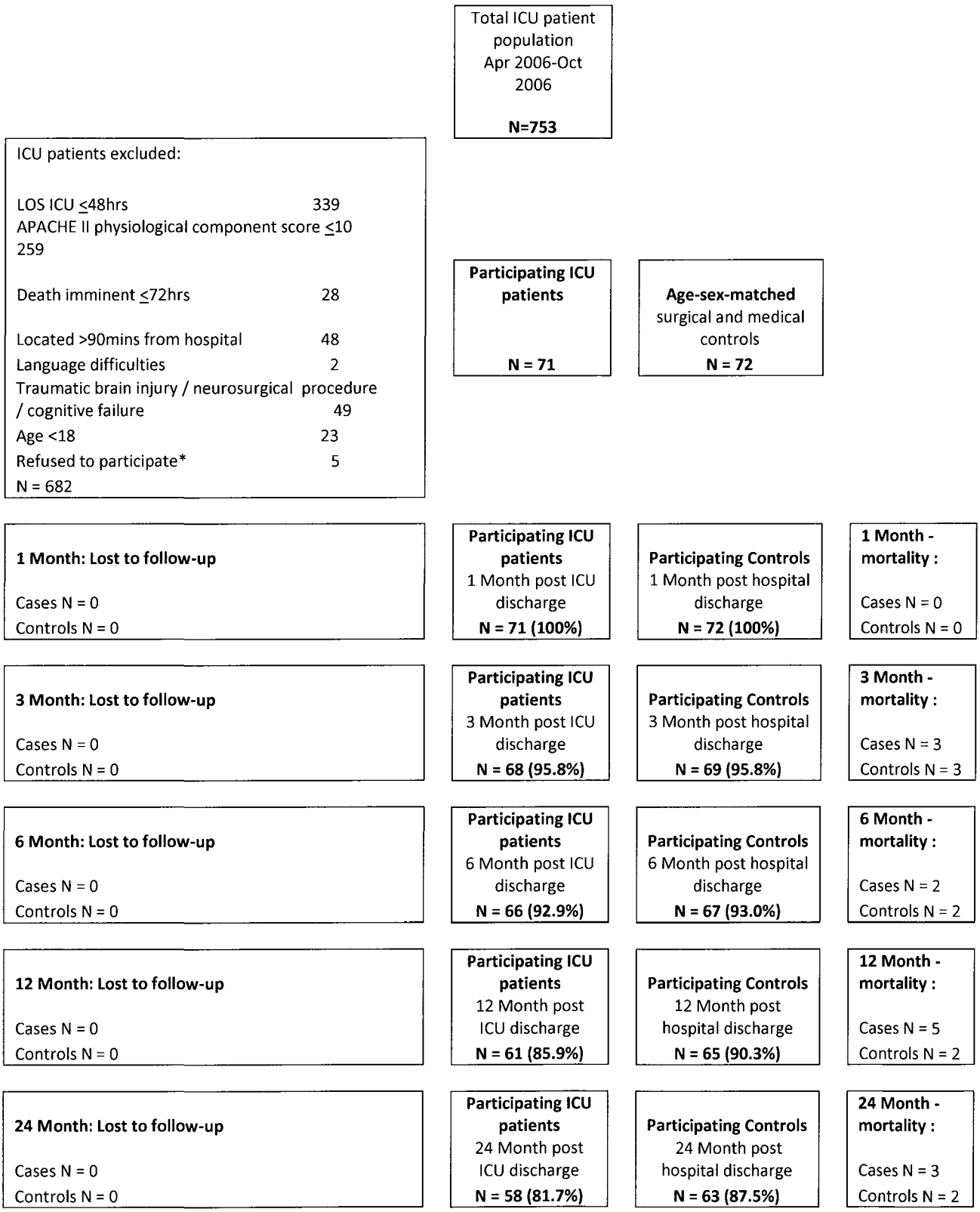
2. Examine common themes and characterise the subject's recovery during the first 24 months following ICU discharge.

Analyses:

- Predictors of morbidity and mortality - significant univariates were then used to inform a multivariable model (adjusting for multicollinearity, age and sex), to form a battery of tests which give the relative risk of impairment and death for ICU patients at 24 months;

- Patient narrative, thematic analysis

Figure 1: Study Recruitment Schema



*Refused to participate due to 'tiredness', 'unwell' or 'anxiety'

Demographic Characteristics

From April through October 2006, 143 patients were recruited from two centres in Southern Tasmania, one being the sole tertiary referral hospital in Tasmania. The cohort consisted of 71 survivors of critical illness from a mixed medical-surgical population, and 72 controls, patients from general medical and surgical acute-care wards who did not experience critical illness. ICU patients were recruited consecutively on ICU discharge after which a restricted random sample of controls was matched by age and sex (Figure 1.0).

Both groups were very similar at baseline (Table 5.0). Data show the mean age of ICU patients was 62.1 years (*SD* 16.4) and controls 61.7 years (*SD* 17.3). Fifty-four percent of ICU patients were male compared with 57% of controls. The levels of education show similar numbers of ICU patients and controls holding primary, secondary and tertiary levels of education. Full Scale Intelligence Quotient (FSIQ) scores, an estimate of premorbid I.Q. show both groups are of average intelligence, (mean; SD) ICU patients 104 (13.9) and controls 107 (14.7). Occupation also show both groups very comparable, with 55% of ICU patients retired compared with 51% of controls. With regard to employment status, 21% of ICU patients and 19% of controls were employed, with 1% of controls and none of the ICU patients, being unemployed. A total of 49% of ICU patients were receiving social support on admission, compared to 32% of controls, including 17% of ICU patients being hospitalised prior to ICU admission.

The Charlson-Age Comorbidity Index (CACI) show similar weights of comorbid medical conditions. ICU patients were more independent, scoring higher FIM scores and reported higher physical component quality of life. Controls had reduced mobility, 10% being house mobile versus 4% of cases. Still, controls showed a higher level of integration at home and in the community.

Table 5.0: *Background characteristics. Values are mean (%) unless otherwise stated*

	N	Controls	N	ICU
Age (years), mean (*SD*)	72	61.7 (17.3)	71	62.1 (16.4)
Male	72	41 (56.9)	71	38 (53.5)
Deceased during study	72	13 (18)	71	22 (31)
FSIQ, mean (*SD*)	46	107 (14.7)	52	104 (13.9)
Mini-Mental State Examination (MMSE) , mean (SD)	53	28.7 (3.69)	60	27.9 (3.80)
National Adult Reading Test (NART), mean (*SD*)	43	25.7 (17.8)	48	21.6 (14.3)
Charlson weighted index of comorbidity, mean (*SD*)	71	2.96 (2.87)	71	2.23 (2.11)
Charlson condition & age-related score, mean (*SD*)	71	4.87 (3.55)	71	4.24 (2.97)
Apache 2		NA	71	19.0 (8.0)
Apache 2 ROD		NA	59	0.34 (0.25)
Apache 3		NA	71	67.2 (27.8)
Apache 3 ROD		NA	71	0.23 (0.24)
SAPS 2		NA	71	39.9 (14.9)
SAPS 2 ROD		NA	71	0.29 (0.24)
Sepsis	72	15	71	29
Trauma	72	5	71	5
Neoplasia	72	7	71	5
Other	72	45	71	32
Married or living with partner	67	42 (63)	71	41 (58)
Social situation	66		70	
Hostel resident		0		2 (3)
Rehab unit inpatient		0		0
Acute care inpatient		0		0
Living at home alone		12 (18)		14 (20)
Living at home caring for others		7 (11)		4 (6)
Living at home with carer		3 (5)		2 (3)
Living at home with family/partner		40 (61)		47 (67)
Living with friends		3 (5)		1 (1)
Nursing home resident		1 (2)		0
Dependents	72	7 (10%)	71	9 (13%)
Occupation	67		71	
Home duties		12 (18)		9 (13)
Employed		13 (19)		15 (21)
Retired		34 (51)		39 (55)
Not in labour force		5 (7)		7 (10)
Student		2 (3)		1 (1)
Unemployed		1 (1)		0
Education	72		71	
Primary		18 (25)		18 (25)
Secondary		40 (56)		40 (56)
Tertiary		14 (19)		13 (18)
Social service support	72	22 (31)	70	35 (49)
Community aged care package		2 (3)		1 (1)
District nurse		5 (7)		8 (11)
Home help		12 (17)		6 (9)
Hospitalised		0		12 (17)
Meals on wheels		0		2 (3)
Other		3 (4)		6 (9)
Mobility capacity	67		71	
House mobile		7 (10)		3 (4)
Independent		52 (78)		57 (80)
With aid		7 (10)		9 (13)
With assistance (person)		1 (1)		2 (3)

Table 5.0 (continued)	N	Controls	N	ICU
Tobacco	67	3 (5.5)	70	6 (8.6)
Cannabis	71	0	70	2 (2.9)
FIM, mean (SD)	72	119 (14.2)	71	121 (14.3)
CIQ, mean (SD)	70	35.7 (16.2)	71	16.8 (4.63)
SF36v2 PCS	67	38.5 (13.7)	70	45.7 (13.5)
SF36v2 MCS	67	49.2 (13.9)	70	53.8 (11.0)

FIM Functional Independence Measure: Score range 18-126; <108 = impairment; CIQ Community Integration Questionnaire: Score range 0-29, <6.2 = impairment; SF36v2 PCS Physical Component Score: Score range 0-100, mean, (SD) 50 (10); SF36v2 MCS Mental Component Score: Score range 0-100, mean, (SD) 50 (10).

Admission characteristics

APACHE 3 diagnoses indicate (Table 6.0) that pneumonia accounted for over 25% of case admissions (aspiration 9.86%, bacterial 14.08% and viral 1.41%), sepsis 19.71% and cardiac surgery 19.71%. Of note, study inclusion criteria show recruited cardiac surgery patients had an ICU length of stay of greater than 48hrs with an APACHE II physiological component score greater than 10 describing the more complex rather than routine cases. It is worth noting cardiac arrest occurred in four cases (5.63%) and one (2.5%) control. While both cardiac surgery and cardiac arrest diagnosis may suggest hypoxic brain injury and associated impaired cognitive function, inclusion criteria required a MMSE score of greater than 24, before patients in these groups were deemed testable. Data shows these scores were attained with mean MMSE score of 28.7 (*SD* 3.69) for cases and 27.9 (*SD* 3.80) for controls (Table 1). Control admission data show 37.5% of controls principal admission diagnosis was cardiac related with 33% of having received a general anaesthetic. Three control patients were admitted to ICU during their hospital admission however length of ICU stay was less than 24 hours, two patients receiving routine post-op care and one with acute pulmonary oedema (Table 7.0; 8.0).

Ensuring a heterogeneous and representative, mixed medical-surgical population within both groups, meant excluding as few as participants as possible. This was achieved by employing an inclusion criterion of MMSE score of 24 or more. All consecutive patients discharged from ICU participants achieved this, were therefore deemed testable and recruited.

Table 6.0. *Apache 3 admission diagnosis-ICU patients*

Admission Diagnosis	Freq	Percent
Acute Myocardial Infarction (NonOperative)	1	1.41
Aspiration Pneumonia (NonOperative)	7	9.86
Bacterial Pneumonia (NonOperative)	10	14.08
Burns (NonOperative)	1	1.41
CABG with valve repair or replacement	3	4.23
COPD (NonOperative)	2	2.82
Cardiac Arrest (NonOperative)	4	5.63
Cardiomyopathy (NonOperative)	1	1.41
Cellulitis/soft tissue infection (PostOperative)	1	1.41
Congestive Heart Failure (NonOperative)	1	1.41
Coronary Artery Bypass Graft	10	14.08
Dissecting Aortic Aneurysm (PostOperative)	1	1.41
Drug overdose (NonOperative)	2	2.82
GI Neoplasm (PostOperative)	2	2.82
GI Obstruction (NonOperative)	1	1.41
GI Obstruction (PostOperative)	1	1.41
GI Perforation/rupture (PostOperative)	3	4.23
GI Vascular ischemia resection surgery	1	1.41
Mechanical Airway Obstruction (NonOperative)	1	1.41
Multiple trauma excluding head (NonOperative)	3	4.23
Peritonitis (PostOperative)	2	2.82
Renal Neoplasm (PostOperative)	1	1.41
Seizure (NonOperative)	1	1.41
Sepsis of Urinary tract origin with sho	1	1.41
Sepsis other than urinary (NonOperative)	2	2.82
Sepsis with shock other than urinary tract	3	4.23
Valvular Heart Surgery (PostOperative)	4	5.63
Viral Pneumonia (NonOperative)	1	1.41
Total	71	100

Table 7.0. *Principal diagnoses surgical controls*

Admission diagnosis	Operation	Freq (%)	Anaesthetic type	ICU admission (Y/N)	Reason for ICU admission
Surgical Controls					
acute abdomen	appendicectomy	1 (3.12)	GA	N	NIL
acute choecystitis	NIL	1 (3.12)	NIL	N	NIL
acute ischemic gangrenous right hand	right below elbow amputation	1 (3.12)	GA	N	NIL
bilateral varicose veins	bilateral high ligation and stripping varicose veins	1 (3.12)	GA	N	NIL
bowel cancer	laparotomy, subtotal colectomy, open cholecystectomy	1 (3.12)	GA	Y	acute pulmonary oedema
cancer gall bladder	NIL	1 (3.12)	NIL	N	NIL
cellulitis left leg	NIL	1 (3.12)	NIL	N	NIL
cholelithiasis with cholodocolithiasis	laparoscopic cholecystectomy	1 (3.12)	GA	N	NIL
cholodocolithiasis	ERCP	1 (3.12)	GA	N	NIL
Chron's disease	reversal of ileostomy	1 (3.12)	GA	N	NIL
colorectal carcinoma	right hemicolectomy, bilateral salpingoopherectomy	1 (3.12)	GA	N	NIL
diverticulitis with rectal bleed	NIL	1 (3.12)	NIL	N	NIL
elective right hemicolectomy	right hemicolectomy	1 (3.12)	epidural	N	NIL
enterocutaneous fistula, anterior wall cellulitis	incision and drainage	1 (3.12)	GA	N	NIL
ischaemic heart disease	coronary artery bypass grafts	2 (6.25)	GA	Y	routine post-op care
left buccal adenocystic cancer	excision left buccal adenocystic cancer	1 (3.12)	GA	N	NIL
left mastectomy	left mastectomy	1 (3.12)	GA	N	NIL

Table 7.0. (Continued)	Operation	Freq (%)	Anaesthetic type	ICU admission (Y/N)	Reason for ICU admission
Non-Hodgkin's lymphoma	biopsy	1 (3.12)	GA	N	NIL
pancreatitis	NIL	2 (6.25	NIL	N	NIL
pelvic cyst drainage and repair incisional hernia	pelvic cyst drainage and repair incisional hernia	1 (3.12)	GA	N	NIL
pre sacral abscess	CT guided pre sacral abscess drainage	1 (3.12)	GA	N	NIL
reversal of colostomy	reversal of colostomy	1 (3.12)	GA	N	NIL
reversal of loop colostomy	reversal of loop colostomy	1 (3.12)	GA	N	NIL
right ankle fracture	open reduction and internal fixation	1 (3.12)	GA	N	NIL
right transverse process fractures, rib fractures	nasal laceration repair, split skin graft, wound washout	1 (3.12)	GA	N	NIL
sepsis following fundoplication surgery	fundoplication	1 (3.12)	GA	N	NIL
sigmoid cancer	recto-sigmoid resection	1 (3.12)	GA	N	NIL
small bowel obstruction band adhesion	laparotomy, division of band adhesion	1 (3.12)	GA	N	NIL
unhealing left index toe ulcer	amputation left index toe, angiogram	1 (3.12)	GA	N	NIL

Seventy-one ICU patients and seventy-two controls were consecutively recruited at discharge. Statistically, a 2:1 match was the aim, that is, 1 ICU patients each matched to 1 medical and 1 surgical control however due to financial constraints, a 1:1 match was used. ICU patients were consecutively recruited at ICU discharge, after which sex-matched controls were randomly selected within a five year age range of cases. Both medical and surgical controls were representative of medical and surgical acute-care admissions, at this time.

Table 8.0. Principal diagnoses medical controls	
Principal admission diagnosis	**Freq (%) (N=40)**
acute coronary syndrome	3 (7.5)
acute myocardial infarction with VF arrest	1 (2.5)
amyloidosis	1 (2.5)
asthma	2 (5)
atrial flutter	1 (2.5)
atypical chest pain	2 (5.0)
chest pain and dyspnoea	1 (2.5)
chron's disease	1 (2.5)
confusion	1 (2.5)
congestive cardiac failure	4 (10)
coronary artery disease	1 (2.5)
dermatitis right leg	1 (2.5)
diverticular abscess	1 (2.5)
exacerbation chronic obstructive airways disease	1 (2.5)
forefoot cellulitis	1 (2.5)
fracture lumbar vertebrae	1 (2.5)
general deterioration	1 (2.5)
heart failure	1 (2.5)
infective exacerbation chronic obstructive airways disease	1 (2.5)
metastatic cancer	1 (2.5)
myocardial ischaemia	1 (2.5)
non cardiac chest pain	1 (2.5)
non healing leg wound	1 (2.5)
pancreatic pseudocyst and pancreatitis	1 (2.5)
pericarditis	1 (2.5)
pneumonia	1 (2.5)
recurrent falls	1 (2.5)
respiratory failure, pneumonia	1 (2.5)
spontaneous pneumothorax	1 (2.5)
stabilisation of blood sugar levels	1 (2.5)
ulcerative colitis	1 (2.5)
unstable angina	2 (5.0)

Data relating to admission (Table 9.0) show ICU patients had a mean ICU length of stay (LOS) of 5.9 days and 29 hospital days compared with the controls mean LOS of 7.5 days. Ninety-three percent ICU patients were intubated and 42% of ICU patients had at least one episode of severe sepsis. Twenty-three percent of ICU patients suffered chronic obstructive airways disease and obstructive sleep apnoea (almost 9% smokers) compared with 14% of controls. Hypertension was also common among both groups although 6% more frequent among ICU patients. Even so, equal numbers had a diagnosis of cardiovascular disease. There were a higher proportion of controls with diabetes occurring in 31% of controls and only 24% among ICU patients. Other comorbidities were equally weighted within both groups. Comorbidities which may influence testing outcomes were cerebrovascular accident, dementia/delirium, head injury, depression, psychiatric illness and chronic alcohol and drug abuse also were equally weighted between both groups. Data relating to doses of Morphine,

Midazolam and Propofol were not collected for controls as doses were considered incidental.

Table 9.0. *In-hospital interventions and comorbidities. Numbers are mean (SD) or number (%).*

Test	Control		ICU	
	N	Mean (*SD*)	N	Mean (*SD*)
This admission				
Arterial line	72	0	71	69 (97%)
Cardiac arrest	72	0	67	8 (12%)
Central line	72	1	70	70 (100%)
Arrhythmia	72	1 (1%)	64	22 (34%)
Episode of sepsis (severe sepsis)	72	0	62	25 (40%)
Haemofiltration	72	0	70	5 (7%)
Mechanical ventilation (hours)	72	1	71	150.9 (151.9)
ICU day number	72	1	63	5.9 (5.5)
Insulin therapy	72	0	0	
Intercostal catheter	72	0	70	18 (26%)
Intra-aortic balloon pump	72	0	70	5 (7%)
Intra-cranial pressure monitor	72	0	70	0
Intubation	72	0	71	66 (93%)
Laparotomy	72	0	71	3 (4%)
Number of septic episodes (severe sepsis)			71	
0		0		39 (58%)
1		0		19 (28%)
2		0		6 (9%)
3 or more		0		3 (5%)
PA catheter	72	0	71	22 (31%)
Medical history				
CABG valve surgery	72	0	70	2 (3%)
Carcinoma	72	13 (18%)	71	5 (7%)
Cardiac arrest	72	0	71	1 (1%)
Cardio-respiratory arrest	72	0	71	0
COAD OSA	72	10 (14%)	71	16 (23%)
Hypoxic insults (Pao2/FIO2<200)	72	0	71	0
Incontinence	72	1 (1%)	70	0
Obesity	72	2 (3%)	71	2 (3%)
Respiratory arrest	72	4 (6%)	71	5 (7%)
Type 1 diabetes	72	2 (3%)	69	1 (1%)
Type 2 diabetes	72	20 (28%)	71	16 (23%)
Alcohol abuse	72	9 (13%)	71	5 (7%)
Cardiovascular disease	72	24 (33%)	71	23 (32%)
Chronic drug abuse	72	2 (3%)	71	3 (4%)
Chronic neurologic disease	72	1 (1%)	70	0
CVA or hemiparesis	72	4 (6%)	70	10 (14%)
Depression	72	7(10%)	71	10 (14%)
Head injury	72	1 (1%)	70	0
Table 9.0 *(continued)*				
Chronic heart failure	72	1(1%)	71	5 (7%)
Chronic renal failure	72	3 (4%)	71	3 (4%)
Dementia / delirium	72	1 (1%)	71	0
Hypertension	72	27 (38%)	71	31 (44%)
Psychiatric disorder	72	0	71	2 (3%)

Seizures	72	2 (2%)	70	3 (4%)
Spinal cord injury	72	1 (1%)	71	1 (1%)
Apache 2		NA	71	19.0 (8.0)
Apache 2 ROD		NA	59	0.34 (0.25)
Apache 3		NA	71	67.2 (27.8)
Apache 3 ROD		NA	71	0.23 (0.24)
SAPS 2		NA	71	39.9 (14.9)
SAPS 2 ROD		NA	71	0.29 (0.24)
Days in ICU		NA	71	9.3 (7.2)
Days in hospital	72	7.5 (5.2)	71	29.1 (30.9)
Ventilation (hours)				
Invasive		0	71	151 (152)
Non-invasive		0	71	3.4 (9.2)
Morphine (mg)		0	71	358 (754)
Midazolam (mg)		0	71	396 (861)
Propofol (mg)		0	71	7669 (10958)
Noradrenaline (mg)		0	71	34.4 (50.6)
SOFA total		NA	71	7.8 (2.1)
Days before death	72	492.5 (470.2)	22	616 (491)

Correlations between Critical Care Treatments and Outcomes

Unadjusted correlations between ICU treatments, severity scoring criteria and positive coefficients show strong relationships. Strongly significant relationships exist between Days in ICU and noradrenaline (mg) and SOFA score. This means as the Days in ICU increase, the amount of noradrenaline (mg) increased by a coefficient of 0.269 ($p < 0.05$) and the total SOFA score increased by a coefficient of 0.871 ($p < 0.0001$). Similarly as the hours of invasive ventilation increased, so did noradrenaline (mg), the SOFA score and the days in ICU. As the number of septic episodes increase (per patient) so does the SOFA score, days in ICU and hours of ventilation. (It should be noted, associations between SOFA and APACHE scores and noradrenaline (mg) were not analysed further as noradrenaline is a score component). Positive relationships between these parameters reflect a clinical reality. Each parameter is commonly used as a clinical indicator of patient acuity so an increase of one parameter would be expected to be reflected similarly in the others (Table 10.0).

Table 10.0. *Unadjusted correlations among ICU intervention variables for ICU patients.*

Parameter	Noradrenaline	SOFA total	Days in ICU	Invasive ventilation (hrs)	Apache 3 ROD
Days in ICU	0.269*	0.871****	~		
Invasive ventilation (hrs)	0.284*	0.871****	0.962****	~	
Apache3 ROD	~	0.102	-0.008	0.0031	~
Number septic episodes	0.198	0.267*	0.267*	0.343**	0.105

*<0.05 **<0.01 ***<0.001 ****<0.0001 ~ not analysed

Correlations between critical care treatments and outcomes at each timepoint

Unadjusted correlations among ICU treatment variables, severity scoring criteria and cognitive outcome tasks at each time-point show significant relationships. Noradrenaline is used clinically as a component of or individual indicator of severity of illness in the APACHE 3 and SOFA scores. Clinically, as the mean dose of noradrenaline is increased, the severity of illness increases and outcomes would be expected to be worse. The APACHE 3 score and SOFA score are mortality prediction tools currently used in critical care; higher scores equating to higher mortality. Again as severity of illness increases, clinical outcomes would be expected to be worse. Study data confirms these relationships (Table 11.0).

Table 11.0. *Unadjusted correlations among ICU intervention variables and cognitive test outcomes for ICU patients *p <0.05*

	Stroop 3	*TMT*	*DS*	*LNS*
Noradrenaline (mg)				
1 month	0.217	0.256	-0.036	-0.225
3 months	0.095	0.347*	-0.167	-0.176
6 months	0.197	0.342*	-0.177	-0.300*
12 months	0.285*	0.103	-0.177	-0.261*
24 months	0.261	0.247	0.042	-0.033
SOFA score				
1 month	0.084	0.036	-0.067	-0.010
3 months	-0.011	0.093	-0.014	0.09
6 months	0.104	0.174	-0.153	-0.071
12 months	0.09	0.227	-0.066	0.0002
24 months	0.126	0.299*	-0.004	0.002
Days in ICU				
1 month	-0.050	-0.058	0.075	0.023
3 months	-0.161	0.0004	0.059	0.142
6 months	-0.023	0.164	-0.025	0.075
12 months	-0.078	0.216	-0.059	0.102
24 months	-0.010	0.224	-0.020	0.026
Ventilation hours				
1 month	-0.114	-0.103	0.035	0.013
3 months	-0.178	-0.036	-0.008	0.136
6 months	-0.096	0.147	-0.076	0.09
12 months	-0.091	0.232	-0.079	0.093
24 months	-0.040	0.216	0.034	0.032
APACHE 3 ROD				
1 month	0.230	0.348	0.184	-0.111
3 months	0.293*	0.054	-0.076	-0.216
6 months	0.085	0.092	-0.028	-0.234
12 months	0.262	0.135	0.023	-0.149
24 months	0.348*	0.350*	-0.081	-0.053

ICU variables of significance

- *Noradrenaline*

Data shows significant relationships between noradrenaline and the TMT, the LNS and the SNST across the study period. Correlations between noradrenaline and the TMT at 3 and 6 months show as milligrams of noradrenaline increase, the TMT mean score increases (worsens). At 6 and 12 months, as milligrams of noradrenaline increase, the LNS mean score decreases (worsens). Finally, at 12 month time point, as milligrams of noradrenaline increase, the SNST mean score increases (worsens).

- *SOFA score*

A significant relationship exists between the SOFA score and the mean TMT at 24 months which indicates as the mean SOFA score increases, the mean TMT increases (worsens).

- *APACHE3 ROD*

Data shows relationships between the APACHE 3 risk of death (ROD) score and the mean SNST scores at three and the SNST mean score and TMT mean score at 24 months. This indicates, at three month time point, as the APACHE 3 ROD mean score increases, the SNST mean score increases (worsens). Similarly at 24 months, as the APACHE 3 ROD mean score increases, the SNST mean score increases (worsens). Also at 24 months, as the APACHE 3 ROD mean score increases, the TMT mean score increases (worsens).

Test Outcomes

This following section describes the functional, cognitive and psychosocial outcomes of both groups.

Functional Outcomes

In this study, functional outcome describes the ability of a person to perform the functional skills used for activities of daily living. Functional outcome was measured using the FIM. The FIM is used extensively in Australia within areas of rehabilitation medicine to monitor overall

functional capacity and to monitor changes in patient condition. It provides a valuable metric which measures progress of functional skills used particularly for ADL's. The higher the FIM score the higher the functional capacity. The score range is between 18 and 126, with impairment classified, in this study, as scores < 108.[175]

Results of the FIM show overall ICU patients and controls score similarly at all timepoints, with both groups holding the same level of function pre admission. Interestingly, neither group score 126, full functional independence, at any stage throughout the study period. At 1 month the mean scores for surviving ICU patients drop to impaired levels not recovering to premorbid levels until 12 months. Surviving control mean scores, however, dip very mildly at one month, quickly recovering to exceed premorbid values at 3 months. Standard deviation of data throughout all timepoints (except time point 12 months) for ICU patients, uncover impairment. Surviving controls show impairment at the premorbid and one month time points only. Deceased patient scores show lower values compared to survivors particularly deceased controls yet both deceased groups recover to the premorbid level before death (Figure 2.0, Appendix 1.1).

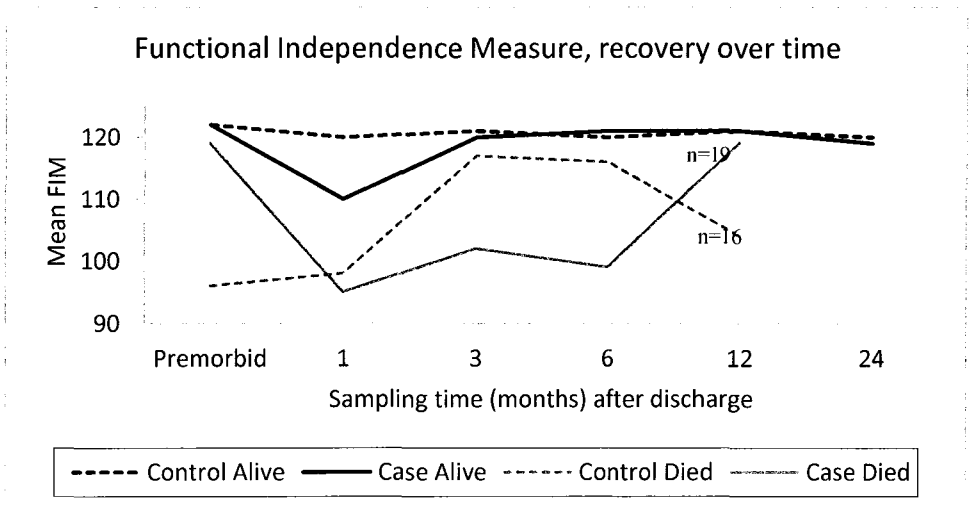


Figure 2.0 Functional Independence Measure - ICU Cases and Controls recovery over time
(A higher score denotes improvement)

Analysis was performed using mixed model regression. Due to deceased patients showing an altered recovery curve compared with survivors, analysis was performed on both, survivors only and the cohort as a whole. Data show ICU patients have a significantly lower level of physical function (FIM score) at each time point relative to controls (Coefficient, -0.056; CI, -

0.112 to -0.001; $p \leq 0.002$; all ICU patients, and Coefficient -0.061; CI, -0.114 to -0.009; $p \leq 0.021$; age, sex adjusted, ICU survivors only).

Similarly, comparing age related data as a patients' mean age increases, the functional outcome mean scores decrease (worsen) at each time point relative to younger patients (Coefficient, -0.123; CI, -0.235 to -0.012; $p \leq 0.029$, all older patients and Coefficient, -0.128; CI, -0.208 to -0.047; $p \leq 0.002$ for older survivors only, sex adjusted) (Table 12.0).

Table 12.0 *Functional Independence Measure Effect over Time*

Functional Impairment Measure (FIM)	Coefficient (95% CI) Time x Case	*p* value	Coefficient (95% CI) Age x Time	*p* value
Survivors	-0.061 (-0.114 to -0.009)	0.021	-0.128 (-0.208 to -0.047)	0.002
All	-0.056 (-0.112 to -0.001)	0.002	-0.123 (-0.235 to -0.012)	0.029

Neuropsychological Outcomes

- *Mini Mental State Examination*

Prior to neuropsychological testing, patients were screened using the MMSE. The MMSE is a very brief screening test of cognitive mental state, commonly used to screen for dementia. Patients were deemed cognitively fit for neuropsychological testing if achieved a MMSE score greater than 24. Looking at test outcomes for each group, the mean MMSE was similar for both groups. All participants scored above the minimum testing requirement of 24 (Appendix 2.0).

- *Digit Span*

The DS is a standardised measure of auditory-verbal short-term memory. Age scaled scores were used to remove effect of age on task performance. Higher scores show improvement with impairment classified as ASS ≤ 4, two standard deviations below the mean ASS. ICU patients do not ever achieve the mean normative score. Among survivors, data show controls mean scores were higher (improved) with a higher sustained level of recovery from

day 28 throughout 24 months. The pattern or shape of recovery curves were very similar for ICU patients, however, the mean score for ICU patients being always lower than controls. Both groups exceed day 28 scores at three months with scores plateauing at six months. Controls reach the mean normative score range of ≥ 10 and plateau. Deceased patient test curves (both groups) differ from both survivor and total cohort curves with scores being lower with a gradual decline prior to death (Figure 3.0, Appendix 1.2). Overall, mixed model analysis shows no statistical significance between groups and recovery over time (Table 13.0).

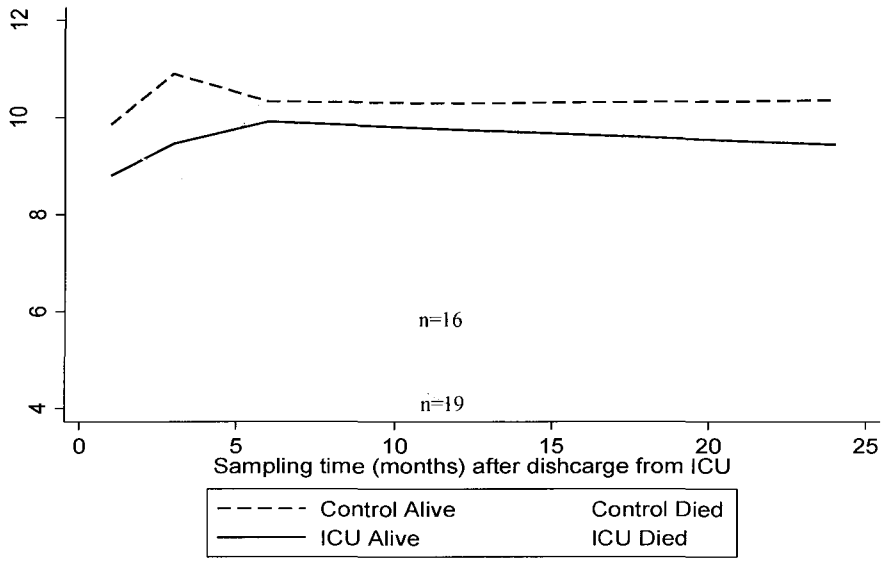


Figure 3.0 Digit Span Test Outcomes - ICU Cases and Controls recovery over time
(A higher score denotes improvement)

Table 13.0. *Digit Span Effect over Time*

Digit Span (scaled score)	Case x Time Coefficient (95% CI)	*p* value
Survivors	0.008 (-0.038 to 0.055)	0.727
All	0.008 (-0.037 to 0.055)	0.705

Among ICU patients, the incidence of impairment on the DS increases at each time point, trending up from 13.64% at one month to 17.39% (peaking) at 24 months. The incidence of

impairment for controls remains fairly steady, seeing a gradual trend for improvement from six months on (Table 14.0).

Table 14.0. *Digit Span Task (Freq; %)*

DS	ICU			Controls		
from discharge (months)	Not impaired	Impaired	Dead	Not impaired	Impaired	Dead
1	57 (86.36)	9 (13.64)	0 (0.00)	63 (91.30)	6 (8.70)	0 (0.00)
3	55 (80.88)	10 (14.71)	3 (4.41)	56 (87.50)	5 (7.81)	3 (4.69)
6	53 (77.94)	9 (13.24)	6 (8.82)	51 (77.27)	9 (13.64)	6 (9.09)
12	46 (69.70)	10 (15.15)	10 (15.15)	51 (76.12)	9 (13.43)	7 (10.45)
24	44 (63.77)	12 (17.39)	13 (18.84)	50 (73.53)	8 (11.76)	10 (14.71)

(An increase in mean DS score denotes improvement)

- *Letter Number Sequence*

The LNS is an auditory-verbal, working memory task which measures executive function. The LNS task is similar to the DS however is deemed to be more sensitive due to the executive function component. Age scaled scores are used to remove effect of age on task performance. Higher scores show increased capacity or improvement with impairment classified as ≤ 4, two standard deviations below the mean ASS. Neither group, at any time point, achieve a mean normative score. Among both groups, 1 month scores are the lowest (worst performance). Both groups exceed their 1 month scores at 3 months and plateau at 6 months. Among survivors, both ICU patients and controls begin to show improvement by 6 months with ICU patients plateauing and sustaining this level. Not surprisingly, controls score higher than ICU patients throughout the two year study period. Where ICU patients sustain a plateaued recovery curve, controls show an ongoing deteriorating trend out to (and beyond) 24 months; although never to drop to levels as low as case score level. Deceased patients show very different recovery curves among both groups, with scores being lower with a gradual decline prior to death. Standard deviations uncover impairment

for survivor ICU patients at 3 months and at all timepoints for deceased cases and 1 month and 3 months for deceased controls (Figure 4.0, Appendix 1.3). Mixed model regression analysis shows, for a one unit increase in LNS mean score, ICU patients increased by a coefficient (factor) of 0.059 (CI, 0.003 to 0.112; $p \leq 0.035$) and 0.054 (CI, 0.000 to 0.109; $p \leq 0.049$) respectively relative to controls (age, sex adjusted). Therefore ICU patients' mean scores increase (improve) in executive function at each time point relative to controls (Table 15.0).

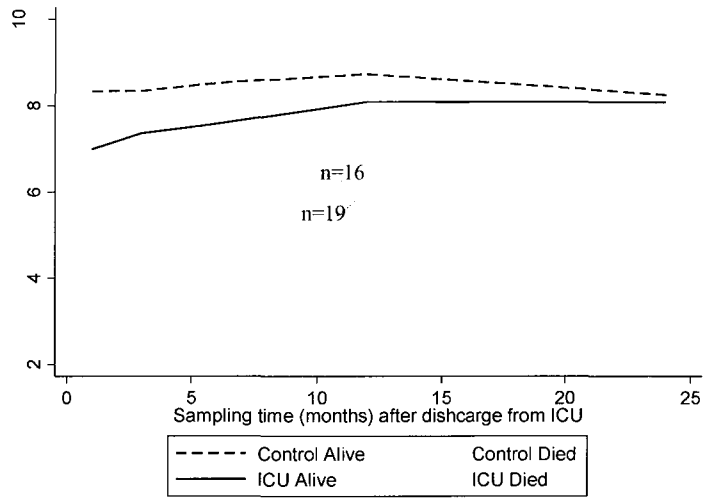


Figure 4.0. Letter Number Sequence Test Outcomes - ICU Cases and Controls recovery over time (A higher score denotes improvement)

Table 15.0. *Letter Number Sequence Effect over Time*

Letter Number Sequence (scaled score)	Case x Time Coefficient (95% CI)	*p* value
Survivors	0.054 (0.000 to 0.109)	0.049
All	0.059 (0.003 to 0.112)	0.035

Among ICU patients, the incidence of impairment on the LNS peaks at the 3 month time point after which there is a gradual reduction in incidence of impairment out to 24 months. The incidence of impairment for controls follows a similar trend with incidence much higher than expected for controls, (almost 30% at one month), however remain lower than ICU patients throughout (Table 16.0).

Table 16.0. *Letter Number Sequence (Freq; %)*						
	ICU			Controls		
from discharge (months)	Not impaired	Impaired	Dead	Not impaired	Impaired	Dead
1	42 (65.63)	22 (34.38)	0 (0.00)	46 (70.77)	19 (29.23)	0 (0.00)
3	37 (54.41)	28 (41.18)	3 (4.41)	40 (68.97)	15 (25.68)	3 (5.17)
6	38 (57.58)	22 (33.33)	6 (9.09)	37 (61.67)	17 (28.33)	6 (10.00)
12	40 (61.54)	15 (23.08)	10 (15.38)	40 (66.67)	13 (21.67)	7 (11.67)
24	39 (59.09)	14 (21.21)	13 (19.70)	42 (67.74)	10 (16.13)	10 (16.13)

(Impairment ≤ 4; an increase in mean LNS score denotes improvement)

- *Trailmaking Task – Test B*

The TMT is a timed task assessing visual-conceptual, perceptual speed, cognitive flexibility, attention and task alternation. The raw test scores were converted to z scores which showed high levels of impairment (Figure 5.0, Table 17.0, Appendix 1.4). Raw test scores have been used to describe outcome only. Results as z scores, are presented below.

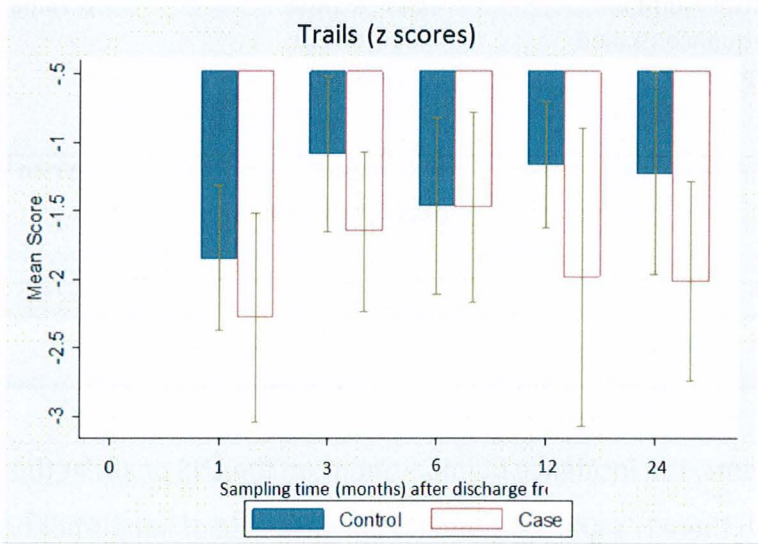


Figure 5.0. Trailmaking B Task z score Outcomes - ICU Cases and Controls recovery over time
(A lower score denotes improvement)

Table 17.0. z score interrpretation

>3.0		Very superior
1.4 - 2.5	=	Superior
0.7 - 1.3	=	High average
0.6 - -0.6	=	Average
-0.7 - -1.3	=	Low average
-1.4 - -1.9	=	Borderline
< -2.0	=	Clinically impaired

Raw study scores are displayed in seconds with no specified level of impairment (Appendix 1.4). Throughout the study period, among survivors, ICU patients show higher scores or greater impairment with both groups peaking at 1 month, the time point of greatest impairment. Both groups improved at 3 months, after which, controls then plateau out to 24 months. ICU patients also plateaued until 12 months after which there is an ongoing upward trajectory, denoting deterioration, continuing to (and possibly past) 24 months. Deceased patient scores (both groups) are considerably higher (worse) than that of the total cohort at day 28, indicating much higher levels of impairment after which drop to below initial testing levels at time of death (Figure 6.0).

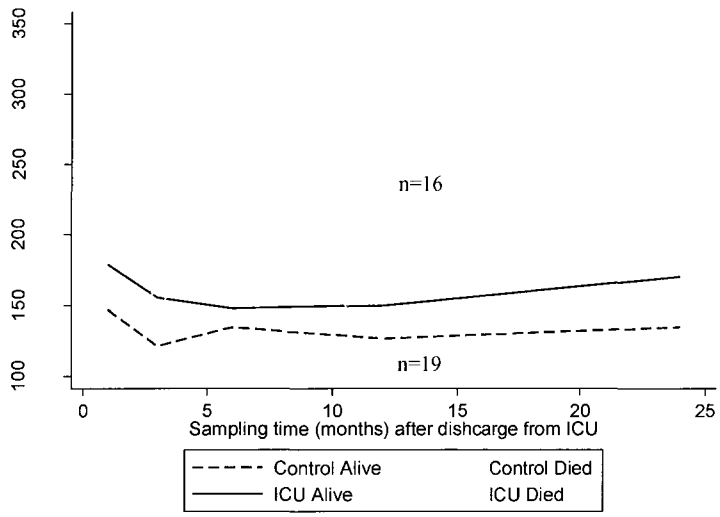


Figure 6: Trailmaking B Task Outcomes - ICU Cases and Controls recovery over time
(A lower score denotes improvement)

Mixed model regression analysis shows strong significance between groups recovery over time. As patients' mean age increase levels of executive cognitive impairment increase at each time point relative to younger patients (Coefficient, 2.065; CI, 1.275 to 2.854; $p \leq 0.001$;

all older patients, and Coefficient, 1.850; CI, 1.051 to 2.652; $p \leq 0.001$; older survivors only, sex adjusted) (Table 18.0).

Table 18.0 *Trailmaking B Effect of Age over Time*		
Test Trailmaking (sec)	Age x Time Coefficient (95% CI)	*p* value
Survivors	1.85 (1.051 to 2.652)	0.000
All	2.065 (1.275 to 2.854)	0.000

- Stroop Task

The SNST is a timed task and measures cognitive flexibility and control and executive functioning. Similar to the TMT, scores were converted to z scores and results showed extraordinarily high levels of impairment (Figure 7.0, Table 17.0, Appendix 1.5).

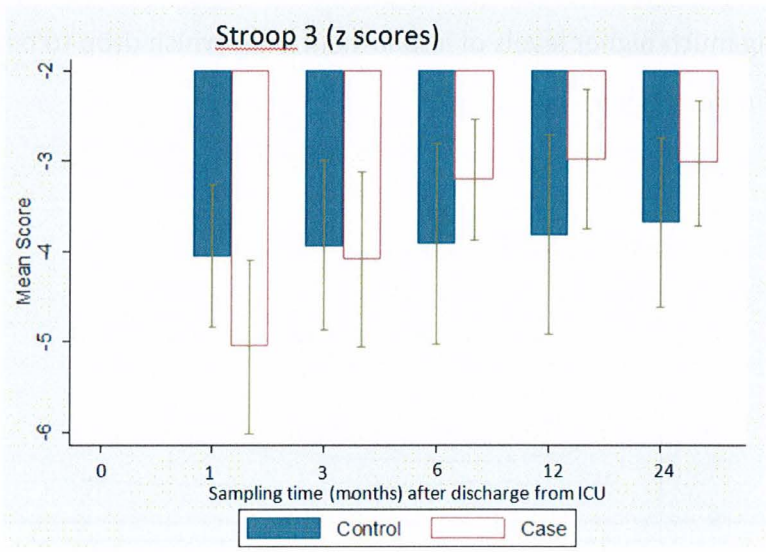


Figure 7.0 Stroop 3 (z scores) - ICU Cases and Controls recovery over time

Table 17.0. z score interrpretation		
>3.0		Very superior
1.4 - 2.5	=	Superior
0.7 - 1.3	=	High average
0.6 - -0.6	=	Average
-0.7 - -1.3	=	Low average
-1.4 - -1.9	=	Borderline
< -2.0	=	Clinically impaired

The SNST is a general measure of cognitive flexibility, control, mental flexibility and executive function. Study scores are displayed as a ratio of Stroop 3 - Stroop 2 scores with no specified level of impairment (Appendix 3.2). Among survivors, results show highest scores (greatest impairment) for ICU patients at 1 month and improve considerably at time point 3 months to plateau to levels (below controls) sustained out to 24 months. Highest scores and greatest impairment also occur for controls at 1 month although generally remain constant throughout the study period, resting at a higher level to ICU patients. Similar curves of recovery are evident among both survivor groups, with ICU patients and control scores equilibrating after 12 months. Deceased control scores are much higher (worse) than deceased ICU patients (also much higher than overall cohort) with scores decreasing at 3 months although continue to remain much higher than other groups until death (Figure 8.0). Using mixed model regression analysis for a one unit increase in SNST Ratio mean score, older patients' scores increased (worsened) by a coefficient (factor) of 0.009 (CI, 0.004 to 0.013; $p \leq 0.001$) and 0.008 (CI, 0.004 to 0.013; $p \leq 0.001$) respectively relative to younger patients (sex adjusted). Therefore as patients' mean age increases, cognitive executive function worsens at each time point relative to younger patients (Table 19.0).

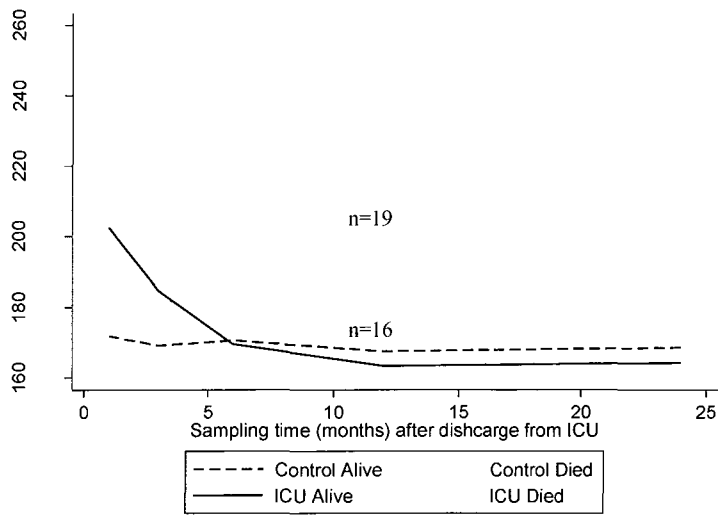


Figure 8.0. Stroop Task Test Outcomes - ICU Cases and Controls recovery over time
(A lower score denotes improvement)

Table 19.0. *Stroop Task Age over Time*		
Test	Coefficient (95%; CI)	
Stroop 3 ratio	Age x Time	*p value*
Survivors	0.008 (0.004 to 0.013)	0.000
All	0.009 (0.004 to 0.013)	0.000

Psychosocial Outcomes

- Impact of Events Scale– Revised

The IES-R provides a dimensional assessment of PTSD related symptoms. Participants specify the frequency with which they have had avoidance-, intrusion-, and hyper- arousal related thoughts over the preceding seven days. The higher the score is indicative of greater the level of distress, with the total score ranging from 0 - 88. Among survivors, the data indicates that ICU patients have a higher mean score at 1 month which is sustained through to 6 months. Scores decrease sharply by 12 months (improve) and continue until falling to almost match controls at 24 months. Data standard deviation uncovers higher levels of impairment. Controls mean scores are much lower at one month correcting to plateau at six months and

by 24 months show no measurable level of PTSD. ICU patient test scores also drop to negligible levels by 24 months. Data for the deceased ICU patients display similar high levels to the overall cohort, and then dip before peaking again at very high levels at 24 months. However, it needs to be noted that this data is derived from very small numbers. (Figure 9.0, Appendix 1.6).

Mixed model regression analysis outcomes show ICU patients achieve lower scores (greater improvement) in distress symptoms at each time point relative to controls (Coefficient, -0.348; CI, -0.588 to 0.108; $p = 0.004$, all cases and Coefficient, -0.350; CI, -0.589 to 0.111; $p = 0.004$, survivor cases only, age, sex adjusted) (Table 20.0).

Additionally, comparing sex related data for a one unit increase in the mean IES-R total score, female patients and surviving female patients increased by a coefficient (factor) of 2.853 (CI, 0.205 to 5.502; $p = 0.035$) and 2.630 (CI, -0.049 to 5.310; $p = 0.054$) respectively

relative to male patients (age adjusted). Therefore female patients showed higher levels of distress symptoms related to PTSD at each time point relative to male patients.

Comparing age related data as patients' mean age increases, distress symptoms decrease (improve) relative to younger patients (Coefficient, -0.161; CI, -0.239 to 0.084; $p \leq 0.001$, all older patients, and Coefficient, -0.153; CI, -0.231 to 0.076; $p \leq 0.001$, older survivors only, sex adjusted).

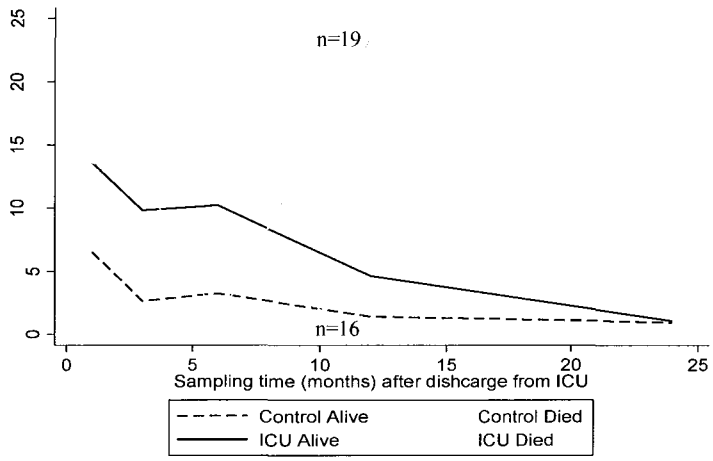


Figure 9.0. Impact of Events Scale – Revised (Total) Test Outcomes
ICU Cases and Controls recovery over time
(A lower score denotes improvement)

Table 20.0. *Impact of Events Scale – Revised (Total) Effect Over Time*

Test IES TOTAL	Coefficient (95%; CI) Case x Time	*p* value	Coefficient (95%; CI) Age x Time	*p* value	Coefficient (95%; CI) Sex x Time	*p* value
Survivors	-0.350 (-0.589 to -0.111)	0.004	-0.153 (-0.231 to -0.076)	0.000	2.630 (0.049 to 5.310)	0.054
All	-0.348 (-0.588 to -0.108)	0.004	-0.161 (0.239 to -0.084)	0.000	2.853 (0.205 to 5.502)	0.035

The incidence of IES-R impairment (symptoms of distress related to the event) for both groups, were highest for both groups at the one month time point. The incidence within both groups drop dramatically with no impaired within either group at 24 months (Table 21.0.

Table 21.0. Impact of Events Scale – Revised (Freq; %)

	ICU			Controls		
From discharge (months)	Not impaired	Impaired	Dead	Not impaired	Impaired	Dead
1	58 (82.86)	12 (17.14)	0 (0.00)	65 (91.55)	6 (8.45)	0 (0.00)
3	61 (85.92)	7 (9.68)	3 (4.23)	64 (94.12)	1 (1.47)	3 (4.41)
6	60 (85.71)	4 (5.71)	6 (8.57)	62 (88.57)	2 (2.86)	6 (8.57)
12	56 (80.00)	4 (5.71)	10 (14.29)	61 (87.14)	2 (2.86)	7 (10.00)
24	58 (81.69)	0 (0.00)	13 (18.31)	59 (85.51)	0 (0.00)	10 (14.49)

(A decrease in mean IES-R total mean score denotes improvement)

- *Avoidance Component*

Avoidance is one of three components of the IES-R. The avoidance component has a total score range between 0-32, the higher the score, the greater the level of avoidance symptoms. ICU patients display much higher levels of avoidance compared with controls at all timepoints, with no overlap of standard deviation at three and six months. This component illustrates a high level of distress among cases which is sustained to six months and then decreases largely by 12 months and further at 24 months. Scores were more moderate for controls and similarly to cases, both display a trajectory of improvement out to 24 months which possibly may continue (Figure 10.0, Appendix 3.3).

Using mixed model regression analysis ICU patients' symptoms of Avoidance decreased (improved) relative to controls (Coefficient, -0.138; CI, 0.221 to -0.055; $p = 0.001$ for all cases and Coefficient, -0.137; CI, 0.2, for survivor cases only, age, sex adjusted) (Table 22.0).

Comparing age related data, as mean age increases, Avoidance symptoms related to PTSD decrease (improve) relative to younger patients (Coefficient, -0.059; CI, 0.088 to -0.031; $p \leq 0.001$, older survivors only, sex adjusted).

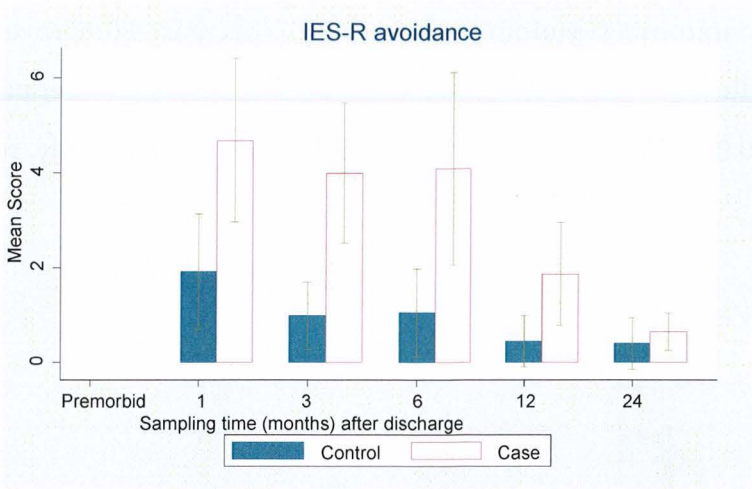


Figure 10.0. Impact of Events Scale – Revised (Component: Avoidance Test Outcomes) ICU Cases and Controls recovery over time
(A lower score denotes improvement)

Table 22.0. *Impact of Event Scale – Revised (Component: Avoidance) Effect over Time*

Impact of Events (Avoidance)	Coefficient (95%; CI) Case x Time	*p* value	Coefficient (95%; CI) Age x Time	*p* value
Survivors	-0.138 (0.221 to -0.055)	0.001	-0.059 (0.088 to -0.031)	0.000
All	-0.137 (0.221to -0.054)	0.001		

- *Hyperarousal Component*

Hyperarousal is the second component of the IES-R. The hyperarousal component comprises a total score range between 0-24, the higher the score, the greater the level of Hyperarousal symptoms. ICU patients display higher levels of hyperarousal compared with controls at all timepoints although standard deviations overlap for all but for time point six months. Controls show much levels of avoidance with both groups dropping to negligible levels by 24 months. (Figure 11, Appendix 3.4).

Using mixed model regression analysis, ICU patients' symptoms of hyperarousal increased (worsened) relative to controls (Coefficient, 1.731; CI, 0.628 to 2.834; $p = 0.002$, age, sex adjusted). It is notable there was no statistical significance in case by time effect of surviving ICU patients.

Comparing age related data (excluding deceased) at all timepoints, as patients mean age increases, hyperarousal symptoms related to PTSD decreased (improved) relative to younger patients (Coefficient, -0.042; CI, -0.064 to -0.020; $p \leq 0.001$, all older patients and Coefficient, -0.042; CI,-0.064 to 0.019; $p \leq 0.001$, older survivors only, sex adjusted) (Table 23.0).

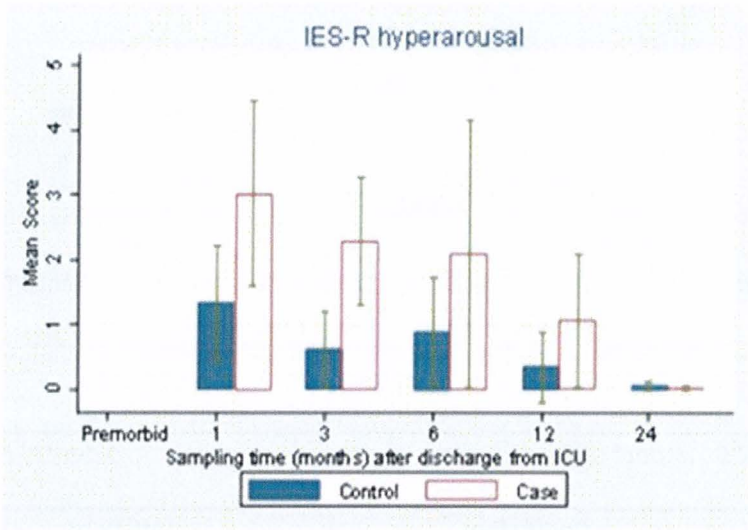


Figure 11.0. Impact of Events Scale – (Component: Hyperarousal)
ICU Cases and Controls recovery over time
(A lower score denotes improvement)

Table 23.0. *Impact of Events Scale – Revised (Component Hyperarousal) Effect over Time*

Impact of Events Hyperarousal	Coefficient (95%; CI) Case x Time	*p* value	Coefficient (95%; CI) Age x Time	*p* value
Survivors	-0.079 (0.163 to 0.004)	0.063	-0.042 (-0.064 to -0.019)	0.000
All	1.731 (0.628 to 2.834)	0.002	-0.042 (-0.064 to -0.020)	0.000

- *Interruptions Component*

Interruptions are the third component of the IES-R. The interruptions component has a total score range between 0-24, the higher the score, the greater the level of interruption symptoms.

The same pattern exists in this component for both groups with higher levels for both groups at day 28, dropping steadily, particularly at 12 months, down to negligible levels at 24

months. Again, scores are much higher for ICU patients at all timepoints, with no overlap in standard deviation at three months. At 24 months ICU patients' scores drop lower than controls (Figure 12.0, Appendix 3.5).

Using mixed model regression analysis, ICU patients' symptoms of interruptions related to PTSD decrease (improve) relative to controls (Coefficient, -0.132; CI, -0.220 to -0.043; p = 0.003, all cases and Coefficient, -0.132; CI, -0.220 to -0.044; p = 0.003, ICU patient survivors only, age, sex adjusted) (Table 24.0).

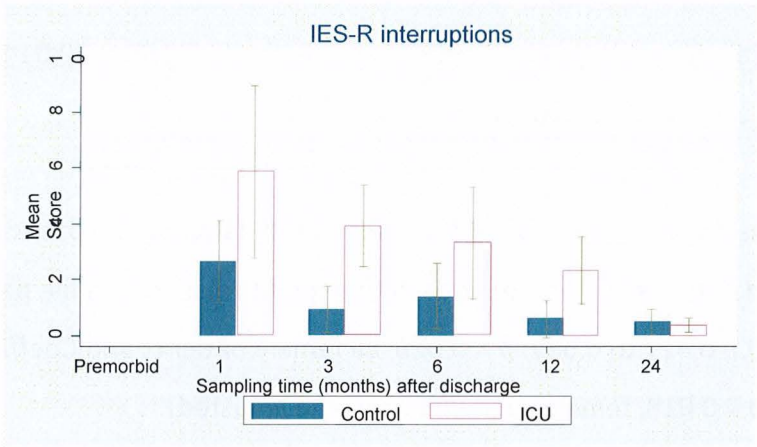


Figure 12.0. Impact of Events Scale-Revised (Component: Interruptions) Test Outcomes
ICU Cases and Controls recovery over time
(A lower score denotes improvement)

Table 24.0. *Impact of Events Scale-Revised (Component: Interruptions) Effect over Time*

Impact of Events Interruptions	Coefficient (95%; CI) Case x Time	*p* value
Survivors	-0.132 (-0.220 to -0.044)	0.003
All	-0.132 (-0.220 to -0.043)	0.003

- *Hospital Anxiety and Depression Scale (HADS)*

The HADS is a screening tool developed to measure mood disorders of anxiety and depression in non-psychiatric patients. The total score range is 0 - 28, the higher the score, the greater the level of anxiety and depression symptoms. Among survivors, study data

show both groups show very similarly shaped recovery curves. Both groups of survivors show greatest scores (highest levels of anxiety and depression) at 1 month. Surprisingly, controls show higher levels of anxiety and depression than ICU patients. Both groups show an improving trend (scores declining) with both groups plateauing at 12 months and continuing to drop (improve) through to 24 months (and beyond). ICU patients peak slightly at day 28 however they plateau out to 24 months (Figure 13.0, Appendix 1.7).

Mixed model regression analysis show ICU patients' symptoms of anxiety and depression decrease (improve) at each time point relative to controls (Coefficient, -0.914; CI, -0.168 to -0.014; $p = 0.020$ for all ICU patients and Coefficient -0.090; CI, -0.165 to -0.014; $p = 0.020$, survivor cases only, age, sex adjusted, Table 25.0).

Mixed model regression analysis show, within sex related data, female patients score higher levels of anxiety and depression (worse) at each time point relative to male patients (Coefficient, 3.548, CI, 0.427 to 6.669; $p = 0.026$, all female patients and Coefficient, 3.766, CI, 0.653 to 6.879; $p = 0.018$, female survivors only, age adjusted).

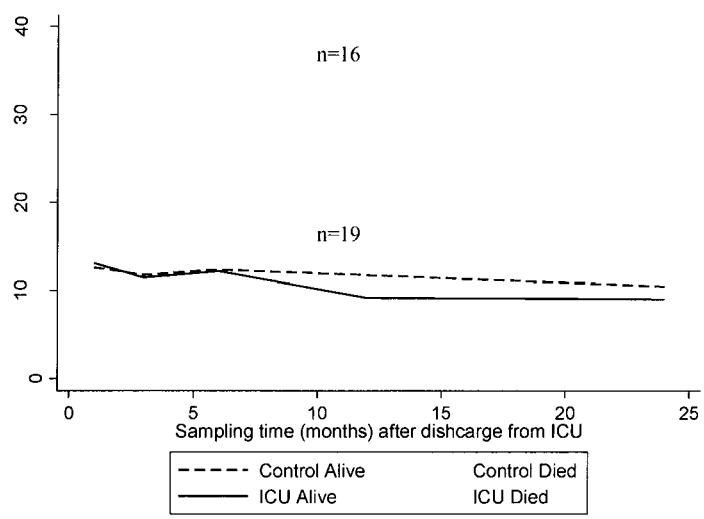


Figure 13.0. Hospital Anxiety and Depression Scale test Outcomes
ICU Cases and Controls recovery over time
(A lower score denotes improvement)

Table 25.0. Hospital Anxiety and Depression Scale Effect over Time

Test HADS TOTAL	Coefficient (95%; CI) Case x Time	*p* value	Coefficient (95%; CI) Sex x Time	*p* value
Survivors	-0.090 (-0.165 to -0.014)	0.020	3.766 (0.653 to 6.879	0.018
All	-0.914 (-0.168 to -0.014)	0.020	3.548 (0.427 to 6.669)	0.026

- *Hospital Anxiety and Depression Scale - Component Scores*

As HADS subscales (component) data were not used in the predictor model, comparator survivor and deceased patient groups, together with effect over time were not analysed.

- *Hospital Anxiety and Depression Scale-Anxiety subscale (HADS-A)*

The HADS-A is a self-assessment screening tool for symptoms of anxiety. Subscale scores range between 0 - 14, higher scores greater symptoms of anxiety. Both ICU patients and controls scores were similar at day 28 decreasing at three months however peaking at six months before again trending down out to 24 months, at which point ICU patients' level of anxiety was less than controls. This trend in recovery may continue to improve past 24 months. Deceased patient scores are similar to total cohort scores, with deceased case scores lower (Figure 14.0, Appendix 1.8).

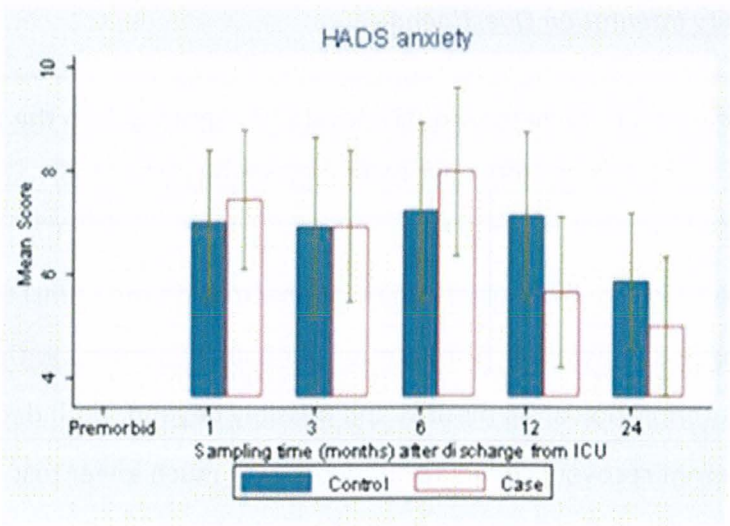


Figure 14.0. Hospital Anxiety and Depression Scale – Anxiety Subscale Test Outcomes
ICU Cases and Controls recovery over time
(A lower score denotes improvement)

- *Hospital Anxiety and Depression Scale – Depression Subscale (HADS-D)*

The HADS-D is a self-assessment screening tool for symptoms of depression. Subscale scores range between 0 - 14, higher scores greater symptoms of depression. Difference in mean scores between ICU patients and controls were greater however levels of depression overall lower at each time point than for anxiety. Levels of depression for both groups were highest at day 28, slowly decreasing towards 24 months. Generally after six months both groups show a trend of recovery towards 24 months with possible ongoing improvement. Test scores indicate the low levels of depression remained fairly constant overall for both groups (Figure 15.0, Appendix 1.9).

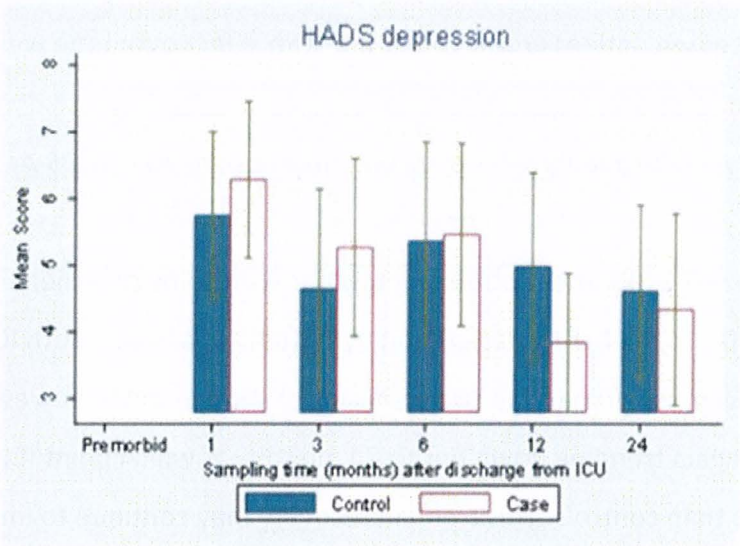


Figure 15.0. Hospital Anxiety and Depression Scale – Depression Subscale
ICU Cases and Controls recovery over time
(A lower score denotes improvement)

- *Community Integration Questionnaire*

The CIQ is a brief measure of an individual's level of integration into the home and community with a score range of 0 – 29, with impairment defined as a score ≤ 6). Among survivors, recovery curves are similar for both groups. ICU patients have lower scores (worse) compared with controls, (particularly at premorbid time point) throughout the study period, indicating less integration. Both groups plateau at 6 months with cases showing a slight trend of deterioration at 24 months and possibly beyond. Both deceased groups display very different recovery curves to survivors with much lower test scores throughout the study period, reflecting less integration. (Figure 16.0, Appendix 1.10).

Using mixed model regression analysis, ICU patients' community and home integration decrease (deteriorate) relative to controls at each time point (Coefficient, -0.139; CI, -0.192 to -0.085; $p \leq 0.001$ for all ICU patients and Coefficient, -0.134, CI, -0.186 to -0.082; $p \leq 0.000$, ICU patient survivors only, age, sex adjusted, Table 26.0).

Comparing age related data as patients mean age increases, anxiety and depression symptoms decreased (improved) relative to younger patients (Coefficient, -0.139; CI, 0.192 to -0.085; $p \leq 0.001$ for all older patients and Coefficient, -0.134; CI,0.186 to -0.082; p=0.000 for older survivors only, sex adjusted) .

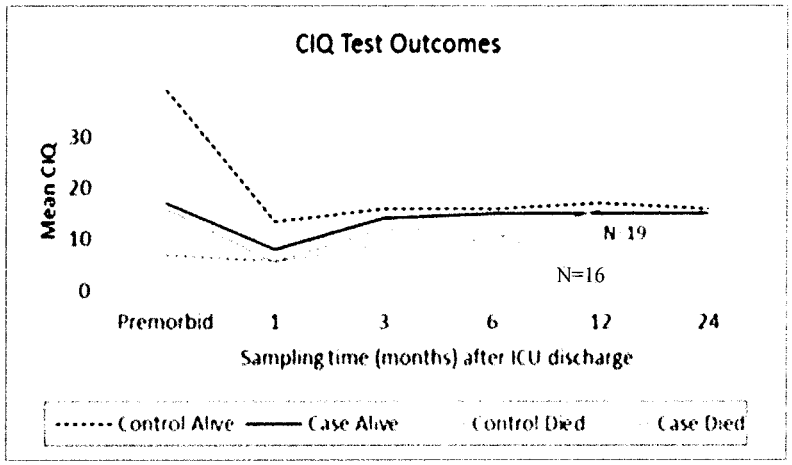


Figure 16.0. Community Integration Test Outcomes - ICU Cases and Controls recovery over time (A higher score denotes improvement)

Table 26.0. *Community Integration Questionnaire Effect over Time*

Community Integration Questionnaire (CIQ)	Coefficient (95% CI) Age x Time	*p* value
Survivors	-0.134 (-0.186 to -0.082)	0.000
All	-0.139 (-0.192 to -0.085)	0.000

- <u>Short Form Questionnaire-36v2</u>

The SF-36v2 is a 36-item multipurpose health quality of life survey that measures overall health, functional status and mental status. It measures 8 domains: role limitations due to physical problems, bodily pain, general health perceptions, energy/vitality, social

functioning, role limitations due to emotional problems and mental health, equating to two summary scales; physical component score and mental component score. Score range is 0 - 100 with impaired classified as ≤ 45.

- *Physical Component Score*

Among survivors, premorbid values show ICU patients perceive a higher level of physical health compared with controls although at day 28 both groups drop, before plateauing at three months at similar levels to controls though never regain premorbid levels. Control curves show deterioration from six months continuing to 24 months and possibly beyond. ICU patients drop markedly at 3 months, only reaching control levels at 12 months. The recovery curves of both deceased groups are distinctly different to those of survivors and have substantially lower scores at all timepoints indicating very low perceived levels of physical health. (Figure 17.0, Appendix 1.11). Using mixed model regression survivor ICU patients' quality of life PCS decrease (deteriorate) at each time point relative to survivor controls (Coefficient, -0.350; CI, -0.463 to -0.236; $p \leq 0.000$, age, sex adjusted, Table 27.0).

Comparing age related data as patients mean age increases, quality of life PCS decreased (deteriorated) at each time point relative to younger patients (Coefficient, -0.349; CI, -0.459 to -0.000; p=0.000 for all older patients and Coefficient, -0.349; CI,-0.462 to 0.236; $p = 0.001$ for older survivors only, sex adjusted).

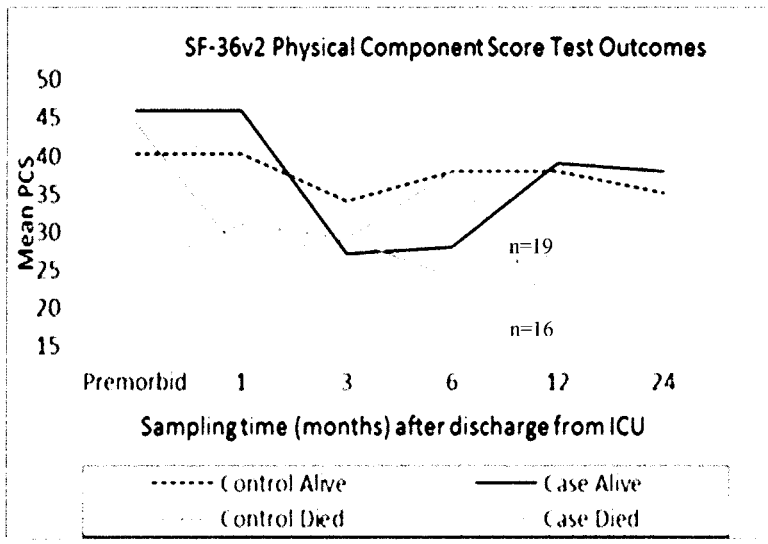


Figure 17.0. SF-36v2 Physical Component Score Test Outcomes
ICU Cases and Controls recovery over time
(A higher score denotes improvement)

Table 27.0. *SF-36v2 Physical Component Score Effect over Time*

SF-36v2 PCS	Coefficient (95% CI) Case x Time	*p* value	Coefficient (95%;CI) Age x Time	*p* value
Survivors	-0.350 (-0.463 to -0.236)	0.000	-0.349 (-0.462 to -0.236)	0.000
All			-0.349 (-0.459 to 0.000)	0.000

Surprisingly, 70% of controls were impaired at the premorbid time point, compared with 40% of cases. The incidence of PCS impairment among both groups is highest at the one month time point after which both groups show a trend of improvement out to 24 months. At 24 month time point, almost 48% of ICU patients are impaired while the incidence of impairment among controls at 24 months is exceeds 56% (Table 28.0)

Table 28.0 *SF-36v2 Physical Component Score (Freq; %)*

	SF-36v2 PCS ICU			SF-36v2 PCS Controls		
from discharge (months)	Not impaired	Impaired	Dead	Not impaired	Impaired	Dead
Preadmission	40 (57.14)	30 (42.86)	0 (0.00)	19 (28.36)	48 (71.64)	0 (0.00)
1	4 (5.71)	66 (94.29)	0 (0.00)	10 (14.93)	57 (85.07)	0 (0.00)
3	19 (26.76)	49 (69.01)	3 (4.23)	21 (33.87)	38 (61.29)	3 (4.84)
6	20 (28.57)	44 (62.86)	6 (8.57)	22 (34.38)	36 (56.25)	6 (9.38)
12	22 (30.99)	39 (54.93)	10 (14.08)	20 (31.25)	37 (57.81)	7 (10.94)
24	24 (33.80)	34 (47.89)	13 (18.31)	17 (27.42)	35 (56.45)	10 (16.13)

- *Mental Component Score*

Overall, among survivors, both groups score similarly at all timepoints, plateauing between 3 and 6 months and maintaining this level out to 24 months. ICU patients have a slightly higher level of MCS than controls at all timepoints, perceiving a higher level of mental health and

continue to maintain a higher score out to 24 months (Figure 18.0, Appendix 1.12). Using mixed model regression sex related data show female patients score lower MCS levels relative to male patients (Coefficient, -4.428; CI, -8.488 to -0.369; *p*=0.032, age adjusted, Table 29.0).

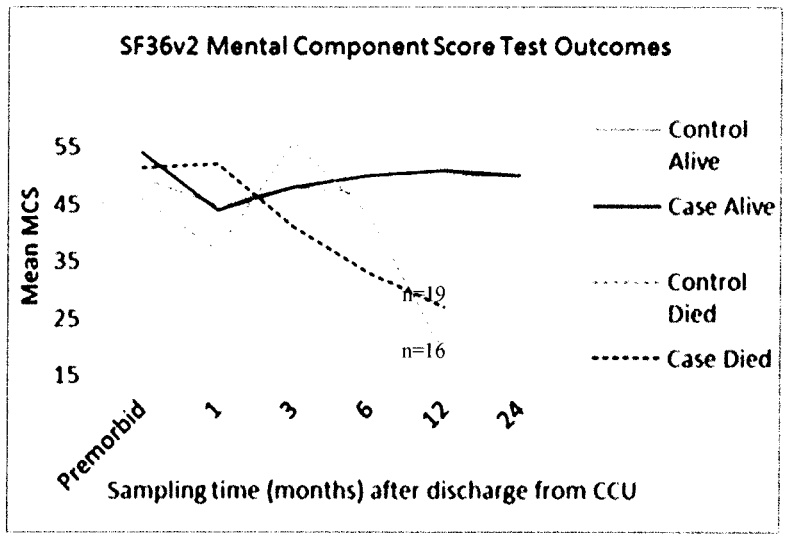


Figure 18.0. SF36v2 Mental Component Score Test Outcomes

ICU Cases and Controls recovery over time

(A higher score denotes improvement)

Table 29.0 *SF-36v2 Mental Component Score Effect over Time*

SF36v2 MCS	Coefficient (95% CI) Sex x Time	p value
Survivors	-4.428 (-8.488 to -0.369)	0.032

The highest incidence of impairment for the MCS for both groups is the one month time point, with ICU patients showing 50% impairment and controls comparatively less although high levels of incidence with almost 42% impaired. However at 24 months, the incidence of impairment among cases drops lower than controls, with 18% of ICU patients still impaired and almost 26% of controls impaired (Table 30.0).

Table 30.0 *SF36v2 Mental Component Score (Freq; %)*						
	SF-36v2 MCS ICU			SF-36v2 MCS Controls		
from discharge (months)	Not impaired	Impaired	Dead	Not impaired	Impaired	Dead
PREMORBID	59 (84.29)	11 (15.71)	0 (0.00)	49 (73.13)	18 (26.87)	0 (0.00)
1	35 (50.00)	35 (50.00)	0 (0.00)	39 (58.21)	28 (41.79)	0 (0.00)
3	42 (59.15)	26 (36.62)	3 (4.32)	38 (61.29)	21 (33.87)	3 (4.84)
6	44 (62.86)	20 (28.57)	6 (8.57)	41 (64.06)	17 (26.56)	6 (9.38)
12	46 (64.79)	15 (21.13)	10 (14.08)	39 (60.94)	18 (28.13)	7 (10.94)
24	45 (63.38)	13 (18.31)	13 (18.31)	36 (58.06)	16 (25.81)	10 (16.13)

- <u>Short Form Questionnaire - 36v2 Factor scores</u>

- *<u>SF-36v2- Bodily Pain (BP)</u>*

Examining test scores at each time point from premorbid time point through to 24 months, cases perceive a higher level of bodily pain at premorbid time point which reduces at one month although again climbs and plateaus at 3 months. The BP component measured by controls was constant throughout the study period dipping slightly at 1 month, although also plateauing after 3 months (Figure 19.0, Appendix 1.13).

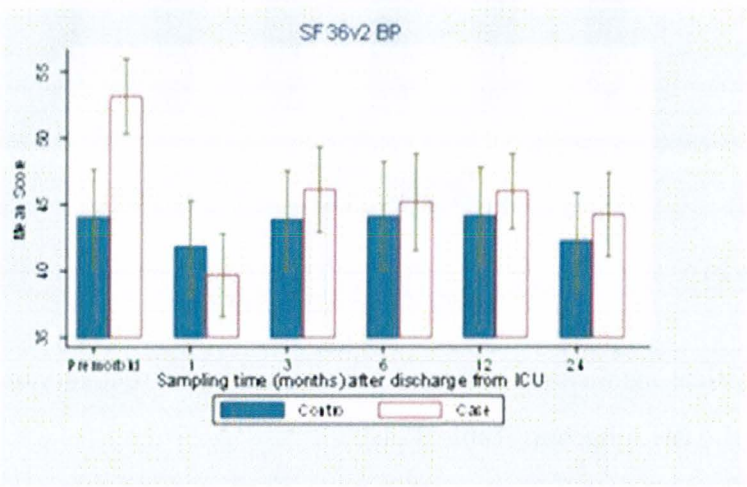


Figure 19.0. SF36v2-BP (Bodily Pain) Test Scores - ICU Cases and Controls recovery over time
(A higher score denotes improvement)

There is no statistical significance between groups during the recovery of ICU patients and controls within the BP subgroup (Table 31.0).

Table 31.0. *Change in SF-36v2 BP score over the 2-year study period*

SF-36v2 subgroup	Controls	ICU	*p*-value
BP	0.24	0.14	0.350

- *SF-36v2-General Health*

Examining test scores at each time point from premorbid time point through to 24 months, show ICU patients regard they have a higher level of GH compared with controls at premorbid time point dipping sharply at day 28 closer to control levels and then plateauing to 24 months. The level of perceived GH for controls is much lower at premorbid time point, and although dip slightly at day 28 exceed premorbid levels by 3 months however after which subtly fall lower than ICU patients consistently from six months through to 24 months (Figure 20, Appendix 1.14).

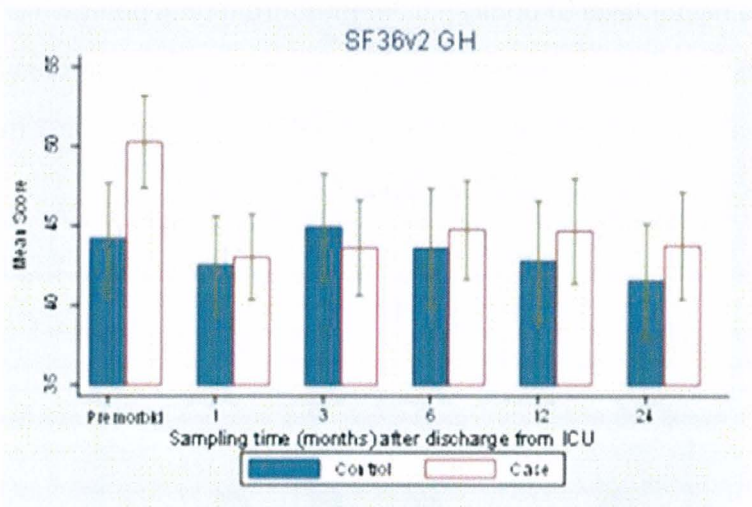


Figure 20.0. SF36v2-GH (General Health) - ICU Cases and Controls recovery over time
(A higher score denotes improvement)

There is no statistical significance between groups during the recovery of ICU patients and controls within the GH subgroup (Table 32.0).

Table 32.0. *Change in SF-36v2-GH score over the 2-year study period*			
SF-36v2 subgroup	Controls	ICU	*p*-value
GH	0.24	0.15	0.28

- *SF-36v2-Mental Health*

Based on test scores, ICU patients perceive a higher level of MH compared with controls at premorbid time point falling sharply at day 28 to levels closer to controls however recovery curves show an ongoing upward trajectory out to 24 months. Although ICU patients do not regain their premorbid level of perceived MH during the 24 month study period the trajectory suggests one of ongoing improvement. The control group's perceived MH likewise dips at day 28 although not as sharply as cases at the same time point and likewise continue to steadily improve out to and possibly past 24 months (Figure 21, Appendix 1.15).

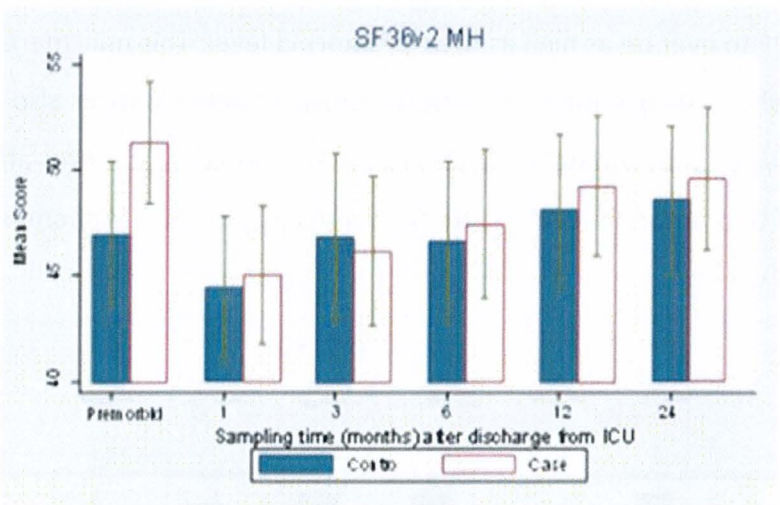


Figure 21.0. SF-36v2-MH (Mental Health) - ICU Cases and Controls recovery over time
(A higher score denotes improvement)

There is no statistical significance between groups during the recovery of ICU patients and controls within the MH subgroup (Table 33.0).

Table 33.0. *Change in SF-36v2 MH score over the 2-year study period*

SF-36v2 subgroup	Controls	ICU	*p*-value
MH	0.38	0.35	0.772

- *SF-36v2-Physical Functioning*

Examining test scores at each time point from premorbid time point through to 24 months, ICU patients show higher test scores at premorbid time point compared with controls dropping dramatically at day 28. By the 3 month time point test scores show an improvement with continuing improvement to 24 months, however ICU patients do not ever regain their premorbid test scores within the 24 months, showing that ICU patients do not perceive their PF to ever be as high as their premorbid level. This may merely be indicative of potential bias when asking patients to reflect retrospectively. Controls also perceive a reduction in physical functioning at day 28 reflected by lower test scores although recovering well to premorbid levels by three months (Figure 22.0, Appendix 1.16).

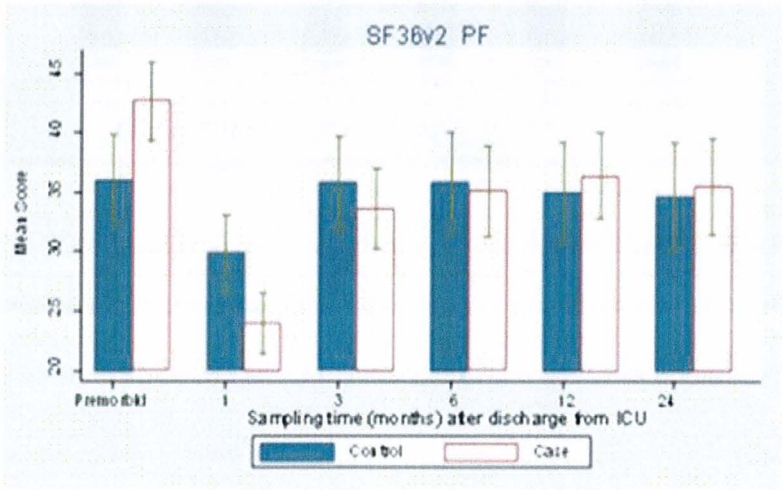


Figure 22.0. SF-36v2-PF (Physical Function) - ICU Cases and Controls recovery over time
(A higher score denotes improvement)

The recovery of physical function (PF) between ICU patients and controls was statistically significant (Table 34.0).

Table 34.0. *Change in SF-36v2 –PF score over the 2-year study period*

SF-36v2 subgroup	Controls	ICU	*p*-value
PF	-2.85	-3.06	0.024

- *SF-36v2-Role Emotional*

Examining test scores at each time point from premorbid time point through to 24 months show at the premorbid time point, ICU patients scoring more highly in the area of RE than controls. Both group scores drop dramatically at day 28 with controls showing recovery to premorbid levels by 3 months, continuing to improve and exceeding premorbid levels at 24 months, with the potential for continued improvement past 24 months. Recovery for ICU patients is more gradual, with test scores showing gradually recovery by 3 months and plateau at 12 months. ICU patients so not ever perceive they regain premorbid levels in the area of emotional health (Figure 23, Appendix 1.17).

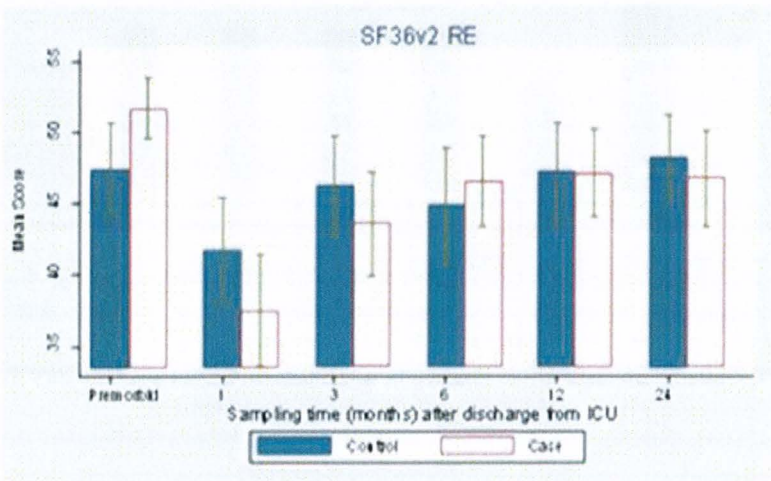


Figure 23.0 SF-36v2-RE (Role Emotional) - ICU Cases and Controls recovery over time
(A higher score denotes improvement)

There is no statistical significance between groups during the recovery of ICU patients and controls within the RE subgroup (Table 35.0).

Table 35.0. *Change in SF-36v2 RE score over the 2-year study period*

SF-36v2 subgroup	Controls	ICU	*p*-value
RE	-2.07	-2.12	0.679

- *SF-36v2-Role Physical*

Examining test scores at each time point from premorbid time point through to 24 months show ICU patients dip very sharply at day 28 in response to the effects of critical illness, to a much greater degree compared with control test scores. Recovery is evident by 3 months with scores continuing to increase out to 24 months, however ICU patient scores do not ever match premorbid levels within the 24 month study period. This shows the potential for further recovery past 24 months. Controls adopt the same pattern of recovery with a more modest drop in scores at day 28. Recovery is seen at 3 months however RP test scores plateau at this point and do not regain their perceived premorbid levels of RP function (Figure 24.0, Appendix 1.18).

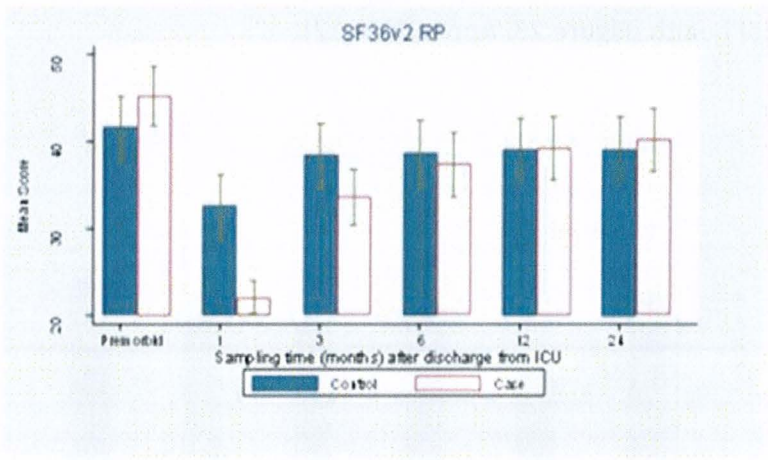


Figure 24.0. SF-36v2-RP (Role Physical) - ICU Cases and Controls recovery over time
(A higher score denotes improvement)

There is no statistical significance between groups during the recovery of ICU patients and controls within the RP subgroup (Table 36.0).

Table 36.0. *Change in SF-36v2 RP score over the 2-year study period*

SF-36v2 subgroup	Controls	ICU	*p*-value
RP	-5.90	-6.28	0.000

- *SF-36v2-Social Function*

Based on test scores at each time point from premorbid time point through to 24 months show ICU patients perceive a higher level of SF at the premorbid time point compared with controls. Both groups test scores drop at day 28 with ICU patients showing a trajectory of continued recovery out to 24 months. The levels of perceived premorbid SF are not regained during the 24 months study period however the ICU patient trajectory show cases potentially may continue to improve out past 24 months. Controls show recovery to premorbid levels by 3 months after which they plateau, with no further improvement in their perceived SF past 3 months (Figure 25.0, Appendix 1.19).

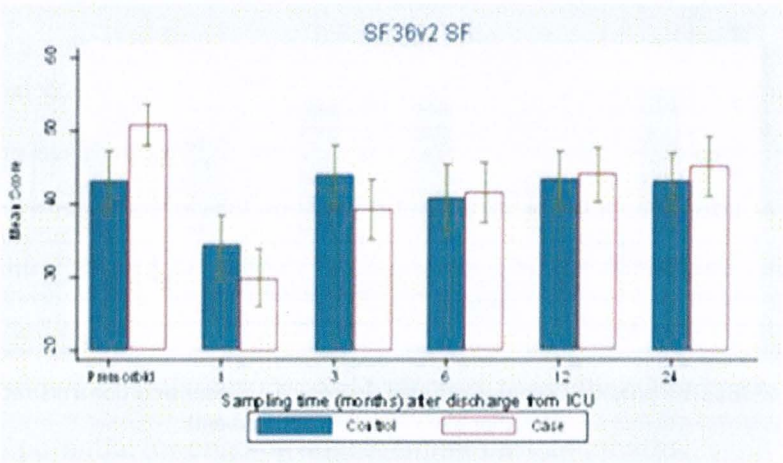


Figure 25.0. SF-36v2-SF (Social Functioning) - ICU Cases and Controls recovery over time
(A higher score denotes improvement)

at 3 months to similar levels of controls. ICU patients do not show recovery in either component score back to premorbid levels within the 24 month study period. Control curves show deterioration from six months continuing out to 24 months. ICU patients have a slightly higher level of MCS than controls and continue to maintain a higher score out to 24 months.

Test Scores for Diagnostic Subgroups

1. Sepsis
2. Neoplasia
3. Trauma
4. Other

Data was sorted into the diagnostic subgroups of 'sepsis', 'trauma' 'neoplasia' and 'other', to examine significance of test outcome among specific diagnostic groups. Test scores and recovery curves include combined data of both survivors and deceased scores (Appendix 4.1 – 4.11). Significance between groups is calculated using independent-samples t-test. Patient numbers within each diagnostic subgroup vary. Overall sample sizes of diagnostic subgroups are small, with trauma and neoplasia considered too small to analyse (< 10 participants). Discussion will only include the statistically significant subgroups, being the sepsis diagnostic group using the DS, LNS, TMT, SNST, SF36v2 MCS, CIQ and FIM and the 'other' diagnostic subgroup using the SF-36v2 PCS and IES-R. Mean scores are displayed in Appendices 4.1 – 4.11.

Sepsis subgroup

The sepsis diagnostic subgroup shows significance between group recoveries for the DS, LNS SNST, TMT, MCS, CIQ and FIM tasks while the 'Other' subgroup shows significance between groups for the TMT, PCS and IES-R tasks (Table 39.0).

Table 39.0. Outcome among diagnostic subgroups

Diagnostic subgroup	LNS traj	LNS (p)	DS traj	DS (p)	STROOP traj	SNST (p)	TMT traj	TMT (p)	MCS traj	MCS (p)	PCS traj	PCS (p)	CIQ traj	CIQ (p)	HADS traj	HADS (p)	IES-R traj	IES-R (p)	FIM traj	FIM (p)	N control	N case
SEPSIS	↓	0.000	↓	0.000	↓	0.004	↓	0.001	↑	0.004	~	0.342	↓	0.048	~	0.291	~	0.415	↓	0.025	15	29
OTHER	~	0.420	~	0.276	~	0.090	↓	0.006	~	0.278	↓	0.025	~	0.402	~	0.081	↑	0.017	~	0.149	45	32

↑ improving trajectory; ↓ declining trajectory; ~ not significant

- Sepsis subgroup - Digit Span

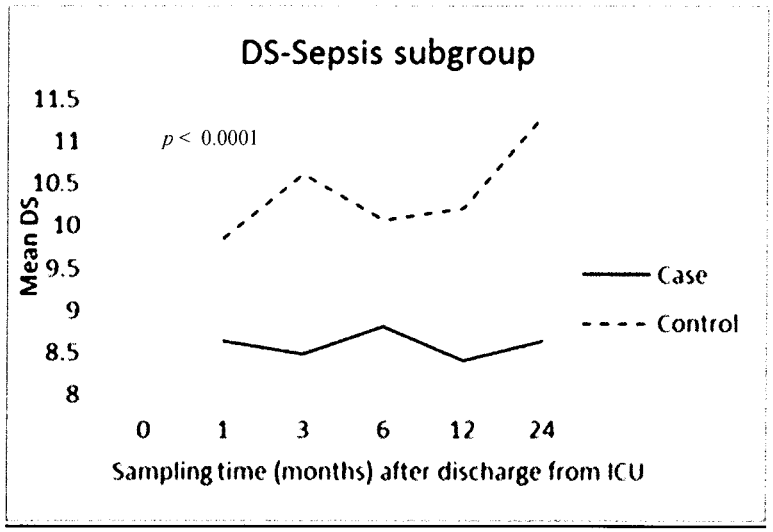


Figure 27.0. Digit Span Task Outcomes for subgroups
ICU Cases and Controls recovery over time
(A higher score denotes improvement)

The sepsis subgroup shows strong statistical significance of DS test outcome when comparing the recovery of ICU patients and controls. Mean test scores are lower for ICU patients (worse outcome) compared with controls. ICU patients show worse outcome in the sepsis subgroup in the area of verbal memory. Recovery curves for sepsis shows ongoing improvement in mean scores throughout the 24 month period. Recovery curves in the sepsis subgroup are very similar as seen in the overall survivor DS task and LNS sepsis subgroup. Clinically there is no evidence of impairment (≤4) within mean test scores for ICU patients or controls (Figure 27.0).

- Sepsis subgroup - Letter Number Sequence

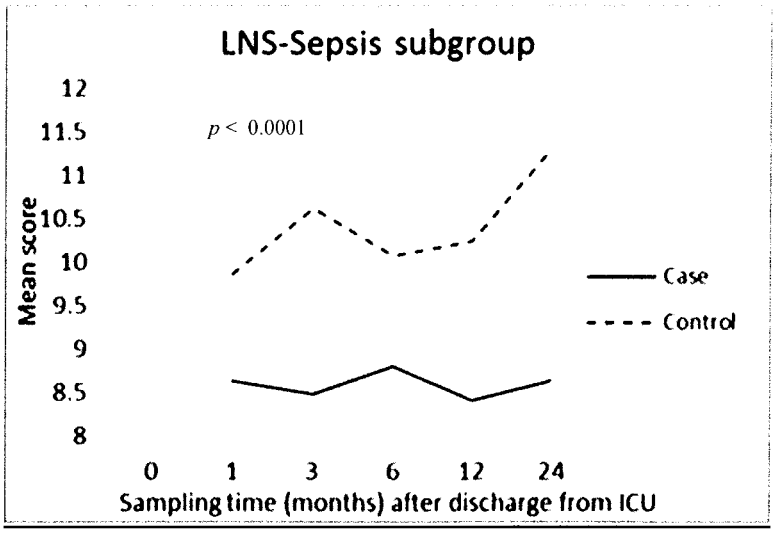


Figure 28.0. Letter Number Sequence Test Outcomes for subgroups
ICU Cases and Controls recovery over time
(A greater score denotes improvement)

For the test outcome of LNS, only sepsis shows statistical significance, showing an ongoing trajectory of improvement at 24 months among ICU patients and controls. Mean test scores are lower for ICU patients compared with controls in the sepsis subgroup. Recovery curves for ICU patients and controls show an ongoing improvement throughout the 24 month study period for sepsis. This follows a similar pattern as seen in the DS task. Both tasks measure verbal working memory however the LNS also contains an executive function component increasing the test sensitivity to cognitive decline. Similarity of recovery curves of the sepsis subgroup to the overall survivor recovery curves is evident, also seen with the DS task. Clinically, mean test scores do not uncover any clinical impairment (≤ 4) for ICU patients or controls. ICU patients show worse outcome in the sepsis subgroup in the area of verbal memory and executive function (Figure 28.0).

- Sepsis subgroup - Stroop Task

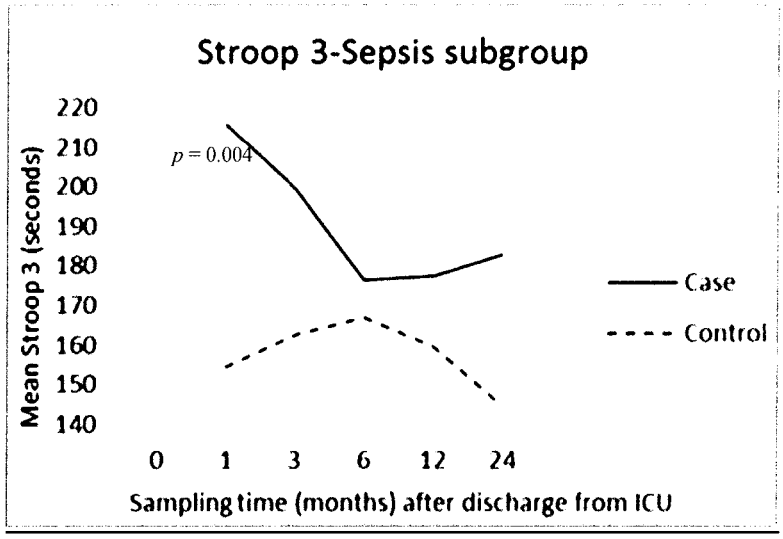


Figure 29.0. SNST task Test Outcomes for subgroups
ICU Cases and Controls recovery over time
(A lower score denotes improvement)

Within the SNST outcomes, sepsis shows strong statistical significance when comparing outcomes of ICU patients and controls. Recovery curves are distinctly different within this subgroup to the overall survivor study cohort, with ICU patients showing worse outcome throughout the 24 month study period, with a deteriorating trajectory. Cohort survivor ICU patient curves improve and supersede controls at 6 months after which both plateauing between 6 and 12 months with a slight trajectory of deterioration out to 24 months. ICU patients show higher test scores (worse outcome) in the sepsis group. Differences may be the direct effect of increased homogeneity, small numbers or skewing caused by deceased patients (Figure 29.0). ICU patients show worse outcome in sepsis subgroup in the area of executive function, specifically multitasking.

- Sepsis Subgroup – Trailmaking B Task

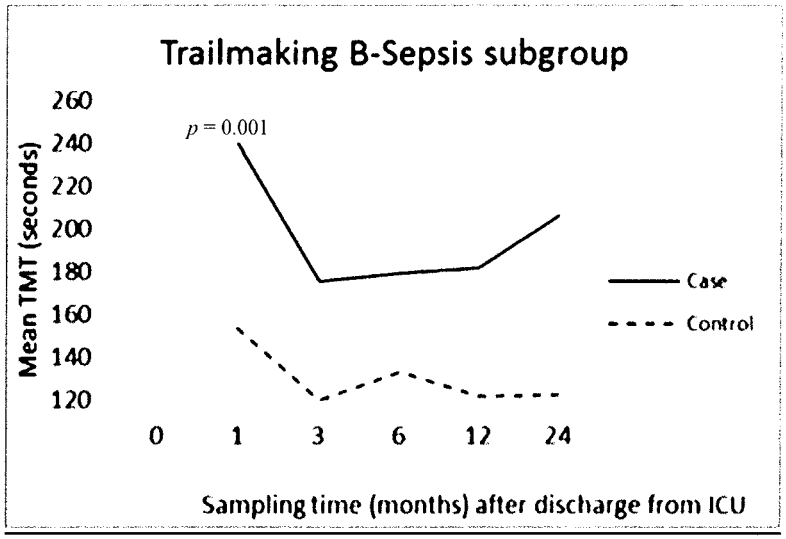


Figure 30.0. Trailmaking B Task Test Outcomes for subgroups (seconds)
ICU Cases and Controls recovery over time
(A lower score denotes improvement)

Within the TMT, the sepsis subgroup only shows statistical significance. There is wide variation of test scores and recovery curves for both ICU patients and controls. ICU patients are seen to achieve higher mean test scores (worse outcome) compared with controls. Recovery curve of the sepsis subgroup closely aligns with the recovery curve seen in the overall TMT survivor cohort. ICU patients show lower mean test scores (worse outcome) in sepsis subgroup in the area of executive function than controls (Figure 30.0.)

- Sepsis Subgroup – SF-36v2 (Mental Component Score)

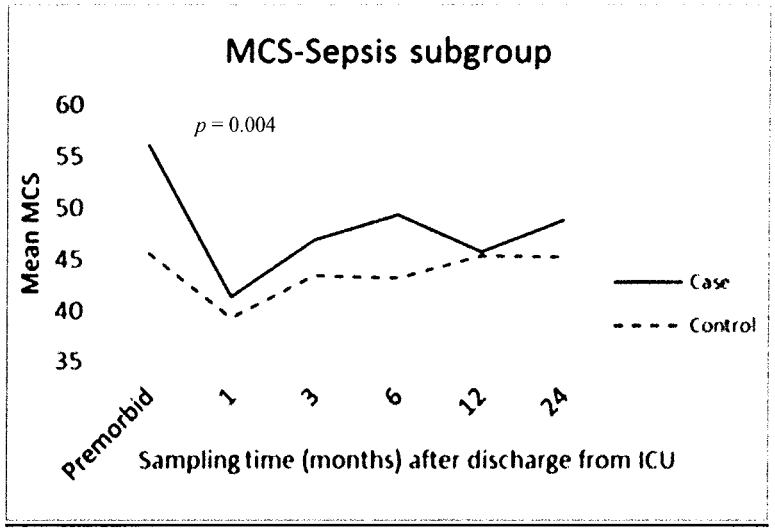


Figure 31.0. SF36v2 MCS Test Outcomes for subgroups - ICU Cases and Controls recovery over time; (A higher score denotes improvement)

Within the SF-36v2 MCS, the sepsis subgroup only shows statistical significance. Mean test scores are similar for cases and controls. Sepsis subgroup shows a trajectory of improvement at 24 months. Mean test scores show clinical impairment (≤ 45) for ICU patients prior to admission. Clinically meaningful improvement occurs by 1 month for ICU patients of sepsis subgroup which is sustained to 24 months. Control mean test scores of sepsis subgroup marginally improve and plateau from the 6 month time point, sustained to 24 months (Figure 31.0).

- Sepsis Subgroup - Community Integration Questionnaire

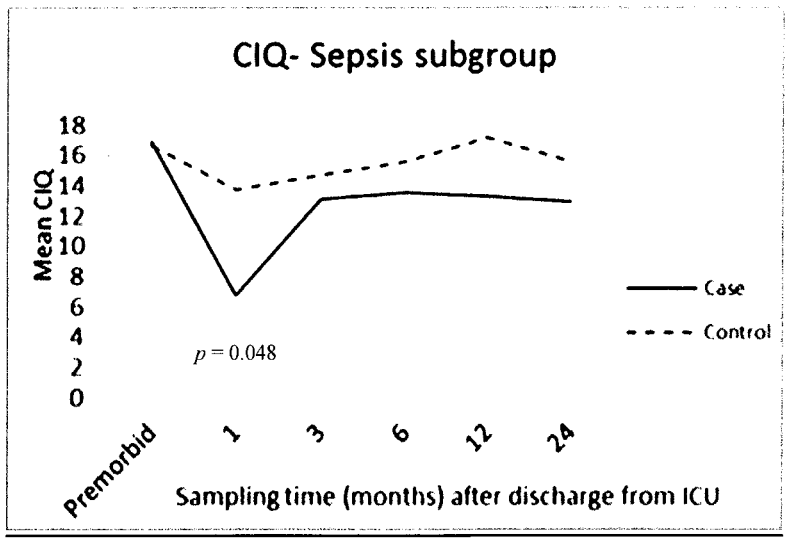


Figure 32.0. Community Integration Questionnaire Test Outcomes for subgroups ICU Cases and Controls recovery over time
(A higher score denotes improvement)

The subgroup, sepsis show strong statistical significance of CIQ test outcome when comparing the recovery of ICU patients and controls. Test scores show higher mean scores for controls compared to ICU patients throughout the 24 month study period. Both ICU patients and controls improve at 1 month after which scores plateau for both out to 24 months. Neither groups show clinical impairment (<6) at any time point throughout the study period. Recovery curves compare with the survivor CIQ study cohorts however subgroup recovery curves show lower levels of community independence at the premorbid timepoint for both groups. ICU patients show worse outcome than controls in the subgroup of sepsis (Figure 32.0).

- Sepsis Subgroup - Functional Independence Measure

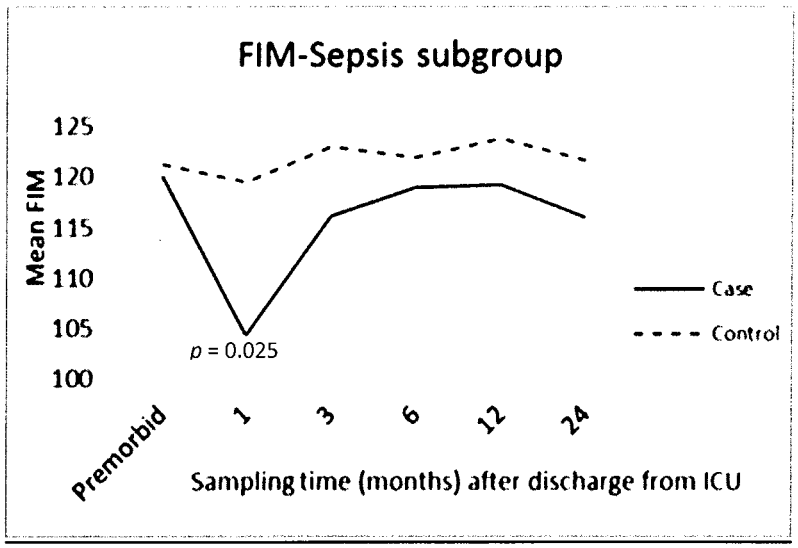


Figure 33.0. Functional Independence Measure test Outcomes for subgroups ICU Cases and Controls recovery over time
(A higher score denotes improvement)

The subgroup, sepsis show strong statistical significance of FIM test outcome when comparing the recovery of ICU patients and controls. Mean test scores remain lower (worse) for ICU patients than controls throughout the entire study period. ICU patients show clinical impairment at premorbid time point (<108) after which there is noted improvement at 1 month however the recovery curve shows a negative trajectory at 24 months. Controls mean test scores are considerably higher at premorbid time point, after which plateau and are sustained throughout the study period. Recovery curves are comparatively similar to the survivor FIM study cohorts however subgroup recovery curves show lower levels of functional independence at the premorbid time point for both controls. ICU patients show worse outcome than controls in the subgroup sepsis (Figure 33.0).

Other subgroup

- Other subgroup – SF-36v2 (Physical Component Score)

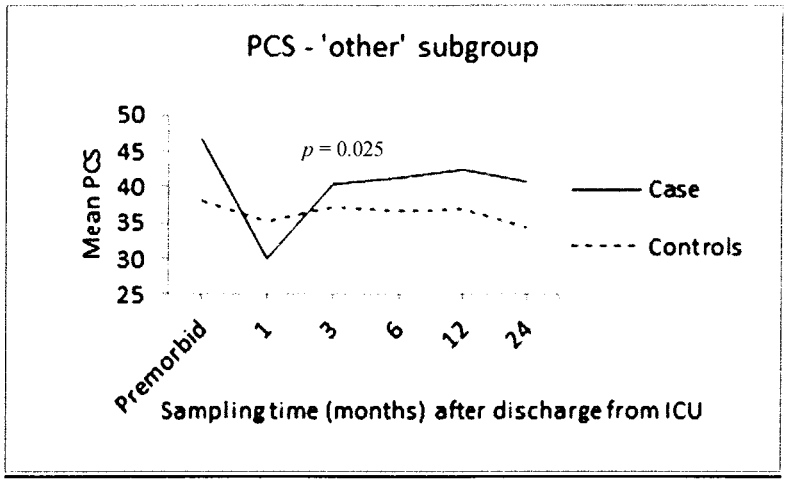


Figure 34.0. SF-36v2 PCS Test Outcomes for subgroups ICU Cases and Controls recovery over time (An increase in SF36v2 PCS mean score denotes improvement)

The PCS recovery curves within the Sepsis subgroup show mean test scores for controls show clinical impairment (≤ 45) prior to admission. Clinically meaningful improvement occurs by one month for ICU patients of sepsis subgroup which is sustained to 24 months. Both group test scores worsen at the 1 month time point with only marginal improvement for controls out to 24 months. ICU patients do show improvement at 6 and 12 month timepoints however show an ongoing trajectory of deterioration at 24 months. Neither group achieve premorbid levels of PCS recovery (Figure 34.0).

- Other Subgroup - Impact of Events – Revised

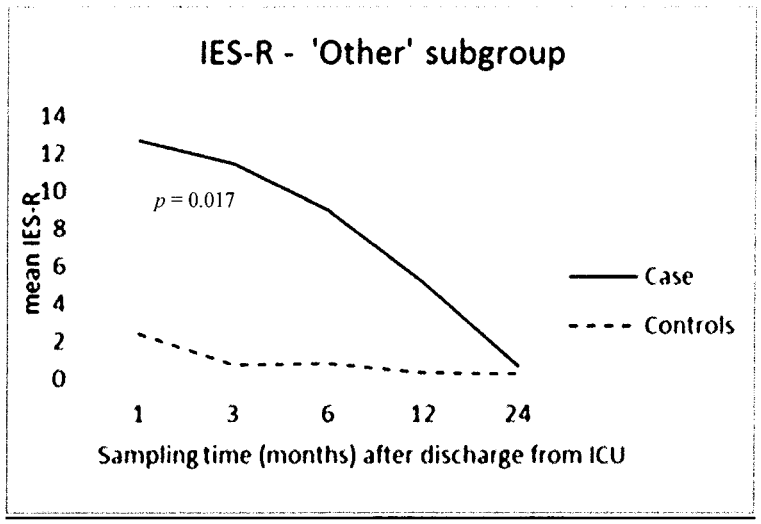


Figure 35.0. Impact of Events-Revised test outcomes for subgroups – mean score (A lower score denotes improvement)

The only subgroup to show statistical significance in IES-R outcome recovery between ICU patients and controls is the 'other' subgroup. Recovery curves show a gradual but definite improving recovery for ICU patients out to 24 months. Control test scores are much lower (better) than ICU patients and plateau to almost negligible levels from 1 month, sustained through to 24 months. ICU patients show higher levels of PTSD related to the episode of illness than controls. The ICU patient recovery curve reflects the gradual reduction in perceived stress in relation to the episode of illness (similar to the study survivor cohort) there is a matching of control recovery curve at 24 months. ICU patients show higher levels of PTSD related to the episode of illness in the 'other' subgroup (Figure 35.0).

Defining Impairment

Holding an understanding of the outcome and recovery curves of ICU patients and controls overall, the effects over time and recovery curves of subgroups it was time to interrogate the ICU patient data to start prediction analyses. Methodically decisions were made in relation to:

- level of outcome
- defining level of impairment
- identify predictors of morbidity and mortality (Table 40.0)
- define the clinically relevant outcome measures

Significant univariates were used to inform a multivariable model (adjusting for multicollinearity, age and sex), to form a battery of tests which give the relative risk of impairment and death for ICU patients at 24 months.

Defining level of impairment

Impairment was defined for a group of outcome measures aimed to reflect a clinically meaningful overview of recovery. Levels of impairment are derived from validated sources.

Table 40.0. *Outcome measures impairment descriptors*
24 month OUTCOME MEASURES (Impaired)
Letter Number Sequence (LNS) - Impairment ≤ 4
Digit Span (DS) – Impairment ≤ 4
SF-36v2 Physical Component Score (PCS) Impairment ≤45
SF-36v2 Mental Component Score (MCS) Impairment ≤ 45
Residential Support • Inpatient acute care • Inpatient rehabilitation unit • Living at home with carer • Nursing home resident
Mobility Impairment • Hospitalised • House mobile

The DS and LNS levels of impairment are defined as recommended by WAIS-III [197] as two standard deviations below the norm. PCS and MCS impairment are defined by authors Ware et al 1992 as scores or 45 or less. Residential support and mobility impairment are clinically relevant levels at which require moderate levels of carer support. Frequencies of impairment for each outcome measure are presented in following graphs (Table 40.0). ICU patients show increasing impairment from baseline to 24 months across all outcomes except for LNS which shows 34% impaired at baseline (1 month) dropping to 21at 24 months. PCS and MCS component baseline scores reflect premorbid values, showing participants regard their quality of life, across both physical and mental domains worse at 24 months than prior to admission. Social support show greater than four times more impaired at 24 months than baseline (prior to admission) and mobility impairment also show greater numbers of impaired at 24 months (Table 41.0).

Controls however show an improvement or reduction in number of impaired at 24 months across all domains except in the DS which shows a slight increase in the number of impaired at 24 months. The level and number of impaired across all domains for controls were considerably higher than anticipated, anticipating the acute-care patient cohort as a controls group who would exhibit normative scores. At baseline (1 month) almost 30% of controls were impaired; canvassing scores greater than two standard deviations below normative levels. Physical component quality of life scores show greater than 70% of controls regarded their physical quality of life impaired prior to admission.

Table 41.0. *Impaired at 24 months (%)*

	Baseline Impaired ICU (%)	24 month Impaired ICU (%)	Baseline Impaired controls (%)	24 month Impaired controls (%)	Baseline inter-group Difference (%)	24 month inter-group Difference (%)
LNS	34.38	21.21	29.23	16.13	5.15	4.27
DS	13.64	17.39	8.70	11.76	4.94	5.63
SF-36v2 PCS	42.86	47.89	71.64	56.45	28.78	8.56
SF-36v2 MCS	15.71	18.31	26.87	25.81	11.16	7.5
Social Support	2.86	9.86	6.06	0.00	3.20	9.86
Mobility Impairment	4.23	7.04	10.45	3.17	6.22	3.87

- <u>Digit Span</u>

Although overall ICU patients show higher numbers of impaired DS at each time point compared with controls throughout the whole study period, both groups show a very similar trend throughout the study period, with the proportion of impaired being equivalent. At 24 months, the proportion of impaired ICU patients continue to increase whereas the proportion of impaired controls appear to gently plateau although numbers remain higher than day 28 levels in both groups. Of survivors, at 24 months, there were 21.43% ICU patients and 13.79% controls impaired. Both ICU patients and controls show a steady decline in unimpaired patients throughout the study period, although is greater among ICU patients. Given the LNS and DS are both cognitive tasks measuring verbal working memory, what is noticeable is from day 28 through to six months, the LNS show double the number of

impaired patients than the DS across both groups. One difference perhaps can be attributed to the LNS also measuring executive function, making it more sensitive to general cognitive impairment than the DS in this population (Figure 36.0, Table 42.0).

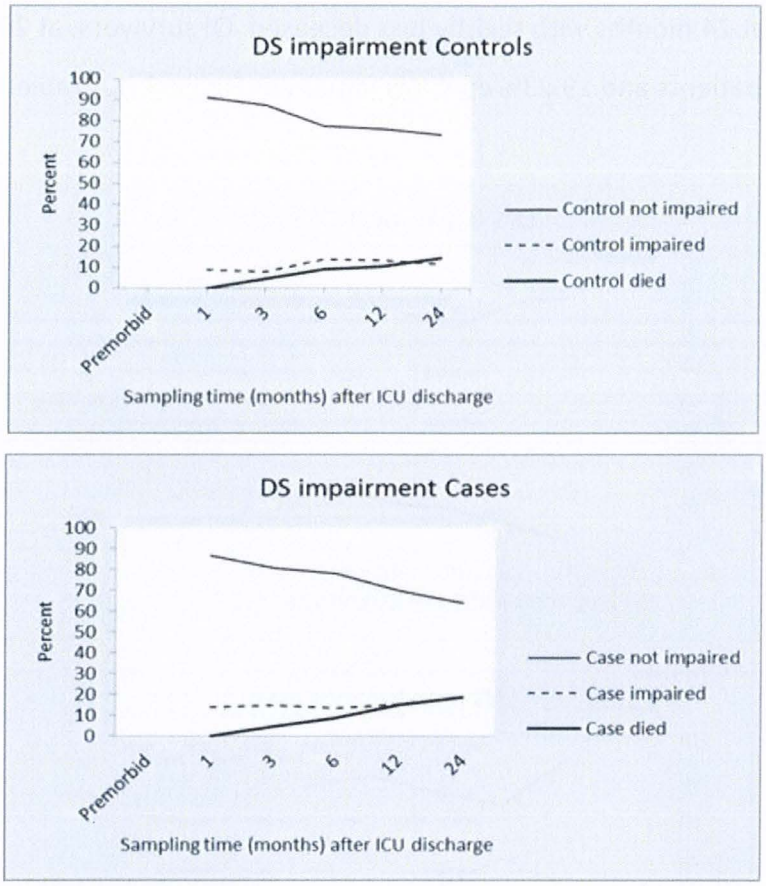


Figure 36.0 Digit Span Impairment over time (ICU cases and controls)

Table 42.0. *Digit Span (Frequency of Impaired at 24 months)*

	Impaired ICU (total)	Impaired ICU (survivors)	Impaired controls (total)	Impaired controls (survivors)
DS	17.39	21.43	11.76	13.79

- <u>Letter Number Sequence</u>

Overall ICU patients show higher numbers of LNS impaired at each time point, across the study period with both groups showing similar recovery curves. Recovery curves deviated at 3 months with the proportion of impaired ICU patients increasing at 3 months before

assuming a downward trend, almost matching the level of impaired controls at 24 months. Proportionally, the number of unimpaired remains relatively steady within both groups. While ICU patients show a slight decrease in numbers of unimpaired at 3 months, overall the trend remains static throughout the 24 month study period. Controls show a very slight downward trend at 24 months with slightly less deceased. Of survivors, at 24 months, there were 22.22% ICU patients and 19.23% controls impaired (Figure 37.0, Table 43.0).

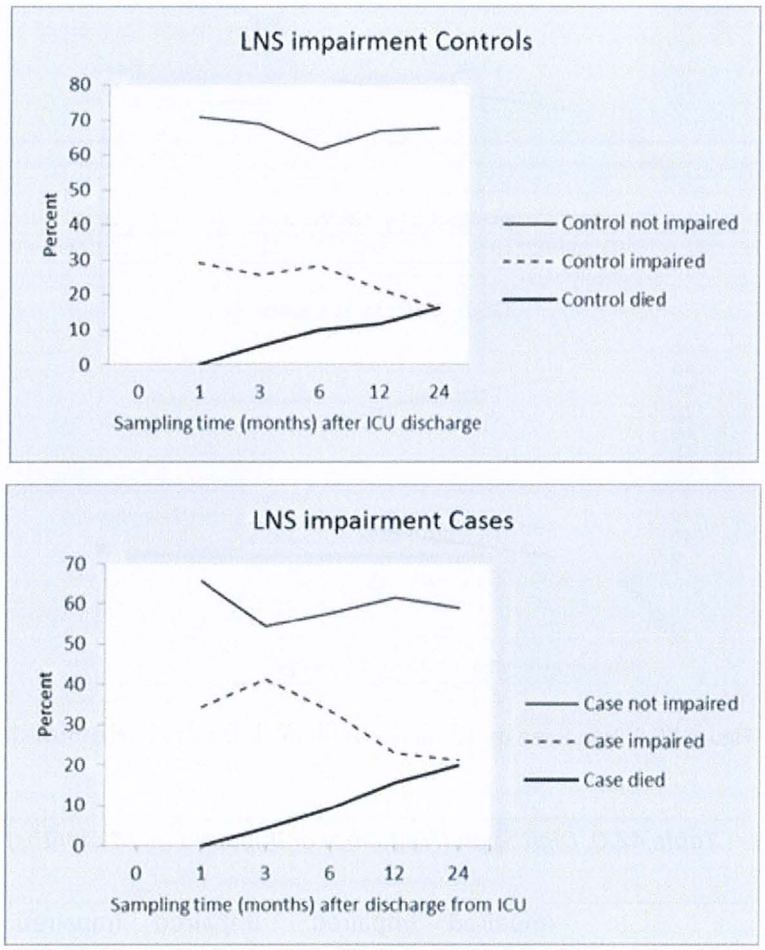


Figure 37.0. Letter Number Sequence Impairment over time (ICU cases and controls)

Table 43.0. *Letter Number Sequence (Frequency of Impaired at 24 months)*

Table 45.0. LNS % Impaired at 24 months

	Impaired ICU (total)	Impaired ICU (survivors)	Impaired controls (total)	Impaired controls (survivors)
LNS	20.28	22.22	16.94	19.23

- SF-36v2-Physical Component Score

The SF-36v2 PCS show very high numbers of impaired ICU patients and controls throughout the study period. At premorbid time point, controls show 71.64% and cases, 42.86% impairment of their total samples. Both impaired ICU patients and controls increase sharply at 1 month, seeing the number of ICU patients double to 94.29% and 85% controls. Both groups displayed a reduction in numbers of impaired at 24 months, the downward trend more acute for controls across the study period. The proportion of unimpaired dip sharply at 1 month within both groups however ICU patients show a slight downward trend across the study period, whereas controls display a definite upward trend out to 24 months. Of survivors, at 24 months, there were 58.62% ICU patients and 67.30% controls impaired (Figure 38.0, Table 44.0).

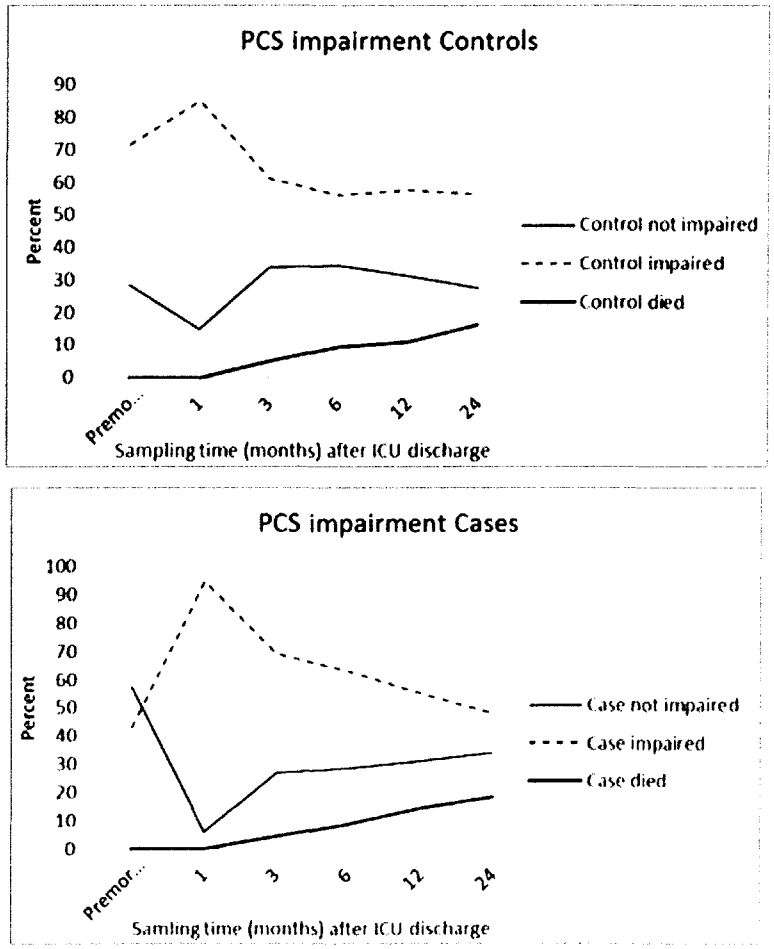
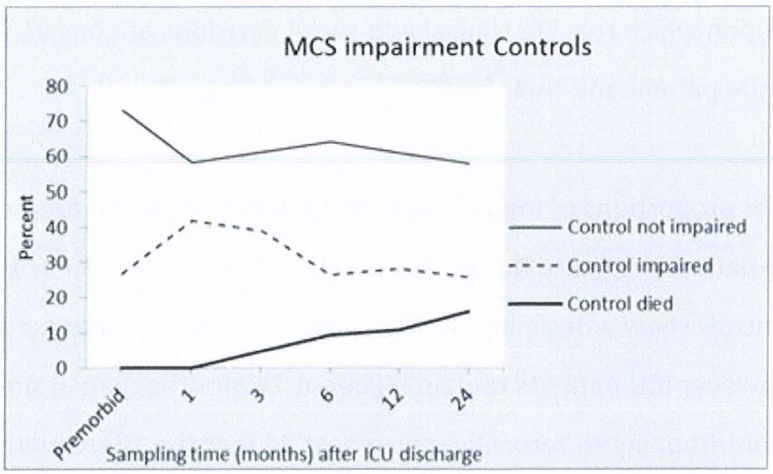


Figure 38.0. SF-36v2 PCS Impairment over time (ICU cases and controls)

Table 44.0. *SF-36v2 PCS (Frequency of Impaired at 24 months)*				
	% Impaired at 24 months			
	Impaired ICU (total)	Impaired ICU (survivors)	Impaired controls (total)	Impaired controls (survivors)
SF-36v2 PCS	47.88	58.62	56.45	67.30

- SF-36v2-Mental Component Score

Proportionally, the number of impaired in the area of MCS within both groups are by far less than seen in the Physical Component Score, however, groups show similar trends across the study period. Controls show a greater number of impaired at the premorbid time point with both groups increasing sharply at the 28 day time point (number of ICU patients double to exactly match the number of unimpaired at 50%). Both groups show a downward trend and reduction in numbers of impaired at 24 months, with controls returning to premorbid levels, and ICU patients not achieving this within the 24 month study period. ICU patients show a greater proportion of unimpaired at premorbid time point, although drop by 30% (compared to controls who drop by approximately 15%) at 1 month. Overall, both ICU patients and controls show a downward trend in numbers of unimpaired throughout the study period, with cases approximately 21% less and controls 15%. Of survivors, at 24 months, there were 22.41% ICU patients and 30.77% controls impaired (Figure 39.0, Table 45.0).



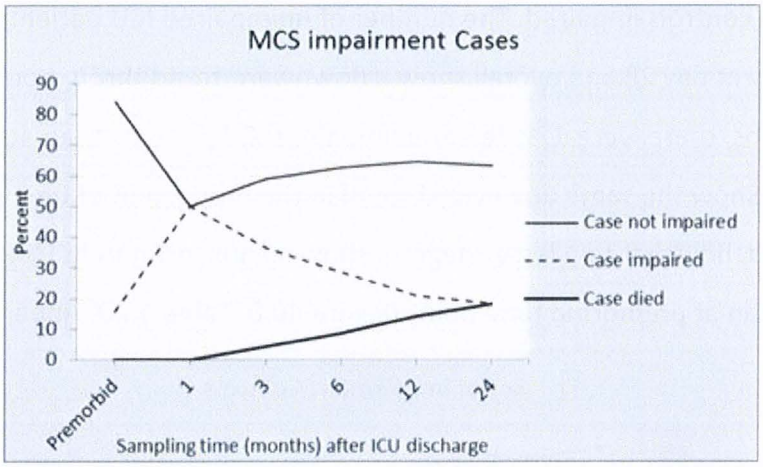


Figure 39.0. SF-36v2 MCS Impairment over time (ICU cases and controls)

Table 45.0. *SF-36v2 MCS (Frequency of Impaired at 24 months)*

	% Impaired at 24 months			
	Impaired ICU (total)	Impaired ICU (survivors)	Impaired controls (total)	Impaired controls (survivors)
SF-36v2 MCS	18.30	22.41	25.8	30.77

- Social support

Residential support was included as a secondary indicator or lifestyle measure, based on living arrangements and support required. Frequencies are derived from the defining classification criteria of acute care inpatient, inpatient of a rehabilitation unit, living at home with carer or a nursing home resident. All were deemed to be indicative of an increased level

of dependence upon which real life clinical and social decisions are based, for the health care team as well as the patient and their family.

Data show similar proportions of impaired within both groups at the premorbid time point after which, ICU patients increase by approximately 35% (controls 4%) at 1 month. Both ICU patients and controls show a declining trend in proportion of impaired across the 24 month study period, however ICU patients remain higher at 24 months than at premorbid time point and controls dropping to zero. Of survivors, at 24 months, there were 12.07% ICU patients and 0% controls impaired. The number of unimpaired ICU patients is seen to decrease sharply at day 28 and overall show a downward trend throughout the study period. Still, at 24 months, there were 17% fewer unimpaired ICU patients than at premorbid time point. Controls show the same downward trend in the proportion of unimpaired across the 24 month period, however to a lesser degree, showing approximately 10% fewer unimpaired at 24 months than at premorbid time point (Figure 40.0, Table 46.0; Appendix 5.1).

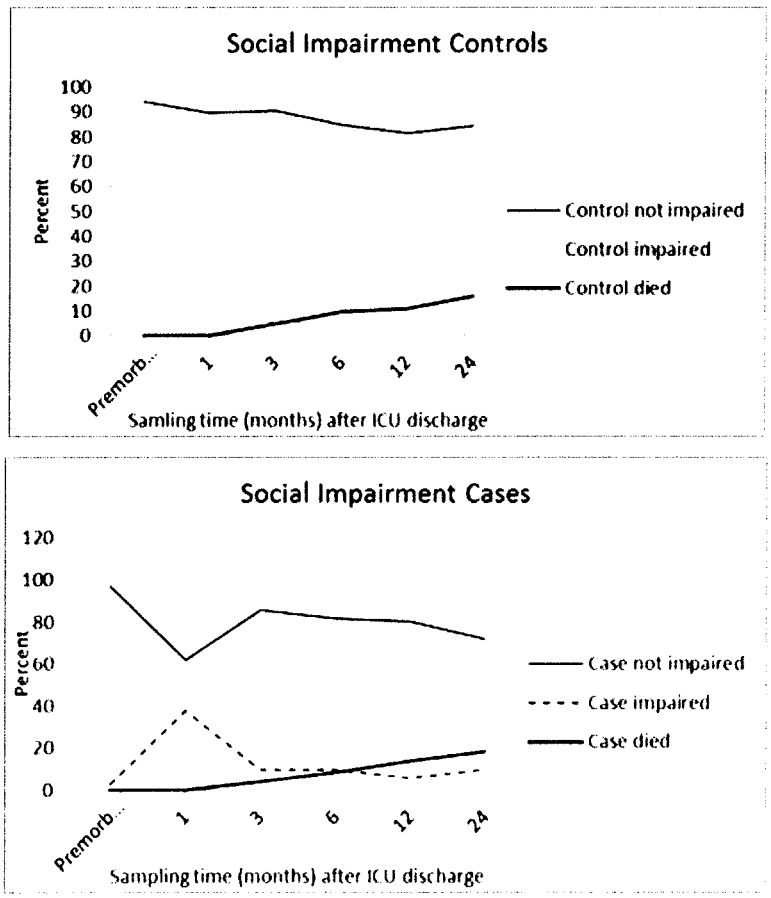


Figure 40.0. Residential Support Impairment over time (ICU patients and controls)

Table 46.0. Residential Support (Frequency of Impaired at 24 months) % Impaired at 24 months				
	Impaired ICU (total)	Impaired ICU (survivors)	Impaired controls (total)	Impaired controls (survivors)
Residential Support	9.85	12.07	0.00	0.00

- Mobility Impairment

Mobility Impairment, similar to Residential support was included as a secondary indicator or lifestyle measure, based on the level of mobility; defined as house mobile or hospitalised. Both were deemed to be indicative of an increased level of dependence upon which real-life clinical and social decisions are based. These measures were also included as it is such real-life parameters which are of most use to patients and their families.

The proportion of impaired participants in both groups, spiked sharply at day 28 although both ICU patients and controls show a similar downward trend throughout the study period. At 24 months, the proportion of impaired ICU patients remain higher than at premorbid levels however the proportion of impaired controls drop below premorbid levels. Of survivors, at 24 months, there were 8.62% ICU patients and 3.17% controls impaired. There were proportionally higher numbers of unimpaired ICU patients at premorbid time point, seen to trend down where at 24 months, there were over 20% fewer unimpaired ICU patients. Controls also show the downward trend in unimpaired throughout the 24 months, however at 24 months, there were approximately 9% fewer unimpaired participants than at premorbid time point (Figure 41.0, Table 47.0; Appendix 5.2).

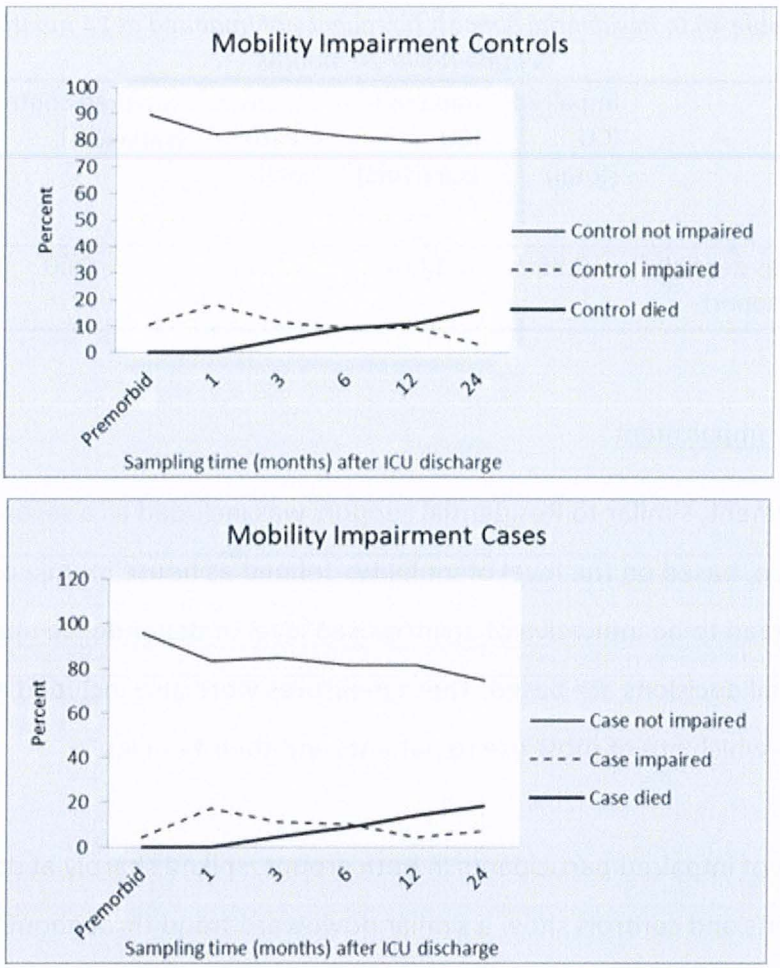


Figure 41.0. Mobility Impairment over time (ICU cases controls)

Table 47.0. *Mobility Impairment (Frequency of Impaired at 24 months)*

	% Impaired at 24 months			
	Impaired ICU (total)	Impaired ICU (survivors)	Impaired controls (total)	Impaired controls (survivors)
Mobility Impairment	7.04	8.62	3.17	3.77

Return to Work

The functional consequences to the ICU survivor can be severe. To the survivor and the community, successful return to work often signifies a successful recovery while a failure to return to work or changes in patterns of employment signifies failure of

an otherwise successful recovery. The status of return to work has profound consequences to the individual and family, both economic and psychosocial. The outcome measure of work capacity is a reflection of one aspect of the social cost of illness. There is much inter-study variability within the literature with this outcome. Consistently studies show with ICU patients that work status often changes throughout the first year, with a decrease in the number of survivors in full-or part-time employment.[23, 147]

- Days off work

ICU patients had a much higher rate of time off work compared with controls. The ICU patient rate of sick leave was very similar at 3 months as was for 1 month. Rates surprisingly increased over three fold, at 6 month time point after which reduced at 12 months with only 6 days recorded overall at 24 months. Controls took much lower levels of leave overall, with highest levels recorded at 1 month time point although again increasing at 6 months, falling to zero days at 12 and 24 months (Table 48.0; Appendix 7.0)

Table 48.0 *Days off work*

Test		Control		ICU
Days off work	N	Mean (*SD*)	N	Mean (*SD*)
Preadmission	9	1.6 (4.7)	13	13.8 (49.9)
1 month	14	15.4 (17.6)	18	27.8 (40.4)
3 months	10	9 (28.4)	17	54.6 (54.4)
6 months	9	20 (60.0)	15	97.3 (94.4)
12 months	7	0	13	74.2 (88.2)
24 months	1	0	4	6.0 (12.0)

The mean age of the study cohort was 61.7 years with the majority (greater than 70%) of participants within both groups' retirees. Subsequently numbers of employed /unemployed/ students were very small which may skew analyses. Both groups show a reduction in the number of employed over the 24 month study period; for controls a reduction from 13 people employed at baseline (prior to admission) to 6 employed at the 24 month time point.

Numbers of unemployed were negligible within controls cohort, dropping from 1 to 0. Unemployed ICU patients increased at 24 month time point, going from 0 to 2 cases.

Closer examination of the work capacity data (Tables 49.0, 50.0) indicates that of those employed, there was a reduction in the hours worked per week within both groups. The number of controls who worked 35 hours or more per week decreased by 5.5% (4 people) from baseline (prior to admission) to 24 months with the number of people classified as working less than 35 hours per week increasing from 2 to 3 ICU patients. ICU patients show a reduction in numbers working 35 hours or more each week of 5% (3 people) from baseline (prior to admission) compared to the 24 month time point, while concurrently showing an increase from 5.08 - 8.47% (three to five people) at 24 months. Numbers of unemployed were negligible within both groups, with number of unemployed ICU patients increasing from 0 to 2 at 24 months.

Table 49.0. CONTROLS WORK CAPACITY																			
Episode number	N	≥35 hrs/wk (N)	%	< 35 hr/wk (N)	%	Age Pension (N)	%	Disability Pension (N)	%	Unemployed (N)	%	Student (N)	%	Sicknes s Benefit	%	Not Stated (N)	%	Retired/Home duties/not in labour force	%
PREMORBID	59	12	20.34	2	3.39	35	59.32	6	10.17	1	1.69	2	3.39	1	1.69	0	0.00	43.00	72.88
1	59	2	3.39	3	5.08	35	59.32	8	13.56	1	1.69	2	3.39	7	11.86	1	1.69	50.00	84.74
3	56	5	8.93	5	8.93	33	58.93	8	14.29	1	1.79	2	3.57	2	3.57	0	0.00	44.00	78.57
6	56	7	12.50	5	8.93	31	55.36	9	16.07	0	0.00	2	3.57	2	3.57	0	0.00	43.00	96.43
12	56	8	14.29	4	7.14	32	57.14	9	16.07	0	0.00	2	3.57	1	1.79	0	0.00	43.00	76.78
24	54	8	14.81	3	5.56	31	57.41	10	18.52	0	0.00	2	3.70	0	0.00	0	0.00	41.00	75.93

Table 50.0. ICU WORK CAPACITY																			
Episode number	N	≥35 hrs/wk (N)	%	< 35 hr/wk (N)	%	Age Pension (N)	%	Disability Pension (N)	%	Unemployed (N)	%	Student (N)	%	Sicknes s Benefit (N)	%	Not Stated (N)	%	Retired/Home duties/not in labour force (N)	%
PREMORBID	59	11	18.64	3	5.08	35	59.32	6	10.17	0	0.00	1	1.69	0	0.00	3	5.08	44	74.57
1	59	3	5.08	1	1.69	38	64.41	7	11.86	1	1.69	0	0.00	8	13.56	2	3.39	54	91.52
3	56	6	10.17	3	5.08	38	64.41	6	10.17	1	1.69	0	0.00	5	8.47	0	0.00	49	83.04
6	56	10	16.95	2	3.36	38	64.41	6	10.17	1	1.69	0	0.00	2	3.39	0	0.00	46	77.97
12	56	10	16.95	4	6.78	38	64.41	5	8.47	2	3.39	0	0.00	0	0.00	0	0.00	43	72.88
24	54	8	13.56	5	8.47	40	67.80	4	6.78	2	3.39	0	0.00	0	0.00	0	0.00	44	74.57

Employment status show numbers within groups of casual and permanent employees also very small, with no trend evident. Overall ICU patients had a much higher rate of time off work after discharge compared with controls. The rate of sick leave among ICU patients was very similar at three months as was for day 28. Rates surprisingly increased three fold at 6 month time point for ICU patients after which appeared to reduce at 12 months with only six days recorded overall between 12 and 24 months. Controls took much lower levels of leave overall, with highest levels at 1 month although again increasing at 6 months, falling to zero days at 6 – 12 month and 12 - 24 month periods.

Prediction Analysis

Holding a tool which enables clinicians to predict a patient's outcome at 24 months after discharge from the ICU will have high utility. It will assist patients and families make informed treatment choices knowing of their likely long-term outcome. It will help inform health care teams (both the critical care through to rehabilitation teams) help allocate effectively their limited numbers of beds to those with the greatest need and those who potentially show best long-term outcome.

Predicting impairment or death at 24 months after ICU discharge prior to admission or at one month after admission was a secondary aim. A predictor, when applied to mixed model regression uncovered multiple, significant relationships of impairment and or death, for cases at 24 months. Univariate analysis provided the necessary information to enable the informed selection of a set of predictors and outcomes to progress the area of prediction analysis. From the univariate analysis, mixed model regression analyses showed statistically significant relationships to study outcomes (Table 51.0).

Outcome measures include cognitive tasks, the LNS and DS (verbal memory / executive function), quality of life component scores (PCS, MCS), residential support, and mobility impairment. Impairment is defined as previously. Premorbid predictors include the FIM, CIQ, both performed retrospectively, years of education and CACI. One month predictors include the FIM, CIQ, APACHE 3 ROD and the MMSE. Tables 52.0 and 53.0 show results of mixed model regression using the listed predictors and outcome measures. Prediction was based on premorbid and one month. Using mixed model regression relative risk ratios were

calculated (95% CI) against each outcome measure, for the morbidity and mortality outcomes of impairment and death.

Table 51.0. *Predictors and Outcomes*

PREDICTORS (Premorbid & 28 day)	24 month OUTCOME MEASURES (Impaired and Death)
Functional Independence Measure (FIM)	Letter Number Sequence (LNS) - Impairment ≤ 4
Community Integration Score (CIQ)	Digit Span (DS) – Impairment ≤ 4
Years Education	SF36v2 Physical Component Score (PCS) Impairment ≤ 45
Charlson Age Comorbidity Index (CACI)	SF36v2 Mental Component Score (MCS) Impairment ≤ 45
APACHE 3 Risk of Death (ROD)	Residential Support • Inpatient acute care Inpatient rehabilitation unit • Living at home with carer • Nursing home resident
Mini Mental State Examination (MMSE)	Mobility Impairment • Hospitalised • House mobile

Prediction analysis results discussion

- <u>Premorbid predictors and outcome</u>

Of the premorbid predictors, years of education shows a strong association for mobility impairment at 24 months (RRR 0.539; $p = 0.023$). This indicates for a one unit increase in years of education, the risk of mobility impairment decreases by 46.1%. Years of education also proves to be a strong predictor of death at 24 months. For a one unit increase in years of education, the relative risk of death (measured by LNS, DS, PCS, residential support and mobility impairment) all decrease between 17.3 – 29.3% at 24 months after discharge from critical care. In clinical terms, greater the years of education, the risk of death decreases at 24 months after discharge from critical care.

The premorbid FIM score proves to be a strong predictor of death at 24 months. The FIM, a measure of functional outcome, describes the ability of a person to perform the functional skills used for activities of daily living. When interpreting scores, as the FIM score improves the greater functional independence. For a one unit increase in the premorbid FIM score, the relative risk of death (measured by LNS, DS, PCS, MCS, residential support and mobility impairment) all decrease between 5.6 - 16.6% at 24 months after discharge from critical care. In clinical terms, as functional independence improves, the risk of death decreases at 24 months after discharge from critical care.

The premorbid CACI scores also prove to be a strong predictor of death at 24 months. The Charlson Age Comorbidity Index is a tool designed to predict mortality based on comorbidities. When interpreting scores, an increase in the CACI score indicates the greater level of comorbidities. For a one unit increase in the premorbid CACI score, the relative risk of death (measured by LNS, DS, PCS, MCS, Residential Support and Mobility Impairment) all increase between 31.3 – 53.1% at 24 months after discharge from critical care. In clinical terms, as comorbidities increase, the risk of death increases 24 months after discharge from critical care.

The Community Integration Questionnaire (CIQ) is a brief measure of an individual's level of integration into the home and community. When interpreting scores, as the CIQ score improves, the greater the integration. Data shows for a one unit increase in the premorbid CIQ score, the relative risk of death (measured by LNS, DS, PCS, MCS, and residential support and mobility impairment) all decrease between 10.3 – 51.1% at 24 months after discharge from critical care. In clinical terms, the greater the home and community integration, the risk of death decreases 24 months after discharge from critical care. (Tables 52.0, 53.0)

Table 52.0 *Premorbid predictors of impairment*

Predictor (impairment) premorbid	*Outcome Measure*	*Effect*	*RRR (%)*	*P value*
FIM	LNS	~	0.996	0.719
	DS	~	1.006	0.793
	PCS	~	0.999	0.918
	MCS	~	1.006	0.712
	Social Impairment	~	1.275	0.371
	Mobility Impairment	~	0.991	0.683
CIQ	LNS	~	0.960	0.260
	DS	~	1.025	0.557
	PCS	~	0.989	0.598
	MCS	~	0.986	0.651
	Social Impairment	~	1.066	0.399
	Mobility Impairment	~	1.015	0.849
Years Education	LNS	~	0.913	0.298
	DS	~	0.840	0.108
	PCS	~	1.005	0.891
	MCS	~	0.934	0.282
	Social Impairment	~	0.688	0.086
	Mobility Impairment	↑	0.539 (46.1)	0.023
CACI	LNS	~	0.965	0.666
	DS	~	0.868	0.179
	PCS	~	0.989	0.589
	MCS	~	0.898	0.127
	Social Impairment	~	1.001	0.991
	Mobility Impairment	~	0.915	0.585

↑ positive effect ; ↓ negative effect; ~ not significant

Table 53.0 *Premorbid predictors of death*

Predictor (death) premorbid	*24 month outcome measure*	*Effect*	*RRR (%)*	*p value*
FIM	LNS	↑	0.932 (6.8)	0.000
	DS	↑	0.941 (5.9)	0.000
	PCS	↑	0.946 (5.4)	0.002
	MCS	↑	0.956 (4.4)	0.000
	Social Impairment	↑	0.953 (4.7)	0.000
	Mobility Impairment	↑	0.940 (6.0)	0.000
CIQ	LNS	↑	0.897 (10.3)	0.003
	DS	↑	0.875 (12.5)	0.002
	PCS	↑	0.489 (51.1)	0.420
	MCS	↑	0.891 (10.9)	0.006
	Social Impairment	↑	0.895 (10.5)	0.001
	Mobility Impairment	↑	0.893 (10.7)	0.001
Years Education	LNS	↑	0.827 (17.3)	0.049
	DS	↑	0.813 (18.7)	0.029
	PCS	↑	0.707 (29.3)	0.037
	MCS	~	0.882	0.111
	Social Impairment	↑	0.851 (14.9)	0.047
	Mobility Impairment	↑	0.819 (18.1)	0.031
CACI	LNS	↓	1.531 (53.1)	0.000
	DS	↓	1.333 (33.3)	0.000
	PCS	↓	1.313 (31.3)	0.000
	MCS	↓	1.313 (31.3)	0.000
	Social Impairment	↓	1.334 (33.4)	0.000
	Mobility Impairment	↓	1.337 (33.7)	0.000

↑ positive effect ; ↓ negative effect; ~ not significant

Table 54.0 *One month predictors of impairment*

Predictor (impairment) 1 month	*Outcome Measure*	*Effect*	*RRR (%)*	*P value*
FIM	LNS	~	0.990	0.440
	DS	~	0.997	0.844
	PCS	~	1.003	0.581
	MCS	~	1.000	0.970
	Social Impairment	~	0.968	0.095
	Mobility Impairment	~	0.977	0.312
CIQ	LNS	↑	0.933 (6.7)	0.048
	DS	~	0.942	0.128
	PCS	~	1.006	0.961
	MCS	~	1.023	0.423
	Social Impairment	~	0.956	0.523
	Mobility Impairment	~	1.008	0.897
MMSE	LNS	~	0.902	0.083
	DS	↑	0.795 (20.5)	0.000
	PCS	~	0.967	0.108
	MCS	~	1.031	0.557
	Social Impairment	~	0.933	0.346
	Mobility Impairment	↑	0.866 (13.4)	0.045
APACHE 3 ROD	LNS	~	1.416	0.641
	DS	~	2.100	0.401
	PCS	~	1.188	0.623
	MCS	~	2.407	0.256
	Social Impairment	~	6.710	0.079
	Mobility Impairment	↓	2.950 (295)	0.013

↑ positive effect ; ↓ negative effect; ~ not significant

Table 55.0 *One month predictors of death*

Predictor (death) 1 month	*Outcome Measure*	*Effect*	*RRR (%)*	*P value*
FIM	LNS	↑	0.834 (16.6)	0.001
	DS	↑	0.923 (7.7)	0.000
	PCS	↑	0.944 (5.6)	0.000
	MCS	↑	0.921 (7.9)	0.000
	Social Impairment	↑	0.936 (6.4)	0.000
	Mobility Impairment	↑	0.913 (8.7)	0.000
CIQ	LNS	↑	0.919 (8.1)	0.014
	DS	↑	0.906 (9.4)	0.004
	PCS	↑	0.863 (13.7)	0.001
	MCS	↑	0.750 (25.0)	0.001
	Social Impairment	↑	0.892 (10.8)	0.001
	Mobility Impairment	↑	0.895 (10.5)	0.001
MMSE	LNS	~	0.976	0.821
	DS	~	1.001	0.987
	PCS	~	1.008	0.917
	MCS	~	1.025	0.702
	Social Impairment	~	1.034	0.668
	Mobility Impairment	~	1.023	0.796
APACHE 3 ROD	LNS	~	2.083	0.388
	DS	~	1.001	0.987
	PCS	~	1.008	0.917
	MCS	~	1.025	0.702
	Social Impairment	~	1.034	0.668
	Mobility Impairment	~	1.023	0.796

↑ positive effect ; ↓ negative effect; ~ not significant

<u>One month predictors and outcome</u>

At one month, data shows for a one unit increase in the CIQ score, the relative risk of LNS impairment decreases and the risk of death, (measured by LNS, DS, PCS, MCS, residential support and mobility impairment) all decrease 24 months after discharge from critical care. In clinical terms, the greater the home and community integration the risk of LNS impairment (verbal working memory and executive function) decreases; as does the risk of death, 24 months after ICU discharge.

The MMSE is widely used as a general screening measure of cognitive mental state and dementia. When interpreting scores, an increase in the MMSE score indicates an

improvement in general cognition. Study data shows for a one unit increase in the one month MMSE score, the relative risk of DS and mobility impairment decreases 24 months after ICU discharge.

The APACHE 3 is a severity-of-disease classification system used to predict mortality at ICU discharge. The higher the Apache 3 score, the greater the severity of disease. Study data shows for a one unit increase in the APACHE 3 R.O.D. the relative risk of mobility impairment increases (RRR 2.95; $p = 0.013$), almost triples at 24 months after discharge from ICU.

Finally, the premorbid FIM score is a strong predictor of death as is the one month FIM score, which proves to be a strong predictor of death at 24 months after ICU discharge. This effect not only holds but becomes stronger at one month time point. For a one unit increase in the one month FIM score, the relative risk of death (measured by LNS, DS, PCS, MCS, residential support and mobility impairment) all decrease 24 months after ICU discharge. (Tables 54.0, 55.0)

Thematic Analysis

A thematic approach to analysing narratives was used to look for patterns, meaning and potential points of interest in the data and ensures an honest interpretation is maintained through the by constant reference to the raw data source.[206] Both ICU patients and controls discussed their perceptions, experiences and memories of their illness experience at each time point. Often patients and families diarised their thoughts and any questions throughout the illness episode and could directly refer to these. Narratives are subjective and may be influenced and altered with time. Narratives contained both factual and emotional memories, some explicit often chronologically pieced together. ICU patients often turned narratives of fear into comedy or stories depicting themselves in control, in an attempt to normalise the experience for themselves and others. Many could not recall or understand much of their time in the critical care unit and consequently would construct stories in an attempt to share their experience without feeling uncomfortable and concerned. Narrations were broadly themed incorporating physical incapacity, isolation and advice, and reassurance.

Physical incapacity for cases comprised of statements surrounding weakness, tiredness, and debility, loss of balance and stamina, and pain. Isolation, often incorporating cognitive deficits such as poor concentration and memory, panic attacks, feeling like 'they're going slow', loneliness and recurring memories of critical care overlay their fear of being a burden to their families physically, emotionally and financially. Ongoing physical incapacity would build hopelessness, frustration and despair among survivors of critical illness. Very few survivors knew of, or participated in community physiotherapy or occupational therapy services.

'In intensive care I had a nurse and twice daily visits from physiotherapists and OT's. The physio spent a lot of time with me doing exercises with my hands, legs and feet. When I got to the ward, I saw a physio twice during the first five days. There is no physio on weekends. The OT came one day and worked on helping me to try and sit up. There was not enough staff to lift me and they could not locate a lifting frame so I stayed in bed. I feel this made me go backwards as I was so weak I stayed in bed the whole time laying dawn. I knew I was not improving and was getting distressed about it because I wanted to go home.'

'One day two physios and my OT came and helped me to walk on a walking frame. After that I never saw a physio or OT again. It was as if they had ticked that box that I was on my feet and no longer needed any rehabilitation.'

'I remember being transferred from the critical care unit to the ward and because I am only young, you know, only 28 [years old] the nurses didn't understand how weak I was. I think I lost about 12 kgs over two and a half weeks... The nurses would tell me to get up and walk to the toilet but I was so weak, I couldn't. I fell over twice...I was scared to get up by myself'

Physical recovery was gradual. The impact of weakness, pain and exhaustion forced survivors to adapt to managing with their new disabilities.

'I don't have any energy anymore. I am just so tired, I just don't have the strength to eat let alone walk down to the shops at the end of the block anymore...My doctor told me my scan looked worse and there was no operation I could have as it has spread. My daughter drops in when she can, she's just so busy...They say I have to start chemo next week [crying].'

'My life has changed; I didn't know it would be like this [tired, strained stare]. I can't go out to lunch with my friends as I fear my bag will leak or burst. I am up many times every night with cramps. I smell, my skin is flaking off and hair falling out. I have to walk with a frame. '

'I still have problems with my wounds, they are just not healing. I have such a lot of pain from these pressure sores on the back of my heals that I can't even wear shoes or walk any further than around here [gesturing].'

'I can't drive or really get around with this [orthotic] boot and no way can I walk all that way to the [hospital] for them diabetes appointments. The lady at the hospital gets really mad that I don't turn up but I haven't even got any money for food. '

'At the moment I can't get to the toilet fast enough, I'm so weak and can't walk by myself so end up soiling my pants as I keep having diarrhoea [pause, breath, blink back tears] I feel I have lost all self-respect.'

Often as a result of the physical incapacity, survivors became isolated, unable to keep up mentally or physically. The physical and mental exhaustion together with factors such as loss of balance and pain saw survivors become socially isolated with families adopting a protective role; often becoming gatekeepers.

'I remember one day the nurse was watching this TV show on the TV above my bed and I couldn't move or talk cause of that breathing tube. I remember it was Bathurst and you know..suddenly one of the cars burst into flames. You know, I was lying there with all those burns and couldn't move and in a lot of pain and I cried hard inside cause I felt for the driver. The nurse didn't even blink, he didn't understand.'

'I remember all of a sudden people talking about me, they were yelling across the room, 'we're going to exterminate [name] now'...I thought well, [with a laugh] I've trusted them so far. I was real scared, they talked so fast I couldn't understand...suddenly I was sat bolt upright in the bed and they wrenched this thing out of my throat...'

'It was such a terrible time I wanted to leave but they wouldn't let me. I felt everyone was plotting against me. I could see people looking at me, walking past me, staring and talking about me and then turning away to plot...I was scared, I struggled to get away, I wanted to yell and they come close and force me down. I didn't want to be there. They were trying to kill me. I saw a priest just waiting in the room. I looked around and saw other dead bodies lying in the room...'

'I still remember the black shapes of the evil spirits flying over my bed. They were swooping over my bed trying to eat my flesh.'

Discharge from the ICU signifies a stage of recovery when patients no longer require intensive care support. Transfer from the critical care to the ward environment has been described by survivors as a time of heightened anxiety, fear and confusion. In the intensive care unit, survivors become accustomed and reassured to have nurses and doctors always in sight. Intensive unit discharge brings the loss of one-to-one nurse-patient ratios, with patients now entering the very different environment of a busy general ward.

'I can't remember much but I remember it was so busy, people always asking me things I didn't know. They spoke so fast I couldn't keep up. I couldn't understand them. I didn't know what day it was or really where I was.'

Patients perceive ICU-ward transfer as one of rapid transition. After the ICU nurse transferred the patient to the ward, the patient would not see the ICU, ICU nurse or have any reference to their critical illness experience again. Survivors perceive that ward nurses have very limited insight and understanding of the patient's critical illness journey, feeling it has very little relevance to their plan of care on the ward. Immediately the survivor feels isolated and frightened as they suffer pervasive memories of critical care. They describe feeling disorientated to time and place and often did not understand (or have) a plan of care. At this stage in recovery, survivors have very limited knowledge of their diagnosis, treatment or prognosis.

'Can you show me where I was in intensive care? I just want to see if I can piece it all together, what went on. I remember a lot of bits but I don't know if I dreamed it.'

Weak, incapacitated, unable to stand or walk, feed themselves, many found themselves alone in a single room. The transition to the ward was sudden and dramatic. The survivors' working memory and executive function (ability to multitask, problem solve, short term memory) were greatly impaired at this time. They did not have the capacity to make simple decisions, understand simple statements or fill in a menu. The state of cognitive impairment continues months after ICU discharge. Survivors describe the day-to-day impact of their new disability.

'Can you tell me what is wrong with me? I just can't keep up anymore...[in tears] I can't look after my kids, I just can't seem to keep up with them. They're noisy and I can't do things quickly anymore, my mind is blurry, going in slow motion, it's all just so confusing. At work my boss has been great and has let me come back to work part-time. I'm working three days a week but it's still really hard and all going wrong. It's all so fast and confusing, and I know I'm making mistakes but I can't seem to understand what people want. My friends at work ask me how I am...I look just the same, they say...they don't understand...I can't explain it as like a funny one-liner so I smile and don't bother. I feel really depressed and down all the time. Will it always be this way?'

'Do you have my file? Can you tell me what happened, how I came to be admitted? They took me off the machine and sent me home that afternoon with my cut up clothes in a brown paper bag. They said I discharged myself. I can't remember doing that [crying].'

'I'm just so worried about being a strain on my husband [pause, shaking head] he's not young and shouldn't have to get up and change me through the night, every night.'

I run a roofing business and keep forgetting to order the materials for the jobs and can't coordinate them for the right day and times. My mum has come in and is helping me manage things.

However recurrent statements reflect, a quiet sense of gratitude and overwhelming appreciation for life.

'I feel I appreciate everything so much more now [pause]. Nothing worries me [smile]. I am just so glad to be alive [smile with tears].'

The themes of advice and reassurance uncovered patient frustration on many levels. They include lack of information about their illness episode with patients often searching to understand what had gone on while they had been sedated or unconscious. Patients felt there was a lack of acknowledgement and understanding of their critical illness by other health care professionals outside of critical care, with no one able to give accurate advice or reassurance about problems experienced or able to assist with making achievable ongoing plans of care. Many describe the journey out of the critical care unit sudden and disjoint with the lack of organised health planning causing survivors to feel their recovery was going backwards. All survivors who were employed prior to the critical illness found returning to work very difficult. There was lack of advice around the appropriate time to return and the capacity. All had problems managing their prior workload, expressing feelings of failure and doubt about their capability. All endured difficulty integrating with colleagues.

'We have had no follow-up since leaving hospital you know [pause]. The GP doesn't know what to do [pause] doesn't seem to understand my problems or give me any answers [frown, turns away]. I feel abandoned. We have to try and figure it out by ourselves.'

'How long will it take for her to be back to normal [husband referring to wife, the patient]? I really have never learned to cook cause it was always [wife's] job.. I have figured out this routine I follow everyday [exhausted sigh]. I get her up and showered by seven, and then I put all the wet sheets I've changed through the night into the machine then make her breakfast. She eats so little but I force her to eat more [wry smile from patient]. Then I put her on the couch in the sun while I clean up the house. At ten o'clock I make sure she marches three laps around the backyard with her walker. Our GP has changed all her tablets and now I don't know what any of them are for. It's been eight weeks now, how much longer will she be like this? [looking around the kitchen] How long do you reckon it takes to boil an egg for a salad?'

'My husband now travels without me as I am just not strong enough and now I have all these problems. He is away for three months at a time and I have to find ways of coping out here on the farm by myself.'

Often roles and relationships change with the impact of critical illness often borne by the whole family unit. Survivors often describe relationship strain as the critical illness defines their sense of self.

'Yeah she's [name] eight months pregnant and our [older child] is just two. I try and concentrate on my work but can't seem to do anything I could before. I have started drinking abit. The business is going further and further down and I won't be able to pay the rent for my office soon. I find it hard to quote for jobs and can't manage to draw plans anymore. She [wife] is always very tired, she has had to take on extra work and when she gets home she has to look after our son as I can't by myself. He [son] is just so noisy all the time that I don't like being around them. We used to argue but now we really don't talk much at all, I feel uncomfortable around her. She thinks I am just another child she has to look after. It will be a relief if she leaves me.'

'Since my accident my boy [10 year old] won't leave my side. The teachers say he's muckn around at school. You know he saw them drag me out of the car…now all I can do is sit in this chair for couple hours each day…rest of the time I'm in bed.'

'My family is smothering me. He [husband] won't leave me, telling me to eat more, pushing me to rest and sleep like I'm going to fall over and break.'

'Yes, it's good to be home with her [wife]. If I couldn't be home looking after her then there would be no point to me living.'

Themes for controls

Physical incapacity

Control narratives were also grouped under the same themes. The themes were common between groups with controls often themes however the severity of with pain and weakness also common problems, however to a lesser degree.

'I still have problems with my wounds, they are just not healing. I have such a lot of pain from these pressure sores on the back of my heals that I can't even wear shoes or walk any further than around here [gesturing].'

'I am a lot weaker since my surgery and fear falling in the shower.'

Isolation

The theme of isolation consisted of financial problems, transport problems and issues with logistics of getting to hospital appointments; feeling depressed and often also endures relationship strains between partners and carers.

'My husband gives me no consideration. I was trying to sleep last night and he was watching the soccer on T.V. all night which kept me awake.'

Advice and reassurance

Advice and reassurance consisted of such issues as lack of information about their illness and prognosis, problems with the transition back to work.

'We are due to move house next week and I worry how things will go. I worry about the contracts and sale of the house.'

'I still experience a lot of pain and am unsure of which of these tablets I should be taking.'

Controls are seen to commonly suffer lack of information regarding their condition, transport problems (attending clinic appointments) as are restricted with driving, they fear being a burden and are often frustrated with carer's lack of consideration and support. These problems are not in isolation but coupled with physical problems most commonly listed as changes in bowel habits, leg cramps poor wound healing, pain and immobility. Controls do not highlight any cognitive problems. Comparison between groups shows a greater number of problems for cases with greater diversity. There were neither critically ill survivors nor carers who felt they were prepared to deal with the new disabilities and impairments and some even reported that their complaints to physicians were dismissive.

Themes are derived from patient transcripts which reliably represent the ICU patients and controls recovery experience (Table 56.0). Controls experiences were also grouped under the same themes, with pain and weakness also common problems, however to a lesser degree. The theme of isolation consisted of financial problems, transport problems and issues with logistics of getting to hospital appointments, feeling depressed and a burden. Advice and reassurance consisted of such issues as lack of information about their illness and prognosis, problems with the transition back to work and often also endure relationship strains between partners and carers.

Table 56.0. *Themes derived from patient transcripts which reliably represent the case and controls recovery experience.*

Constructs	ICU themes	Control themes
Physical Incapacity	Lack of balance and strength, limiting mobility.	Weakness
	Weakness and lack of endurance	Pain
	Tiredness	Immobility
	Breathlessness	Poor wound healing
	Pain	Altered bowel habits
	Poor wound healing	
	Problems sleeping	
	Nightmares	
	Hearing problems / loss; problems communicating	
	Embarrassed at altered body image	
Isolation	Pervasive memories of critical care	Financial difficulties
	Altered perspective to illness, renewed appreciation of life	Transport problems, difficulty getting to clinic appointments as cannot drive, public transport not suitable, taxi expensive
	Financial problems	Feeling depressed
	Loneliness and isolation	Fear of being a burden
	Critical illness defining the sense of self	
	Fear of being a burden	
	Recall of traumatic events consistent with PTSD	
	Poor concentration	
	Panic attacks	
	Poor memory	
Advice and Reassurance	Lack of discharge follow-up and ongoing support	Lack of information about illness and prognosis
	Carers uninformed, limiting independence and restricting recovery	Relationship strain and change
	Ability to cope with disability	Difficulties returning to work
	Relationship strain and change	
	Difficulties returning to work	

As an extension to this analysis and to create longitudinal trajectories of the narrative data, the overall construct trajectory was categorised as 'positive', 'negative', 'mixed' or 'neutral.' Categorisations or themes were based on 3 constructs, physical incapacity, isolation and advice and reassurance. Each transcript was coded for positive, negative, mixed or no change on each theme. (Table 56.1)

Table 56.1. *Narrative recovery trajectories over 24 months, ICU patients and controls (Freq; %)*										
	Trajectory type									
Themes	Positive				Negative		Mixed		Neutral	
	ICU patient (n)	Control (n)	ICU	Control	ICU	Control	ICU	Control	ICU	Control
Physical incapacity	71	72	0 (0)	63 (87.5)	61 (85.9)	2 (2.8)	3 (4.2)	5 (6.9)	7 (9.9)	2 (2.8)
Isolation	71	72	11 (15.5)	67 (93.1)	23 (32.4)	0 (0)	30 (42.2)	5 (6.9)	7 (9.9)	0 (0)
Advice and reassurance	71	72	9 (12.7)	70 (97.2)	17 (24)	0 (0)	1 (1.3)	0 (0)	44 (62)	2 (2.8)

Narrative trajectories

Across the construct of physical incapacity, ICU patient narratives were predominantly classified as negative (86%), neutral (9.9%) and 4.2% of narratives were classified as mixed. Comparatively, 87.5% of controls were classified as a positive trajectory, 7% mixed and almost 3% equally neutral or negative. Throughout the 24 month period, ICU patients regarded physical incapacity (Table 56.0) incorporating themes such as lack of balance and strength, weakness and lack of endurance, as factors which continued to impact causing a negative affect across the study period. Additionally, almost 10% of ICU patients show neutral or no change to themes within this construct which shows no clear change to these themes. Controls show the inverse, a positive trajectory throughout the study period. While highlighting themes of weakness and pain, these themes improved across the 24 month period. Comparing the narrative trajectories to the quantitative data, physical function, as measured by the FIM show a much slower recovery for ICU survivors, re-claiming premorbid levels by 12 months however do ever reach full physical function before showing a downward trajectory. Controls are seen to exceed premorbid levels by the 3 month time point, reflected within the positive narrative trajectory. Considering the HRQOL physical component score, while trajectories may show a similar pattern of recovery, ICU patients display greater deterioration across each time point compared to controls, also consistent with narrative trajectories.

Considering the construct of isolation, ICU patient narratives were predominantly mixed (42%) with only 15% classified as positive trajectories. Themes within this construct include memories of the ICU experience, financial problems, loneliness, poor concentration, memory among others. Controls show a positive trajectory of 97% across the 24 month period and while there are some common themes between ICU patients and controls,

(financial problems, fear of being a burden), it appears these correct quickly, becoming predominantly a positive trajectory across the 24 month period. While considering quantitative data, the HRQOL mental component score, ICU patients show higher levels of quality of life compared with controls however do suffer higher levels of neuropsychological impairment, reflected across the Stroop, Trailmaking Task and Letter Number Sequence. Psychosocially, while ICU patients do display lower levels of anxiety and depression compared with controls, they show high levels of post-traumatic stress associated symptoms. The narrative analysis trajectory informs the study of the ongoing impact of symptoms related to the neuropsychological impairment and post-traumatic stress associated symptoms among ICU survivors.

Finally within the construct of advice and reassurance, the narrative trajectories for ICU patients are dispersed between a neutral trajectory, 62% showing there was no clear change across the 24 month period, 24% negative and almost 13% positive. Controls show a strongly positive trajectory across the 24 month period (97%). ICU patients cite such themes as lack of information and ongoing support for both themselves and carers which they regard impede their recovery. The neutral narrative trajectory shows little change, if not increasing dissatisfaction (negative trajectory) in this area of support, advice and reassurance. Quantitative data in the area of community integration for both ICU patients confirms this, showing a moderated recovery, never reaching the premorbid level of community integration across the study period. Controls show a strongly positive narrative trajectory which reflects either greater access to advice and reassurance or perhaps cited themes, such as returning to work and relationship change and strain, were on a lesser scale. Community integration recovery trajectories for controls show improvement by 3 month time point.

Test incompletion

Finally, reasons for test incompletion must be discussed not only for reasons of study rigour but this additional information may highlight further areas where patients perhaps encountered problems (Table 57.0). Researchers documented at each interview reasons why test batteries were unable to be completed under the heading of 'physical inability', 'poor cognition' (MMSE<24) and 'refusal'. Early time points see a high level of physical inability among ICU patients, showing patients were physically exhausted and a low level of physical

endurance. The number of ICU patients who refuse increase during the study which may indicate familiarity of the test battery and deciding to opt out due to such factors as distress due to low levels of achievement or mental exhaustion. Phone interviews were classified as refusal. Each interview required approximately one hour so physical and mental exhaustion is factors to be considered when designing an extensive test battery for this cohort.

Table 57.0. *Reasons for test incompletion*

UNABLE TO COMPLETE COGNITIVE TESTS	CONTROL				ICU patients			
	N	PHYSICAL INABILITY	POOR COGNITION	REFUSED	N	PHYSICAL INABILITY	POOR COGNITION	REFUSED
Preadmission	13	4	8	1	48	21	10	17
1 month	13	4	8	1	48	21	10	17
3 months	18	5	13	0	37	7	9	21
6 months	19	4	8	7	37	10	5	22
12 months	16	3	10	3	36	0	8	28

Chapter 5
Discussion

Study Summary

With advances in critical care medicine, a higher proportion of patients are now surviving ICU admission.[6] With this increase in survival, critical care research has begun focusing on long-term outcomes of ICU survivors, including physical function, mental health, HRQoL and cognitive outcomes.[10,37,38] Critical illness and associated therapies expose patients to enormous stressors. [102] ICU survivors may face significant physical limitations[6] which predispose them to depressive symptoms, which may impact their HRQoL[94] and capacity to return to work.[108] Increasingly, attention has been focused on the effect critical illness may have on cognitive functioning and impairment.[19,94]

ICU outcome literature has demonstrated marked variability in the reported physical, neuropsychological and psychosocial disability among survivors [14,16,40-43,45,46,51,55,56] This is not surprising given such factors as the heterogeneous population, the varied follow-up time points, incompleteness of follow-up and the lack of independent assessors.[6-8,37,39]

The present study followed the longitudinal trajectory of two groups (ICU survivors and controls) using a study methodology that is consistent with current evidence,[35,36] describing outcomes based on a battery of tests that are validated in this population. The scale and completeness of follow-up data adds novel data and addresses some of the recognised limitations of the current critical care outcomes literature.

Key findings

- This study profiled and tracked the recovery of a group of non-ICU, medical and surgical acute care patients. This group acted as a control group for the ICU survivors. Very few studies use the acute care hospitalised patient as a control population.[9]

- The control group showed unexpected high levels of impairment, particularly across the neuropsychological domain. Long-term recovery trajectories across all domains

show similar levels of impairment among controls to those seen among ICU survivors. With comparable levels of impairment amongst both groups, study data arguably questions the implication of critical illness and critical care therapies as the causation of long-term impairment among survivors. Critical care research may have erroneously over emphasised the implication of critical care therapies;[27] with long-term impairment explained as more one of a continuum of pre-existing impairment.[176]

- Few studies have gathered premorbid or baseline data prior to critical care admission.[9,17,210] This study provides a baseline data set which uncovers the profile of two parallel groups, both suffering similar levels of comorbidities and chronic illness, requiring social health support. This study provides important novel epidemiological information detailing previously unrecognised high levels of chronic ill-health across functional, neurocognitive and psychosocial domains. This data highlights the need for management, support and investment of primary health care resources.

- Study literature broadly cites a period of up to 4 years for the recovery of the critical care survivor and longer across many domains.[21,29,48] This study shows trajectories of recovery across functional, neuropsychological and psychosocial domains reach maximum recovery between 3-12 months, after which trajectories plateau or show deterioration. This information provides a sound methodological prototype for further studies, providing the consistency for future study design in long-term outcomes which is urgently needed.[10,211]

- The addition of the narrative trajectory is relatively novel in ICU research[78,176] and provides meaning of the journey of survivors and a focus for a responsive health care system to support optimal recovery.[78,176]

- This study has provided a multivariate model based on criteria at premorbid and 1 month timepoints, which has the ability to predict those with impairment at 2 years following discharge. This work provides the research community fundamental

information for further risk stratification which will help distinguish between patients who can regain independence and those who will not.

Study outcomes will be discussed in detail, addressing the study aims.

Primary Aims

- Determine the incidence of functional, neuropsychological and psychosocial impairment of patients surviving critical illness 24 months following ICU discharge;

- Determine the level of functional, neuropsychological and psychosocial impairment of patients surviving critical illness over a 24 month period following ICU discharge;

- Track the functional, neuropsychological and psychosocial recovery of patients surviving critical illness over a 24 month period following ICU discharge.

Secondary Aims

- Determine baseline variables associated with outcome (not impaired, impaired and death) 24 months following ICU discharge;

- Examine common themes and characterise the subject's recovery during the first 24 months following ICU discharge.

Study outcomes

Despite a slightly older and sicker critical care population when compared to the Australian critical care population published by Moran in 2008,[77] the incidence of functional impairment was comparable to the study literature.[39] Prior to hospitalisation both ICU survivors and controls reported physical impairment and functional quality of life to be lower than norm referenced average levels. ICU survivors were more physically independent,

which may reflect the impact of a rapid onset of critical illness, rather than a slower, more chronic state of illness, as seen among controls.

Study scores are reflected as a poorer quality of life within the patient narratives and thematic analysis. ICU survivors describe similar themes to those identified by Cuthbertson[176] as a state of physical incapacity, which incorporates lack of balance, strength, weakness, lack of endurance, tiredness and pain. Compared to controls, the immediate impact of an illness with greater severity (critical illness) is reflected in both the objective and subjective test scores.

Neuropsychological impairments after critical illness are seen to affect multiple cognitive domains and many critical care survivors face significant brain-related morbidity.[13,15,17,39] An episode of cognitive impairment may result in new and often persistent disability, in some cases even resembling dementia.[13,15, 17, 18] In this study, neither group attained neuropsychogical scores in the normative range throughout the 24 month study period, with controls having a lower incidence at the 3 month and 24 month timepoints. While such levels of impairment have been reported for ICU survivors,[14,16,40,41,46] such high levels of impairment among controls have not been previously reported. Existing evidence suggests that older adults without dementia at baseline found that those who underwent an acute illness hospitalisation or a critical illness hospitalisation had a greater likelihood of cognitive decline than did those who were not hospitalised. Such impairment for a general acute care hospital population has not been previously acknowledged and now must be given consideration.

ICU survivors also face significant physical limitations during recovery which predispose them to depressive symptoms.[6] Psychological problems associated with critical care have been widely reported, especially in the areas of delirium, anxiety, depression and PTSD.[102-104] The reported prevalence of anxiety and depressive problems in ICU survivors ranges from 12 to 43% for anxiety[58,109] and between 10 and 30% for depression.[55-58,109] This was not reflected in this study data, revealing very low levels of symptoms of PTSD, anxiety and depression. This is perhaps reflective of recent changes in practice to less sedation and more physical activity whilst in ICU.[1,125]

Research indicates that previously healthy patients who suffer critical illness tend to suffer greater deterioration in their HRQoL than individuals who had a lower HRQoL status prior to ICU admission as HRQoL is influenced by the patient's prior health status as well as their expectations for a return to premorbid functional status.[24] A rapid onset of critical illness gives insufficient time to prepare or adjust for the new state of incapacity. Controls appear to have endured a slower onset, chronic state of physical illness and report a lower quality of life prior to admission.

The literature shows cognitive impairment in ICU survivors includes a wide range of impairments, predominantly in the areas of memory[14,16,40-42] and executive function. [14,16,40,42,44,46] Levels range between 30 - 90% at three months improving to approximately 41% at 6 months with further improvement at 9 months however remaining impaired when compared to population norms.[46 48] Studies to date indicate that cognitive function improves during the first 6 - 12 months after hospital discharge and remains consistent and disabling for up to 6 years after discharge.[212] This suggests that while some recovery occurs initially, chronic cognitive impairments persist in many patients. This is supported by the data; results of the present study indicate that neither group attained scores in the normative average range throughout the 24 months. In this study, throughout all cognitive tasks, ICU survivors displayed higher levels of deficit throughout the study period with a lower level of recovery across the 24 month study period, compared to controls. While such levels of impairment were expected for ICU survivors, such high levels of impairment were not for controls. Further, executive function, information processing speed and visual-motor attention test performance of ICU survivors in this study is below test performances of other patient groups reported in the literature.[14,16,40,42,44,46]

The completeness of the dataset has provided a highly detailed trajectory of the sequelae of critical illness and its severity in comparison to acutely hospitalised patients. Furthermore, the completeness of the dataset has facilitated the development of a predictive model which provides variables at the premorbid and 1 month time points which predict impairment and death of ICU survivors at 24 months. This data will inform clinicians of patient's long-term outcome. Early identification of patients who are at high risk of long-term impairment will assist patients and families to make informed treatment choices and will also assist the

clinical team to coordinate care across the continuum and between settings to maximise recovery.

Prediction Analysis

Currently there is no single instrument which can reliably predict long-term morbidity or mortality of survivors of critical illness. The results of this study identify potential variables that predict items risk of clinical impairment and death at 24 months following discharge from critical care.

Predicting impairment or death at 24 months after ICU discharge prior to admission or at 1 month after admission was a secondary aim for this study. Outcome was stratified at 24 months as 'not impaired', 'impaired' and 'deceased'. Impairment was defined as outlined in Table 58.0. The impairment descriptors are clinically relevant parameters which reflect day-to-day function and patient outcome.

Table 58.0. *Test Outcome predictors and outcome*

PREDICTORS (Premorbid & 28 day)	24 month OUTCOME MEASURES (Impaired and Death)
Functional Independence Measure (FIM)	Letter Number Sequence (LNS) - Impairment $\leq$ 4
Community Integration Score (CIQ)	Digit Span (DS) – Impairment $\leq$ 4
Years Education	SF-36v2 Physical Component Score (PCS) Impairment $\leq$ 45
Charlson Age Comorbidity Index (CACI)	SF-36v2 Mental Component Score (MCS) Impairment $\leq$ 45
APACHE 3 Risk of Death (ROD)	Social Impairment • Inpatient acute care Inpatient rehabilitation unit Living at home with carer Nursing home resident
Mini Mental State Examination (MMSE)	Mobility Impairment • Hospitalised • House mobile

The levels of impairment among ICU patients and controls at 24 months were comparably high, with cases showing higher levels of impairment across all tasks excluding the subjective component measures of quality of life. (Table 59.0)

Table 59.0. *Incidence of impairment at 24 months (%)*

	Impaired ICU (total)	Impaired ICU (survivors)	Impaired controls (total)	Impaired controls (survivors)
LNS	20.28	22.22	16.94	19.23
DS	17.39	21.43	11.76	13.79
SF-36v2 PCS	47.88	58.62	56.45	67.30
SF-36v2 MCS	18.30	22.41	25.8	30.77
Residential Support	9.85	12.07	0.00	0.00
Mobility Impairment	7.04	8.62	3.17	3.77

Statistically significant premorbid and 1 month univariate 'predictors' were applied in a mixed model regression. From the univariate analysis, mixed model regression analyses showed statistically significant relationships to study outcomes (Tables 60.0, 61.0; Appendix 6).

Impairment prediction

Significant premorbid predictors of impairment at 24 months include Years of education, MMSE, FIM, APACHE 3 ROD and the CIQ.

- *Years of education*

Years of education was found to be a significant premorbid and 1 month predictor of mobility impairment (defined as being hospitalised or house mobile) at 24 months. This means that for each unit increase in years of education, the risk of mobility impairment *decreases* by a RRR of 0.539 or 46.1% at 24 months after discharge. The positive association between education and health has been well established in areas of health lifestyle[213] socioeconomic status[214] and social-psychological resources.[215] The well-educated are more

likely to be employed full-time with high incomes which in turn give a greater sense of control over their lives and their health. They are more likely to make positive health choices, such as not smoke, drink moderately and exercise[215]. Authors conclude that high educational attainment improves health directly and indirectly, such as work and economic conditions.[215]

- *Mini Mental State Examination*

A similar relationship exists between MMSE and a reduction in impairment of mobility impairment. The MMSE is widely used as a general screening measure of cognitive mental state and dementia. An increase in the MMSE performance indicates an improvement in general cognition. An association between reduced cognitive function and mobility impairment has been widely reported. McGough[216] found the prevalence of functional mobility limitations and falls is higher in people with dementia compared with cognitively healthy older adults, and both are associated with gait and motor impairments.

The results of the present study indicate that improved MMSE performance is associated with an improvement in Digit Span, (a task measuring verbal short term memory) at 24 months.

- *APACHE 3 Risk of Death*

APACHE 3 ROD (severity of illness assessment) also shows strong predictive relationship with mobility impairment at 24 months. For every unit increase in APACHE 3 risk of death (worsening) mobility impairment triples at 24 months. ICU acquired weakness is a syndrome encompassing myopathic, neuropathic and atrophic changes, which clinically presents as profound weakness. Mortality is higher in those with a diagnosis of ICU acquired weakness[217] and may demonstrate a link between ICU acquired weakness and severity of illness, rather than ICU acquired weakness being a direct cause of mortality.[217] ICU-acquired weakness is a complication of critical illness associated with worse clinical outcomes and functional decline in survivors.

- *Community Integration Questionnaire*

The results of the present study indicate that CIQ performance at 1 month is a significant predictor of later function.

The level of home and community integration predicts LNS outcome. For each unit increase in the CIQ score, the relative risk of LNS impairment (verbal working memory) decreases with integration. Zunzunegui and colleagues[218] also found as association between cognitive decline and community integration. The authors show that few social ties, poor integration, and social disengagement are risk factors for cognitive decline among community-dwelling elderly persons.

For a one unit increase in the mean score of (premorbid predictor) the relative risk of (outcome) ***impairment*** increases or decreases by %

Premorbid predictor	Outcome	Trend	%	*(p value)*	1 month predictor	Outcome	Trend	%	*(p value)*
Years of Education	Mobility Impairment	decreases	46.1	0.023	MMSE	DS	decreases	20.5	0.000
						Mobility Impairment	decreases	13.4	0.045
					CIQ	LNS	decreases	6.7	0.048
APACHE 3 ROD	Mobility Impairment		295	0.013					

For a one unit increase in the mean score of (premorbid predictor) the relative risk of (outcome) death increases or decreases by %

Premorbid predictor	Outcome	Trend	%	*(p value)*	1 month predictor	Outcome	Trend	%	*(p value)*
Functional Independence Measure	Letter Number Sequence	decreases	6.8	0.000	Functional Independence Measure	Letter Number Sequence	decreases	16.6	0.001
	Digit Span	decreases	5.9	0.000		Digit Span	decreases	7.7	0.000
	Physical Component	decreases	5.4	0.002		Physical	decreases	5.6	0.000
	Mental Component	decreases	4.4	0.000		Mental	decreases	7.9	0.000
	Social Impairment	decreases	4.7	0.000		Social Impairmer	decreases	6.4	0.000
	Mobility Impairment	decreases	6.0	0.000		Mobility	decreases	8.7	0.000
Community Integration Questionnaire	Letter Number Sequence	decreases	10.3	0.003	Community Integration Questionnaire	Letter Number Sequence	decreases	8.1	0.014
	Digit Span	decreases	12.5	0.002		Digit Span	decreases	9.4	0.004
	Physical Component	decreases	51.1	0.042		Physical	decreases	13.7	0.001
	Mental Component	decreases	10.9	0.006		Mental	decreases	25.0	0.001
	Social Impairment	decreases	10.5	0.001		Social Impairmer	decreases	10.5	0.001
	Mobility Impairment	decreases	10.7	0.001		Mobility	decreases	10.8	0.001
Years of Education	Letter Number	decreases	17.3	0.049					
	Digit Span	decreases	18.7	0.029					
	Physical Component	decreases	29.3	0.037					
	Social Impairment	decreases	18.1	0.047					
	Mobility Impairment	decreases	14.9	0.031					
Charlson Comorbidity Index	Letter Number Sequence	increases	53.1	0.000					
	Digit Span	increases	33.1	0.000					
	Physical Component	increases	31.3	0.000					
	Mental Component	increases	31.3	0.000					
	Social Impairment	increases	33.4	0.000					
	Mobility Impairment	increases	33.7	0.000					

Table 61.0. *Premorbid and one month predictors of death at 24 months*

Death prediction

Significant premorbid predictors of death at 24 months include Years of education, FIM, CIQ, and the CACI.

- *Years of education*

Years of Education are a strong predictor of death. As years of education increase, the relative risk of death measured using Mobility Impairment, the DS, the LNS, the PCS and Residential Support decrease.

- *Functional Independence Measure*

The outcome effect of the premorbid physical functional predictor, the FIM shows a broad effect on outcome at 24 months. As FIM scores increase (physical function improves) the relative risk of death for all outcomes decrease. This effect not only holds but becomes stronger at the 1 month time point.

- *Community Integration Questionnaire*

Socially, premorbid and 1 month CIQ scores also show a broad significant effect across all outcome measures in relation to predicting death. In particular for every unit increase in CIQ scores the relative risk of death for the PCS decreases by 51%. This predictor item holds its statistical significance at 1 month, with the relative risk for death decreases across all outcome measures at levels between 8 - 25% at 24 months. The relative risk of death for the MCS is seen to decrease by half as the CIQ increases.

- *Charlson Age and Comorbidites Index*

Finally, the effect of comorbidities shows a very strong effect. With every unit increase in the mean CACI score (indicating greater comorbidities) the relative risk of death across all outcomes measures increases between 30 - 50%.

Significance of prediction analysis

It has only been relatively recently that the long-term consequences of critical illness have been considered. For many, discharge from critical care signifies the start to recovery of functional, neuropsychological and psychosocial problems. Currently we cannot predict those patients who will lead a short and straight-forward recovery or those who will endure long-term problems and may need substantial help. What is now clear is that many ICU patients are discharged home and are likely to incur many problems which will lead to a poor quality of life. These problems cause ripple on effects to families and society in general and consequently, rehabilitation after critical illness has been classified as a major public

health issue by the National Health Service.[3] In response, the NICE clinical guidelines[3] were formulated to assist clinicians in assessing and standardising practices after critical illness.

In this study prediction analyses provides variables at the premorbid and 1 month time points which predict impairment (definition was predetermined, Table 55) and death at 24 months. This data will inform clinicians of patient's long-term outcome. Holding information which allows early identification of patients who require early intensive rehabilitation is important on the individual and social level. Rehabilitation is often fundamental in enhancing patients' functional independence and play an important role in assisting with the patient's return to the community and home.

Early identification of patients who are at high risk of impairment will assist the rehabilitation team coordinate care across the continuum and between settings.

This assists maximising independence between setting and at different stages of recovery and minimising ongoing health care needs of this population.

Information relating to risk of clinically meaningful impairment and death, long-term, will assist patients and families to make informed treatment choices. We now hold accurate data which describes the recovery curves and long-term trajectory of the survivor of critical illness.

Conclusion

This study has demonstrated novel and supporting evidence for the functional, neuropsychological and psychosocial recovery of ICU survivors compared with the existing literature. It has also revealed a much greater impaired profile for non-ICU medical and surgical acute care hospitalised patients, exhibiting a sicker and poorer baseline and recovery than expected.

Chapter 6

Conclusion

Test Battery

A broad test-battery incorporating standardised objective and subjective tests to measure functional, psychosocial, neuropsychological impairment together with patient self-report was used at 6 timepoints, over a 2 year period. Face-to-face, semi-structured interviews were conducted, which included narrative analysis. Tests, validated for use in ICU patients were used wherever possible.

It was important to design a heterogeneous study to accurately describe the recovery of the ICU survivor from a general medical, surgical unit rather than focusing on a homogeneous diagnostic group with limited capacity for generalisation to the general ICU population. The study did not suffer any loss to follow-up among the 143 participants throughout the study period, excluding attrition due to death.

The recovery of survivors of critical illness shows physical functional, neuropsychological and psychosocial impairment, of varying degrees, consistent with the literature. Points of note include:

Demographics

- Preadmission, both groups were physically impaired to some degree and consider their functional quality of life below normative levels;

- The ICU patient profile show a sicker demographic prior to admission with almost 50 percent receiving social support and 17% of ICU patients hospitalised prior to ICU admission;

- However ICU patients were more physically independent and report higher levels of quality of life prior to admission compared with controls;

- Preadmission, the control profile was largely a group with a degree of functional deficit, reduced mobility, receiving community services although were still living at home and showed a higher level of integration at home and in the community.

Physical Functional Outcome

- Neither group score full functional capacity at any stage throughout the study period;

- Both groups show greatest deterioration in scores at the one month time point, reflecting the impact of the immediate illness episode and show recovery between 3 and 6 months;

- Controls reach maximum recovery and then plateau at 3 months after which show a trajectory of decline out to 24 months;

- ICU patients take longer to recover, achieving their maximum recovery reaching 12 months after which also showing a trajectory of decline at 24 months.

Quality of life

- Throughout the 24 month study period, both groups show gradual improvement to 12 months however do not ever perceive their physical function to be as high as the preadmission levels. The MCS trajectory is one of ongoing improvement at 24 months.

Neuropsychological Recovery

Verbal working memory

- Recovery curves for the DS show both ICU patients and controls show a similar pattern, achieving maximum recovery by 3 - 6 months after which both groups show a trajectory of decline at 24 months;

- Cognitively, overall ICU patients suffer higher levels of working memory deficit throughout the study with a lower level of recovery which is less sustained;

- ICU patients do not achieve normative scores at any time point for the DS or LNS, with older ICU patients showing worse verbal working memory.

Executive function

- Recovery curves for the TMT, for both groups show maximum recovery by 6 months, after which the trajectory for ICU patients, at 24 months shows deterioration while controls continue to plateau;

- The SNST shows maximum recovery occurring later, between 6 - 12 months after which both groups show a plateauing trajectory.

Psychosocial outcome

- There were no screened cases of PTSD symptoms in this study;

- ICU patients show low incidence of PTSD associated stress with scores improving to match controls, dropping to negligible levels by 24 months;

- The IES-R show controls score negligible levels of PTSD associated distress;

- Study data show both groups display low levels of deficit in the area of anxiety and depression throughout the study;

- Overall in this study up to 17% of ICU patients and 8% of controls displayed clinically elevated anxiety and depression (HADS) related to distress of the episode of illness. However, the level of clinically elevated anxiety and depression declined rapidly, with no evidence of anxiety or depression in either group at 24 months;

- ICU patients show slightly higher levels of anxiety and depression, particularly among females.

Narratives confirm:

- Comparison between groups shows greater incidence and higher severity of problems for ICU patients with greater diversity;

- In the psychosocial domain, most common themes for ICU patients include physical weakness, fatigue, poor balance and strength;
- They felt unsupported immediately once discharged from the ICU. They found they were a lack of community support and service, lack of information, advice and reassurance resulting in loneliness, isolation and an inability to cope. ICU patients describe the majority of clinicians (from acute-care through to their General Practitioner) as dismissive of their problems and concerns;

- ICU patients feel ill-equipped and frightened to cope on the hospital wards. They regard there generally is lack of appreciation of the critical illness experience. They cite upon ICU discharge, there is a lack of ongoing rehabilitation, such as physiotherapy, occupational therapy;

- ICU patients perceive a low level of ongoing support, especially within the community, showing low levels of participation in community occupational / rehabilitation / allied health services. ICU patients believe their General Practitioners may be unaware of community based programs or regard them as unnecessary;

- ICU patients describe being unable to concentrate and describe poor memory function, many suffering panic attacks;

- Neither critically ill survivors nor carers felt they were prepared to deal with the new disabilities and impairments;

- Controls describe lack of information regarding their health condition, prognosis or recovery;

- Controls site transport problems (attending clinic appointments) as a significant and common problem due to driving restrictions;

- Controls are frustrated with their carer's lack of consideration and support.

- Controls cite transient physical problems such as changes in bowel habits, leg cramps poor wound healing, pain and immobility. Controls do not highlight any cognitive problems;

- Themes reflect a concerning level of patient frustration with the current systems and raise concerns for the ongoing management of patients following critical illness.

Significance of outcomes

- Information surrounding recovery, outcome and impairment will influence immediate and ongoing patient treatment and care, and will have significance for future critical care health modelling. Understanding long-term recovery of intensive care survivors is needed to assist clinicians, patients, families and policymakers judge the clinical and economic benefits of new interventions and ensure provisions for suitable rehabilitation. Recovery outcomes will inform and strengthen the health literacy of patients and families, assisting in their decision making process.

- Using non-ICU, acute-care hospitalised controls is relatively novel in the area of critical care outcome research, with the majority of controlled studies recruiting control cohorts from either parallel critically-ill patient groups or controlling data within community norms. An acute-care hospitalised cohort was used to control for the effect of acute illness on the outcome of the critically ill survivor. Study data show impairment (to a lesser degree) among non-ICU general medical and surgical acute-care hospitalised controls, existing prior to admission. The literature details physical, psychosocial and cognitive deficits following critical illness, however there is very little published detail of the pre-existing level of impairment which chronically exists among acute-care hospitalised controls. These results perhaps reflect higher levels of incapacity and chronic disease existing in the community than previously acknowledged. This suggests that long-term impairment seen after critical illness may not totally be directly attributable to the critical illness episode. Acute-care hospitalised controls and ICU survivors may be suffering a chronic state of disability, upon which the critical illness episode is superimposed. This information is vital to accurately inform the design of the health planning framework for the health model to be sustainable.

- Cognitive impairment was not isolated to ICU patients. Study data show acute-care hospitalised controls suffered high levels of cognitive deficit compared to ICU patients.

- Study data confirms follow-up of between 3 and 12 months will show maximal recovery across all physical functional, psychosocial and cognitive domains. This data will inform future longitudinal studies, recognising follow-up is costly and loss to follow-up is notoriously high for long-term longitudinal follow. Being able to define the required length of follow-up is finally working towards a standardised test battery.

- The incidence of delirium is well documented in the critical care literature. Delirium has been cited to occur in up to 80% of ICU patients and may contribute to morbidity and mortality in the ICU.[219] Although delirium is recognised as a significant factor which may predispose ICU patients to PTSD and long-term cognitive deficits, it was not able to be measured in this study as delirium was not routinely measured in the critical care units at the time the study was conducted. However, it is recommended that all ICU patients be monitored using a validated delirium assessment instrument.

- Secondary outcome measures have been incorporated as outcomes for this study. These include social support, mobility impairment and return to work. These criteria were included to describe real-life situations upon which day-to-day health and service support services are allocated. These have important implications for such services including general practice, community nursing, rehabilitation, physiotherapy, occupational medicine and employers as they provide ongoing support for survivors of critical illness. Holding knowledge of the high level of deficit among acute-care hospitalised patients may alert clinicians to ensure appropriate services are in place to support a population previously thought to be independent. A comprehensive approach - medical and psychosocial - eventually entailing adequate vocational rehabilitation with supported employment can improve outcomes.

Utility of Prediction analysis

Having the capacity to predict the two year outcome of critically ill patients at unit admission will potentially change the model of critical care treatment. It has high utility for clinicians

and invaluable for patients and their families. Critical care beds are a scarce resource and a tool of predication will assure effective use of the beds.

A prediction tool will therefore ensure patients who choose not accept the long-term deficits or limitations or poor quality of life make an informed treatment limitation order with the knowledge that their quality of life may be poorer.

Study Limitations

- This is a small pilot study conducted at two metropolitan hospitals (one a tertiary referral centre) in southern Tasmania. Currently Tasmania has the nation's highest unemployment rate which may result in a sample of a lower socioeconomic status than the wider Australian population, which may cause study bias.

- Delirium was not measured in this study as this was an observational study and delirium was not routinely measured in the critical care units at the time the study was conducted. The levels of PTSD symptoms measured by the IES-R were overall low to moderate levels.

- Positive outcomes were not measured. ICU patients, in particular, relayed a heightened sense of the value and meaning of life, often changing their outlook after critical illness. The capacity to capture positive outcomes was only reflected in the thematic analysis. Positive outcomes may have an impact on and create bias among such measures as quality of life, anxiety and depression and premorbid task scores.

- MMSE should have been administered prior to each time point to assess for general cognitive decline.

- Study design and study rigor was limited by financial constraints. The ideal design of a 'controlled' study (whereby a 2:1 match exists with 1 ICU patient matched to 2

controls) could not be achieved. This ensures that each and every control patient has a match. However, the adopted design still achieved study rigor.

- Unplanned critical care unit readmissions which have shown to increase mortality and longer length of hospital stay[220] have not been displayed nor factored into the study analyses due to small numbers. Data show one study participant (ICU patient) was readmitted to the ICU twice, within the 2 year study period.

- Administration of the test battery required approximately one hour to complete. While participants were offered rest breaks it was acknowledged interviews were mentally and physically tiring. Fatigue was highlighted by participants to be one of their primary problems, especially during the early stages of recovery. The length of interview may have contributed to participant fatigue. This perhaps contributed to the number of incomplete tasks within the test battery (participants noted as refusing some tasks) and perhaps poor test scores. This is a methodological factor of study design which should be a considered in future study design.

- Premorbid values, measured retrospectively, may show bias and inaccuracy.

- The control cohort consists of 16.25% cardiac related diagnostic groups. While this is acknowledged to be a high percentage of the total control cohort and may cause some study bias, it is also a true reflection of the current epidemiology of cardiovascular disease and representative of the restricted random sample.

- Five ICU patients listed as 'refused to participate' did so based on either reasons of 'tiredness,' 'unwell,' or 'anxiety'. This is a potential area of study bias, as these ICU patients possibly incurred higher levels of deficit.

- Three control patients were admitted to ICU during their hospital admission; however length of ICU stay was less than 24 hours, two patients receiving routine

post-op care and one with acute pulmonary oedema (Table 3 & 4). The patient who was readmitted to ICU during their current admission was not re-enrolled.

- Timepoints for the groups differed; for controls it was from hospital discharge; for cases from critical care discharge. Given the 3-week mean difference in hospital length of stay (29 versus 7.5 days) this may be a systematic measurement bias.

In conclusion:

- Greatest deficits existed among ICU survivors which were sustained across the study period which is consistent with the outcome literature;

- Preadmission scores reflect a fixed degree of dysfunction or a state of chronic disability prior to admission for both ICU patients and controls. Of concern is the high level of functional impairment seen among controls throughout the study, ranging between 56 – 85%;

- This study show high levels and incidence of physical and cognitive impairment for controls between 7.81 - 29.23% throughout the study period. Such impairment for a general acute-care general hospital population was previously unknown and must be now given consideration;

- This study confirms the highest levels and incidence of functional, neuropsychological and psychosocial deficits occurs one month after ICU discharge;

- Levels of anxiety and depression are not as high as those cited in the literature.

Further research

- Further work on the predictor index is required to formulate into a tool for clinical use. Defining specific outcome (levels of impairment) with predictor test scores is

required to extend and refine the spectrum of impairment among ICU patients. This will then enable clinicians to not only identify patients who require immediate and additional ongoing rehabilitation but perhaps identify non-ICU acute care patients at risk of deterioration.

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APPENDICIES

APPENDIX 1.0 - TEST OUTCOMES

Appendix 1.1. Functional Independence Measure (Recovery over Time)

FIM	All Control		All ICU		Survivor Control		Survivor ICU		Deceased Controls		Deceased ICU	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Preadmission	72	119 (14.2)	71	121 (14.3)	64	122 (6.10)	59	122 (14.66)	8	96 (31.67)	12	119 (12.91)
1 month	72	117 (15.2)	72	108 (18.7)	64	120 (9.61)	59	110 (14.91)	8	98 (31.94)	12	95 (29.08)
3 months	65	121 (9.24)	68	118 (12.8)	62	121 (9.38)	59	120 (7.77)	3	117 (5.03)	9	102 (24.78)
6 months	64	121 (9.74)	65	119 (15.0)	62	120 (9.72)	59	121 (7.55)	2	116 (12.72)	6	99 (40.78)
12 months	63	122 (8.56)	61	122 (6.46)	62	121 (8.32)	59	121 (6.44)	1	104	2	120 (9.19)
24 months	60	121 (7.62)	60	119 (11.4)	60	120 (7.62)	59	119 (11.43)	0		0	

Score range 0-126. Increase in score denotes improved functional independence.
Clinical impairment <108

Appendix 1.2. Digit Span Task (Recovery over Time)

Test Digit Span (Adj)	All Control		All ICU		Survivor Control		Survivor ICU		Deceased Control		Deceased ICU	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Preadmission	0		0		0		0		0		0	
1 month	69	9.7 (2.80)	66	8.88 (3.16)	62	9.85 (2.80)	56	8.80 (3.05)	7	8.14 (2.41)	10	9.30 (3.83)
3 months	61	10.8 (3.45)	65	9.40 (3.66)	59	10.89 (3.46)	57	9.45 (3.52)	2	8.00 (1.41)	8	9.00 (4.81)
6 months	60	10.3 (3.51)	62	9.66 (3.04)	58	10.32 (3.56)	58	9.91 (2.94)	2	10.5 (0.70)	4	6.00 (2.00)
12 months	60	10.2 (3.69)	56	9.64 (3.07)	59	10.28 (3.67)	55	9.74 (3.00)	1	6.00	1	4.00 (2.00)
24 months	59	10.4 (3.53)	58	9.43 (3.15)	59	10.35 (3.52)	57	9.43 (3.17)	0		0	

Increase in score denotes improved verbal memory. Below normal: 7-8
Clinical Impairment: ≤4

Appendix 1.3. Letter Number Sequence (Recovery over Time)

LNS (adj)		All Control		All ICU		Survivor Control		Survivor ICU		Deceased Controls		Deceased ICU
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Preadmission	0		0		0		0		0		0	
1 month	65	8.87 (3.7)	64	7.71 (3.0)	58	9.06 (3.7)	54	7.83 (3.1)	7	5.71 (2.36)	10	5.70 (2.58)
3 months	55	8.94 (3.7)	65	7.44 (3.7)	53	9.05 (3.7)	56	7.75 (3.8)	2	5.00 (1.41)	9	5.44 (4.00)
6 months	54	9.03 (4.1)	60	8.13 (3.3)	52	9.01 (4.1)	56	8.44 (3.2)	2	7.50 (2.12)	4	3.25 (2.50)
12 months	53	9.30 (3.9)	55	8.76 (3.4)	52	9.34 (3.9)	54	8.87 (3.4)	1	6.00	2	6.00 (4.24)
24 months	53	8.86 (3.6)	54	8.85 (3.9)	53	8.86 (3.6)	54	8.85 (3.9)	0		0	

Increase in score denotes improved verbal working memory. Below normal: 7-8
Clinical Impairment: ≤ 4

Appendix 1.4. Trailmaking B Task (Recovery over Time)

TRAILS (sec)		All Control		All ICU		Survivor Control		Survivor ICU		Deceased Controls		Deceased ICU
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Preadmission	0		0		0		0		0		0	
1 month	65	162 (100)	53	192 (131)	58	146 (79)	44	178 (124)	7	292 (152)	9	256 (151)
3 months	53	120 (85)	54	154 (96)	51	121 (70)	47	155 (100)	2	335 (216)	7	146 (58)
6 months	53	136 (84)	51	154 (103)	51	134 (83)	47	147 (100)	2	175 (98)	4	224 (112)
12 months	52	129 (71)	48	149 (87)	51	126 (70)	46	149 (89)	1	230 (230)	2	124 (3)
24 months	52	135 (114)	47	172 (94)	52	134 (114)	46	170 (94)	0		0	

Decrease in score denotes improved executive function

Appendix 1.5. StroopTask (Recovery over Time)

Stroop Ratio	N	All Control Mean (SD)	N	All ICU Mean (SD)	N	Survivor Control Mean (SD)	N	Survivor ICU Mean (SD)	N	Deceased Controls Mean (SD)	**N**	Deceased ICU Mean (SD)
Preadmission	0		0		0		0		0		**0**	
1 month	63	0.97 (0.42)	54	1.19 (0.54)	58	0.97 (0.42)	46	1.18 (0.58)	5	252.80 (69.29)	8	215.38 (73.54)
3 months	54	0.91 (0.50)	52	1.11 (0.50)	53	0.92 (0.50)	46	0.99 (0.49)	1	181	6	205.83 (95.53)
6 months	52	1.01 (0.57)	49	0.95 (0.71)	50	1.00 (0.58)	47	0.94 (0.73)	2	184.5 (0.71)	2	182 (56.56)
12 months	53	0.95 (0.61)	48	0.96 (0.64)	52	0.96 (0.62)	46	0.94 (0.65)	1	170.00	2	203.00 (21.21)
24 months	52	0.86 (0.38)	46	0.90 (0.46)	52	0.86 (0.38)	46	0.90 (0.46)	0		0	

Decrease in score denotes improvement

Appendix 1.6. Impact of Events Scale – Revised (Total) (Recovery over Time)

IES (Total)	All Control		All ICU		Survivor Control		Survivor ICU		Deceased Controls		Deceased ICU	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
	0		0		0		0		0		0	
Preadmission												
1 month	71	5.90 (14.6)	70	13.6 (22.3)	64	6.54 (15.25)	59	13.59 (22.34)	7	0	11	13.54 (23.03)
3 months	65	2.52 (8.27)	68	10.2 (15.1)	62	2.64 (8.45)	59	9.81 (14.12)	3	0	9	12.66 (21.20)
6 months	64	3.33 (11.5)	64	9.50 (23.6)	62	3.24 (11.66)	59	10.22 (24.44)	2	6.00 (8.48)	5	1.00 (1.41)
12 months	63	1.40 (6.32)	60	5.28 (12.0)	62	1.41 (6.36)	58	4.65 (10.85)	1	0	2	23.50 (33.23)
24 months	60	0.95 (3.67)	60	1.05 (2.16)	60	0.95 (3.67)	59	1.06 (2.17)	0		0	

Score range: 0-88 Decrease in score denotes less likelihood of post-traumatic related stress

Appendix 1.7. Hospital Anxiety and Depression Scale Task (Recovery over Time)

HADS (TOTAL)	All Control		All ICU		Survivor Control		Survivor ICU		Deceased Controls		Deceased ICU	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Preadmission	0		0		0		0		0		0	
1 month	72	12.75 (10.83)	70	13.72 (9.64)	64	12.57 (10.44)	59	13.06 (9.41)	8	14.12 (14.38)	11	17.27 (10.52)
3 months	65	11.55 (12.23)	68	12.19 (11.15)	62	11.75 (12.37	59	11.42 (10.63)	3	7.33 (9.45)	9	17.22 (13.75)
6 months	64	12.57 (12.14)	64	13.43 (11.22)	62	12.33 (11.72)	59	12.16 (10.45)	2	20.00 (28.28)	5	28.40 (9.78)
12 months	63	12.09 (11.56)	61	9.49 (8.90)	62	11.70 (11.24)	59	9.18 (8.85)	1	36.00	2	18.50 (6.36)
24 months	60	10.46 (9.41)	59	9.01 (9.19)	60	10.46 (9.41)	59	9.01 (9.19)	0		0	

Decrease in score denotes less anxiety and depression. Score range 0 – 42

Appendix 1.8. Hospital Anxiety and Depression Scale – Anxiety Subscale (Recovery over Time)

Test HADS ANXIETY	N	Control Alive Mean (SD)	N	ICU Alive Mean (SD)	N	Control Deceased Mean (SD)	N	ICU Deceased Mean (SD)
Preadmission	0		0		0		0	
1 month	72	7.00 (5.98)	70	7.44 (5.63)	64	6.93 (5.83)	59	7.10 (5.55)
3 months	65	6.91 (7.00)	68	6.93 (6.03)	62	6.98 (7.07)	59	6.54 (5.89)
6 months	64	7.22 (6.86)	64	7.98 (6.52)	62	7.12 (6.71)	59	7.49 (6.46)
12 months	63	7.13 (6.46)	61	5.66 (5.66)	62	6.93 (6.33)	59	5.54 (5.72)
24 months	60	5.87 (5.08)	60	5.00 (5.20)	60	5.86 (5.07)	59	4.88 (5.15)

Decrease in score denotes less anxiety. 8-10: mild; 11-14: mod; 15-21: severe

Appendix 1.9. Hospital Anxiety and Depression Scale – Depression Subscale (Recovery over Time)

HADS DEPRESSION Test		Control Alive		ICU Alive		Control Deceased		ICU Deceased
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Preadmission	0		0		0		0	
1 month	72	5.75 (5.34)	70	6.29 (4.93)	64	5.64 (5.13)	59	5.96 (4.82)
3 months	65	4.65 (6.04)	68	5.26 (5.51)	62	4.77 (6.12)	59	4.88 (5.14)
6 months	64	5.36 (5.97)	64	5.45 (5.49)	62	5.20 (5.73)	59	4.67 (4.71)
12 months	63	4.97 (5.61)	61	3.84 (4.05)	62	4.77 (5.43)	59	3.6 (3.92)
24 months	60	4.60 (5.07)	60	4.33 (5.56)	60	4.6 (5.06)	59	4.13 (5.38)

Decrease in score denotes less depression. 8-10: mild; 11-14: mod; 15-21: severe

Appendix 1.10. Community Integration Questionnaire (Recovery over Time)

CIQ (TOTAL)		All Control		All ICU		Survivor Control		Survivor ICU		Deceased Control		Deceased ICU
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Preadmission	70	35.7 (16.07)	71	16.8 (4.63)	63	39 (17.6)	59	17 (4.4)	7	6.96 (6.91)	12	15.85 (5.50)
1 month	72	12.6 (6.72)	71	8.0 (6.25)	64	13.5 (6.4)	59	8 (6.2)	8	5.84 (5.14)	12	5.54 (5.89)
3 months	65	15.9 (6.35)	68	13.3 (6.06)	62	16 (6.2)	59	14 (5.7)	3	11.75 (8.51)	9	9.00 (6.79)
6 months	64	16.08 (6.55)	65	15.0 (5.77)	62	16 (6.2)	59	15 (5.4)	2	11.75 (16.61)	6	10.12 (6.68)
12 months	63	16.8 (6.59)	61	15.97 (6.43)	62	17 (6.3)	59	15 (6.5)	1	1	2	15.62 (0.88)
24 months	60	16.6 (6.47)	59	15.2 (6.87)	60	16 (6.4)	59	15 (6.8)	0		0	

Score range: 0-29; greater the score, greater the integration

Appendix 1.11. SF-36v2 Physical Component Score (Recovery over Time)

SF-36v2 PCS		All Control		All ICU		Survivor Control		Survivor ICU		Deceased Control		Deceased ICU
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Preadmission	59	40.28 (13.27)	59	45.93 (13.47)	59	40.28 (13.26)	59	45.93 (13.47)	8	25.11 (9.39)	11	44.34 (14.04)
1 month	67	33.3 (12.0)	70	27.3 (10.0)	59	40.2 (13.2)	59	45.9 (13.47)	8	30.94 (14.42)	11	27.00 (10.69)
3 months	59	37.9 (13.2)	68	36.5 (13.0)	59	33.5 (11.7)	59	27.4 (9.95)	3	29.36 (15.18)	9	29.07 (12.30)
6 months	58	38.1 (14.8)	64	37.5 (14.5)	56	38.3 (13.05	59	27.6 (12.86)	2	37.65 (15.34)	5	23.46 (8.93)
12 months	57	36.8 (13.6)	61	38.6 (13.0)	56	38.1 (14.91)	59	38.6 (14.29)	1	18.60	2	26.75 (8.41)
24 months	53	35.5 (15.0)	60	37.6 (14.7)	53	35.4 (14.99)	59	37.8 (14.63)	0		0	

Score range: Clinically meaningful: mean < 50; > 10 point decrements in each domain. Higher score denotes improvement.

Appendix 1.12. SF-36v2 Mental Component Score (Recovery over Time)

SF-36v2 MCS	All Control		All ICU		Survivor Control		Survivor ICU		Deceased Control		Deceased ICU	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Preadmission	59	49.66 (13.22)	59	54.27 (10.42)	59	49.66 (13.22)	59	54.27 (10.42)	8	45.72 (19.29)	11	51.50 (14.14)
1 month	67	44.8 (14.5)	70	44.3 (14.7)	59	45 (14.1)	59	44 (14.9)	8	37.24 (16.11)	11	51.50 (14.14)
3 months	59	49.2 (15.2)	68	47.2 (16.1)	56	48 (15.3)	59	48 (15.7)	3	56.00 (11.11)	9	41.01 (13.75)
6 months	58	47.5 (15.3)	64	49.0 (14.0)	56	47 (15.0)	59	50 (13.4)	2	43.00 (29.55)	5	33.34 (11.40)
12 months	57	49.5 (12.8)	61	50.6 (13.6)	56	50 (12.2)	59	51 (13.0)	1	18.80	2	27.30 (6.22)
24 months	53	50.4 (11.1)	60	50.5 (14.1)	53	50 (11.1)	59	50 (13.9)	0		0	

Score range: Clinically meaningful: mean < 50; > 10 point decrements in each domain Impairment is considered <=45. Higher score denotes improvement.

Appendix 1.13. SF-36v2-BP (Bodily Pain) Test Scores (Recovery over Time)

SF-36v2 BP	Clinically meaningful: mean < 50; > 5 point decrements in each domain							
	N	All Control Mean (SD)	N	All ICU Mean (SD)	N	Survivor Controls Mean (SD)	N	Survivor ICU Mean (SD)
Preadmission	67	44.0 (14.7)	70	61.1 (69.1)	59	45 (14.5)	59	53 (12.2)
1 month	67	41.8 (14.2)	70	39.6 (13.0)	59	41 (13.9)	59	38 (12.6)
3 months	59	43.8 (14.2)	68	46.1 (13.4)	56	44 (14.2)	59	47 (12.5)
6 months	58	44.1 (15.8)	64	45.2 (14.6)	56	43 (15.8)	59	45 (14.4)
12 months	57	44.1 (13.8)	61	46.0 (11.1)	56	44 (13.5)	59	46 (11.1)
24 months	53	42.2 (13.3)	60	44.2 (12.2)	53	42 (13.2)	59	44 (12.1)

Score range: Increased score denotes improvement

Appendix 1.14. SF-36v2-GH (General Health) Test Score (Recovery over Time)

SF-36v2 GH	Clinically meaningful: mean < 50; > 10 point decrements in each domain							
	N	All Control Mean (SD)	N	All ICU Mean (SD)	N	Survivor Control Mean (SD)	N	Survivor ICU Mean (SD)
Preadmission	67	44.2 (14.3)	70	50.3 (12.2)	59	45 (13.4)	59	50 (11.2)
1 month	67	42.5 (12.5)	70	43.0 (11.2)	59	43 (11.7)	59	44 (11.1)
3 months	59	44.9 (13.0)	68	43.6 (12.4)	56	45 (12.8)	59	45 (11.8)
6 months	58	43.6 (14.3)	64	44.7 (12.4)	56	43 (14)	59	46 (11.5)
12 months	57	42.8 (14.2)	61	44.7 (12.9)	56	43 (13.8)	59	45 (12.6)
24 months	53	41.5 (13.2)	60	43.7 (13.1)	53	41 (13.1)	59	44 (12.7)

Score range: Increased score denotes improvement

Appendix 1.15. SF-36v2-MH (Mental Health) Test Scores (Recovery over Time)

SF-36v2 MH	Clinically meaningful: mean < 50; > 10 point decrements in each domain							
	N	All Control Mean (SD)	N	All ICU Mean (SD)	N	Survivor Control Mean (SD)	N	Survivor ICU Mean (SD)
Preadmission	67	46.9 (14.2)	70	51.3 (12.1)	59	47 (13.7)	59	51 (11.8)
1 month	67	44.4 (14.0)	70	45.0 (13.8)	59	45 (13.4)	59	45 (13.9)
3 months	59	46.9 (15.0)	68	46.2 (15.0)	56	46 (15.1)	59	47 (14.2)
6 months	58	46.7 (14.3)	64	47.4 (14.1)	56	46 (14.1)	59	48 (13.8)
12 months	57	48.1 (13.4)	61	49.2 (12.9)	56	48 (13.1)	59	49 (12.5)
24 months	53	48.6 (12.7)	60	49.6 (13.1)	53	48 (12.7)	59	49 (13.0)

Score range: Increased score denotes improvement

Appendix 1.16. SF-36v2-PF (Physical Functioning) Test Scores (Recovery over Time)

SF-36v2 PF	Clinically meaningful: mean < 50; > 10 point decrements in each domain							
	N	All Control Mean (SD)	N	All ICU Mean (SD)	N	Survivor Control Mean (SD)	N	Survivor ICU Mean (SD)
Preadmission	67	36.0 (15.7)	70	42.7 (14.2)	59	37 (15.1)	59	43 (13.5)
1 month	67	29.8 (13.6)	70	24.0 (10.8)	59	30 (13.3)	59	24 (11.0)
3 months	59	35.7 (15.4)	68	33.6 (14.2)	56	36 (15.5)	59	35 (13.6)
6 months	58	35.8 (16.1)	64	35.1 (15.2)	56	36 (16.1)	59	36 (15.1)
12 months	57	35.0 (16.0)	61	36.4 (14.0)	56	35 (15.8)	59	36 (14.0)
24 months	53	34.6 (16.3)	60	35.5 (15.7)	53	34 (16.3)	59	35 (15.7)

Score range: Increased score denotes improvement

Appendix 1.17. SF-36v2-RE (Role Emotional) Test Scores (Recovery over Time)

SF-36v2 RE	Clinically meaningful: mean < 50; > 10 point decrements in each domain							
	N	All Control Mean (SD)	N	All ICU Mean (SD)	N	Survivors Control Mean (SD)	N	Survivor ICU Mean (SD)
Preadmission	67	47.4 (13.5)	70	51.7 (8.8)	59	48 (12.5)	59	52 (7.9)
1 month	67	41.7 (15.0)	70	37.5 (16.4)	59	42 (14.9)	59	38 (16.2)
3 months	59	46.3 (13.2)	68	43.6 (15.3)	56	46 (13.4)	59	45 (13.8)
6 months	58	44.9 (15.3)	64	46.5 (12.7)	56	45 (14.7)	59	47 (12.2)
12 months	57	47.2 (13.3)	61	47.1 (12.1)	56	47 (12.3)	59	47 (12.0)
24 months	53	48.3 (10.7)	60	46.8 (13.1)	53	48 (10.7)	59	47 (13.0)

Score range: Increased score denotes improvement

Appendix 1.18. SF-36v2-RP (Role Physical) Test Scores (Recovery over Time)

SF-36v2 RP	Clinically meaningful: mean < 50; > 10 point decrements in each domain							
	N	All Control Mean (SD)	N	All ICU Mean (SD)	N	Survivor Control Mean (SD)	N	Survivor ICU Mean (SD)
Preadmission	67	41.4(15.3)	70	45.3 (14.3)	59	43 (14.4)	59	45 (14.4)
1 month	67	38.7 (12.6)	70	37.2 (11.3)	59	32 (14.8)	59	22 (7.5)
3 months	59	43.7 (15.0)	68	43.9 (13.9)	56	38 (14.1)	59	34 (12.9)
6 months	58	43.7 (15.3)	64	43.7 (13.7)	56	38 (14.7)	59	38 (14.7)
12 months	57	41.1 (15.3)	61	45.5 (13.1)	56	39 (12.9)	59	39 (14.3)
24 months	53	41.0 (13.3)	60	42.5 (15.0)	53	39 (13.0)	59	40 (14.0)

Score r ange: Increased score denotes improvement

Appendix 1.19. SF-36v2-SF (Social Functioning) Test Scores (Recovery over Time)

SF-36v2 SF	Clinically meaningful: mean < 50; > 10 point decrements in each domain							
	N	All Control Mean (SD)	N	All ICU Mean (SD)	N	Survivor Control Mean (SD)	N	Survivor ICU Mean (SD)
Preadmission	67	42.9 (16.7)	70	50.7 (12.1)	59	44 (15.9)	59	51 (11.2)
1 month	67	34.2 (17.0)	70	29.8 (16.3)	59	35 (17.0)	59	29 (16.4)
3 months	59	43.9 (15.6)	68	39.3 (17.0)	56	43 (15.8)	59	40 (16.7)
6 months	58	40.7 (17. 57	64	41.5 (16.4)	56	40 (17.8)	59	43 (15.1)
12 months	57	43.1 (14.7)	61	44.0 (14.7)	56	43 (14.3)	59	44 (13.7)
24 months	53	43.0 (13.7)	60	45.2 (15.8)	53	43 (13.6)	59	45 (15.5)

Score range: Increased score denotes improvement

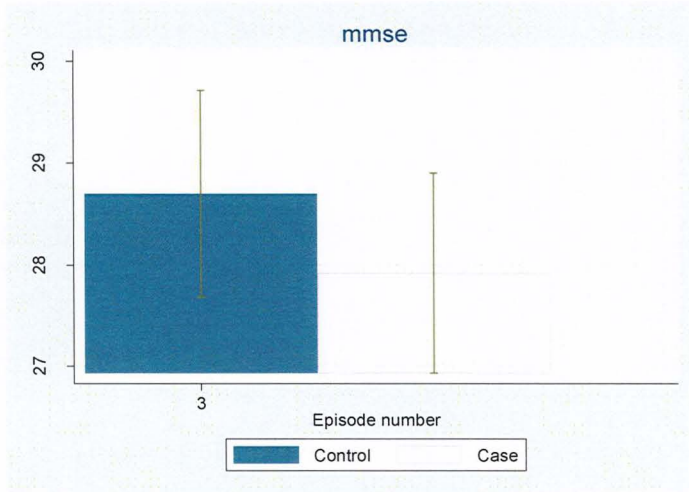
Appendix 1.20. SF-36v2-VT (Vitality Component) Test Scores (Recovery over Time)

SF-36v2 VT Clinically meaningful: mean < 50; > 10 point decrements in each domain

	N	All Control Mean (SD)	N	All ICU Mean (SD)	N	Survivor Control Mean (SD)	N	Survivor ICU Mean (SD)
Preadmission	67	44.5 (14.9)	70	51.5 (12.6)	59	45 (14.8)	59	52 (11.7)
1 month	67	38.7 (12.6)	70	37.2 (11.3)	59	39 (12.4)	59	38 (11.5)
3 months	59	43.7 (15.0)	68	43.9 (13.9)	56	43 (14.9)	59	45 (13.4)
6 months	58	43.7 (15.3)	64	43.7 (13.7)	56	43 (15.0)	59	45 (13.0)
12 months	57	41.1 (15.3)	61	45.5 (13.1)	56	41 (15.1)	59	46 (12.6)
24 months	53	41.0 (13.3)	60	42.5 (15.0)	53	41 (13.2)	59	42 (14.8)

Score range: Increased score denotes improvement

Appendix 1.21. Mini-Mental State Examination Test Scores
(ICU cases and controls)



Score range: 0-30

Appendix 1.22 *Trailmaking B Task z scores*

Months	N	ICU (Mean;SD)	N	Control (Mean;SD)
1	53	-2.28 (2.76)	65	-1.84 (2.14)
3	54	-1.65 (2.14)	53	-1.08 (2.05)
6	51	-1.47 (2.47)	52	-1.46 (2.32)
12	47	-1.98 (3.70)	52	-1.16 (1.65)
24	47	-2.04 (2.49)	52	-1.23 (2.67)

Appendix 1.23. *Stroop z scores*

Months	ICU N	ICU (Mean;SD)	Control N	Control (Mean;SD)
1	54	-5.05 (3.52)	63	-4.04 (3.14)
3	52	-4.09 (3.48)	54	-3.93 (3.41)
6	49	-3.20 (2.32)	52	-3.92 (3.98)
12	48	-2.98 (2.65)	53	-3.81 (3.99)
24	47	-3.02 (2.37)	52	-3.68 (3.56)

Appendix 1.24. Impact of Event Scale – Revised (Component: Avoidance) Test Scores

Impact of Events (Avoidance)	N	Control Mean (SD)	N	ICU Mean (SD)
Preadmission	0		0	
1 month	71	1.92 (5.14)	70	4.68 (7.23)
3 months	65	0.98 (2.86)	68	3.99 (6.09)
6 months	64	1.05 (3.71)	64	4.09 (8.09)
12 months	63	0.44 (2.15)	60	1.87 (4.20)
24 months	60	0.40 (2.10)	60	0.65 (1.51)

Score range 0-32; Decrease in score denotes less likelihood of post-traumatic related stress

Appendix 1.25. Impact of Events Scale – Revised (Component Hyperarousal) Test Scores

Impact of Events Hyperarousal	Control		ICU	
	N	Mean (SD)	N	Mean (SD)
Preadmission	0		0	
1 month	71	1.34 (3.71)	70	3.02 (6.00)
3 months	65	0.62 (2.37)	68	2.29 (4.09)
6 months	64	0.89 (3.37)	64	2.09 (8.29)
12 months	63	0.35 (2.14)	60	1.07 (4.02)
24 months	60	0.07 (2.52)	60	0.02 (0.13)

Score range 0-20; Decrease in score denotes less likelihood of post-traumatic related stress

Appendix 1.26. Impact of Events Scale-Revised (Component: Interruptions) Test Scores

Impact of Events Interruptions Preadmission	N 0	Control Mean (SD)	N 0	ICU Mean (SD)
1 month	71	2.65 (6.09)	70	5.88 (12.86)
3 months	65	0.92 (3.31)	68	3.90 (6.06)
6 months	64	1.39 (4.68)	64	3.32 (8.10)
12 months	63	0.60 (2.62)	60	2.35 (4.70)
24 months	60	0.48 (1.65	60	0.38 (0.99)

Score range 0-32; Decrease in score denotes less likelihood of post-traumatic related stress

Appendix 2.0
Subgroup Test Scores

Appendix 2.1. Digit Span Task Score for subgroups

Test		Control		ICU
DIGIT SPAN ADJUSTED	N	Mean (SD)	N	Mean (SD)
SEPSIS				
1 month	14	9.86 (1.88)	25	8.64 (2.55)
3 months	13	10.61 (3.45)	25	8.48 (4.11)
6 months	14	10.07 (3.63)	25	8.80 (3.23)
12 months	14	10.21 (4.19)	22	8.40 (3.09)
24 months	13	11.38 (4.52)	22	8.63 (2.98)
TRAUMA				
I month	4	9.00 (3.74)	5	12.20 (3.11)
3 months	5	9.40 (3.36)	5	11.40 (5.94)
6 months	5	9.00 (3.67)	5	10.80 (4.44)
12 months	5	8.00 (2.65)	4	12.5 (3.11)
24 months	5	8.80 (2.77)	3	14.00 (2.00)
NEOPLASIA				
I month	7	10.29 (3.64)	4	8.75 (0.50)
3 months	6	13.33 (4.59)	4	8.25 (0.50)
6 months	6	13.83 (3.60)	4	8.75 (2.06)
12 months	6	13.33 (5.00)	4	9.00 (1.82)
24 months	6	12.33 (3.50)	4	8.25 (2.87)
OTHER				
I month	44	9.59 (2.89)	32	8.56 (3.56)
3 months	37	10.64 (3.22)	31	9.97 (2.90)
6 months	35	10.03 (3.20)	28	10.36 (2.59)
12 months	35	10.00 (3.14)	26	10.34 (2.81)
24 months	35	9.88 (3.11)	28	9.75 (3.09)

Increase in score denotes improved verbal memory. Below normal: 7-8
Clinical Impairment: ≤4

Appendix 2.2. Letter Number Sequence Test Scores for subgroups

Test		Control		ICU
LN SCORE ADJ	N	Mean (SD)	N	Mean (SD)
SEPSIS				
I month	14	8.5 (3.23)	24	6.08 (3.29)
3 months	13	8.07 (3.42)	24	6.29 (3.62)
6 months	14	7.93 (3.89)	24	6.45 (3.20)
12 months	13	9.00 (4.45)	23	7.04 (3.23)
24 months	13	8.53 (3.67)	21	7.71 (3.79)
TRAUMA				
I month	5	7.40 (2.79)	5	10.00 (3.08)
3 months	5	7.20 (2.68)	5	8.40 (5.27)
6 months	5	7.60 (2.05)	5	8.80 (5.63)
12 months	5	7.80 (3.63)	4	10.75 (2.06)
24 months	5	7.40 (2.30)	3	13.00 (1.00)
NEOPLASIA				
I month	7	9.86 (4.67)	4	6.00 (2.16)
3 months	6	11.17 (4.54)	4	5.25 (2.75)
6 months	6	11.67 (4.41)	4	5.50 (2.08)
12 months	6	9.83 (3.76)	4	5.25 (0.96)
24 months	6	10.33 (4.63)	3	5.00 (2.00)
OTHER				
I month	39	7.64 (3.29)	32	6.91 (2.65)
3 months	31	7.87 (3.35)	32	7.72 (2.96)
6 months	29	8.24 (3.68)	28	8.00 (2.85)
12 months	29	8.45 (3.36)	26	8.88 (3.10)
24 months	29	7.83 (3.49)	27	8.15 (3.49)

Increase in score denotes improved verbal working memory. Below normal: 7-8
Clinical Impairment: ≤ 4

Appendix 2.3. Stroop Task Test Scores for subgroups

Test		Control		ICU
STROOP 3	N	Mean (SD)	N	Mean (SD)
SEPSIS				
I month	14	154.43 (59.69)	22	215.55 (90.10)
3 months	13	162.62 (72.52)	21	199.48 (82.72)
6 months	14	167.07 (88.64)	21	176.24 (58.85)
12 months	14	159.64 (89.31)	21	177.57 (56.16)
24 months	13	144.69 (65.91)	19	182.95 (60.45)
TRAUMA				
I month	5	173.20 (55.18)	2	121.00 (12.73)
3 months	5	157.00 (53.30)	2	134.5 (24.75)
6 months	5	171.00 (85.14)	2	113.50 (12.02)
12 months	5	166.00 (93.56)	1	98.00
24 months	5	154.6 (40.76)	1	101.00
NEOPLASIA				
I month	7	187.57 (111.65)	4	231.75 (36.61)
3 months	6	140.17 (68.51)	4	244.50 (67.34)
6 months	6	142.50 (50.82)	4	203.75 (49.73)
12 months	6	152.83 (51.45)	4	217.50 (72.08)
24 months	6	171.33 (112.07)	4	166.75 (37.50)
OTHER				
I month	37	186.27 (67.13)	26	197.27 (87.57)
3 months	30	180.23 (70.57)	25	171.84 (67.87)
6 months	27	179.63 (79.34)	22	163.14 (61.60)
12 months	28	174.96 (80.05)	22	146.59 (54.48)
24 months	28	181.61 (79.38)	22	150.63 (43.38)

A decrease in score denotes improvement

Appendix 2.4. Trailmaking B Task - Test Scores for subgroups (seconds)

Test		Control		ICU
TRAILMAKING B	N	Mean (SD)	N	Mean (SD)
SEPSIS				
I month	14	153.50 (78.52)	22	239.73 (166.06)
3 months	11	119.91 (91.99)	22	175.73 (127.76)
6 months	14	132.79 (83.89)	23	178.96 (123.41)
12 months	14	121.64 (64.83)	21	181.67 (110.46)
24 months	13	122.08 (104.78)	19	206.37 (113.29)
TRAUMA				
I month	5	119.60 (62.00)	2	93.00 (33.94)
3 months	5	102.40 (85.46)	2	95.00 (49.49)
6 months	5	124.00 (89.22)	2	185.00 (190.91)
12 months	5	105.80 (52.32)	1	54.00
24 months	5	117.20 (56.37)	1	72.00
NEOPLASIA				
I month	7	133.43 (93.91)	4	161.50 (32.09)
3 months	6	106.83 (75.31)	4	156.75 (58.86)
6 months	6	133.50 (125.19)	4	155.00 (95.68)
12 months	6	96.00 (64.77)	4	157.75 (52.18)
24 months	6	135.00 (161.59)	4	136.50 (50.31)
OTHER				
I month	39	176.67 (110.47)	25	163.00 (95.56)
3 months	31	141.87 (86.68)	26	139.96 (66.37)
6 months	28	140.64 (77.03)	22	124.05 (66.09)
12 months	27	144.00 (77.64)	22	119.55 (51.89)
24 months	28	143.82 (119.81)	22	149.86 (73.41)

A decrease in score denotes improvement

Appendix 2.5. SF-36v2 Mental Component Score Test Scores for subgroup

Test		Control		ICU
SF-36V2 - MCS	N	Mean (SD)	N	Mean (SD)
SEPSIS				
Preadmission	15	45.61 (14.50)	29	56.08 (8.18)
I month	15	39.27 (13.92)	29	41.35 (16.39)
3 months	15	43.45 (15.81)	27	16.86 (15.34)
6 months	15	43.15 (15.96)	27	49.26 (14.22)
12 months	15	45.26 (11.46)	25	45.65 (15.28)
24 months	14	45.25 (11.12)	23	48.77 (14.49)
TRAUMA				
Preadmission	5	57.34 (2.73)	5	52.02 (6.62)
I month	5	49.80 (10.04)	5	44.20 (10.90)
3 months	5	56.09 (15.83)	5	39.36 (19.44)
6 months	5	45.46 (19.50)	5	45.58 (11.39)
12 months	5	55.21 (8.60)	4	54.31 (6.10)
24 months	5	55.06 (11.38)	4	47.68 (20.89)
NEOPLASIA				
Preadmission	7	48.1 (14.87)	4	61.60 (4.88)
I month	7	42.51 (19.07)	4	49.05 (10.79)
3 months	7	51.97 (15.30)	4	53.05 (8.70)
6 months	7	54.30 (11.76)	4	53.40 (16.75)
12 months	7	53.14 (12.81)	4	53.33 (8.07)
24 months	6	56.28 (5.12)	4	56.38 (9.92)
OTHER				
Preadmission	40	49.71 (14.33)	32	51.13 (13.45)
I month	40	46.72 (14.23)	32	46.30 (14.09)
3 months	32	50.25 (14.69)	32	48.05 (17.17)
6 months	31	48.43 (15.05)	28	48.74 (14.45)
12 months	30	49.73 (13.84)	28	54.19 (12.38)
24 months	28	50.82 (11.37)	28	52.18 (13.34)

Score range: Clinically meaningful: mean < 50; > 10 point decrements in each domain Impairment is considered <=45. Higher score denotes improvement.

Appendix 2.6. SF-36v2 Physical Component Score test Scores for subgroups

Test		Control		ICU
SF-36V2 - PCS	N	Mean (SD)	N	Mean (SD)
SEPSIS				
Preadmission	15	36.33 (13.37)	29	43.12 (13.66)
1 month	15	31.08 (9.44)	29	25.95 (8.87)
3 months	15	36.12 (12.89)	27	33.38 (13.01)
6 months	15	37.90 (13.68)	27	32.96 (12.61)
12 months	15	33.55 (14.64)	25	33.35 (11.47)
24 months	14	34.16 (17.12)	23	34.19 (12.67)
TRAUMA				
Preadmission	5	52.16 (13.37)	5	53.92 (6.96)
1 month	5	23.87 (7.93)	5	26.08 (4.77)
3 months	5	42.30 (14.97)	5	34.40 (8.64)
6 months	5	35.46 (17.55)	5	45.14 (16.11)
12 months	5	43.00 (13.81)	4	51.17 (7.79)
24 months	5	38.40 (15.81)	4	51.89 (4.10)
NEOPLASIA				
Preadmission	7	36.48 (15.00)	4	45.40 (16.91)
1 month	7	34.50 (11.16)	4	18.87 (6.38)
3 months	7	41.88 (15.18)	4	30.27 (2.08)
6 months	7	47.58 (15.28)	4	32.67 (15.13)
12 months	7	38.51 (14.95)	4	31.08 (10.74)
24 months	6	41.33 (14.82	4	25.95 (2.50)
OTHER				
Preadmission	40	37.91 (13.23)	32	46.75 (13.52)
1 month	40	35.06 (12.98)	32	29.85 (11.24)
3 months	32	37.19 (12.94)	32	40.24 (13.65)
6 months	31	36.46 (14.68)	28	41.10 (15.00)
12 months	30	36.90 (12.92)	28	42.46 (12.83)
24 months	28	34.36 (14.23)	28	40.56 (16.04)

Score range: Clinically meaningful: mean < 50; > 10 point decrements in each domain Impairment is considered <=45. Higher score denotes improvement.

Appendix 2.7. Impact of Events-Revised Test Scores for subgroups

Test IES TOTAL	N	Control Mean (SD)	N	ICU Mean (SD)
SEPSIS				
1 month	15	12.33 (23.60)	29	14.83 (24.45)
3 months	15	6.47 (15.40)	27	8.66 (12.95)
6 months	15	11.13 (21.94)	27	6.03 (15.55)
12 months	15	2.80 (9.51)	25	6.64 (15.45)
24 months	14	1.85 (6.13)	23	1.73 (2.87)
TRAUMA				
1 month	5	4.20 (5.76)	5	10.40 (16.31)
3 months	5	5.20 (7.15)	5	11.20 (10.03)
6 months	5	3.40 (7.60)	5	6.66 (70.43)
12 months	5	6.60 (14.76)	4	1.25 (1.89)
24 months	5	4.20 (6.57)	4	1.25 (1.89)
NEOPLASIA				
1 month	7	15.28 (23.02)	4	16.00 (17.76)
3 months	7	1.86 (3.48)	4	9.50 (6.80)
6 months	7	0	4	2.75 (3.09)
12 months	7	0.28 (0.75)	4	1.75 (3.50)
24 months	6	0	4	0
OTHER				
1 month	44	2.41 (6.85)	32	12.65 (22.26)
3 months	38	0.74 (3.22)	32	11.40 (18.14)
6 months	37	0.78 (2.26)	28	8.96 (13.17)
12 months	36	0.31 (1.83)	27	5.14 (9.92)
24 months	35	0.29 (1.20)	28	0.64 (1.49)

Score range: 0-88 Decrease in score denotes less likelihood of post-traumatic related stress

Appendix 2.8. Hospital Anxiety and Depression Test Scores for subgroup

Test		Control		ICU
HADS TOTAL	N	Mean (SD)	N	Mean (SD)
SEPSIS				
1 month	15	12.60 (9.96)	29	16.62 (10.50)
3 months	15	15.40 (12.32)	27	12.11 (10.45)
6 months	15	14.13 (12.65)	27	14.96 (11.70)
12 months	15	15.80 (9.89)	25	12.80 (9.15)
24 months	14	12.43 (10.40)	23	10.83 (11.09)
TRAUMA				
1 month	5	11.80 (13.49)	5	9.4 (5.98)
3 months	5	8.60 (12.45)	5	19.00 (14.44)
6 months	5	15.80 (12.47)	5	13.80 (15.93)
12 months	5	13.40 (16.83)	4	4.25 (2.50)
24 months	5	8.20 (9.78)	4	4.00 (8.00)
NEOPLASIA				
1 month	7	14.71 (13.79)	4	17.5 (5.06)
3 months	7	7.71 (11.52)	4	13.50 (8.34)
6 months	7	6.14 (9.70)	4	13.00 (10.42)
12 months	7	10.42 (16.27)	4	10.50 (9.88)
24 months	6	5.33 (9.75)	4	9.75 (7.93)
OTHER				
1 month	45	12.60 (10.71)	32	11.31 (9.02)
3 months	38	11.13 (11.84)	32	11.03 (11.59)
6 months	37	12.72 (12.34)	28	11.96 (10.38)
12 months	36	10.69 (10.55)	28	7.14 (8.37)
24 months	35	10.88 (8.95)	28	8.14 (7.72)

Decrease in score denotes less anxiety and depression. Score range 0 – 42

Appendix 2.9. Community Integration Questionnaire Test Scores for subgroup

Test		Control		ICU
CIQ TOTAL	N	Mean (SD)	N	Mean (SD)
SEPSIS				
Preadmission	15	106.67 (349.83)	29	16.89 (4.28)
1 month	15	13.71 (6.12)	29	6.73 (5.54)
3 months	15	14.73 (6.13)	27	13.15 (5.65)
6 months	15	15.53 (5.79)	25	13.54 (4.96)
12 months	15	17.13 (6.19)	25	13.29 (5.78)
24 months	14	15.55 (6.37)	23	12.93 (6.31)
TRAUMA				
Preadmission	5	22.65 (3.89)	5	18.75 (4.44)
1 month	5	11.20 (7.69)	5	4.80 (3.74)
3 months	5	18.20 (9.93)	5	10.75 (6.35)
6 months	5	16.40 (9.23)	5	13.95 (5.15)
12 months	5	18.50 (7.72)	4	22.13 (7394)
24 months	5	22.25 (6.49)	4	16.50 (11.13)
NEOPLASIA				
Preadmission	6	14.25 (5.50)	5	14.8 (7.09)
1 month	7	12.67 (7.10)	5	11.60 (9.14)
3 months	7	14.96 (6.55)	4	13.76 (6.33)
6 months	7	16.21 (7.35)	4	14.36 (4.31)
12 months	7	14.42 (7.32)	4	10.38 (2.80)
24 months	6	15.16 (7.05)	4	14.44 (2.98)
OTHER				
Preadmission	44	16.06 (7.93)	32	16.83 (4.65)
1 month	45	12.48 (6.94)	32	9.20 (6.43)
3 months	38	16.25 (6.03)	32	13.99 (6.48)
6 months	37	16.24 (6.59)	29	16.82 (6.47)
12 months	36	16.94 (6.63)	28	18.28 (5.66)
24 months	35	16.58 (6.27)	28	17.12 (6.76)

Score range: 0-29; greater the score, greater the integration

Appendix 2.10. Functional Independence Measure test Scores for subgroups

Test		Control		ICU
FIM	N	Mean (SD)	N	Mean (SD)
SEPSIS				
Preadmission	15	121.20 (7.06)	29	119.97 (19.79)
1 month	15	119.53 (8.33)	29	104.27 (20.58)
3 months	15	123.00 (3.42)	27	116.14 (11.19)
6 months	15	121.93 (4.92)	27	118.89 (8.59)
12 months	15	123.80 (3.80)	25	119.24 (8.50)
24 months	14	121.64 (5.94)	23	116.00 (14.48)
TRAUMA				
Preadmission	5	126.00 (0)	5	124.40 (3.57)
1 month	5	112.00 (19.81)	5	99.20 (23.32)
3 months	5	120.40 (11.97)	5	116.20 (6.79)
6 months	5	120.20 (10.87)	5	121.40 (10.29)
12 months	5	120.80 (11.62)	4	126.00 (0)
24 months	5	122.40 (7.50)	4	126.00 (0)
NEOPLASIA				
Preadmission	7	122.42 (6.45)	5	120.40 (8.17)
1 month	7	121.14 (11.55)	5	98.40 (32.47)
3 months	7	116.86 (22.89)	4	118.50 (3.00)
6 months	7	116.43 (24.88)	4	119.25 (6.80)
12 months	7	118.57 (18.79)	4	117.75 (1.89)
24 months	6	122.67 (7.69)	4	118.75 (2.22)
OTHER				
Preadmission	45	118.51 (17.21)	32	122.63 (9376)
1 month	45	117.44 (17.01)	32	113.88 (11.62)
3 months	38	121.86 (6.13)	32	119.59 (15.27)
6 months	37	121.18 (5.97)	29	119.17 (20.62)
12 months	36	121.55 (6.64)	28	124.25 (3.29)
24 months	35	120.00 (8.37)	28	121.25 (9.47)

Score range 0-126. Increase in score denotes improved functional independence. Clinical impairment <108

Appendix 2.11. Statistical significance of diagnostic subgroups

Diagnostic subgroup	p value									
	LNS	DS	STROOP 3	MCS	HADS TOT	CIQ TOT	PCS	FIM	N control	N case
SEPSIS	0.000	0.000	0.004	0.004	0.291	0.048	0.342	0.025	15	29
TRAUMA	0.014	0.000	0.000	0.033	0.331	0.126	0.231	0.368	5	5
NEOPLASIA	1.070	0.001	0.006	0.144	0.000	0.065	0.077	0.493	7	5
OTHER	0.420	0.276	0.090	0.278	0.081	0.402	0.025	0.149	45	32

Appendix 3.0. Level of Impairment

Appendix 3.1. Social Impairment (Freq; %)

	ICU			Controls		
from discharge (months)	Not impaired	Impaired	Dead	Not impaired	Impaired	Dead
Preadmission	68 (97.14)	2 (2.86)	0 (0.00)	62 (93.94)	4 (6.06)	0 (0.00)
1	44 (61.97)	27 (38.03)	0 (0.00)	60 (89.55)	7 (10.45)	0 (0.00)
3	61 (85.92)	7 (9.86)	3 (4.23)	56 (90.32)	3 (4.84)	3 (4.84)
6	58 (81.69)	7 (9.86)	6 (8.45)	54 (84.38)	4 (6.25)	6 (9.38)
12	57 (80.28)	4 (5.63)	10 (14.08)	52 (81.25)	5 (7.81)	7 (10.94)
24	51 (71.83)	7 (9.86)	13 (18.31)	53 (84.13)	0 (0.00)	10 (15.87)

Appendix 3.2. Mobility Impairment (Freq; %)

	ICU			Controls		
from discharge (months)	Not impaired	Impaired	Dead	Not impaired	Impaired	Dead
Preadmission	68 (95.77)	3 (4.23)	0 (0.00)	60 (89.55)	7 (10.45)	0 (0.00)
1	59 (83.10)	12 (16.90)	0 (0.00)	55 (82.09)	12 (17.91)	0 (0.00)
3	60 (84.51)	8 (11.27)	3 (4.23)	52 (83.87)	7 (11.29)	3 (4.84)
6	57 (81.43)	7 (10.00)	6 (8.57)	52 (81.25)	6 (9.38)	6 (9.38)
12	57 (81.43)	3 (4.29)	10 (14.29)	51 (79.69)	6 (9.38)	7 (10.94)
24	53 (74.65)	5 (7.04)	13 (18.31)	51 (80.95)	2 (3.17)	10 (15.87)

Appendix 4.0 Predictors of impairment

Appendix 4.1. Premorbid indicators of 24 month impairment

PREMORBID PREDICTORS OF IMPAIRMENT AT 24 MONTHS

Predictor	OUTCOME MEASURES											
	LNS		DS		PCS		MCS		MOBILITY		SOCIAL	
	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*
FIM	0.996 (0.977 to 1.015)	0.719	1.006 (0.959 to 1.055)	0.793	0.999 (0.983 to 1.014)	0.918	1.006 (0.973 to 1.040)	0.712	0.991 (0.950 to 1.033)	0.683	1.275 (0.748 to 2.175)	0.371
CIQ	0.960 (0.896 to 1.030)	0.260	1.025 (0.943 to 1.114)	0.557	0.989 (0.950 to 1.029)	0.598	0.986 (0.927 to 1.047)	0.651	1.066 (0.917 to 1.239)	0.399	1.015 (0.870 to 1.184)	0.849
YRS EDN	0.913 (0.770 to 1.082)	0.298	0.840 (0.680 to 1.039)	0.108	1.005 (0.932 to 1.084)	0.891	0.934 (0.825 to 1.057)	0.282	**0.539 (0.317 to 0.918)**	**0.023**	0.688 (0.449 to 1.054)	0.086
CACI	0.965 (0.821 to 1.133)	0.666	0.868 (0.706 to 1.066)	0.179	0.989 (0.950 to 1.029)	0.589	0.898 (0.784 to 1.030)	0.127	0.915 (0.665 to 1.125)	0.585	1.001 (0.725 to 1.382)	0.991

Appendix 4.2. Premorbid indicators of death at 24 months

PREMORBID PREDICTORS OF DEATH AT 24 MONTHS

Predictor	OUTCOME MEASURES											
	LNS		DS		PCS		MCS		MOBILITY		SOCIAL	
	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*
FIM	**0.932 (0.903 to 0.962)**	**0.000**	**0.941 (0.917 to 0.965)**	**0.000**	**0.946 (0.915 to 0.979)**	**0.002**	**0.956 (0.937 to 0.976)**	**0.000**	**0.940 (0.915 to 0.965)**	**0.000**	**0.953 (0.934 to 0.972)**	**0.000**
CIQ	**0.897 (0.834 to 0.964)**	**0.003**	**0.875 (0.805 to 0.952)**	**0.002**	**0.489 (0.246 to 0.973)**	**0.042**	**0.891 (0.821 to 0.966)**	**0.006**	**0.893 (0.835 to 0.956)**	**0.001**	**0.895 (0.836 to 0.958)**	**0.001**
YRS EDN	**0.827 (0.685 to 0.999)**	**0.049**	**0.813 (0.676 to 0.978)**	**0.029**	**0.707 (0.511 to 0.979)**	**0.037**	0.882 (0.756 to 1.029)	0.111	**0.819 (0.684 to 0.918)**	**0.031**	**0.851 (0.727 to 0.997)**	**0.047**
CACI	**1.531 (1.304 to 1.798)**	**0.000**	**1.333 (1.211 to 1.467)**	**0.000**	**1.313 (1.193 to 1.445)**	**0.000**	**1.313 (1.193 to 1.445)**	**0.000**	**1.337 (1.207 to 1.480)**	**0.000**	**1.334 (1.204 to 1.477)**	**0.000**

Appendix 4.3. One month indicators of death at 24 months

1 MONTH PREDICTORS OF DEATH AT 24 MONTHS

Predictor	LNS		DS		PCS		MCS		MOBILITY		SOCIAL	
	OUTCOME MEASURES											
	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*
FIM	**0.834 (0.753 to 0.924)**	**0.001**	**0.923 (0.893 to 0.953)**	**0.000**	**0.944 (0.917 to 0.971)**	**0.000**	**0.921 (0.886 to 0.958)**	**0.000**	**0.913 (0.875 to 0.953)**	**0.000**	**0.936 (0.911 to 0.962)**	**0.000**
CIQ	**0.919 (0.860 to 0.983)**	**0.014**	**0.906 (0.848 to 0.968)**	**0.004**	**0.863 (0.790 to 0.942)**	**0.001**	**0.750 (0.631 to 0.891)**	**0.001**	**0.895 (0.836 to 0.958)**	**0.001**	**0.892 (0.833 to 0.954)**	**0.001**
APACHE 3 R.O.D.	2.083 (0.393 to 11.041)	0.388	1.935 (0.332 to 11.267)	0.462	1.700 (0.377 to 7.661)	0.490	2.213 (0.392 to 12.493)	0.368	1.754 (0.303 to 10.149)	0.530	1.893 (0.311 to 11.513)	0.488
MMSE	0.976 (0.794 to 1.200)	0.821	1.001 (0.818 to 1.225)	0.987	1.088 (0.863 to 1.176)	0.917	1.025 (0.901 to 1.166)	0.702	1.023 (0.857 to 1.222)	0.796	1.034 (0.886 to 1.207)	0.668

Appendix 4.4. One month predictors of impairment at 24 months

1 MONTH PREDICTORS OF IMPAIRMENT AT 24 MONTHS

Predictor	OUTCOME MEASURES											
	LNS		DS		PCS		MCS		MOBILITY		SOCIAL	
	RRR (95%CI)	*p value*		*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*	RRR (95%CI)	*p value*
FIM	0.990 (0.965 to 1.015)	0.440	0.997 (0.967 to 1.027)	0.844	1.003 (0.991 to 1.015)	0.581	1.000 (0.972 to 1.029)	0.970	0.977 (0.933 to 1.022)	0.312	0.968 (0.933 to 1.005)	0.095
CIQ	**0.933 (0.872 to 0.999)**	**0.048**	0.942 (0.873 to 1.017)	0.128	1.006 (0.976 to 1.025)	0.961	1.023 (0.966 to 1.085)	0.423	1.008 (0.892 to 1.138)	0.897	0.956 (0.836 to 1.095)	0.523
APACHE 3 R.O.D.	1.416 (0.327 to 6.129)	0.641	2.100 (0.371 to 11.877)	0.401	1.188 (0.597 to 2.363)	0.623	2.407 (0.528 to 10.962)	0.256	**2.950 (2.539 to 2.710)**	**0.013**	6.710 (0.801 to 56.163)	0.079
MMSE	0.902 (0.803 to 1.013)	0.083	**0.795 (0.705 to 0.896)**	**0.000**	0.967 (0.929 to 1.007)	0.108	1.031 (0.929 to 1.144)	0.557	**0.866 (0.752 to 0.996)**	**0.045**	0.933 (0.808 to 1.077)	0.346

Appendix 5.0
Employment status

Appendix 5.1. Employment status (Controls)

CONTROLS EMPLOYMENT STATUS											
Episode number	N	Casual (N)	%	N/A (N)	%	Not stated (N)	%	Permanent (N)	%	Self-employed (N)	%
PREMORBID	59	5	8.47	44	74.58	0	0.00	9	15.25	1	1.69
1	59	2	3.39	52	88.14	0	0.00	4	6.78	1	1.69
3	56	5	8.93	44	78.57	0	0.00	6	10.71	1	1.79
6	56	6	10.71	42	75.00	0	0.00	7	12.50	1	1.79
12	56	6	10.71	43	76.79	0	0.00	6	10.71	1	1.79
24	54	4	7.41	41	75.93	0	0.00	6	11.11	2	3.70

Appendix 5.2. Employment status (ICU cases)

CASE EMPLOYMENT STATUS											
Episode number	N	Casual (N)	%	N/A (N)	%	Not stated (N)	%	Permanent (N)	%	Self-employed (N)	%
PREMORBID	59	4	6.78	42	71.19	2	3.39	5	8.47	6	10.17
1	59	2	3.39	52	88.14	0	0	1	1.69	4	6.78
3	56	2	3.39	50	84.75	0	0	3	5.08	4	6.78
6	56	2	3.39	46	77.97	1	1.69	7	11.86	3	5.08
12	56	4	6.78	32	54.24	13	22.03	6	10.17	4	6.78
24	54	3	5.08	46	77.97	0	0.00	6	10.17	4	6.78

Appendix 6.0.
Protocol for semi-structured interviews

Introduction

I want to talk about your experience while you were sick and how your experience has affected your life – in any way you think is important. This includes the time before you came to hospital, your time in hospital and after you left the hospital, up until now. We are interested in finding out the things that makes your overall satisfaction with your daily life and functioning good or what makes it bad. But before we begin, I'd like to review a few things.

1. Please be as honest as you can and say exactly what you think. Don't worry what I think or what your family or friends think.
2. I would like you to talk about your experience and feelings.

General probe questions

1. Do you clearly remember all of your illness experience? If not, which parts are you unclear of? How does this make you feel?
2. How did your ICU / hospital experience affect you – in good ways or bad ways? Why?
3. What are the most important things (and activities) that matter to you in your day-to-day life? How did your illness affect these?
4. Has your recovery gone as you expected? Why or why not?

More specific probe questions

1. Have you noticed any problems that interfere with your daily routine?
2. Do you have any worries or concerns about any particular issue now?
3. Do you feel your emotions have been normal since your illness? Why or why not?
4. Has your thinking been clear since your illness?
5. How does it feel now that you are home after being in hospital? Is anything different?
6. Have any of your relationships changed in any way? If so why?

Appendix 7.0
Protocol for test administration

Mini-Mental State Examination (MMSE)

The MMSE is a measure of orientation to time and place, attention and concentration, language, constructional ability and immediate and delayed recall. It is commonly used to screen for cognitive impairment.

Administration Time Point: A score of $\geq$ 24 is required to commence neuropsychometric testing. If the subject scores < 24, please administer at the next timepoint for qualification of neuropsychomnetric testing.

Materials: Response form
Pen

1. This is administered at the beginning of the baseline assessment.

2. Tell the patient you are going to ask them some questions to test their memory.

3. The response sheet gives clear instructions, however for question 8 clearly read the three instructions before giving the patient the piece of paper. This will enable you to examine the patients' ability to remember and execute three instructions.

TRAILMAKING B

This is a test of complex visual scanning and with a motor component hence success is strongly influenced by motor speed and agility and is referred to as a mental tracking working memory task. Visual scanning and tracking problems revealed on this test can give the examiner an idea of how effectively the patient responds to visual array of any complexity, follows a sequence mentally, deals with more than one stimulus or thought at a time, or is flexible in shifting the course of ongoing activity.

Administration Time points: 1, 3, 6, 12 & 24 months

Materials: Response form
Stopwatch
Pens

1. Tell the patient, "I am going to ask you to alternate between numbers and letters. I will show you on this practice sample. There is a beginning and an end (point to both) and I want you to join the dots without taking your pen off the paper. Starting with your pen on 1 then you go to A, then 2-B and 3-C and so on. Can you complete this sample?"

2. If the patient has difficulties explain again and demonstrate with the sample.

3. Tell the patient the task will be timed so they need to work as quickly as possible but be accurate.

4. Watch the patient carefully and if they are off track you can tell them and guide them in the right direction. If they are finding it difficult and you have corrected them several times do not keep correcting them. If the test is invalid because the sequence was not correct place the appropriate code on the page.

TRAILMAKING B - SCORING

1. Write the time taken to complete in **seconds** on the demonstration page.

Digit Span – Forwards & Backwards

Forms A, B, & C

Digit Span is commonly used for measuring span of immediate verbal recall. Digits Forward and Digits Backward involve different mental activities however both depend on a short-term retention capacity. Digits backward is a more complex working memory task requiring manipulation of the material to be recalled.

Administration Time points:	Form A – 1 month; 12 months
	Form C – 3 months;
	Form B – 6 months, 24 months

Materials:	Response sheet
	Pen

1. Inform the participant that you are going to read out a string of numbers.

2. When you have finished each string, they are asked to repeat the numbers back to you.

3. They will start of easy and get more difficult.

4. Start with item 1

5. Numbers are spaced 1 second apart and said in a monotone voice, dropping your voice on the last digit to indicate the end of the string.

6. Do not group numbers together.

7. Do not repeat any trials. If the patient asks for the items to be repeated tell the patient you cannot repeat them but can they recall any at all.

8. Discontinue when both levels of a trial are incorrect.

9. Attempt digits backwards even if the participants score 0 on forwards.

10. When the Digits Forward is completed then inform the patient you are now going to read some numbers but this time they are required to repeat them backwards. Provide an example, "If I say 9-3-2, then you say 2-3-9".

11. Discontinue when both trials of an item are incorrect.

Digit Span - SCORING

1. Add up all items for Digit Forwards and Digits Backwards, add together and place in appropriate space.
2. - is the last item where both trials are correct
3. String – is the longest correct string (only need 1 string correct in the tow trials of the item). Count the numbers recalled in the string.

Letter-Number Sequencing

Forms A, B, & C

Administration Time points:	Form A – 1 month; 12 months
	Form C – 3 months;
	Form B – 6 months, 24 months
Materials:	Response sheet
	Pen

1. Tell the patient you are going to say a group of numbers and letters. "After I say them I want you to rearrange them with the numbers first, in order, starting with the lowest number. Then tell me the letters in alphabetical order."

2. Use an example, "If I say B-7 then your answer should be 7-B, the number first and then the letter. If I say 9-C-3 then your answer should be 3-9-C."

3. Use Practice examples:

   6-F (6-F) G-4 (4-G) 3-W-5 (3-5-W) T-7-L (7-L-T) 1-J-A (1-A-J)

4. Correct any practice items given incorrectly.

5. Do not repeat any items.

6. Discontinue after failure on all three trials of an item.

National Adult Reading Test (NART)

The National Adult Reading Test (NART) is a commonly used instrument in estimating premorbid intelligence. The NART is a 50 item irregular word list thought to be relatively unaffected by neurological and psychiatric disorder. The NART provides clinicians and researchers with a measure of premorbid intellectual functioning rather than current cognitive ability. Establishing premorbid intellectual functioning is an important factor in the assessment of patients as it allows a clinician to assess the degree of impairment for an individual and therefore establish a realistic expectation of recovery.

Administration Time Points: Baseline assessment

Materials: NART record sheet
NART pronunciation sheet
NART tape (correct pronunciation sample for interviewers)

- Tell the patient, 'I would like you to read this long list of words, they are difficult words and most people do not recognize many of them, so just have a guess, OK? Go ahead.'

- Responses should be reinforced, 'That's fine, good' is encouraging without being dishonest.

- Mark with a cross next to the words pronounced incorrectly.

- A ceiling of 14 incorrect responses in 15 consecutive responses can be implemented without significantly affected the accuracy of the test.

- If the patient becomes anxious allow them to stop and continue with other neuropsychometric tests. If the patient finds the test very difficult they can stop at the bottom of the first column. The WAIS vocabulary can be administered in place of

the NART for those patients who find it too difficult. It is preferable that the WAIS Vocabulary is administered at the baseline assessment. If this is not possible due to time constraints it can be administered at the next assessment. Please make a note of this on the pack cover sheet.

NART - SCORING

- Incorrect responses are added together to give a NART error score.

- The NART error score can be used to yield an estimate of premorbid functioning by referring to the
  WAIS-111 conversion form in the scoring folder.

Hospital Anxiety and Depression Scale (HADS)

The Hospital Anxiety and Depression Scale is a widely used self-report instrument designed as brief assessment of anxiety and depression in non-psychiatric populations.

Administration Time points: 1, 3, 6, 12 & 24 months

Materials: HADS response form

- Fold the scoring section over as indicated on the form.

- Tell the patient, 'I would like you to complete this questionnaire about how you have been feeling over the past week. Read each item below and underline the reply which comes closest to how you have been feeling. Don't take too long over your replies, your immediate reaction to each item will probably be more accurate than a long, thought out response.'

- The patient can fill this out alone. If they have difficulty understanding or reading problems the tester can provide assistance.

HADS - SCORING

- Unfold the scoring section and cross out the numbers corresponding to the patients' response.

- Add together all scores in the Anxiety column on both sides of the page and place the total in the
  appropriate box. Follow this procedure for the Depression Scale also.

Score	**Description**
0-7	Normal
8-10	Mild
11-14	Moderate
15-21	Severe

Short Form Health Survey-36v2 (SF-36v2)

The SF-36v2 is a 36-item multipurpose health survey that measures overall health, functional status and mental status. It measures 8 domains: physical functioning (PF), role limitations due to physical problems, bodily pain (BP), general health perceptions, energy/vitality (VT), social functioning (SF), role limitations due to emotional problems and mental health (MH), equating to two summary scales; physical component score (PCS) and mental component score (MCS). It contains 11 questions, most consisting of structured Likert-type responses. Current scoring recommendations are that the scores be standardised to a 0-100 range, converting the lowest possible score to 0 and the highest to 100. Scores are norm-based, mean = 50, SD = 10. When interpreting scores, 50 is considered average; 0-49 is below average; 51-100 is above average. Clinical significance is a five point improvement or decline in scores.

Administration Time points: Premorbid, 1, 3, 6, 12 & 24 months

Materials: Response sheet
Pen

- Directions and domain definitions are included in the stimuli packs and in this manual. It is preferable to read these to the patient on the first administration but not at the other time points.

Administration for each time point:

- Visit 1 Retrospective data. Administered at baseline or 1 month.
  Ask the patient to answer the questions on the QOLI reflecting on their life **over the month *PRIOR* to the injury.**

- 1 Month Ask the patient to answer the questions on the QOLI reflecting on their life **over the month *SINCE* their injury.**

- 3 Month Ask the patient to answer the questions on the QOLI reflecting on their life **over the past month.**
- 6 months Ask the patient to answer the questions on the QOLI reflecting on their life **over the past month.**
- 12 months Ask the patient to answer the questions on the QOLI reflecting on their life **over the past month.**
- 24 months Ask the patient to answer the questions on the QOLI reflecting on their life **over the past month.**

Example: **HEALTH:** Over the last month how important has your health been to your happiness? Over the last month how satisfied have you been with your health?

Community Integrated Questionnaire (CIQ)

The CIQ is a questionnaire that was specifically designed as a telephone interview evaluating community integration.

Administration Time points: Premorbid, 1, 3, 6, 12 & 24 months

Materials: Questionnaire form
Pen

- Tell the patient, 'I would like you to answer some questions about everyday tasks like shopping, paying bills and leisure activities. Could you please colour in the circle next to the appropriate response.'

Functional Independence Measure (FIM)

The FIM is a measure of disability not impairment. It measures what a person can actually do at the time of assessment and it assess the need, type and amount of assistance ("Burden of Care") required for a person with a disability to perform basic life skills effectively. The FIM includes a seven-level scale that designates major gradations in behaviour from dependence to independence

Administration Time points: Premorbid, 1, 3, 6, 12 & 24 months

Materials: Response sheet
Pen

- Some information regarding each section can be obtained throughout the assessment, however some specific questions will need to be asked to clarify circumstances.
- Record the score which best describes the patients level of function for every FIM item on the coding sheet.
- The FIM score should reflect what the person *usually* does – actual not capacity is recorded.
- If differences in function occur in different environments or at different times of the day, record the lowest score as the usual reason for this is that the patient has not mastered the function. A discussion with ward nurses (inpatient) or carers (outpatient) may be necessary to resolve any queries.
- If the If the patient does not perform the activity or would be put at risk if tested, enter Level 1 – Total Assistance. For example, the patient who requires a bed bath is scored 1 for Transfers: Tub or Shower.
- When two helpers are required for the patient to perform activities described in an item, score Level 1.

- Do not leave any FIM item blank.
- Do not enter 'N/A' for any FIM item.
- For the items Walk/Wheelchair, Comprehension and Expression, indicate the most usual mode in the small box. *Do not place numbers in the small box.*

FIM SCORING

NO HELPER

7 = Complete Independence
(no help, no devices, safely, timely)

6 = Modified Independence
(assistive device, safety or timeliness issues)

HELPER

Modified Independence

5 = Supervision, setup or standby prompting

4 = Minimal contact assistance or prompting
(Subject does **75% or more effort**)

3 = Moderate contact assisstacne or prompting
(Subject does **50-74%** of effort)

Complete Independence

2 = Maximal contact assissatance or prompting
(subject does **25-49%** of effort)

1 = Total assistance
(Subject does **less than 25%** of effort)

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      Appendix 8.1
.
.          ****************************************************
.          *       MIXED MODELS for test outcomes: Group x time    *
.          ****************************************************
.
.
.  use "ICU_ALL_data_CLEAN_v2", clear

.   capture drop __0000*

.  set more off

.
.                  /* Generate terms for Mixed model analyses      */
.
.   drop if episodenumber<=3
(429 observations deleted)

.   gen case_time=case*sample_time                        /* create interaction
>  term for case and sample time     */

.   gen sample_time_0=sample_time-1                       /* start sample time
> at zero    */

.   gen sample_time_0_case=sample_time_0*case     /* interaction term     */

.
.   gen ln_time=ln(sample_time)                           /* log time (linear m
> ode;)      */

.   gen ln_time_case=ln_time*case                         /* ln(time) interacti
> on */

.
.   gen sample_time_6=sample_time-6                       /* sets 6 month sampl
> ing time to 0      - can be used to compare changes relative to 6 months   */

.   gen case_sample_time_6=sample_time_6*case

.
.
.   ***************
.   *     SURVIVORS       *
.   ***************
.
. drop if died_study==1
(80 observations deleted)

.
.  foreach var of varlist digitspanadjusted lnagescaledscore stroop_ratio trail
> s_inseconds ///
>                  sf36v2mcs sf36v2pcs  iesravoidance iesrhyperarousal iesrinter
> ruptions ies_total ///
>                  hadstotal ciq_total fim {
  2.                 display ""
  3.                 display "************************"
  4.                 display "`var'"
  5.                 display "************************"
  6.                 xtmixed `var' case sample_time_0 ||  patientnumber:
  7.                 xtmixed `var' case sample_time_0 age sex_recode ||  patien
> tnumber:
  8.                 xtmixed `var' case sample_time_0 sample_time_0_case ||  pa
> tientnumber:
  9.                 xtmixed `var' case sample_time_0 sample_time_0_case  age s
> ex_recode ||  patientnumber:
 10.                 }
```

```
**********************
digitspanadjusted
**********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1105.7113
Iteration 1:   log likelihood = -1105.7113

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       462
Group variable: patientnumber                   Number of groups   =       118

                                                Obs per group: min =         3
                                                               avg =       3.9
                                                               max =         4


                                                Wald chi2(2)       =      3.20
Log likelihood = -1105.7113                     Prob > chi2        =    0.2021

------------------------------------------------------------------------------
----
digitspanadjusted |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inter
> val]
------------------+-----------------------------------------------------------
----
             case |  -.7871773     .52381    -1.50   0.133    -1.813826    .239
> 4714
    sample_time_0 |  -.0115078   .0118445    -0.97   0.331    -.0347226     .01
> 1707
            _cons |   10.55961   .3868786    27.29   0.000     9.801337    11.3
> 1787
------------------------------------------------------------------------------
----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   2.648711   .1993428      2.285456    3.069702
-----------------------------+------------------------------------------------
               sd(Residual) |   2.047069   .0780287      1.899709     2.20586
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   216.83 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1096.0015
Iteration 1:   log likelihood = -1096.0015

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       458
Group variable: patientnumber                   Number of groups   =       117

                                                Obs per group: min =         3
                                                               avg =       3.9
                                                               max =         4


                                                Wald chi2(4)       =      3.79
```

```
Log likelihood = -1096.0015                     Prob > chi2        =    0.4351

------------------------------------------------------------------------------
digitspanadjusted |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inter
> val]
------------------+-----------------------------------------------------------
             case |  -.8397317   .5238697    -1.60   0.109    -1.866497     .18
> 7034
    sample_time_0 |   -.010268   .0119145    -0.86   0.389      -.03362     .01
> 3084
              age |   -.006262   .0155906    -0.40   0.688    -.0368191    .024
> 2951
       sex_recode |   .2970337   .5385901     0.55   0.581    -.7585836    1.35
> 2651
            _cons |   10.84604   .9750675    11.12   0.000     8.934945    12.7
> 5714
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.630619   .1992911      2.267631    3.051711
-----------------------------+------------------------------------------------
                sd(Residual) |   2.050208   .0784908      1.901999    2.209966
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   211.85 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1105.6091
Iteration 1:   log likelihood = -1105.6091

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       462
Group variable: patientnumber                   Number of groups   =       118

                                                Obs per group: min =         3
                                                               avg =       3.9
                                                               max =         4


                                                Wald chi2(3)       =      3.40
Log likelihood = -1105.6091                     Prob > chi2        =    0.3336

------------------------------------------------------------------------------
 digitspanadjusted |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
              case |  -.8968671    .577324    -1.55   0.120    -2.028401    .23
> 46672
     sample_time_0 |  -.0167809   .0166208    -1.01   0.313    -.0493571    .01
> 57954
sample_time_0_case |   .0107075   .0236839     0.45   0.651    -.0357122    .05
> 71271
             _cons |    10.6138   .4050475    26.20   0.000      9.81992    11.
> 40768
------------------------------------------------------------------------------
```

```
------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.649137   .1993508      2.285865    3.070142
-----------------------------+------------------------------------------------
                sd(Residual) |   2.046394   .0780034      1.899082    2.205134
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   216.99 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1095.9407
Iteration 1:   log likelihood = -1095.9407

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       458
Group variable: patientnumber                   Number of groups   =       117

                                                Obs per group: min =         3
                                                               avg =       3.9
                                                               max =         4


                                                Wald chi2(5)       =      3.91
Log likelihood = -1095.9407                     Prob > chi2        =    0.5622

------------------------------------------------------------------------------
-----
 digitspanadjusted |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
             case |  -.9248306    .577937    -1.60   0.110    -2.057566     .2
> 07905
     sample_time_0 |   -.014396   .0167924    -0.86   0.391    -.0473085    .01
> 85164
sample_time_0_case |   .0083098   .0238244     0.35   0.727    -.0383852    .05
> 50048
              age |  -.0062794   .0155918    -0.40   0.687    -.0368388      .
> 02428
       sex_recode |   .2972218   .5386282     0.55   0.581    -.7584702    1.3
> 52914
            _cons |    10.8894   .9830262    11.08   0.000     8.962708     12
> .8161
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.630915   .1992983      2.267912    3.052021
-----------------------------+------------------------------------------------
                sd(Residual) |   2.049793   .0784752      1.901614    2.209519
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   211.95 Prob >= chibar2 = 0.0000

***********************
lnagescaledscore
***********************

Performing EM optimization:

Performing gradient-based optimization:
```

```
Iteration 0:   log likelihood =  -1082.586
Iteration 1:   log likelihood =  -1082.586

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       430
Group variable: patientnumber                   Number of groups   =       111

                                                Obs per group: min =         2
                                                               avg =       3.9
                                                               max =         4


                                                Wald chi2(2)       =      2.90
Log likelihood =  -1082.586                     Prob > chi2        =    0.2343

------------------------------------------------------------------------------
---
lnagescaledscore |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
> al]
-----------------+------------------------------------------------------------
---
            case |  -.5629436   .5949895    -0.95   0.344    -1.729102    .6032
> 144
   sample_time_0 |   .0198756   .0140656     1.41   0.158    -.0076924    .0474
> 436
           _cons |   8.819655   .4500145    19.60   0.000     7.937643    9.701
> 667
------------------------------------------------------------------------------
---

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.897137   .2280773      2.482894    3.380492
-----------------------------+------------------------------------------------
                sd(Residual) |   2.337066   .0925027      2.162618    2.525586
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   186.27 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1082.3102
Iteration 1:   log likelihood = -1082.3102

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       430
Group variable: patientnumber                   Number of groups   =       111

                                                Obs per group: min =         2
                                                               avg =       3.9
                                                               max =         4


                                                Wald chi2(4)       =      3.46
Log likelihood = -1082.3102                     Prob > chi2        =    0.4841

------------------------------------------------------------------------------
---
lnagescaledscore |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
> al]
-----------------+------------------------------------------------------------
---
```

```
             case |  -.5555408    .595712    -0.93   0.351    -1.723115    .6120
> 332
   sample_time_0 |   .0197743   .0140664     1.41   0.160    -.0077953    .0473
> 438
              age |  -.0043052   .0174935    -0.25   0.806    -.0385918    .0299
> 815
       sex_recode |    .451277   .6110484     0.74   0.460    -.7463559     1.64
> 891
            _cons |   8.869656   1.087285     8.16   0.000     6.738616     11.0
> 007
------------------------------------------------------------------------------
---

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   2.888578   .2276259      2.475185    3.371014
-----------------------------+------------------------------------------------
               sd(Residual) |     2.3371   .0925063      2.162646    2.525628
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   185.22 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1080.6631
Iteration 1:   log likelihood = -1080.6631

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       430
Group variable: patientnumber                   Number of groups   =       111

                                                Obs per group: min =         2
                                                               avg =       3.9
                                                               max =         4


                                                Wald chi2(3)       =      6.80
Log likelihood = -1080.6631                     Prob > chi2        =    0.0786

------------------------------------------------------------------------------
-----
  lnagescaledscore |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |  -1.123777   .6600449    -1.70   0.089    -2.417441    .16
> 98874
     sample_time_0 |  -.0080155   .0199112    -0.40   0.687    -.0470407    .03
> 10097
sample_time_0_case |   .0550086   .0279602     1.97   0.049     .0002075    .10
> 98097
             _cons |   9.106153   .4729471    19.25   0.000     8.179194    10.
> 03311
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   2.901911   .2279447      2.487839      3.3849
-----------------------------+------------------------------------------------
               sd(Residual) |   2.322605   .0919339       2.14923    2.509965
------------------------------------------------------------------------------
```

```
LR test vs. linear regression: chibar2(01) =   188.79 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1080.3924
Iteration 1:   log likelihood = -1080.3924

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       430
Group variable: patientnumber                   Number of groups   =       111

                                                Obs per group: min =         2
                                                               avg =       3.9
                                                               max =         4


                                                Wald chi2(5)       =      7.34
Log likelihood = -1080.3924                     Prob > chi2        =    0.1963

------------------------------------------------------------------------------
-----
  lnagescaledscore |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |  -1.115842   .6607698    -1.69   0.091    -2.410927    .17
> 92427
     sample_time_0 |  -.0080782   .0199116    -0.41   0.685    -.0471043    .03
> 09479
sample_time_0_case |   .0549366   .0279608     1.96   0.049     .0001346    .10
> 97387
               age |  -.0042218   .0175033    -0.24   0.809    -.0385276     .0
> 30084
        sex_recode |   .4474983   .6113927     0.73   0.464    -.7508094    1.6
> 45806
             _cons |   9.152608   1.097247     8.34   0.000     7.002044    11.
> 30317
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.893498   .2275016      2.480261    3.375585
-----------------------------+------------------------------------------------
                sd(Residual) |   2.322642   .0919379      2.149259    2.510011
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   187.73 Prob >= chibar2 = 0.0000

***********************
stroop_ratio
***********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -276.33119
Iteration 1:   log likelihood = -276.33119

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       392
Group variable: patientnumber                   Number of groups   =       102
```

```
                                                  Obs per group: min =         1
                                                                 avg =       3.8
                                                                 max =         4


                                                  Wald chi2(2)       =      2.39
Log likelihood = -276.33119                       Prob > chi2        =    0.3027

------------------------------------------------------------------------------
 stroop_ratio |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   .0024961   .0889111     0.03   0.978    -.1717664    .1767586
sample_time_0 |  -.0038927   .0025186    -1.55   0.122     -.008829    .0010435
        _cons |   .9876004   .0662552    14.91   0.000     .8577425    1.117458
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   .3982823   .0361361      .3333969    .4757957
-----------------------------+------------------------------------------------
               sd(Residual) |   .3993577   .0166608      .3680025    .4333844
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   103.19 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -269.11638
Iteration 1:   log likelihood = -269.11638

Computing standard errors:

Mixed-effects ML regression                       Number of obs      =       392
Group variable: patientnumber                     Number of groups   =       102

                                                  Obs per group: min =         1
                                                                 avg =       3.8
                                                                 max =         4


                                                  Wald chi2(4)       =     17.84
Log likelihood = -269.11638                       Prob > chi2        =    0.0013

------------------------------------------------------------------------------
 stroop_ratio |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |  -.0327823   .0834363    -0.39   0.694    -.1963144    .1307498
sample_time_0 |  -.0039286   .0025174    -1.56   0.119    -.0088626    .0010054
          age |   .0089969   .0024299     3.70   0.000     .0042344    .0137595
   sex_recode |   .0485846   .0847706     0.57   0.567    -.1175628     .214732
        _cons |   .4468092   .1513265     2.95   0.003     .1502148    .7434037
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   .3639868   .0344365      .3023808    .4381442
-----------------------------+------------------------------------------------
               sd(Residual) |   .3992243     .01665      .3678891    .4332286
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    85.21 Prob >= chibar2 = 0.0000

Performing EM optimization:
```

```
Performing gradient-based optimization:

Iteration 0:   log likelihood = -276.32268
Iteration 1:   log likelihood = -276.32268

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       392
Group variable: patientnumber                   Number of groups   =       102

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(3)       =      2.41
Log likelihood = -276.32268                     Prob > chi2        =    0.4923

------------------------------------------------------------------------------
-----
      stroop_ratio |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   .0092125   .1027473     0.09   0.929    -.1921686    .21
> 05935
     sample_time_0 |  -.0035839   .0034554    -1.04   0.300    -.0103563    .00
> 31885
sample_time_0_case |  -.0006587   .0050465    -0.13   0.896    -.0105497    .00
> 92323
             _cons |   .9844478   .0705328    13.96   0.000     .8462061     1.
> 12269
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   .3983695    .036147      .3334651    .4759067
-----------------------------+------------------------------------------------
                sd(Residual) |   .3993241   .0166605      .3679696    .4333504
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   103.20 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -269.10646
Iteration 1:   log likelihood = -269.10646

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       392
Group variable: patientnumber                   Number of groups   =       102

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(5)       =     17.85
Log likelihood = -269.10646                     Prob > chi2        =    0.0031

------------------------------------------------------------------------------
-----
```

```
      stroop_ratio |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |  -.0255421   .0980071    -0.26   0.794    -.2176324    .16
> 65482
     sample_time_0 |  -.0035954   .0034536    -1.04   0.298    -.0103644    .00
> 31735
sample_time_0_case |  -.0007106   .0050435    -0.14   0.888    -.0105956    .00
> 91744
               age |   .0089992   .0024304     3.70   0.000     .0042358    .01
> 37626
        sex_recode |   .0486027   .0847841     0.57   0.566    -.1175712    .21
> 47765
             _cons |   .4432665   .1534184     2.89   0.004     .1425719    .74
> 39611
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   .3640727   .0344456      .3024506    .4382499
-----------------------------+------------------------------------------------
                sd(Residual) |   .3991886   .0166495      .3678543    .4331919
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    85.22 Prob >= chibar2 = 0.0000

**********************
trails_inseconds
**********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2222.2158
Iteration 1:   log likelihood = -2222.2158

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       391
Group variable: patientnumber                   Number of groups   =       102

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(2)       =      6.19
Log likelihood = -2222.2158                     Prob > chi2        =    0.0452

------------------------------------------------------------------------------
---
trails_inseconds |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
> al]
-----------------+------------------------------------------------------------
---
            case |   25.98953   15.33789     1.69   0.090    -4.072186    56.05
> 124
   sample_time_0 |   .6302743    .344882     1.83   0.068    -.0456819     1.30
> 623
           _cons |   123.8996   11.11536    11.15   0.000     102.1139    145.6
> 853
------------------------------------------------------------------------------
---
```

```
------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   72.00086   5.808466      61.47088    84.33464
-----------------------------+------------------------------------------------
                sd(Residual) |   54.58713   2.267428      50.31915    59.21712
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   190.21 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2212.7013
Iteration 1:   log likelihood = -2212.7013

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       391
Group variable: patientnumber                   Number of groups   =       102

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(4)       =     27.78
Log likelihood = -2212.7013                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
---
trails_inseconds |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
> al]
-----------------+------------------------------------------------------------
---
            case |   18.97738   14.03321     1.35   0.176    -8.527216    46.48
> 197
   sample_time_0 |    .633075   .3450173     1.83   0.067    -.0431465    1.309
> 296
             age |   1.853866   .4082413     4.54   0.000     1.053728    2.654
> 004
      sex_recode |   -3.83882   14.26093    -0.27   0.788    -31.78973    24.11
> 209
           _cons |   18.44014   25.36572     0.73   0.467    -31.27575    68.15
> 604
------------------------------------------------------------------------------
---

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   64.42832   5.391925      54.68155    75.91241
-----------------------------+------------------------------------------------
                sd(Residual) |   54.61564   2.270659      50.34173     59.2524
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   153.65 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2221.9812
Iteration 1:   log likelihood = -2221.9812

Computing standard errors:
```

```
Mixed-effects ML regression                     Number of obs      =       391
Group variable: patientnumber                   Number of groups   =       102

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(3)       =      6.67
Log likelihood = -2221.9812                     Prob > chi2        =    0.0833

------------------------------------------------------------------------------
-----
  trails_inseconds |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |    21.1694   16.87377     1.25   0.210    -11.90258    54.
> 24137
     sample_time_0 |   .4064506   .4747827     0.86   0.392    -.5241064    1.3
> 37008
sample_time_0_case |     .47301   .6901945     0.69   0.493    -.8797464    1.8
> 25766
             _cons |   126.1971   11.60905    10.87   0.000     103.4438    148
> .9504
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   72.01098    5.80788      61.48186    84.34327
-----------------------------+------------------------------------------------
               sd(Residual) |   54.54258   2.265593      50.27805    59.16882
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   190.50 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2212.4892
Iteration 1:   log likelihood = -2212.4892

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       391
Group variable: patientnumber                   Number of groups   =       102

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(5)       =     28.20
Log likelihood = -2212.4892                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
  trails_inseconds |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   14.40011   15.69641     0.92   0.359    -16.36429     45
> .1645
     sample_time_0 |   .4202255   .4749616     0.88   0.376    -.5106822    1.3
> 51133
```

```
sample_time_0_case |   .4497908    .690392     0.65   0.515    -.9033526    1.8
> 02934
               age |   1.851794    .408324     4.54   0.000     1.051494    2.6
> 52094
        sex_recode |  -3.799805   14.26356    -0.27   0.790    -31.75587    24.
> 15626
             _cons |   20.72806   25.61118     0.81   0.418    -29.46894    70.
> 92506
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   64.45162   5.392434      54.70372    75.93654
-----------------------------+------------------------------------------------
                sd(Residual) |    54.5722   2.268939      50.30153    59.20546
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   153.92 Prob >= chibar2 = 0.0000

***********************
sf36v2mcs
***********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1777.1514
Iteration 1:   log likelihood = -1777.1514

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       457
Group variable: patientnumber                   Number of groups   =       115

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(2)       =      2.81
Log likelihood = -1777.1514                     Prob > chi2        =    0.2460

------------------------------------------------------------------------------
    sf36v2mcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   1.118207   2.052848     0.54   0.586    -2.905301    5.141715
sample_time_0 |   .0889086   .0562518     1.58   0.114    -.0213429    .1991601
        _cons |     48.314   1.576078    30.65   0.000     45.22494    51.40305
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   9.890297   .8137204      8.417383    11.62095
-----------------------------+------------------------------------------------
                sd(Residual) |   9.602908   .3673977      8.909158    10.35068
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   139.11 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1774.8317
```

```
Iteration 1:   log likelihood = -1774.8317

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       457
Group variable: patientnumber                   Number of groups   =       115

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(4)       =      7.55
Log likelihood = -1774.8317                     Prob > chi2        =    0.1095

------------------------------------------------------------------------------
    sf36v2mcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   1.075444   2.014962     0.53   0.594    -2.873808    5.024697
sample_time_0 |     .08876   .0562493     1.58   0.115    -.0214866    .1990067
          age |   .0505874    .059008     0.86   0.391    -.0650662     .166241
   sex_recode |   -4.42973   2.071119    -2.14   0.032    -8.489048   -.3704107
        _cons |    47.3159   3.727484    12.69   0.000     40.01017    54.62164
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   9.646313   .8017135      8.196289    11.35286
-----------------------------+------------------------------------------------
                sd(Residual) |   9.602648   .3673681      8.908952    10.35036
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   132.34 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1777.1279
Iteration 1:   log likelihood = -1777.1279

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       457
Group variable: patientnumber                   Number of groups   =       115

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(3)       =      2.85
Log likelihood = -1777.1279                     Prob > chi2        =    0.4149

------------------------------------------------------------------------------
-----
         sf36v2mcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   1.365661   2.348981     0.58   0.561    -3.238257     5.
> 96958
     sample_time_0 |   .1016955   .0815137     1.25   0.212    -.0580685    .26
> 14594
sample_time_0_case |  -.0244098    .112624    -0.22   0.828    -.2451488    .19
> 63292
             _cons |   48.18568   1.683596    28.62   0.000     44.88589    51.
```

```
> 48547
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   9.890442   .8137048      8.417552    11.62106
-----------------------------+------------------------------------------------
               sd(Residual) |   9.602253   .3673726       8.90855    10.34997
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   139.14 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1774.8088
Iteration 1:   log likelihood = -1774.8088

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       457
Group variable: patientnumber                   Number of groups   =       115

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(5)       =      7.60
Log likelihood = -1774.8088                     Prob > chi2        =    0.1799

------------------------------------------------------------------------------
-----
        sf36v2mcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
------------------+-----------------------------------------------------------
-----
             case |    1.31965    2.31575     0.57   0.569    -3.219137    5.8
> 58436
     sample_time_0 |   .1013826   .0815087     1.24   0.214    -.0583715    .26
> 11366
sample_time_0_case |  -.0240969   .1126189    -0.21   0.831    -.2448259    .19
> 66321
              age |   .0506259   .0590085     0.86   0.391    -.0650286    .16
> 62805
        sex_recode |  -4.428856    2.07113    -2.14   0.032    -8.488197   -.36
> 95148
            _cons |   47.18658   3.776181    12.50   0.000      39.7854    54.
> 58775
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |    9.64652   .8017008      8.196514    11.35304
-----------------------------+------------------------------------------------
               sd(Residual) |   9.601994   .3673431      8.908345    10.34965
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   132.37 Prob >= chibar2 = 0.0000

***********************
sf36v2pcs
***********************
```

```
Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1705.5686
Iteration 1:   log likelihood = -1705.5686

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =        457
Group variable: patientnumber                   Number of groups   =        115

                                                Obs per group: min =          3
                                                               avg =        4.0
                                                               max =          4


                                                Wald chi2(2)       =       3.64
Log likelihood = -1705.5686                     Prob > chi2        =     0.1617

------------------------------------------------------------------------------
    sf36v2pcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   1.119246   2.271993     0.49   0.622    -3.333778     5.57227
sample_time_0 |  -.0814429   .0441118    -1.85   0.065    -.1679005    .0050147
        _cons |   37.99033   1.687041    22.52   0.000     34.68379    41.29687
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   11.57619   .8460616      10.03123    13.35909
-----------------------------+------------------------------------------------
                sd(Residual) |    7.52815   .2878513      6.984594    8.114007
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   285.13 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1688.8474
Iteration 1:   log likelihood = -1688.8474

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =        457
Group variable: patientnumber                   Number of groups   =        115

                                                Obs per group: min =          3
                                                               avg =        4.0
                                                               max =          4


                                                Wald chi2(4)       =      42.48
Log likelihood = -1688.8474                     Prob > chi2        =     0.0000

------------------------------------------------------------------------------
    sf36v2pcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   1.772278   1.967787     0.90   0.368    -2.084515     5.62907
sample_time_0 |  -.0817108   .0441043    -1.85   0.064    -.1681538    .0047321
          age |  -.3497509    .057637    -6.07   0.000    -.4627173   -.2367844
   sex_recode |   -.081618   2.022677    -0.04   0.968    -4.045992    3.882756
        _cons |   58.59957   3.625701    16.16   0.000     51.49333    65.70581
------------------------------------------------------------------------------
```

```
------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |    9.83031   .7457977      8.472059    11.40632
-----------------------------+------------------------------------------------
               sd(Residual) |   7.527632   .2877925      6.984184    8.113366
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   219.52 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1703.9445
Iteration 1:   log likelihood = -1703.9445

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       457
Group variable: patientnumber                   Number of groups   =       115

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(3)       =      6.94
Log likelihood = -1703.9445                     Prob > chi2        =    0.0737

------------------------------------------------------------------------------
-----
         sf36v2pcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |  -.4900493   2.441556    -0.20   0.841    -5.275412    4.2
> 95313
     sample_time_0 |  -.1647057   .0636331    -2.59   0.010    -.2894243   -.03
> 99871
sample_time_0_case |   .1588167   .0878919     1.81   0.071    -.0134481    .33
> 10816
             _cons |    38.8252   1.749473    22.19   0.000      35.3963     42
> .2541
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   11.58956   .8460614      10.04448    13.37231
-----------------------------+------------------------------------------------
               sd(Residual) |   7.491048   .2864369      6.950163    8.074026
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   287.68 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood =  -1687.212
Iteration 1:   log likelihood =  -1687.212

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       457
```

```
Group variable: patientnumber                   Number of groups   =       115

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(5)       =     45.76
Log likelihood =  -1687.212                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
         sf36v2pcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |    .158048   2.160677     0.07   0.942    -4.076802    4.3
> 92898
     sample_time_0 |   -.165227   .0636154    -2.60   0.009     -.289911   -.04
> 05431
sample_time_0_case |   .1593381   .0878762     1.81   0.070    -.0128962    .33
> 15723
               age |  -.3500139   .0576644    -6.07   0.000    -.4630341   -.23
> 69937
        sex_recode |  -.0876754   2.023629    -0.04   0.965    -4.053916    3.8
> 78565
             _cons |   59.45536   3.657681    16.25   0.000     52.28644    66.
> 62428
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   9.842745   .7455499      8.484788    11.41804
-----------------------------+------------------------------------------------
                sd(Residual) |   7.490538    .286379       6.94976    8.073395
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   221.79 Prob >= chibar2 = 0.0000

***********************
iesravoidance
***********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1370.0935
Iteration 1:   log likelihood = -1370.0934

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       481
Group variable: patientnumber                   Number of groups   =       121

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(2)       =     35.90
Log likelihood = -1370.0934                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
iesravoidance |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
```

```
          case |   1.879528    .525941     3.57   0.000     .8487021    2.910353
sample_time_0 |   -.102864   .0213128    -4.83   0.000    -.1446362   -.0610917
        _cons |   1.775374   .4261586     4.17   0.000     .9401188     2.61063
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.196619    .251262      1.755454    2.748654
-----------------------------+------------------------------------------------
                sd(Residual) |   3.748045   .1395731      3.484231    4.031834
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    38.19 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1351.5818
Iteration 1:   log likelihood = -1351.5815
Iteration 2:   log likelihood = -1351.5815

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       477
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(4)       =     56.88
Log likelihood = -1351.5815                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
iesravoidance |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   1.939587   .4923354     3.94   0.000     .9746275    2.904547
sample_time_0 |  -.1040412   .0214814    -4.84   0.000     -.146144   -.0619384
          age |    -.06014   .0145947    -4.12   0.000    -.0887451   -.0315349
   sex_recode |    1.20524   .5052558     2.39   0.017     .2149573    2.195524
        _cons |   4.824645   .9436213     5.11   0.000     2.975182    6.674109
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   1.922779   .2525086      1.486433    2.487214
-----------------------------+------------------------------------------------
                sd(Residual) |    3.76227   .1406604       3.49644    4.048312
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    25.51 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1364.6421
Iteration 1:   log likelihood = -1364.6421

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       481
Group variable: patientnumber                   Number of groups   =       121
```

```
                                                  Obs per group: min =         3
                                                                 avg =       4.0
                                                                 max =         4


                                                  Wald chi2(3)       =     47.69
Log likelihood = -1364.6421                       Prob > chi2        =    0.0000

------------------------------------------------------------------------------
     iesravoidance |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
              case |   3.302866   .6778253     4.87   0.000     1.974353    4.6
> 31379
     sample_time_0 |  -.0339131   .0295054    -1.15   0.250    -.0917425    .02
> 39164
sample_time_0_case |  -.1397031   .0419952    -3.33   0.001    -.2220123    -.0
> 57394
             _cons |   1.076878   .4735022     2.27   0.023     .1488311    2.0
> 04926
------------------------------------------------------------------------------


------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |    2.21869   .2481496      1.781943    2.762481
-----------------------------+------------------------------------------------
                sd(Residual) |   3.692244    .137494       3.43236    3.971806
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    40.96 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood =  -1346.308
Iteration 1:   log likelihood = -1346.3077
Iteration 2:   log likelihood = -1346.3077

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       477
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(5)       =     68.30
Log likelihood = -1346.3077                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
     iesravoidance |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
              case |   3.350455   .6544631     5.12   0.000     2.067731    4.6
> 33179
     sample_time_0 |  -.0351081   .0298667    -1.18   0.240    -.0936457    .02
> 34294
sample_time_0_case |   -.138512   .0423357    -3.27   0.001    -.2214884   -.05
> 55355
```

```
                 age |  -.0599447   .0145937    -4.11   0.000    -.0885478   -.03
> 13416
        sex_recode |    1.20411   .5052107     2.38   0.017      .213915    2.1
> 94305
               _cons |   4.115284   .9674323     4.25   0.000     2.219152    6.0
> 11417
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |    1.94914   .2485405      1.518112    2.502547
-----------------------------+------------------------------------------------
                sd(Residual) |   3.707227   .1386056       3.44528     3.98909
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    27.75 Prob >= chibar2 = 0.0000

***********************
iesrhyperarousal
***********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1338.4725
Iteration 1:   log likelihood = -1338.3955
Iteration 2:   log likelihood = -1338.3954

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       481
Group variable: patientnumber                   Number of groups   =       121

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(2)       =     16.46
Log likelihood = -1338.3954                     Prob > chi2        =    0.0003

------------------------------------------------------------------------------
---
iesrhyperarousal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
> al]
-----------------+------------------------------------------------------------
---
            case |   .9056384   .4027913     2.25   0.025      .116182    1.695
> 095
   sample_time_0 |  -.0723138   .0213356    -3.39   0.001    -.1141308   -.0304
> 968
           _cons |    1.20041   .3549939     3.38   0.001     .5046347    1.896
> 185
------------------------------------------------------------------------------
---

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   1.165531    .291863      .7134654    1.904036
-----------------------------+------------------------------------------------
                sd(Residual) |   3.753886   .1397205      3.489789    4.037969
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =     5.07 Prob >= chibar2 = 0.0122
```

```
Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1322.5982
Iteration 1:   log likelihood = -1322.3747
Iteration 2:   log likelihood = -1322.3747

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       477
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(4)       =     31.30
Log likelihood = -1322.3747                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
---
iesrhyperarousal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
> al]
-----------------+------------------------------------------------------------
---
            case |    .949034   .3839817     2.47   0.013     .1964437    1.701
> 624
   sample_time_0 |  -.0732969   .0215069    -3.41   0.001    -.1154497   -.0311
> 442
             age |  -.0422267    .011379    -3.71   0.000    -.0645291   -.0199
> 242
      sex_recode |   .6203698   .3940182     1.57   0.115    -.1518918    1.392
> 631
           _cons |   3.444423    .748553     4.60   0.000     1.977286     4.91
> 156
------------------------------------------------------------------------------
---

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   .9179568   .3410256      .4431967    1.901288
-----------------------------+------------------------------------------------
               sd(Residual) |     3.7686   .1408251      3.502453    4.054971
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =     2.11 Prob >= chibar2 = 0.0732

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1336.6588
Iteration 1:   log likelihood = -1336.5892
Iteration 2:   log likelihood = -1336.5891

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       481
Group variable: patientnumber                   Number of groups   =       121

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4
```

```
                                                  Wald chi2(3)       =     20.20
Log likelihood = -1336.5891                       Prob > chi2        =    0.0002

------------------------------------------------------------------------------
  iesrhyperarousal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
              case |   1.730356   .5912303     2.93   0.003     .5715659    2.8
> 89146
     sample_time_0 |  -.0324165   .0298202    -1.09   0.277    -.0908629    .02
> 60299
sample_time_0_case |   -.080909   .0424643    -1.91   0.057    -.1641375    .00
> 23195
             _cons |   .7958866   .4130484     1.93   0.054    -.0136734    1.6
> 05447
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |    1.17983   .2878247      .7314167    1.903153
-----------------------------+------------------------------------------------
                sd(Residual) |   3.735292   .1390277      3.472504    4.017967
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =     5.39 Prob >= chibar2 = 0.0101

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1320.8581
Iteration 1:   log likelihood = -1320.6529
Iteration 2:   log likelihood = -1320.6529

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       477
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                  Wald chi2(5)       =     34.87
Log likelihood = -1320.6529                       Prob > chi2        =    0.0000

------------------------------------------------------------------------------
  iesrhyperarousal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
              case |   1.760596   .5812034     3.03   0.002     .6214585    2.8
> 99734
     sample_time_0 |  -.0337039   .0301841    -1.12   0.264    -.0928636    .02
> 54558
sample_time_0_case |   -.079633   .0428072    -1.86   0.063    -.1635336    .00
> 42676
               age |  -.0421227   .0113799    -3.70   0.000    -.0644268   -.01
> 98186
        sex_recode |   .6198159   .3940413     1.57   0.116    -.1524908    1.3
> 92123
```

```
               _cons |   3.037058   .7796742     3.90   0.000     1.508924    4.5
> 65191
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |    .936763   .3336626      .4660613    1.882853
-----------------------------+------------------------------------------------
                sd(Residual) |   3.750403   .1401481      3.485536    4.035398
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =     2.31 Prob >= chibar2 = 0.0642

************************
iesrinterruptions
************************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1392.1292
Iteration 1:   log likelihood = -1392.1291

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       481
Group variable: patientnumber                   Number of groups   =       121

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(2)       =     28.52
Log likelihood = -1392.1291                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
----
iesrinterruptions |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inter
> val]
------------------+-----------------------------------------------------------
----
             case |   1.612942   .5385968     2.99   0.003     .5573117    2.66
> 8572
    sample_time_0 |  -.0997053   .0224766    -4.44   0.000    -.1437587    -.05
> 5652
            _cons |   1.880458   .4398088     4.28   0.000     1.018449    2.74
> 2468
------------------------------------------------------------------------------
----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.198956   .2641251      1.737702    2.782644
-----------------------------+------------------------------------------------
                sd(Residual) |   3.952896   .1471986      3.674668    4.252189
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    32.93 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:
```

```
Iteration 0:   log likelihood = -1376.6554
Iteration 1:   log likelihood =  -1376.655
Iteration 2:   log likelihood =  -1376.655

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       477
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(4)       =     41.20
Log likelihood =  -1376.655                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
----
iesrinterruptions |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inter
> val]
------------------+-----------------------------------------------------------
----
             case |   1.660601   .5177713     3.21   0.001     .6457882    2.67
> 5414
    sample_time_0 |  -.1008579   .0226574    -4.45   0.000    -.1452655   -.056
> 4503
              age |  -.0518768   .0153487    -3.38   0.001    -.0819596   -.021
> 7939
       sex_recode |   .8076879   .5313587     1.52   0.129     -.233756    1.84
> 9132
            _cons |   4.622077   .9925272     4.66   0.000     2.676759    6.56
> 7394
------------------------------------------------------------------------------
----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |    2.01639    .266481      1.556259    2.612565
-----------------------------+------------------------------------------------
                sd(Residual) |   3.968245   .1483695      3.687846    4.269964
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    25.06 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood =  -1387.666
Iteration 1:   log likelihood = -1387.6659

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       481
Group variable: patientnumber                   Number of groups   =       121

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(3)       =     38.05
Log likelihood = -1387.6659                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
```

```
 iesrinterruptions |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
             case |   2.973003    .703374     4.23   0.000     1.594415    4.3
> 51591
     sample_time_0 |  -.0338183   .0311971    -1.08   0.278    -.0949635     .0
> 27327
sample_time_0_case |  -.1334933   .0444052    -3.01   0.003    -.2205259   -.04
> 64608
            _cons |    1.21301   .4913554     2.47   0.014     .2499711    2.1
> 76049
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.220348   .2611544      1.763209    2.796007
-----------------------------+------------------------------------------------
                sd(Residual) |    3.90431   .1453914      3.629499    4.199929
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    35.07 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1372.3409
Iteration 1:   log likelihood = -1372.3406
Iteration 2:   log likelihood = -1372.3406

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       477
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(5)       =     50.41
Log likelihood = -1372.3406                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
 iesrinterruptions |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
             case |   3.008312   .6900421     4.36   0.000     1.655854    4.3
> 60769
     sample_time_0 |   -.035003    .031583    -1.11   0.268    -.0969045    .02
> 68985
sample_time_0_case |  -.1323163   .0447689    -2.96   0.003    -.2200618   -.04
> 45708
              age |  -.0516887   .0153519    -3.37   0.001    -.0817779   -.02
> 15995
        sex_recode |    .806707   .5314616     1.52   0.129    -.2349385    1.8
> 48352
            _cons |   3.944308   1.018232     3.87   0.000      1.94861    5.9
> 40007
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
```

```
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.040575   .2629869      1.585079    2.626966
-----------------------------+------------------------------------------------
                sd(Residual) |   3.920335   .1465844      3.643309    4.218424
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    26.91 Prob >= chibar2 = 0.0000

**********************
ies_total
**********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1868.3447
Iteration 1:   log likelihood = -1868.3443
Iteration 2:   log likelihood = -1868.3443

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       481
Group variable: patientnumber                   Number of groups   =       121

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(2)       =     29.87
Log likelihood = -1868.3443                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
    ies_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   4.397852   1.408557     3.12   0.002     1.637131    7.158572
sample_time_0 |  -.2749061   .0610753    -4.50   0.000    -.3946114   -.1552007
        _cons |   4.856276    1.16247     4.18   0.000     2.577878    7.134675
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   5.561398   .7177648      4.318433    7.162122
-----------------------------+------------------------------------------------
                sd(Residual) |   10.74178    .399971      9.985774    11.55502
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    26.71 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1846.9414
Iteration 1:   log likelihood =  -1846.939
Iteration 2:   log likelihood =  -1846.939

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       477
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4
```

```
                                                  Wald chi2(4)       =     47.37
Log likelihood =  -1846.939                       Prob > chi2        =    0.0000

------------------------------------------------------------------------------
    ies_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   4.548884    1.33221     3.41   0.001       1.9378    7.159968
sample_time_0 |  -.2781812   .0615615    -4.52   0.000    -.3988395    -.157523
          age |  -.1542436   .0394892    -3.91   0.000    -.2316411   -.0768461
   sex_recode |   2.633227   1.367143     1.93   0.054    -.0463244    5.312779
        _cons |   12.89119   2.561602     5.03   0.000     7.870543    17.91184
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   4.887904   .7339883      3.641687    6.560586
-----------------------------+------------------------------------------------
               sd(Residual) |   10.78299   .4031074      10.02116    11.60273
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    17.69 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1864.0943
Iteration 1:   log likelihood = -1864.0941
Iteration 2:   log likelihood = -1864.0941

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       481
Group variable: patientnumber                   Number of groups   =       121

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                  Wald chi2(3)       =     38.96
Log likelihood = -1864.0941                       Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
         ies_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   8.005675   1.869929     4.28   0.000     4.340681    11.
> 67067
     sample_time_0 |  -.1001732   .0848207    -1.18   0.238    -.2664187    .06
> 60723
sample_time_0_case |  -.3540856   .1207391    -2.93   0.003    -.5907299   -.11
> 74414
             _cons |   3.085906   1.306293     2.36   0.018     .5256182    5.6
> 46194
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   5.619027    .708911      4.388048    7.195333
```

```
----------------------------+-----------------------------------------------
               sd(Residual) |   10.61657   .3953091      9.869375    11.42033
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    28.51 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1842.8422
Iteration 1:   log likelihood = -1842.8405
Iteration 2:   log likelihood = -1842.8405

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       477
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(5)       =     56.14
Log likelihood = -1842.8405                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
        ies_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
------------------+-----------------------------------------------------------
-----
             case |   8.119422   1.820061     4.46   0.000     4.552168    11.
> 68668
     sample_time_0 |  -.1037705   .0858606    -1.21   0.227    -.2720541    .06
> 45131
sample_time_0_case |   -.350508   .1217189    -2.88   0.004    -.5890726   -.11
> 19434
              age |  -.1537548   .0394927    -3.89   0.000     -.231159   -.07
> 63506
       sex_recode |   2.630557   1.367237     1.92   0.054    -.0491778    5.3
> 10292
            _cons |   11.09638   2.634836     4.21   0.000     5.932197    16.
> 26056
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   4.956145   .7225625      3.724314    6.595409
-----------------------------+------------------------------------------------
               sd(Residual) |    10.6597   .3985116      9.906556    11.47009
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    19.14 Prob >= chibar2 = 0.0000

************************
hadstotal
************************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1726.5316
Iteration 1:   log likelihood = -1726.5316
```

```
Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       482
Group variable: patientnumber                   Number of groups   =       121

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(2)       =      7.40
Log likelihood = -1726.5316                     Prob > chi2        =    0.0248

------------------------------------------------------------------------------
    hadstotal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   -1.16148   1.575716    -0.74   0.461    -4.249828    1.926867
sample_time_0 |  -.1028044   .0393073    -2.62   0.009    -.1798453   -.0257635
        _cons |   12.66438   1.170419    10.82   0.000      10.3704    14.95836
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   7.941439    .611198      6.829487    9.234436
-----------------------------+------------------------------------------------
                sd(Residual) |   6.909192   .2572619      6.422927    7.432271
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   182.20 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1701.6936
Iteration 1:   log likelihood = -1701.6936

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       478
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(4)       =     12.40
Log likelihood = -1701.6936                     Prob > chi2        =    0.0146

------------------------------------------------------------------------------
    hadstotal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |  -1.097413   1.546969    -0.71   0.478    -4.129417     1.93459
sample_time_0 |  -.0901591   .0386274    -2.33   0.020    -.1658674   -.0144508
          age |   .0170933   .0458801     0.37   0.709      -.07283    .1070165
   sex_recode |   3.767328    1.58783     2.37   0.018     .6552379    6.879418
        _cons |    9.70948   2.911524     3.33   0.001     4.002999    15.41596
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   7.758977   .5996749      6.668327     9.02801
-----------------------------+------------------------------------------------
                sd(Residual) |   6.761172   .2527662      6.283474    7.275186
```

```
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   180.63 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1726.0887
Iteration 1:   log likelihood = -1726.0887

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       482
Group variable: patientnumber                   Number of groups   =       121

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(3)       =      8.30
Log likelihood = -1726.0887                     Prob > chi2        =    0.0402

------------------------------------------------------------------------------
-----
         hadstotal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |  -.4082983   1.767359    -0.23   0.817    -3.872259    3.0
> 55662
     sample_time_0 |   -.066262   .0551927    -1.20   0.230    -.1744378    .04
> 19138
sample_time_0_case |  -.0739493    .078518    -0.94   0.346    -.2278418    .07
> 99433
             _cons |   12.29462   1.234558     9.96   0.000     9.874927     14
> .7143
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   7.945449    .611154      6.833529    9.238294
-----------------------------+------------------------------------------------
                sd(Residual) |   6.900219   .2569297      6.414583    7.422623
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   182.79 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1700.8577
Iteration 1:   log likelihood = -1700.8577

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       478
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(5)       =     14.09
```

```
Log likelihood = -1700.8577                     Prob > chi2       =    0.0150

------------------------------------------------------------------------------
         hadstotal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
------------------+-----------------------------------------------------------
              case |  -.0815626   1.735027    -0.05   0.963    -3.482153    3.3
> 19027
     sample_time_0 |  -.0404371   .0544016    -0.74   0.457    -.1470622     .0
> 66188
sample_time_0_case |  -.0997741   .0770674    -1.29   0.195    -.2508236    .05
> 12753
               age |    .017256   .0458941     0.38   0.707    -.0726947    .10
> 72066
        sex_recode |   3.766787   1.588308     2.37   0.018     .6537604    6.8
> 79813
             _cons |   9.197041   2.939017     3.13   0.002     3.436673    14.
> 95741
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   7.765349   .5995344       6.67487    9.033981
-----------------------------+------------------------------------------------
                sd(Residual) |   6.744724   .2521538      6.268184    7.257493
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   181.71 Prob >= chibar2 = 0.0000

***********************
ciq_total
***********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1438.9397
Iteration 1:   log likelihood = -1438.9397

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       482
Group variable: patientnumber                   Number of groups   =       121

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(2)       =      2.96
Log likelihood = -1438.9397                     Prob > chi2        =    0.2274

------------------------------------------------------------------------------
    ciq_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   -1.23659   .9811517    -1.26   0.208    -3.159612    .6864324
sample_time_0 |   .0244224   .0207727     1.18   0.240    -.0162914    .0651361
        _cons |   16.21077   .7168336    22.61   0.000      14.8058    17.61574
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
```

```
patientnum~r: Identity        |
                  sd(_cons) |   5.074748   .3702536      4.398563    5.854882
----------------------------+------------------------------------------------
               sd(Residual) |   3.650959   .1359645      3.393967    3.927411
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   253.02 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1416.8464
Iteration 1:   log likelihood = -1416.8464

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       478
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(4)       =     29.27
Log likelihood = -1416.8464                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
    ciq_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |  -1.066886   .8975183    -1.19   0.235     -2.82599    .6922177
sample_time_0 |   .0260236   .0209226     1.24   0.214    -.0149839    .0670311
          age |  -.1342854   .0266191    -5.04   0.000     -.186458   -.0821129
   sex_recode |   1.555673   .9212293     1.69   0.091    -.2499033    3.361249
        _cons |   23.46091   1.687254    13.90   0.000     20.15395    26.76786
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   4.556441   .3437728      3.930109     5.28259
----------------------------+------------------------------------------------
               sd(Residual) |   3.662042   .1369542      3.403218     3.94055
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   207.78 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1438.8299
Iteration 1:   log likelihood = -1438.8299

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       482
Group variable: patientnumber                   Number of groups   =       121

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(3)       =      3.18
Log likelihood = -1438.8299                     Prob > chi2        =    0.3643

------------------------------------------------------------------------------
```

```
-----
         ciq_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |  -1.434873   1.068642    -1.34   0.179    -3.529373    .65
> 96268
     sample_time_0 |   .0147988   .0291972     0.51   0.612    -.0424267    .07
> 20244
sample_time_0_case |   .0194701   .0415326     0.47   0.639    -.0619323    .10
> 08725
             _cons |   16.30813    .746422    21.85   0.000     14.84517    17.
> 77109
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   5.076223   .3703172      4.399916    5.856484
-----------------------------+------------------------------------------------
                sd(Residual) |   3.649587   .1359151      3.392688    3.925939
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   253.23 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1416.7692
Iteration 1:   log likelihood = -1416.7692

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       478
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(5)       =     29.41
Log likelihood = -1416.7692                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
         ciq_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   -1.23424    .993604    -1.24   0.214    -3.181668     .7
> 13188
     sample_time_0 |   .0178312   .0295316     0.60   0.546    -.0400496    .07
> 57119
sample_time_0_case |   .0164378   .0418339     0.39   0.694    -.0655551    .09
> 84307
               age |  -.1343124   .0266239    -5.04   0.000    -.1864944   -.08
> 21304
        sex_recode |   1.555772   .9213927     1.69   0.091    -.2501249    3.3
> 61668
             _cons |   23.54534    1.70116    13.84   0.000     20.21112    26.
> 87955
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
```

```
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   4.557583   .3438202       3.93116    5.283826
-----------------------------+------------------------------------------------
                sd(Residual) |   3.661035   .1369183      3.402279     3.93947
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   207.93 Prob >= chibar2 = 0.0000

**********************
fim
**********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1574.7851
Iteration 1:   log likelihood = -1574.7851

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       482
Group variable: patientnumber                   Number of groups   =       121

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(2)       =      5.48
Log likelihood = -1574.7851                     Prob > chi2        =    0.0647

------------------------------------------------------------------------------
          fim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   -.431994   1.439643    -0.30   0.764    -3.253643    2.389655
sample_time_0 |  -.0617567   .0266153    -2.32   0.020    -.1139218   -.0095917
        _cons |   121.7938   1.040942   117.00   0.000     119.7536     123.834
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   7.560329   .5392442       6.57398     8.69467
-----------------------------+------------------------------------------------
                sd(Residual) |    4.67757   .1746838      4.347425    5.032785
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   295.24 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1557.9393
Iteration 1:   log likelihood = -1557.9393

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       478
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4
```

```
                                                  Wald chi2(4)       =     17.09
Log likelihood = -1557.9393                       Prob > chi2        =    0.0019

------------------------------------------------------------------------------
          fim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |  -.2556776   1.385284    -0.18   0.854    -2.970784    2.459429
sample_time_0 |   -.061964   .0268308    -2.31   0.021    -.1145513   -.0093767
          age |  -.1283738   .0410873    -3.12   0.002    -.2089034   -.0478443
   sex_recode |  -.9867701   1.421894    -0.69   0.488    -3.773632    1.800092
        _cons |   129.8607   2.597877    49.99   0.000     124.7689    134.9524
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons)  |   7.207379   .5217254      6.254043    8.306037
-----------------------------+------------------------------------------------
               sd(Residual)  |    4.69572   .1761399      4.362877    5.053955
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   270.49 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1574.7851
Iteration 1:   log likelihood = -1574.7851

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       482
Group variable: patientnumber                   Number of groups   =       121

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(3)       =      5.48
Log likelihood = -1574.7851                     Prob > chi2        =    0.1400

------------------------------------------------------------------------------
-----
               fim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |  -.4369989   1.538349    -0.28   0.776    -3.452107    2.5
> 78109
     sample_time_0 |  -.0619997   .0374254    -1.66   0.098    -.1353522    .01
> 13527
sample_time_0_case |   .0004915    .053234     0.01   0.993    -.1038452    .10
> 48282
             _cons |   121.7963   1.074443   113.36   0.000     119.6904    123
> .9021
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons)  |   7.560389   .5392862      6.573967    8.694824
-----------------------------+------------------------------------------------
               sd(Residual)  |   4.677558   .1746874      4.347407    5.032781
------------------------------------------------------------------------------
```

```
LR test vs. linear regression: chibar2(01) =   295.09 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1557.9392
Iteration 1:   log likelihood = -1557.9392

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       478
Group variable: patientnumber                   Number of groups   =       120

                                                Obs per group: min =         3
                                                               avg =       4.0
                                                               max =         4


                                                Wald chi2(5)       =     17.09
Log likelihood = -1557.9392                     Prob > chi2        =    0.0043

------------------------------------------------------------------------------
               fim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
              case |  -.2649294   1.489135    -0.18   0.859     -3.18358    2.6
> 53721
     sample_time_0 |  -.0624171   .0378844    -1.65   0.099    -.1366691     .0
> 11835
sample_time_0_case |   .0009089   .0536616     0.02   0.986    -.1042659    .10
> 60836
               age |  -.1283753   .0410879    -3.12   0.002    -.2089061   -.04
> 78445
         sex_recode |   -.986765   1.421913    -0.69   0.488    -3.773664    1.8
> 00134
             _cons |   129.8653   2.612492    49.71   0.000     124.7449    134
> .9857
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   7.207489   .5217714      6.254073    8.306249
-----------------------------+------------------------------------------------
                sd(Residual) |   4.695697   .1761434      4.362848    5.053939
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   270.36 Prob >= chibar2 = 0.0000

.
.
.   ***************
.   *     ALL CASES       *
.   ***************
.
.
.  use "Marsden_ICU_ALL_data_CLEAN_v2", clear

.   capture drop __0000*

.
.  set more off

.
```

```
.                /* Generate terms for Mixed model analyses      */
.
.   drop if episodenumber<=3
(429 observations deleted)

.   gen case_time=case*sample_time                        /* create interaction
>  term for case and sample time     */

.   gen sample_time_0=sample_time-1                       /* start sample time
> at zero    */

.   gen sample_time_0_case=sample_time_0*case     /* interaction term     */

.
.   gen ln_time=ln(sample_time)                           /* log time (linear m
> ode;)      */

.   gen ln_time_case=ln_time*case                         /* ln(time) interacti
> on */

.
.   gen sample_time_6=sample_time-6                       /* sets 6 month sampl
> ing time to 0      - can be used to compare changes relative to 6 months   */

.   gen case_sample_time_6=sample_time_6*case

.
.
.  foreach var of varlist digitspanadjusted lnagescaledscore stroop_ratio trail
> s_inseconds ///
>                 sf36v2mcs sf36v2pcs  iesravoidance iesrhyperarousal iesrinter
> ruptions ies_total ///
>                 hadstotal ciq_total fim {
  2.                 display ""
  3.                 display "************************"
  4.                 display "`var'"
  5.                 display "************************"
  6.                 xtmixed `var' case sample_time_0 ||  patientnumber:
  7.                 xtmixed `var' case sample_time_0 age sex_recode ||  patien
> tnumber:
  8.                 xtmixed `var' case sample_time_0 sample_time_0_case ||  pa
> tientnumber:
  9.                 xtmixed `var' case sample_time_0 sample_time_0_case age se
> x_recode ||  patientnumber:
 10.                 }

************************
digitspanadjusted
************************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1153.7469
Iteration 1:   log likelihood = -1153.7469

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =        480
Group variable: patientnumber                   Number of groups   =        129

                                                Obs per group: min =          1
                                                               avg =        3.7
                                                               max =          4


                                                Wald chi2(2)       =       3.50
```

```
Log likelihood = -1153.7469                     Prob > chi2        =    0.1740

------------------------------------------------------------------------------
----
digitspanadjusted |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inter
> val]
------------------+-----------------------------------------------------------
----
             case |  -.8350017   .5147925    -1.62   0.105    -1.843976     .17
> 3973
    sample_time_0 |   -.011223   .0117945    -0.95   0.341    -.0343398    .011
> 8938
            _cons |   10.48123   .3857005    27.17   0.000     9.725268    11.2
> 3719
------------------------------------------------------------------------------
----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.707692   .1980045      2.346139    3.124963
-----------------------------+------------------------------------------------
                sd(Residual) |   2.048273   .0774196      1.902018    2.205775
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   223.73 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1143.9688
Iteration 1:   log likelihood = -1143.9688

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       476
Group variable: patientnumber                   Number of groups   =       128

                                                Obs per group: min =         1
                                                               avg =       3.7
                                                               max =         4


                                                Wald chi2(4)       =      4.35
Log likelihood = -1143.9688                     Prob > chi2        =    0.3613

------------------------------------------------------------------------------
----
digitspanadjusted |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inter
> val]
------------------+-----------------------------------------------------------
----
             case |  -.8776711   .5147953    -1.70   0.088    -1.886651    .131
> 3092
    sample_time_0 |  -.0100703   .0118647    -0.85   0.396    -.0333246     .01
> 3184
              age |  -.0090146   .0153872    -0.59   0.558    -.0391729    .021
> 1438
       sex_recode |   .3351473   .5267843     0.64   0.525    -.6973308    1.36
> 7625
            _cons |   10.91742   .9795173    11.15   0.000       8.9976    12.8
> 3724
------------------------------------------------------------------------------
----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
```

```
------------------------------+-----------------------------------------------
patientnum~r: Identity        |
                   sd(_cons) |   2.688682   .1979412      2.327415    3.106025
------------------------------+-----------------------------------------------
                sd(Residual) |   2.051506   .0778794      1.904405    2.209969
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   218.51 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1153.6302
Iteration 1:   log likelihood = -1153.6302

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       480
Group variable: patientnumber                   Number of groups   =       129

                                                Obs per group: min =         1
                                                               avg =       3.7
                                                               max =         4


                                                Wald chi2(3)       =      3.73
Log likelihood = -1153.6302                     Prob > chi2        =    0.2919

------------------------------------------------------------------------------
-----
 digitspanadjusted |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
             case |  -.9463842   .5640612    -1.68   0.093    -2.051924    .15
> 91554
     sample_time_0 |  -.0168608   .0165845    -1.02   0.309    -.0493659    .01
> 56443
sample_time_0_case |    .011398   .0235822     0.48   0.629    -.0348221    .05
> 76182
            _cons |   10.53789   .4031369    26.14   0.000     9.747759    11.
> 32803
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.708011     .19802      2.346428    3.125313
-----------------------------+------------------------------------------------
                sd(Residual) |   2.047554   .0773949      1.901345    2.205005
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   223.86 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1143.8972
Iteration 1:   log likelihood = -1143.8972

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       476
Group variable: patientnumber                   Number of groups   =       128

                                                Obs per group: min =         1
```

```
                                                                avg =       3.7
                                                                max =         4

                                                  Wald chi2(5)       =      4.49
Log likelihood = -1143.8972                       Prob > chi2        =    0.4814

------------------------------------------------------------------------------
 digitspanadjusted |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
              case |  -.9654065   .5646223    -1.71   0.087    -2.072046    .14
> 12329
     sample_time_0 |  -.0145494   .0167562    -0.87   0.385     -.047391    .01
> 82921
sample_time_0_case |   .0089776    .023722     0.38   0.705    -.0375168     .0
> 55472
               age |   -.009022   .0153878    -0.59   0.558    -.0391816    .02
> 11376
        sex_recode |   .3352742   .5268055     0.64   0.524    -.6972457    1.3
> 67794
             _cons |   10.96281   .9868699    11.11   0.000     9.028582    12.
> 89704
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.688906    .197956      2.327612    3.106281
-----------------------------+------------------------------------------------
                sd(Residual) |   2.051054   .0778643      1.903982    2.209486
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   218.59 Prob >= chibar2 = 0.0000

***********************
lnagescaledscore
***********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1130.9135
Iteration 1:   log likelihood = -1130.9135

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       449
Group variable: patientnumber                   Number of groups   =       123

                                                Obs per group: min =         1
                                                               avg =       3.7
                                                               max =         4


                                                Wald chi2(2)       =      4.96
Log likelihood = -1130.9135                     Prob > chi2        =    0.0838

------------------------------------------------------------------------------
---
lnagescaledscore |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
> al]
-----------------+------------------------------------------------------------
---
```

```
            case |  -.8625739   .5742127    -1.50   0.133     -1.98801    .2628
> 622
   sample_time_0 |   .0224689    .013886     1.62   0.106    -.0047472     .049
> 685
           _cons |   8.750552   .4412843    19.83   0.000     7.885651    9.615
> 453
------------------------------------------------------------------------------
---

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |    2.91404   .2207911      2.511896    3.380565
-----------------------------+------------------------------------------------
               sd(Residual) |   2.320554   .0907241       2.14938     2.50536
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   194.57 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1130.5386
Iteration 1:   log likelihood = -1130.5386

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       449
Group variable: patientnumber                   Number of groups   =       123

                                                Obs per group: min =         1
                                                               avg =       3.7
                                                               max =         4


                                                Wald chi2(4)       =      5.73
Log likelihood = -1130.5386                     Prob > chi2        =    0.2205

------------------------------------------------------------------------------
---
lnagescaledscore |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
> al]
-----------------+------------------------------------------------------------
---
            case |  -.8492644   .5744991    -1.48   0.139    -1.975262     .276
> 733
   sample_time_0 |   .0222806   .0138881     1.60   0.109    -.0049396    .0495
> 008
             age |  -.0073659   .0169761    -0.43   0.664    -.0406385    .0259
> 066
      sex_recode |   .4798845   .5853169     0.82   0.412    -.6673155    1.627
> 085
           _cons |   8.974368   1.075672     8.34   0.000      6.86609    11.08
> 265
------------------------------------------------------------------------------
---

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   2.903568   .2202429      2.502455    3.368975
-----------------------------+------------------------------------------------
               sd(Residual) |   2.320536   .0907218      2.149367    2.505338
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   193.33 Prob >= chibar2 = 0.0000
```

```
Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1128.7105
Iteration 1:   log likelihood = -1128.7105

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       449
Group variable: patientnumber                   Number of groups   =       123

                                                Obs per group: min =         1
                                                               avg =       3.7
                                                               max =         4


                                                Wald chi2(3)       =      9.43
Log likelihood = -1128.7105                     Prob > chi2        =    0.0241

------------------------------------------------------------------------------
-----
  lnagescaledscore |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |  -1.425826   .6326032    -2.25   0.024    -2.665706    -.1
> 85947
     sample_time_0 |  -.0071683    .019709    -0.36   0.716    -.0457974    .03
> 14607
sample_time_0_case |   .0581167   .0276079     2.11   0.035     .0040062    .11
> 22271
             _cons |   9.047758   .4624684    19.56   0.000     8.141337     9.
> 95418
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   2.911847   .2201676      2.510779    3.376982
-----------------------------+------------------------------------------------
               sd(Residual) |   2.306323   .0901575      2.136217    2.489974
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   196.76 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1128.3375
Iteration 1:   log likelihood = -1128.3375

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       449
Group variable: patientnumber                   Number of groups   =       123

                                                Obs per group: min =         1
                                                               avg =       3.7
                                                               max =         4


                                                Wald chi2(5)       =     10.19
Log likelihood = -1128.3375                     Prob > chi2        =    0.0699

------------------------------------------------------------------------------
```

```
-----
  lnagescaledscore |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |  -1.412563   .6329302    -2.23   0.026    -2.653083   -.17
> 20421
     sample_time_0 |  -.0073412     .01971    -0.37   0.710     -.045972    .03
> 12897
sample_time_0_case |   .0580904   .0276071     2.10   0.035     .0039814    .11
> 21994
               age |  -.0072686   .0169498    -0.43   0.668    -.0404895    .02
> 59524
        sex_recode |   .4787825   .5843933     0.82   0.413    -.6666073    1.6
> 24172
             _cons |    9.26621   1.082836     8.56   0.000     7.143891    11.
> 38853
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.901451   .2196228      2.501406    3.365474
-----------------------------+------------------------------------------------
                sd(Residual) |   2.306306   .0901554      2.136205    2.489953
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   195.52 Prob >= chibar2 = 0.0000

************************
stroop_ratio
************************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -284.99002
Iteration 1:   log likelihood = -284.99002

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       406
Group variable: patientnumber                   Number of groups   =       110

                                                Obs per group: min =         1
                                                               avg =       3.7
                                                               max =         4


                                                Wald chi2(2)       =      2.53
Log likelihood = -284.99002                     Prob > chi2        =    0.2820

------------------------------------------------------------------------------
 stroop_ratio |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   .0121019   .0858622     0.14   0.888    -.1561849    .1803888
sample_time_0 |   -.003941   .0024895    -1.58   0.113    -.0088203    .0009383
        _cons |   .9889318   .0649509    15.23   0.000     .8616305    1.116233
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   .3965764   .0352342       .333197    .4720117
-----------------------------+------------------------------------------------
```

```
                sd(Residual) |   .3970632    .016392      .3662008    .4305265
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   105.33 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -277.41968
Iteration 1:   log likelihood = -277.41968

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       406
Group variable: patientnumber                   Number of groups   =       110

                                                Obs per group: min =         1
                                                               avg =       3.7
                                                               max =         4


                                                Wald chi2(4)       =     18.68
Log likelihood = -277.41968                     Prob > chi2        =    0.0009

------------------------------------------------------------------------------
 stroop_ratio |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |  -.0188792   .0807454    -0.23   0.815    -.1771373    .1393789
sample_time_0 |  -.0039338    .002486    -1.58   0.114    -.0088063    .0009388
          age |    .009194   .0023849     3.86   0.000     .0045197    .0138684
   sex_recode |   .0350859   .0820457     0.43   0.669    -.1257207    .1958925
        _cons |   .4378974     .15019     2.92   0.004     .1435303    .7322644
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   .3636983   .0335864      .3034838    .4358601
-----------------------------+------------------------------------------------
                sd(Residual) |   .3966676   .0163547       .365874    .4300531
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    88.10 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -284.98432
Iteration 1:   log likelihood = -284.98432

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       406
Group variable: patientnumber                   Number of groups   =       110

                                                Obs per group: min =         1
                                                               avg =       3.7
                                                               max =         4


                                                Wald chi2(3)       =      2.54
Log likelihood = -284.98432                     Prob > chi2        =    0.4675

------------------------------------------------------------------------------
-----
      stroop_ratio |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
```

```
------------------+-------------------------------------------------------------
-----
             case |   .0173466    .098935     0.18   0.861    -.1765624    .21
> 12556
     sample_time_0 |  -.0036895   .0034269    -1.08   0.282    -.0104061    .00
> 30271
sample_time_0_case |  -.0005324   .0049864    -0.11   0.915    -.0103055    .00
> 92407
            _cons |   .9863978   .0691605    14.26   0.000     .8508458     1.
> 12195
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   .3966291    .035241      .3332378    .4720793
-----------------------------+------------------------------------------------
               sd(Residual) |    .397042    .016392      .3661799    .4305053
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   105.34 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -277.41071
Iteration 1:   log likelihood = -277.41071

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       406
Group variable: patientnumber                   Number of groups   =       110

                                                Obs per group: min =         1
                                                               avg =       3.7
                                                               max =         4


                                                Wald chi2(5)       =     18.70
Log likelihood = -277.41071                     Prob > chi2        =    0.0022

------------------------------------------------------------------------------
-----
      stroop_ratio |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
------------------+-------------------------------------------------------------
-----
             case |  -.0123085   .0944853    -0.13   0.896    -.1974963    .17
> 28794
     sample_time_0 |  -.0036185   .0034227    -1.06   0.290    -.0103269    .00
> 30898
sample_time_0_case |   -.000667   .0049785    -0.13   0.893    -.0104246    .00
> 90906
              age |    .009197   .0023852     3.86   0.000      .004522    .01
> 38719
        sex_recode |   .0351185    .082053     0.43   0.669    -.1257025    .19
> 59395
            _cons |   .4345332   .1522809     2.85   0.004     .1360681    .73
> 29983
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
```

```
                 sd(_cons) |   .3637466   .0335912      .3035236    .4359187
----------------------------+-----------------------------------------------
              sd(Residual) |   .3966433   .0163543      .3658505    .4300279
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    88.12 Prob >= chibar2 = 0.0000

**********************
trails_inseconds
**********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2336.5537
Iteration 1:   log likelihood = -2336.5537

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       409
Group variable: patientnumber                   Number of groups   =       112

                                                Obs per group: min =         1
                                                               avg =       3.7
                                                               max =         4


                                                Wald chi2(2)       =      4.83
Log likelihood = -2336.5537                     Prob > chi2        =    0.0893

------------------------------------------------------------------------------
---
trails_inseconds |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
> al]
-----------------+------------------------------------------------------------
---
            case |   22.13969   15.16477     1.46   0.144    -7.582709    51.86
> 208
   sample_time_0 |   .5832612   .3508025     1.66   0.096     -.104299    1.270
> 821
           _cons |   130.3928   11.17943    11.66   0.000     108.4815    152.3
> 041
------------------------------------------------------------------------------
---

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                 sd(_cons) |   74.22288   5.906877      63.50335    86.75189
-----------------------------+------------------------------------------------
              sd(Residual) |   55.84376   2.303646       51.5064    60.54637
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   185.71 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2324.6956
Iteration 1:   log likelihood = -2324.6956

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       409
Group variable: patientnumber                   Number of groups   =       112

                                                Obs per group: min =         1
```

```
                                                                avg =       3.7
                                                                max =         4

                                                  Wald chi2(4)       =     31.61
Log likelihood = -2324.6956                       Prob > chi2        =    0.0000

------------------------------------------------------------------------------
trails_inseconds |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
> al]
-----------------+------------------------------------------------------------
            case |   15.24345   13.69828     1.11   0.266    -11.60469    42.09
> 159
   sample_time_0 |   .5988361   .3506711     1.71   0.088    -.0884666    1.286
> 139
             age |     2.0679   .4028395     5.13   0.000     1.278349    2.857
> 451
      sex_recode |  -12.24019   13.89974    -0.88   0.379    -39.48318    15.00
> 279
           _cons |   14.33476   25.54187     0.56   0.575    -35.72638     64.3
> 959
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   65.39863   5.421774      55.59057    76.93718
-----------------------------+------------------------------------------------
                sd(Residual) |    55.8524   2.303259      51.51571    60.55416
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   148.09 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2336.2664
Iteration 1:   log likelihood = -2336.2664

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       409
Group variable: patientnumber                   Number of groups   =       112

                                                Obs per group: min =         1
                                                               avg =       3.7
                                                               max =         4


                                                  Wald chi2(3)       =      5.41
Log likelihood = -2336.2664                       Prob > chi2        =    0.1440

------------------------------------------------------------------------------
-----
  trails_inseconds |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   16.97389   16.61925     1.02   0.307    -15.59925    49.
> 54704
     sample_time_0 |   .3300174   .4841838     0.68   0.495    -.6189653
> 1.279
sample_time_0_case |   .5322048   .7018383     0.76   0.448     -.843373    1.9
> 07783
```

```
               _cons |   132.9299    11.6647    11.40   0.000     110.0675    155
> .7923
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   74.20187   5.903441      63.48834     86.7233
-----------------------------+------------------------------------------------
                sd(Residual) |   55.79739   2.301623      51.46383    60.49586
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   185.95 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2324.4334
Iteration 1:   log likelihood = -2324.4334

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       409
Group variable: patientnumber                   Number of groups   =       112

                                                Obs per group: min =         1
                                                               avg =       3.7
                                                               max =         4


                                                Wald chi2(5)       =     32.15
Log likelihood = -2324.4334                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
  trails_inseconds |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   10.30985   15.29555     0.67   0.500    -19.66888    40.
> 28858
     sample_time_0 |   .3569069   .4840957     0.74   0.461    -.5919033    1.3
> 05717
sample_time_0_case |   .5080547   .7013225     0.72   0.469    -.8665122    1.8
> 82621
               age |   2.065307    .402793     5.13   0.000     1.275848    2.8
> 54767
        sex_recode |  -12.22577   13.89758    -0.88   0.379    -39.46452    15.
> 01298
             _cons |   16.90774    25.7836     0.66   0.512    -33.62719    67.
> 44266
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   65.39758   5.419672      55.59303    76.93129
-----------------------------+------------------------------------------------
                sd(Residual) |   55.80646   2.301305      51.47345    60.50422
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   148.34 Prob >= chibar2 = 0.0000

***********************
sf36v2mcs
```

Appendix 8 1_ICU_mixed_model_regression_THESIS_TECH
****

```
Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1874.8926
Iteration 1:   log likelihood = -1874.8926

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =        479
Group variable: patientnumber                   Number of groups   =        127

                                                Obs per group: min =          1
                                                               avg =        3.8
                                                               max =          4


                                                Wald chi2(2)       =       2.82
Log likelihood = -1874.8926                     Prob > chi2        =     0.2436

------------------------------------------------------------------------------
    sf36v2mcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |  -.5357125   2.056316    -0.26   0.794    -4.566018    3.494593
sample_time_0 |   .0941027   .0567383     1.66   0.097    -.0171023    .2053078
        _cons |   48.24276   1.598177    30.19   0.000     45.11039    51.37513
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons)  |   10.34722   .8284659       8.84445    12.10532
-----------------------------+------------------------------------------------
               sd(Residual)  |   9.755631   .3693739      9.057882    10.50713
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   143.89 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1873.1938
Iteration 1:   log likelihood = -1873.1938

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =        479
Group variable: patientnumber                   Number of groups   =        127

                                                Obs per group: min =          1
                                                               avg =        3.8
                                                               max =          4


                                                Wald chi2(4)       =       6.28
Log likelihood = -1873.1938                     Prob > chi2        =     0.1789

------------------------------------------------------------------------------
    sf36v2mcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |  -.5401894   2.032297    -0.27   0.790    -4.523418    3.443039
sample_time_0 |   .0947141   .0567332     1.67   0.095    -.0164809    .2059091
          age |   .0345554   .0599717     0.58   0.564    -.0829869    .1520977
   sex_recode |   -3.82433   2.076599    -1.84   0.066     -7.89439    .2457291
        _cons |   47.86945   3.853315    12.42   0.000     40.31709    55.42181
```

```
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |    10.1797   .8202924      8.692493    11.92136
-----------------------------+------------------------------------------------
                sd(Residual) |   9.754481   .3692832        9.0569    10.50579
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   139.13 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1874.8905
Iteration 1:   log likelihood = -1874.8905

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       479
Group variable: patientnumber                   Number of groups   =       127

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(3)       =      2.83
Log likelihood = -1874.8905                     Prob > chi2        =    0.4188

------------------------------------------------------------------------------
-----
         sf36v2mcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |  -.6078963   2.331431    -0.26   0.794    -5.177417    3.9
> 61625
     sample_time_0 |   .0901675   .0824923     1.09   0.274    -.0715144    .25
> 18494
sample_time_0_case |    .007476   .1136452     0.07   0.948    -.2152645    .23
> 02166
             _cons |   48.28125   1.702047    28.37   0.000      44.9453     51
> .6172
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   10.34557   .8287406      8.842356    12.10432
-----------------------------+------------------------------------------------
                sd(Residual) |   9.755995   .3694368       9.05813    10.50763
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   143.74 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1873.1912
Iteration 1:   log likelihood = -1873.1912

Computing standard errors:
```

```
Mixed-effects ML regression                     Number of obs      =       479
Group variable: patientnumber                   Number of groups   =       127

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(5)       =      6.29
Log likelihood = -1873.1912                     Prob > chi2        =    0.2790

------------------------------------------------------------------------------
        sf36v2mcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
------------------+-----------------------------------------------------------
             case |  -.6185518   2.310124    -0.27   0.789    -5.146311    3.9
> 09208
     sample_time_0 |   .0904416   .0824841     1.10   0.273    -.0712241    .25
> 21074
sample_time_0_case |   .0081162   .1136204     0.07   0.943    -.2145757    .23
> 08082
              age |   .0345427   .0599639     0.58   0.565    -.0829843    .15
> 20697
        sex_recode |  -3.824332   2.076321    -1.84   0.065    -7.893848    .24
> 51829
            _cons |   47.91201   3.898808    12.29   0.000     40.27049    55.
> 55354
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   10.17789   .8205698      8.690238    11.92022
-----------------------------+------------------------------------------------
                sd(Residual) |   9.754879   .3693489      9.057177    10.50633
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   138.97 Prob >= chibar2 = 0.0000

************************
sf36v2pcs
************************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1792.3313
Iteration 1:   log likelihood = -1792.3313

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       479
Group variable: patientnumber                   Number of groups   =       127

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(2)       =      3.02
Log likelihood = -1792.3313                     Prob > chi2        =    0.2205

------------------------------------------------------------------------------
    sf36v2pcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
        case |  -.1442684   2.187104    -0.07   0.947    -4.430913    4.142376
sample_time_0 |  -.0764781   .0440069    -1.74   0.082      -.16273    .0097737
       _cons |   37.73532   1.653088    22.83   0.000     34.49533    40.97531
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   11.61914   .8160963      10.12483    13.33399
-----------------------------+------------------------------------------------
               sd(Residual) |     7.5499   .2842922      7.012762    8.128179
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   293.45 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1774.9695
Iteration 1:   log likelihood = -1774.9695

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       479
Group variable: patientnumber                   Number of groups   =       127

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(4)       =     42.82
Log likelihood = -1774.9695                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
    sf36v2pcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   .5407929   1.908518     0.28   0.777    -3.199833    4.281419
sample_time_0 |  -.0777901   .0439823    -1.77   0.077    -.1639938    .0084135
          age |  -.3488518   .0563449    -6.19   0.000    -.4592859   -.2384178
   sex_recode |  -.1443047   1.948887    -0.07   0.941    -3.964054    3.675444
        _cons |   58.58396   3.610674    16.23   0.000     51.50717    65.66075
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |    9.93615   .7260627      8.610303    11.46616
-----------------------------+------------------------------------------------
               sd(Residual) |   7.551195   .2843698      7.013913    8.129635
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   227.23 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1790.6841
Iteration 1:   log likelihood = -1790.6841

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       479
Group variable: patientnumber                   Number of groups   =       127
```

```
                                                  Obs per group: min =         1
                                                                 avg =       3.8
                                                                 max =         4

                                                  Wald chi2(3)       =      6.36
Log likelihood = -1790.6841                       Prob > chi2        =    0.0954

------------------------------------------------------------------------------
         sf36v2pcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
              case |   -1.68026   2.341397    -0.72   0.473    -6.269315    2.9
> 08794
     sample_time_0 |  -.1605269   .0636727    -2.52   0.012    -.2853232   -.03
> 57307
sample_time_0_case |   .1596167   .0877711     1.82   0.069    -.0124115     .3
> 31645
             _cons |   38.55505   1.710807    22.54   0.000     35.20193    41.
> 90817
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   11.60606   .8142623        10.115    13.31691
-----------------------------+------------------------------------------------
                sd(Residual) |   7.518586   .2830689      6.983756    8.094373
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   295.43 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood =  -1773.237
Iteration 1:   log likelihood =  -1773.237

Computing standard errors:

Mixed-effects ML regression                       Number of obs      =       479
Group variable: patientnumber                     Number of groups   =       127

                                                  Obs per group: min =         1
                                                                 avg =       3.8
                                                                 max =         4

                                                  Wald chi2(5)       =     46.48
Log likelihood =  -1773.237                       Prob > chi2        =    0.0000

------------------------------------------------------------------------------
         sf36v2pcs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
              case |  -1.036343   2.083814    -0.50   0.619    -5.120545    3.0
> 47858
     sample_time_0 |  -.1639574   .0636483    -2.58   0.010    -.2887058    -.0
> 39209
sample_time_0_case |   .1635878    .087711     1.87   0.062    -.0083226    .33
> 54982
               age |  -.3491189   .0562341    -6.21   0.000    -.4593358    -.2
```

```
> 38902
        sex_recode |  -.1446444   1.945027    -0.07   0.941    -3.956827    3.6
> 67538
             _cons |   59.44162   3.632667    16.36   0.000     52.32172    66.
> 56151
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   9.920035   .7238366      8.598119    11.44519
-----------------------------+------------------------------------------------
                sd(Residual) |   7.519503   .2831105      6.984596    8.095376
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   228.89 Prob >= chibar2 = 0.0000

**********************
iesravoidance
**********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1445.3307
Iteration 1:   log likelihood = -1445.3306

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       503
Group variable: patientnumber                   Number of groups   =       133

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(2)       =     38.11
Log likelihood = -1445.3306                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
iesravoidance |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |    2.05104   .5261872     3.90   0.000     1.019732    3.082348
sample_time_0 |  -.1022694   .0215525    -4.75   0.000    -.1445115   -.0600272
        _cons |   1.735924   .4302864     4.03   0.000     .8925779     2.57927
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.283873   .2618185      1.824282    2.859249
-----------------------------+------------------------------------------------
                sd(Residual) |   3.829383   .1418102      3.561287    4.117661
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    37.91 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1426.0634
Iteration 1:   log likelihood = -1426.0622
Iteration 2:   log likelihood = -1426.0622
```

```
Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       499
Group variable: patientnumber                   Number of groups   =       132

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(4)       =     60.74
Log likelihood = -1426.0622                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
iesravoidance |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   2.101541   .4921218     4.27   0.000        1.137    3.066082
sample_time_0 |  -.1050767   .0217148    -4.84   0.000    -.1476371   -.0625164
          age |  -.0627491    .014699    -4.27   0.000    -.0915586   -.0339396
   sex_recode |   1.208888    .503658     2.40   0.016     .2217364     2.19604
        _cons |   4.990308    .962919     5.18   0.000     3.103022    6.877595
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   1.994183   .2628381      1.540191    2.581995
-----------------------------+------------------------------------------------
                sd(Residual) |   3.845094    .142807      3.575141    4.135429
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    25.28 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1440.0743
Iteration 1:   log likelihood = -1440.0742

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       503
Group variable: patientnumber                   Number of groups   =       133

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(3)       =     49.45
Log likelihood = -1440.0742                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
     iesravoidance |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   3.414385   .6708779     5.09   0.000     2.099489    4.7
> 29282
     sample_time_0 |  -.0330577   .0300284    -1.10   0.271    -.0919123    .02
> 57968
sample_time_0_case |  -.1387897   .0425265    -3.26   0.001    -.2221402   -.05
> 54392
             _cons |   1.047612   .4774731     2.19   0.028      .111782    1.9
> 83442
------------------------------------------------------------------------------
```

```
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.301217   .2583302      1.846729    2.867555
-----------------------------+------------------------------------------------
                sd(Residual) |   3.777433   .1398199      3.513096    4.061661
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    40.35 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1420.9432
Iteration 1:   log likelihood = -1420.9424
Iteration 2:   log likelihood = -1420.9424

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       499
Group variable: patientnumber                   Number of groups   =       132

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(5)       =     71.87
Log likelihood = -1420.9424                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
     iesravoidance |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   3.459505   .6472128     5.35   0.000     2.190991    4.7
> 28019
     sample_time_0 |   -.035618   .0303913    -1.17   0.241    -.0951839     .0
> 23948
sample_time_0_case |  -.1379992    .042846    -3.22   0.001    -.2219758   -.05
> 40225
               age |   -.062621   .0146844    -4.26   0.000    -.0914018   -.03
> 38401
        sex_recode |   1.207286   .5031098     2.40   0.016     .2212085    2.1
> 93363
             _cons |   4.292441   .9855335     4.36   0.000     2.360831    6.2
> 24051
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   2.015767   .2585723      1.567662    2.591959
-----------------------------+------------------------------------------------
                sd(Residual) |   3.793546   .1408326      3.527323    4.079864
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    27.24 Prob >= chibar2 = 0.0000

**********************
iesrhyperarousal
**********************
```

```
Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1401.8389
Iteration 1:   log likelihood = -1401.7193
Iteration 2:   log likelihood =  -1401.719
Iteration 3:   log likelihood =  -1401.719

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =        503
Group variable: patientnumber                   Number of groups   =        133

                                                Obs per group: min =          1
                                                               avg =        3.8
                                                               max =          4


                                                Wald chi2(2)       =      17.47
Log likelihood =  -1401.719                     Prob > chi2        =     0.0002

------------------------------------------------------------------------------
---
iesrhyperarousal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
> al]
-----------------+------------------------------------------------------------
---
            case |   .9228419   .3928168     2.35   0.019     .1529352    1.692
> 749
   sample_time_0 |  -.0726438   .0211618    -3.43   0.001    -.1141202   -.0311
> 674
           _cons |   1.213982   .3490778     3.48   0.001     .5298024    1.898
> 162
------------------------------------------------------------------------------
---

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   1.152255   .2964354       .695927    1.907802
-----------------------------+------------------------------------------------
                sd(Residual) |    3.77351   .1384328      3.511712    4.054826
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =     4.77 Prob >= chibar2 = 0.0145

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1385.4541
Iteration 1:   log likelihood = -1385.1451
Iteration 2:   log likelihood = -1385.1451

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =        499
Group variable: patientnumber                   Number of groups   =        132

                                                Obs per group: min =          1
                                                               avg =        3.8
                                                               max =          4


                                                Wald chi2(4)       =      33.45
Log likelihood = -1385.1451                     Prob > chi2        =     0.0000
```

```
------------------------------------------------------------------------------
iesrhyperarousal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
> al]
-----------------+------------------------------------------------------------
            case |   .9632926   .3745488     2.57   0.010     .2291904    1.697
> 395
   sample_time_0 |  -.0750746   .0213108    -3.52   0.000     -.116843   -.0333
> 062
             age |  -.0427285   .0111736    -3.82   0.000    -.0646283   -.0208
> 286
      sex_recode |   .6488599   .3836091     1.69   0.091        -.103     1.40
> 072
           _cons |   3.508617   .7439006     4.72   0.000     2.050599    4.966
> 636
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   .8978469    .349028      .4190899    1.923523
-----------------------------+------------------------------------------------
                sd(Residual) |   3.786662   .1392866      3.523274    4.069741
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =     1.91 Prob >= chibar2 = 0.0834

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1400.0832
Iteration 1:   log likelihood = -1399.9741
Iteration 2:   log likelihood =  -1399.974
Iteration 3:   log likelihood =  -1399.974

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       503
Group variable: patientnumber                   Number of groups   =       133

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(3)       =     21.09
Log likelihood =  -1399.974                     Prob > chi2        =    0.0001

------------------------------------------------------------------------------
-----
  iesrhyperarousal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   1.703053   .5725407     2.97   0.003     .5808936    2.8
> 25212
     sample_time_0 |  -.0332245   .0297789    -1.12   0.265      -.09159     .0
> 25141
sample_time_0_case |  -.0788883   .0421279    -1.87   0.061    -.1614574    .00
> 36809
             _cons |   .8203515   .4069727     2.02   0.044     .0226997    1.6
> 18003
------------------------------------------------------------------------------
-----
```

```
------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons)  |   1.167426   .2921558      .7148427    1.906549
-----------------------------+------------------------------------------------
               sd(Residual)  |   3.755808   .1377794      3.495245    4.035796
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =     5.07 Prob >= chibar2 = 0.0121

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1383.7649
Iteration 1:   log likelihood = -1383.4794
Iteration 2:   log likelihood = -1383.4794

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       499
Group variable: patientnumber                   Number of groups   =       132

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(5)       =     36.90
Log likelihood = -1383.4794                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
  iesrhyperarousal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   1.731847   .5627911     3.08   0.002     .6287968    2.8
> 34897
     sample_time_0 |  -.0359477   .0301193    -1.19   0.233    -.0949805     .0
> 23085
sample_time_0_case |   -.077607   .0424203    -1.83   0.067    -.1607493    .00
> 55352
               age |  -.0426494   .0111772    -3.82   0.000    -.0645563   -.02
> 07424
        sex_recode |   .6482973   .3837156     1.69   0.091    -.1037715    1.4
> 00366
             _cons |   3.113322   .7745966     4.02   0.000      1.59514    4.6
> 31503
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons)  |   .9178921   .3409877      .4431786    1.901098
-----------------------------+------------------------------------------------
               sd(Residual)  |     3.7693   .1386493      3.507117    4.051083
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =     2.11 Prob >= chibar2 = 0.0732

************************
iesrinterruptions
************************

Performing EM optimization:
```

```
Performing gradient-based optimization:

Iteration 0:   log likelihood = -1468.1655
Iteration 1:   log likelihood = -1468.1651
Iteration 2:   log likelihood = -1468.1651

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       503
Group variable: patientnumber                   Number of groups   =       133

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(2)       =     29.71
Log likelihood = -1468.1651                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
----
iesrinterruptions |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inter
> val]
------------------+-----------------------------------------------------------
----
             case |   1.735492   .5423174     3.20   0.001     .6725694    2.79
> 8415
    sample_time_0 |  -.0992489   .0226691    -4.38   0.000    -.1436795   -.054
> 8184
            _cons |   1.839141   .4457238     4.13   0.000     .9655387    2.71
> 2744
------------------------------------------------------------------------------
----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   2.317104   .2812657      1.826506    2.939477
-----------------------------+------------------------------------------------
               sd(Residual) |    4.02875    .150227      3.744813    4.334216
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    32.80 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1451.2891
Iteration 1:   log likelihood = -1451.2875
Iteration 2:   log likelihood = -1451.2875

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       499
Group variable: patientnumber                   Number of groups   =       132

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(4)       =     45.35
Log likelihood = -1451.2875                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
----
iesrinterruptions |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inter
```

```
> val]
-----------------+----------------------------------------------------------------
----
            case |   1.781996   .5183817     3.44   0.001     .7659867    2.79
> 8005
   sample_time_0 |  -.1017881   .0228298    -4.46   0.000    -.1465338   -.057
> 0425
             age |  -.0567757   .0154835    -3.67   0.000    -.0871227   -.026
> 4287
      sex_recode |   1.001513   .5305304     1.89   0.059    -.0383078    2.04
> 1333
           _cons |   4.828345   1.014216     4.76   0.000     2.840518    6.81
> 6172
------------------------------------------------------------------------------
----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   2.104542    .281835      1.618701    2.736203
-----------------------------+------------------------------------------------
               sd(Residual) |   4.042429   .1510232      3.757006    4.349536
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    24.69 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1463.7908
Iteration 1:   log likelihood = -1463.7905
Iteration 2:   log likelihood = -1463.7905

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       503
Group variable: patientnumber                   Number of groups   =       133

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(3)       =     39.04
Log likelihood = -1463.7905                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
 iesrinterruptions |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
             case |    3.04543   .6982112     4.36   0.000     1.676961    4.4
> 13899
     sample_time_0 |  -.0327648   .0316465    -1.04   0.301    -.0947907    .02
> 92612
sample_time_0_case |  -.1333154   .0448146    -2.97   0.003    -.2211503   -.04
> 54805
            _cons |   1.177782   .4968788     2.37   0.018     .2039172    2.1
> 51646
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
```

```
                 sd(_cons) |   2.338375   .2780809      1.852204    2.952158
----------------------------+-----------------------------------------------
              sd(Residual) |   3.981653   .1484446      3.701083    4.283493
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    34.83 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood =  -1447.038
Iteration 1:   log likelihood = -1447.0368
Iteration 2:   log likelihood = -1447.0368

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       499
Group variable: patientnumber                   Number of groups   =       132

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(5)       =     54.44
Log likelihood = -1447.0368                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
 iesrinterruptions |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
             case |   3.083891   .6822248     4.52   0.000     1.746755    4.4
> 21027
     sample_time_0 |  -.0351901   .0320128    -1.10   0.272    -.0979339    .02
> 75538
sample_time_0_case |  -.1323404   .0451321    -2.93   0.003    -.2207978    -.0
> 43883
              age |  -.0566799   .0154872    -3.66   0.000    -.0870342   -.02
> 63255
        sex_recode |   1.001844   .5306108     1.89   0.059    -.0381339    2.0
> 41822
            _cons |   4.160013   1.039292     4.00   0.000     2.123038    6.1
> 96989
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                 sd(_cons) |   2.128436   .2781076      1.647556    2.749673
-----------------------------+------------------------------------------------
              sd(Residual) |   3.995895   .1492656      3.713792    4.299426
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    26.43 Prob >= chibar2 = 0.0000

************************
ies_total
************************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1963.3706
Iteration 1:   log likelihood = -1963.3696
```

```
Iteration 2:   log likelihood = -1963.3696

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       503
Group variable: patientnumber                   Number of groups   =       133

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(2)       =     31.54
Log likelihood = -1963.3696                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
    ies_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   4.703611   1.400139     3.36   0.001     1.959389    7.447833
sample_time_0 |  -.2741289   .0614108    -4.46   0.000    -.3944919   -.1537659
        _cons |   4.789884   1.165387     4.11   0.000     2.505767    7.074002
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |    5.73463   .7469865      4.442514     7.40256
-----------------------------+------------------------------------------------
                sd(Residual) |   10.92039   .4045954      10.15551    11.74288
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    26.26 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1940.8859
Iteration 1:   log likelihood = -1940.8797
Iteration 2:   log likelihood = -1940.8797

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       499
Group variable: patientnumber                   Number of groups   =       132

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(4)       =     51.39
Log likelihood = -1940.8797                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
    ies_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |   4.839384   1.320091     3.67   0.000     2.252053    7.426716
sample_time_0 |  -.2817998   .0618496    -4.56   0.000    -.4030229   -.1605768
          age |  -.1620623   .0394187    -4.11   0.000    -.2393216    -.084803
    sex_recode |   2.853811   1.351283     2.11   0.035     .2053447    5.502278
        _cons |   13.31922   2.590258     5.14   0.000     8.242404    18.39603
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
```

```
                 sd(_cons) |   5.002705   .7616759      3.711992    6.742217
----------------------------+-----------------------------------------------
              sd(Residual) |   10.96026   .4069526      10.19098    11.78761
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    17.18 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1959.2274
Iteration 1:   log likelihood = -1959.2266
Iteration 2:   log likelihood = -1959.2266

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       503
Group variable: patientnumber                   Number of groups   =       133

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(3)       =     40.38
Log likelihood = -1959.2266                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
         ies_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   8.162645   1.839568     4.44   0.000     4.557159    11.
> 76813
     sample_time_0 |  -.0987157   .0858133    -1.15   0.250    -.2669067    .06
> 94753
sample_time_0_case |  -.3515974   .1214973    -2.89   0.004    -.5897277   -.11
> 34671
             _cons |   3.043737   1.308823     2.33   0.020     .4784909    5.6
> 08983
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                 sd(_cons) |   5.788449   .7375448      4.509257    7.430525
-----------------------------+------------------------------------------------
              sd(Residual) |   10.80121   .4000876      10.04484    11.61453
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    27.92 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood =  -1936.868
Iteration 1:   log likelihood = -1936.8634
Iteration 2:   log likelihood = -1936.8634

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       499
Group variable: patientnumber                   Number of groups   =       132

                                                Obs per group: min =         1
```

```
                                                                avg =       3.8
                                                                max =         4

                                                  Wald chi2(5)       =     60.00
Log likelihood = -1936.8634                       Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
         ies_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   8.274726   1.786735     4.63   0.000      4.77279    11.
> 77666
     sample_time_0 |  -.1062585   .0868146    -1.22   0.221     -.276412    .06
> 38949
sample_time_0_case |  -.3486396   .1223629    -2.85   0.004    -.5884665   -.10
> 88128
               age |  -.1617559   .0394136    -4.10   0.000    -.2390051   -.08
> 45067
        sex_recode |   2.852013   1.350994     2.11   0.035     .2041131    5.4
> 99912
             _cons |   11.55396   2.661677     4.34   0.000     6.337167    16.
> 77075
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |    5.06712   .7496578      3.791663    6.771621
-----------------------------+------------------------------------------------
                sd(Residual) |   10.84247   .4025086      10.08158    11.66078
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    18.52 Prob >= chibar2 = 0.0000

***********************
hadstotal
***********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1821.0635
Iteration 1:   log likelihood = -1821.0635

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       504
Group variable: patientnumber                   Number of groups   =       133

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(2)       =      6.84
Log likelihood = -1821.0635                     Prob > chi2        =    0.0328

------------------------------------------------------------------------------
    hadstotal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |  -.0790379   1.583729    -0.05   0.960    -3.183089    3.025013
sample_time_0 |  -.1043337   .0399036    -2.61   0.009    -.1825432   -.0261242
        _cons |   12.70891   1.194659    10.64   0.000     10.36742     15.0504
```

```
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   8.334093   .6236234      7.197217    9.650549
-----------------------------+------------------------------------------------
                sd(Residual) |   7.057757   .2600757       6.56599    7.586355
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   186.64 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1796.6032
Iteration 1:   log likelihood = -1796.6032

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       500
Group variable: patientnumber                   Number of groups   =       132

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(4)       =     11.76
Log likelihood = -1796.6032                     Prob > chi2        =    0.0192

------------------------------------------------------------------------------
    hadstotal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |  -.0352176   1.561425    -0.02   0.982    -3.095555     3.02512
sample_time_0 |  -.0914843    .039261    -2.33   0.020    -.1684344   -.0145343
          age |   .0330295   .0467304     0.71   0.480    -.0585605    .1246194
   sex_recode |   3.552879   1.595366     2.23   0.026     .4260192    6.679739
        _cons |   8.903273   3.014082     2.95   0.003     2.995781    14.81076
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   8.181972    .613292      7.064069    9.476787
-----------------------------+------------------------------------------------
                sd(Residual) |    6.91446   .2557081      6.431014    7.434249
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   186.49 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1820.4421
Iteration 1:   log likelihood = -1820.4421

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       504
Group variable: patientnumber                   Number of groups   =       133

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4
```

```
                                                  Wald chi2(3)       =      8.10
Log likelihood = -1820.4421                       Prob > chi2        =    0.0440

------------------------------------------------------------------------------
         hadstotal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
              case |   .7834382   1.760458     0.45   0.656    -2.666996    4.2
> 33872
     sample_time_0 |  -.0601402   .0561997    -1.07   0.285    -.1702896    .05
> 00093
sample_time_0_case |  -.0889193   .0797144    -1.12   0.265    -.2451566     .0
> 67318
             _cons |   12.27217   1.255647     9.77   0.000     9.811144    14.
> 73319
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   8.322223     .62251      7.187348    9.636293
-----------------------------+------------------------------------------------
                sd(Residual) |   7.049443   .2597313      6.558325    7.577338
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   186.92 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1795.5418
Iteration 1:   log likelihood = -1795.5418

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =        500
Group variable: patientnumber                   Number of groups   =        132

                                                Obs per group: min =          1
                                                               avg =        3.8
                                                               max =          4


                                                  Wald chi2(5)       =     13.94
Log likelihood = -1795.5418                       Prob > chi2        =    0.0160

------------------------------------------------------------------------------
         hadstotal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
              case |   1.072995   1.733875     0.62   0.536    -2.325338    4.4
> 71329
     sample_time_0 |  -.0342105   .0554633    -0.62   0.537    -.1429165    .07
> 44956
sample_time_0_case |  -.1142611   .0783388    -1.46   0.145    -.2678024    .03
> 92801
               age |   .0331613   .0466457     0.71   0.477    -.0582626    .12
> 45853
        sex_recode |    3.54868   1.592471     2.23   0.026     .4274944    6.6
> 69865
             _cons |    8.33155   3.034009     2.75   0.006     2.385001     14
```

```
> .2781
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   8.167778   .6117321      7.052653     9.45922
-----------------------------+------------------------------------------------
                sd(Residual) |   6.899045   .2550847      6.416774    7.417563
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   187.15 Prob >= chibar2 = 0.0000

***********************
ciq_total
***********************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1516.1372
Iteration 1:   log likelihood = -1516.1372

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       505
Group variable: patientnumber                   Number of groups   =       133

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(2)       =      4.92
Log likelihood = -1516.1372                     Prob > chi2        =    0.0854

------------------------------------------------------------------------------
    ciq_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |  -1.718388   .9876585    -1.74   0.082    -3.654163    .2173869
sample_time_0 |    .028108   .0206354     1.36   0.173    -.0123367    .0685527
        _cons |   15.93634   .7332184    21.73   0.000     14.49926    17.37342
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   5.358471   .3764615      4.669167    6.149536
-----------------------------+------------------------------------------------
                sd(Residual) |   3.645602   .1342049      3.391831    3.918361
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   270.38 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1493.5798
Iteration 1:   log likelihood = -1493.5798

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       501
Group variable: patientnumber                   Number of groups   =       132
```

```
                                                  Obs per group: min =         1
                                                                 avg =       3.8
                                                                 max =         4


                                                  Wald chi2(4)       =     32.26
Log likelihood = -1493.5798                       Prob > chi2        =    0.0000

------------------------------------------------------------------------------
    ciq_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
         case |  -1.524806   .9072668    -1.68   0.093    -3.303017    .2534041
sample_time_0 |   .0293874   .0207803     1.41   0.157    -.0113413    .0701162
          age |   -.138995   .0271741    -5.11   0.000    -.1922552   -.0857347
   sex_recode |    1.46698   .9266094     1.58   0.113    -.3491412    3.283101
        _cons |   23.60997   1.750793    13.49   0.000     20.17848    27.04147
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   4.836274   .3510366      4.194954    5.575639
-----------------------------+------------------------------------------------
                sd(Residual) |   3.657532   .1352534      3.401819    3.932467
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   224.18 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1515.9351
Iteration 1:   log likelihood = -1515.9351

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       505
Group variable: patientnumber                   Number of groups   =       133

                                                  Obs per group: min =         1
                                                                 avg =       3.8
                                                                 max =         4


                                                  Wald chi2(3)       =      5.33
Log likelihood = -1515.9351                       Prob > chi2        =    0.1492

------------------------------------------------------------------------------
-----
         ciq_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |  -1.972131   1.064823    -1.85   0.064    -4.059146    .11
> 48839
     sample_time_0 |   .0150795   .0290726     0.52   0.604    -.0419018    .07
> 20607
sample_time_0_case |   .0262365   .0412556     0.64   0.525     -.054623     .1
> 07096
             _cons |   16.06489   .7602762    21.13   0.000     14.57478    17.
> 55501
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
```

```
patientnum~r: Identity        |
                  sd(_cons) |   5.356179   .3762535       4.66725    6.146801
----------------------------+------------------------------------------------
               sd(Residual) |   3.644174   .1341463      3.390513    3.916813
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   270.58 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood =  -1493.409
Iteration 1:   log likelihood =  -1493.409

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       501
Group variable: patientnumber                   Number of groups   =       132

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(5)       =     32.63
Log likelihood =  -1493.409                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
-----
         ciq_total |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |   -1.75986   .9920457    -1.77   0.076    -3.704234    .18
> 45135
     sample_time_0 |   .0172257   .0294061     0.59   0.558    -.0404092    .07
> 48606
sample_time_0_case |   .0242803   .0415445     0.58   0.559    -.0571455    .10
> 57062
               age |  -.1390223   .0271614    -5.12   0.000    -.1922576    -.0
> 85787
        sex_recode |   1.467936   .9261763     1.58   0.113    -.3473358    3.2
> 83208
             _cons |   23.73121   1.762233    13.47   0.000      20.2773    27.
> 18512
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   4.833873    .350831      4.192924    5.572799
----------------------------+------------------------------------------------
               sd(Residual) |   3.656454   .1352069      3.400828    3.931294
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   224.30 Prob >= chibar2 = 0.0000

************************
fim
************************

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1718.3012
Iteration 1:   log likelihood = -1718.3012
```

```
Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       505
Group variable: patientnumber                   Number of groups   =       133

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(2)       =      5.76
Log likelihood = -1718.3012                     Prob > chi2        =    0.0562

------------------------------------------------------------------------------
         fim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        case |  -2.534272   1.941039    -1.31   0.192    -6.338639    1.270095
sample_time_0 |  -.0564899   .0279536    -2.02   0.043    -.1112779   -.0017019
       _cons |   121.4672   1.413098    85.96   0.000     118.6976    124.2368
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   10.87956   .7281441      9.542064    12.40453
-----------------------------+------------------------------------------------
               sd(Residual) |   4.931163   .1827499      4.585679    5.302676
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   368.74 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1702.8058
Iteration 1:   log likelihood = -1702.8058

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       501
Group variable: patientnumber                   Number of groups   =       132

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(4)       =     13.41
Log likelihood = -1702.8058                     Prob > chi2        =    0.0094

------------------------------------------------------------------------------
         fim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        case |  -2.341415    1.89985    -1.23   0.218    -6.065054    1.382223
sample_time_0 |  -.0568184    .028184    -2.02   0.044    -.1120581   -.0015788
         age |  -.1239537   .0569293    -2.18   0.029     -.235533   -.0123744
   sex_recode |  -2.525602   1.938973    -1.30   0.193    -6.325919    1.274714
       _cons |   130.0498   3.657103    35.56   0.000      122.882    137.2176
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                  sd(_cons) |   10.58131   .7151607      9.268491    12.08008
-----------------------------+------------------------------------------------
```

```
  sd(Residual) |     4.9513   .1843925      4.602772     5.32622
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   347.47 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood =  -1718.241
Iteration 1:   log likelihood =  -1718.241

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       505
Group variable: patientnumber                   Number of groups   =       133

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4


                                                Wald chi2(3)       =      5.88
Log likelihood =  -1718.241                     Prob > chi2        =    0.1177

------------------------------------------------------------------------------
-----
               fim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
-------------------+----------------------------------------------------------
-----
              case |  -2.721194   2.013631    -1.35   0.177    -6.667839    1.2
> 25451
     sample_time_0 |  -.0661129   .0393743    -1.68   0.093     -.143285    .01
> 10593
sample_time_0_case |   .0194128   .0559077     0.35   0.728    -.0901643    .12
> 89899
             _cons |    121.562   1.438704    84.49   0.000     118.7422    124
> .3818
------------------------------------------------------------------------------
-----

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   10.87503   .7279894      9.537836     12.3997
-----------------------------+------------------------------------------------
                sd(Residual) |    4.93106   .1827566      4.585565    5.302587
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   368.43 Prob >= chibar2 = 0.0000

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1702.7396
Iteration 1:   log likelihood = -1702.7396

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =       501
Group variable: patientnumber                   Number of groups   =       132

                                                Obs per group: min =         1
                                                               avg =       3.8
                                                               max =         4
```

```
                                                  Wald chi2(5)       =     13.55
Log likelihood = -1702.7396                       Prob > chi2        =    0.0187

------------------------------------------------------------------------------
                 fim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
--------------------+---------------------------------------------------------
                case |  -2.538982   1.975112    -1.29   0.199    -6.410131    1.3
> 32167
     sample_time_0 |  -.0670761   .0398643    -1.68   0.092    -.1452086    .01
> 10565
sample_time_0_case |   .0205198    .056364     0.36   0.716    -.0899516    .13
> 09911
                 age |  -.1239771   .0569044    -2.18   0.029    -.2355077   -.01
> 24465
          sex_recode |  -2.524597   1.938128    -1.30   0.193    -6.323258    1.2
> 74064
               _cons |   130.1517   3.666227    35.50   0.000     122.9661    137
> .3374
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
patientnum~r: Identity       |
                   sd(_cons) |   10.57642   .7149948      9.263924    12.07486
-----------------------------+------------------------------------------------
                sd(Residual) |   4.951185      .1844      4.602644     5.32612
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   347.12 Prob >= chibar2 = 0.0000

.
.  log close
      name:  <unnamed>
       log:  U:\ICU\FINAL ANLAYSES\Marsden_IC
> U_mixed_model_regression_31Jan2013.smcl
  log type:  smcl
 closed on:  31 Jan 2013, 22:41:26
------------------------------------------------------------------------------
```

```
--------------------------------------------------------------------------------
--------------------


.
.  Appendix 8.2

.  keep if sample_time==0
(858 observations deleted)

.
.  ************** Pre-morbid predictors *****************
.
.  *******************************
.  * LNS Impairment at 24 months  *
.  *******************************
.
.  ** 1. FIM: pre-morbid **
.
.  LnMM3_lf lns_impair_24 fim

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -470.00736
rescale:       log likelihood = -127.68049
rescale eq:    log likelihood = -125.99376
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -120.85351
Iteration 2:   log likelihood = -115.59344
Iteration 3:   log likelihood = -114.41805
Iteration 4:   log likelihood =  -113.8589
Iteration 5:   log likelihood = -113.74062
Iteration 6:   log likelihood = -113.73977
Iteration 7:   log likelihood = -113.73977

                                                  Number of obs   =        128
                                                  Wald chi2(1)    =       0.02
Log likelihood = -113.73977                       Prob > chi2     =     0.8897

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |  -.0011222   .0080951    -0.14   0.890    -.0169884    .0147439
       _cons |  -1.539191   .9862346    -1.56   0.119    -3.472175    .3937938
-------------+----------------------------------------------------------------
eq2          |
         fim |  -.0125021   .0038494    -3.25   0.001    -.0200469   -.0049573
       _cons |  -.2654289   .4156213    -0.64   0.523    -1.080032    .5491738
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
------------------------------------------------------------------------------
             |
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |   0.998878                       0.890     0.983155    1.014853
-------------+----------------------------------------------------------------
eq2          |
         fim |   0.987576                       0.001     0.980153    0.995055
------------------------------------------------------------------------------

.  LnMM3_lf lns_impair_24 case fim

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)
```

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	LNS impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	42	10	10	62
	67.74	16.13	16.13	100.00
Case	39	14	13	66
	59.09	21.21	19.70	100.00
Total	81	24	23	128
	63.28	18.75	17.97	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -470.00736
rescale:       log likelihood = -127.68049
rescale eq:    log likelihood = -125.99376
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -121.20495
Iteration 2:   log likelihood = -116.05528
Iteration 3:   log likelihood = -114.64468
Iteration 4:   log likelihood = -113.76659
Iteration 5:   log likelihood = -113.49213
Iteration 6:   log likelihood = -113.46248
Iteration 7:   log likelihood = -113.46213
Iteration 8:   log likelihood = -113.46213

                                                  Number of obs   =        128
                                                  Wald chi2(2)    =       0.54
Log likelihood = -113.46213                       Prob > chi2     =     0.7651
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	.2741659	.3801327	0.72	0.471	-.4708805	1.019212
fim	.0000264	.0081673	0.00	0.997	-.0159813	.0160341
_cons	-1.827841	1.057656	-1.73	0.084	-3.900809	.2451276
eq2						
case	.0055081	.4107422	0.01	0.989	-.7995318	.8105481
fim	-.0124567	.0043163	-2.89	0.004	-.0209166	-.0039969
_cons	-.2736642	.6102401	-0.45	0.654	-1.469713	.9223844

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.315433	0.471	0.624452	2.771011
fim	1.000026	0.997	0.984146	1.016163
eq2				
case	1.005523	0.989	0.449539	2.249140
fim	0.987621	0.004	0.979301	0.996011

```
. LnMM3_lf lns_impair_24 case fim age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |   LNS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        42         10         10 |        62
           |     67.74      16.13      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        39         14         13 |        66
           |     59.09      21.21      19.70 |    100.00
-----------+---------------------------------+----------
     Total |        81         24         23 |       128
           |     63.28      18.75      17.97 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -470.00736
rescale:       log likelihood = -127.68049
rescale eq:    log likelihood = -125.99376
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -116.47915
Iteration 2:   log likelihood = -105.18759
Iteration 3:   log likelihood = -97.722564
Iteration 4:   log likelihood = -96.604919
Iteration 5:   log likelihood = -96.531052
Iteration 6:   log likelihood = -96.529801
Iteration 7:   log likelihood = -96.529799

                                                  Number of obs   =        128
                                                  Wald chi2(4)    =       1.08
Log likelihood = -96.529799                       Prob > chi2     =     0.8976

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |    .252107   .3793972     0.66   0.506    -.4914978    .9957119
         fim |  -.0035492   .0098823    -0.36   0.719    -.0229181    .0158197
         age |   .0069096   .0114935     0.60   0.548    -.0156172    .0294365
  sex_recode |   .1312534    .377753     0.35   0.728    -.6091289    .8716357
       _cons |  -1.880596   1.098704    -1.71   0.087    -4.034016    .2728251
-------------+----------------------------------------------------------------
eq2          |
        case |   .0401543   .3175517     0.13   0.899    -.5822356    .6625441
         fim |  -.0694317   .0161093    -4.31   0.000    -.1010054    -.037858
         age |   .1090949   .0256862     4.25   0.000     .0587509    .1594389
  sex_recode |   .1940479   .3437142     0.56   0.572    -.4796196    .8677153
       _cons |  -1.300591   .6142496    -2.12   0.034    -2.504498   -.0966841
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+--------------------------------------------------------------
             |
             |      RR                            P>|z|     [95% Conf. Interval]
-------------+--------------------------------------------------------------
eq1          |
        case |   1.286734                         0.506     0.611709    2.706650
```

```
         fim |   0.996457                          0.719     0.977342    1.015945
         age |   1.006934                          0.548     0.984504    1.029874
  sex_recode |   1.140257                          0.728     0.543824    2.390818
-------------+----------------------------------------------------------------
eq2          |
        case |   1.040971                          0.899     0.558648    1.939721
         fim |   0.932924                          0.000     0.903928    0.962850
         age |   1.115268                          0.000     1.060511    1.172853
  sex_recode |   1.214154                          0.572     0.619019    2.381464
-------------+----------------------------------------------------------------

.
.  ** 2. Years education: pre-morbid **
.
.  LnMM3_lf lns_impair_24 YRSEDN

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -430.00672
rescale:       log likelihood = -116.72354
rescale eq:    log likelihood = -115.27517
Iteration 0:   log likelihood = -115.27517
Iteration 1:   log likelihood = -104.29838
Iteration 2:   log likelihood = -99.504029
Iteration 3:   log likelihood = -99.407391
Iteration 4:   log likelihood = -99.407115
Iteration 5:   log likelihood = -99.407115

                                                  Number of obs   =        117
                                                  Wald chi2(1)    =       1.53
Log likelihood = -99.407115                       Prob > chi2     =     0.2167

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
      YRSEDN |  -.0984204   .0796641    -1.24   0.217    -.2545592    .0577184
       _cons |  -.6608915   .8054982    -0.82   0.412    -2.239639    .9178559
-------------+----------------------------------------------------------------
eq2          |
      YRSEDN |  -.2816578   .0931305    -3.02   0.002    -.4641902   -.0991254
       _cons |   1.028825   .8317281     1.24   0.216    -.6013321    2.658982
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                             P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
      YRSEDN |   0.906268                          0.217     0.775258    1.059417
-------------+----------------------------------------------------------------
eq2          |
      YRSEDN |   0.754532                          0.002     0.628644    0.905629
-------------+----------------------------------------------------------------

.  LnMM3_lf lns_impair_24 case YRSEDN

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX

Case	LNS impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	42	10	10	62
	67.74	16.13	16.13	100.00
Case	39	14	13	66
	59.09	21.21	19.70	100.00
Total	81	24	23	128
	63.28	18.75	17.97	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -430.00672
rescale:       log likelihood = -116.72354
rescale eq:    log likelihood = -115.27517
Iteration 0:   log likelihood = -115.27517
Iteration 1:   log likelihood = -104.25383
Iteration 2:   log likelihood = -99.430431
Iteration 3:   log likelihood =  -99.31392
Iteration 4:   log likelihood = -99.313462
Iteration 5:   log likelihood = -99.313462

                                                  Number of obs   =        117
                                                  Wald chi2(2)    =       1.58
Log likelihood = -99.313462                       Prob > chi2     =     0.4534
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	.086865	.3909293	0.22	0.824	-.6793423	.8530724
YRSEDN	-.0963246	.080246	-1.20	0.230	-.2536038	.0609546
_cons	-.7321598	.8711743	-0.84	0.401	-2.43963	.9753105
eq2						
case	.1077863	.3801151	0.28	0.777	-.6372257	.8527982
YRSEDN	-.2794535	.0937897	-2.98	0.003	-.4632779	-.0956291
_cons	.9437653	.8954123	1.05	0.292	-.8112106	2.698741

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.090749	0.824	0.506950	2.346846
YRSEDN	0.908169	0.230	0.775999	1.062851
eq2				
case	1.113810	0.777	0.528757	2.346203
YRSEDN	0.756197	0.003	0.629218	0.908801

```
.  LnMM3_lf lns_impair_24 case YRSEDN age sex_recode
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	LNS impairmant at 24 months Not impai	Impaired	Dead	Total
Control	42	10	10	62
	67.74	16.13	16.13	100.00
Case	39	14	13	66
	59.09	21.21	19.70	100.00
Total	81	24	23	128
	63.28	18.75	17.97	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -430.00672
rescale:       log likelihood = -116.72354
rescale eq:    log likelihood = -115.27517
Iteration 0:   log likelihood = -115.27517
Iteration 1:   log likelihood =   -103.396
Iteration 2:   log likelihood = -97.819148
Iteration 3:   log likelihood = -97.379258
Iteration 4:   log likelihood = -97.372706
Iteration 5:   log likelihood = -97.372681
Iteration 6:   log likelihood = -97.372681

                                                  Number of obs   =        117
                                                  Wald chi2(4)    =       1.60
Log likelihood = -97.372681                       Prob > chi2     =     0.8091
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	.0952592	.3908326	0.24	0.807	-.6707586	.8612771
YRSEDN	-.0903903	.0867905	-1.04	0.298	-.2604965	.0797159
age	.0017563	.0132383	0.13	0.894	-.0241903	.0277028
sex_recode	.04774	.3840961	0.12	0.901	-.7050744	.8005545
_cons	-.9296625	1.460728	-0.64	0.524	-3.792637	1.933312
eq2						
case	.12911	.356238	0.36	0.717	-.5691036	.8273237
YRSEDN	-.1891493	.0961923	-1.97	0.049	-.3776827	-.000616
age	.0302324	.0178706	1.69	0.091	-.0047934	.0652581
sex_recode	-.192809	.3883245	-0.50	0.620	-.953911	.5682929
_cons	-1.88123	1.847841	-1.02	0.309	-5.502931	1.740471

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.099944	0.807	0.511321	2.366181
YRSEDN	0.913575	0.298	0.770669	1.082979
age	1.001758	0.894	0.976100	1.028090
sex_recode	1.048898	0.901	0.494072	2.226775
eq2				
case	1.137815	0.717	0.566033	2.287189
YRSEDN	0.827663	0.049	0.685448	0.999384
age	1.030694	0.091	0.995218	1.067434
sex_recode	0.824639	0.620	0.385231	1.765251

```
.
.  ** 3. CIQ Total: pre-morbid **
.
.  LnMM3_lf lns_impair_24 ciq_total

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -450.00736
rescale:       log likelihood = -125.18049
rescale eq:    log likelihood = -123.49376
Iteration 0:   log likelihood = -123.49376
Iteration 1:   log likelihood = -110.86887
Iteration 2:   log likelihood = -104.40687
Iteration 3:   log likelihood = -104.11716
Iteration 4:   log likelihood = -104.11648
Iteration 5:   log likelihood = -104.11648

                                                  Number of obs   =        126
                                                  Wald chi2(1)    =       1.48
Log likelihood = -104.11648                       Prob > chi2     =     0.2230

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
   ciq_total |   -.037208   .0305354    -1.22   0.223    -.0970564    .0226403
       _cons |   -1.06782   .4894171    -2.18   0.029     -2.02706   -.1085801
-------------+----------------------------------------------------------------
eq2          |
   ciq_total |  -.1223324   .0321039    -3.81   0.000    -.1852549     -.05941
       _cons |  -.0311523   .3937384    -0.08   0.937    -.8028654    .7405608
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
ciq_total	0.963476	0.223	0.907505	1.022899
eq2				
ciq_total	0.884854	0.000	0.830892	0.942320

```
.  LnMM3_lf lns_impair_24 case ciq_total

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	LNS impairmant at 24 months Not impai	Impaired	Dead	Total
Control	42	10	10	62
	67.74	16.13	16.13	100.00
Case	39	14	13	66
	59.09	21.21	19.70	100.00
Total	81	24	23	128
	63.28	18.75	17.97	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -450.00736
rescale:       log likelihood = -125.18049
rescale eq:    log likelihood = -123.49376
Iteration 0:   log likelihood = -123.49376
Iteration 1:   log likelihood = -110.47804
Iteration 2:   log likelihood = -103.72628
Iteration 3:   log likelihood = -103.46078
Iteration 4:   log likelihood = -103.45941
Iteration 5:   log likelihood = -103.45941

                                                  Number of obs   =        126
                                                  Wald chi2(2)    =       1.73
Log likelihood = -103.45941                       Prob > chi2     =     0.4210

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .1873925   .3720311     0.50   0.614     -.541775      .91656
   ciq_total |  -.0362327   .0313006    -1.16   0.247    -.0975807    .0251153
       _cons |  -1.187297   .5661912    -2.10   0.036    -2.297012    -.077583
-------------+----------------------------------------------------------------
eq2          |
        case |   .2828772   .3599538     0.79   0.432    -.4226193    .9883737
   ciq_total |  -.1250076   .0327748    -3.81   0.000    -.1892451   -.0607701
       _cons |  -.1586129   .4725623    -0.34   0.737    -1.084818    .7675922
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
------------------------------------------------------------------------------
             |
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   1.206101                       0.614     0.581715    2.500673
   ciq_total |   0.964416                       0.247     0.907029    1.025433
-------------+----------------------------------------------------------------
eq2          |
        case |   1.326942                       0.432     0.655328    2.686861
   ciq_total |   0.882490                       0.000     0.827584    0.941040
------------------------------------------------------------------------------

.  LnMM3_lf lns_impair_24 case ciq_total age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |   LNS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        42         10         10 |        62
           |     67.74      16.13      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        39         14         13 |        66
           |     59.09      21.21      19.70 |    100.00
-----------+---------------------------------+----------
     Total |        81         24         23 |       128
```

```
|      63.28      18.75      17.97 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -450.00736
rescale:       log likelihood = -125.18049
rescale eq:    log likelihood = -123.49376
Iteration 0:   log likelihood = -123.49376
Iteration 1:   log likelihood = -109.93847
Iteration 2:   log likelihood = -101.63188
Iteration 3:   log likelihood = -101.09966
Iteration 4:   log likelihood = -101.09154
Iteration 5:   log likelihood = -101.09153
Iteration 6:   log likelihood = -101.09153

                                                  Number of obs   =        126
                                                  Wald chi2(4)    =       2.16
Log likelihood = -101.09153                       Prob > chi2     =     0.7060

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |    .235719   .3757709     0.63   0.530    -.5007785    .9722164
   ciq_total |  -.0399357    .035477    -1.13   0.260    -.1094693    .0295979
         age |   .0006543   .0129814     0.05   0.960    -.0247889    .0260974
  sex_recode |   .2472514   .3797095     0.65   0.515    -.4969655    .9914682
       _cons |  -1.315392   1.147026    -1.15   0.251    -3.563521    .9327375
-------------+----------------------------------------------------------------
eq2          |
        case |   .3109257   .4105247     0.76   0.449    -.4936879    1.115539
   ciq_total |  -.1085735   .0369638    -2.94   0.003    -.1810212   -.0361258
         age |   .0323968   .0172911     1.87   0.061    -.0014931    .0662867
  sex_recode |   .0427993   .3932509     0.11   0.913    -.7279584    .8135569
       _cons |  -2.603231   1.416624    -1.84   0.066    -5.379764    .1733014
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
------------------------------------------------------------------------------
             |
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   1.265819                       0.530     0.606059    2.643798
   ciq_total |   0.960851                       0.260     0.896310    1.030040
         age |   1.000654                       0.960     0.975516    1.026441
  sex_recode |   1.280501                       0.515     0.608374    2.695189
-------------+----------------------------------------------------------------
eq2          |
        case |   1.364688                       0.449     0.610371    3.051213
   ciq_total |   0.897113                       0.003     0.834418    0.964519
         age |   1.032927                       0.061     0.998508    1.068533
  sex_recode |   1.043728                       0.913     0.482894    2.255918
------------------------------------------------------------------------------

.
.  ** 4. Charlson age condition: pre-morbid **
.
.  rename charlson_condition_age caci

.  LnMM3_lf lns_impair_24 caci

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -470.00736
```

```
rescale:       log likelihood = -127.68049
rescale eq:    log likelihood = -125.99376
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -109.53756
Iteration 2:   log likelihood = -101.20706
Iteration 3:   log likelihood =  -100.5038
Iteration 4:   log likelihood = -100.49562
Iteration 5:   log likelihood = -100.49559
Iteration 6:   log likelihood = -100.49559

                                                  Number of obs   =        128
                                                  Wald chi2(1)    =       0.01
Log likelihood = -100.49559                       Prob > chi2     =     0.9365

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        caci |    -.00415   .0521011    -0.08   0.937    -.1062664    .0979663
       _cons |  -1.655021   .2992504    -5.53   0.000    -2.241541     -1.0685
-------------+----------------------------------------------------------------
eq2          |
        caci |   .2501291   .0405781     6.16   0.000     .1705974    .3296608
       _cons |   -3.30606   .4441829    -7.44   0.000    -4.176643   -2.435478
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
caci	0.995859	0.937	0.899185	1.102926
eq2				
caci	1.284191	0.000	1.186013	1.390496

```
.  LnMM3_lf lns_impair_24 case caci

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	LNS impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	42	10	10	62
	67.74	16.13	16.13	100.00
Case	39	14	13	66
	59.09	21.21	19.70	100.00
Total	81	24	23	128
	63.28	18.75	17.97	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -470.00736
rescale:       log likelihood = -127.68049
rescale eq:    log likelihood = -125.99376
```

```
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -107.66909
Iteration 2:   log likelihood = -96.460562
Iteration 3:   log likelihood = -94.214878
Iteration 4:   log likelihood = -93.842963
Iteration 5:   log likelihood = -93.820182
Iteration 6:   log likelihood =  -93.81994
Iteration 7:   log likelihood =  -93.81994

                                                  Number of obs   =        128
                                                  Wald chi2(2)    =       0.54
Log likelihood =  -93.81994                       Prob > chi2     =     0.7640

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .2780245   .3815749     0.73   0.466    -.4698486    1.025898
        caci |   .0031831   .0568778     0.06   0.955    -.1082954    .1146616
       _cons |  -1.841328    .418294    -4.40   0.000    -2.661169   -1.021487
-------------+----------------------------------------------------------------
eq2          |
        case |    1.55975   .4272405     3.65   0.000     .7223739    2.397126
        caci |   .4235119   .0801796     5.28   0.000     .2663628     .580661
       _cons |  -5.389956   .9445203    -5.71   0.000    -7.241182    -3.53873
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.320519	0.466	0.625097	2.789599
caci	1.003188	0.955	0.897363	1.121494
eq2				
case	4.757631	0.000	2.059316	10.991539
caci	1.527316	0.000	1.305209	1.787219

```
.  LnMM3_lf lns_impair_24 case caci age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |   LNS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        42         10         10 |        62
           |     67.74      16.13      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        39         14         13 |        66
           |     59.09      21.21      19.70 |    100.00
-----------+---------------------------------+----------
     Total |        81         24         23 |       128
           |     63.28      18.75      17.97 |    100.00

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
```

```
feasible:       log likelihood = -470.00736
rescale:        log likelihood = -127.68049
rescale eq:     log likelihood = -125.99376
Iteration 0:    log likelihood = -125.99376
Iteration 1:    log likelihood = -112.48564
Iteration 2:    log likelihood = -103.11556
Iteration 3:    log likelihood = -94.887093
Iteration 4:    log likelihood = -92.962416
Iteration 5:    log likelihood = -92.872206
Iteration 6:    log likelihood = -92.871551
Iteration 7:    log likelihood = -92.871551

                                                  Number of obs   =        128
                                                  Wald chi2(4)    =       1.27
Log likelihood = -92.871551                       Prob > chi2     =     0.8656

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .2058059   .4071134     0.51   0.613    -.5921217    1.003733
        caci |  -.0353745   .0820013    -0.43   0.666    -.1960941    .1253451
         age |   .0105983   .0158467     0.67   0.504    -.0204608    .0416573
  sex_recode |   .1440565   .3781182     0.38   0.703    -.5970415    .8851544
       _cons |  -2.355877   .8015592    -2.94   0.003    -3.926904     -.78485
-------------+----------------------------------------------------------------
eq2          |
        case |   1.206962     .52068     2.32   0.020     .1864481    2.227476
        caci |   .4265101     .08183     5.21   0.000     .2661263    .5868939
         age |   .0218249   .0278389     0.78   0.433    -.0327383    .0763881
  sex_recode |  -.2517755   .4003909    -0.63   0.529    -1.036527    .5329762
       _cons |  -6.608007   2.159446    -3.06   0.002    -10.84044    -2.37557
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                                P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   1.228515                             0.613     0.553152    2.728449
        caci |   0.965244                             0.666     0.821935    1.133540
         age |   1.010655                             0.504     0.979747    1.042537
  sex_recode |   1.154949                             0.703     0.550438    2.423359
-------------+----------------------------------------------------------------
eq2          |
        case |   3.343313                             0.020     1.204962    9.276426
        caci |   1.531902                             0.000     1.304900    1.798394
         age |   1.022065                             0.433     0.967792    1.079381
  sex_recode |   0.777419                             0.529     0.354684    1.703996
-------------+----------------------------------------------------------------

.
.   ** 5. Apache3 ROD: cases only **
.
.   LnMM3_lf lns_impair_24 apache3rod

Log multinomial model

initial:        log likelihood =     -<inf>  (could not be evaluated)
feasible:       log likelihood = -270.00354
rescale:        log likelihood = -66.938756
rescale eq:     log likelihood = -66.938756
Iteration 0:    log likelihood = -66.938756
Iteration 1:    log likelihood = -62.852708
Iteration 2:    log likelihood = -62.824378
Iteration 3:    log likelihood = -62.824162
Iteration 4:    log likelihood = -62.824162
```

```
                                                  Number of obs   =         66
                                                  Wald chi2(1)    =       0.32
Log likelihood = -62.824162                       Prob > chi2     =     0.5708

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |   .4468689    .788248     0.57   0.571    -1.098069    1.991807
       _cons |  -1.657819   .3182515    -5.21   0.000     -2.28158   -1.034057
-------------+----------------------------------------------------------------
eq2          |
  apache3rod |   .5742907   .8053666     0.71   0.476    -1.004199     2.15278
       _cons |  -1.765546   .3371696    -5.24   0.000    -2.426386   -1.104705
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
apache3rod	1.563409	0.571	0.333515	7.328762
eq2				
apache3rod	1.775870	0.476	0.366338	8.608760

```
.  LnMM3_lf lns_impair_24 case apache3rod
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

	LNS impairmant at 24 months			
Case	Not impai	Impaired	Dead	Total
Control	42	10	10	62
	67.74	16.13	16.13	100.00
Case	39	14	13	66
	59.09	21.21	19.70	100.00
Total	81	24	23	128
	63.28	18.75	17.97	100.00

```
Log multinomial model
note: case omitted because of collinearity
note: case omitted because of collinearity

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -270.00354
rescale:       log likelihood = -66.938756
rescale eq:    log likelihood = -66.938756
Iteration 0:   log likelihood = -66.938756
Iteration 1:   log likelihood = -62.852708
Iteration 2:   log likelihood = -62.824378
Iteration 3:   log likelihood = -62.824162
Iteration 4:   log likelihood = -62.824162

                                                  Number of obs   =         66
```

```
                                                  Wald chi2(1)    =       0.32
Log likelihood = -62.824162                       Prob > chi2     =     0.5708

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |          0  (omitted)
  apache3rod |   .4468689    .788248     0.57   0.571    -1.098069    1.991807
       _cons |  -1.657819   .3182515    -5.21   0.000     -2.28158   -1.034057
-------------+----------------------------------------------------------------
eq2          |
        case |          0  (omitted)
  apache3rod |   .5742907   .8053666     0.71   0.476    -1.004199     2.15278
       _cons |  -1.765546   .3371696    -5.24   0.000    -2.426386   -1.104705
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

             |
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   1.000000                          .     1.000000    1.000000
  apache3rod |   1.563409                       0.571     0.333515    7.328762
-------------+----------------------------------------------------------------
eq2          |
        case |   1.000000                          .     1.000000    1.000000
  apache3rod |   1.775870                       0.476     0.366338    8.608760
-------------+----------------------------------------------------------------

.  LnMM3_lf lns_impair_24 case apache3rod age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |   LNS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        42         10         10 |        62
           |     67.74      16.13      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        39         14         13 |        66
           |     59.09      21.21      19.70 |    100.00
-----------+---------------------------------+----------
     Total |        81         24         23 |       128
           |     63.28      18.75      17.97 |    100.00


Log multinomial model
note: case omitted because of collinearity
note: case omitted because of collinearity

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -270.00354
rescale:       log likelihood = -66.938756
rescale eq:    log likelihood = -66.938756
Iteration 0:   log likelihood = -66.938756
Iteration 1:   log likelihood = -60.636702
Iteration 2:   log likelihood = -60.232669
Iteration 3:   log likelihood = -60.225698
Iteration 4:   log likelihood = -60.225692
```

```
Iteration 5:   log likelihood = -60.225692

                                                  Number of obs   =         66
                                                  Wald chi2(3)    =       2.28
Log likelihood = -60.225692                       Prob > chi2     =     0.5161

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |          0  (omitted)
  apache3rod |    .348378   .7473653     0.47   0.641    -1.116431    1.813187
         age |  -.0002165   .0153193    -0.01   0.989    -.0302418    .0298087
  sex_recode |    .694811   .5080298     1.37   0.171    -.3009091    1.690531
       _cons |  -2.007833   1.000788    -2.01   0.045    -3.969341   -.0463247
-------------+----------------------------------------------------------------
eq2          |
        case |          0  (omitted)
  apache3rod |   .7340771   .8508439     0.86   0.388    -.9335463    2.401701
         age |   .0315384   .0212457     1.48   0.138    -.0101023    .0731792
  sex_recode |  -.5177521   .5096518    -1.02   0.310    -1.516651     .481147
       _cons |  -3.657013   1.538498    -2.38   0.017    -6.672413   -.6416134
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   1.000000                            .     1.000000    1.000000
  apache3rod |   1.416768                        0.641     0.327446    6.129954
         age |   0.999783                        0.989     0.970211    1.030257
  sex_recode |   2.003330                        0.171     0.740145    5.422359
-------------+----------------------------------------------------------------
eq2          |
        case |   1.000000                            .     1.000000    1.000000
  apache3rod |   2.083558                        0.388     0.393157   11.041939
         age |   1.032041                        0.138     0.989949    1.075923
  sex_recode |   0.595858                        0.310     0.219446    1.617929
-------------+----------------------------------------------------------------

.
.
.   ****************************************
.   * Digit Span: Impairment at 24 months  *
.   ****************************************
.
.   ** 1. FIM: pre-morbid **
.
.   LnMM3_lf digit_impair_24 fim

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -430.00854
rescale:       log likelihood = -124.35702
rescale eq:    log likelihood = -121.97116
Iteration 0:   log likelihood = -121.97116
Iteration 1:   log likelihood = -116.98803
Iteration 2:   log likelihood = -112.04535
Iteration 3:   log likelihood = -111.66109
Iteration 4:   log likelihood = -111.66105
Iteration 5:   log likelihood = -111.66105

                                                  Number of obs   =        137
                                                  Wald chi2(1)    =       0.27
Log likelihood = -111.66105                       Prob > chi2     =     0.6023
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
fim	.0093636	.0179691	0.52	0.602	-.0258551	.0445823
_cons	-3.065912	2.219749	-1.38	0.167	-7.416541	1.284717
eq2						
fim	-.0148416	.0035294	-4.21	0.000	-.021759	-.0079241
_cons	-.0565178	.3645897	-0.16	0.877	-.7711004	.6580649

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
fim	1.009408	0.602	0.974476	1.045591
eq2				
fim	0.985268	0.000	0.978476	0.992107

```
. LnMM3_lf digit_impair_24 case fim
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Digit span impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	50	8	10	68
	73.53	11.76	14.71	100.00
Case	44	12	13	69
	63.77	17.39	18.84	100.00
Total	94	20	23	137
	68.61	14.60	16.79	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -430.00854
rescale:       log likelihood = -124.35702
rescale eq:    log likelihood = -121.97116
Iteration 0:   log likelihood = -121.97116
Iteration 1:   log likelihood = -116.55903
Iteration 2:   log likelihood = -111.59302
Iteration 3:   log likelihood = -111.08592
Iteration 4:   log likelihood = -111.08582
Iteration 5:   log likelihood = -111.08582

                                                  Number of obs   =        137
                                                  Wald chi2(2)    =       1.33
Log likelihood = -111.08582                       Prob > chi2     =     0.5146
```

Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	.4290283	.4234249	1.01	0.311	-.4008693	1.258926
fim	.0106746	.017475	0.61	0.541	-.0235757	.044925
_cons	-3.462013	2.191192	-1.58	0.114	-7.75667	.832645
eq2						
case	.0518965	.4112418	0.13	0.900	-.7541226	.8579157
fim	-.0145583	.0040336	-3.61	0.000	-.022464	-.0066525
_cons	-.116985	.5773927	-0.20	0.839	-1.248654	1.014684

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.535764	0.311	0.669738	3.521637
fim	1.010732	0.541	0.976700	1.045949
eq2				
case	1.053267	0.900	0.470423	2.358240
fim	0.985547	0.000	0.977786	0.993370

```
. LnMM3_lf digit_impair_24 case fim age sex_recode
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

Key
frequency
row percentage

Case	Digit span impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	50	8	10	68
	73.53	11.76	14.71	100.00
Case	44	12	13	69
	63.77	17.39	18.84	100.00
Total	94	20	23	137
	68.61	14.60	16.79	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -420.00854
rescale:       log likelihood = -121.85702
rescale eq:    log likelihood = -119.47116
Iteration 0:   log likelihood = -119.47116
Iteration 1:   log likelihood = -111.48529
Iteration 2:   log likelihood = -100.20492
Iteration 3:   log likelihood = -93.626651
Iteration 4:   log likelihood = -92.631256
Iteration 5:   log likelihood = -92.627108
Iteration 6:   log likelihood = -92.627103

                                                  Number of obs   =        136
                                                  Wald chi2(4)    =       3.72
```

```
Log likelihood = -92.627103                     Prob > chi2     =     0.4456

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .4844413   .4421704     1.10   0.273    -.3821968    1.351079
         fim |   .0063823   .0243342     0.26   0.793    -.0413118    .0540764
         age |    .020436   .0150764     1.36   0.175    -.0091131    .0499851
  sex_recode |   .1531014   .4213858     0.36   0.716    -.6727997    .9790025
       _cons |  -4.423397   3.035379    -1.46   0.145    -10.37263    1.525836
-------------+----------------------------------------------------------------
eq2          |
        case |   .2488879   .3734039     0.67   0.505    -.4829704    .9807461
         fim |  -.0607038   .0128857    -4.71   0.000    -.0859593   -.0354483
         age |   .0891562   .0199252     4.47   0.000     .0501036    .1282088
  sex_recode |   .4083883   .4207037     0.97   0.332    -.4161758    1.232952
       _cons |  -1.162975   .6519849    -1.78   0.074    -2.440841    .1148923
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                                P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   1.623268                             0.273     0.682361    3.861592
         fim |   1.006403                             0.793     0.959530    1.055565
         age |   1.020646                             0.175     0.990928    1.051255
  sex_recode |   1.165443                             0.716     0.510278    2.661800
-------------+----------------------------------------------------------------
eq2          |
        case |   1.282598                             0.505     0.616948    2.666445
         fim |   0.941102                             0.000     0.917632    0.965173
         age |   1.093251                             0.000     1.051380    1.136790
  sex_recode |   1.504391                             0.332     0.659564    3.431345
-------------+----------------------------------------------------------------

.
.   ** 2. Years education: pre-morbid **
.
.   LnMM3_lf digit_impair_24 YRSEDN

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -380.00763
rescale:       log likelihood = -110.06372
rescale eq:    log likelihood = -107.37316
Iteration 0:   log likelihood = -107.37316
Iteration 1:   log likelihood =  -105.9731
Iteration 2:   log likelihood = -95.228697
Iteration 3:   log likelihood = -92.727054
Iteration 4:   log likelihood = -92.390688
Iteration 5:   log likelihood = -92.390571
Iteration 6:   log likelihood = -92.390571

                                                Number of obs   =        122
                                                Wald chi2(1)    =       4.35
Log likelihood = -92.390571                     Prob > chi2     =     0.0369

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
      YRSEDN |  -.2168422   .1039301    -2.09   0.037    -.4205414   -.0131429
       _cons |   .1810492   .9783708     0.19   0.853    -1.736522    2.098621
-------------+----------------------------------------------------------------
```

```
eq2          |
      YRSEDN |  -.2876996   .0956926    -3.01   0.003    -.4752537   -.1001456
       _cons |   1.044041   .8570262     1.22   0.223    -.6356993    2.723782
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
YRSEDN	0.805057	0.037	0.656691	0.986943
eq2				
YRSEDN	0.749987	0.003	0.621727	0.904706

```
.  LnMM3_lf digit_impair_24 case YRSEDN

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Not impai	Digit span impairmant at 24 months Impaired	Dead	Total
Control	50	8	10	68
	73.53	11.76	14.71	100.00
Case	44	12	13	69
	63.77	17.39	18.84	100.00
Total	94	20	23	137
	68.61	14.60	16.79	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -380.00763
rescale:       log likelihood = -110.06372
rescale eq:    log likelihood = -107.37316
Iteration 0:   log likelihood = -107.37316
Iteration 1:   log likelihood = -97.745294
Iteration 2:   log likelihood = -92.040457
Iteration 3:   log likelihood = -91.725065
Iteration 4:   log likelihood = -91.720525
Iteration 5:   log likelihood = -91.720522

                                                  Number of obs   =        122
                                                  Wald chi2(2)    =       5.51
Log likelihood = -91.720522                       Prob > chi2     =     0.0637

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .5025131   .4962039     1.01   0.311    -.4700287    1.475055
      YRSEDN |   -.200359   .1042784    -1.92   0.055    -.4047409    .0040229
       _cons |  -.3005975   1.097964    -0.27   0.784    -2.452567    1.851372
-------------+----------------------------------------------------------------
eq2          |
```

```
        case |   .0576306   .3884774     0.15   0.882    -.7037712    .8190323
      YRSEDN |  -.2858564   .0967916    -2.95   0.003    -.4755644   -.0961485
       _cons |   .9921363   .9347895     1.06   0.289    -.8400173     2.82429
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

------------------------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   1.652870                       0.311     0.624984    4.371276
      YRSEDN |   0.818437                       0.055     0.667150    1.004031
-------------+----------------------------------------------------------------
eq2          |
        case |   1.059324                       0.882     0.494716    2.268304
      YRSEDN |   0.751370                       0.003     0.621534    0.908329
------------------------------------------------------------------------------

.  LnMM3_lf digit_impair_24 case YRSEDN age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |   Digit span impairmant at 24
           |              months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        50          8         10 |        68
           |     73.53      11.76      14.71 |    100.00
-----------+---------------------------------+----------
      Case |        44         12         13 |        69
           |     63.77      17.39      18.84 |    100.00
-----------+---------------------------------+----------
     Total |        94         20         23 |       137
           |     68.61      14.60      16.79 |    100.00

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -380.00763
rescale:       log likelihood = -110.06372
rescale eq:    log likelihood = -107.37316
Iteration 0:   log likelihood = -107.37316
Iteration 1:   log likelihood = -96.356083
Iteration 2:   log likelihood = -89.895794
Iteration 3:   log likelihood = -89.160734
Iteration 4:   log likelihood = -89.155651
Iteration 5:   log likelihood = -89.155649

                                                  Number of obs   =        122
                                                  Wald chi2(4)    =       5.80
Log likelihood = -89.155649                       Prob > chi2     =     0.2144

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |    .516024   .4923605     1.05   0.295    -.4489848    1.481033
      YRSEDN |  -.1732108   .1079205    -1.60   0.108    -.3847311    .0383094
         age |   .0102246   .0171228     0.60   0.550    -.0233355    .0437848
```

```
  sex_recode |    .095891   .4320992     0.22   0.824    -.7510078    .9427898
       _cons |  -1.282519   1.837935    -0.70   0.485    -4.884805    2.319768
-------------+----------------------------------------------------------------
eq2          |
        case |   .1125891   .3609491     0.31   0.755    -.5948581    .8200363
      YRSEDN |  -.2063816   .0943966    -2.19   0.029    -.3913956   -.0213676
         age |   .0302578    .017648     1.71   0.086    -.0043316    .0648472
  sex_recode |  -.2226576   .3888247    -0.57   0.567      -.98474    .5394248
       _cons |  -1.738985   1.811656    -0.96   0.337    -5.289766    1.811796
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.675353	0.295	0.638276	4.397485
YRSEDN	0.840960	0.108	0.680634	1.039053
age	1.010277	0.550	0.976935	1.044757
sex_recode	1.100639	0.824	0.471891	2.567133
eq2				
case	1.119172	0.755	0.551641	2.270582
YRSEDN	0.813523	0.029	0.676113	0.978859
age	1.030720	0.086	0.995678	1.066996
sex_recode	0.800389	0.567	0.373536	1.715020

```
.
.  ** 3. CIQ Total: pre-morbid **
.
.  LnMM3_lf digit_impair_24 ciq_total

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -410.00854
rescale:       log likelihood = -119.35702
rescale eq:    log likelihood = -119.35702
Iteration 0:   log likelihood = -119.35702
Iteration 1:   log likelihood = -105.74935
Iteration 2:   log likelihood = -103.18004
Iteration 3:   log likelihood = -102.94454
Iteration 4:   log likelihood = -102.94134
Iteration 5:   log likelihood = -102.94134

                                                  Number of obs   =        135
                                                  Wald chi2(1)    =       0.07
Log likelihood = -102.94134                       Prob > chi2     =     0.7972

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
   ciq_total |   .0092486   .0359933     0.26   0.797    -.0612969    .0797942
       _cons |  -2.066174   .6505295    -3.18   0.001    -3.341188   -.7911594
-------------+----------------------------------------------------------------
eq2          |
   ciq_total |  -.1451478   .0343306    -4.23   0.000    -.2124346   -.0778609
       _cons |   .2421023   .4124323     0.59   0.557    -.5662501    1.050455
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]

```
eq1          |
   ciq_total |   1.009292                          0.797     0.940544    1.083064
-------------+----------------------------------------------------------------
eq2          |
   ciq_total |   0.864894                          0.000     0.808613    0.925093
-------------+----------------------------------------------------------------
```

```
.  LnMM3_lf digit_impair_24 case ciq_total

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |   Digit span impairmant at 24
           |              months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        50          8         10 |        68
           |     73.53      11.76      14.71 |    100.00
-----------+---------------------------------+----------
      Case |        44         12         13 |        69
           |     63.77      17.39      18.84 |    100.00
-----------+---------------------------------+----------
     Total |        94         20         23 |       137
           |     68.61      14.60      16.79 |    100.00

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -410.00854
rescale:       log likelihood = -119.35702
rescale eq:    log likelihood = -119.35702
Iteration 0:   log likelihood = -119.35702
Iteration 1:   log likelihood = -104.85322
Iteration 2:   log likelihood = -101.66202
Iteration 3:   log likelihood = -101.33153
Iteration 4:   log likelihood = -101.32626
Iteration 5:   log likelihood = -101.32626

                                                  Number of obs   =        135
                                                  Wald chi2(2)    =       0.85
Log likelihood = -101.32626                       Prob > chi2     =     0.6539

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .3773247   .4254907     0.89   0.375    -.4566218    1.211271
   ciq_total |   .0134426   .0378431     0.36   0.722    -.0607284    .0876136
       _cons |   -2.34701   .7561702    -3.10   0.002    -3.829076   -.8649437
-------------+----------------------------------------------------------------
eq2          |
        case |   .5026241   .3676746     1.37   0.172    -.2180048    1.223253
   ciq_total |  -.1619354    .039155    -4.14   0.000    -.2386778    -.085193
       _cons |   .1830782   .4899642     0.37   0.709     -.777234     1.14339
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf. Interval]

```
eq1          |
        case |   1.458378                          0.375     0.633420    3.357751
   ciq_total |   1.013533                          0.722     0.941079    1.091566
-------------+----------------------------------------------------------------
eq2          |
        case |   1.653053                          0.172     0.804122    3.398224
   ciq_total |   0.850496                          0.000     0.787669    0.918335
-------------+----------------------------------------------------------------
```

```
. LnMM3_lf digit_impair_24 case ciq_total age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |   Digit span impairmant at 24
           |              months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        50          8         10 |        68
           |     73.53      11.76      14.71 |    100.00
-----------+---------------------------------+----------
      Case |        44         12         13 |        69
           |     63.77      17.39      18.84 |    100.00
-----------+---------------------------------+----------
     Total |        94         20         23 |       137
           |     68.61      14.60      16.79 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -400.00854
rescale:       log likelihood = -116.85702
rescale eq:    log likelihood = -116.85702
Iteration 0:   log likelihood = -116.85702
Iteration 1:   log likelihood = -100.05751
Iteration 2:   log likelihood = -96.338208
Iteration 3:   log likelihood = -95.959067
Iteration 4:   log likelihood = -95.950898
Iteration 5:   log likelihood = -95.950892

                                                  Number of obs   =        134
                                                  Wald chi2(4)    =       4.34
Log likelihood = -95.950892                       Prob > chi2     =     0.3617

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .4224628    .439632     0.96   0.337    -.4392002    1.284126
   ciq_total |   .0250758   .0426822     0.59   0.557    -.0585798    .1087315
         age |   .0282905   .0170048     1.66   0.096    -.0050383    .0616194
  sex_recode |   .1563101   .4366905     0.36   0.720    -.6995876    1.012208
       _cons |  -4.521656   1.536174    -2.94   0.003    -7.532501   -1.510811
-------------+----------------------------------------------------------------
eq2          |
        case |    .390735   .3653855     1.07   0.285    -.3254076    1.106877
   ciq_total |   -.132469   .0427138    -3.10   0.002    -.2161864   -.0487516
         age |    .024299   .0180028     1.35   0.177    -.0109859    .0595839
  sex_recode |   .0229635   .3490182     0.07   0.948    -.6610996    .7070266
       _cons |  -1.805217   1.576895    -1.14   0.252    -4.895874    1.285441
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.525714	0.337	0.644552	3.611509
ciq_total	1.025393	0.557	0.943103	1.114863
age	1.028695	0.096	0.994974	1.063557
sex_recode	1.169189	0.720	0.496790	2.751669
eq2				
case	1.478067	0.285	0.722233	3.024898
ciq_total	0.875930	0.002	0.805585	0.952418
age	1.024597	0.177	0.989074	1.061395
sex_recode	1.023229	0.948	0.516283	2.027952

```
.
.   ** 4. Charlson age condition: pre-morbid **
.
.   LnMM3_lf digit_impair_24 caci

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -420.00854
rescale:       log likelihood = -121.85702
rescale eq:    log likelihood = -119.47116
Iteration 0:   log likelihood = -119.47116
Iteration 1:   log likelihood =  -106.7237
Iteration 2:   log likelihood = -101.34778  (not concave)
Iteration 3:   log likelihood = -98.550423
Iteration 4:   log likelihood = -96.716994
Iteration 5:   log likelihood = -96.649934
Iteration 6:   log likelihood = -96.649668
Iteration 7:   log likelihood = -96.649668

                                                  Number of obs   =        136
                                                  Wald chi2(1)    =       0.00
Log likelihood = -96.649668                       Prob > chi2     =     0.9490

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        caci |  -.0039402   .0616279    -0.06   0.949    -.1247287    .1168483
       _cons |  -1.950288   .3504675    -5.56   0.000    -2.637192   -1.263385
-------------+----------------------------------------------------------------
eq2          |
        caci |   .2660514   .0423282     6.29   0.000     .1830896    .3490131
       _cons |  -3.467121   .4573916    -7.58   0.000    -4.363592    -2.57065
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
caci	0.996068	0.949	0.882736	1.123949
eq2				
caci	1.304802	0.000	1.200922	1.417668

```
.   LnMM3_lf digit_impair_24 case caci
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Digit span impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	50	8	10	68
	73.53	11.76	14.71	100.00
Case	44	12	13	69
	63.77	17.39	18.84	100.00
Total	94	20	23	137
	68.61	14.60	16.79	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -420.00854
rescale:       log likelihood = -121.85702
rescale eq:    log likelihood = -119.47116
Iteration 0:   log likelihood = -119.47116
Iteration 1:   log likelihood = -105.60969
Iteration 2:   log likelihood = -97.754844
Iteration 3:   log likelihood = -95.017066
Iteration 4:   log likelihood = -94.876112
Iteration 5:   log likelihood = -94.871779
Iteration 6:   log likelihood = -94.871761
Iteration 7:   log likelihood = -94.871761

                                                  Number of obs   =        136
                                                  Wald chi2(2)    =       1.32
Log likelihood = -94.871761                       Prob > chi2     =     0.5163
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	.5092805	.4436347	1.15	0.251	-.3602275	1.378789
caci	-.0029337	.061759	-0.05	0.962	-.1239791	.1181116
_cons	-2.245262	.4563019	-4.92	0.000	-3.139598	-1.350927
eq2						
case	.2871884	.2501555	1.15	0.251	-.2031074	.7774843
caci	.2831523	.0470329	6.02	0.000	.1909695	.375335
_cons	-3.738218	.5203929	-7.18	0.000	-4.758169	-2.718267

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.664093	0.251	0.697518	3.970089
caci	0.997071	0.962	0.883398	1.125370
eq2				
case	1.332675	0.251	0.816191	2.175991

```
        caci |   1.327307                      0.000     1.210423    1.455479
-------------+----------------------------------------------------------------

.  LnMM3_lf digit_impair_24 case caci age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |   Digit span impairmant at 24
           |              months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        50          8         10 |        68
           |     73.53      11.76      14.71 |    100.00
-----------+---------------------------------+----------
      Case |        44         12         13 |        69
           |     63.77      17.39      18.84 |    100.00
-----------+---------------------------------+----------
     Total |        94         20         23 |       137
           |     68.61      14.60      16.79 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -420.00854
rescale:       log likelihood = -121.85702
rescale eq:    log likelihood = -119.47116
Iteration 0:   log likelihood = -119.47116
Iteration 1:   log likelihood = -102.86664
Iteration 2:   log likelihood = -93.303774
Iteration 3:   log likelihood = -91.782776
Iteration 4:   log likelihood = -91.651782
Iteration 5:   log likelihood = -91.647231
Iteration 6:   log likelihood = -91.647222

                                                  Number of obs   =        136
                                                  Wald chi2(4)    =       5.93
Log likelihood = -91.647222                       Prob > chi2     =     0.2048

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |     .39475   .4348441     0.91   0.364    -.4575288    1.247029
        caci |  -.1413658    .105174    -1.34   0.179    -.3475031    .0647715
         age |   .0439819   .0212159     2.07   0.038     .0023994    .0855643
  sex_recode |   .0949956   .4264712     0.22   0.824    -.7408725    .9308637
       _cons |   -4.45048   1.237655    -3.60   0.000    -6.876239   -2.024721
-------------+----------------------------------------------------------------
eq2          |
        case |   .2814358   .3803735     0.74   0.459    -.4640825    1.026954
        caci |   .2877937   .0490097     5.87   0.000     .1917364    .3838509
         age |   .0163324   .0237565     0.69   0.492    -.0302294    .0628942
  sex_recode |   .1356278   .3594377     0.38   0.706    -.5688571    .8401126
       _cons |  -4.939255   1.677277    -2.94   0.003    -8.226657   -1.651852
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
------------------------------------------------------------------------------
             |
             |      RR                          P>|z|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
eq1          |
        case |   1.484013                      0.364     0.632846    3.479988
        caci |   0.868172                      0.179     0.706450    1.066915
         age |   1.044963                      0.038     1.002402    1.089332
  sex_recode |   1.099654                      0.824     0.476698    2.536699
-------------+----------------------------------------------------------------
eq2          |
        case |   1.325031                      0.459     0.628712    2.792547
        caci |   1.333482                      0.000     1.211351    1.467927
         age |   1.016467                      0.492     0.970223    1.064914
  sex_recode |   1.145256                      0.706     0.566172    2.316628
-------------+----------------------------------------------------------------

.
.   ** 5. Apache3 ROD: cases only **
.
.   LnMM3_lf digit_impair_24 apache3rod

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood =   -250.004
rescale:       log likelihood = -68.693724
rescale eq:    log likelihood =  -66.48118
Iteration 0:   log likelihood =  -66.48118
Iteration 1:   log likelihood = -62.702686
Iteration 2:   log likelihood = -61.895029
Iteration 3:   log likelihood =  -61.88041
Iteration 4:   log likelihood = -61.880396
Iteration 5:   log likelihood = -61.880396

                                                  Number of obs   =         69
                                                  Wald chi2(1)    =       0.63
Log likelihood = -61.880396                       Prob > chi2     =     0.4280

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |   .6957673   .8777254     0.79   0.428    -1.024543    2.416078
       _cons |  -1.926774    .369149    -5.22   0.000    -2.650293   -1.203255
-------------+----------------------------------------------------------------
eq2          |
  apache3rod |   .5364537   .8602937     0.62   0.533    -1.149691    2.222598
       _cons |  -1.802771   .3470929    -5.19   0.000    -2.483061   -1.122482
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                         P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |   2.005247                      0.428     0.358960   11.201834
-------------+----------------------------------------------------------------
eq2          |
  apache3rod |   1.709932                      0.533     0.316735    9.231285
-------------+----------------------------------------------------------------

.   LnMM3_lf digit_impair_24 case apache3rod

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
```

| row percentage |

Case	Digit span impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	50	8	10	68
	73.53	11.76	14.71	100.00
Case	44	12	13	69
	63.77	17.39	18.84	100.00
Total	94	20	23	137
	68.61	14.60	16.79	100.00

```
Log multinomial model
note: case omitted because of collinearity
note: case omitted because of collinearity

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood =   -250.004
rescale:       log likelihood = -68.693724
rescale eq:    log likelihood =  -66.48118
Iteration 0:   log likelihood =  -66.48118
Iteration 1:   log likelihood = -62.702686
Iteration 2:   log likelihood = -61.895029
Iteration 3:   log likelihood =  -61.88041
Iteration 4:   log likelihood = -61.880396
Iteration 5:   log likelihood = -61.880396

                                                  Number of obs   =         69
                                                  Wald chi2(1)    =       0.63
Log likelihood = -61.880396                       Prob > chi2     =     0.4280
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	0	(omitted)				
apache3rod	.6957673	.8777254	0.79	0.428	-1.024543	2.416078
_cons	-1.926774	.369149	-5.22	0.000	-2.650293	-1.203255
eq2						
case	0	(omitted)				
apache3rod	.5364537	.8602937	0.62	0.533	-1.149691	2.222598
_cons	-1.802771	.3470929	-5.19	0.000	-2.483061	-1.122482

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.000000	.	1.000000	1.000000
apache3rod	2.005247	0.428	0.358960	11.201834
eq2				
case	1.000000	.	1.000000	1.000000
apache3rod	1.709932	0.533	0.316735	9.231285

```
.  LnMM3_lf digit_impair_24 case apache3rod age sex_recode
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Digit span impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	50	8	10	68
	73.53	11.76	14.71	100.00
Case	44	12	13	69
	63.77	17.39	18.84	100.00
Total	94	20	23	137
	68.61	14.60	16.79	100.00

```
Log multinomial model
note: case omitted because of collinearity
note: case omitted because of collinearity

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood =   -250.004
rescale:       log likelihood = -68.693724
rescale eq:    log likelihood =  -66.48118
Iteration 0:   log likelihood =  -66.48118
Iteration 1:   log likelihood = -60.601632
Iteration 2:   log likelihood = -58.726367
Iteration 3:   log likelihood = -58.668033
Iteration 4:   log likelihood =  -58.66774
Iteration 5:   log likelihood =  -58.66774

                                                  Number of obs   =         69
                                                  Wald chi2(3)    =       2.41
Log likelihood =  -58.66774                       Prob > chi2     =     0.4922
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	0	(omitted)				
apache3rod	.7423878	.8838118	0.84	0.401	-.9898515	2.474627
age	.0317693	.0231418	1.37	0.170	-.0135878	.0771263
sex_recode	.1185807	.5162949	0.23	0.818	-.8933387	1.1305
_cons	-4.092019	1.694027	-2.42	0.016	-7.41225	-.7717873
eq2						
case	0	(omitted)				
apache3rod	.6604939	.8987107	0.73	0.462	-1.100947	2.421934
age	.0293086	.0208386	1.41	0.160	-.0115342	.0701515
sex_recode	-.3450346	.5082754	-0.68	0.497	-1.341236	.6511668
_cons	-3.616038	1.528435	-2.37	0.018	-6.611717	-.6203595

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.000000	.	1.000000	1.000000
apache3rod	2.100946	0.401	0.371632	11.877277
age	1.032279	0.170	0.986504	1.080179
sex_recode	1.125898	0.818	0.409287	3.097205

```
-------------+----------------------------------------------------------------
eq2          |
        case |   1.000000                          .     1.000000    1.000000
  apache3rod |   1.935748                      0.462     0.332556   11.267635
         age |   1.029742                      0.160     0.988532    1.072671
  sex_recode |   0.708196                      0.497     0.261522    1.917777
-------------+----------------------------------------------------------------

.
.
.   ****************************************
.   * IES-R Total: Impairment at 24 months *
.   ****************************************
.
.
. ** NOTE: no cases "Impaired" after 2 years (all those impaired at time 1 had
died)
. ** so cannot do multinomial regression. Need to recode (0=not impaired,
1=Dead)for log-binomial
.  tab case  iesrtot_impair_24

           |      IES-R total
           |   impairmant at 24
           |         months
      Case | Not impai       Dead |     Total
-----------+----------------------+----------
   Control |        59         10 |        69
      Case |        58         13 |        71
-----------+----------------------+----------
     Total |       117         23 |       140


.
.   ****************************************
.   * SF36 PCS: Impairment at 24 months    *
.   ****************************************
.
.
.   ** 1. FIM: pre-morbid **
.   LnMM3_lf sf36pcs_impair_24 fim

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -920.00372
rescale:       log likelihood = -149.89074
rescale eq:    log likelihood = -140.01063
Iteration 0:   log likelihood = -140.01063
Iteration 1:   log likelihood = -134.66215
Iteration 2:   log likelihood = -132.92238
Iteration 3:   log likelihood = -131.61798
Iteration 4:   log likelihood = -131.61663
Iteration 5:   log likelihood = -131.61663

                                                  Number of obs   =        133
                                                  Wald chi2(1)    =       0.85
Log likelihood = -131.61663                       Prob > chi2     =     0.3555

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |   .0052834   .0057182     0.92   0.356    -.0059242    .0164909
       _cons |  -1.298419   .7108535    -1.83   0.068    -2.691666    .0948287
-------------+----------------------------------------------------------------
eq2          |
         fim |  -.0117049   .0039982    -2.93   0.003    -.0195412   -.0038686
       _cons |  -.3967308   .4391522    -0.90   0.366    -1.257453    .4639917
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
fim	1.005297	0.356	0.994093	1.016628
eq2				
fim	0.988363	0.003	0.980648	0.996139

```
.  LnMM3_lf sf36pcs_impair_24 case fim

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 PCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        17         35         10 |        62
           |     27.42      56.45      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        24         34         13 |        71
           |     33.80      47.89      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        41         69         23 |       133
           |     30.83      51.88      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -920.00372
rescale:       log likelihood = -149.89074
rescale eq:    log likelihood = -140.01063
Iteration 0:   log likelihood = -140.01063
Iteration 1:   log likelihood =   -134.451
Iteration 2:   log likelihood = -133.10648
Iteration 3:   log likelihood = -131.17944
Iteration 4:   log likelihood = -131.13591
Iteration 5:   log likelihood = -131.13572
Iteration 6:   log likelihood = -131.13572

                                                  Number of obs   =        133
                                                  Wald chi2(2)    =       1.45
Log likelihood = -131.13572                       Prob > chi2     =     0.4834

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.1273138   .1682326    -0.76   0.449    -.4570437     .202416
         fim |   .0045935   .0057584     0.80   0.425    -.0066927    .0158798
       _cons |   -1.14925   .7325168    -1.57   0.117    -2.584956    .2864568
-------------+----------------------------------------------------------------
eq2          |
        case |  -.0864821   .4160047    -0.21   0.835    -.9018364    .7288722
         fim |  -.0120795   .0044865    -2.69   0.007    -.0208729   -.0032861
       _cons |  -.3061524   .6339879    -0.48   0.629    -1.548746    .9364411
------------------------------------------------------------------------------
```

Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.880457	0.449	0.633153	1.224357
fim	1.004604	0.425	0.993330	1.016007
eq2				
case	0.917152	0.835	0.405824	2.072742
fim	0.987993	0.007	0.979343	0.996719

```
.  LnMM3_lf sf36pcs_impair_24 case fim age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 PCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        17         35         10 |        62
           |     27.42      56.45      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        24         34         13 |        71
           |     33.80      47.89      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        41         69         23 |       133
           |     30.83      51.88      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -920.00372
rescale:       log likelihood = -149.89074
rescale eq:    log likelihood = -140.01063
Iteration 0:   log likelihood = -140.01063
Iteration 1:   log likelihood = -120.99405
Iteration 2:   log likelihood =  -113.4224
Iteration 3:   log likelihood = -109.26476
Iteration 4:   log likelihood = -106.34672
Iteration 5:   log likelihood =  -106.1363
Iteration 6:   log likelihood = -106.13376
Iteration 7:   log likelihood = -106.13376

                                                  Number of obs   =        133
                                                  Wald chi2(4)    =       9.37
Log likelihood = -106.13376                       Prob > chi2     =     0.0525

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.3380701   .1863987    -1.81   0.070    -.7034048    .0272646
         fim |  -.0008027   .0078271    -0.10   0.918    -.0161435     .014538
         age |   .0113019   .0046109     2.45   0.014     .0022646    .0203391
  sex_recode |   .3930768   .1974453     1.99   0.047      .006091    .7800626
       _cons |  -1.297622    .926164    -1.40   0.161     -3.11287    .5176261
-------------+----------------------------------------------------------------
eq2          |
```

```
        case |  -.4043285   .6743646    -0.60   0.549    -1.726059    .9174018
         fim |   -.054668   .0172387    -3.17   0.002    -.0884553   -.0208808
         age |    .069085    .022877     3.02   0.003      .024247     .113923
  sex_recode |   .9984989   .7689917     1.30   0.194    -.5086972    2.505695
       _cons |  -.4124227   .8936944    -0.46   0.644    -2.164031    1.339186
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                           P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   0.713145                        0.070     0.494897    1.027640
         fim |   0.999198                        0.918     0.983986    1.014644
         age |   1.011366                        0.014     1.002267    1.020547
  sex_recode |   1.481532                        0.047     1.006110    2.181609
-------------+----------------------------------------------------------------
eq2          |
        case |   0.667425                        0.549     0.177984    2.502779
         fim |   0.946799                        0.002     0.915344    0.979336
         age |   1.071527                        0.003     1.024543    1.120666
  sex_recode |   2.714204                        0.194     0.601278   12.252071
-------------+----------------------------------------------------------------

.
.  ** 2. Years education: pre-morbid **
.
.  LnMM3_lf sf36pcs_impair_24 YRSEDN

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -830.00345
rescale:       log likelihood = -136.08776
rescale eq:    log likelihood = -127.75376
Iteration 0:   log likelihood = -127.75376
Iteration 1:   log likelihood = -113.24866
Iteration 2:   log likelihood = -112.20939
Iteration 3:   log likelihood = -111.26547
Iteration 4:   log likelihood = -110.92559
Iteration 5:   log likelihood = -110.89853
Iteration 6:   log likelihood = -110.89836
Iteration 7:   log likelihood = -110.89836

                                                  Number of obs   =        121
                                                  Wald chi2(1)    =       2.14
Log likelihood = -110.89836                       Prob > chi2     =     0.1431

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
      YRSEDN |  -.0512078   .0349678    -1.46   0.143    -.1197434    .0173278
       _cons |  -.1384823   .3547701    -0.39   0.696    -.8338189    .5568542
-------------+----------------------------------------------------------------
eq2          |
      YRSEDN |  -.2601127   .0844299    -3.08   0.002    -.4255923   -.0946332
       _cons |   .7795363   .7473903     1.04   0.297    -.6853218    2.244394
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                           P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
      YRSEDN |   0.950081                        0.143     0.887148    1.017479
```

```
------------+----------------------------------------------------------------
eq2         |
      YRSEDN |   0.770965                          0.002     0.653383    0.909707
------------+----------------------------------------------------------------
```

```
. LnMM3_lf sf36pcs_impair_24 case YRSEDN

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 PCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        17         35         10 |        62
           |     27.42      56.45      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        24         34         13 |        71
           |     33.80      47.89      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        41         69         23 |       133
           |     30.83      51.88      17.29 |    100.00

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -830.00345
rescale:       log likelihood = -136.08776
rescale eq:    log likelihood = -127.75376
Iteration 0:   log likelihood = -127.75376
Iteration 1:   log likelihood =  -112.8949
Iteration 2:   log likelihood = -110.10461
Iteration 3:   log likelihood = -108.69999
Iteration 4:   log likelihood = -108.63149
Iteration 5:   log likelihood = -108.63137
Iteration 6:   log likelihood = -108.63137

                                                  Number of obs   =        121
                                                  Wald chi2(2)    =       3.45
Log likelihood = -108.63137                       Prob > chi2     =     0.1780

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.1610462   .1827477    -0.88   0.378    -.5192251    .1971328
      YRSEDN |  -.0460516   .0366695    -1.26   0.209    -.1179225    .0258194
       _cons |  -.1042793   .3512038    -0.30   0.767    -.7926261    .5840674
-------------+----------------------------------------------------------------
eq2          |
        case |   1.035397   .4990974     2.07   0.038     .0571836     2.01361
      YRSEDN |  -.4514777   .1555225    -2.90   0.004    -.7562961   -.1466592
       _cons |    1.96436   1.189965     1.65   0.099    -.3679282    4.296648
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

------------+----------------------------------------------------------------
             |
             |      RR                             P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   0.851253                          0.378     0.594981    1.217906
```

```
      YRSEDN |   0.954993                          0.209     0.888765    1.026156
-------------+----------------------------------------------------------------
eq2          |
        case |   2.816223                          0.038     1.058850    7.490306
      YRSEDN |   0.636687                          0.004     0.469402    0.863588
-------------+----------------------------------------------------------------

.  LnMM3_lf sf36pcs_impair_24 case YRSEDN age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 PCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        17         35         10 |        62
           |     27.42      56.45      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        24         34         13 |        71
           |     33.80      47.89      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        41         69         23 |       133
           |     30.83      51.88      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -830.00345
rescale:       log likelihood = -136.08776
rescale eq:    log likelihood = -127.75376
Iteration 0:   log likelihood = -127.75376
Iteration 1:   log likelihood = -113.09483
Iteration 2:   log likelihood =  -107.5785
Iteration 3:   log likelihood = -104.53315
Iteration 4:   log likelihood = -103.05234
Iteration 5:   log likelihood = -102.54299
Iteration 6:   log likelihood = -102.38363
Iteration 7:   log likelihood = -102.37787
Iteration 8:   log likelihood = -102.37787

                                                  Number of obs   =        121
                                                  Wald chi2(4)    =      11.13
Log likelihood = -102.37787                       Prob > chi2     =     0.0251

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.4238428   .1958194    -2.16   0.030    -.8076417   -.0400439
      YRSEDN |   .0052746   .0385419     0.14   0.891    -.0702661    .0808152
         age |   .0132324   .0061517     2.15   0.031     .0011753    .0252895
  sex_recode |   .4669189   .2122004     2.20   0.028     .0510137     .882824
       _cons |   -1.56115   .7306972    -2.14   0.033     -2.99329   -.1290096
-------------+----------------------------------------------------------------
eq2          |
        case |   1.222806   .6418592     1.91   0.057    -.0352146    2.480827
      YRSEDN |  -.3455811   .1656938    -2.09   0.037    -.6703349   -.0208273
         age |   .0070916   .0139945     0.51   0.612    -.0203371    .0345203
  sex_recode |  -.5429069   .5090358    -1.07   0.286    -1.540599     .454785
       _cons |   .5724347   2.008679     0.28   0.776    -3.364504    4.509373
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.654527	0.030	0.445908	0.960747
YRSEDN	1.005288	0.891	0.932146	1.084171
age	1.013320	0.031	1.001176	1.025612
sex_recode	1.595072	0.028	1.052337	2.417718
eq2				
case	3.396707	0.057	0.965398	11.951147
YRSEDN	0.707809	0.037	0.511537	0.979388
age	1.007117	0.612	0.979868	1.035123
sex_recode	0.581057	0.286	0.214253	1.575835

```
.
.  ** 3. CIQ Total: pre-morbid **
.
.  LnMM3_lf sf36pcs_impair_24 ciq_total

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -900.00372
rescale:       log likelihood = -147.39074
rescale eq:    log likelihood = -135.01063
Iteration 0:   log likelihood = -135.01063
Iteration 1:   log likelihood = -117.50472
Iteration 2:   log likelihood = -115.27977
Iteration 3:   log likelihood = -115.24862
Iteration 4:   log likelihood =  -115.2485
Iteration 5:   log likelihood =  -115.2485

                                                  Number of obs   =        131
                                                  Wald chi2(1)    =       1.06
Log likelihood =  -115.2485                       Prob > chi2     =     0.3031
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
ciq_total	-.0157878	.0153321	-1.03	0.303	-.0458383	.0142627
_cons	-.3849134	.2511368	-1.53	0.125	-.8771324	.1073056
eq2						
ciq_total	-.1832286	.0482738	-3.80	0.000	-.2778435	-.0886138
_cons	.7594889	.574926	1.32	0.186	-.3673454	1.886323

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
ciq_total	0.984336	0.303	0.955196	1.014365
eq2				
ciq_total	0.832578	0.000	0.757415	0.915199

```
.  LnMM3_lf sf36pcs_impair_24 case ciq_total
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	SF36 PCS impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	17	35	10	62
	27.42	56.45	16.13	100.00
Case	24	34	13	71
	33.80	47.89	18.31	100.00
Total	41	69	23	133
	30.83	51.88	17.29	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -900.00372
rescale:       log likelihood = -147.39074
rescale eq:    log likelihood = -135.01063
Iteration 0:   log likelihood = -135.01063
Iteration 1:   log likelihood = -116.42262
Iteration 2:   log likelihood = -112.54748
Iteration 3:   log likelihood = -112.44073
Iteration 4:   log likelihood = -112.43731
Iteration 5:   log likelihood =  -112.4373
Iteration 6:   log likelihood =  -112.4373

                                                  Number of obs   =        131
                                                  Wald chi2(2)    =       3.60
Log likelihood =  -112.4373                       Prob > chi2     =     0.1650
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	-.2590618	.1658622	-1.56	0.118	-.5841459	.0660222
ciq_total	-.0230299	.0164906	-1.40	0.163	-.0553509	.0092912
_cons	-.1333733	.2909885	-0.46	0.647	-.7037003	.4369537
eq2						
case	-.2526694	.3820436	-0.66	0.508	-1.001461	.4961224
ciq_total	-.2267869	.0637645	-3.56	0.000	-.3517631	-.1018107
_cons	1.4999	.9139857	1.64	0.101	-.2914788	3.291279

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.771775	0.118	0.557582	1.068250
ciq_total	0.977233	0.163	0.946153	1.009334
eq2				
case	0.776725	0.508	0.367342	1.642341
ciq_total	0.797091	0.000	0.703447	0.903201

```
.  LnMM3_lf sf36pcs_impair_24 case ciq_total age sex_recode
```

Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	SF36 PCS impairmant at 24 months Not impai	Impaired	Dead	Total
Control	17	35	10	62
	27.42	56.45	16.13	100.00
Case	24	34	13	71
	33.80	47.89	18.31	100.00
Total	41	69	23	133
	30.83	51.88	17.29	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -900.00372
rescale:       log likelihood = -147.39074
rescale eq:    log likelihood = -135.01063
Iteration 0:   log likelihood = -135.01063
Iteration 1:   log likelihood = -118.36514
Iteration 2:   log likelihood = -106.62538
Iteration 3:   log likelihood = -100.07776
Iteration 4:   log likelihood = -95.095901
Iteration 5:   log likelihood = -94.200333
Iteration 6:   log likelihood =  -94.09714
Iteration 7:   log likelihood = -94.096274
Iteration 8:   log likelihood = -94.096273

                                                  Number of obs   =        131
                                                  Wald chi2(4)    =      16.73
Log likelihood = -94.096273                       Prob > chi2     =     0.0022
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	-.6245043	.218746	-2.85	0.004	-1.053239	-.19577
ciq_total	-.0108663	.0205842	-0.53	0.598	-.0512107	.0294781
age	.0207614	.0061993	3.35	0.001	.0086109	.0329119
sex_recode	.5727519	.2232916	2.57	0.010	.1351084	1.010395
_cons	-1.749352	.6096214	-2.87	0.004	-2.944188	-.5545164
eq2						
case	-1.268385	.7723327	-1.64	0.101	-2.78213	.2453588
ciq_total	-.7140726	.3508564	-2.04	0.042	-1.401738	-.0264067
age	-.0317827	.0296007	-1.07	0.283	-.0897991	.0262337
sex_recode	1.916397	1.043861	1.84	0.066	-.1295331	3.962326
_cons	9.784405	6.09858	1.60	0.109	-2.168591	21.7374

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.535527	0.004	0.348806	0.822201

```
   ciq_total |   0.989193                          0.598     0.950078    1.029917
         age |   1.020978                          0.001     1.008648    1.033459
  sex_recode |   1.773140                          0.010     1.144661    2.746687
-------------+----------------------------------------------------------------
eq2          |
        case |   0.281285                          0.101     0.061907    1.278080
   ciq_total |   0.489646                          0.042     0.246169    0.973939
         age |   0.968717                          0.283     0.914115    1.026581
  sex_recode |   6.796425                          0.066     0.878506   52.579506
------------------------------------------------------------------------------

.
.   ** 4. Charlson age condition: pre-morbid **
.
.   LnMM3_lf sf36pcs_impair_24 caci

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -920.00372
rescale:       log likelihood = -149.89074
rescale eq:    log likelihood = -140.01063
Iteration 0:   log likelihood = -140.01063
Iteration 1:   log likelihood = -119.85731
Iteration 2:   log likelihood = -114.25961
Iteration 3:   log likelihood = -113.02371
Iteration 4:   log likelihood = -112.56231
Iteration 5:   log likelihood = -112.55829
Iteration 6:   log likelihood = -112.55828

                                                  Number of obs   =        133
                                                  Wald chi2(1)    =       1.22
Log likelihood = -112.55828                       Prob > chi2     =     0.2696

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        caci |   .0217776   .0197266     1.10   0.270    -.0168858    .0604409
       _cons |  -.7600609   .1345892    -5.65   0.000    -1.023851    -.496271
-------------+----------------------------------------------------------------
eq2          |
        caci |   .2375561   .0584701     4.06   0.000     .1229569    .3521553
       _cons |   -3.30567   .5419766    -6.10   0.000    -4.367925   -2.243415
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

             |
             |      RR                             P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        caci |   1.022016                          0.270     0.983256    1.062305
-------------+----------------------------------------------------------------
eq2          |
        caci |   1.268146                          0.000     1.130836    1.422129
------------------------------------------------------------------------------

.   *LnMM3_lf sf36pcs_impair_24 case caci
.   *LnMM3_lf sf36pcs_impair_24 case caci age sex_recode
.   ** above models wont converge
.
.   ** 5. Apache3 ROD: cases only **
.
.   LnMM3_lf sf36pcs_impair_24 apache3rod

Log multinomial model
```

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -470.00218
rescale:       log likelihood =  -79.17385
rescale eq:    log likelihood = -76.805005
Iteration 0:   log likelihood = -76.805005
Iteration 1:   log likelihood = -73.762286
Iteration 2:   log likelihood = -72.729166
Iteration 3:   log likelihood = -72.532468
Iteration 4:   log likelihood = -72.531858
Iteration 5:   log likelihood = -72.531858

                                                  Number of obs   =         71
                                                  Wald chi2(1)    =       0.38
Log likelihood = -72.531858                       Prob > chi2     =     0.5371

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |   .2281727   .3696673     0.62   0.537    -.4963619    .9527073
       _cons |  -.7910405   .1598867    -4.95   0.000    -1.104413   -.4776682
-------------+----------------------------------------------------------------
eq2          |
  apache3rod |    .403969   .7452129     0.54   0.588    -1.056622     1.86456
       _cons |  -1.798187    .326015    -5.52   0.000    -2.437165    -1.15921
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
apache3rod	1.256302	0.537	0.608741	2.592719
eq2				
apache3rod	1.497757	0.588	0.347628	6.453093

```
.  LnMM3_lf sf36pcs_impair_24 apache3rod age sex_recode

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -470.00218
rescale:       log likelihood =  -79.17385
rescale eq:    log likelihood = -76.805005
Iteration 0:   log likelihood = -76.805005
Iteration 1:   log likelihood = -69.301944
Iteration 2:   log likelihood = -66.874683
Iteration 3:   log likelihood = -66.229571
Iteration 4:   log likelihood = -66.227791
Iteration 5:   log likelihood =  -66.22779

                                                  Number of obs   =         71
                                                  Wald chi2(3)    =       4.68
Log likelihood =  -66.22779                       Prob > chi2     =     0.1964

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |    .172476   .3508927     0.49   0.623     -.515261     .860213
         age |   .0173957   .0084429     2.06   0.039     .0008479    .0339434
  sex_recode |   .1513236   .2332007     0.65   0.516    -.3057415    .6083886
       _cons |  -1.978096   .6378344    -3.10   0.002    -3.228228   -.7279633
-------------+----------------------------------------------------------------
eq2          |
```

```
  apache3rod |   .5306521    .768164     0.69   0.490    -.9749217    2.036226
         age |   .0219943   .0165994     1.33   0.185      -.01054    .0545286
  sex_recode |  -.3670911   .5191872    -0.71   0.480    -1.384679    .6504972
       _cons |  -3.115754   1.239286    -2.51   0.012    -5.544711   -.6867975
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |   1.188243                       0.623     0.597345    2.363664
         age |   1.017548                       0.039     1.000848    1.034526
  sex_recode |   1.163373                       0.516     0.736577    1.837468
-------------+----------------------------------------------------------------
eq2          |
  apache3rod |   1.700041                       0.490     0.377222    7.661639
         age |   1.022238                       0.185     0.989515    1.056043
  sex_recode |   0.692747                       0.480     0.250404    1.916493
-------------+----------------------------------------------------------------

.
.   ****************************************
.   * SF36 MCS: Impairment at 24 months    *
.   ****************************************
.
.   ** 1. FIM: pre-morbid **
.
.   LnMM3_lf sf36mcs_impair_24 fim

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -520.00736
rescale:       log likelihood = -133.93049
rescale eq:    log likelihood = -130.99376
Iteration 0:   log likelihood = -130.99376
Iteration 1:   log likelihood =  -127.1069
Iteration 2:   log likelihood = -123.68251
Iteration 3:   log likelihood = -121.90374
Iteration 4:   log likelihood = -121.79252
Iteration 5:   log likelihood = -121.79224
Iteration 6:   log likelihood = -121.79224

                                                  Number of obs   =        133
                                                  Wald chi2(1)    =       0.22
Log likelihood = -121.79224                       Prob > chi2     =     0.6363

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |   .0052869   .0111794     0.47   0.636    -.0166244    .0271982
       _cons |  -2.164289   1.376924    -1.57   0.116    -4.863012     .534433
-------------+----------------------------------------------------------------
eq2          |
         fim |  -.0137723   .0037226    -3.70   0.000    -.0210685   -.0064762
       _cons |  -.1548987   .3939759    -0.39   0.694    -.9270774    .6172799
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |   1.005301                       0.636     0.983513    1.027571
```

```
-------------+----------------------------------------------------------------
eq2          |
         fim |   0.986322                          0.000     0.979152    0.993545
-------------+----------------------------------------------------------------

.  LnMM3_lf sf36mcs_impair_24 case fim

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 MCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        36         16         10 |        62
           |     58.06      25.81      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        45         13         13 |        71
           |     63.38      18.31      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        81         29         23 |       133
           |     60.90      21.80      17.29 |    100.00

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -520.00736
rescale:       log likelihood = -133.93049
rescale eq:    log likelihood = -130.99376
Iteration 0:   log likelihood = -130.99376
Iteration 1:   log likelihood = -127.06112
Iteration 2:   log likelihood = -123.45323
Iteration 3:   log likelihood = -121.39281
Iteration 4:   log likelihood = -121.24254
Iteration 5:   log likelihood = -121.24226
Iteration 6:   log likelihood = -121.24226

                                                  Number of obs   =        133
                                                  Wald chi2(2)    =       1.18
Log likelihood = -121.24226                       Prob > chi2     =     0.5532

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.3254429   .3316902    -0.98   0.327    -.9755436    .3246579
         fim |   .0043883   .0116646     0.38   0.707    -.0184738    .0272505
       _cons |  -1.895611   1.455576    -1.30   0.193    -4.748487    .9572646
-------------+----------------------------------------------------------------
eq2          |
        case |  -.0485747   .4067159    -0.12   0.905    -.8457234    .7485739
         fim |  -.0140912   .0041618    -3.39   0.001    -.0222481   -.0059342
       _cons |  -.0913641   .5872704    -0.16   0.876    -1.242393    1.059665
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                             P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   0.722207                          0.327     0.376987    1.383557
```

```
         fim |   1.004398                          0.707     0.981696    1.027625
-------------+----------------------------------------------------------------
eq2          |
        case |   0.952586                          0.905     0.429247    2.113983
         fim |   0.986008                          0.001     0.977998    0.994083
-------------+----------------------------------------------------------------
```

```
. LnMM3_lf sf36mcs_impair_24 case fim age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 MCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        36         16         10 |        62
           |     58.06      25.81      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        45         13         13 |        71
           |     63.38      18.31      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        81         29         23 |       133
           |     60.90      21.80      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -520.00736
rescale:       log likelihood = -133.93049
rescale eq:    log likelihood = -130.99376
Iteration 0:   log likelihood = -130.99376
Iteration 1:   log likelihood = -120.72593
Iteration 2:   log likelihood = -114.57985
Iteration 3:   log likelihood = -110.86536
Iteration 4:   log likelihood = -109.35991
Iteration 5:   log likelihood = -109.24784
Iteration 6:   log likelihood = -109.24421
Iteration 7:   log likelihood = -109.24421

                                                  Number of obs   =        133
                                                  Wald chi2(4)    =       3.64
Log likelihood = -109.24421                       Prob > chi2     =     0.4565

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.4041969   .3275306    -1.23   0.217    -1.046145    .2377513
         fim |    .006286   .0170267     0.37   0.712    -.0270857    .0396577
         age |   .0061294   .0099328     0.62   0.537    -.0133386    .0255974
  sex_recode |   .4183405   .3376199     1.24   0.215    -.2433824    1.080063
       _cons |  -2.680104    2.21237    -1.21   0.226     -7.01627    1.656062
-------------+----------------------------------------------------------------
eq2          |
        case |   .4366435   .4194291     1.04   0.298    -.3854225    1.258709
         fim |  -.0441841   .0105868    -4.17   0.000    -.0649338   -.0234344
         age |   .0611006    .016383     3.73   0.000     .0289905    .0932106
  sex_recode |   .4729241    .442976     1.07   0.286    -.3952928    1.341141
       _cons |  -1.240349   .7579987    -1.64   0.102    -2.725999    .2453006
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.667513	0.217	0.351289	1.268394
fim	1.006306	0.712	0.973278	1.040455
age	1.006148	0.537	0.986750	1.025928
sex_recode	1.519438	0.215	0.783972	2.944866
eq2				
case	1.547504	0.298	0.680163	3.520875
fim	0.956778	0.000	0.937129	0.976838
age	1.063006	0.000	1.029415	1.097693
sex_recode	1.604680	0.286	0.673483	3.823404

```
.
.   ** 2. Years education: pre-morbid **
.
.   LnMM3_lf sf36mcs_impair_24 YRSEDN

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -490.00654
rescale:       log likelihood = -122.52155
rescale eq:    log likelihood = -120.60557
Iteration 0:   log likelihood = -120.60557
Iteration 1:   log likelihood = -112.17382
Iteration 2:   log likelihood = -110.16891
Iteration 3:   log likelihood = -109.57624
Iteration 4:   log likelihood = -109.53226
Iteration 5:   log likelihood = -109.53214
Iteration 6:   log likelihood = -109.53214

                                                  Number of obs   =        121
                                                  Wald chi2(1)    =       1.23
Log likelihood = -109.53214                       Prob > chi2     =     0.2674

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
      YRSEDN |  -.0661762   .0596619    -1.11   0.267    -.1831115    .0507591
       _cons |  -.7843869   .6100022    -1.29   0.198    -1.979969    .4111954
-------------+----------------------------------------------------------------
eq2          |
      YRSEDN |  -.2029536   .0721032    -2.81   0.005    -.3442732    -.061634
       _cons |   .2284922     .64785     0.35   0.724     -1.04127    1.498255
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
YRSEDN	0.935966	0.267	0.832675	1.052069
eq2				
YRSEDN	0.816316	0.005	0.708735	0.940227

```
.   LnMM3_lf sf36mcs_impair_24 case YRSEDN
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	SF36 MCS impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	36	16	10	62
	58.06	25.81	16.13	100.00
Case	45	13	13	71
	63.38	18.31	18.31	100.00
Total	81	29	23	133
	60.90	21.80	17.29	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -490.00654
rescale:       log likelihood = -122.52155
rescale eq:    log likelihood = -120.60557
Iteration 0:   log likelihood = -120.60557
Iteration 1:   log likelihood = -112.26443
Iteration 2:   log likelihood = -109.21625
Iteration 3:   log likelihood = -108.61806
Iteration 4:   log likelihood = -108.60926
Iteration 5:   log likelihood = -108.60925
Iteration 6:   log likelihood = -108.60925

                                                  Number of obs   =        121
                                                  Wald chi2(2)    =       3.36
Log likelihood = -108.60925                       Prob > chi2     =     0.1861
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	-.4434533	.3279603	-1.35	0.176	-1.086244	.1993371
YRSEDN	-.0666841	.0552353	-1.21	0.227	-.1749433	.0415751
_cons	-.5492709	.5780118	-0.95	0.342	-1.682153	.5836113
eq2						
case	.2104411	.3888829	0.54	0.588	-.5517555	.9726377
YRSEDN	-.2008973	.0754938	-2.66	0.008	-.3488625	-.052932
_cons	.0811007	.6806164	0.12	0.905	-1.252883	1.415084

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.641816	0.176	0.337482	1.220593
YRSEDN	0.935491	0.227	0.839505	1.042451
eq2				
case	1.234222	0.588	0.575938	2.644912
YRSEDN	0.817996	0.008	0.705490	0.948444

```
.  LnMM3_lf sf36mcs_impair_24 case YRSEDN age sex_recode
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	SF36 MCS impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	36	16	10	62
	58.06	25.81	16.13	100.00
Case	45	13	13	71
	63.38	18.31	18.31	100.00
Total	81	29	23	133
	60.90	21.80	17.29	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -490.00654
rescale:       log likelihood = -122.52155
rescale eq:    log likelihood = -120.60557
Iteration 0:   log likelihood = -120.60557
Iteration 1:   log likelihood = -109.82272
Iteration 2:   log likelihood = -106.82985
Iteration 3:   log likelihood = -105.75265
Iteration 4:   log likelihood = -105.72985
Iteration 5:   log likelihood = -105.72983
Iteration 6:   log likelihood = -105.72983

                                                Number of obs   =        121
                                                Wald chi2(4)    =       5.67
Log likelihood = -105.72983                     Prob > chi2     =     0.2256
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	-.5241813	.3259171	-1.61	0.108	-1.162967	.1146046
YRSEDN	-.0680406	.0632395	-1.08	0.282	-.1919878	.0559066
age	.0000777	.0112515	0.01	0.994	-.0219748	.0221301
sex_recode	.5263603	.3253045	1.62	0.106	-.1112248	1.163945
_cons	-.7524099	1.167654	-0.64	0.519	-3.04097	1.53615
eq2						
case	.3229501	.4097065	0.79	0.431	-.4800599	1.12596
YRSEDN	-.1249877	.0783857	-1.59	0.111	-.2786209	.0286455
age	.0283687	.0172374	1.65	0.100	-.005416	.0621534
sex_recode	-.1969424	.41161	-0.48	0.632	-1.003683	.6097985
_cons	-2.533737	1.710131	-1.48	0.138	-5.885531	.8180577

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.592040	0.108	0.312557	1.121430
YRSEDN	0.934223	0.282	0.825317	1.057499
age	1.000078	0.994	0.978265	1.022377

```
  sex_recode |   1.692760                          0.106     0.894738    3.202544
-------------+----------------------------------------------------------------
eq2          |
        case |   1.381196                          0.431     0.618746    3.083175
      YRSEDN |   0.882508                          0.111     0.756827    1.029060
         age |   1.028775                          0.100     0.994599    1.064126
  sex_recode |   0.821238                          0.632     0.366527    1.840061
-------------+----------------------------------------------------------------

.
.  ** 3. CIQ Total: pre-morbid **
.
.  LnMM3_lf sf36mcs_impair_24 ciq_total

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -500.00736
rescale:       log likelihood = -131.43049
rescale eq:    log likelihood = -125.99376
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -116.38256
Iteration 2:   log likelihood = -113.74775
Iteration 3:   log likelihood = -113.34764
Iteration 4:   log likelihood = -113.34152
Iteration 5:   log likelihood = -113.34152

                                                  Number of obs   =        131
                                                  Wald chi2(1)    =       0.14
Log likelihood = -113.34152                       Prob > chi2     =     0.7105

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
   ciq_total |   -.010438   .0281217    -0.37   0.711    -.0655556    .0446796
       _cons |   -1.33785   .4791626    -2.79   0.005    -2.276992   -.3987089
-------------+----------------------------------------------------------------
eq2          |
   ciq_total |  -.1346231   .0362658    -3.71   0.000    -.2057028   -.0635434
       _cons |   .0954153   .4448719     0.21   0.830    -.7765176    .9673482
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                             P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
   ciq_total |   0.989616                          0.711     0.936547    1.045693
-------------+----------------------------------------------------------------
eq2          |
   ciq_total |   0.874045                          0.000     0.814075    0.938433
-------------+----------------------------------------------------------------

.  LnMM3_lf sf36mcs_impair_24 case ciq_total

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 MCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
```

Control	36	16	10	62
	58.06	25.81	16.13	100.00
Case	45	13	13	71
	63.38	18.31	18.31	100.00
Total	81	29	23	133
	60.90	21.80	17.29	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -500.00736
rescale:       log likelihood = -131.43049
rescale eq:    log likelihood = -125.99376
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -116.14889
Iteration 2:   log likelihood = -113.13957
Iteration 3:   log likelihood = -112.55157
Iteration 4:   log likelihood = -112.53984
Iteration 5:   log likelihood =  -112.5398
Iteration 6:   log likelihood =  -112.5398

                                                  Number of obs   =        131
                                                  Wald chi2(2)    =       1.57
Log likelihood =  -112.5398                       Prob > chi2     =     0.4553
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	-.3917662	.3300959	-1.19	0.235	-1.038742	.2552098
ciq_total	-.0133405	.0270138	-0.49	0.621	-.0662865	.0396056
_cons	-1.096525	.4911101	-2.23	0.026	-2.059083	-.1339671
eq2						
case	.2731147	.3688147	0.74	0.459	-.4497488	.9959781
ciq_total	-.1340583	.0359609	-3.73	0.000	-.2045402	-.0635763
_cons	-.0745873	.5072099	-0.15	0.883	-1.0687	.9195259

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.675862	0.235	0.353900	1.290732
ciq_total	0.986748	0.621	0.935863	1.040400
eq2				
case	1.314051	0.459	0.637788	2.707371
ciq_total	0.874539	0.000	0.815022	0.938403

```
.  LnMM3_lf sf36mcs_impair_24 case ciq_total age sex_recode
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX

Case	SF36 MCS impairmant at 24 months Not impai	Impaired	Dead	Total
Control	36	16	10	62
	58.06	25.81	16.13	100.00
Case	45	13	13	71
	63.38	18.31	18.31	100.00
Total	81	29	23	133
	60.90	21.80	17.29	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -500.00736
rescale:       log likelihood = -131.43049
rescale eq:    log likelihood = -125.99376
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -114.98132
Iteration 2:   log likelihood = -110.64621
Iteration 3:   log likelihood = -109.24597
Iteration 4:   log likelihood = -109.20444
Iteration 5:   log likelihood = -109.20432
Iteration 6:   log likelihood = -109.20432

                                                  Number of obs   =        131
                                                  Wald chi2(4)    =       4.43
Log likelihood = -109.20432                       Prob > chi2     =     0.3511
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	-.4542333	.3249389	-1.40	0.162	-1.091102	.1826351
ciq_total	-.0140904	.0311062	-0.45	0.651	-.0750575	.0468766
age	.0062208	.0119639	0.52	0.603	-.017228	.0296697
sex_recode	.4850641	.339026	1.43	0.152	-.1794146	1.149543
_cons	-1.683761	1.072602	-1.57	0.116	-3.786022	.4184995
eq2						
case	.2737376	.369926	0.74	0.459	-.4513039	.9987792
ciq_total	-.1152816	.0415487	-2.77	0.006	-.1967156	-.0338476
age	.0276619	.0181	1.53	0.126	-.0078134	.0631373
sex_recode	.1671236	.3623306	0.46	0.645	-.5430314	.8772785
_cons	-2.270308	1.579901	-1.44	0.151	-5.366858	.8262415

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.634935	0.162	0.335846	1.200376
ciq_total	0.986008	0.651	0.927690	1.047993
age	1.006240	0.603	0.982920	1.030114
sex_recode	1.624279	0.152	0.835759	3.156749
eq2				
case	1.314870	0.459	0.636797	2.714965
ciq_total	0.891115	0.006	0.821424	0.966719
age	1.028048	0.126	0.992217	1.065173
sex_recode	1.181900	0.645	0.580984	2.404347

.

```
.  ** 4. Charlson age condition: pre-morbid **
.
.  LnMM3_lf sf36mcs_impair_24 caci

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -520.00736
rescale:       log likelihood = -133.93049
rescale eq:    log likelihood = -130.99376
Iteration 0:   log likelihood = -130.99376
Iteration 1:   log likelihood = -116.83726
Iteration 2:   log likelihood = -110.38912
Iteration 3:   log likelihood = -109.70834
Iteration 4:   log likelihood = -109.42966
Iteration 5:   log likelihood = -109.41898
Iteration 6:   log likelihood = -109.41897
Iteration 7:   log likelihood = -109.41897

                                                  Number of obs   =        133
                                                  Wald chi2(1)    =       0.40
Log likelihood = -109.41897                       Prob > chi2     =     0.5292

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        caci |  -.0299471    .047597    -0.63   0.529    -.1232356    .0633413
       _cons |  -1.391555   .2551841    -5.45   0.000    -1.891707   -.8914033
-------------+----------------------------------------------------------------
eq2          |
        caci |   .2547737   .0419857     6.07   0.000     .1724834    .3370641
       _cons |  -3.376883   .4528315    -7.46   0.000    -4.264417    -2.48935
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
caci	0.970497	0.529	0.884055	1.065390
eq2				
caci	1.290170	0.000	1.188252	1.400829

```
.  LnMM3_lf sf36mcs_impair_24 case caci

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	SF36 MCS impairmant at 24 months Not impai	Impaired	Dead	Total
Control	36	16	10	62
	58.06	25.81	16.13	100.00
Case	45	13	13	71
	63.38	18.31	18.31	100.00
Total	81	29	23	133

```
|      60.90      21.80      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -520.00736
rescale:       log likelihood = -133.93049
rescale eq:    log likelihood = -130.99376
Iteration 0:   log likelihood = -130.99376
Iteration 1:   log likelihood = -116.74885
Iteration 2:   log likelihood = -109.96864
Iteration 3:   log likelihood = -108.66836
Iteration 4:   log likelihood = -108.31108
Iteration 5:   log likelihood = -108.30764
Iteration 6:   log likelihood = -108.30762
Iteration 7:   log likelihood = -108.30762

                                                  Number of obs   =        133
                                                  Wald chi2(2)    =       1.52
Log likelihood = -108.30762                       Prob > chi2     =     0.4668

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.3436785   .3297017    -1.04   0.297     -.989882     .302525
        caci |  -.0298918   .0466333    -0.64   0.522    -.1212914    .0615078
       _cons |  -1.222958   .2854873    -4.28   0.000    -1.782502   -.6634129
-------------+----------------------------------------------------------------
eq2          |
        case |    .351231   .2509119     1.40   0.162    -.1405473    .8430094
        caci |   .2733669   .0468165     5.84   0.000     .1816082    .3651255
       _cons |  -3.701141   .5329082    -6.95   0.000    -4.745622    -2.65666
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
------------------------------------------------------------------------------
             |
             |      RR                           P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   0.709157                        0.297     0.371621    1.353271
        caci |   0.970551                        0.522     0.885776    1.063439
-------------+----------------------------------------------------------------
eq2          |
        case |   1.420816                        0.162     0.868883    2.323348
        caci |   1.314382                        0.000     1.199144    1.440695
------------------------------------------------------------------------------

.  LnMM3_lf sf36mcs_impair_24 case caci age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 MCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        36         16         10 |        62
           |     58.06      25.81      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        45         13         13 |        71
```

```
           Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX
           |     63.38      18.31      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        81         29         23 |       133
           |     60.90      21.80      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -520.00736
rescale:       log likelihood = -133.93049
rescale eq:    log likelihood = -130.99376
Iteration 0:   log likelihood = -130.99376
Iteration 1:   log likelihood = -114.73456
Iteration 2:   log likelihood = -109.35448
Iteration 3:   log likelihood = -106.55326
Iteration 4:   log likelihood = -105.27259
Iteration 5:   log likelihood = -105.23686
Iteration 6:   log likelihood = -105.23677
Iteration 7:   log likelihood = -105.23677

                                                  Number of obs   =        133
                                                  Wald chi2(4)    =       6.54
Log likelihood = -105.23677                       Prob > chi2     =     0.1622

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.4200824   .3208567    -1.31   0.190     -1.04895    .2087852
        caci |  -.1065544   .0697726    -1.53   0.127    -.2433061    .0301974
         age |   .0215016   .0133459     1.61   0.107    -.0046559     .047659
  sex_recode |   .3589484   .3242729     1.11   0.268    -.2766147    .9945116
       _cons |  -2.372349   .7436321    -3.19   0.001    -3.829842   -.9148573
-------------+----------------------------------------------------------------
eq2          |
        case |   .2103047   .3472642     0.61   0.545    -.4703205      .89093
        caci |   .2724824    .048941     5.57   0.000     .1765598     .368405
         age |      .0195    .021948     0.89   0.374    -.0235173    .0625174
  sex_recode |   .0046394   .3515514     0.01   0.989    -.6843887    .6936675
       _cons |  -4.945477   1.610612    -3.07   0.002    -8.102219   -1.788735
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+--------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+--------------------------------------------------------------
eq1          |
        case |   0.656993                       0.190     0.350305    1.232180
        caci |   0.898926                       0.127     0.784031    1.030658
         age |   1.021734                       0.107     0.995355    1.048813
  sex_recode |   1.431823                       0.268     0.758347    2.703404
-------------+--------------------------------------------------------------
eq2          |
        case |   1.234054                       0.545     0.624802    2.437395
        caci |   1.313220                       0.000     1.193106    1.445427
         age |   1.019691                       0.374     0.976757    1.064513
  sex_recode |   1.004650                       0.989     0.504398    2.001041
-------------+--------------------------------------------------------------

.
.   ** 5. Apache3 ROD: cases only **
.
.   LnMM3_lf sf36mcs_impair_24 apache3rod

Log multinomial model
```

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -260.00409
rescale:       log likelihood = -70.794718
rescale eq:    log likelihood = -69.440979
Iteration 0:   log likelihood = -69.440979
Iteration 1:   log likelihood = -65.985552
Iteration 2:   log likelihood = -64.349138
Iteration 3:   log likelihood = -63.761103
Iteration 4:   log likelihood = -63.660734
Iteration 5:   log likelihood = -63.660137
Iteration 6:   log likelihood = -63.660137

                                                  Number of obs   =         71
                                                  Wald chi2(1)    =       1.36
Log likelihood = -63.660137                       Prob > chi2     =     0.2440

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |   .9363234    .803752     1.16   0.244    -.6390015    2.511648
       _cons |  -1.943396   .3597264    -5.40   0.000    -2.648447   -1.238345
-------------+----------------------------------------------------------------
eq2          |
  apache3rod |    .572305   .8736831     0.66   0.512    -1.140082    2.284692
       _cons |  -1.839984   .3504278    -5.25   0.000     -2.52681   -1.153158
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
apache3rod	2.550587	0.244	0.527819	12.325230
eq2				
apache3rod	1.772348	0.512	0.319793	9.822663

```
.  LnMM3_lf sf36mcs_impair_24 apache3rod age sex_recode

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -260.00409
rescale:       log likelihood = -70.794718
rescale eq:    log likelihood = -69.440979
Iteration 0:   log likelihood = -69.440979
Iteration 1:   log likelihood = -65.353473
Iteration 2:   log likelihood = -62.394324
Iteration 3:   log likelihood = -61.628622
Iteration 4:   log likelihood =  -61.62149
Iteration 5:   log likelihood = -61.621487

                                                  Number of obs   =         71
                                                  Wald chi2(3)    =       1.98
Log likelihood = -61.621487                       Prob > chi2     =     0.5767

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |   .8787889   .7733417     1.14   0.256     -.636933    2.394511
         age |  -.0058083   .0171744    -0.34   0.735    -.0394694    .0278529
  sex_recode |   .3556636   .5127559     0.69   0.488    -.6493195    1.360647
       _cons |  -1.745958   1.063043    -1.64   0.101    -3.829485    .3375687
-------------+----------------------------------------------------------------
```

```
eq2          |
  apache3rod |   .7946068   .8829943     0.90   0.368    -.9360302    2.525244
         age |   .0375663   .0233467     1.61   0.108    -.0081924    .0833249
  sex_recode |  -.3685135   .5073586    -0.73   0.468    -1.362918    .6258911
       _cons |  -4.204874   1.723564    -2.44   0.015    -7.582998   -.8267495
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |   2.407982                       0.256     0.528912   10.962833
         age |   0.994209                       0.735     0.961299    1.028244
  sex_recode |   1.427127                       0.488     0.522401    3.898714
-------------+----------------------------------------------------------------
eq2          |
  apache3rod |   2.213571                       0.368     0.392182   12.493941
         age |   1.038281                       0.108     0.991841    1.086895
  sex_recode |   0.691762                       0.468     0.255913    1.869912
-------------+----------------------------------------------------------------

.
.   ****************************************
.   * Social: Impairment at 24 months      *
.   ****************************************
.
.   ** 1. FIM: pre-morbid **
.
.   LnMM3_lf social_impair_24 fim

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -89.247317
Iteration 2:   log likelihood = -85.868903
Iteration 3:   log likelihood = -84.045257
Iteration 4:   log likelihood = -83.472947
Iteration 5:   log likelihood = -83.181051
Iteration 6:   log likelihood = -83.149926
Iteration 7:   log likelihood = -83.149711
Iteration 8:   log likelihood = -83.149711

                                                  Number of obs   =        134
                                                  Wald chi2(1)    =       0.89
Log likelihood = -83.149711                       Prob > chi2     =     0.3468

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |    .233365    .248051     0.94   0.347    -.2528059     .719536
       _cons |  -32.07877   31.15549    -1.03   0.303     -93.1424    28.98486
-------------+----------------------------------------------------------------
eq2          |
         fim |  -.0151083   .0034679    -4.36   0.000    -.0219052   -.0083114
       _cons |  -.0056376    .353399    -0.02   0.987     -.698287    .6870118
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
```

eq1				
fim	1.262842	0.347	0.776619	2.053480
eq2				
fim	0.985005	0.000	0.978333	0.991723

```
.  LnMM3_lf social_impair_24 case fim
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

Key
frequency
row percentage

Case	Social impairmant at 24 months Not impai	Impaired	Dead	Total
Control	53	0	10	63
	84.13	0.00	15.87	100.00
Case	51	7	13	71
	71.83	9.86	18.31	100.00
Total	104	7	23	134
	77.61	5.22	17.16	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -88.946636
Iteration 2:   log likelihood = -84.667329
Iteration 3:   log likelihood = -80.776546
Iteration 4:   log likelihood = -79.214549
Iteration 5:   log likelihood = -78.764229
Iteration 6:   log likelihood = -78.715038
Iteration 7:   log likelihood = -78.707269
Iteration 8:   log likelihood =  -78.70585
Iteration 9:   log likelihood = -78.705538
Iteration 10:  log likelihood = -78.705461
Iteration 11:  log likelihood = -78.705446
Iteration 12:  log likelihood = -78.705442

                                                  Number of obs   =        134
                                                  Wald chi2(2)    =       0.65
Log likelihood = -78.705442                       Prob > chi2     =     0.7225
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	15.71782	1064.495	0.01	0.988	-2070.654	2102.089
fim	.1963074	.2435378	0.81	0.420	-.2810178	.6736327
_cons	-42.53969	1064.933	-0.04	0.968	-2129.769	2044.69
eq2						
case	-.0237631	.4047149	-0.06	0.953	-.8169898	.7694635
fim	-.0152178	.0039415	-3.86	0.000	-.022943	-.0074926
_cons	.0198726	.5603378	0.04	0.972	-1.078369	1.118114

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	6.70e+06	0.988	0.000000	.
fim	1.216901	0.420	0.755015	1.961349
eq2				
case	0.976517	0.953	0.441759	2.158608
fim	0.984897	0.000	0.977318	0.992535

```
. LnMM3_lf social_impair_24 case fim age sex_recode
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

Key
frequency
row percentage

Case	Social impairmant at 24 months Not impai	Impaired	Dead	Total
Control	53	0	10	63
	84.13	0.00	15.87	100.00
Case	51	7	13	71
	71.83	9.86	18.31	100.00
Total	104	7	23	134
	77.61	5.22	17.16	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -87.244448
Iteration 2:   log likelihood = -76.730122
Iteration 3:   log likelihood = -71.483245
Iteration 4:   log likelihood = -68.897497
Iteration 5:   log likelihood = -67.879697
Iteration 6:   log likelihood =   -67.6907
Iteration 7:   log likelihood =  -67.67415
Iteration 8:   log likelihood = -67.670332
Iteration 9:   log likelihood =  -67.66952
Iteration 10:  log likelihood = -67.669352
Iteration 11:  log likelihood = -67.669314
Iteration 12:  log likelihood = -67.669304
Iteration 13:  log likelihood = -67.669303

                                                  Number of obs   =        134
                                                  Wald chi2(4)    =       0.90
Log likelihood = -67.669303                       Prob > chi2     =     0.9245

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
```

```
eq1          |
        case |   16.56819   1739.372     0.01   0.992    -3392.539    3425.675
         fim |   .2435362   .2721999     0.89   0.371    -.2899659    .7770383
         age |   .0069392   .0237816     0.29   0.770    -.0396719    .0535503
  sex_recode |  -.2330061   .7186492    -0.32   0.746    -1.641533    1.175521
       _cons |  -49.64128   1739.713    -0.03   0.977    -3459.416    3360.133
-------------+----------------------------------------------------------------
eq2          |
        case |   .4003788   .3988884     1.00   0.316    -.3814281    1.182186
         fim |  -.0476804    .010304    -4.63   0.000    -.0678759    -.027485
         age |   .0669216   .0159966     4.18   0.000     .0355689    .0982742
  sex_recode |   .3891553   .4282469     0.91   0.363    -.4501931    1.228504
       _cons |  -1.173212   .7110061    -1.65   0.099    -2.566758    .2203343
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.57e+07	0.992	0.000000	.
fim	1.275753	0.371	0.748289	2.175021
age	1.006963	0.770	0.961105	1.055010
sex_recode	0.792149	0.746	0.193683	3.239829
eq2				
case	1.492390	0.316	0.682886	3.261495
fim	0.953438	0.000	0.934376	0.972889
age	1.069212	0.000	1.036209	1.103265
sex_recode	1.475734	0.363	0.637505	3.416115

```
.
.   ** 2. Years education: pre-morbid **
.
.   LnMM3_lf social_impair_24 YRSEDN

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -270.00863
rescale:       log likelihood = -84.536353
rescale eq:    log likelihood = -84.536353
Iteration 0:   log likelihood = -84.536353
Iteration 1:   log likelihood = -74.498549
Iteration 2:   log likelihood = -72.282493
Iteration 3:   log likelihood = -72.189414
Iteration 4:   log likelihood = -72.188919
Iteration 5:   log likelihood = -72.188919

                                                  Number of obs   =        122
                                                  Wald chi2(1)    =       3.12
Log likelihood = -72.188919                       Prob > chi2     =     0.0773

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
      YRSEDN |  -.2965846    .167893    -1.77   0.077    -.6256489    .0324797
       _cons |  -.1822314   1.484045    -0.12   0.902    -3.090907    2.726444
-------------+----------------------------------------------------------------
eq2          |
      YRSEDN |  -.2269546   .0776505    -2.92   0.003    -.3791468   -.0747625
       _cons |   .4539745   .6968272     0.65   0.515    -.9117817    1.819731
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
YRSEDN	0.743353	0.077	0.534914	1.033013
eq2				
YRSEDN	0.796957	0.003	0.684445	0.927964

```
.  LnMM3_lf social_impair_24 case YRSEDN

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |  Social impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        53         0         10 |        63
           |     84.13      0.00      15.87 |    100.00
-----------+---------------------------------+----------
      Case |        51         7         13 |        71
           |     71.83      9.86      18.31 |    100.00
-----------+---------------------------------+----------
     Total |       104         7         23 |       134
           |     77.61      5.22      17.16 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -270.00863
rescale:       log likelihood = -84.536353
rescale eq:    log likelihood = -84.536353
Iteration 0:   log likelihood = -84.536353
Iteration 1:   log likelihood = -73.074667
Iteration 2:   log likelihood = -69.021065
Iteration 3:   log likelihood = -68.430621
Iteration 4:   log likelihood = -68.285938
Iteration 5:   log likelihood = -68.251227
Iteration 6:   log likelihood = -68.244322
Iteration 7:   log likelihood = -68.242857
Iteration 8:   log likelihood =  -68.24251
Iteration 9:   log likelihood = -68.242432
Iteration 10:  log likelihood = -68.242415
Iteration 11:  log likelihood = -68.242412

                                                  Number of obs   =        122
                                                  Wald chi2(2)    =       2.79
Log likelihood = -68.242412                       Prob > chi2     =     0.2478

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   16.31287   1652.231     0.01   0.992        -3222    3254.626
      YRSEDN |  -.3464245   .2073944    -1.67   0.095      -.75291     .060061
       _cons |  -15.49659   1652.232    -0.01   0.993    -3253.811    3222.818
-------------+----------------------------------------------------------------
eq2          |
        case |   .1673293   .3897829     0.43   0.668    -.5966312    .9312898
```

```
      YRSEDN |  -.2409655   .0847535    -2.84   0.004    -.4070794   -.0748517
       _cons |   .4882397   .7892319     0.62   0.536    -1.058626    2.035106
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.22e+07	0.992	0.000000	.
YRSEDN	0.707212	0.095	0.470994	1.061901
eq2				
case	1.182143	0.668	0.550664	2.537780
YRSEDN	0.785869	0.004	0.665591	0.927881

```
.  LnMM3_lf social_impair_24 case YRSEDN age sex_recode
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Social impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	53	0	10	63
	84.13	0.00	15.87	100.00
Case	51	7	13	71
	71.83	9.86	18.31	100.00
Total	104	7	23	134
	77.61	5.22	17.16	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -270.00863
rescale:       log likelihood = -84.536353
rescale eq:    log likelihood = -84.536353
Iteration 0:   log likelihood = -84.536353
Iteration 1:   log likelihood = -72.951775
Iteration 2:   log likelihood = -69.090748
Iteration 3:   log likelihood = -66.580983
Iteration 4:   log likelihood =  -65.90035
Iteration 5:   log likelihood = -65.779204
Iteration 6:   log likelihood =  -65.74667
Iteration 7:   log likelihood = -65.741163
Iteration 8:   log likelihood = -65.739861
Iteration 9:   log likelihood = -65.739552
Iteration 10:  log likelihood = -65.739489
Iteration 11:  log likelihood = -65.739479
Iteration 12:  log likelihood = -65.739476

                                                  Number of obs   =        122
                                                  Wald chi2(4)    =       3.54
Log likelihood = -65.739476                       Prob > chi2     =     0.4719

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
eq1          |
        case |   16.21562   1514.654     0.01   0.991    -2952.452    2984.883
      YRSEDN |  -.3736829   .2174916    -1.72   0.086    -.7999587    .0525929
         age |  -.0097538   .0251821    -0.39   0.699    -.0591097    .0396022
  sex_recode |  -.4690126   .8012778    -0.59   0.558    -2.039488    1.101463
       _cons |  -14.33908   1514.657    -0.01   0.992    -2983.012    2954.334
-------------+----------------------------------------------------------------
eq2          |
        case |   .2529337   .3821651     0.66   0.508     -.496096    1.001963
      YRSEDN |  -.1603643   .0805782    -1.99   0.047    -.3182947    -.002434
         age |   .0318679   .0172958     1.84   0.065    -.0020311     .065767
  sex_recode |  -.1905879   .3971706    -0.48   0.631     -.969028    .5878521
       _cons |  -2.388427   1.685859    -1.42   0.157    -5.692649    .9157956
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.10e+07	0.991	0.000000	.
YRSEDN	0.688195	0.086	0.449348	1.054000
age	0.990294	0.699	0.942603	1.040397
sex_recode	0.625620	0.558	0.130095	3.008564
eq2				
case	1.287798	0.508	0.608903	2.723624
YRSEDN	0.851833	0.047	0.727388	0.997569
age	1.032381	0.065	0.997971	1.067978
sex_recode	0.826473	0.631	0.379452	1.800118

```
.
.  ** 3. CIQ Total: pre-morbid **
.
.  LnMM3_lf social_impair_24 ciq_total

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -280.00944
rescale:       log likelihood = -88.650323
rescale eq:    log likelihood = -88.650323
Iteration 0:   log likelihood = -88.650323
Iteration 1:   log likelihood =  -79.83291
Iteration 2:   log likelihood = -78.267057
Iteration 3:   log likelihood =  -78.08987
Iteration 4:   log likelihood =   -78.0884
Iteration 5:   log likelihood =   -78.0884

                                                  Number of obs   =        132
                                                  Wald chi2(1)    =       0.00
Log likelihood =   -78.0884                       Prob > chi2     =     0.9616

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
   ciq_total |   .0029017   .0602126     0.05   0.962    -.1151127    .1209162
       _cons |  -2.984924   1.065798    -2.80   0.005    -5.073849   -.8959988
-------------+----------------------------------------------------------------
eq2          |
   ciq_total |  -.0996833   .0239389    -4.16   0.000    -.1466027    -.052764
       _cons |  -.3941089   .2971818    -1.33   0.185    -.9765745    .1883567
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
ciq_total	1.002906	0.962	0.891266	1.128530
eq2				
ciq_total	0.905124	0.000	0.863637	0.948604

```
.  LnMM3_lf social_impair_24 case ciq_total

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |  Social impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        53          0         10 |        63
           |     84.13       0.00      15.87 |    100.00
-----------+---------------------------------+----------
      Case |        51          7         13 |        71
           |     71.83       9.86      18.31 |    100.00
-----------+---------------------------------+----------
     Total |       104          7         23 |       134
           |     77.61       5.22      17.16 |    100.00

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -280.00944
rescale:       log likelihood = -88.650323
rescale eq:    log likelihood = -88.650323
Iteration 0:   log likelihood = -88.650323
Iteration 1:   log likelihood = -78.381364
Iteration 2:   log likelihood = -74.867067
Iteration 3:   log likelihood = -72.828734
Iteration 4:   log likelihood = -72.357692
Iteration 5:   log likelihood = -72.276652
Iteration 6:   log likelihood =   -72.2584
Iteration 7:   log likelihood = -72.254964
Iteration 8:   log likelihood = -72.254189
Iteration 9:   log likelihood = -72.254009
Iteration 10:  log likelihood = -72.253968
Iteration 11:  log likelihood = -72.253959
Iteration 12:  log likelihood = -72.253958

                                                  Number of obs   =        132
                                                  Wald chi2(2)    =       0.00
Log likelihood = -72.253958                       Prob > chi2     =     0.9992

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   17.28471   2330.155     0.01   0.994    -4549.734    4584.304
   ciq_total |   .0029055   .0729829     0.04   0.968    -.1401384    .1459494
       _cons |  -19.64965   2330.155    -0.01   0.993    -4586.669     4547.37
-------------+----------------------------------------------------------------
```

```
eq2          |
        case |    .536066   .3957242     1.35   0.176    -.2395393    1.311671
   ciq_total | -.1176323   .0295341    -3.98   0.000    -.1755181   -.0597464
       _cons | -.4577988   .3645418    -1.26   0.209    -1.172288      .25669
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	3.21e+07	0.994	0.000000	.
ciq_total	1.002910	0.968	0.869238	1.157138
eq2				
case	1.709269	0.176	0.786990	3.712372
ciq_total	0.889023	0.000	0.839022	0.942003

```
. LnMM3_lf social_impair_24 case ciq_total age sex_recode
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Social impairmant at 24 months Not impai	Impaired	Dead	Total
Control	53	0	10	63
	84.13	0.00	15.87	100.00
Case	51	7	13	71
	71.83	9.86	18.31	100.00
Total	104	7	23	134
	77.61	5.22	17.16	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -280.00944
rescale:       log likelihood = -88.650323
rescale eq:    log likelihood = -88.650323
Iteration 0:   log likelihood = -88.650323
Iteration 1:   log likelihood = -77.468375
Iteration 2:   log likelihood = -74.904361
Iteration 3:   log likelihood = -70.907894
Iteration 4:   log likelihood = -70.003352
Iteration 5:   log likelihood = -69.841274
Iteration 6:   log likelihood = -69.824001
Iteration 7:   log likelihood = -69.819941
Iteration 8:   log likelihood = -69.818936
Iteration 9:   log likelihood = -69.818741
Iteration 10:  log likelihood = -69.818709
Iteration 11:  log likelihood = -69.818702
Iteration 12:  log likelihood =   -69.8187

                                                  Number of obs   =        132
                                                  Wald chi2(4)    =       0.10
Log likelihood =   -69.8187                       Prob > chi2     =     0.9987
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	16.4236	1508.931	0.01	0.991	-2941.028	2973.875
ciq_total	.0150036	.0786603	0.19	0.849	-.1391678	.1691749
age	.0052978	.0231621	0.23	0.819	-.0400991	.0506948
sex_recode	-.1840035	.7529433	-0.24	0.807	-1.659745	1.291738
_cons	-19.24026	1508.933	-0.01	0.990	-2976.694	2938.214
eq2						
case	.4404159	.3836995	1.15	0.251	-.3116214	1.192453
ciq_total	-.1101763	.0346979	-3.18	0.001	-.1781829	-.0421697
age	.0343997	.0175891	1.96	0.050	-.0000742	.0688737
sex_recode	.1636354	.3646813	0.45	0.654	-.5511268	.8783975
_cons	-2.890971	1.371285	-2.11	0.035	-5.578641	-.2033011

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.36e+07	0.991	0.000000	.
ciq_total	1.015117	0.849	0.870082	1.184327
age	1.005312	0.819	0.960694	1.052002
sex_recode	0.831933	0.807	0.190187	3.639107
eq2				
case	1.553353	0.251	0.732259	3.295155
ciq_total	0.895676	0.001	0.836789	0.958707
age	1.034998	0.050	0.999926	1.071301
sex_recode	1.177785	0.654	0.576300	2.407039

```
.
.  ** 4. Charlson age condition: pre-morbid **
.
.  LnMM3_lf social_impair_24 caci

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood =  -79.45085
Iteration 2:   log likelihood = -72.492005
Iteration 3:   log likelihood =  -71.52816
Iteration 4:   log likelihood = -71.381163
Iteration 5:   log likelihood =  -71.38084
Iteration 6:   log likelihood =  -71.38084

                                                  Number of obs   =        134
                                                  Wald chi2(1)    =       0.00
Log likelihood =  -71.38084                       Prob > chi2     =     0.9886
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
caci	-.0015234	.1067586	-0.01	0.989	-.2107665	.2077196
_cons	-2.944952	.6111242	-4.82	0.000	-4.142733	-1.74717
eq2						
caci	.2780387	.0438006	6.35	0.000	.1921911	.3638863

```
       _cons |  -3.537188   .4700086    -7.53   0.000    -4.458388   -2.615988
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

------------------------------------------------------------------------------
             |      RR                         P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        caci |   0.998478                      0.989     0.809963    1.230868
-------------+----------------------------------------------------------------
eq2          |
        caci |   1.320537                      0.000     1.211902    1.438911
------------------------------------------------------------------------------

.  LnMM3_lf social_impair_24 case caci

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |  Social impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        53          0         10 |        63
           |     84.13       0.00      15.87 |    100.00
-----------+---------------------------------+----------
      Case |        51          7         13 |        71
           |     71.83       9.86      18.31 |    100.00
-----------+---------------------------------+----------
     Total |       104          7         23 |       134
           |     77.61       5.22      17.16 |    100.00

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -72.735289
Iteration 2:   log likelihood =  -67.71392
Iteration 3:   log likelihood =  -66.28297
Iteration 4:   log likelihood = -65.831358
Iteration 5:   log likelihood = -65.777244
Iteration 6:   log likelihood = -65.763492
Iteration 7:   log likelihood = -65.760706
Iteration 8:   log likelihood =   -65.7601
Iteration 9:   log likelihood = -65.759963
Iteration 10:  log likelihood = -65.759929
Iteration 11:  log likelihood = -65.759923

                                                  Number of obs   =        134
                                                  Wald chi2(2)    =       0.01
Log likelihood = -65.759923                       Prob > chi2     =     0.9958

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   15.47897   925.9172     0.02   0.987    -1799.285    1830.243
        caci |   .0094876   .1053366     0.09   0.928    -.1969684    .2159436
```

```
       _cons |  -17.83857   925.9173    -0.02   0.985    -1832.603    1796.926
-------------+----------------------------------------------------------------
eq2          |
        case |   .2669831   .2674677     1.00   0.318     -.257244    .7912102
        caci |   .2959221    .048773     6.07   0.000     .2003288    .3915155
       _cons |  -3.806172   .5402761    -7.04   0.000    -4.865094    -2.74725
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	5.28e+06	0.987	0.000000	.
caci	1.009533	0.928	0.821217	1.241032
eq2				
case	1.306018	0.318	0.773180	2.206065
caci	1.344365	0.000	1.221804	1.479221

```
.  LnMM3_lf social_impair_24 case caci age sex_recode
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

	Social impairmant at 24 months			
Case	Not impai	Impaired	Dead	Total
Control	53	0	10	63
	84.13	0.00	15.87	100.00
Case	51	7	13	71
	71.83	9.86	18.31	100.00
Total	104	7	23	134
	77.61	5.22	17.16	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -76.379061
Iteration 2:   log likelihood =  -70.82735
Iteration 3:   log likelihood = -70.716205  (not concave)
Iteration 4:   log likelihood = -69.059623
Iteration 5:   log likelihood = -67.240061
Iteration 6:   log likelihood = -66.019742
Iteration 7:   log likelihood = -65.683133
Iteration 8:   log likelihood =  -65.63672
Iteration 9:   log likelihood = -65.634442
Iteration 10:  log likelihood = -65.633969
Iteration 11:  log likelihood = -65.633866
Iteration 12:  log likelihood = -65.633844
Iteration 13:  log likelihood = -65.633838

                                                  Number of obs   =        134
```

```
                                                  Wald chi2(4)    =       0.01
Log likelihood = -65.633838                       Prob > chi2     =     1.0000

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   15.64997   1007.366     0.02   0.988    -1958.751    1990.051
        caci |    .001786   .1644966     0.01   0.991    -.3206214    .3241934
         age |   .0020389   .0333611     0.06   0.951    -.0633477    .0674256
  sex_recode |  -.0107343    .774128    -0.01   0.989    -1.527997    1.506529
       _cons |  -18.09878   1007.367    -0.02   0.986    -1992.502    1956.304
-------------+----------------------------------------------------------------
eq2          |
        case |   .2333933   .3820721     0.61   0.541    -.5154542    .9822408
        caci |   .2885059   .0520863     5.54   0.000     .1864186    .3905932
         age |   .0105251   .0219677     0.48   0.632    -.0325307     .053581
  sex_recode |   .0565495   .3659846     0.15   0.877    -.6607672    .7738662
       _cons |  -4.483184   1.535224    -2.92   0.003    -7.492168     -1.4742
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   6.26e+06                       0.988     0.000000          .
        caci |   1.001788                       0.991     0.725698    1.382915
         age |   1.002041                       0.951     0.938617    1.069751
  sex_recode |   0.989323                       0.989     0.216970    4.511045
-------------+----------------------------------------------------------------
eq2          |
        case |   1.262878                       0.541     0.597229    2.670433
        caci |   1.334432                       0.000     1.204927    1.477857
         age |   1.010581                       0.632     0.967993    1.055042
  sex_recode |   1.058179                       0.877     0.516455    2.168132
-------------+----------------------------------------------------------------

.
.   ** 5. Apache3 ROD: cases only **
.
.   LnMM3_lf social_impair_24 apache3rod

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -200.00463
rescale:       log likelihood = -59.145832
rescale eq:    log likelihood = -57.199777
Iteration 0:   log likelihood = -57.199777
Iteration 1:   log likelihood = -54.500611
Iteration 2:   log likelihood =  -53.48853
Iteration 3:   log likelihood = -53.485745
Iteration 4:   log likelihood = -53.485745

                                                  Number of obs   =         71
                                                  Wald chi2(1)    =       3.13
Log likelihood = -53.485745                       Prob > chi2     =     0.0770

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |   1.813675    1.02555     1.77   0.077    -.1963659    3.823715
       _cons |  -2.861592   .5567358    -5.14   0.000    -3.952774   -1.770409
-------------+----------------------------------------------------------------
eq2          |
```

```
  apache3rod |   .5681114   .8720802     0.65   0.515    -1.141134    2.277357
       _cons |  -1.838944   .3500555    -5.25   0.000     -2.52504   -1.152848
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |   6.132943                       0.077     0.821712   45.773965
-------------+----------------------------------------------------------------
eq2          |
  apache3rod |   1.764931                       0.515     0.319456    9.750877
-------------+----------------------------------------------------------------

.  LnMM3_lf social_impair_24 apache3rod age sex_recode

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -200.00463
rescale:       log likelihood = -59.145832
rescale eq:    log likelihood = -57.199777
Iteration 0:   log likelihood = -57.199777
Iteration 1:   log likelihood = -53.944392
Iteration 2:   log likelihood = -51.820752
Iteration 3:   log likelihood = -51.775992
Iteration 4:   log likelihood = -51.775811
Iteration 5:   log likelihood = -51.775811

                                                  Number of obs   =         71
                                                  Wald chi2(3)    =       3.13
Log likelihood = -51.775811                       Prob > chi2     =     0.3724

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |   1.903646   1.084006     1.76   0.079     -.220966    4.028259
         age |   .0045303   .0249793     0.18   0.856    -.0444283    .0534888
  sex_recode |  -.2096741   .7193987    -0.29   0.771     -1.61967    1.200321
       _cons |  -3.082884    1.64906    -1.87   0.062    -6.314983    .1492155
-------------+----------------------------------------------------------------
eq2          |
  apache3rod |   .6385154   .9209488     0.69   0.488    -1.166511    2.443542
         age |    .030764   .0207733     1.48   0.139    -.0099509    .0714789
  sex_recode |  -.3545082   .5086456    -0.70   0.486    -1.351435    .6424189
       _cons |  -3.723835   1.517456    -2.45   0.014    -6.697994   -.7496759
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |   6.710318                       0.079     0.801744   56.163030
         age |   1.004541                       0.856     0.956544    1.054945
  sex_recode |   0.810848                       0.771     0.197964    3.321184
-------------+----------------------------------------------------------------
eq2          |
  apache3rod |   1.893667                       0.488     0.311452   11.513749
         age |   1.031242                       0.139     0.990098    1.074095
  sex_recode |   0.701518                       0.486     0.258868    1.901074
-------------+----------------------------------------------------------------

.
```

```
.   ****************************************
.   * Mobility: Impairment at 24 months    *
.   ****************************************
.
.   ** 1. FIM: pre-morbid **
.
.   LnMM3_lf mobility_impair_24 fim

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -88.957757
Iteration 2:   log likelihood = -86.018784
Iteration 3:   log likelihood = -84.409294
Iteration 4:   log likelihood = -84.279358
Iteration 5:   log likelihood = -84.279037
Iteration 6:   log likelihood = -84.279037

                                                  Number of obs   =        134
                                                  Wald chi2(1)    =       0.03
Log likelihood = -84.279037                       Prob > chi2     =     0.8524

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |  -.0030996   .0166639    -0.19   0.852    -.0357603    .0295611
       _cons |  -2.580536   2.017605    -1.28   0.201     -6.53497    1.373897
-------------+----------------------------------------------------------------
eq2          |
         fim |  -.0144258   .0036246    -3.98   0.000    -.0215298   -.0073218
       _cons |  -.0855772   .3780605    -0.23   0.821    -.8265622    .6554079
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
fim	0.996905	0.852	0.964872	1.030002
eq2				
fim	0.985678	0.000	0.978700	0.992705

```
.   LnMM3_lf mobility_impair_24 case fim

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Mobility impairmant at 24 months Not impai	Impaired	Dead	Total
Control	51	2	10	63
	80.95	3.17	15.87	100.00
Case	53	5	13	71

```
           |     74.65       7.04      18.31 |    100.00
-----------+----------------------------------+----------
     Total |       104          7         23 |       134
           |     77.61       5.22      17.16 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -88.901496
Iteration 2:   log likelihood = -85.855875
Iteration 3:   log likelihood = -83.940207
Iteration 4:   log likelihood = -83.769614
Iteration 5:   log likelihood = -83.769353
Iteration 6:   log likelihood = -83.769353

                                                  Number of obs   =        134
                                                  Wald chi2(2)    =       0.95
Log likelihood = -83.769353                       Prob > chi2     =     0.6217

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .7925449   .8231972     0.96   0.336    -.8208918    2.405982
         fim |  -.0008263   .0161809    -0.05   0.959    -.0325402    .0308877
       _cons |  -3.348375   2.107806    -1.59   0.112    -7.479599    .7828481
-------------+----------------------------------------------------------------
eq2          |
        case |  -.0298194   .4063244    -0.07   0.941    -.8262006    .7665617
         fim |  -.0145124   .0040977    -3.54   0.000    -.0225436   -.0064811
       _cons |   -.059416   .5790022    -0.10   0.918     -1.19424    1.075408
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                           P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   2.209011                        0.336     0.440039   11.089312
         fim |   0.999174                        0.959     0.967984    1.031370
-------------+----------------------------------------------------------------
eq2          |
        case |   0.970621                        0.941     0.437709    2.152353
         fim |   0.985592                        0.000     0.977709    0.993540
-------------+----------------------------------------------------------------

.  LnMM3_lf mobility_impair_24 case fim age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | Mobility impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        51          2         10 |        63
           |     80.95       3.17      15.87 |    100.00
```

Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX

Case	53	5	13	71
	74.65	7.04	18.31	100.00
Total	104	7	23	134
	77.61	5.22	17.16	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -86.773024
Iteration 2:   log likelihood = -76.364638
Iteration 3:   log likelihood = -70.783727
Iteration 4:   log likelihood = -68.731943
Iteration 5:   log likelihood =   -68.5911
Iteration 6:   log likelihood = -68.590969
Iteration 7:   log likelihood = -68.590969

                                                  Number of obs   =        134
                                                  Wald chi2(4)    =       3.03
Log likelihood = -68.590969                       Prob > chi2     =     0.5520
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	.8337845	.8110493	1.03	0.304	-.755843	2.423412
fim	-.0087733	.0214796	-0.41	0.683	-.0508726	.033326
age	.0270771	.0252373	1.07	0.283	-.0223872	.0765413
sex_recode	-.8004949	.8207502	-0.98	0.329	-2.409136	.8081459
_cons	-3.878487	2.408133	-1.61	0.107	-8.59834	.8413671
eq2						
case	.2552574	.3577982	0.71	0.476	-.4460142	.9565291
fim	-.0614534	.0135498	-4.54	0.000	-.0880104	-.0348963
age	.0913558	.0213446	4.28	0.000	.049521	.1331905
sex_recode	.4373361	.4032859	1.08	0.278	-.3530898	1.227762
_cons	-1.237385	.6610047	-1.87	0.061	-2.53293	.0581608

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	2.302014	0.304	0.469615	11.284296
fim	0.991265	0.683	0.950400	1.033888
age	1.027447	0.283	0.977862	1.079547
sex_recode	0.449107	0.329	0.089893	2.243744
eq2				
case	1.290794	0.476	0.640175	2.602647
fim	0.940397	0.000	0.915751	0.965706
age	1.095659	0.000	1.050768	1.142468
sex_recode	1.548576	0.278	0.702514	3.413581

```
.
.   ** 2. Years education: pre-morbid **
.
.   LnMM3_lf mobility_impair_24 YRSEDN
```

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -280.00854
rescale:       log likelihood = -86.857023
rescale eq:    log likelihood = -86.857023
Iteration 0:   log likelihood = -86.857023
Iteration 1:   log likelihood = -74.683012
Iteration 2:   log likelihood = -70.931841
Iteration 3:   log likelihood = -70.557187
Iteration 4:   log likelihood = -70.550151
Iteration 5:   log likelihood = -70.550142
Iteration 6:   log likelihood = -70.550142

                                                  Number of obs   =        122
                                                  Wald chi2(1)    =       6.21
Log likelihood = -70.550142                       Prob > chi2     =     0.0127

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
      YRSEDN |  -.6203985    .248929    -2.49   0.013     -1.10829   -.1325067
       _cons |   2.737834   1.990342     1.38   0.169    -1.163164    6.638833
-------------+----------------------------------------------------------------
eq2          |
      YRSEDN |  -.2735136   .0962607    -2.84   0.004    -.4621811   -.0848461
       _cons |   .8997652   .8657878     1.04   0.299    -.7971478    2.596678
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
------------------------------------------------------------------------------
             |
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
      YRSEDN |   0.537730                       0.013     0.330123    0.875897
-------------+----------------------------------------------------------------
eq2          |
      YRSEDN |   0.760702                       0.004     0.629908    0.918654
------------------------------------------------------------------------------

.  LnMM3_lf mobility_impair_24 case YRSEDN

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | Mobility impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        51          2         10 |        63
           |     80.95       3.17      15.87 |    100.00
-----------+---------------------------------+----------
      Case |        53          5         13 |        71
           |     74.65       7.04      18.31 |    100.00
-----------+---------------------------------+----------
     Total |       104          7         23 |       134
           |     77.61       5.22      17.16 |    100.00

Log multinomial model
```

Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -280.00854
rescale:       log likelihood = -86.857023
rescale eq:    log likelihood = -86.857023
Iteration 0:   log likelihood = -86.857023
Iteration 1:   log likelihood = -74.547623
Iteration 2:   log likelihood = -70.488816
Iteration 3:   log likelihood = -70.090803
Iteration 4:   log likelihood =  -70.08144
Iteration 5:   log likelihood = -70.081435

                                                  Number of obs   =        122
                                                  Wald chi2(2)    =       6.77
Log likelihood = -70.081435                       Prob > chi2     =     0.0338

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .5698431   .7688359     0.74   0.459    -.9370476    2.076734
      YRSEDN |  -.6300481    .252421    -2.50   0.013    -1.124784    -.135312
       _cons |   2.446307   2.091019     1.17   0.242    -1.652015     6.54463
-------------+----------------------------------------------------------------
eq2          |
        case |   .1404256   .3899374     0.36   0.719    -.6238376    .9046888
      YRSEDN |  -.2732886    .096895    -2.82   0.005    -.4631993   -.0833779
       _cons |   .8137392   .9139707     0.89   0.373    -.9776104    2.605089
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.767990	0.459	0.391783	7.978366
YRSEDN	0.532566	0.013	0.324723	0.873443
eq2				
case	1.150763	0.719	0.535884	2.471163
YRSEDN	0.760873	0.005	0.629267	0.920003

```
.  LnMM3_lf mobility_impair_24 case YRSEDN age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Mobility impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	51	2	10	63
	80.95	3.17	15.87	100.00
Case	53	5	13	71
	74.65	7.04	18.31	100.00
Total	104	7	23	134
	77.61	5.22	17.16	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -280.00854
rescale:       log likelihood = -86.857023
rescale eq:    log likelihood = -86.857023
Iteration 0:   log likelihood = -86.857023
Iteration 1:   log likelihood = -73.817376
Iteration 2:   log likelihood = -69.311067
Iteration 3:   log likelihood =  -67.18202
Iteration 4:   log likelihood = -66.825934
Iteration 5:   log likelihood = -66.823395
Iteration 6:   log likelihood = -66.823394

                                                  Number of obs   =        122
                                                  Wald chi2(4)    =       7.95
Log likelihood = -66.823394                       Prob > chi2     =     0.0934

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .5689919   .7614808     0.75   0.455     -.923483    2.061467
      YRSEDN |  -.6162956   .2711476    -2.27   0.023    -1.147735   -.0848562
         age |  -.0046067    .027761    -0.17   0.868    -.0590171    .0498038
  sex_recode |  -.6365374   .7742973    -0.82   0.411    -2.154132    .8810573
       _cons |   2.862295    3.50573     0.82   0.414    -4.008809    9.733399
-------------+----------------------------------------------------------------
eq2          |
        case |   .1633974   .3632011     0.45   0.653    -.5484636    .8752584
      YRSEDN |  -.1987823   .0918965    -2.16   0.031    -.3788962   -.0186684
         age |   .0343832   .0175821     1.96   0.051    -.0000772    .0688435
  sex_recode |  -.2482893   .3881666    -0.64   0.522    -1.009082    .5125033
       _cons |  -2.112659   1.752663    -1.21   0.228    -5.547815    1.322497
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                           P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   1.766485                        0.455     0.397133    7.857487
      YRSEDN |   0.539941                        0.023     0.317355    0.918644
         age |   0.995404                        0.868     0.942691    1.051065
  sex_recode |   0.529121                        0.411     0.116004    2.413450
-------------+----------------------------------------------------------------
eq2          |
        case |   1.177505                        0.653     0.577837    2.399495
      YRSEDN |   0.819728                        0.031     0.684617    0.981505
         age |   1.034981                        0.051     0.999923    1.071269
  sex_recode |   0.780134                        0.522     0.364554    1.669465
-------------+----------------------------------------------------------------

.
.  ** 3. CIQ Total: pre-morbid **
.
.  LnMM3_lf mobility_impair_24 ciq_total

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -280.00944
rescale:       log likelihood = -88.650323
rescale eq:    log likelihood = -88.650323
Iteration 0:   log likelihood = -88.650323
Iteration 1:   log likelihood = -79.664782
Iteration 2:   log likelihood = -78.169421
Iteration 3:   log likelihood = -77.995291
```

```
Iteration 4:   log likelihood = -77.993909
Iteration 5:   log likelihood = -77.993909

                                                  Number of obs   =        132
                                                  Wald chi2(1)    =       0.01
Log likelihood = -77.993909                       Prob > chi2     =     0.9357

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
   ciq_total |   .0049194   .0609798     0.08   0.936    -.1145988    .1244377
       _cons |  -3.018499   1.082089    -2.79   0.005    -5.139354   -.8976443
-------------+----------------------------------------------------------------
eq2          |
   ciq_total |   -.100478   .0235976    -4.26   0.000    -.1467284   -.0542276
       _cons |  -.3816301   .2912788    -1.31   0.190    -.9525262    .1892659
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
ciq_total	1.004932	0.936	0.891724	1.132511
eq2				
ciq_total	0.904405	0.000	0.863528	0.947216

```
.  LnMM3_lf mobility_impair_24 case ciq_total

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Mobility impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	51	2	10	63
	80.95	3.17	15.87	100.00
Case	53	5	13	71
	74.65	7.04	18.31	100.00
Total	104	7	23	134
	77.61	5.22	17.16	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -280.00944
rescale:       log likelihood = -88.650323
rescale eq:    log likelihood = -88.650323
Iteration 0:   log likelihood = -88.650323
Iteration 1:   log likelihood = -79.199259
Iteration 2:   log likelihood = -76.862672
Iteration 3:   log likelihood = -76.441804
Iteration 4:   log likelihood = -76.428821
Iteration 5:   log likelihood = -76.428802
Iteration 6:   log likelihood = -76.428802
```

```
                                                  Number of obs   =        132
                                                  Wald chi2(2)    =       0.88
Log likelihood = -76.428802                       Prob > chi2     =     0.6437

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .7656764   .8184125     0.94   0.349    -.8383826    2.369735
   ciq_total |   .0065119   .0672058     0.10   0.923    -.1252091    .1382329
       _cons |   -3.52655   1.330909    -2.65   0.008    -6.135085   -.9180156
-------------+----------------------------------------------------------------
eq2          |
        case |   .5439065   .3972847     1.37   0.171    -.2347572     1.32257
   ciq_total |  -.1179413   .0293659    -4.02   0.000    -.1754973   -.0603852
       _cons |  -.4581808   .3533847    -1.30   0.195    -1.150802    .2344404
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	2.150448	0.349	0.432409	10.694562
ciq_total	1.006533	0.923	0.882312	1.148243
eq2				
case	1.722723	0.171	0.790763	3.753055
ciq_total	0.888748	0.000	0.839040	0.941402

```
. LnMM3_lf mobility_impair_24 case ciq_total age sex_recode
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | Mobility impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+------------------------------+----------
   Control |        51          2         10 |        63
           |     80.95       3.17      15.87 |    100.00
-----------+------------------------------+----------
      Case |        53          5         13 |        71
           |     74.65       7.04      18.31 |    100.00
-----------+------------------------------+----------
     Total |       104          7         23 |       134
           |     77.61       5.22      17.16 |    100.00
```

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -280.00944
rescale:       log likelihood = -88.650323
rescale eq:    log likelihood = -88.650323
Iteration 0:   log likelihood = -88.650323
Iteration 1:   log likelihood = -77.718488
Iteration 2:   log likelihood = -76.297469
Iteration 3:   log likelihood =  -73.24225
Iteration 4:   log likelihood = -72.413932
```

```
Iteration 5:   log likelihood = -72.286148
Iteration 6:   log likelihood = -72.285683
Iteration 7:   log likelihood = -72.285683

                                                  Number of obs   =        132
                                                  Wald chi2(4)    =       3.67
Log likelihood = -72.285683                       Prob > chi2     =     0.4519

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .6717303   .8154965     0.82   0.410    -.9266135    2.270074
   ciq_total |   .0646313   .0766465     0.84   0.399     -.085593    .2148557
         age |   .0326643   .0260742     1.25   0.210    -.0184401    .0837688
  sex_recode |  -1.005943   .8497674    -1.18   0.236    -2.671457    .6595703
       _cons |  -6.164647   2.500543    -2.47   0.014    -11.06562   -1.263674
-------------+----------------------------------------------------------------
eq2          |
        case |   .4212974   .3838317     1.10   0.272    -.3309989    1.173594
   ciq_total |  -.1121594   .0344312    -3.26   0.001    -.1796434   -.0446754
         age |   .0366861   .0180776     2.03   0.042     .0012546    .0721175
  sex_recode |   .1793147   .3638215     0.49   0.622    -.5337624    .8923918
       _cons |  -3.012885   1.387865    -2.17   0.030    -5.733049   -.2927203
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   1.957622                       0.410     0.395892    9.680118
   ciq_total |   1.066766                       0.399     0.917968    1.239683
         age |   1.033204                       0.210     0.981729    1.087377
  sex_recode |   0.365700                       0.236     0.069151    1.933961
-------------+----------------------------------------------------------------
eq2          |
        case |   1.523937                       0.272     0.718206    3.233592
   ciq_total |   0.893902                       0.001     0.835568    0.956308
         age |   1.037367                       0.042     1.001255    1.074782
  sex_recode |   1.196397                       0.622     0.586395    2.440961
-------------+----------------------------------------------------------------

.
.   ** 4. Charlson age condition: pre-morbid **
.
.   LnMM3_lf mobility_impair_24 caci

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -79.079465
Iteration 2:   log likelihood = -72.203714
Iteration 3:   log likelihood =  -71.30712
Iteration 4:   log likelihood = -71.127367
Iteration 5:   log likelihood = -71.126849
Iteration 6:   log likelihood = -71.126849

                                                  Number of obs   =        134
                                                  Wald chi2(1)    =       0.10
Log likelihood = -71.126849                       Prob > chi2     =     0.7462

------------------------------------------------------------------------------
```

```
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        caci |   .0335505   .1036762     0.32   0.746    -.1696511     .236752
       _cons |  -3.112737   .6376574    -4.88   0.000    -4.362522   -1.862951
-------------+----------------------------------------------------------------
eq2          |
        caci |   .2754887   .0436245     6.31   0.000     .1899862    .3609912
       _cons |   -3.51933   .4678704    -7.52   0.000    -4.436339   -2.602321
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
caci	1.034120	0.746	0.843959	1.267127
eq2				
caci	1.317174	0.000	1.209233	1.434751

```
.  LnMM3_lf mobility_impair_24 case caci
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | Mobility impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        51          2         10 |        63
           |     80.95       3.17      15.87 |    100.00
-----------+---------------------------------+----------
      Case |        53          5         13 |        71
           |     74.65       7.04      18.31 |    100.00
-----------+---------------------------------+----------
     Total |       104          7         23 |       134
           |     77.61       5.22      17.16 |    100.00
```

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -78.592605
Iteration 2:   log likelihood = -71.182092
Iteration 3:   log likelihood = -69.941249
Iteration 4:   log likelihood = -69.573625
Iteration 5:   log likelihood = -69.568321
Iteration 6:   log likelihood = -69.568315

                                                  Number of obs   =        134
                                                  Wald chi2(2)    =       1.11
Log likelihood = -69.568315                       Prob > chi2     =     0.5740

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
```

```
eq1          |
        case |   .8172174   .8195338     1.00   0.319    -.7890393    2.423474
        caci |   .0421278   .1050175     0.40   0.688    -.1637027    .2479584
       _cons |  -3.664712   .8959443    -4.09   0.000    -5.420731   -1.908694
-------------+----------------------------------------------------------------
eq2          |
        case |   .3221465   .2593739     1.24   0.214    -.1862169    .8305099
        caci |   .2941259    .048426     6.07   0.000     .1992127    .3890392
       _cons |  -3.822871   .5368994    -7.12   0.000    -4.875174   -2.770567
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	2.264191	0.319	0.454281	11.284996
caci	1.043028	0.688	0.848994	1.281407
eq2				
case	1.380087	0.214	0.830093	2.294488
caci	1.341953	0.000	1.220442	1.475562

```
.  LnMM3_lf mobility_impair_24 case caci age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | Mobility impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        51          2         10 |        63
           |     80.95       3.17      15.87 |    100.00
-----------+---------------------------------+----------
      Case |        53          5         13 |        71
           |     74.65       7.04      18.31 |    100.00
-----------+---------------------------------+----------
     Total |       104          7         23 |       134
           |     77.61       5.22      17.16 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -76.117713
Iteration 2:   log likelihood = -71.235154
Iteration 3:   log likelihood = -69.829976
Iteration 4:   log likelihood = -68.844851
Iteration 5:   log likelihood = -68.491823
Iteration 6:   log likelihood =  -68.42486
Iteration 7:   log likelihood = -68.423602
Iteration 8:   log likelihood =   -68.4236

                                                  Number of obs   =        134
                                                  Wald chi2(4)    =       2.93
Log likelihood =   -68.4236                       Prob > chi2     =     0.5698
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	.6399397	.8164577	0.78	0.433	-.960288	2.240167
caci	-.0885028	.1622516	-0.55	0.585	-.4065102	.2295045
age	.0379521	.0350058	1.08	0.278	-.0306581	.1065622
sex_recode	-.8229706	.826686	-1.00	0.319	-2.443246	.7973042
_cons	-5.076771	2.000726	-2.54	0.011	-8.998122	-1.155419
eq2						
case	.2765389	.3802657	0.73	0.467	-.4687682	1.021846
caci	.2905962	.0518694	5.60	0.000	.1889341	.3922583
age	.0105099	.0222205	0.47	0.636	-.0330415	.0540612
sex_recode	.0521235	.3654529	0.14	0.887	-.664151	.7683981
_cons	-4.514749	1.5437	-2.92	0.003	-7.540345	-1.489152

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.896367	0.433	0.382783	9.394904
caci	0.915301	0.585	0.665970	1.257976
age	1.038681	0.278	0.969807	1.112447
sex_recode	0.439125	0.319	0.086878	2.219549
eq2				
case	1.318558	0.467	0.625773	2.778319
caci	1.337224	0.000	1.207961	1.480320
age	1.010565	0.636	0.967498	1.055549
sex_recode	1.053506	0.887	0.514710	2.156309

```
.
.   ** 5. Apache3 ROD: cases only **
.
.   LnMM3_lf mobility_impair_24 apache3rod

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -180.00481
rescale:       log likelihood = -54.504492
rescale eq:    log likelihood = -53.119376
Iteration 0:   log likelihood = -53.119376
Iteration 1:   log likelihood = -49.025653
Iteration 2:   log likelihood = -46.757035
Iteration 3:   log likelihood = -46.736524
Iteration 4:   log likelihood = -46.736459
Iteration 5:   log likelihood = -46.736459

                                                Number of obs   =         71
                                                Wald chi2(1)    =       8.72
Log likelihood = -46.736459                     Prob > chi2     =     0.0031
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
apache3rod	3.19647	1.082406	2.95	0.003	1.074993	5.317947
_cons	-3.886107	.8190584	-4.74	0.000	-5.491433	-2.280782
eq2						
apache3rod	.5209327	.8358611	0.62	0.533	-1.117325	2.15919

```
       _cons |  -1.827216   .3430141    -5.33   0.000    -2.499511    -1.15492
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

------------------------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |  24.446080                       0.003     2.929972    2.04e+02
-------------+----------------------------------------------------------------
eq2          |
  apache3rod |   1.683597                       0.533     0.327154    8.664121
------------------------------------------------------------------------------

.  LnMM3_lf mobility_impair_24 apache3rod age sex_recode

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -180.00481
rescale:       log likelihood = -54.504492
rescale eq:    log likelihood = -53.119376
Iteration 0:   log likelihood = -53.119376
Iteration 1:   log likelihood = -48.125462
Iteration 2:   log likelihood = -43.695332
Iteration 3:   log likelihood = -43.370423
Iteration 4:   log likelihood = -43.348977
Iteration 5:   log likelihood = -43.348885
Iteration 6:   log likelihood = -43.348885

                                                  Number of obs   =         71
                                                  Wald chi2(3)    =       6.62
Log likelihood = -43.348885                       Prob > chi2     =     0.0852

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |   4.418249   1.778789     2.48   0.013     .9318857    7.904612
         age |   .0824868   .0695293     1.19   0.235     -.053788    .2187617
  sex_recode |  -.9671678    .914771    -1.06   0.290    -2.760086    .8257504
       _cons |  -9.665504   5.447729    -1.77   0.076    -20.34286    1.011847
-------------+----------------------------------------------------------------
eq2          |
  apache3rod |   .5623209    .895459     0.63   0.530    -1.192746    2.317388
         age |    .030668   .0208138     1.47   0.141    -.0101263    .0714623
  sex_recode |  -.3638859    .510548    -0.71   0.476    -1.364542    .6367699
       _cons |   -3.69425   1.512352    -2.44   0.015    -6.658406   -.7300951
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

------------------------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
  apache3rod |  82.950908                       0.013     2.539293    2.71e+03
         age |   1.085984                       0.235     0.947633    1.244535
  sex_recode |   0.380158                       0.290     0.063286    2.283594
-------------+----------------------------------------------------------------
eq2          |
  apache3rod |   1.754740                       0.530     0.303387   10.149133
         age |   1.031143                       0.141     0.989925    1.074078
  sex_recode |   0.694971                       0.476     0.255498    1.890365
------------------------------------------------------------------------------

.
```

```
.
.   ************** 1 month predictors ************************
.
.   use "Marsden_ICU_ALL_data_CLEAN_v3_Impairment_coded", clear

.  keep if sample_time==1
(858 observations deleted)

.
.   ********************************
.   * LNS Impairment at 24 months  *
.   ********************************
.
.   ** 1. FIM:  1 month **
.
.   LnMM3_lf lns_impair_24 fim

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -470.00736
rescale:       log likelihood = -127.68049
rescale eq:    log likelihood = -125.99376
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -111.56833
Iteration 2:   log likelihood = -103.32572
Iteration 3:   log likelihood =  -102.1554
Iteration 4:   log likelihood = -102.14487
Iteration 5:   log likelihood = -102.14487

                                                  Number of obs   =        128
                                                  Wald chi2(1)    =       1.37
Log likelihood = -102.14487                       Prob > chi2     =     0.2417

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |  -.0115589   .0098723    -1.17   0.242    -.0309082    .0077904
       _cons |  -.3888446   1.085269    -0.36   0.720    -2.515933    1.738244
-------------+----------------------------------------------------------------
eq2          |
         fim |  -.0423528    .008061    -5.25   0.000    -.0581521   -.0265535
       _cons |    2.76518   .7338758     3.77   0.000     1.326809     4.20355
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
fim	0.988508	0.242	0.969565	1.007821
eq2				
fim	0.958532	0.000	0.943506	0.973796

```
.  LnMM3_lf lns_impair_24 case fim

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	LNS impairmant at 24 months Not impai	Impaired	Dead	Total
Control	42	10	10	62
	67.74	16.13	16.13	100.00
Case	39	14	13	66
	59.09	21.21	19.70	100.00
Total	81	24	23	128
	63.28	18.75	17.97	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -470.00736
rescale:       log likelihood = -127.68049
rescale eq:    log likelihood = -125.99376
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -116.05386
Iteration 2:   log likelihood = -108.22493
Iteration 3:   log likelihood = -102.41457
Iteration 4:   log likelihood = -97.314114
Iteration 5:   log likelihood = -96.574265
Iteration 6:   log likelihood = -96.561952
Iteration 7:   log likelihood =  -96.56194
Iteration 8:   log likelihood =  -96.56194

                                                  Number of obs   =        128
                                                  Wald chi2(2)    =       1.29
Log likelihood =  -96.56194                       Prob > chi2     =     0.5258

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .0774523   .4655992     0.17   0.868    -.8351053      .99001
         fim |  -.0095575   .0119454    -0.80   0.424      -.03297     .013855
       _cons |  -.6539042   1.490405    -0.44   0.661    -3.575045    2.267236
-------------+----------------------------------------------------------------
eq2          |
        case |  -2.802619   1.121199    -2.50   0.012    -5.000129   -.6051091
         fim |  -.0919716   .0247061    -3.72   0.000    -.1403946   -.0435485
       _cons |    9.38217   2.995768     3.13   0.002     3.510572    15.25377
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.080531	0.868	0.433829	2.691261
fim	0.990488	0.424	0.967568	1.013951
eq2				
case	0.060651	0.012	0.006737	0.546015
fim	0.912131	0.000	0.869015	0.957386

```
.  LnMM3_lf lns_impair_24 case fim age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
```

Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX

frequency / row percentage	LNS impairmant at 24 months			
Case	Not impai	Impaired	Dead	Total
Control	42	10	10	62
	67.74	16.13	16.13	100.00
Case	39	14	13	66
	59.09	21.21	19.70	100.00
Total	81	24	23	128
	63.28	18.75	17.97	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -470.00736
rescale:       log likelihood = -127.68049
rescale eq:    log likelihood = -125.99376
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -115.56034
Iteration 2:   log likelihood = -106.86033
Iteration 3:   log likelihood = -95.175282
Iteration 4:   log likelihood = -86.693094
Iteration 5:   log likelihood = -83.281735
Iteration 6:   log likelihood = -83.095496
Iteration 7:   log likelihood =  -83.08978
Iteration 8:   log likelihood =  -83.08976
Iteration 9:   log likelihood =  -83.08976

                                                  Number of obs   =        128
                                                  Wald chi2(4)    =       1.72
Log likelihood =  -83.08976                       Prob > chi2     =     0.7863
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	.0737487	.4700872	0.16	0.875	-.8476053	.9951028
fim	-.0100409	.0130016	-0.77	0.440	-.0355235	.0154417
age	.0066728	.0122407	0.55	0.586	-.0173186	.0306642
sex_recode	.0845157	.3702722	0.23	0.819	-.6412044	.8102359
_cons	-1.055451	1.839609	-0.57	0.566	-4.661019	2.550116
eq2						
case	-4.594817	1.671874	-2.75	0.006	-7.87163	-1.318004
fim	-.1803993	.0521517	-3.46	0.001	-.2826147	-.0781839
age	.1181494	.0320109	3.69	0.000	.0554091	.1808896
sex_recode	-.1185282	.290988	-0.41	0.684	-.6888541	.4517978
_cons	11.19052	4.601284	2.43	0.015	2.172169	20.20887

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.076536	0.875	0.428440	2.705002
fim	0.990009	0.440	0.965100	1.015562
age	1.006695	0.586	0.982830	1.031139
sex_recode	1.088190	0.819	0.526658	2.248438

```
eq2          |
        case |   0.010104                          0.006     0.000381    0.267669
         fim |   0.834937                          0.001     0.753810    0.924794
         age |   1.125412                          0.000     1.056973    1.198283
  sex_recode |   0.888227                          0.684     0.502151    1.571134
-------------+----------------------------------------------------------------------

.
.   ** 2. MMSE: 1 month **
.
.   LnMM3_lf lns_impair_24 mmse

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -350.00627
rescale:       log likelihood = -99.873772
rescale eq:    log likelihood = -91.726168
Iteration 0:   log likelihood = -91.726168
Iteration 1:   log likelihood = -89.062518
Iteration 2:   log likelihood = -87.797793
Iteration 3:   log likelihood = -87.550115
Iteration 4:   log likelihood = -87.544654
Iteration 5:   log likelihood = -87.544646

                                                  Number of obs   =        104
                                                  Wald chi2(1)    =       4.49
Log likelihood = -87.544646                       Prob > chi2     =     0.0341

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        mmse |  -.1189416   .0561332    -2.12   0.034    -.2289606   -.0089225
       _cons |   1.796167   1.537347     1.17   0.243    -1.216977    4.809311
-------------+----------------------------------------------------------------
eq2          |
        mmse |  -.0303147   .0989718    -0.31   0.759    -.2242959    .1636666
       _cons |  -1.215998   2.818085    -0.43   0.666    -6.739342    4.307346
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
-------------+----------------------------------------------------------------
             |
             |      RR                             P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        mmse |   0.887860                          0.034     0.795360    0.991117
-------------+----------------------------------------------------------------
eq2          |
        mmse |   0.970140                          0.759     0.799079    1.177822
-------------+----------------------------------------------------------------

.   LnMM3_lf lns_impair_24 case mmse

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |   LNS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        42         10         10 |        62
```

```
           |     67.74      16.13      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        39         14         13 |        66
           |     59.09      21.21      19.70 |    100.00
-----------+---------------------------------+----------
     Total |        81         24         23 |       128
           |     63.28      18.75      17.97 |    100.00
```

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -350.00627
rescale:       log likelihood = -99.873772
rescale eq:    log likelihood = -91.726168
Iteration 0:   log likelihood = -91.726168
Iteration 1:   log likelihood = -89.150893
Iteration 2:   log likelihood = -87.618019
Iteration 3:   log likelihood = -87.111158
Iteration 4:   log likelihood = -87.058647
Iteration 5:   log likelihood = -87.058488
Iteration 6:   log likelihood = -87.058488

                                                  Number of obs   =        104
                                                  Wald chi2(2)    =       5.07
Log likelihood = -87.058488                       Prob > chi2     =     0.0791

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .2740134   .4026126     0.68   0.496    -.5150928     1.06312
        mmse |  -.1084307   .0573698    -1.89   0.059    -.2208734    .0040121
       _cons |   1.339192    1.66102     0.81   0.420    -1.916347    4.594732
-------------+----------------------------------------------------------------
eq2          |
        case |   .2964739    .546411     0.54   0.587    -.7744721     1.36742
        mmse |  -.0185115   .1014704    -0.18   0.855    -.2173897    .1803668
       _cons |  -1.723327   2.976962    -0.58   0.563    -7.558066    4.111412
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.315232	0.496	0.597445	2.895390
mmse	0.897241	0.059	0.801818	1.004020
eq2				
case	1.345107	0.587	0.460947	3.925210
mmse	0.981659	0.855	0.804616	1.197657

```
.  LnMM3_lf lns_impair_24 case mmse age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |   LNS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
```

Control	42	10	10	62
	67.74	16.13	16.13	100.00
Case	39	14	13	66
	59.09	21.21	19.70	100.00
Total	81	24	23	128
	63.28	18.75	17.97	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -350.00627
rescale:       log likelihood = -99.873772
rescale eq:    log likelihood = -91.726168
Iteration 0:   log likelihood = -91.726168
Iteration 1:   log likelihood = -85.444562
Iteration 2:   log likelihood =   -83.3058
Iteration 3:   log likelihood = -83.239455
Iteration 4:   log likelihood = -83.239282
Iteration 5:   log likelihood = -83.239282

                                                  Number of obs   =        104
                                                  Wald chi2(4)    =       6.08
Log likelihood = -83.239282                       Prob > chi2     =     0.1934
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	.2058887	.4079512	0.50	0.614	-.593681	1.005458
mmse	-.1026669	.0592038	-1.73	0.083	-.2187042	.0133705
age	.0120293	.0123587	0.97	0.330	-.0121933	.036252
sex_recode	.0490827	.3748707	0.13	0.896	-.6856504	.7838159
_cons	.4428344	1.929667	0.23	0.818	-3.339243	4.224912
eq2						
case	.0666681	.5353954	0.12	0.901	-.9826875	1.116024
mmse	-.0238389	.1052678	-0.23	0.821	-.23016	.1824823
age	.0413315	.0212877	1.94	0.052	-.0003917	.0830547
sex_recode	-.3708215	.5314239	-0.70	0.485	-1.412393	.6707502
_cons	-3.995137	3.411438	-1.17	0.242	-10.68143	2.691159

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.228616	0.614	0.552291	2.733160
mmse	0.902428	0.083	0.803559	1.013460
age	1.012102	0.330	0.987881	1.036917
sex_recode	1.050307	0.896	0.503762	2.189812
eq2				
case	1.068941	0.901	0.374304	3.052692
mmse	0.976443	0.821	0.794406	1.200193
age	1.042198	0.052	0.999608	1.086601
sex_recode	0.690167	0.485	0.243560	1.955704

```
.
.  ** 3. CIQ Total: 1 month **
.
.  LnMM3_lf lns_impair_24 ciq_total
```

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -470.00736
rescale:       log likelihood = -127.68049
rescale eq:    log likelihood = -125.99376
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -112.53555
Iteration 2:   log likelihood = -106.15962
Iteration 3:   log likelihood =  -106.0659
Iteration 4:   log likelihood = -106.06518
Iteration 5:   log likelihood = -106.06518

                                                  Number of obs   =        128
                                                  Wald chi2(1)    =       4.48
Log likelihood = -106.06518                       Prob > chi2     =     0.0342

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
   ciq_total |  -.0641012   .0302689    -2.12   0.034    -.1234273   -.0047752
       _cons |   -1.12335    .270882    -4.15   0.000    -1.654269    -.592431
-------------+----------------------------------------------------------------
eq2          |
   ciq_total |  -.1071149   .0347115    -3.09   0.002    -.1751482   -.0390816
       _cons |  -.8855594   .2497355    -3.55   0.000    -1.375032   -.3960868
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
ciq_total	0.937910	0.034	0.883886	0.995236
eq2				
ciq_total	0.898422	0.002	0.839333	0.961672

```
.  LnMM3_lf lns_impair_24 case ciq_total

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	LNS impairmant at 24 months Not impai	Impaired	Dead	Total
Control	42	10	10	62
	67.74	16.13	16.13	100.00
Case	39	14	13	66
	59.09	21.21	19.70	100.00
Total	81	24	23	128
	63.28	18.75	17.97	100.00

```
Log multinomial model
```

Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -470.00736
rescale:       log likelihood = -127.68049
rescale eq:    log likelihood = -125.99376
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -112.32303
Iteration 2:   log likelihood =  -105.7036
Iteration 3:   log likelihood = -105.58667
Iteration 4:   log likelihood = -105.58494
Iteration 5:   log likelihood = -105.58494

                                                  Number of obs   =        128
                                                  Wald chi2(2)    =       4.50
Log likelihood = -105.58494                       Prob > chi2     =     0.1056

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.0457144   .3825531    -0.12   0.905    -.7955047     .704076
   ciq_total |  -.0642382   .0313875    -2.05   0.041    -.1257566   -.0027198
       _cons |  -1.096723     .39726    -2.76   0.006    -1.875338   -.3181076
-------------+----------------------------------------------------------------
eq2          |
        case |  -.2991582   .3432714    -0.87   0.383    -.9719579    .3736414
   ciq_total |  -.1122887   .0329551    -3.41   0.001    -.1768796   -.0476979
       _cons |  -.6800001   .3093202    -2.20   0.028    -1.286257   -.0737436
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+--------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+--------------------------------------------------------------
eq1          |
        case |   0.955315                       0.905     0.451353    2.021977
   ciq_total |   0.937782                       0.041     0.881829    0.997284
-------------+--------------------------------------------------------------
eq2          |
        case |   0.741442                       0.383     0.378342    1.453016
   ciq_total |   0.893786                       0.001     0.837881    0.953422
-------------+--------------------------------------------------------------

.  LnMM3_lf lns_impair_24 case ciq_total age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

             |   LNS impairmant at 24 months
        Case | Not impai   Impaired       Dead |     Total
-------------+---------------------------------+----------
     Control |        42         10         10 |        62
             |     67.74      16.13      16.13 |    100.00
-------------+---------------------------------+----------
        Case |        39         14         13 |        66
             |     59.09      21.21      19.70 |    100.00
-------------+---------------------------------+----------
       Total |        81         24         23 |       128
             |     63.28      18.75      17.97 |    100.00

Log multinomial model
```

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -470.00736
rescale:       log likelihood = -127.68049
rescale eq:    log likelihood = -125.99376
Iteration 0:   log likelihood = -125.99376
Iteration 1:   log likelihood = -111.21394
Iteration 2:   log likelihood = -103.03818
Iteration 3:   log likelihood = -102.43404
Iteration 4:   log likelihood = -102.34518
Iteration 5:   log likelihood = -102.34325
Iteration 6:   log likelihood = -102.34325

                                                  Number of obs   =        128
                                                  Wald chi2(4)    =       4.74
Log likelihood = -102.34325                       Prob > chi2     =     0.3153

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.0541388   .3907871    -0.14   0.890    -.8200674    .7117898
   ciq_total |  -.0684279   .0345907    -1.98   0.048    -.1362245   -.0006313
         age |  -.0011004   .0117984    -0.09   0.926    -.0242248    .0220239
  sex_recode |   .2749024    .375374     0.73   0.464    -.4608171    1.010622
       _cons |  -1.121005   .9163199    -1.22   0.221    -2.916959    .6749491
-------------+----------------------------------------------------------------
eq2          |
        case |  -.0980676   .3535523    -0.28   0.781    -.7910173    .5948822
   ciq_total |  -.0836735   .0340071    -2.46   0.014    -.1503262   -.0170207
         age |   .0360239   .0175765     2.05   0.040     .0015746    .0704731
  sex_recode |  -.0149425    .377506    -0.04   0.968    -.7548406    .7249557
       _cons |  -3.408352   1.380644    -2.47   0.014    -6.114365   -.7023394
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.947301	0.890	0.440402	2.037635
ciq_total	0.933861	0.048	0.872647	0.999369
age	0.998900	0.926	0.976066	1.022268
sex_recode	1.316402	0.464	0.630768	2.747309
eq2				
case	0.906588	0.781	0.453383	1.812817
ciq_total	0.919732	0.014	0.860427	0.983123
age	1.036681	0.040	1.001576	1.073016
sex_recode	0.985169	0.968	0.470086	2.064640

```
.
.
.   ****************************************
.   * Digit Span: Impairment at 24 months  *
.   ****************************************
.
.
.   ** 1. FIM: 1 month **
.
.   LnMM3_lf digit_impair_24 fim

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -430.00854
rescale:       log likelihood = -124.35702
```

```
rescale eq:    log likelihood = -121.97116
Iteration 0:   log likelihood = -121.97116
Iteration 1:   log likelihood = -112.19342
Iteration 2:   log likelihood = -105.25995
Iteration 3:   log likelihood = -100.62025
Iteration 4:   log likelihood = -100.48791
Iteration 5:   log likelihood = -100.48756
Iteration 6:   log likelihood = -100.48756

                                                  Number of obs   =        137
                                                  Wald chi2(1)    =       0.81
Log likelihood = -100.48756                       Prob > chi2     =     0.3680

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |  -.0107479   .0119379    -0.90   0.368    -.0341457    .0126499
       _cons |  -.7247082   1.323696    -0.55   0.584    -3.319105    1.869689
-------------+----------------------------------------------------------------
eq2          |
         fim |   -.046861   .0082452    -5.68   0.000    -.0630212   -.0307008
       _cons |   3.178721   .7438875     4.27   0.000     1.720728    4.636714
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
fim	0.989310	0.368	0.966431	1.012730
eq2				
fim	0.954220	0.000	0.938924	0.969766

```
.  LnMM3_lf digit_impair_24 case fim

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Digit span impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	50	8	10	68
	73.53	11.76	14.71	100.00
Case	44	12	13	69
	63.77	17.39	18.84	100.00
Total	94	20	23	137
	68.61	14.60	16.79	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -430.00854
rescale:       log likelihood = -124.35702
rescale eq:    log likelihood = -121.97116
```

```
Iteration 0:   log likelihood = -121.97116
Iteration 1:   log likelihood = -111.32592
Iteration 2:   log likelihood = -103.50513
Iteration 3:   log likelihood = -97.223998
Iteration 4:   log likelihood = -96.856986
Iteration 5:   log likelihood = -96.853418
Iteration 6:   log likelihood = -96.853414

                                                  Number of obs   =        137
                                                  Wald chi2(2)    =       1.10
Log likelihood = -96.853414                       Prob > chi2     =     0.5771

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .2873411   .4877629     0.59   0.556    -.6686566    1.243339
         fim |  -.0063267   .0138028    -0.46   0.647    -.0333797    .0207263
       _cons |  -1.376819   1.695079    -0.81   0.417    -4.699114    1.945475
-------------+----------------------------------------------------------------
eq2          |
        case |  -1.507695   .5306363    -2.84   0.004    -2.547723    -.467667
         fim |  -.0725985    .013996    -5.19   0.000    -.1000301   -.0451669
       _cons |   6.665966   1.573884     4.24   0.000     3.581209    9.750722
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.332879	0.556	0.512396	3.467170
fim	0.993693	0.647	0.967171	1.020943
eq2				
case	0.221420	0.004	0.078260	0.626462
fim	0.929974	0.000	0.904810	0.955838

```
.  LnMM3_lf digit_impair_24 case fim age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |   Digit span impairmant at 24
           |              months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        50          8         10 |        68
           |     73.53      11.76      14.71 |    100.00
-----------+---------------------------------+----------
      Case |        44         12         13 |        69
           |     63.77      17.39      18.84 |    100.00
-----------+---------------------------------+----------
     Total |        94         20         23 |       137
           |     68.61      14.60      16.79 |    100.00

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
```

```
feasible:       log likelihood = -420.00854
rescale:        log likelihood = -121.85702
rescale eq:     log likelihood = -119.47116
Iteration 0:    log likelihood = -119.47116
Iteration 1:    log likelihood = -107.87953
Iteration 2:    log likelihood = -98.510641
Iteration 3:    log likelihood = -89.923217
Iteration 4:    log likelihood = -88.421214
Iteration 5:    log likelihood = -88.407555
Iteration 6:    log likelihood = -88.407483
Iteration 7:    log likelihood = -88.407483

                                                  Number of obs   =        136
                                                  Wald chi2(4)    =       4.02
Log likelihood = -88.407483                       Prob > chi2     =     0.4035

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .4488771   .4916386     0.91   0.361    -.5147168    1.412471
         fim |  -.0029887   .0152025    -0.20   0.844    -.0327851    .0268077
         age |   .0260222   .0169527     1.53   0.125    -.0072044    .0592489
  sex_recode |   .2121823   .4207885     0.50   0.614     -.612548    1.036913
       _cons |  -3.687043   2.309551    -1.60   0.110     -8.21368    .8395945
-------------+----------------------------------------------------------------
eq2          |
        case |  -1.302026   .5289067    -2.46   0.014    -2.338664   -.2653874
         fim |  -.0797543   .0164999    -4.83   0.000    -.1120935   -.0474152
         age |   .0316255     .01609     1.97   0.049     .0000897    .0631612
  sex_recode |   .2993633    .308036     0.97   0.331    -.3043762    .9031028
       _cons |   5.034128   2.310712     2.18   0.029     .5052168     9.56304
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   1.566552                       0.361     0.597670    4.106089
         fim |   0.997016                       0.844     0.967746    1.027170
         age |   1.026364                       0.125     0.992821    1.061039
  sex_recode |   1.236373                       0.614     0.541968    2.820495
-------------+----------------------------------------------------------------
eq2          |
        case |   0.271980                       0.014     0.096456    0.766909
         fim |   0.923343                       0.000     0.893961    0.953691
         age |   1.032131                       0.049     1.000090    1.065199
  sex_recode |   1.349000                       0.331     0.737583    2.467247
-------------+----------------------------------------------------------------

.
.   ** 2. mmse: 1 month **
.
.   LnMM3_lf digit_impair_24 mmse

Log multinomial model

initial:        log likelihood =     -<inf>  (could not be evaluated)
feasible:       log likelihood = -290.00717
rescale:        log likelihood = -86.667073
rescale eq:     log likelihood = -86.667073
Iteration 0:    log likelihood = -86.667073
Iteration 1:    log likelihood = -77.038119
Iteration 2:    log likelihood = -75.212518
Iteration 3:    log likelihood = -74.840502
Iteration 4:    log likelihood = -74.773039
```

```
Iteration 5:   log likelihood = -74.772183
Iteration 6:   log likelihood = -74.772182

                                                  Number of obs   =        108
                                                  Wald chi2(1)    =      23.17
Log likelihood = -74.772182                       Prob > chi2     =     0.0000

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        mmse |  -.2455754   .0510175    -4.81   0.000    -.3455679   -.1455829
       _cons |   4.785316   1.241451     3.85   0.000     2.352117    7.218515
-------------+----------------------------------------------------------------
eq2          |
        mmse |  -.0071395   .0967665    -0.07   0.941    -.1967984    .1825194
       _cons |  -1.914348   2.758279    -0.69   0.488    -7.320475    3.491779
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
mmse	0.782254	0.000	0.707818	0.864518
eq2				
mmse	0.992886	0.941	0.821356	1.200237

```
.  LnMM3_lf digit_impair_24 case mmse
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Digit span impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	50	8	10	68
	73.53	11.76	14.71	100.00
Case	44	12	13	69
	63.77	17.39	18.84	100.00
Total	94	20	23	137
	68.61	14.60	16.79	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -290.00717
rescale:       log likelihood = -86.667073
rescale eq:    log likelihood = -86.667073
Iteration 0:   log likelihood = -86.667073
Iteration 1:   log likelihood =   -76.5297
Iteration 2:   log likelihood = -74.658649
Iteration 3:   log likelihood =  -74.34302
Iteration 4:   log likelihood = -74.016128
Iteration 5:   log likelihood = -73.994629
```

```
Iteration 6:   log likelihood = -73.994469
Iteration 7:   log likelihood = -73.994469

                                                  Number of obs   =        108
                                                  Wald chi2(2)    =      25.46
Log likelihood = -73.994469                       Prob > chi2     =     0.0000

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .5319769   .5482112     0.97   0.332    -.5424972    1.606451
        mmse |  -.2194798   .0531003    -4.13   0.000    -.3235544   -.1154051
       _cons |   3.730713   1.527571     2.44   0.015     .7367291    6.724697
-------------+----------------------------------------------------------------
eq2          |
        case |   .2882229   .5466464     0.53   0.598    -.7831843     1.35963
        mmse |   .0036048   .0979078     0.04   0.971     -.188291    .1955007
       _cons |  -2.387081   2.875912    -0.83   0.407    -8.023764    3.249603
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.702294	0.332	0.581295	4.985088
mmse	0.802936	0.000	0.723573	0.891005
eq2				
case	1.334055	0.598	0.456949	3.894752
mmse	1.003611	0.971	0.828374	1.215920

```
.  LnMM3_lf digit_impair_24 case mmse age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |   Digit span impairmant at 24
           |              months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        50          8         10 |        68
           |     73.53      11.76      14.71 |    100.00
-----------+---------------------------------+----------
      Case |        44         12         13 |        69
           |     63.77      17.39      18.84 |    100.00
-----------+---------------------------------+----------
     Total |        94         20         23 |       137
           |     68.61      14.60      16.79 |    100.00

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -290.00717
rescale:       log likelihood = -86.667073
rescale eq:    log likelihood = -86.667073
Iteration 0:   log likelihood = -86.667073
Iteration 1:   log likelihood = -74.559081
```

```
Iteration 2:   log likelihood = -70.575911
Iteration 3:   log likelihood = -69.224144
Iteration 4:   log likelihood = -68.827642
Iteration 5:   log likelihood =  -68.78719
Iteration 6:   log likelihood =  -68.78655
Iteration 7:   log likelihood =  -68.78655

                                                  Number of obs   =        108
                                                  Wald chi2(4)    =      23.68
Log likelihood =  -68.78655                       Prob > chi2     =     0.0001

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .3671604   .5558047     0.66   0.509    -.7221968    1.456518
        mmse |  -.2292338   .0612035    -3.75   0.000    -.3491905   -.1092772
         age |   .0378384   .0232624     1.63   0.104    -.0077551    .0834318
  sex_recode |  -.1179955   .3874693    -0.30   0.761    -.8774214    .6414303
       _cons |   1.674049   2.209396     0.76   0.449    -2.656288    6.004386
-------------+----------------------------------------------------------------
eq2          |
        case |   .1730052   .5370272     0.32   0.747    -.8795487    1.225559
        mmse |   .0016884   .1027665     0.02   0.987    -.1997302    .2031071
         age |   .0412711   .0217998     1.89   0.058    -.0014557     .083998
  sex_recode |  -.2026369   .5361788    -0.38   0.705    -1.253528    .8482543
       _cons |  -4.894912   3.313202    -1.48   0.140    -11.38867    1.598844
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                                P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   1.443629                             0.509     0.485684    4.290991
        mmse |   0.795143                             0.000     0.705259    0.896482
         age |   1.038563                             0.104     0.992275    1.087011
  sex_recode |   0.888700                             0.761     0.415854    1.899195
-------------+----------------------------------------------------------------
eq2          |
        case |   1.188872                             0.747     0.414970    3.406070
        mmse |   1.001690                             0.987     0.818952    1.225204
         age |   1.042135                             0.058     0.998545    1.087627
  sex_recode |   0.816575                             0.705     0.285496    2.335566
-------------+----------------------------------------------------------------

.
.   ** 3. CIQ Total: 1 month **
.
.   LnMM3_lf digit_impair_24 ciq_total

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -430.00854
rescale:       log likelihood = -124.35702
rescale eq:    log likelihood = -121.97116
Iteration 0:   log likelihood = -121.97116
Iteration 1:   log likelihood = -111.27499
Iteration 2:   log likelihood = -104.17912
Iteration 3:   log likelihood = -103.94813
Iteration 4:   log likelihood = -103.94789
Iteration 5:   log likelihood = -103.94789

                                                  Number of obs   =        137
                                                  Wald chi2(1)    =       3.89
Log likelihood = -103.94789                       Prob > chi2     =     0.0484
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
ciq_total	-.0676147	.0342627	-1.97	0.048	-.1347684	-.000461
_cons	-1.324228	.3159388	-4.19	0.000	-1.943457	-.7049996
eq2						
ciq_total	-.1201004	.0356047	-3.37	0.001	-.1898843	-.0503165
_cons	-.8363293	.2518069	-3.32	0.001	-1.329862	-.3427968

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
ciq_total	0.934621	0.048	0.873918	0.999539
eq2				
ciq_total	0.886831	0.001	0.827055	0.950928

```
. LnMM3_lf digit_impair_24 case ciq_total
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

Key
frequency
row percentage

Case	Digit span impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	50	8	10	68
	73.53	11.76	14.71	100.00
Case	44	12	13	69
	63.77	17.39	18.84	100.00
Total	94	20	23	137
	68.61	14.60	16.79	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -430.00854
rescale:       log likelihood = -124.35702
rescale eq:    log likelihood = -121.97116
Iteration 0:   log likelihood = -121.97116
Iteration 1:   log likelihood = -111.11107
Iteration 2:   log likelihood = -104.20655
Iteration 3:   log likelihood = -103.40101
Iteration 4:   log likelihood = -103.39439
Iteration 5:   log likelihood = -103.39439

                                                  Number of obs   =        137
                                                  Wald chi2(2)    =       3.88
Log likelihood = -103.39439                       Prob > chi2     =     0.1441
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	.043123	.4475809	0.10	0.923	-.8341196	.9203655
ciq_total	-.0652164	.0365004	-1.79	0.074	-.1367558	.006323
_cons	-1.369095	.4862942	-2.82	0.005	-2.322215	-.4159764
eq2						
case	-.3622259	.338403	-1.07	0.284	-1.025484	.3010318
ciq_total	-.1282378	.0333246	-3.85	0.000	-.1935528	-.0629228
_cons	-.5739891	.3008576	-1.91	0.056	-1.163659	.015681

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.044066	0.923	0.434257	2.510208
ciq_total	0.936865	0.074	0.872183	1.006343
eq2				
case	0.696125	0.284	0.358623	1.351252
ciq_total	0.879644	0.000	0.824026	0.939016

```
. LnMM3_lf digit_impair_24 case ciq_total age sex_recode
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

Key
frequency
row percentage

Case	Digit span impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	50	8	10	68
	73.53	11.76	14.71	100.00
Case	44	12	13	69
	63.77	17.39	18.84	100.00
Total	94	20	23	137
	68.61	14.60	16.79	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -420.00854
rescale:       log likelihood = -121.85702
rescale eq:    log likelihood = -119.47116
Iteration 0:   log likelihood = -119.47116
Iteration 1:   log likelihood = -106.70583
Iteration 2:   log likelihood = -99.014267
Iteration 3:   log likelihood = -96.762273
Iteration 4:   log likelihood =   -96.7103
Iteration 5:   log likelihood = -96.709954
Iteration 6:   log likelihood = -96.709954

                                                  Number of obs   =        136
                                                  Wald chi2(4)    =       6.13
```

```
Log likelihood = -96.709954                     Prob > chi2     =     0.1897

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .1605797    .474047     0.34   0.735    -.7685353    1.089695
   ciq_total |  -.0593514   .0389551    -1.52   0.128    -.1357019    .0169991
         age |   .0195569   .0169673     1.15   0.249    -.0136984    .0528121
  sex_recode |   .2731469   .4274079     0.64   0.523    -.5645572    1.110851
       _cons |  -2.949173    1.34099    -2.20   0.028    -5.577465   -.3208822
-------------+----------------------------------------------------------------
eq2          |
        case |  -.1771103   .3633067    -0.49   0.626    -.8891784    .5349577
   ciq_total |  -.0979979   .0338925    -2.89   0.004     -.164426   -.0315697
         age |   .0355142   .0178991     1.98   0.047     .0004327    .0705957
  sex_recode |   .0545077   .3847032     0.14   0.887    -.6994968    .8085122
       _cons |  -3.301451   1.410916    -2.34   0.019    -6.066796   -.5361065
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------|
             |      RR                          P>|z|     [95% Conf. Interval]
-------------|-----------------------------------------------------------------
eq1          |
        case |   1.174191                       0.735     0.463692    2.973366
   ciq_total |   0.942376                       0.128     0.873103    1.017144
         age |   1.019749                       0.249     0.986395    1.054232
  sex_recode |   1.314093                       0.523     0.568612    3.036942
-------------|-----------------------------------------------------------------
eq2          |
        case |   0.837687                       0.626     0.410993    1.707376
   ciq_total |   0.906651                       0.004     0.848381    0.968923
         age |   1.036152                       0.047     1.000433    1.073147
  sex_recode |   1.056021                       0.887     0.496835    2.244566
-------------|-----------------------------------------------------------------

.
.
.   ****************************************
.   * IES-R Total: Impairment at 24 months *
.   ****************************************
.
. ** NOTE: no cases "Impaired" after 2 years (all those impaired at time 1 had
died)
. ** so cannot do multinomial regression. Need to recode (0=not impaired,
1=Dead)for log-binomial
.  tab case  iesrtot_impair_24

           |      IES-R total
           |   impairmant at 24
           |         months
      Case | Not impai       Dead |     Total
-----------+----------------------+----------
   Control |        59         10 |        69
      Case |        58         13 |        71
-----------+----------------------+----------
     Total |       117         23 |       140


.
.   ****************************************
.   * SF36 PCS: Impairment at 24 months    *
.   ****************************************
.
.   ** 1. FIM: 1 month **
.   LnMM3_lf sf36pcs_impair_24 fim
```

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -920.00372
rescale:       log likelihood = -149.89074
rescale eq:    log likelihood = -140.01063
Iteration 0:   log likelihood = -140.01063
Iteration 1:   log likelihood = -129.18584
Iteration 2:   log likelihood =  -127.4483
Iteration 3:   log likelihood = -127.21385
Iteration 4:   log likelihood =  -127.1987
Iteration 5:   log likelihood = -127.19864
Iteration 6:   log likelihood = -127.19864

                                                  Number of obs   =        133
                                                  Wald chi2(1)    =       1.60
Log likelihood = -127.19864                       Prob > chi2     =     0.2055

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |   .0063171   .0049894     1.27   0.205     -.003462    .0160962
       _cons |  -1.370836   .5845155    -2.35   0.019    -2.516465    -.225207
-------------+----------------------------------------------------------------
eq2          |
         fim |  -.0270105   .0062019    -4.36   0.000     -.039166    -.014855
       _cons |    1.09387   .5734259     1.91   0.056    -.0300244    2.217764
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
fim	1.006337	0.205	0.996544	1.016226
eq2				
fim	0.973351	0.000	0.961591	0.985255

```
.  LnMM3_lf sf36pcs_impair_24 case fim

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	SF36 PCS impairmant at 24 months Not impai	Impaired	Dead	Total
Control	17	35	10	62
	27.42	56.45	16.13	100.00
Case	24	34	13	71
	33.80	47.89	18.31	100.00
Total	41	69	23	133
	30.83	51.88	17.29	100.00

```
Log multinomial model
```

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -920.00372
rescale:       log likelihood = -149.89074
rescale eq:    log likelihood = -140.01063
Iteration 0:   log likelihood = -140.01063
Iteration 1:   log likelihood = -126.94344
Iteration 2:   log likelihood = -124.30521
Iteration 3:   log likelihood = -124.07049
Iteration 4:   log likelihood = -124.06628
Iteration 5:   log likelihood = -124.06627

                                                  Number of obs   =        133
                                                  Wald chi2(2)    =       1.58
Log likelihood = -124.06627                       Prob > chi2     =     0.4543

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   -.061276   .1927316    -0.32   0.751     -.439023    .3164709
         fim |   .0048672   .0055189     0.88   0.378    -.0059496     .015684
       _cons |  -1.175368   .6938412    -1.69   0.090    -2.535272    .1845356
-------------+----------------------------------------------------------------
eq2          |
        case |  -1.349055    .690442    -1.95   0.051    -2.702297    .0041863
         fim |  -.0425648   .0113552    -3.75   0.000    -.0648206    -.020309
       _cons |   3.446012    1.43204     2.41   0.016     .6392654    6.252759
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.940564	0.751	0.644666	1.372276
fim	1.004879	0.378	0.994068	1.015808
eq2				
case	0.259485	0.051	0.067051	1.004195
fim	0.958328	0.000	0.937236	0.979896

```
.  LnMM3_lf sf36pcs_impair_24 case fim age

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 PCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        17         35         10 |        62
           |     27.42      56.45      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        24         34         13 |        71
           |     33.80      47.89      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        41         69         23 |       133
           |     30.83      51.88      17.29 |    100.00
```

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -920.00372
rescale:       log likelihood = -149.89074
rescale eq:    log likelihood = -140.01063
Iteration 0:   log likelihood = -140.01063
Iteration 1:   log likelihood = -117.47317
Iteration 2:   log likelihood = -109.43759
Iteration 3:   log likelihood = -104.00493
Iteration 4:   log likelihood = -99.634726
Iteration 5:   log likelihood = -98.416069
Iteration 6:   log likelihood = -97.695086
Iteration 7:   log likelihood = -97.572186
Iteration 8:   log likelihood = -97.567678
Iteration 9:   log likelihood = -97.567665
Iteration 10:  log likelihood = -97.567665

                                                  Number of obs   =        133
                                                  Wald chi2(3)    =       9.56
Log likelihood = -97.567665                       Prob > chi2     =     0.0227

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .0974467   .1812037     0.54   0.591     -.257706    .4525994
         fim |   .0089207   .0068211     1.31   0.191    -.0044484    .0222898
         age |   .0121789   .0045137     2.70   0.007     .0033322    .0210255
       _cons |  -2.494834   .9126105    -2.73   0.006    -4.283518   -.7061506
-------------+----------------------------------------------------------------
eq2          |
        case |  -3.373379   1.800411    -1.87   0.061    -6.902119    .1553609
         fim |  -.3671497    .222695    -1.65   0.099    -.8036238    .0693244
         age |   .4166296   .2807522     1.48   0.138    -.1336346    .9668938
       _cons |   7.417072   3.483635     2.13   0.033     .5892721    14.24487
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
--------------------------------------------------------------------------------
             |
             |      RR                           P>|z|     [95% Conf. Interval]
-------------+------------------------------------------------------------------
eq1          |
        case |   1.102353                        0.591     0.772822    1.572394
         fim |   1.008961                        0.191     0.995561    1.022540
         age |   1.012253                        0.007     1.003338    1.021248
-------------+------------------------------------------------------------------
eq2          |
        case |   0.034274                        0.061     0.001006    1.168079
         fim |   0.692706                        0.099     0.447704    1.071784
         age |   1.516841                        0.138     0.874910    2.629763
--------------------------------------------------------------------------------

.  LnMM3_lf sf36pcs_impair_24 case fim sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 PCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
```

```
           Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX
   Control |        17         35         10 |        62
           |     27.42      56.45      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        24         34         13 |        71
           |     33.80      47.89      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        41         69         23 |       133
           |     30.83      51.88      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -920.00372
rescale:       log likelihood = -149.89074
rescale eq:    log likelihood = -140.01063
Iteration 0:   log likelihood = -140.01063
Iteration 1:   log likelihood = -125.59206
Iteration 2:   log likelihood = -120.41468
Iteration 3:   log likelihood = -119.66091
Iteration 4:   log likelihood = -119.65427
Iteration 5:   log likelihood = -119.65426

                                                  Number of obs   =        133
                                                  Wald chi2(3)    =       3.39
Log likelihood = -119.65426                       Prob > chi2     =     0.3353

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.0839797   .1945423    -0.43   0.666    -.4652757    .2973162
         fim |   .0032985   .0059699     0.55   0.581    -.0084022    .0149992
  sex_recode |   .2189043   .1698121     1.29   0.197    -.1139213    .5517299
       _cons |   -1.09037   .7308391    -1.49   0.136    -2.522788    .3420483
-------------+----------------------------------------------------------------
eq2          |
        case |  -1.690899   .7016596    -2.41   0.016    -3.066126   -.3156714
         fim |  -.0573482   .0145654    -3.94   0.000    -.0858958   -.0288005
  sex_recode |   .9036903   .5159859     1.75   0.080    -.1076235    1.915004
       _cons |   4.760438    1.60622     2.96   0.003     1.612305    7.908571
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   0.919450                       0.666     0.627962    1.346241
         fim |   1.003304                       0.581     0.991633    1.015112
  sex_recode |   1.244712                       0.197     0.892328    1.736254
-------------+----------------------------------------------------------------
eq2          |
        case |   0.184354                       0.016     0.046601    0.729299
         fim |   0.944265                       0.000     0.917690    0.971610
  sex_recode |   2.468697                       0.080     0.897966    6.786967
-------------+----------------------------------------------------------------

.  *LnMM3_lf sf36pcs_impair_24 case fim age sex_recode
.  **NOTE: model won't converge with both age and sex as covariates
.  bysort case: tab sf36pcs_impair_24 sex, summ(fim)

------------------------------------------------------------------------------
--------------------
-> case = Control

           Means, Standard Deviations and Frequencies of FIM
```

```
  SF36 PCS |
impairmant |
     at 24 |         SEX
    months |         F          M |     Total
-----------+----------------------+----------
 Not impai |     124.5        124 | 124.11765
           | 1.9148542  3.0276504 | 2.7586762
           |         4         13 |        17
-----------+----------------------+----------
  Impaired |       122  113.94118 | 118.08571
           |  4.087283  14.964419 | 11.420754
           |        18         17 |        35
-----------+----------------------+----------
      Dead |      92.6        109 |     100.8
           | 37.944697  18.881208 | 29.547702
           |         5          5 |        10
-----------+----------------------+----------
     Total | 116.92593  116.97143 | 116.95161
           | 19.321025  13.541843 | 16.165565
           |        27         35 |        62

-------------------------------------------------------------------------------
--------------------
-> case = Case

             Means, Standard Deviations and Frequencies of FIM

  SF36 PCS |
impairmant |
     at 24 |         SEX
    months |         F          M |     Total
-----------+----------------------+----------
 Not impai |     113.5  108.35714 |     110.5
           | 11.530154  21.058918 | 17.589523
           |        10         14 |        24
-----------+----------------------+----------
  Impaired |       107  113.41176 | 110.20588
           | 13.638182  12.334194 | 13.211059
           |        17         17 |        34
-----------+----------------------+----------
      Dead |        92      97.75 | 95.538462
           | 31.168895  27.814436 | 27.992902
           |         5          8 |        13
-----------+----------------------+----------
     Total |  106.6875  108.38462 | 107.61972
           | 17.600289  19.834334 | 18.747469
           |        32         39 |        71


.
.   ** 2. mmse: 1 month **
.
.   LnMM3_lf sf36pcs_impair_24 mmse

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -720.00327
rescale:       log likelihood = -120.63577
rescale eq:    log likelihood = -103.95751
Iteration 0:   log likelihood = -103.95751
Iteration 1:   log likelihood = -102.95547
Iteration 2:   log likelihood = -102.62349
Iteration 3:   log likelihood =  -102.6173
Iteration 4:   log likelihood = -102.61729

                                                  Number of obs   =        108
```

```
                                                  Wald chi2(1)    =       0.30
Log likelihood = -102.61729                       Prob > chi2     =     0.5849

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        mmse |  -.0100103   .0183234    -0.55   0.585    -.0459236     .025903
       _cons |  -.3230509   .5157314    -0.63   0.531    -1.333866    .6877641
-------------+----------------------------------------------------------------
eq2          |
        mmse |   .0108837   .0682107     0.16   0.873    -.1228068    .1445742
       _cons |  -2.425198   1.954907    -1.24   0.215    -6.256744    1.406349
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
mmse	0.990040	0.585	0.955115	1.026241
eq2				
mmse	1.010943	0.873	0.884435	1.155547

```
.  LnMM3_lf sf36pcs_impair_24 case mmse

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 PCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        17         35         10 |        62
           |     27.42      56.45      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        24         34         13 |        71
           |     33.80      47.89      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        41         69         23 |       133
           |     30.83      51.88      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -720.00327
rescale:       log likelihood = -120.63577
rescale eq:    log likelihood = -103.95751
Iteration 0:   log likelihood = -103.95751
Iteration 1:   log likelihood = -102.93273
Iteration 2:   log likelihood = -102.45347
Iteration 3:   log likelihood = -102.44818
Iteration 4:   log likelihood = -102.44818

                                                  Number of obs   =        108
                                                  Wald chi2(2)    =       0.50
Log likelihood = -102.44818                       Prob > chi2     =     0.7805

------------------------------------------------------------------------------
```

Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	-.0818792	.1837471	-0.45	0.656	-.4420169	.2782586
mmse	-.0125463	.0191214	-0.66	0.512	-.0500237	.024931
_cons	-.2067831	.5747139	-0.36	0.719	-1.333202	.9196354
eq2						
case	.2838521	.5485498	0.52	0.605	-.7912857	1.35899
mmse	.0192997	.0700899	0.28	0.783	-.1180741	.1566734
_cons	-2.829557	2.106992	-1.34	0.179	-6.959185	1.300072

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.921383	0.656	0.642739	1.320828
mmse	0.987532	0.512	0.951207	1.025244
eq2				
case	1.328236	0.605	0.453262	3.892260
mmse	1.019487	0.783	0.888630	1.169614

```
.  LnMM3_lf sf36pcs_impair_24 case mmse age sex_recode
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

Key
frequency
row percentage

Case	SF36 PCS impairmant at 24 months Not impai	Impaired	Dead	Total
Control	17	35	10	62
	27.42	56.45	16.13	100.00
Case	24	34	13	71
	33.80	47.89	18.31	100.00
Total	41	69	23	133
	30.83	51.88	17.29	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -720.00327
rescale:       log likelihood = -120.63577
rescale eq:    log likelihood = -103.95751
Iteration 0:   log likelihood = -103.95751
Iteration 1:   log likelihood = -93.784622
Iteration 2:   log likelihood = -89.648381
Iteration 3:   log likelihood = -87.330632
Iteration 4:   log likelihood =  -87.22856
Iteration 5:   log likelihood = -87.227652
Iteration 6:   log likelihood = -87.227651

                                                  Number of obs   =        108
                                                  Wald chi2(4)    =      13.66
Log likelihood = -87.227651                       Prob > chi2     =     0.0085
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	-.3283209	.1969021	-1.67	0.095	-.7142419	.0576001
mmse	-.0327422	.0203858	-1.61	0.108	-.0726977	.0072133
age	.0182341	.0052594	3.47	0.001	.0079259	.0285423
sex_recode	.3915378	.1882104	2.08	0.037	.0226522	.7604233
_cons	-.8469782	.6290895	-1.35	0.178	-2.079971	.3860145
eq2						
case	.3607191	.5718798	0.63	0.528	-.7601448	1.481583
mmse	.008168	.0787732	0.10	0.917	-.1462245	.1625606
age	.0250334	.0154557	1.62	0.105	-.0052592	.0553259
sex_recode	-.2870879	.556674	-0.52	0.606	-1.378149	.8039731
_cons	-4.080273	2.398762	-1.70	0.089	-8.78176	.6212128

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.720132	0.095	0.489563	1.059291
mmse	0.967788	0.108	0.929882	1.007239
age	1.018401	0.001	1.007957	1.028953
sex_recode	1.479254	0.037	1.022911	2.139182
eq2				
case	1.434360	0.528	0.467599	4.399905
mmse	1.008201	0.917	0.863964	1.176520
age	1.025349	0.105	0.994755	1.056885
sex_recode	0.750446	0.606	0.252045	2.234401

```
.
.   ** 3. CIQ Total: 1 month **
.
.   LnMM3_lf sf36pcs_impair_24 ciq_total

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -920.00372
rescale:       log likelihood = -149.89074
rescale eq:    log likelihood = -140.01063
Iteration 0:   log likelihood = -140.01063
Iteration 1:   log likelihood = -128.98067
Iteration 2:   log likelihood = -127.55894
Iteration 3:   log likelihood = -127.49722
Iteration 4:   log likelihood = -127.49619
Iteration 5:   log likelihood = -127.49619

                                                  Number of obs   =        133
                                                  Wald chi2(1)    =       0.05
Log likelihood = -127.49619                       Prob > chi2     =     0.8200
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
ciq_total	.0024668	.010838	0.23	0.820	-.0187753	.0237089
_cons	-.6812557	.1400054	-4.87	0.000	-.9556612	-.4068502
eq2						
ciq_total	-.0973331	.0306283	-3.18	0.001	-.1573635	-.0373026

```
       _cons |  -1.001416   .2266504    -4.42   0.000    -1.445642   -.5571893
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
ciq_total	1.002470	0.820	0.981400	1.023992
eq2				
ciq_total	0.907254	0.001	0.854393	0.963385

```
.  LnMM3_lf sf36pcs_impair_24 case ciq_total

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 PCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        17         35         10 |        62
           |     27.42      56.45      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        24         34         13 |        71
           |     33.80      47.89      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        41         69         23 |       133
           |     30.83      51.88      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -920.00372
rescale:       log likelihood = -149.89074
rescale eq:    log likelihood = -140.01063
Iteration 0:   log likelihood = -140.01063
Iteration 1:   log likelihood = -126.77097
Iteration 2:   log likelihood = -126.07365
Iteration 3:   log likelihood = -124.53106
Iteration 4:   log likelihood = -124.34063
Iteration 5:   log likelihood = -124.33354
Iteration 6:   log likelihood = -124.33352
Iteration 7:   log likelihood = -124.33352

                                                  Number of obs   =        133
                                                  Wald chi2(2)    =       1.02
Log likelihood = -124.33352                       Prob > chi2     =     0.6009

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.1801476   .1833321    -0.98   0.326    -.5394719    .1791767
   ciq_total |  -.0025202   .0125232    -0.20   0.841    -.0270652    .0220248
       _cons |  -.5382166   .1983672    -2.71   0.007    -.9270092    -.149424
-------------+----------------------------------------------------------------
eq2          |
        case |  -.7275359     .43344    -1.68   0.093    -1.577063    .1219909
```

```
   ciq_total |  -.1447504   .0447955    -3.23   0.001     -.232548   -.0569527
       _cons |  -.2536637   .4675263    -0.54   0.587    -1.169998     .662671
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

------------------------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   0.835147                       0.326     0.583056    1.196232
   ciq_total |   0.997483                       0.841     0.973298    1.022269
-------------+----------------------------------------------------------------
eq2          |
        case |   0.483098                       0.093     0.206581    1.129744
   ciq_total |   0.865238                       0.001     0.792512    0.944639
------------------------------------------------------------------------------

.  LnMM3_lf sf36pcs_impair_24 case ciq_total sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 PCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        17         35         10 |        62
           |     27.42      56.45      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        24         34         13 |        71
           |     33.80      47.89      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        41         69         23 |       133
           |     30.83      51.88      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -920.00372
rescale:       log likelihood = -149.89074
rescale eq:    log likelihood = -140.01063
Iteration 0:   log likelihood = -140.01063
Iteration 1:   log likelihood = -125.74285
Iteration 2:   log likelihood = -123.30443
Iteration 3:   log likelihood = -122.80448
Iteration 4:   log likelihood = -122.78911
Iteration 5:   log likelihood = -122.78909
Iteration 6:   log likelihood = -122.78909

                                                  Number of obs   =        133
                                                  Wald chi2(3)    =       3.53
Log likelihood = -122.78909                       Prob > chi2     =     0.3163

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.1591472   .1707483    -0.93   0.351    -.4938077    .1755133
   ciq_total |   .0006105   .0125747     0.05   0.961    -.0240354    .0252565
  sex_recode |    .254984   .1660238     1.54   0.125    -.0704167    .5803847
       _cons |  -.7019576   .2228353    -3.15   0.002    -1.138707   -.2652085
```

```
-------------+----------------------------------------------------------------
eq2          |
        case |  -.6217611   .4292705    -1.45   0.148    -1.463116    .2195937
   ciq_total |  -.1471944   .0448489    -3.28   0.001    -.2350967   -.0592922
  sex_recode |  -.0337122   .3630795    -0.09   0.926     -.745335    .6779106
       _cons |  -.2785411   .4864639    -0.57   0.567    -1.231993    .6749106
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   0.852871                       0.351     0.610298    1.191858
   ciq_total |   1.000611                       0.961     0.976251    1.025578
  sex_recode |   1.290441                       0.125     0.932005    1.786726
-------------+----------------------------------------------------------------
eq2          |
        case |   0.536998                       0.148     0.231514    1.245571
   ciq_total |   0.863126                       0.001     0.790494    0.942431
  sex_recode |   0.966850                       0.926     0.474575    1.969758
-------------+----------------------------------------------------------------

.   *LnMM3_lf sf36pcs_impair_24 case ciq_total age
.   **NOTE: model won't converge with both age and sex as covariates
.
.
.   ****************************************
.   * SF36 MCS: Impairment at 24 months    *
.   ****************************************
.
.   ** 1. FIM: 1 month **
.
.   LnMM3_lf sf36mcs_impair_24 fim

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -520.00736
rescale:       log likelihood = -133.93049
rescale eq:    log likelihood = -130.99376
Iteration 0:   log likelihood = -130.99376
Iteration 1:   log likelihood = -119.85718
Iteration 2:   log likelihood = -117.06463
Iteration 3:   log likelihood = -116.25206
Iteration 4:   log likelihood = -116.01364
Iteration 5:   log likelihood = -116.00491
Iteration 6:   log likelihood = -116.00491

                                                  Number of obs   =        133
                                                  Wald chi2(1)    =       0.21
Log likelihood = -116.00491                       Prob > chi2     =     0.6488

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |   .0046707   .0102571     0.46   0.649    -.0154327    .0247742
       _cons |  -2.049143   1.176623    -1.74   0.082    -4.355281    .2569945
-------------+----------------------------------------------------------------
eq2          |
         fim |  -.0334033   .0062246    -5.37   0.000    -.0456032   -.0212033
       _cons |   1.771952   .5509365     3.22   0.001     .6921368    2.851768
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
fim	1.004682	0.649	0.984686	1.025084
eq2				
fim	0.967148	0.000	0.955421	0.979020

```
.  LnMM3_lf sf36mcs_impair_24 case fim

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 MCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        36         16         10 |        62
           |     58.06      25.81      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        45         13         13 |        71
           |     63.38      18.31      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        81         29         23 |       133
           |     60.90      21.80      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -520.00736
rescale:       log likelihood = -133.93049
rescale eq:    log likelihood = -130.99376
Iteration 0:   log likelihood = -130.99376
Iteration 1:   log likelihood = -117.61384
Iteration 2:   log likelihood = -114.62617
Iteration 3:   log likelihood = -113.12857
Iteration 4:   log likelihood =  -112.8873
Iteration 5:   log likelihood = -112.87535
Iteration 6:   log likelihood = -112.87531
Iteration 7:   log likelihood = -112.87531

                                                  Number of obs   =        133
                                                  Wald chi2(2)    =       1.08
Log likelihood = -112.87531                       Prob > chi2     =     0.5817

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.3593452   .3887774    -0.92   0.355    -1.121335    .4026445
         fim |   -.000915   .0114518    -0.08   0.936    -.0233602    .0215301
       _cons |  -1.243562   1.405079    -0.89   0.376    -3.997466    1.510342
-------------+----------------------------------------------------------------
eq2          |
        case |  -1.099805   .5386602    -2.04   0.041     -2.15556   -.0440504
         fim |  -.0459359   .0097555    -4.71   0.000    -.0650563   -.0268155
       _cons |    3.68151   1.169547     3.15   0.002     1.389239    5.973781
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.698133	0.355	0.325845	1.495775
fim	0.999085	0.936	0.976911	1.021764
eq2				
case	0.332936	0.041	0.115838	0.956906
fim	0.955103	0.000	0.937015	0.973541

```
.  LnMM3_lf sf36mcs_impair_24 case fim age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 MCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        36         16         10 |        62
           |     58.06      25.81      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        45         13         13 |        71
           |     63.38      18.31      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        81         29         23 |       133
           |     60.90      21.80      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -520.00736
rescale:       log likelihood = -133.93049
rescale eq:    log likelihood = -130.99376
Iteration 0:   log likelihood = -130.99376
Iteration 1:   log likelihood = -116.47878
Iteration 2:   log likelihood = -109.58245
Iteration 3:   log likelihood = -105.61743
Iteration 4:   log likelihood = -103.72586
Iteration 5:   log likelihood = -103.62549
Iteration 6:   log likelihood = -103.62529
Iteration 7:   log likelihood = -103.62529

                                                  Number of obs   =        133
                                                  Wald chi2(4)    =       3.74
Log likelihood = -103.62529                       Prob > chi2     =     0.4424

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   -.399523   .3866327    -1.03   0.301    -1.157309    .3582631
         fim |   .0005516   .0144811     0.04   0.970    -.0278308     .028934
         age |   .0068078   .0105387     0.65   0.518    -.0138477    .0274634
  sex_recode |    .460787    .337685     1.36   0.172    -.2010635    1.122637
       _cons |   -2.04458   2.008336    -1.02   0.309    -5.980846    1.891686
-------------+----------------------------------------------------------------
eq2          |
        case |  -1.105548   .5612364    -1.97   0.049    -2.205551   -.0055451
```

```
         fim |  -.0813619   .0197549    -4.12   0.000    -.1200809    -.042643
         age |   .0439446   .0156132     2.81   0.005     .0133433    .0745459
  sex_recode |   .9122636   .5037978     1.81   0.070    -.0751619    1.899689
       _cons |   3.931922   1.827511     2.15   0.031     .3500654    7.513778
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                           P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   0.670640                        0.301     0.314331    1.430842
         fim |   1.000552                        0.970     0.972553    1.029357
         age |   1.006831                        0.518     0.986248    1.027844
  sex_recode |   1.585321                        0.172     0.817861    3.072948
-------------+----------------------------------------------------------------
eq2          |
        case |   0.331029                        0.049     0.110190    0.994470
         fim |   0.921860                        0.000     0.886849    0.958253
         age |   1.044924                        0.005     1.013433    1.077395
  sex_recode |   2.489952                        0.070     0.927593    6.683817
-------------+----------------------------------------------------------------

.
.  ** 2. mmse: 1 month **
.
.  LnMM3_lf sf36mcs_impair_24 mmse

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -390.00627
rescale:       log likelihood = -107.46857
rescale eq:    log likelihood = -96.726168
Iteration 0:   log likelihood = -96.726168
Iteration 1:   log likelihood = -95.289368
Iteration 2:   log likelihood = -95.158701
Iteration 3:   log likelihood = -95.158145
Iteration 4:   log likelihood = -95.158145

                                                  Number of obs   =        108
                                                  Wald chi2(1)    =       0.41
Log likelihood = -95.158145                       Prob > chi2     =     0.5240

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        mmse |   .0359199   .0563664     0.64   0.524    -.0745562     .146396
       _cons |    -2.4468   1.631016    -1.50   0.134    -5.643533     .749933
-------------+----------------------------------------------------------------
eq2          |
        mmse |   .0108133   .0686566     0.16   0.875    -.1237512    .1453778
       _cons |   -2.42321   1.967412    -1.23   0.218    -6.279266    1.432845
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                           P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        mmse |   1.036573                        0.524     0.928155    1.157655
-------------+----------------------------------------------------------------
eq2          |
        mmse |   1.010872                        0.875     0.883600    1.156476
-------------+----------------------------------------------------------------
```

```
.  LnMM3_lf sf36mcs_impair_24 case mmse

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 MCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        36         16         10 |        62
           |     58.06      25.81      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        45         13         13 |        71
           |     63.38      18.31      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        81         29         23 |       133
           |     60.90      21.80      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -390.00627
rescale:       log likelihood = -107.46857
rescale eq:    log likelihood = -96.726168
Iteration 0:   log likelihood = -96.726168
Iteration 1:   log likelihood = -95.105029
Iteration 2:   log likelihood = -94.932297
Iteration 3:   log likelihood = -94.931978
Iteration 4:   log likelihood = -94.931978

                                                  Number of obs   =        108
                                                  Wald chi2(2)    =       0.74
Log likelihood = -94.931978                       Prob > chi2     =     0.6895

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.1904152   .3448664    -0.55   0.581    -.8663409    .4855104
        mmse |   .0312494   .0553753     0.56   0.573    -.0772842    .1397831
       _cons |  -2.213191    1.63814    -1.35   0.177    -5.423886    .9975037
-------------+----------------------------------------------------------------
eq2          |
        case |   .2633349   .5411379     0.49   0.627    -.7972759    1.323946
        mmse |    .015519   .0714788     0.22   0.828    -.1245768    .1556149
       _cons |  -2.710644   2.119057    -1.28   0.201    -6.863919    1.442632
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.826616	0.581	0.420487	1.625004
mmse	1.031743	0.573	0.925627	1.150024
eq2				
case	1.301262	0.627	0.450555	3.758221
mmse	1.015640	0.828	0.882870	1.168376

```
.  LnMM3_lf sf36mcs_impair_24 case mmse age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 MCS impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        36         16         10 |        62
           |     58.06      25.81      16.13 |    100.00
-----------+---------------------------------+----------
      Case |        45         13         13 |        71
           |     63.38      18.31      18.31 |    100.00
-----------+---------------------------------+----------
     Total |        81         29         23 |       133
           |     60.90      21.80      17.29 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -390.00627
rescale:       log likelihood = -107.46857
rescale eq:    log likelihood = -96.726168
Iteration 0:   log likelihood = -96.726168
Iteration 1:   log likelihood = -94.903101
Iteration 2:   log likelihood = -90.614388
Iteration 3:   log likelihood = -90.166361
Iteration 4:   log likelihood = -90.147035
Iteration 5:   log likelihood = -90.146968
Iteration 6:   log likelihood = -90.146968

                                                  Number of obs   =        108
                                                  Wald chi2(4)    =       3.91
Log likelihood = -90.146968                       Prob > chi2     =     0.4183

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.3096479    .341126    -0.91   0.364    -.9782426    .3589468
        mmse |   .0311641   .0531155     0.59   0.557    -.0729405    .1352686
         age |   .0129415   .0111483     1.16   0.246    -.0089087    .0347917
  sex_recode |   .4423206   .3380315     1.31   0.191     -.220209     1.10485
       _cons |  -3.164769   1.742371    -1.82   0.069    -6.579752    .2502145
-------------+----------------------------------------------------------------
eq2          |
        case |   .1382746   .5219344     0.26   0.791    -.8846981    1.161247
        mmse |   .0251221   .0656512     0.38   0.702    -.1035519    .1537961
         age |   .0398669   .0207404     1.92   0.055    -.0007836    .0805175
  sex_recode |  -.1741637    .535657    -0.33   0.745    -1.224032    .8757048
       _cons |   -5.45477   2.498669    -2.18   0.029    -10.35207   -.5574682
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.733705	0.364	0.375971	1.431821

mmse	1.031655	0.557	0.929656	1.144844
age	1.013026	0.246	0.991131	1.035404
sex_recode	1.556315	0.191	0.802351	3.018772
eq2				
case	1.148291	0.791	0.412839	3.193914
mmse	1.025440	0.702	0.901629	1.166253
age	1.040672	0.055	0.999217	1.083848
sex_recode	0.840159	0.745	0.294042	2.400567

```
.
.   ** 3. CIQ Total: 1 month **
.
.   LnMM3_lf sf36mcs_impair_24 ciq_total

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -520.00736
rescale:       log likelihood = -133.93049
rescale eq:    log likelihood = -130.99376
Iteration 0:   log likelihood = -130.99376
Iteration 1:   log likelihood =  -119.7715
Iteration 2:   log likelihood = -118.59598
Iteration 3:   log likelihood = -118.58421
Iteration 4:   log likelihood =  -118.5842

                                                  Number of obs   =        133
                                                  Wald chi2(1)    =       0.82
Log likelihood =  -118.5842                       Prob > chi2     =     0.3653

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
   ciq_total |   .0197923   .0218602     0.91   0.365    -.0230529    .0626374
       _cons |  -1.732352   .2986182    -5.80   0.000    -2.317633   -1.147071
-------------+----------------------------------------------------------------
eq2          |
   ciq_total |   -.115942   .0370707    -3.13   0.002    -.1885992   -.0432848
       _cons |  -.8599764   .2600674    -3.31   0.001    -1.369699   -.3502537
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
ciq_total	1.019989	0.365	0.977211	1.064641
eq2				
ciq_total	0.890527	0.002	0.828118	0.957639

```
.   LnMM3_lf sf36mcs_impair_24 case ciq_total

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | SF36 MCS impairmant at 24 months
```

Case	Not impai	Impaired	Dead	Total
Control	36	16	10	62
	58.06	25.81	16.13	100.00
Case	45	13	13	71
	63.38	18.31	18.31	100.00
Total	81	29	23	133
	60.90	21.80	17.29	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -520.00736
rescale:       log likelihood = -133.93049
rescale eq:    log likelihood = -130.99376
Iteration 0:   log likelihood = -130.99376
Iteration 1:   log likelihood = -117.16812
Iteration 2:   log likelihood =  -114.5278
Iteration 3:   log likelihood = -114.49853
Iteration 4:   log likelihood = -114.49847
Iteration 5:   log likelihood = -114.49847

                                                  Number of obs   =        133
                                                  Wald chi2(2)    =       1.26
Log likelihood = -114.49847                       Prob > chi2     =     0.5329

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |  -.2609955    .386301    -0.68   0.499    -1.018132    .4961405
   ciq_total |   .0110456   .0266179     0.41   0.678    -.0411245    .0632158
       _cons |  -1.511762   .4441948    -3.40   0.001    -2.382367   -.6411557
-------------+----------------------------------------------------------------
eq2          |
        case |  -1.396481   .5178306    -2.70   0.007     -2.41141   -.3815514
   ciq_total |  -.2180034   .0609379    -3.58   0.000    -.3374396   -.0985673
       _cons |   .6477719   .5988494     1.08   0.279    -.5259513    1.821495
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.770284	0.499	0.361269	1.642370
ciq_total	1.011107	0.678	0.959710	1.065257
eq2				
case	0.247466	0.007	0.089689	0.682801
ciq_total	0.804123	0.000	0.713595	0.906135

```
. LnMM3_lf sf36mcs_impair_24 case ciq_total age sex_recode
```

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX

Case	SF36 MCS impairmant at 24 months Not impai	Impaired	Dead	Total
Control	36	16	10	62
	58.06	25.81	16.13	100.00
Case	45	13	13	71
	63.38	18.31	18.31	100.00
Total	81	29	23	133
	60.90	21.80	17.29	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -520.00736
rescale:       log likelihood = -133.93049
rescale eq:    log likelihood = -130.99376
Iteration 0:   log likelihood = -130.99376
Iteration 1:   log likelihood = -117.55318
Iteration 2:   log likelihood =  -110.7147
Iteration 3:   log likelihood = -107.86724
Iteration 4:   log likelihood = -107.63192
Iteration 5:   log likelihood = -107.63165
Iteration 6:   log likelihood = -107.63165

                                                  Number of obs   =        133
                                                  Wald chi2(4)    =       4.17
Log likelihood = -107.63165                       Prob > chi2     =     0.3831
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	-.2138843	.3863667	-0.55	0.580	-.9711491	.5433804
ciq_total	.0236834	.0295536	0.80	0.423	-.0342406	.0816075
age	.0094059	.0107252	0.88	0.380	-.0116152	.0304269
sex_recode	.4279147	.3273555	1.31	0.191	-.2136902	1.06952
_cons	-2.470526	.9484511	-2.60	0.009	-4.329456	-.6115964
eq2						
case	-1.825444	.6658069	-2.74	0.006	-3.130401	-.5204864
ciq_total	-.2872646	.0882022	-3.26	0.001	-.4601378	-.1143914
age	.0386471	.0142774	2.71	0.007	.0106639	.0666303
sex_recode	-.1628985	.3202168	-0.51	0.611	-.7905119	.464715
_cons	-1.195945	1.231512	-0.97	0.331	-3.609664	1.217773

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	0.807442	0.580	0.378648	1.721818
ciq_total	1.023966	0.423	0.966339	1.085030
age	1.009450	0.380	0.988452	1.030894
sex_recode	1.534055	0.191	0.807599	2.913980
eq2				
case	0.161146	0.006	0.043700	0.594231
ciq_total	0.750313	0.001	0.631197	0.891909
age	1.039404	0.007	1.010721	1.068900
sex_recode	0.849677	0.611	0.453613	1.591561

.

```
.   ****************************************
.   * Social: Impairment at 24 months      *
.   ****************************************
.
.   ** 1. FIM: 1 month **
.
.   LnMM3_lf social_impair_24 fim

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -79.811095
Iteration 2:   log likelihood = -76.993689
Iteration 3:   log likelihood = -75.860061
Iteration 4:   log likelihood = -75.249271
Iteration 5:   log likelihood =  -75.11387
Iteration 6:   log likelihood = -75.105789
Iteration 7:   log likelihood = -75.105757
Iteration 8:   log likelihood = -75.105757

                                                  Number of obs   =        134
                                                  Wald chi2(1)    =       5.88
Log likelihood = -75.105757                       Prob > chi2     =     0.0154

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |  -.0355627   .0146715    -2.42   0.015    -.0643183   -.0068071
       _cons |   .7728943   1.416849     0.55   0.585    -2.004079    3.549868
-------------+----------------------------------------------------------------
eq2          |
         fim |   -.032042   .0065667    -4.88   0.000    -.0449124   -.0191715
       _cons |   1.621519   .5991843     2.71   0.007      .447139    2.795898
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
fim	0.965062	0.015	0.937706	0.993216
eq2				
fim	0.968466	0.000	0.956081	0.981011

```
.   LnMM3_lf social_impair_24 case fim

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Social impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	53	0	10	63
	84.13	0.00	15.87	100.00

Case	51	7	13	71
	71.83	9.86	18.31	100.00
Total	104	7	23	134
	77.61	5.22	17.16	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood =    -79.122
Iteration 2:   log likelihood = -78.528128  (not concave)
Iteration 3:   log likelihood = -74.336264
Iteration 4:   log likelihood =  -72.34244
Iteration 5:   log likelihood = -71.653612
Iteration 6:   log likelihood = -71.536576
Iteration 7:   log likelihood = -71.507348
Iteration 8:   log likelihood =   -71.5013
Iteration 9:   log likelihood = -71.499762
Iteration 10:  log likelihood = -71.499467
Iteration 11:  log likelihood = -71.499415
Iteration 12:  log likelihood =  -71.49941

                                                  Number of obs   =        134
                                                  Wald chi2(2)    =       2.38
Log likelihood =  -71.49941                       Prob > chi2     =     0.3039
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	15.31614	1005.553	0.02	0.988	-1955.531	1986.164
fim	-.0229076	.0148424	-1.54	0.123	-.0519982	.006183
_cons	-15.31032	1005.554	-0.02	0.988	-1986.16	1955.54
eq2						
case	-.4685537	.3766247	-1.24	0.213	-1.206725	.2696172
fim	-.0366005	.0076015	-4.81	0.000	-.0514991	-.0217018
_cons	2.356568	.8250593	2.86	0.004	.7394813	3.973654

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	4.48e+06	0.988	0.000000	.
fim	0.977353	0.123	0.949331	1.006202
eq2				
case	0.625907	0.213	0.299176	1.309463
fim	0.964061	0.000	0.949805	0.978532

```
.  LnMM3_lf social_impair_24 case fim age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
```

```
| row percentage |
+----------------+

           |  Social impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        53         0         10 |        63
           |     84.13      0.00      15.87 |    100.00
-----------+---------------------------------+----------
      Case |        51         7         13 |        71
           |     71.83      9.86      18.31 |    100.00
-----------+---------------------------------+----------
     Total |       104         7         23 |       134
           |     77.61      5.22      17.16 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -77.362994
Iteration 2:   log likelihood =  -66.86504
Iteration 3:   log likelihood = -62.633359
Iteration 4:   log likelihood = -62.103949
Iteration 5:   log likelihood = -61.968642
Iteration 6:   log likelihood = -61.940024
Iteration 7:   log likelihood = -61.933532
Iteration 8:   log likelihood = -61.932447
Iteration 9:   log likelihood =  -61.93219
Iteration 10:  log likelihood = -61.932132
Iteration 11:  log likelihood = -61.932119
Iteration 12:  log likelihood = -61.932117

                                                  Number of obs   =        134
                                                  Wald chi2(4)    =       3.08
Log likelihood = -61.932117                       Prob > chi2     =     0.5438

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   16.54466   1935.288     0.01   0.993     -3776.55    3809.639
         fim |  -.0317813   .0190425    -1.67   0.095    -.0691039    .0055413
         age |   .0106069   .0249425     0.43   0.671    -.0382795    .0594932
  sex_recode |  -.1629925   .7191015    -0.23   0.821    -1.572406    1.246421
       _cons |   -16.2315   1935.289    -0.01   0.993    -3809.328    3776.865
-------------+----------------------------------------------------------------
eq2          |
        case |  -.7674332   .4256005    -1.80   0.071    -1.601595    .0667283
         fim |  -.0655782   .0139787    -4.69   0.000     -.092976   -.0381804
         age |   .0528517   .0146479     3.61   0.000     .0241424     .081561
  sex_recode |   .4336202   .3481622     1.25   0.213    -.2487652    1.116006
       _cons |   1.753401    1.53538     1.14   0.253    -1.255888    4.762691
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.53e+07	0.993	0.000000	.
fim	0.968718	0.095	0.933230	1.005557
age	1.010663	0.671	0.962444	1.061299
sex_recode	0.849598	0.821	0.207545	3.477872

```
-------------+----------------------------------------------------------------
eq2          |
        case |   0.464203                          0.071     0.201575    1.069005
         fim |   0.936526                          0.000     0.911215    0.962539
         age |   1.054273                          0.000     1.024436    1.084979
  sex_recode |   1.542833                          0.213     0.779763    3.052636
-------------+----------------------------------------------------------------

.
.  ** 2. MMSE: 1 month **
.
.  LnMM3_lf social_impair_24 mmse

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -190.00817
rescale:       log likelihood = -63.639703
rescale eq:    log likelihood = -63.639703
Iteration 0:   log likelihood = -63.639703
Iteration 1:   log likelihood = -62.077576
Iteration 2:   log likelihood = -61.906025
Iteration 3:   log likelihood = -61.903392
Iteration 4:   log likelihood = -61.903385
Iteration 5:   log likelihood = -61.903385

                                                  Number of obs   =        109
                                                  Wald chi2(1)    =       1.11
Log likelihood = -61.903385                       Prob > chi2     =     0.2927

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        mmse |   -.062878   .0597617    -1.05   0.293    -.1800089    .0542528
       _cons |  -1.165992   1.623995    -0.72   0.473    -4.348964     2.01698
-------------+----------------------------------------------------------------
eq2          |
        mmse |     .01131   .0739044     0.15   0.878      -.13354      .15616
       _cons |  -2.446574   2.115122    -1.16   0.247    -6.592137     1.69899
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |
             |      RR                             P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        mmse |   0.939058                          0.293     0.835263    1.055751
-------------+----------------------------------------------------------------
eq2          |
        mmse |   1.011374                          0.878     0.874992    1.169013
-------------+----------------------------------------------------------------

.  LnMM3_lf social_impair_24 case mmse

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           |  Social impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
```

```
           Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX
   Control |        53          0         10 |        63
           |     84.13       0.00      15.87 |    100.00
-----------+--------------------------------+----------
      Case |        51          7         13 |        71
           |     71.83       9.86      18.31 |    100.00
-----------+--------------------------------+----------
     Total |       104          7         23 |       134
           |     77.61       5.22      17.16 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -190.00817
rescale:       log likelihood = -63.639703
rescale eq:    log likelihood = -63.639703
Iteration 0:   log likelihood = -63.639703
Iteration 1:   log likelihood = -59.922734
Iteration 2:   log likelihood =  -58.33404
Iteration 3:   log likelihood = -58.061062
Iteration 4:   log likelihood = -57.986962
Iteration 5:   log likelihood = -57.971174
Iteration 6:   log likelihood = -57.967489
Iteration 7:   log likelihood = -57.966693
Iteration 8:   log likelihood =  -57.96658
Iteration 9:   log likelihood = -57.966566
Iteration 10:  log likelihood = -57.966563

                                                  Number of obs   =        109
                                                  Wald chi2(2)    =       0.96
Log likelihood = -57.966563                       Prob > chi2     =     0.6174

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   15.82221   1251.969     0.01   0.990    -2437.992    2469.636
        mmse |   -.065886   .0670969    -0.98   0.326    -.1973936    .0656216
       _cons |  -16.32101    1251.97    -0.01   0.990    -2470.137    2437.495
-------------+----------------------------------------------------------------
eq2          |
        case |   .2780767   .5391572     0.52   0.606    -.7786521    1.334805
        mmse |    .015908   .0786893     0.20   0.840    -.1383202    .1701362
       _cons |  -2.739019   2.307422    -1.19   0.235    -7.261483    1.783444
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |
             |      RR                            P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   7.44e+06                         0.990     0.000000           .
        mmse |   0.936238                         0.326     0.820868    1.067823
-------------+----------------------------------------------------------------
eq2          |
        case |   1.320587                         0.606     0.459024    3.799257
        mmse |   1.016035                         0.840     0.870820    1.185466
-------------+----------------------------------------------------------------

.  LnMM3_lf social_impair_24 case mmse age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
```

| row percentage |

Case	Social impairmant at 24 months Not impai	Impaired	Dead	Total
Control	53	0	10	63
	84.13	0.00	15.87	100.00
Case	51	7	13	71
	71.83	9.86	18.31	100.00
Total	104	7	23	134
	77.61	5.22	17.16	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -190.00817
rescale:       log likelihood = -63.639703
rescale eq:    log likelihood = -63.639703
Iteration 0:   log likelihood = -63.639703
Iteration 1:   log likelihood =  -61.87336
Iteration 2:   log likelihood = -55.973698
Iteration 3:   log likelihood = -55.107447
Iteration 4:   log likelihood = -54.988283
Iteration 5:   log likelihood = -54.963888
Iteration 6:   log likelihood =   -54.9581
Iteration 7:   log likelihood = -54.956862
Iteration 8:   log likelihood = -54.956689
Iteration 9:   log likelihood = -54.956667
Iteration 10:  log likelihood = -54.956663

                                                  Number of obs   =        109
                                                  Wald chi2(4)    =       1.40
Log likelihood = -54.956663                       Prob > chi2     =     0.8449
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	15.41707	1001.336	0.02	0.988	-1947.166	1978
mmse	-.0690732	.0732993	-0.94	0.346	-.2127372	.0745909
age	.0091211	.0233112	0.39	0.696	-.0365679	.0548102
sex_recode	-.4575711	.8366626	-0.55	0.584	-2.0974	1.182258
_cons	-16.21853	1001.338	-0.02	0.987	-1978.805	1946.368
eq2						
case	.1739991	.5254026	0.33	0.741	-.855771	1.203769
mmse	.0337922	.0787969	0.43	0.668	-.1206468	.1882313
age	.0412836	.0213518	1.93	0.053	-.0005652	.0831324
sex_recode	-.2193578	.5302262	-0.41	0.679	-1.258582	.8198665
_cons	-5.804014	2.862807	-2.03	0.043	-11.41501	-.1930163

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	4.96e+06	0.988	0.000000	.
mmse	0.933258	0.346	0.808369	1.077443
age	1.009163	0.696	0.964093	1.056340
sex_recode	0.632819	0.584	0.122775	3.261729
eq2				

case	1.190055	0.741	0.424955	3.332655
mmse	1.034370	0.668	0.886347	1.207113
age	1.042148	0.053	0.999435	1.086686
sex_recode	0.803034	0.679	0.284057	2.270197

```
.
.  ** 3. CIQ Total: 1 month **
.
.  LnMM3_lf social_impair_24 ciq_total

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -81.764524
Iteration 2:   log likelihood =  -79.20682
Iteration 3:   log likelihood = -79.171139
Iteration 4:   log likelihood = -79.170959
Iteration 5:   log likelihood = -79.170959

                                                  Number of obs   =        134
                                                  Wald chi2(1)    =       2.02
Log likelihood = -79.170959                       Prob > chi2     =     0.1551

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
   ciq_total |  -.0974031   .0685057    -1.42   0.155    -.2316719    .0368656
       _cons |  -2.158581   .5648904    -3.82   0.000    -3.265746   -1.051416
-------------+----------------------------------------------------------------
eq2          |
   ciq_total |  -.1202717   .0371448    -3.24   0.001    -.1930742   -.0474691
       _cons |   -.828371   .2603485    -3.18   0.001    -1.338645   -.3180974
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
ciq_total	0.907190	0.155	0.793206	1.037554
eq2				
ciq_total	0.886680	0.001	0.824421	0.953640

```
.  LnMM3_lf social_impair_24 case ciq_total

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Social impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	53	0	10	63
	84.13	0.00	15.87	100.00

Case	51	7	13	71
	71.83	9.86	18.31	100.00
Total	104	7	23	134
	77.61	5.22	17.16	100.00

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -80.572648
Iteration 2:   log likelihood = -76.140123
Iteration 3:   log likelihood =   -75.4838
Iteration 4:   log likelihood = -75.292751
Iteration 5:   log likelihood = -75.260189
Iteration 6:   log likelihood = -75.252494
Iteration 7:   log likelihood = -75.250583
Iteration 8:   log likelihood = -75.250214
Iteration 9:   log likelihood = -75.250153
Iteration 10:  log likelihood = -75.250138
Iteration 11:  log likelihood = -75.250135

                                                  Number of obs   =        134
                                                  Wald chi2(2)    =       0.37
Log likelihood = -75.250135                       Prob > chi2     =     0.8293
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	15.63458	1097.644	0.01	0.989	-2135.709	2166.978
ciq_total	-.0409899	.067014	-0.61	0.541	-.172335	.0903552
_cons	-17.66002	1097.644	-0.02	0.987	-2169.003	2133.683
eq2						
case	-.4048187	.3606841	-1.12	0.262	-1.111747	.3021093
ciq_total	-.1326503	.0374202	-3.54	0.000	-.2059925	-.059308
_cons	-.5094686	.3458858	-1.47	0.141	-1.187392	.1684551

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	6.17e+06	0.989	0.000000	.
ciq_total	0.959839	0.541	0.841697	1.094563
eq2				
case	0.667098	0.262	0.328984	1.352709
ciq_total	0.875771	0.000	0.813839	0.942416

```
.  LnMM3_lf social_impair_24 case ciq_total age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
```

Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX

Case	Social impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	53	0	10	63
	84.13	0.00	15.87	100.00
Case	51	7	13	71
	71.83	9.86	18.31	100.00
Total	104	7	23	134
	77.61	5.22	17.16	100.00

Log multinomial model

```
initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood =  -79.88043
Iteration 2:   log likelihood = -74.591407
Iteration 3:   log likelihood = -72.175442
Iteration 4:   log likelihood = -71.564872
Iteration 5:   log likelihood = -71.461192
Iteration 6:   log likelihood = -71.442105
Iteration 7:   log likelihood = -71.437784
Iteration 8:   log likelihood = -71.436757
Iteration 9:   log likelihood = -71.436535
Iteration 10:  log likelihood = -71.436489
Iteration 11:  log likelihood = -71.436478
Iteration 12:  log likelihood = -71.436476
```

Log likelihood = -71.436476

Number of obs	= 134
Wald chi2(4)	= 0.52
Prob > chi2	= 0.9712

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eq1						
case	16.26323	1495.372	0.01	0.991	-2914.612	2947.138
ciq_total	-.0439687	.0688295	-0.64	0.523	-.1788721	.0909346
age	.003008	.0234461	0.13	0.898	-.0429456	.0489615
sex_recode	-.2034906	.7236865	-0.28	0.779	-1.62189	1.214909
_cons	-18.36311	1495.373	-0.01	0.990	-2949.24	2912.513
eq2						
case	-.2564884	.3439149	-0.75	0.456	-.9305492	.4175724
ciq_total	-.113969	.0345732	-3.30	0.001	-.1817312	-.0462069
age	.0395918	.0168698	2.35	0.019	.0065276	.072656
sex_recode	.0652419	.3683291	0.18	0.859	-.6566699	.7871537
_cons	-3.41075	1.321001	-2.58	0.010	-5.999865	-.8216348

Exponentiated values of the model coefficients and their 95% confidence limits

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	1.16e+07	0.991	0.000000	.
ciq_total	0.956984	0.523	0.836213	1.095197
age	1.003012	0.898	0.957963	1.050180
sex_recode	0.815878	0.779	0.197525	3.369987

```
eq2          |
        case |   0.773764                          0.456     0.394337    1.518271
   ciq_total |   0.892286                          0.001     0.833825    0.954844
         age |   1.040386                          0.019     1.006549    1.075361
  sex_recode |   1.067417                          0.859     0.518575    2.197134
-------------+----------------------------------------------------------------

.
.   ****************************************
.   * Mobility: Impairment at 24 months    *
.   ****************************************
.
.   ** 1. FIM: 1 month **
.
.   LnMM3_lf mobility_impair_24 fim

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -81.279726
Iteration 2:   log likelihood = -78.281949
Iteration 3:   log likelihood =  -77.40601
Iteration 4:   log likelihood = -76.987588
Iteration 5:   log likelihood =  -76.93415
Iteration 6:   log likelihood = -76.933169
Iteration 7:   log likelihood = -76.933168

                                                  Number of obs   =        134
                                                  Wald chi2(1)    =       2.12
Log likelihood = -76.933168                       Prob > chi2     =     0.1455

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |  -.0239293   .0164381    -1.46   0.145    -.0561474    .0082889
       _cons |  -.3722645   1.713435    -0.22   0.828    -3.730535    2.986006
-------------+----------------------------------------------------------------
eq2          |
         fim |  -.0340244   .0064714    -5.26   0.000    -.0467081   -.0213407
       _cons |   1.830709   .5794128     3.16   0.002      .695081    2.966337
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+----------------------------------------------------------------
             |      RR                                  P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
         fim |   0.976355                          0.145     0.945400    1.008323
-------------+----------------------------------------------------------------
eq2          |
         fim |   0.966548                          0.000     0.954366    0.978885
-------------+----------------------------------------------------------------

.   LnMM3_lf mobility_impair_24 case fim

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
```

```
+----------------+

           | Mobility impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        51         2         10 |        63
           |     80.95      3.17      15.87 |    100.00
-----------+---------------------------------+----------
      Case |        53         5         13 |        71
           |     74.65      7.04      18.31 |    100.00
-----------+---------------------------------+----------
     Total |       104         7         23 |       134
           |     77.61      5.22      17.16 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -79.886379
Iteration 2:   log likelihood = -76.834185
Iteration 3:   log likelihood = -75.691325
Iteration 4:   log likelihood = -75.331894
Iteration 5:   log likelihood = -75.304044
Iteration 6:   log likelihood = -75.303818
Iteration 7:   log likelihood = -75.303818

                                                  Number of obs   =        134
                                                  Wald chi2(2)    =       2.20
Log likelihood = -75.303818                       Prob > chi2     =     0.3334

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .4498848   .9154873     0.49   0.623    -1.344437    2.244207
         fim |   -.019041   .0186392    -1.02   0.307    -.0555732    .0174911
       _cons |  -1.180745    2.30908    -0.51   0.609    -5.706457    3.344968
-------------+----------------------------------------------------------------
eq2          |
        case |  -.8343903   .4444066    -1.88   0.060    -1.705411    .0366305
         fim |  -.0437467   .0087099    -5.02   0.000    -.0608178   -.0266757
       _cons |   3.304109    .994504     3.32   0.001     1.354917    5.253301
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits

-------------+--------------------------------------------------------------
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+--------------------------------------------------------------
eq1          |
        case |   1.568132                       0.623     0.260686    9.432932
         fim |   0.981139                       0.307     0.945943    1.017645
-------------+--------------------------------------------------------------
eq2          |
        case |   0.434139                       0.060     0.181698    1.037310
         fim |   0.957196                       0.000     0.940995    0.973677
-------------+--------------------------------------------------------------

.  LnMM3_lf mobility_impair_24 case fim age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
```

Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX

```
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | Mobility impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        51          2         10 |        63
           |     80.95       3.17      15.87 |    100.00
-----------+---------------------------------+----------
      Case |        53          5         13 |        71
           |     74.65       7.04      18.31 |    100.00
-----------+---------------------------------+----------
     Total |       104          7         23 |       134
           |     77.61       5.22      17.16 |    100.00
```

```
Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -77.887766
Iteration 2:   log likelihood = -68.928123
Iteration 3:   log likelihood = -63.913878
Iteration 4:   log likelihood = -63.573115
Iteration 5:   log likelihood = -63.565048
Iteration 6:   log likelihood = -63.565044

                                                  Number of obs   =        134
                                                  Wald chi2(4)    =       4.04
Log likelihood = -63.565044                       Prob > chi2     =     0.4013

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .5587843   .8726561     0.64   0.522     -1.15159    2.269159
         fim |  -.0232674   .0229991    -1.01   0.312    -.0683449      .02181
         age |   .0269263   .0263269     1.02   0.306    -.0246734     .078526
  sex_recode |  -.6784566   .8359707    -0.81   0.417    -2.316929    .9600159
       _cons |  -2.294381   3.076451    -0.75   0.456    -8.324115    3.735353
-------------+----------------------------------------------------------------
eq2          |
        case |  -1.137011   .4397637    -2.59   0.010    -1.998932   -.2750902
         fim |  -.0903501   .0216631    -4.17   0.000     -.132809   -.0478913
         age |   .0644171   .0176845     3.64   0.000      .029756    .0990781
  sex_recode |   1.015734   .5081976     2.00   0.046      .019685    2.011783
       _cons |   3.411318    1.75837     1.94   0.052    -.0350248     6.85766
------------------------------------------------------------------------------
```

Exponentiated values of the model coefficients and their 95% confidence limits

```
             |
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   1.748545                       0.522     0.316134    9.671261
         fim |   0.977001                       0.312     0.933938    1.022050
         age |   1.027292                       0.306     0.975629    1.081691
  sex_recode |   0.507400                       0.417     0.098576    2.611738
-------------+----------------------------------------------------------------
eq2          |
        case |   0.320776                       0.010     0.135480    0.759504
         fim |   0.913611                       0.000     0.875632    0.953237
```

age	1.066537	0.000	1.030203	1.104153
sex_recode	2.761390	0.046	1.019880	7.476636

```
.
.   ** 2. MMSE: 1 month **
.
.   LnMM3_lf mobility_impair_24 mmse

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -190.00817
rescale:       log likelihood = -63.639703
rescale eq:    log likelihood = -63.639703
Iteration 0:   log likelihood = -63.639703
Iteration 1:   log likelihood = -61.493628
Iteration 2:   log likelihood = -60.949336
Iteration 3:   log likelihood = -60.939752
Iteration 4:   log likelihood = -60.939748

                                                  Number of obs   =        109
                                                  Wald chi2(1)    =       4.50
Log likelihood = -60.939748                       Prob > chi2     =     0.0339

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        mmse |  -.1080787   .0509565    -2.12   0.034    -.2079516   -.0082057
       _cons |   .0193209   1.293193     0.01   0.988    -2.515291    2.553933
-------------+----------------------------------------------------------------
eq2          |
        mmse |   .0119419   .0754814     0.16   0.874     -.135999    .1598827
       _cons |  -2.464459   2.159607    -1.14   0.254    -6.697211    1.768294
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
mmse	0.897557	0.034	0.812246	0.991828
eq2				
mmse	1.012013	0.874	0.872843	1.173373

```
.   LnMM3_lf mobility_impair_24 case mmse

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+
```

Case	Mobility impairmant at 24 months: Not impai	Impaired	Dead	Total
Control	51	2	10	63
	80.95	3.17	15.87	100.00
Case	53	5	13	71
	74.65	7.04	18.31	100.00

```
----------+-----------------------------+----------
    Total |       104           7          23 |       134
          |     77.61        5.22       17.16 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -190.00817
rescale:       log likelihood = -63.639703
rescale eq:    log likelihood = -63.639703
Iteration 0:   log likelihood = -63.639703
Iteration 1:   log likelihood = -61.027858
Iteration 2:   log likelihood = -60.095748
Iteration 3:   log likelihood = -60.038828
Iteration 4:   log likelihood = -60.038599
Iteration 5:   log likelihood = -60.038599

                                                  Number of obs   =        109
                                                  Wald chi2(2)    =       4.96
Log likelihood = -60.038599                       Prob > chi2     =     0.0839

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   1.176807     1.1071     1.06   0.288    -.9930687    3.346682
        mmse |   -.086207   .0527862    -1.63   0.102     -.189666     .017252
       _cons |  -1.400643   1.808292    -0.77   0.439    -4.944829    2.143544
-------------+----------------------------------------------------------------
eq2          |
        case |   .2957297   .5449614     0.54   0.587    -.7723751    1.363834
        mmse |   .0199796   .0775153     0.26   0.797    -.1319477    .1719068
       _cons |  -2.864409    2.30099    -1.24   0.213    -7.374267     1.64545
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
------------------------------------------------------------------------------
             |
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   3.243998                       0.288     0.370438   28.408316
        mmse |   0.917404                       0.102     0.827235    1.017402
-------------+----------------------------------------------------------------
eq2          |
        case |   1.344107                       0.587     0.461915    3.911162
        mmse |   1.020180                       0.797     0.876387    1.187567
------------------------------------------------------------------------------

.  LnMM3_lf mobility_impair_24 case mmse age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | Mobility impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        51          2         10 |        63
           |     80.95       3.17      15.87 |    100.00
-----------+---------------------------------+----------
      Case |        53          5         13 |        71
```

```
           Appendix 8 2_ICU_Predict_Impairment log_THESIS_TECH_INDEX
           |     74.65       7.04      18.31 |    100.00
-----------+--------------------------------+----------
     Total |       104          7         23 |       134
           |     77.61       5.22      17.16 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -190.00817
rescale:       log likelihood = -63.639703
rescale eq:    log likelihood = -63.639703
Iteration 0:   log likelihood = -63.639703
Iteration 1:   log likelihood = -57.539885
Iteration 2:   log likelihood = -54.871422
Iteration 3:   log likelihood = -54.487984
Iteration 4:   log likelihood = -54.482219
Iteration 5:   log likelihood = -54.482207
Iteration 6:   log likelihood = -54.482207

                                                  Number of obs   =        109
                                                  Wald chi2(4)    =       6.80
Log likelihood = -54.482207                       Prob > chi2     =     0.1467

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .9033727   1.097647     0.82   0.411    -1.247976    3.054722
        mmse |  -.1436028   .0716862    -2.00   0.045    -.2841051   -.0031004
         age |   .0711845   .0434246     1.64   0.101    -.0139262    .1562953
  sex_recode |  -.7682669   .8773728    -0.88   0.381    -2.487886    .9513522
       _cons |  -4.248277   3.169392    -1.34   0.180    -10.46017    1.963617
-------------+----------------------------------------------------------------
eq2          |
        case |   .1733078   .5361986     0.32   0.747    -.8776221    1.224238
        mmse |   .0233896   .0904738     0.26   0.796    -.1539358     .200715
         age |   .0407166   .0211918     1.92   0.055    -.0008185    .0822518
  sex_recode |  -.2066016   .5323197    -0.39   0.698    -1.249929    .8367258
       _cons |  -5.476289   3.074985    -1.78   0.075    -11.50315     .550572
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
------------------------------------------------------------------------------
             |
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   2.467913                       0.411     0.287085   21.215283
        mmse |   0.866232                       0.045     0.752688    0.996904
         age |   1.073779                       0.101     0.986170    1.169171
  sex_recode |   0.463816                       0.381     0.083085    2.589209
-------------+----------------------------------------------------------------
eq2          |
        case |   1.189232                       0.747     0.415770    3.401572
        mmse |   1.023665                       0.796     0.857327    1.222276
         age |   1.041557                       0.055     0.999182    1.085729
  sex_recode |   0.813344                       0.698     0.286525    2.308795
------------------------------------------------------------------------------

.
.  ** 3. CIQ Total: 1 month **
.
.  LnMM3_lf mobility_impair_24 ciq_total

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
```

```
feasible:       log likelihood = -300.00944
rescale:        log likelihood = -93.650323
rescale eq:     log likelihood = -93.650323
Iteration 0:    log likelihood = -93.650323
Iteration 1:    log likelihood = -82.259514
Iteration 2:    log likelihood =  -80.51263
Iteration 3:    log likelihood = -80.503795
Iteration 4:    log likelihood = -80.503789

                                                  Number of obs   =        134
                                                  Wald chi2(1)    =       0.29
Log likelihood = -80.503789                       Prob > chi2     =     0.5927

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
   ciq_total |  -.0311917   .0583087    -0.53   0.593    -.1454747    .0830913
       _cons |  -2.657532   .6273449    -4.24   0.000    -3.887106   -1.427959
-------------+----------------------------------------------------------------
eq2          |
   ciq_total |   -.122892   .0373679    -3.29   0.001    -.1961317   -.0496523
       _cons |  -.8076719   .2604383    -3.10   0.002    -1.318122   -.2972221
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
------------------------------------------------------------------------------
             |
             |      RR                          P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
   ciq_total |   0.969290                       0.593     0.864612    1.086641
-------------+----------------------------------------------------------------
eq2          |
   ciq_total |   0.884359                       0.001     0.821904    0.951560
------------------------------------------------------------------------------

.  LnMM3_lf mobility_impair_24 case ciq_total

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | Mobility impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        51          2         10 |        63
           |     80.95       3.17      15.87 |    100.00
-----------+---------------------------------+----------
      Case |        53          5         13 |        71
           |     74.65       7.04      18.31 |    100.00
-----------+---------------------------------+----------
     Total |       104          7         23 |       134
           |     77.61       5.22      17.16 |    100.00

Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
```

```
Iteration 1:   log likelihood = -83.375062
Iteration 2:   log likelihood = -80.681576
Iteration 3:   log likelihood = -79.680681
Iteration 4:   log likelihood = -79.568663
Iteration 5:   log likelihood = -79.567686
Iteration 6:   log likelihood = -79.567686

                                                  Number of obs   =        134
                                                  Wald chi2(2)    =       0.97
Log likelihood = -79.567686                       Prob > chi2     =     0.6146

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |   .7437255   .8779357     0.85   0.397    -.9769969    2.464448
   ciq_total |  -.0102326   .0619677    -0.17   0.869    -.1316871    .1112218
       _cons |  -3.320351   1.037726    -3.20   0.001    -5.354257   -1.286445
-------------+----------------------------------------------------------------
eq2          |
        case |  -.4232984   .3519565    -1.20   0.229    -1.113121    .2665237
   ciq_total |  -.1343973   .0364581    -3.69   0.000    -.2058538   -.0629409
       _cons |  -.4830644    .328836    -1.47   0.142    -1.127571    .1614424
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	2.103759	0.397	0.376440	11.756989
ciq_total	0.989820	0.869	0.876615	1.117643
eq2				
case	0.654883	0.229	0.328532	1.305419
ciq_total	0.874243	0.000	0.813952	0.938999

```
.  LnMM3_lf mobility_impair_24 case ciq_total age sex_recode

Cross-tabulation of the outcome (columns) with the first-named covariate (rows)

+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

           | Mobility impairmant at 24 months
      Case | Not impai   Impaired       Dead |     Total
-----------+---------------------------------+----------
   Control |        51         2         10 |        63
           |     80.95      3.17      15.87 |    100.00
-----------+---------------------------------+----------
      Case |        53         5         13 |        71
           |     74.65      7.04      18.31 |    100.00
-----------+---------------------------------+----------
     Total |       104         7         23 |       134
           |     77.61      5.22      17.16 |    100.00


Log multinomial model

initial:       log likelihood =     -<inf>  (could not be evaluated)
feasible:      log likelihood = -300.00944
rescale:       log likelihood = -93.650323
```

```
rescale eq:    log likelihood = -93.650323
Iteration 0:   log likelihood = -93.650323
Iteration 1:   log likelihood = -80.364091
Iteration 2:   log likelihood = -76.042416
Iteration 3:   log likelihood = -74.890047
Iteration 4:   log likelihood = -74.846206
Iteration 5:   log likelihood = -74.846081
Iteration 6:   log likelihood = -74.846081

                                                  Number of obs   =        134
                                                  Wald chi2(4)    =       3.01
Log likelihood = -74.846081                       Prob > chi2     =     0.5568

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
eq1          |
        case |    .818693   .8507089     0.96   0.336    -.8486657    2.486052
   ciq_total |   .0080277    .062034     0.13   0.897    -.1135568    .1296121
         age |   .0264986   .0260318     1.02   0.309    -.0245227    .0775199
  sex_recode |  -.8239171   .8151256    -1.01   0.312    -2.421534    .7736997
       _cons |  -4.946358   2.112261    -2.34   0.019    -9.086313   -.8064029
-------------+----------------------------------------------------------------
eq2          |
        case |  -.2486048   .3384104    -0.73   0.463    -.9118769    .4146674
   ciq_total |  -.1107621   .0348243    -3.18   0.001    -.1790164   -.0425077
         age |   .0399194   .0177694     2.25   0.025     .0050921    .0747467
  sex_recode |   .0982308    .370598     0.27   0.791    -.6281279    .8245896
       _cons |  -3.476241   1.389614    -2.50   0.012    -6.199835   -.7526479
------------------------------------------------------------------------------

Exponentiated values of the model coefficients and their 95% confidence limits
```

	RR	P>|z|	[95% Conf.	Interval]
eq1				
case	2.267534	0.336	0.427986	12.013749
ciq_total	1.008060	0.897	0.892654	1.138387
age	1.026853	0.309	0.975776	1.080604
sex_recode	0.438710	0.312	0.088785	2.167772
eq2				
case	0.779888	0.463	0.401769	1.513867
ciq_total	0.895152	0.001	0.836092	0.958383
age	1.040727	0.025	1.005105	1.077611
sex_recode	1.103217	0.791	0.533590	2.280944

```
.
.
.  log close
      name:  <unnamed>
       log:  U:\BIOSTATS\RHH\Nursing\Marsden_Kath_ICU\FINAL
ANLAYSES\Marsden_ICU_Predict_Impairment.
> smcl
  log type:  smcl
 closed on:   8 Feb 2013, 14:07:10
------------------------------------------------------------------------------
--------------------
```