



UNIVERSITY *of*
TASMANIA

Primary care to emergency department: right service, right time, right place.

by

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Declaration of originality

This thesis contains no material which has been accepted for a degree or diploma by the University or any other institution, except by way of background information and duly acknowledged in the thesis, and to the best of my knowledge and belief no material previously published or written by another person except where due acknowledgement is made in the text of the thesis contain any material that infringes copyright.

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The research associated with this thesis abides by the international and Australian codes on human and animal experimentations, 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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List of abbreviations

Abbreviation	Definition
ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ATS	Australasian Triage Scale
DHHS	Department of Health and Human Services (Tasmanian Government)
DoH	Department of Health (Australian Government)
ED	Emergency department
EDs	Emergency departments
FTU	Fast track unit
GP	General practitioner
GPP	General practice participants
IRSD	Index of Relative Socio-economic Disadvantage
ITS	Interrupted time series
NGT	Nominal group technique
NP	Nurse practitioner
PHC	Primary health care
SA	Statistical area
SEIFA	Socio-Economic Indexes for Areas
SEP	Socioeconomic position
SPSS	Statistical Package for the Social Sciences

Emergency department presentations continue to increase internationally and provide evidence that all is not well for health services and the populations they serve. In Australia, the equivalent of the combined populations of Brisbane and Adelaide presented to emergency departments with non-urgent conditions over a twelve-month period between July 2018 and June 2019. This study aimed to identify the health service requirements of patients presenting to a regional Australian ED with non-urgent conditions, and to translate findings into key recommendations and priorities for future health service planning.

An explanatory sequential mixed method was used and involved three phases. The first phase was a descriptive and inferential analysis of seven years of routinely collected ED data to establish a profile of who presented to the ED with non-urgent conditions and when and why they presented. During the seven-year period 54.1% (n=165,399) of presentations were triaged as non-urgent. The second phase used a qualitative approach to conduct interviews with patients (n=9) and general practice staff (n=15). A thematic approach was used to analyse data. The final phase engaged key stakeholders and used a nominal group technique to translate research knowledge into recommendations and priorities for health service provision in Northern Tasmania.

This study identified an over-representation in non-urgent ED presentations by young adults and children from the most disadvantaged suburbs, and a significant increase in mental health presentations over a seven-year period. An increasing proportion of presentations was observed to occur outside regular business hours. Interviews and

focus groups highlighted a genuine perceived need for urgent care, at times driven by fear regarding symptoms.

Patient interviewees did not consider the cost of primary care services to be a driver of their ED presentation; instead they demonstrated an understanding of the health system and identified limited access to primary care services. Service characteristics valued by patients were: clear communication, connection and comfort. In contrast, health professionals believed cost to be a major driver of non-urgent ED attendances and attributed patients with blame.

A forum with key stakeholders from health services, academia, local government, community groups and a consumer representative identified key priorities for health service planning targeting local needs. Forum participants concluded that nurse practitioner and community paramedic roles in a primary health care setting could provide the right service at the right time and in the right place for this patient population, thereby reducing ED presentations. Participants identified that the ‘ultimate model’ would be located in the area of greatest need with an ability to provide outreach services and would include an interprofessional approach to health care provision. This service would be community led, driven and designed, and provide extended hours of service, seven days per week.

This study provides a high quality example of how the explanatory sequential mixed method can be used to inform health service planning and policy. This method provides a strong framework in establishing the profile of who accesses the ED with non-urgent conditions and when and why they accessed them. Key findings were used to inform recommendations and priorities to address the needs of over-represented patient populations. The method used in this study provides a strong example for researchers internationally, who are working to address population health care needs.

CHAPTER 1 - Introduction

1.1 Reflection

In 1992, I stepped into an emergency department (ED) for the first time on a four-month placement. I knew early on that this was a place I wanted to work: the unexpected presentations, having to think on my feet, and the diversity of patients and conditions – from those needing immediate life-saving interventions to those presenting with relatively simple injuries. I loved the challenge of caring for patients with such a huge range of health care needs. However, I ended up taking an opportunity to work on a general paediatric unit soon after graduating in the hope that someday I would be able to return to the ED.

It was not until 2010 that the opportunity arose for me to return to the ED. A paediatric background would prove to be beneficial, but there was a lot to learn. New drugs, new diagnostic investigations and new procedures. But that was not all that had changed. During my first ED experience, admitted patients were transferred directly to a ward bed or operating theatre. This meant we were able to arrive for a morning shift to an almost empty department, just a handful of patients from the night shift awaiting morning blood tests or review by an admitting team. But in 2010 that was rarely the case. Presentation numbers had increased and there was now a small (one-bed) area within the ED, used during busy shifts to treat minor presentations. There was a constant demand for this space.

Why was it so different? Why were half the patients presenting with non-urgent conditions? How were we going to continue to provide patient-centred health care services into the future? Questions began to form.

Over the next few years demand continued to increase, and in 2012 we moved into a new department, more than twice the size. The increased space and new services

initially provided some relief. New services included a five-bed/chair fast track unit. Nevertheless, over the next few years patients and staff again faced a similar situation with demand growing. In 2015, when I began to conduct research, the questions of why this was happening and how we were going to provide patient-centred care into the future continued to circle in my mind.

My research journey began with a waiting room survey, *“Why are we waiting? Patients’ perspectives for accessing emergency department services with non-urgent complaints”* (1). This first study then led to the study contained in this thesis. My hope is to see improved health service access and health outcomes in a community known to face some of the most significant challenges in socioeconomic position, income and health in Australia.

1.2 Background

Emergency departments (EDs) are a microcosm of the communities they serve with presentations epitomising the needs of the local community with the patients presenting broadly representative of the communities they serve. Emergency departments are also the canary in the coal mine (2) meaning they provide a warning for increasing healthcare needs of populations and indicate healthcare services under stress to meet these needs. Researchers and service providers have used over-represented populations and presentations in the ED to inform the development of community-based services to address identified needs (3). The need to understand the meaning of these analogies of ‘a microcosm’ or ‘EDs as the canary in the coalmine’ continue as worldwide ED presentations rise at rates exceeding population growth (4-7). In Australia, ED presentations grew by 27.7% (from 6.5 million to 8.3 million) between July 2011 and June 2019 (8), while the population grew by 11.6% (2.5 million) (9, 10). As numbers continue to grow, so do the number of studies aiming to find solutions.

A systematic review published in 2018 explored existing research into the situations faced by EDs internationally and identified a mismatch between causes of increasing ED demand and the solutions implemented to address the situation (11). Solutions have predominately focused on interventions within the walls of the ED, while the causes of demand were largely outside the ED and poorly understood. The causes identified included a high volume of non-urgent presentations, limited access to primary care (12-16) and limited diagnostic services in the community (11), all beyond the walls and control of the ED. These drivers of demand are known as input factors, meaning they are factors which contribute to the patient's decision and need to access ED services (17).

Of the 8.3 million ED presentations across Australia in 2018–2019, almost half were considered non-urgent on arrival (8) and included patients who could have potentially had their needs met outside the ED. For every single one of those presentations there is a human experience. The stories of Danielle and Ryan (Box 1.1) are based on experiences shared with the researcher by patients and parents during this study and represent common ED presentations.

Box 1.1. Patient experiences

Vignette 1 – Danielle

Danielle arrived at triage one Thursday morning with her four-year-old son, Jackson. He'd been getting ready for pre-school and was running through the lounge room when he slipped and injured his right arm. Danielle was anxious because he initially refused to use his arm and she was worried about sending him to pre-school if it was broken. There was no obvious deformity and by the time they arrived at the ED, Jackson was reaching for objects with his right hand and was no longer distressed. Danielle explained that she didn't try her family doctor "... because it's so hard to get an appointment". She also explained, "... I didn't really want to take Jackson to the ED either, he had a bad experience last time and was scared about being there again".

Box 1.1. Patient experiences cont.

Vignette 2 – Ryan

Ryan arrived in the ED on a Saturday afternoon. The 23-year-old apprentice builder had been vomiting for 24 hours. He explained that his flatmates had similar symptoms but “weren’t as sick as me”. Ryan discussed being worried about dehydration and wondered if he needed to go on a drip; he was also concerned about taking resources away from someone in greater need. Ryan had not tried any rehydration fluids, only water, which he continued to vomit. He was worried about how long it would be before he became really sick. Ryan explained to the triage nurse, “My mum’s on holiday in Queensland; I talked to her on the phone and she said I should come here”.

This thesis contains an investigation into who presented to the ED with non-urgent conditions and when and why they presented, and outlines future priorities and recommendations for patient-centred services that would be available when and where needed.

The remainder of this chapter provides a background for the study. The Australian and Tasmanian contexts are presented (Section 1.3) with a brief explanation of the study population (Section 1.4). These are followed by the thesis outline and include the overarching aim and objectives (Section 1.5).

1.3 Australian context

ED presentations increased at more than twice the rate of population growth in Australia between July 2011 and June 2019. In 2019 over eight million patients were seen in Australian EDs (8, 9), 47.5% of whom were triaged to the two least urgent categories (explained further in Section 1.4). This is the equivalent to the combined populations of Adelaide and Brisbane (18) presenting to EDs across the country with non-urgent conditions in one year. All patients presenting to Australian EDs are triaged using the Australasian Triage Scale (ATS). This is a five-tier scale used to ascribe a level of urgency based on the patient’s condition on arrival. All patients are triaged by a specially trained triage nurse. A patient triaged as an ATS-I requires immediate life-saving management,

an ATS-2 must be seen within 10 minutes, an ATS-3 within 30 minutes, an ATS-4 within 60 minutes and an ATS-5 within 120 minutes (19).

The majority of Australian studies on ED demand are based on large analyses of routinely collected ED data (7, 20-25). Studies using this method are useful in establishing profiles and trends but are limited in their ability to reach a deeper understanding of why demand continues to increase. These studies have also demonstrated contextual differences in ED demand, with rural and regional areas experiencing a greater demand for non-urgent presentations than metropolitan regions (7, 21). In order to plan for the future and provide the right services to meet population requirements, there needs to be greater understanding of the factors contributing to ED demand.

In Australia, healthcare governance and accountability are operated and managed by “various levels of government and numerous separate agencies, making overall management of the system difficult” (26). Australia has one of the strongest and most efficient health services in the world, but it is a complex system (27). Medicare was established in 1984 and provides Australians with “universal” health coverage (27). However, funding arrangements are complex and are shared between various government and non-government organisations, private health insurers and patients (who may be required to pay “out-of-pocket” expenses).

State-run hospital services including ED visits are covered by Medicare under state and territory funding and there is no charge to Australian and New Zealand citizens, permanent residents of Australia or those from countries with reciprocal agreements (27). Patients who visit a general practitioner (GP) are either bulk-billed or are required to pay a fee. Bulk-billing is supported by the Australian Government and enables GPs to bill the Department of Human Services a predetermined fee. Bulk-billing is not mandatory and when GPs select this option no payment can be requested from the

patient (28). The alternative is for GPs to issue patients with an account, typically paid on the day, and the patient is then able to claim a Medicare rebate (currently \$37.60) (29). A limitation for patients required to pay using this method is that they must have access to the full amount of credit available (the national average \$75.00 (29)) before receiving the rebate. General practices are not permitted to charge the 'gap' alone meaning that patients must pay the full amount before they can receive the Medicare rebate (28).

1.3.1 Tasmanian context

Tasmania is Australia's smallest and only island state with a population of around 534,400 (9). Between July 2011 and June 2019 Tasmanian ED presentations increased at over twice the rate of population growth, increasing by 17.1% (8) while the population increased by 7.9% (9, 10). In 2019 there were over 165,500 presentations to Tasmanian EDs (8), 53.2% of which were triaged to the two least urgent categories, a higher proportion than the national average.

Tasmania has the oldest population of all Australian states and territories with a median age of 43 years versus the national median of 38 years (30). Tasmanians also experience lower weekly incomes (median \$537 compared to \$662) (31) and a lower rate of bulk-billing for GP services than any other state or territory. In Tasmania 74.6% of GP consultations are bulk-billed versus 84.7% nationally (30). The average cost of a Tasmanian patient visit to a GP is \$38.62 versus \$37.53 nationally (24). In summary, compared to national averages, Tasmanians experience higher levels of socioeconomic disadvantage, yet pay more for general practice services.

The Tasmanian Health Service (THS) is the primary provider of acute health services and is responsible for providing and coordinating care across the state. The service is divided into three regions – Northern, North-Western and Southern. The state capital, Hobart, is located in the south. The Southern region contains half the state's population

with the remaining half dispersed across regional, rural and remote communities in the North and North-West. Analysis of four years of routinely collected ED data across Tasmania's four public EDs demonstrated clear differences in needs of the populations in each of these three regions and recommended that future research was needed to understand the needs of each region and the factors contributing to patients' decisions to present to EDs with non-urgent conditions (25).

The research conducted for this thesis was undertaken in Northern Tasmania which is known to have greater socioeconomic disadvantage and poorer health outcomes than many other Australian regions (32). Northern Tasmania also has a higher dependency ratio (60.8%) than the national level (52.7%) and this has steadily increased over recent years (16). The dependency ratio is based on the proportion of the population unable to independently earn a wage (i.e. those under 15 years and those over 65 years of age). The ED where this study was undertaken is in a 300-bed teaching hospital with a 30-bed ED plus 5-bed/chair fast track unit. The hospital serves a population dispersed across regional, rural and remote areas and acts as a referral centre for the North-West region. In 2015, patients presenting to the ED with non-urgent conditions were surveyed. The research was based on a waiting room questionnaire completed by patients triaged into the low-urgency categories ATS 4 or 5. Over a six-week period, 477 anonymous and voluntary questionnaires were completed. Key findings from this research (1) were:

- 42% of presentations to ED were by people aged under 25 years
- 33% presented as a result of an injury
- 31% would have preferred to be managed by their GP
- 29% had been advised to present by a health care professional
- Only 7% stated that cost was the reason they chose the ED.

The findings of the 2015 study highlighted a need for greater understanding of the situation and factors contributing to patients' decisions to present to the ED with non-urgent conditions. The research contained in this thesis builds on this earlier work. The aims and objectives are outlined in Section 1.5.2.

1.4 Defining the study population

Defining non-urgent presentations is complex and there exists no consistent way for doing so. This study adopted an inclusive method, and encompassed patients triaged to ATS 4 or 5 on arrival. The use of this strategy to measure non-urgent ED presentations did not presume this patient population were 'inappropriate' for ED services; rather it provided a clearly defined and inclusive study population on which to base analyses and consider who presented to the ED with non-urgent conditions and when and why they presented. This method has been adopted in multiple studies internationally (1, 33-38). This is discussed further in Chapter 2.

1.5 Defining primary care and primary health care

The terms, primary care and primary health care are both used throughout this thesis. Muldoon, Hogg (39) highlight the similarities and differences between these terms and the importance of understanding these differences. The similar characteristics of primary care and primary health care are that they both refer to the initial point of contact for care, accessibility and comprehensive and coordinated care. However, primary care is used to describe general practices and the services they provide to individuals and families. Primary care is a person-centred partnership providing care over time (39). Primary health care is a broader term and refers to the philosophy outlined by the World Health Organisation (WHO). Primary health care includes universal access to essential health services and are the hub of the countries healthcare system (39).

1.6 Thesis summary

The section below contains a summary of the purpose statement with a brief description of the methods. The overarching study aim, and objectives are stated, and thesis chapters outlined. Publications (published or submitted for publication) are identified.

1.6.1 Purpose statement and methods

The purpose of this study was to establish a profile and identify trends in who is presenting to a regional Australian ED with non-urgent conditions, when they are presenting, and factors contributing to their decision to present. These findings were then used to establish recommendations and priorities for future service planning in the region – to provide the right patient-centred services at the right time and in the right place.

1.6.2 Study aim and objectives

In order to attain the above purpose, the overarching study aim was to identify the health service requirements of patients with non-urgent conditions presenting to a regional Australian ED and to translate findings into key recommendations and priorities for future health service planning. Three objectives were identified to achieve this aim:

1. To identify the profile of who presents to the ED with non-urgent conditions, and when and why they present
2. To identify the perceived need and service requirements of over-represented patient groups presenting to the ED with non-urgent conditions
3. To interpret and translate research knowledge into local health service recommendations

1.6.3 Study method

An explanatory sequential mixed method was used. This method begins with quantitative data analysis followed by qualitative data collection and analysis, with each phase informing the next (40). This method is predominately focused on quantitative data which is subsequently used to inform the focus of qualitative analysis, it enables researchers to explain the initial results and gain a deeper understanding of the research problem than either phase would provide alone (40). The explanatory sequential mixed method is predominately based on quantitative findings (objective 1) which are used to inform a purposive sample for the subsequent qualitative investigation (objective 2). Objective 3 was addressed through a forum attended by key stakeholders who were presented with key findings from the first two phases to inform priorities and recommendations.

The explanatory sequential mixed method was chosen because analysis of the quantitative data provided a profile of who presented to the ED with non-urgent conditions and when and why they presented. This profile was then used to inform a purposive sample for patient and general practice interview participants and to understand gain insight into the perceived need and service requirement of this patient group. The combination of these data were then able to inform a key stakeholder forum to develop local health service recommendations.

1.6.4 Study significance

This study was conducted in a region that experiences a higher proportion of patients triaged to an ATS 4 or 5 than the national average and in a context of poorer health outcomes and greater socioeconomic disadvantage. The method selected provided the opportunity to develop greater understanding than is currently available. Identification of the profile and trends of non-urgent ED presentations and the factors contributing

to these presentations will facilitate the establishment of priorities and recommendations for future service planning.

1.6.5 Thesis structure

This thesis is structured into eight chapters. This first chapter provides the context for the remainder of the thesis and the background of a national and international problem. An overview of the Australian healthcare system is presented with specific discussion of the Tasmanian context. The aims and objectives of this study are also presented.

Chapter 2, Literature Review: Who, when and why do patients access emergency department services with non-urgent conditions?

Chapter 2 contains a review of primary research published in peer-reviewed journals. The background to the research question is presented followed by the review methods and search strategy. Results include key findings from international studies and are presented to identify what is known about who presents to EDs with non-urgent conditions and when and why they present. Data is synthesised and strengths and translatability are discussed. **Chapter 3, Method: Investigating the referral of patients with non-urgent conditions to a regional Australian emergency department: a study protocol.** Chapter 3 contains the study protocol. This chapter provides details of the explanatory sequential mixed method, and the aim, objectives and ethical considerations for the study.

Published paper, *BMC Health Services Research* in August 2018 (Appendix 3).

Chapter 4, Phase 1: Socioeconomic disadvantage as a driver of non-urgent emergency department presentations: A retrospective data analysis.

Chapter 4 contains a retrospective analysis of seven years of routinely collected ED data. The aim was to establish a profile of who was presenting the ED with non-urgent conditions, and trends observed.

Published paper *PLOS ONE* in April 2020 and added to their special collection, 'Health Inequities and Disparities Research', Appendix 4.

The Human Research Ethics Committee (Tasmania) Network approval letter H0016504 is included as Appendix 5.

The findings from this phase have been used to inform government and private health insurance reports (Appendixes 6 & 7).

Chapter 5, Phase 2: Primary care or emergency department? Factors influencing the decisions of socioeconomically disadvantaged populations: a qualitative enquiry.

Sequentially building on the findings from Phase one – which demonstrated an over-representation of non-urgent presentations by younger participants and those from socioeconomically disadvantaged suburbs – this chapter reports on the findings of a thematic analysis following interviews with young people and focus groups with general practice staff. The objective was to identify needs and service requirements among this population group.

This chapter is contained in a research paper currently under review with the *Australian Journal of Primary Health*.

The Human Research Ethics Committee (Tasmania) Network approval letter H0017492 is included as Appendix 8.

Chapter 6, Phase 3: Engaging health service leaders in research through nominal group technique.

Using an innovative approach, Chapter 6 discusses the engagement of key stakeholders in translating research findings from Phases 1 and 2 into health service recommendations and priorities.

This chapter is contained in a paper currently under review with the *Australian Journal of Rural Health*.

The Human Research Ethics Committee (Tasmania) Network approval letter H0018233 is included as Appendix 9.

Chapter 7, Discussion: Who, when and why do patients present to the emergency department with non-urgent conditions? What can we do differently?

Chapter 7 synthesises key findings of this study, including contributions to the global body of literature and recommendations for future research and service planning.

Chapter 8, Conclusion: Primary care to emergency department: Right service, right time, right place.

Chapter 8 begins with a final reflection and return to the vignettes presented in the introduction. The significance of this research and recommendations for future studies are highlighted in this final summary.

CHAPTER 2 - Literature review

Who, when and why do patients present to the emergency department with non-urgent conditions?

2.1 Overview

This chapter contains the literature review undertaken to examine what is known about who presents to emergency departments with non-urgent conditions and when and why they present. A systematic approach was taken to review international peer-reviewed research. The review begins with an introduction and background followed by the results of the review and discussion and concludes with a summary of the studies and the direction for the investigation included in this thesis.

2.2 Background

Emergency departments have been described as the ‘canary in the coalmine’ and a ‘microcosm’ of the communities they serve (2). The theory is that presentations found to be over-represented in an ED can be used to identify community needs and to inform health policy and service planning (3).

Non-urgent presentations have been a concern of ED clinicians for over sixty years. In 1957 the *British Medical Journal* published a paper discussing presentations to an ED in London, UK (41). In this study the author stated, ‘the great majority of these were not in any sense an emergency’ and found that the most common reason was due to the convenience of the ED.

Discussion of non-urgent ED presentations continues today and presents as a global problem (11, 42-44). The proportion of non-urgent ED presentations in Australia (defined as Australasian Triage Scores 4 or 5) was consistently over 50% between 2011 to 2017 (8). Although the proportion of non-urgent ED presentations began to decline nationally in 2018, almost 3.9 million (47.5%) patients visited EDs across Australia in 2019 (8).

Adding further to the complexity of research into ED demand is a lack of consistent terminology to describe these presentations. Terms such as, ‘non-urgent’, ‘inappropriate’, ‘general practice-type’ (44), ‘low acuity’ (22, 45), ‘avoidable’ (46), are used to describe similar presentation groups. Terms such as ‘inappropriate’ or ‘avoidable’ demonstrate a negative attitude towards patients, while the term ‘low acuity’ may not be generally understood. The latter two terms are inconsistent with efforts to ensure services are ‘patient-centred’. To be inclusive and to avoid attributing blame, the term ‘non-urgent’ was adopted for this review.

The absence of a clear definition has also proved challenging in measuring the proportion of patients who may be suitably managed outside the ED. Some researchers have tested up to four methods in a single study (7, 21, 22) finding vastly different proportions based on definition alone. Proportions were also markedly different between metropolitan and rural EDs (7, 21, 22), indicating that the location of EDs and their local context also play a role in the proportion of non-urgent ED presentations. Whyatt et al. (47) took a novel approach to measuring ‘general practitioner-type’ presentations to an ED in metropolitan Perth, Western Australia. They placed general practitioners (GPs) in the ED to interview patients regarding their presentations and to determine whether they could have been managed in general practice. The research team found that 20–40% of all ED presentations could have been managed in general practice and that some patients presenting with urgent conditions (ATS 2 or 3) could also have been managed in general practice (47).

In 2018, a rigorous systematic review of international literature by Morley and colleagues (11) revealed a mismatch between the identified causes of ED demand and the solutions implemented to reduce that demand. The review found the greater volume of published literature focused on negative consequences for patients, staff and systems, or on solutions implemented to address demand. A smaller number of studies had focused on the causes of ED demand. In these studies, the drivers were found to be outside the walls of the ED. Two causes found to be associated with increased ED demand were the high volume of non-urgent presentations (48) and limited access to primary care (46, 48, 49) and/or diagnostic services within the community (50). These causes are ‘input factors’, meaning they contribute to the need for patients to present to the ED (17); input factors drive demand.

In contrast, an extensive amount of work has focused on solutions to reduce ED crowding based on ‘throughput’ and ‘output’ strategies within the ED (11). As Morley

and colleagues recommend, there is a need for future research into the causes to inform sustainable, patient-centred service planning into the future (11).

Factors external to the ED that contribute to patients' decision-making must be understood if governments and healthcare services hope to address a rising demand for ED services. Once the drivers are understood, targeted strategies can be developed. The aim of this structured literature review was to establish a comprehensive overview of who presented to the ED with non-urgent conditions and when and why they presented and to provide updated knowledge of this situation using a structured appraisal of peer-reviewed research.

'Who' refers to the profile of patients presenting and includes age, gender, socioeconomic position, and ethnicity. 'When' refers to the time of day and day of week. 'Why' refers to both the reasons given by patients – such as access to primary health care (PHC) services, referral to the ED or perceived need – and to their recorded presenting problem or discharge diagnosis.

2.3 Method

International literature was searched to answer the question, '*Who presents to the ED with non-urgent conditions and when and why did they present?*' Three electronic databases – Ovid MEDLINE, Ovid EMBASE and the Cumulative Index to Nursing and Allied Health Literature – were searched using free text and Medical Subject Headings: "Emergency Services, Hospital", OR "emergency department" OR "accident and emergency" AND "non-urgent patients" OR "low-acuity patients" OR "inappropriate patients".

Research published in peer-reviewed journals and written in English between January 2010 and September 2020 were included to establish an understanding of the situation during those ten years. The search included quantitative and qualitative studies and

systematic reviews focused on at least one of the three aspects of non-urgent ED presentations: who, when and/or why? Studies that did not provide evidence to answer at least one of these questions and those that included a focus on other services such as urgent care were excluded.

2.4 Results

Searching electronic databases resulted in the identification of 458 original research papers; duplicates (n=120) were removed; and a further five papers were provided by an expert in the field, taking the total to 343. The title and abstract search were reviewed for relevance to the research question and a further 287 papers removed. A full text search then removed another 20 articles based on relevance, leaving 36 articles for inclusion in this review. The PRISMA flow diagram provides a summary of this search strategy (Figure 2.1).

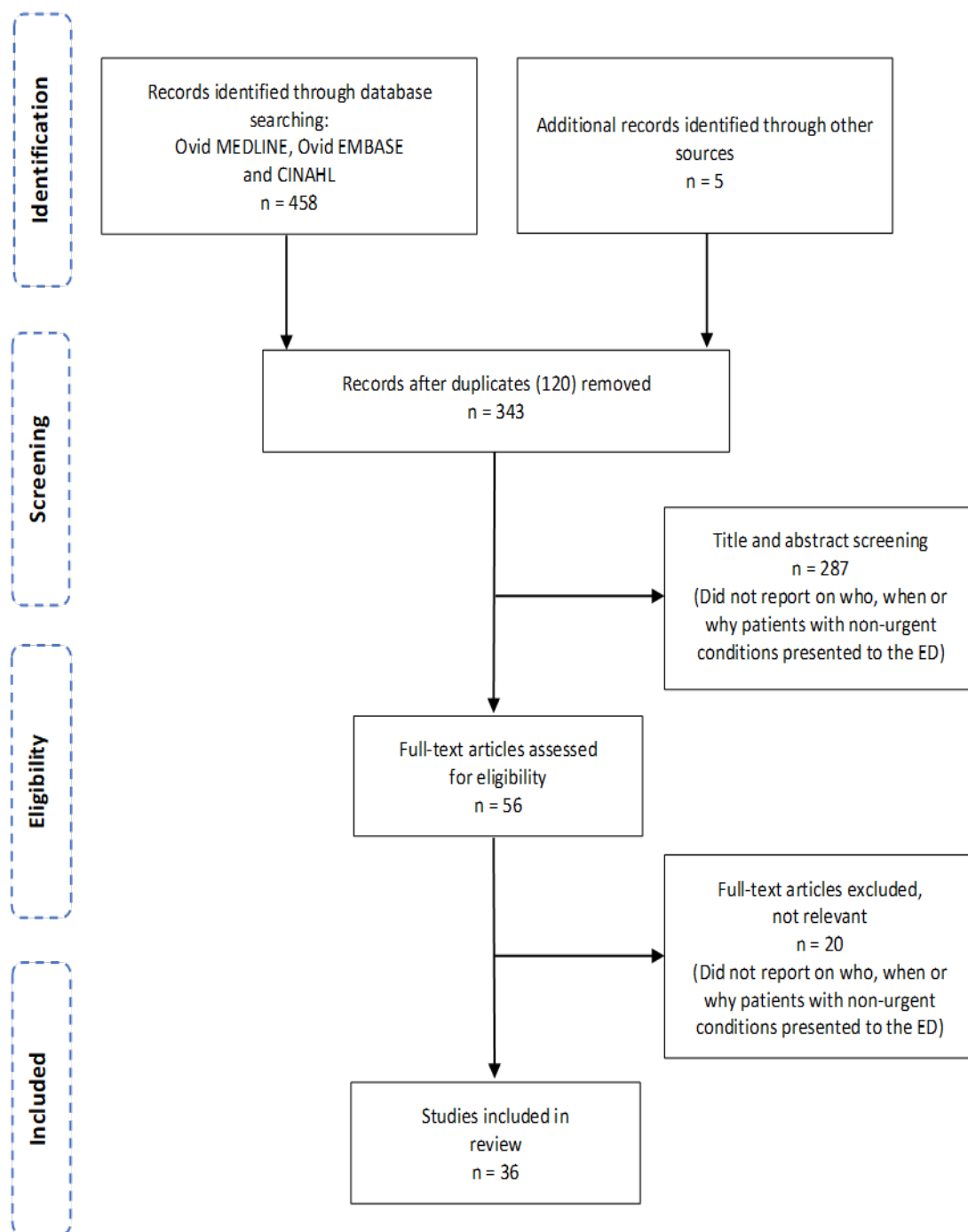


Figure 2.1. Summary of literature search and included articles (adapted PRISMA template (51))

2.4.1 Methods used in included studies

A variety of methods were used in the included studies. Twenty-eight (78%) used quantitative methods based on analysis of large data sets or questionnaires. Six (17%) used qualitative methods and two (5%) were systematic reviews. The methods used in the included studies were:

- *Retrospective statistical analysis of routinely collected ED presentation data* (4, 7, 21, 22, 24, 35, 46, 52-55)
 - 11 studies including between 11,250 (35) to 15 million (53) ED presentations.
- *Quantitative analysis of questionnaires using descriptive and inferential analysis* (1, 5, 6, 33, 34, 36-38, 56-64)
 - 17 studies: participant numbers ranged from 27 (38) to 2,416 (58).
- *Qualitative analysis of interviews* (44, 65-69)
 - 6 studies: participant numbers ranged from 1 (66) to 121 (44).
- *Systematic reviews* (42, 43)
 - 2 reviews: 26 (43) to 30 (42) included studies.

2.4.2 Summary of research findings

Summaries of the included studies are provided in Tables 2.1, 2.2 and 2.3. Some studies focused on one aspect of **who**, **when** or **why** while others provided results to inform all three. Table 2.1 includes a summary of **who** presented to the ED, Table 2.2 **when** patients presented and Table 2.3 **why** patients presented. These tables also list the focus, aim and method used by research teams as well as the country in which the research was conducted.

Table 2.1. Who presented to emergency departments with non-urgent conditions?

Author Year	Country	Focus and method	Aim	Who?
Backman et al. (56) 2010	Sweden	Physician determined ‘appropriateness’ Descriptive & inferential analysis (560 patient interviews and 560 physician questionnaires)	Analyse physicians’ assessment of patient’s urgency and ‘appropriate’ level of care and explore sociodemographic characteristics.	<ul style="list-style-type: none"> • Males • Onset symptoms ≤20 hours • Patients with limited health service contact
Buja et al. (4) 2016	Italy	After hours referrals to ED Retrospective statistical analysis (routinely collected data; 22,662 ED & primary care presentations)	Determine the appropriateness of referrals to ED from after-hours services.	<ul style="list-style-type: none"> • Paediatric patients • Non-Italian patients
Chen et al. (52) 2015	USA	Distance and sociodemographic correlates of ‘avoidable’, visits in California Retrospective statistical analysis (routinely collected data; 3,912,676 presentations;)	Determine trends between avoidable ED use and patient characteristics.	<ul style="list-style-type: none"> • Young (under 34 years of age) • Female • Non-white
Clement et al. (35)	Switzerland	Characteristics of non-urgent presentations Retrospective statistical analysis (routinely collected data; 11,258 presentations)	Determine relationship between nationality, gender, age and health service characteristics.	<ul style="list-style-type: none"> • Young, non-Swiss males
Dinh et al. (24) 2016	Australia	Characteristics and trends in non-urgent presentations. Retrospective statistical analysis (routinely collected data; 10,804,797 presentations)	Determine prevalence of low acuity presentations and to identify trends and characteristics.	<ul style="list-style-type: none"> • Young (under 40yrs)

Author Year	Country	Focus and method	Aim	Who?
Diserens et al. (5) 2015	Switzerland	Compare findings with an earlier study (2000 vs 2013). Descriptive & inferential analysis (1097 patient questionnaires)	Determine whether patient characteristics and rationale for presenting with non-urgent conditions had changed over 13 years.	<ul style="list-style-type: none"> • Young males (constant) • Decreasing number of elderly patients
Dixe et al. (36) 2018	Portugal	Characteristics of non-urgent presentations Descriptive & inferential analysis (357 patient questionnaires and review of medical records)	Determine the drivers of non-urgent presentations.	<ul style="list-style-type: none"> • Middle-aged, retired women (mean 55yrs) • Lower level of education
Ghazali et al. (59) 2019	France	Characteristics and drivers of non-urgent ED presentations Descriptive & inferential analysis (598 patient questionnaires)	Determine the profile and motives of patients with non-urgent conditions.	<ul style="list-style-type: none"> • Young (median age 38yrs) • Male
Hummel et al. (60) 2014	USA	Parental perspectives Descriptive analysis (102 parental questionnaires)	Determine why parents chose ED over primary care options.	<ul style="list-style-type: none"> • Higher proportion of: • African-American and Hispanic • Adolescents, 15-18 years
Idil et al. (61) 2018	Turkey	Profile and characteristics of adult patients with non-urgent conditions Descriptive analysis (624 patient questionnaires)	Identify characteristics and rationale for ED presentation.	<ul style="list-style-type: none"> • Middle-aged (mean, 38yrs) • Presence of chronic disease •
Keyes et al. (55) 2020	USA	Insurance coverage and ED usage Retrospective statistical analysis (routinely collected data; 298,732 presentations)	Determine how insurance cover changed with introduction of Affordable Care Act and whether this influenced non-urgent ED usage.	<ul style="list-style-type: none"> • Young (increasing numbers <19yrs)
Klingberg (37) 2020	Switzerland	Incidence of ED usage between two population groups Descriptive and inferential statistics (147 patient questionnaires)	Determine difference in ED usage between asylum seekers and Swiss nationals.	<ul style="list-style-type: none"> • Younger male asylum seekers (median age 25yrs vs 30yrs)

Author Year	Country	Focus and method	Aim	Who?
Krebs et al. (6) 2016	Canada	Reasons for seeking ED care with a non-urgent condition Descriptive and inferential analysis (1,402 patient questionnaires)	Identify characteristics of patients who seek alternative care before arriving at the ED.	<ul style="list-style-type: none"> • Males • Lower level of education
McHale et al. (53) 2013	UK	Who presented and when are ED services accesses? Retrospective statistical analysis (Routinely collected data; 15,056,095 presentations)	Examine demographics and temporal trends associated with inappropriate ED presentations	<ul style="list-style-type: none"> • Higher odds among: • Young (0-2yrs and 13-25yrs) • Male • Lower odds among: • Socioeconomically disadvantaged
Mathison et al. (54) 2013	USA	Density of primary care services in relation to non-urgent paediatric ED presentations Retrospective statistical analysis (Routinely collected data; 148,314 presentations)	Determine the relationship between 'spatial density' of primary care physicians and non-urgent presentations	<ul style="list-style-type: none"> • African-American and Hispanic • Lower socioeconomic position • Young <5yrs
Moineddin et al. (46) 2011	Canada	Factors influencing ED demand Retrospective statistical analysis (Routinely collected data; 53,353 presentations)	Assess factors resulting in increased demand for ED services	<ul style="list-style-type: none"> • Young (20–45yrs) • Male • Urban setting • Mid-high-income households, • Well educated
Smith et al. (63) 2015	Canada	Factors influencing decision to present to a paediatric ED Descriptive and inferential analysis (300 patient questionnaires)	Explore factors associated with parent decisions to bring children to paediatric ED.	<ul style="list-style-type: none"> • Young (< 12yrs) • Lived in close proximity

Author Year	Country	Focus and method	Aim	Who?
Stephens and Broome (22) 2017	Australia	Characteristics of low acuity presentations; testing three separate definitions. Retrospective statistical analysis (Routinely collected data; 4,909,035 presentations)	Investigate patterns in low acuity presentations across New South Wales (Aust)	<ul style="list-style-type: none"> • Younger (0–9yrs) • Residents, regional and rural/remote NSW • Higher odds with increased socioeconomic position in major city EDs
Unwin et al. (1) 2016	Australia	Patient perspectives for accessing the ED with non-urgent complaints Descriptive and inferential analysis (477 patient questionnaires)	Establish profile of non-urgent patients presenting to ED	<ul style="list-style-type: none"> • Younger (<25yrs)
Uscher-Pines et al. (42) 2013	USA	How patients decide to visit the ED for non-urgent conditions Systematic review (26 articles, USA)	Understand patient rationale for accessing ED services with non-urgent complaints.	<ul style="list-style-type: none"> • Younger age (not specified) • Lower socioeconomic position
Young-Harry et al. (64) 2015	Nigeria	Inappropriate ED presentations Descriptive and inferential analysis (430 patient questionnaires)	Identify patterns of self-referred patients who were deemed to be inappropriate ED-users.	<ul style="list-style-type: none"> • Female

Table 2.2. When did patients present to emergency departments with non-urgent conditions?

Author Year	Country	Focus and method	Aim	When?
Allen et al. (21) 2015	Australia	General practice-type ED presentations Retrospective statistical analysis (routinely collected data; 255,365 ED presentations)	Estimate of the number of general practice-type patients presenting.	<ul style="list-style-type: none"> 31-33% Monday to Friday, 0800–1700 (ACEM definition, see Table 4)
Dixe et al. (36) 2018	Portugal	Characteristics of non-urgent ED presentations Descriptive & inferential analysis (357 patient questionnaires and review of medical records)	Determine the drivers of non-urgent ED presentations	<ul style="list-style-type: none"> 84.6% presented 0800–2000
Nagree et al. (7) 2013	Australia	Quantifying the proportion of GP and low acuity patients in the ED Retrospective statistical analysis (Routinely collected data; 532,129 ED presentations)	Accurately estimate the proportions of patients presenting to the ED suitable for GP management	<ul style="list-style-type: none"> 36% occurred Monday–Friday, 0800–1700 (ACEM definition, see Table 4)
Unwin et al. (1) 2016	Australia	Patient perspectives on accessing the ED, non-urgent complaints Descriptive and inferential analysis (477 patient questionnaires)	Establish profile of non-urgent patients presenting to ED	<ul style="list-style-type: none"> Higher presentations after hours (65.6%) Musculoskeletal complaints Cost found to be a minor factor (6.9%)
Young-Harry et al. (64) 2015	Nigeria	Inappropriate ED presentations Descriptive and inferential analysis (430 patient questionnaires)	Identify patterns of self-referred patients who were deemed to be inappropriate ED-users.	<ul style="list-style-type: none"> After hours (62%)

Table 2.3. Why did patients present to emergency departments with non-urgent conditions?

Author Year	Country	Focus and method	Aim	Why?
Alyasin and Douglas (33) 2014	Saudi Arabia	Reasons for and factors influencing patients' decisions Descriptive data analysis (350 patient questionnaires)	Investigate why non-urgent patients were presenting ED.	<ul style="list-style-type: none"> • Limited access to primary care provider • Convenience of ED and access to other services (pathology and radiology) • Perceived expertise of ED staff • Perceived urgency
Andrews and Kass (34) 2018	USA	Contrast between patients' perceived need and need determined by physician Descriptive & inferential analysis (117 patient and physician questionnaires)	Understand why non-urgent patient populations accessed ED services.	<ul style="list-style-type: none"> • Greater perceived urgency among patients: • Self-referred • With less than college education • With lower income (\leq \$25,000 US) • With acute-on-chronic musculoskeletal pain.
Backman et al. (56) 2010	Sweden	Physician determined 'appropriateness' Descriptive & inferential analysis (560 patient interviews and 560 physician questionnaires)	Analyse physicians' assessment of patient's urgency and 'appropriate' level of care and explore sociodemographic characteristics.	<ul style="list-style-type: none"> • Perceived urgency • Circulatory, digestive, musculoskeletal symptoms or trauma were most frequent.
Beache and Guell (65) 2015	Caribbean	Socially shared custom of non-urgent presentations Qualitative analysis Grounded theory (12 semi-structured interview)	Explore attitudes of patients and understand how and why they present to ED.	<ul style="list-style-type: none"> • Habitual and deliberate use of ED • The health system encouraged use of ED
Botelho et al. (57) (2019)	Portugal	Patient perception of urgency Exploratory economic analysis (55 patient questionnaires)	Explore patient perception of urgency in contrast with physician allocated urgency.	<ul style="list-style-type: none"> • Perceived urgency

Author Year	Country	Focus and method	Aim	Why?
Buja et al. (4) 2016	Italy	After hours referrals to ED Retrospective statistical analysis (routinely collected data; 22,662 ED & primary care presentations)	Determine the appropriateness of referrals to ED from after-hours services.	<ul style="list-style-type: none"> • High incidence of after hours referrals
Chen et al. (52) 2015	USA	Distance and sociodemographic correlates of 'avoidable', visits in California Retrospective statistical analysis (routinely collected data; 3,912,676 presentations;)	Determine trends between avoidable ED use and patient characteristics.	<ul style="list-style-type: none"> • Higher odds in Medicare (disability or over 65yrs) or Medicaid (low income) patients • Patient living 0.5 miles from ED
Dinh et al. (24) 2016	Australia	Characteristics and trends in non-urgent presentations. Retrospective statistical analysis (routinely collected data; 10,804,797 presentations)	Determine prevalence of low acuity presentations and to identify trends and characteristics.	<ul style="list-style-type: none"> • Musculoskeletal complaints
Diserens et al. (5) 2015	Switzerland	Compare findings with an earlier study (2000 vs 2013). Descriptive & inferential analysis (1097 patient questionnaires)	Determine whether patient characteristics and rationale for presenting with non-urgent conditions had changed over 13 yrs.	<ul style="list-style-type: none"> • Traumatic injury Increasingly reported by patients: <ul style="list-style-type: none"> • Lack of awareness of alternatives • Poor timely access of alternatives Decreasingly reported by patients: <ul style="list-style-type: none"> • Convenience • Perceived urgency
Dixe et al. (36) 2018	Portugal	Characteristics of non-urgent presentations Descriptive & inferential analysis (357 patient questionnaires and review of medical records)	Determine the drivers of non-urgent presentations	<ul style="list-style-type: none"> • Perceived urgency

Author Year	Country	Focus and method	Aim	Why?
Durand et al. (70) 2012	France	Drivers of non-urgent presentations Qualitative analysis Thematic analysis (87 patient and 34 health professional interviews)	Determine reasons why patients with non-urgent complaints choose to present to ED.	Patient responses: <ul style="list-style-type: none"> • Perceived urgency (anxiety) • Barriers to primary care • Convenience • Need for reassurance Staff responses: <ul style="list-style-type: none"> • Cost • ‘Condemned’ behaviour
Farion et al. (58) 2015	Canada	Low acuity visits to the paediatric ED Descriptive & inferential analysis (2,146 parent questionnaires)	Understand presentation patterns and resource implications.	<ul style="list-style-type: none"> • Convenience • Perceived urgency • Access to specialist services
Ghazali et al. (59) 2019	France	Characteristics and drivers of non-urgent presentations Descriptive & inferential analysis (598 patient questionnaires)	Determine the profile and motives of patients with non-urgent conditions	<ul style="list-style-type: none"> • Perceived urgency • Access to specialist services • Convenience • Close proximity of the ED • Access to pathology and radiology • Cost found to be a minor factor (3.7%)
Hudgins and Rising (66) 2016	USA	Fear, vulnerability and sacrifice as drivers of ED use Qualitative analysis Structural violence theory with subjectivity analysis (1 in-depth patient interview)	Demonstrate that anthropological methods and analysis have potential to inform patient-centred healthcare design via case study of a frequent non-urgent ED presenter	<ul style="list-style-type: none"> • Complex social reasons for accessing and/or not accessing ED • Thoughts, feelings, beliefs, sense of self, led to complex decision-making • Deep-rooted fear as a barrier and a driver for seeking medical care • Access to health insurance
Hummel et al. (60) 2014	USA	Parental perspectives Descriptive analysis (102 parental questionnaires)	Determine why parents chose ED over primary care options	<ul style="list-style-type: none"> • Lack of access to primary care alternatives after hours

Author Year	Country	Focus and method	Aim	Why?
Idil et al. (61) 2018	Turkey	Profile and characteristics of adult patients with non-urgent conditions Descriptive analysis (624 patient questionnaires)	Identify characteristics and rationale for ED presentation	<ul style="list-style-type: none"> • Convenience (pathology/radiology) • Cost a minor factor (2.6%)
Keyes et al. (55) 2020	USA	Insurance coverage and ED usage Retrospective statistical analysis (routinely collected data; 298,732 ED presentations)	Determine how insurance cover changed with introduction of Affordable Care Act and whether this influenced non-urgent ED usage	<ul style="list-style-type: none"> • Non-urgent ED usage increased with insurance coverage (14.8% over 7 years)
Klingberg (37) 2020	Switzerland	Incidence of ED usage between two population groups Descriptive and inferential statistics (147 patient questionnaires)	Determine difference in ED usage between asylum seekers and Swiss nationals	<ul style="list-style-type: none"> • Did not have regular GP • Limited awareness of alternative services • Previous bad experience with GP • Perceived urgency
Kraaijvanger et al. (43) 2016	Netherlands	Factors contributing to self-referral Systematic review (30 publications)	Explore what motivates self-referred patients to present to ED.	<ul style="list-style-type: none"> • Perceived urgency (anxiety) • Convenience • Limited access to alternative services • Lack of confidence in alternative care services • Financial considerations (USA papers)
Krebs et al. (6) 2016	Canada	Reasons for seeking ED care with a non-urgent condition Descriptive and inferential (1,402 patient questionnaires)	Identify characteristics of patients who seek alternative care before arriving at the ED.	<ul style="list-style-type: none"> • Injury • Perceived urgency • Greater confidence in ED care • Convenience • Limited timely access, alternative services • Cost found to be a minor factor (1.5%)
MacKay et al. (62) 2017	Canada	To understand ED access and prior attempts to access alternative services Descriptive analysis (89 patient questionnaires)	Determine reasons for choosing ED over primary care services and determine time to primary care appointments	<ul style="list-style-type: none"> • Convenience – radiology and pathology) • Long wait to primary care appointments

Author Year	Country	Focus and method	Aim	Why?
MacKichan et al. (67) 2017	UK	Reasons patients seek primary medical care in emergency departments Qualitative analysis Ethnographic exploratory analysis (29 patient/carer and 19 primary care staff interviews)	Describe how processes of access to primary care influence decisions to seek help at the ED	<ul style="list-style-type: none"> • Socioeconomically disadvantaged communities: lower GP-to-patient ratios • Complexity navigating alternative services • Limited timely access to alternative services • Communication (language) challenges • Perceived expertise in ED
Mathison et al. (54) 2013	USA	Density of primary care services in relation to non-urgent paediatric presentations Retrospective statistical analysis (Routinely collected data; 148,314 presentations)	Determine the relationship between 'spatial density' of primary care physicians and non-urgent presentations	<ul style="list-style-type: none"> • Closer proximity to ED • 'Spatial density' of primary care services • Greater odds of patients without private insurance (cost)
Moineddin et al. (46) 2011	Canada	Factors influencing ED demand Retrospective statistical analysis (Routinely collected data; 53,353 presentations)	Assess factors resulting in increased demand for ED services	<ul style="list-style-type: none"> • Access to primary care physician
Nelson (38) 2011	Scotland	Patients decision-making to present to GP or ED with non-urgent conditions in a rural setting Descriptive analysis (27 patient interviews)	Determine perceptions of urgency and other factors influencing decision for ED presentation	<ul style="list-style-type: none"> • Perceived urgency • Convenience and access to radiology • Limited access to primary care
Schmiedhofer et al. (69) 2016	Germany	Patient motives for non-urgent ED visits Qualitative content analysis (64 patient interviews)	Explore the motives of patients categorised as non-urgent	<ul style="list-style-type: none"> • Convenience • Perceived urgency (anxiety) • Timely access • Perceived expertise of ED clinicians

Author Year	Country	Focus and method	Aim	Why?
Shaw et al. (68) 2013	USA	Decision-making processes of patients using the ED Qualitative analysis Grounded theory (30 patient interviews)	Explore non-urgent ED patient decision-making process for presenting	<ul style="list-style-type: none"> • Limited awareness of / access to primary care services • Referred to ED • Language barriers/other intercultural issues with primary care • Transport barriers • Perceived urgency • Cost of primary care
Smith et al.(63) 2015	Canada	Factors influencing the decision to present to a paediatric ED Descriptive and inferential analysis (300 patient questionnaires)	Explore factors associated with parents' decisions to bring their children to the paediatric ED.	<ul style="list-style-type: none"> • Limited access to primary care • Perception of expertise • Child previously managed in same ED • Convenience
Stephens and Broome (22) 2017	Australia	Understand characteristics of low acuity presentations while testing three separate definitions. Retrospective statistical analysis (Routinely collected data; 4,909,035 presentations)	Investigate patterns in low acuity presentations across New South Wales (Aust)	<ul style="list-style-type: none"> • Increased GP density associated with lower proportion of presentations
Unwin et al. (1) 2016	Australia	Patients' perspectives for accessing the ED with non-urgent complaints Descriptive and inferential analysis (477 patient questionnaires)	Establish profile of non-urgent patients presenting to ED	<ul style="list-style-type: none"> • Perceived urgency • Convenience • Limited access to primary care • Referral to ED • Musculoskeletal complaints • Cost found to be a minor factor (6.9%)

Author Year	Country	Focus and method	Aim	Why?
Uscher-Pines et al. (42) 2013	USA	How patients decide to visit the ED for non-urgent conditions Systematic review (26 Articles, USA-based)	Understand patient rationale for accessing ED services with non-urgent complaints.	<ul style="list-style-type: none"> • Perceived urgency • Convenience • Cost • Limited access to primary care • Referral to ED
Young-Harry et al. (64) 2015	Nigeria	Inappropriate ED presentations Descriptive and inferential analysis (430 patient questionnaires)	Identify patterns of self-referred patients who were deemed to be inappropriate ED-users.	<ul style="list-style-type: none"> • Timely access to ED • Convenience, additional services/medications at ED • Perceived expertise • Polyuria/glycosuria, retroviral infection or hypertension

2.4.3 What was learnt?

The findings of this review are discussed below under the sub-headings of **who** presented and **when** and **why** patients presented and reported trends as outlined in Tables 2.1 to 2.3.

2.4.3.1 Who?

Four key factors were identified within the literature as being associated with a higher likelihood of presenting to the ED with non-urgent conditions. These were age, gender, socioeconomic position (SEP) and ethnic background.

Age and gender

Twenty studies (56%) reported on age and/or gender as a factor associated with non-urgent ED presentations. Nine used retrospective data analyses, these reported: young adults and/or children regardless of gender to be over-represented (4, 22, 52, 54, 55); young males were found to be over-represented in Canada (46), Switzerland (35), and the UK (53) found and, one study based in California, USA, found females (regardless of age) to be over-represented (52).

Ten questionnaires and one systematic review considered age and/or gender. Most (n=7) found younger age to be associated with non-urgent ED presentations (1, 5, 37, 42, 59, 60, 63). Two found middle-aged patients to be more likely to present (36, 61). Six studies considered gender, three finding young males (5, 37, 59) and one finding males of all ages (6) to be over-represented. Two studies found females to be over-represented, with one reporting middle-aged females to be more likely to present to an ED with non-urgent conditions (36) and the other females of all ages more likely to present (64).

Socioeconomic position

The SEP of patients presenting with non-urgent conditions was reported in nine studies (25%). Six conducted retrospective data analyses (22, 34, 46, 53, 54, 67), two were questionnaire-based (6, 36) and one was a systematic review (42). Two studies conducted in the USA reported a higher likelihood of patients presenting the ED if they were from lower SEPs (42, 54), while a Canadian study found an over-representation by patients from mid to high SEPs (46). A study from New South Wales, Australia, found higher odds of non-urgent ED presentations among patients from higher SEPs in major cities and from lower SEPs in rural and remote areas (22). A second NSW study, considered SEP based on the location of the ED rather than the patient's place of residence, and found EDs were more frequently located in areas of greater socioeconomic advantage (24). Studies in Portugal and Canada reported patients presenting with non-urgent conditions to have lower levels of education (6, 36).

Ethnicity

Five studies investigated the association between ethnicity and non-urgent ED presentations – four retrospective analyses (4, 35, 52, 54) and one questionnaire (37). Two conducted in Switzerland reported an over-representation by non-Swiss residents (35) and asylum seekers (37). An Italian study found a higher proportion of non-urgent presentations by non-residents (4). Two American studies found 'non-white' residents (52) and African-American and Hispanic (54) populations to be over-represented. An American in-depth case study discussed the ethnological and complex social history of an African-American male who struggled to make healthcare-seeking decisions (66). They identified complex social reasoning as a driver of this patient's presentation to the ED.

2.4.3.2 When did patients present to the ED with non-urgent conditions?

Evidence of when non-urgent presentations occurred was limited to five studies (14%) (Table 2.2). Three of these were conducted in Australia, the other two were based in Nigeria and Portugal. Two of the Australian studies used routinely collected ED data to provide evidence of when they presented. One was conducted across three metropolitan EDs in Western Australia and reported that after-hours presentations (outside the hours 0800 - 1700, Monday to Friday) contributed to 64% of presentations (7). The second was conducted in rural Tasmania and also found a high proportion of after-hours presentations, 67-70% (21). Two questionnaire-based studies found after-hours presentations to contribute to 66% of non-urgent presentations in Northern Tasmania (1) and 62% in Nigeria (63), while the third found that 85% presented between 0800 and 2000 in Portugal.

2.4.3.3 Why?

Thirty (83%) of the included studies contributed answers for why patients with non-urgent conditions presented to the ED (Table 2.3). The methods used to provide this knowledge included retrospective data analyses, questionnaires, interviews and systematic reviews. This review identified five key themes for why patients present to the ED with non-urgent conditions, these being:

1. Limited access to primary health care services at the time of need (50%, n=36)
(1, 5, 6, 22, 33, 37, 38, 42, 43, 46, 54, 56, 60, 62, 63, 67, 68, 70)
2. Perceived urgency for medical attention (47%) (1, 5, 6, 33, 34, 36-38, 42, 43, 56-59, 68-70)
3. Convenience of the ED (42%) (1, 5, 6, 33, 38, 42, 43, 58, 59, 61-64, 69, 70)

4. Cost or access to health insurance (33%) (1, 6, 42, 43, 52, 54, 55, 59, 61, 66, 68, 70)
5. Referral from primary health care to the ED (11%) (1, 4, 42, 68)

Limited access to timely primary care services

Limited access (or barriers) to primary care services at the patient's time of need was the most frequently reported reason for why patients presented the ED with non-urgent conditions. This finding spanned five continents (Europe, Eastern Asia, North America, and Australia/Oceania) and ten countries and included 50% of the studies in this review. Three of the included studies compared non-urgent ED presentation numbers to GP numbers. Two studies were based on retrospective data analyses (22, 54) while the third study implemented an observational and interview-based qualitative study (67). All three studies found an association between fewer GP numbers and higher numbers of non-urgent ED presentations.

The first study to consider this relationship was conducted in the USA in 2013 and found that “low spatial density of primary care was strongly associated with non-urgent ED utilisation” among parents of paediatric patients (54). The second study was conducted in NSW and published in 2017. The researchers measured the density of GPs in relation to the percentage of non-urgent ED presentations and found that “increasing GP density was associated with a decreasing percentage” of non-urgent ED presentations (22). Also published in 2017, the third study by a team in the UK discussed findings in the context of GP-to-patient ratios. Their study found that a lower ratio of GPs per 1000 population in areas experiencing socioeconomic disadvantage played an “implicit” role on non-urgent ED presentations (67).

Perceived urgency for medical attention

Perceived urgency was reported by patients choosing to present to the ED with a non-urgent condition in seventeen (47%) of the included studies. At times, it was found to contribute to anxiety in patients who were unsure of the cause and consequences of their symptoms and sought reassurance (43, 66, 69, 70). An in-depth interview with a middle-aged male discussed the patient's 'deep-rooted fear' regarding his health which at times prevented him from seeking ED care but also drove him to seek ED care (66).

Patients with musculoskeletal symptoms or trauma were found to perceive greater urgency for medical attention than patients with other symptoms (56). The research team who reported this finding used interviews (patients) and questionnaires (physicians) to compare the perceived urgency of patients with the physician's assessed urgency. This research team were the only team in this review to consider an association between specific conditions or injuries and the patient's perception of urgency. Other studies reported a higher incidence of presentations for injury or trauma (5, 6, 11, 24) but did not seek to measure a correlation between presenting conditions and perceived urgency.

Convenience

The convenience of EDs was identified in fifteen (42%) of the included studies. Reasons identified for the ED's convenience included ease of access and availability (1, 5, 6, 42, 43, 58, 59, 62, 63, 69, 70) and/or the provision of additional services such as radiology, pathology and pharmacy (33, 38, 61, 64).

Cost of primary care service or access to health insurance

Cost was mentioned in one third of papers with some studies finding cost to be a minor contributing factor, influencing 1.5% to 6.9% of non-urgent ED presentations (1, 6, 59, 61). A French study found that ED staff believed cost to be a major driver, but this was not reflected in patients' responses (70). Studies finding cost to be a major driver of non-urgent ED presentations were based in the USA (42, 43, 55, 68). Shaw et al. (68) found that patients preferred the flexible payments offered by the ED in the USA. Four studies, also from the USA, found that patients without access to health insurance were more likely to present to the ED (42, 52, 54, 66). In their systematic review Kraaijvanger and colleagues (43) also observed that only studies conducted in the USA found cost to be a significant driver for non-urgent ED presentations.

Referral

Referral of patients from primary care to EDs was found to be a contributing factor in four studies (1, 4, 42, 68). A systematic review of 26 USA-based studies published between 1990 and 2011 aimed to understand factors influencing patients' decision-making processes. They found referrals from primary care to be a "substantial" driver of non-urgent ED presentations and reported that referrals contributed to up to half of in-hours non-urgent ED presentations (42). A second study from the USA used qualitative methods and grounded theory and found that patients discussed being "instructed" to present to the ED by a medical professional (68). An Italian study based on routine ED data found that half of all after hours referrals from primary care to the ED were 'inappropriate' (4). Finally, an Australian study used anonymous questionnaires and reported 29% of patients presenting to the ED with non-urgent conditions had been referred by a medical professional (1).

2.4.3.4 Trends

There were limited investigations relating to trends across the included studies. One study reported a significant increase in those aged under 19 years (34.5%) and those aged 26–64 years (35.5%) in Minnesota (USA) (55). An Australian study found a constant high incidence of paediatric patients (0–4 year old) and young adults (15–24 year old) but no discernible changes in trends between 2010 and 2014 in NSW (24). A third study conducted in Switzerland compared patient questionnaires conducted in 2000 and 2013 and identified four trends in non-urgent presentations (5). The trends were: constant proportion of young males and of traumatic injury; a decreasing proportion of elderly patients; patients increasingly reported a lack of awareness of alternative healthcare services or unavailability of alternative healthcare services when needed and, patients were less likely to report convenience or their perceived urgency as a reason for presenting (5).

2.4.4 Terms and definitions

A variety of terms were used to describe the study population across the 36 included studies. Seventeen (47%) of the studies referred to presentations as ‘non-urgent’ or ‘non-emergent’ while ‘low acuity’ was used in seven (19%) studies. Terms such as ‘inappropriate’ or ‘avoidable’ were used in four (11%) studies.

Methods for measuring non-urgent ED presentations also varied across the included studies. They ranged from prospective methods where patients were considered ‘non-urgent’ at the time of triage to retrospective. Retrospective methods were used at the conclusion of the patient’s presentation and included additional criteria that could not be determined on arrival. The most frequently used method was to classify patients triaged to one of the two least urgent triage categories in a 5-tiered system and was

used by 12 (33%) of the research teams. These methods for measuring non-urgent presentations were referred to as definitions by authors, Table 2.4 outlines these definitions and the key terms used to describe patients in this review.

Table 2.4. Terms and definitions used to measure and describe non-urgent emergency department presentations

Definition	Key term	Author	Country (triage system)
Patient triage category 4 or 5	Non-urgent	Alyasin and Douglas (33)	Saudi Arabia (CTAS ¹)
		Andrews and Kass (34)	Switzerland (MTS ²)
		Clement, Businger (35)	Switzerland (MTS)
		Dixe, Passadouro (36)	Portugal (MTS)
		Klingberg, Stoller (37)	Switzerland (SETS ³)
		Nelson (38)	Scotland (MTS)
		Unwin, Kinsman (1)	Australia (ATS ⁴)
	Non-emergent	Smith, Mustafa (63)	Canada (CTAS)
	Low acuity	Farion, Wright (58)	Canada (CTAS)
		MacKay, Atkinson (62)	Canada (CTAS)
		Schmiedhofer, Mockel (69)	Germany (MTS)
	Inappropriate	Botelho, Dias (57)	Portugal (MTS)
Patient was triaged to least urgent category	Non-urgent	Idil (61)	Turkey (TCS ⁵)
	Non-urgent & inappropriate	Backman, Blomqvist (56)	Sweden (n/a)
		Ghazali, Richard (59)	France (CIMU ⁶)
	Non-life threatening	Diserens, Egli (5)	Switzerland (SETS)
Study-specific definition	Low acuity	Krebs et al. (6)	Canada (CTAS)
	Inappropriate	Buja et al. (4)	Italy (n/a)
		Young-Harry, Dienne (64)	Nigeria (n/a)
	Avoidable	Chen, Hibbert (52)	USA (n/a)
Deemed 'non-urgent' by triage nurse	Non-urgent	Beache and Guell (65)	Caribbean (n/a)
		Durand, Palazzolo (70)	France (n/a)
		Shaw, Howard (68)	USA (n/a)

¹Emergency Triage Scale (4 tier, later amended to 5 tier), ⁴ATS – Australasian Triage Scale (5 tier), ⁵TCS – Turkish Coding System (3 tier), ⁶CIMU – French Emergency Nurses, Classification in Hospital scale (5 tier) ⁷ESI – Emergency Severity Index (5 tier) **n/a** – not applicable/available

Table 2.4. Terms and definitions used cont.

Definition	Key term	Author	Country (triage system)
Tested 4 definitions: 1. ACEM definition: Did not arrive by ambulance; self-referred; and consultation time of <1 hour.	General practice-type	Allen, Cheek (21)	Australia (ATS)
2. AIHW definition: Triage ATS 4 or 5; did not arrive by ambulance, community service or police; and did not die.	Low acuity	Nagree, Camarda (7)	Australia (ATS)
3. Diagnosis method: Specific list of diagnoses; triaged ATS 4 or 5; arrived by private vehicle; and were self-referred.		Stephens et al. (22)	Australia (ATS)
4. Sprivulis method: Triage ATS 3, 4 or 5; not admitted			
Patient triaged as category 4 or 5, plus additional criteria.	Non-urgent	Mathison, Chamberlain (54)	USA (ESI ⁷)
	Low acuity	Dinh, Russell (24)	Australia (ATS)
		Keyes, Valiuddin (55)	USA (ESI)
	Potentially avoidable	Moineddin, Meaney (46)	Canada (CTAS)
Patients who were self-referred, first ED visit or unplanned follow-up, nil investigations required, nil treatment required and follow-up with GP or follow-up not required.	Inappropriate	McHale, Wood (53)	England (n/a)
	n/a	MacKichan, Brangan (67)	England (n/a)
N/A – systematic review	Non-urgent	Uscher-Pines, Pines (42)	USA (n/a)
	Self-referred	Kraaijvanger, van Leeuwen (43)	Netherlands (n/a)
Did not specify definition	Non-emergent	Hummel et al. (60)	USA (n/a)
	Chose not to use 'binary' terms	Hudgins and Rising (66)	USA (n/a)

¹Emergency Triage Scale (4 tier, later amended to 5 tier), ⁴ATS – Australasian Triage Scale (5 tier), ⁵TCS – Turkish Coding System (3 tier), ⁶CIMU – French Emergency Nurses, Classification in Hospital scale (5 tier) ⁷ESI – Emergency Severity Index (5 tier) **n/a** – not applicable/available

2.5 Discussion

The aim of this review was to understand who presents to EDs with non-urgent conditions and when and why they present. This review identifies a complex international problem with studies included from across six continents and fifteen countries and representing multiple health services.

2.5.1 What is known

Across the international literature there were common themes reported by researchers investigating non-urgent ED presentations, such as age groups and service costs, but there were also considerable differences. For example, cost was identified as a major contributing factor in studies conducted in the USA, but this finding was not reported outside the USA. These differences reflect contextual variation and unique population needs and are discussed below.

2.5.1.1 Who?

Studies that described the profile of the patient population were based on retrospective data analyses of routinely collected ED data and/or questionnaires. The majority of these studies described the profile of non-urgent ED presentations to be by patients who were younger, male, experiencing greater socioeconomic disadvantage, and more likely to be from an ethnic minority group. Yet some studies reported being female or from a higher SEP as being more likely. These varying findings indicate unique needs of certain communities and the need to ensure the more frequently reported factors (such as being young and male) are not presumed. This is important for health service planners and policy makers aiming to target and design services to meet community needs.

Age and gender

An interesting observation was the varied measures used to identify 'younger age'. McHale et al. (53) referred to younger age as 0–2 and 13–25 years of age while Moineddin et al. (46) defined their younger population as between 20–45 years of age. These broad references to younger age represent the complexity in discussing non-urgent ED presentations and a lack of consistency across the literature.

Both studies reporting a higher incidence of middle-aged patients were questionnaire-based studies (36, 61) and were at risk of sampling bias related to their non-reporting about the representativeness of the study population. For instance, one study, using convenience sampling by the triage nurse between 0800 and 1600, for Monday to Friday, offered no explanation of how the convenience sampling was conducted. Further, the participants were limited to 'in-hours' presentations (61). It is possible that the profile of patients presenting after-hours and on weekends was different and/or that middle-aged patients were more willing to complete questionnaires. Both research teams excluded participants under the age of 18 years and reported mean age rather than median age (36, 61) further limiting the strength of their finding of older age. It is not possible to determine whether selection bias has occurred in these studies; therefore the translatability of their findings is limited. The finding that middle-aged patients were over-represented is likely to have resulted from sampling error.

The majority of studies considering gender (n=6) found males to be over-represented; only three reported an over-representation of females. One of the three studies finding females to be over-represented was based on analysis of four years of routinely collected ED data (52). The other two were based on questionnaires. One research team calculated a sample size and recruited every fourth eligible patient until the sample size

was reached (64). The second research team did not discuss representativeness of the study population, making it impossible to determine whether these findings were reflective of all non-urgent ED presentations. Researchers reporting differences in gender were not able to provide an explanation for their finding. It is likely that the findings for gender represent healthcare needs within the communities where the studies were conducted. For example, Chen, Hibbert (52) suggested that barriers to or distrust of primary care services may have contributed to the higher proportion of females presenting to a Californian ED.

In summary, males were more frequently reported to be over-represented but this was not true in all studies. The findings related to patient profiles indicate the challenge for researchers, health service providers and policy makers in understanding consistent themes and population needs. This highlights the importance of understanding unique population needs based on age and/or gender across geographic locations before planning and implementing healthcare services to meet local needs.

Disadvantaged and vulnerable population groups

The socioeconomic position (SEP) of patients presenting to the ED with non-urgent conditions was also not consistent across the included studies. Again, demonstrating the importance of understanding local contexts in identifying healthcare needs. Some studies reported greater presentation by populations from mid-high SEP, others reported lower SEP or a lower level of education as factors. Nevertheless, the majority of studies that considered the SEP of patients presenting to the ED with non-urgent conditions identified an over-representation by populations from socioeconomically disadvantaged areas.

An example of mixed findings was found in two studies undertaken in NSW using the same population during similar periods between 2010 and 2014 (24) and 2013 to 2014 (22). These two studies provided an interesting contrast between metropolitan and regional/rural/remote areas in Australia. Stephens and Broome (22) found that patients from higher SEP households in metropolitan NSW had higher odds of non-urgent presentations, while lower SEP patients from rural and remote regions had higher odds. The second NSW study found EDs were more likely to be located in more advantaged suburbs/towns. These findings raise the question of where EDs are located. If EDs are located in areas of greater advantage, it is possible that socioeconomically disadvantaged populations in regional/rural/remote areas experience further disadvantage by having to travel further to attend services compared with more advantaged populations. This demonstrates the challenges for people living in non-urban areas to experience equitable access to healthcare services. A similar finding regarding the challenge of healthcare access for populations living outside urban areas has been identified elsewhere in Australia (71). Specific consideration should be given to the location of health services (EDs and primary care) and to the suburbs/towns most over-represented in ED presentations to determine whether a gap exists between health service provision and population need.

Further evidence of vulnerable population groups being over-represented in non-urgent ED presentations were the studies of ethnic minority groups such as asylum seekers (37), non-national residents (4, 5), 'non-white' residents (52) or African-American or Hispanic (54) populations. An in-depth case study conducted in the USA offered some explanation for this finding, identifying complex social reasons as a driver of ED presentations (66). These complexities have been identified in healthcare research more broadly, asylum seekers and refugees experiencing difficulties when

navigating and negotiating primary care services (72). In meeting the health care needs of vulnerable population groups, it is therefore important to have a firm understanding of the complex social reasons associated with health-seeking behaviour in order to ensure service provision is in accordance with population needs.

2.5.1.2 When?

Five studies considered time of day, four found approximately two-thirds of presentations occurred after-hours when access to primary care services were reduced or non-existent, although finding was based on research from only two countries. The fifth study was informed by patient interviews and review of medical records, presentations between 0800 and 2000 contributed to a high proportion (84.6%) of non-urgent presentations (36). However, they did not demonstrate how interview responses related to the greater cohort of patients, so the study has limited translatability.

2.5.1.3 Why?

Answering the question of ‘why’ patients presented to EDs with non-urgent conditions provided insight into the factors influencing patients’ decision-making. The methods used to provide this knowledge included retrospective data analysis, questionnaires and interviews. Nine studies were based on questionnaires without demonstrated representativeness across all non-urgent ED presentations, consequently, findings from these studies are viewed with caution (33, 34, 36, 38, 56, 57, 60-62). Interestingly however, the findings do not contradict the findings from the questionnaire-based studies that were able to demonstrate representativeness (1, 5, 6, 37, 58, 59, 63, 64).

Contrasting accessible primary care services and patients' perceived urgency

Limited access to primary care services and the perceived urgency of patients for medical attention were the two most common reasons given for presenting to the ED with non-urgent conditions. Perceiving a need for health care is the first step towards seeking care (73). This review highlights limited access to primary care services contributing to patients' decisions to access ED services with non-urgent conditions.

A study attempting to address patients' perception of urgency implemented public education programs through media outlets. After each of the three public education campaigns ED presentations decreased significantly, but once the campaign had finished presentation numbers began to increase (15). This indicates that education campaigns have limited long-term influence on health-seeking behaviour.

An in-depth interview Hudgins and Rising (66) discussed the complex decision-making process of a middle-aged African-American male whose 'sense of self' and beliefs influenced his decisions. While limited to only one person and therefore not generalisable, this study did provide evidence of the complexity of perceived urgency, anxiety and fear experienced by patients seeking health care.

Comparison of two questionnaires conducted in 2000 and 2013 found that perceived urgency for medical attention had decreased but the challenges in accessing alternative healthcare services had increased in Switzerland (5). Researchers have investigated whether increased access to primary care services could reduce non-urgent ED presentations. Three measured the impact of new services with extended opening hours (12, 13, 16); another measured the impact of an existing service that extended its opening hours (14). Nagree et al. (45) used statistical modelling to hypothesise the impact of increased access to primary care services and reported it would not make a significant

difference to ED demands. The four studies using real-world situations all found a significant decrease (between 10% and 26%) in non-urgent ED presentations following improved access to alternative primary care services (12-14, 16). Also considering access to primary care services, studies in the USA (54) and Australia (22) found an association between higher number of GPs per population and fewer non-urgent ED presentations. The real-world studies offer a more accurate indication of the influence of improved access to primary care and provide evidence of strategies that can successfully reduce ED demand. Further international research demonstrates a significant reduction (between 8% and 10%) in the number of non-urgent ED presentations associated with improved access to primary healthcare services (12, 13, 16) and in particular those providing after-hours services (74).

These two most frequently reported drivers of ED demand suggest the need to step back from the focus on non-urgent ED presentations and to consider the broader context. It should not be unexpected that patients who perceive their need for urgent medical attention but are unable to access timely primary health services end up in the ED. In gaining a deeper understanding of this situation, it is important for researchers, policy makers and service providers to understand their local context and needs before implementing interventions, such as educational campaigns that do not address the root causes of ED presentations.

Convenience

By design, EDs provide convenient services because they are easily accessible, always open and provide additional resources such as radiology, pathology and pharmacy. The WHO characterises universal access to health services as: the availability of quality health services; location that allows those in need to reach them; opening hours at the

time of need; and, “all other aspects that allow people to obtain the services when they need them” (75). Emergency departments meet these characteristics whereas most primary health services are only accessible during business hours and have limited capacity to accommodate ‘walk-in’ presentations (6, 60, 67); or are not located in the areas of greatest need (22, 54, 67). It is therefore hardly surprising that the ED offers the most ‘convenient’ option.

Cost

The international discussion of cost as a driver of non-urgent ED presentations was interesting. Cost contributed to the demand for non-urgent ED services in research conducted in the USA, but was a major contributing factor in other countries. The USA’s healthcare system is considerably different to many countries, with limited public access to health insurance (42, 52, 54, 66) and flexible payment options provided for ED services but not by primary care services (68). Kraaijvanger et al. (43) also observed that only USA based studies reported cost as a driver on non-urgent ED presentations. These findings suggest the need to move beyond the presumption that cost is a major driving factor behind non-urgent ED presentations in countries such as Australia and instead to consider other factors.

A French study conducted interviews to investigate why patients presented to the ED, and included patients and ED professionals (70). The French healthcare system requires a small fee for both ED and GP services. The researchers found that staff believed cost of primary care services to be a major barrier for patients and ‘condemned’ patients for presenting to the ED with non-urgent conditions. However, the patients did not mention cost but instead reported their perceived urgency and need for reassurance along with barriers to primary care and the convenience of ED services.

A further four studies, conducted between 2016 and 2019 found cost to be a barrier in only a small proportion of patients (1.5 to 6.9%). These studies included a second French study (59) and three other studies based in Turkey (61), Canada (6) and Australia (1), the later three countries provide free ED services. The Turkish study (61) was based on questionnaires and did not demonstrate whether the study sample was representative of all non-urgent ED presentations. Their finding should therefore be treated with caution, although four other studies supported the finding that cost was a minor contributing factor.

Referral

The practice of referring patients from primary care to the ED with non-urgent conditions is not frequently examined in the literature but was a driver of ED demand in four studies. It is possible this reflects a limited capacity within primary care services to provide certain aspects of care and the convenience of EDs for referral. Future research is needed to understand this issue and identify potential patient-centred solutions.

2.5.1.4 Trends

Trends in ED presentations provide valuable insight into the changing health care needs among population groups and can be used by service providers and policy makers to inform and evolve healthcare services (3). There were limited studies considering the trends associated with non-urgent ED presentations in this review. A questionnaire-based study compared results from two periods (thirteen years apart) and found a decreased proportion of elderly patients with non-urgent conditions. This surprised the authors who concluded that older patients were more likely to be triaged to more urgent categories, although this was not measured (5). They also referred to the

opening of two ‘urgent care’ centres within the local community since the first study. The researchers did not consider how this might have affected the profile of non-urgent ED presentations or whether older patients were more likely to use the new services. This limitation demonstrates the challenge for researchers in identifying health care needs and access between primary health care and ED care.

Analysis of trends in the demand for health services and consideration of factors that contribute to changes is beneficial for service planning and policy development as it demonstrates consistent (24), growing (55) or declining needs (5). This is an area that would benefit from greater understanding and future research to ensure healthcare services are targeted towards evolving population needs.

2.5.2 Complexity of terms and definitions

Two further observations are made in this literature review: the number of terms used to describe the patient population, and the complex definitions used to measure presentations. Terms such as ‘inappropriate’ or ‘avoidable’ tend to attribute blame towards patients. This was discussed by Durand and colleagues (70) who conducted interviews with ED staff and found they were critical of patients for presenting to the ED with ‘inappropriate’ conditions. Healthcare professionals – many with high levels of education and years of experience – should avoid using terms suggesting ‘blame’ towards patients for accessing services for their (actual or perceived) health care needs. In an editorial focused on the ‘patient’s dilemma’, Weber et al. (76) state:

“Rather than blaming the patients, we should listen to them and organise our healthcare systems to provide safe, appropriate, timely, and patient-centred care in the community, where the patients prefer to be.”

The lack of consistent terminology and strategies for defining or measuring non-urgent presentations contributes to the difficulty of establishing the extent of the issue. Australian researchers using routinely collected ED data have found significant differences in definitions within the same patient population (7, 21, 22). For example, a team from metropolitan Perth used the same data to test four different definitions of non-urgent presentations (7). They found the proportion of non-urgent presentations ranged between 9.0% and 26.4% of total ED presentations based on definition alone. Another study in rural Tasmania adopted the same definitions and found that non-urgent presentations ranged from 15.1% to 69.7% of total presentations depending on the definition used (21). A third study in NSW compared EDs located in major cities with inner regional and remote/very remote EDs. Using the same definitions as the previous two studies these researchers found presentations ranged from 7.3% to 18.7% in major cities, 11.8% to 30.8% in inner regional EDs and 10.5% to 34.3% in rural to very remote EDs. These findings not only demonstrate that definition contributes to the wide variation in findings, but also that variation occurs across geographic regions.

Presentations triaged into the two least urgent of a five-tier triage scale was the most frequent method used by researchers to define non-urgent presentations (Table 2.4). This provides a broad, inclusive definition, which can be used to gain an understanding of health-seeking behaviour and decision-making practices of patients with non-urgent conditions, some of whom could be suitably managed outside the ED.

2.5.3 Strength and translatability of studies

The studies in this review vary in their usefulness to the question of who presented to the ED with non-urgent conditions and when and why they chose to present, and were dependant on the method implemented. Analysis of large routinely collected ED data

over a period of months or years can provide insight into who presents to EDs and when, and can also identify trends; while qualitative methods provide a deeper insight into why particular individuals or groups present.

2.5.3.1 Retrospective analyses and questionnaires

The included retrospective analyses included routinely collected ED data and represented a large number of ED presentations. These studies were able to provide a broad overview for the profile of patients and when they presented and can identify trends. Nevertheless, this method is limited by its inability to provide insight into decision-making processes of patients to answer the 'why'. Analyses of large, routinely collected data sets rely on the quality of data entered in busy EDs and may not be accurate. Despite some limitations, this data remains the most commonly used data for hospital and government reporting.

Questionnaires are helpful in gaining a deeper understanding of why patients present; however, only eight (1, 5, 6, 37, 58, 59, 63, 64) of the included questionnaire-based studies were able to demonstrate broad representation of actual non-urgent ED presentations. Six studies did this by reporting the proportion of eligible participants who completed questionnaires, achieving 50% to 90% participation (5, 6, 37, 58, 59, 63). Another accessed routinely collected ED data for the study period and compared age, gender, time of day and day of week to determine that questionnaire participants (n=477) were broadly representative of all presentations (1). The eighth study calculated a sample size and recruited every fourth patient until they reached the calculated number (64). In demonstrating representativeness, these eight studies increased reliability and translatability of findings across their respective populations.

2.5.3.2 Systematic reviews

Two systematic reviews were included in this literature review (42). One included only studies based in the USA (42) while the second included studies from nine high income countries (43). Both studies aimed to understand factors contributing to patients' decisions to present to the ED and used clearly defined search strategies, with inclusion and exclusion criteria.

2.5.4.3 Qualitative studies

Six included studies used qualitative research methods and provided in-depth insight into why patients presented to the ED with non-urgent conditions. Five of these reported using purposive sampling to increase representativeness (65, 67-70). The sixth study presented a case study from one of 40 patient interviews. The patient selected had demonstrated insight and the authors reported that their findings in the presented case study were reflective of the remaining interviews (66). The qualitative studies in this review demonstrated an ability to investigate non-urgent ED presentations and to provide a greater understanding of the circumstances behind patients' decision-making, leading to greater insight into a complex situation. This approach is particularly valuable in understanding local contextual differences and developing insight into complex social reasoning and decision-making to inform future service planning.

2.6 Conclusion

This review provided international evidence published over the last ten years of who presented to the ED with non-urgent conditions and when and why they presented. It confirms that the factors contributing to patients' decision-making are complex and beyond the walls of the ED. There were three key findings. First, there is a need to consider vulnerable population groups, such as younger people, and those from lower

SEPs and ethnic minority groups. Second, patients who are unable to access primary care services in a timely manner and who perceive an urgent need for medical attention are likely to find the ED a convenient option. And third, it demonstrates the importance of understanding the factors driving non-urgent ED presentations within local contexts in order to identify potential strategies and address local needs.

This review supports the description of the ED as a ‘canary in the coalmine’ for health services: the over-representation of vulnerable populations highlights inequitable access to primary care services. Rather than criticising patients, consideration must be given to the realities of the situation and to the identification of local needs to ensure health services are able to provide the right patient-centred service, available at the right time and in the right location.

CHAPTER 3 – Methods

Investigating the service requirements of patients with non-urgent conditions presenting to a regional Australian emergency department

3.1 Overview

This chapter presents the methods used to investigate the service requirements of patients presenting with non-urgent conditions to an emergency department (ED) in regional Australia and to translate findings into key recommendations and priorities for future health service planning.

Section 3.2 contains the study protocol published with BMC Health Services Research in 2018, with formatting and referencing modified to ensure continuity within the thesis. The original publication is included as Appendix 3 as per University of Tasmania guidelines. The Human Research Ethics Committee (Tasmania) Network approval letter H0016504 is included as Appendix 5

Section 3.3 outlines the amendments to the planned protocol. Rationale is also provided for why this amendment was required.

STUDY PROTOCOL

Open Access

3.2 Investigating the referral of patients with non-urgent conditions to a regional Australian emergency department: a study protocol

3.2.1 Abstract

Background: Australia's only island state, Tasmania, experiences one of the nation's highest incidences of non-urgent emergency department (ED) presentations in a healthcare system regularly faced with service demands that exceed resource availability. Service-demand mismatches are acknowledged to contribute to ED crowding which in turn, has been documented to have a correlation with poorer patient outcomes. Crowding within EDs is complex, non-urgent presentations alone are not the primary cause, but have been reported to be a contributing factor. In 2015–16 Tasmania recorded over 153,000 ED attendances, 55% of these fell into the two least urgent triage categories. Recent research in the State's North established that 29% of non-urgent presentations were referred, formally or informally, from primary healthcare providers and that, for many patients (39%), the ED was not their first choice of service provider. This study aims to identify the service needs of patients referred to a regional Australian ED and subsequently triaged as non-urgent.

Method: In order to achieve this aim, three objectives have been identified. The first two objectives use an explanatory sequential mixed method approach while the third objective will incorporate an implementation science approach.

These three objectives are: first, a retrospective analysis of seven years of routinely collected hospital data to identify trends in referral of patients with non-urgent

conditions; second, focus group interviews with patients and primary care providers to further understand perceived need and service requirements of those referred to the ED, and third, translation of findings into local health service recommendations.

Discussion: Identification of the needs of patients referred to the ED with non-urgent conditions will inform future service planning aiming to facilitate access to the right service at the right time and in the right place.

Keywords: Emergency department, Non-urgent presentations, Referral, Primary care, General practitioner

3.2.2 Background

Worldwide interest in the demand for emergency department (ED) services is evidenced by a growing body of work demonstrating links between ED crowding and patient outcomes. Crowding occurs when the demand for services exceeds resource and space availability and has been linked to negative consequences for both patients and the healthcare system. In 2000, Derlet and Richards (77) identified a number of concerns held by ED physicians across the United States which included: increased risk to public safety; increased time to analgesia; extended waiting time; patient dissatisfaction; decreased physician satisfaction; increased violence; miscommunication; and negative impact on teaching. Since then, these themes have remained constant; with increased hospital length of stay, morbidity and mortality also shown to be associated with ED crowding (78-84). A Canadian team in 2014 (79) conducted a retrospective analysis of over 600,000 ED presentations to 42 hospitals, and they reported significant risks to patient safety occurring during periods of crowding. To date, there is considerable evidence indicating links between ED crowding and poorer outcomes for patients, but there appears to be less knowledge around the causes

driving patients to attend EDs. These drivers have been referred to as ED input factors (17). Recent studies have demonstrated a link between ED crowding and the presence of patients with non-urgent conditions in the ED and limited access to primary care services (4, 42, 46, 49, 70).

In 2017, Crawford and colleagues (85) published a systematic review and discussed the increase in non-urgent presentations (input factor) and the growing demand placed on EDs, worldwide, by potentially avoidable presentations. Much debate exists over whether these presentations add a significant burden to the workload and resource demands of crowded EDs, with some arguing they do not add a significant burden (20, 86, 87). In Australia, attendances by patients triaged into the two least urgent categories have continued to exceed 50% nationwide (88-91), it is timely to consider the health-care needs of this patient group and whether alternative models might lead to improved access to timely care and ultimately, to better patient outcomes. Research conducted in Switzerland and Australia (1, 24, 35) have reported a younger demographic amongst patients with non-urgent conditions with the most common presenting complaint among these patients being musculoskeletal. Furthermore, two studies (70, 92) report considerable discrepancies between patients' reasons for attending versus clinicians' perception of the reasons for ED usage by patients presenting with non-urgent conditions. Durand and colleagues (70) concluded that thorough investigation of the healthcare demand is required before strategies are planned and implemented.

Compounding the issue is the lack of a universal definition of 'non-urgent ED presentations'; within the Australian context these are most frequently referred to as those presentations allocated the least urgent triage categories of 4 or 5 (1, 92, 93) on

arrival. Furthermore, a literature review by Forero and colleagues (94) reviewing the ATS discussed the complexities of classifying patients triaged as ATS 4 and 5 as 'primary-care suitable', 'general-practitioner type' or 'inappropriate'; however, for the purposes of this study, the research team include all patients triaged as ATS 4 or 5. The authors acknowledge that this patient group, considered to have non-urgent conditions, will include patients presenting with both low-urgency needs who are unsuitable for primary care and those who are potentially suitable for primary care. Recent Tasmanian research has demonstrated that if primary care services were available at the time of need in regional Northern Tasmania this could result in up to 8000 less ED presentations annually (1).

An Italian research team conducted a retrospective cohort study and identified excessive referrals of patients with non-urgent conditions as a contributor to ED crowding (4). These authors identified that few studies have considered referrals to ED and how such referrals may contribute to crowding. The question of where to best manage the needs of this patient group has not been clearly answered. This is a concern for healthcare providers who face growing demands for services, and for patients who may experience poorer health outcomes in crowded EDs (78, 79, 84).

In Australia, between July 2011 and June 2016 the percentage of ED patients triaged as ATS 4 and 5 has continued to exceed 51% of total ED presentations. From June 2015 to July 2016 these non-urgent presentations totalled over 3.8 million nationwide (91). Tasmania has one the highest incidences of non-urgent ED presentations at 55.3%. In Australia, residents are free to choose between their General Practitioner (GP) and ED services for management of their acute, non-urgent conditions. GP services provide a limited number of same-day appointments, and once these are fully allocated patients

must consider alternatives, of which ED is perceived as a convenient option (1). Additionally, there are a small number of privately run GP services that provide after-hours services. Research from the UK demonstrated that commencement of a co-located after-hours clinic reduced ED presentations (49), yet a systematic review by Crawford and colleagues concluded that evidence on the effect of GP walk-in centres was infrequent and further research is required to determine the proficiency of services as alternatives to EDs (85).

This project has arisen out of research conducted in 2015 at a regional Tasmanian ED in which the researchers (1) identified that 39% of patients with non-urgent conditions had attempted to access alternative healthcare services before arriving at the ED. This surveyed patient group also indicated that 31% would have preferred to be managed by their GP. These findings demonstrated that the ED is not necessarily the first point of contact, nor in fact, the first preference of this patient group. Furthermore, 29% of patients with non-urgent conditions were referred to the ED by a healthcare provider. The term 'referral' used in this instance, includes both formal and informal referrals. The findings of this project will provide greater understanding of local issues and service needs.

Variation in health-seeking behaviour across Tasmanian regions was identified by Morley and colleagues who were able to demonstrate that despite its small geographical and population size, each of Tasmania's three regions (South, North and North West) contribute a unique profile to the State's ED attendances (25). They concluded that future research needs to consider factors driving the various trends and implement services specific to regional demands. This project will provide a local,

contextually relevant picture of the issues driving the demand for non-urgent ED presentations in Northern Tasmania.

This study will aim to identify the service requirements of patients with non-urgent conditions referred, formally or informally, to a regional Australian ED. The objectives to address this aim are: first, to identify trends in primary care referral of non-urgent patients to a regional Tasmanian ED over the previous 7 years; second, to identify the perceived need and service requirements of patients referred from primary care to ED; and third, to translate findings into local health service recommendations.

3.2.3 Methods

3.2.3.1 Overall design

In order to achieve the aim of identifying service requirements of patients who have been referred, formally or in-formally, with non-urgent conditions to a regional Tasmanian ED, this project will implement an explanatory sequential mixed-method approach. The primary objective will be to identify trends in the referral of patients with non-urgent conditions to the ED. The second objective will be to identify the perceived need and service requirements of patients referred to the ED with non-urgent conditions, while the third objective will facilitate translation of these findings into health service recommendations. Figure 1 (below) provides a summary of the research plan and is based on Creswell's design for sequential explanatory mixed methods (40) with the addition of a third objective to disseminate and translate research findings.

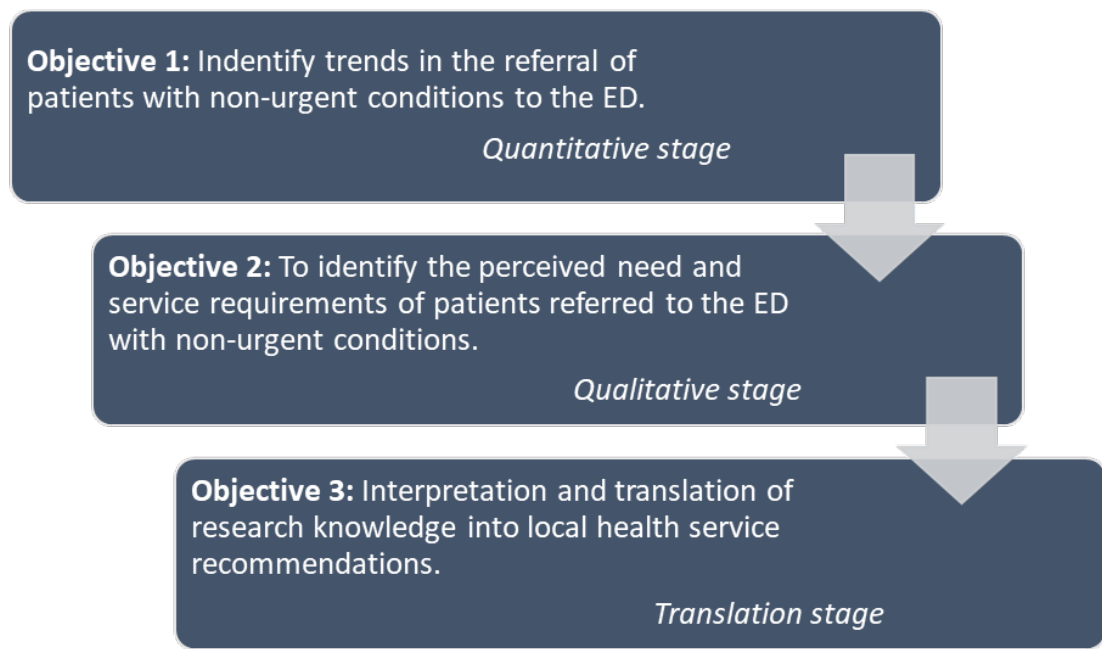


Figure 3.1 Project flow diagram for ‘Primary care to emergency department (ED): right service, right time, right place’

3.2.3.2 Objective 1: Identification of trends in the referral of patients with non-urgent conditions

The focus of the first objective will be to identify trends in the referral of patients with non-urgent conditions, including changes over time, in order to establish a profile of who, when and why patients have accessed ED services with non-urgent conditions. This will involve the analysis of routinely collected ED attendance records for patients presenting and triaged as ATS 4 or 5 during a seven-year period, from July 2009 to June 2016 at a regional Tasmanian hospital. This data is routinely collected by the Tasmanian Health Service (THS) and stored on a data platform by the Department of Health and Human Service, Tasmania.

The study population for this objective will include all ATS 4 and 5 patients presenting to the ED from July 2009 to June 2016. Data collected will include: date, day of week and time of presentation; age and gender; mode of arrival; triage category on arrival; residential suburb; time to first seen by ED physician or nurse practitioner; total ED

length of stay; referral sources into ED and on discharge, and discharge diagnosis and destination. Presentations will be excluded if: their usual place of residence is outside of THS-North's catchment area.

Once obtained, the data will be entered into a statistical software package (SPSS, V22) (95) and analysed for themes, trends and relationships. An interrupted time series (ITS) analysis will be undertaken to determine whether factors such as the number of available general practitioners within the local area or the opening of an additional after hours, walk-in service has affected the number of patients referred with non-urgent conditions or has influenced the overall number of ED presentations. ITS allows researchers to control for trends when comparing data pre and post an intervention and is known to provide robust quasi-experimental research design (96).

3.2.3.3 Identification of perceived needs and service requirements of patients referred to the ED with non-urgent conditions

The second phase of this project will involve focus groups with patients referred to the ED and with primary care providers who have referred patients to the ED. Themes, trends and relationships identified during the first objective will be summarised and presented to participants to facilitate further exploration of the local context and to understand the phenomenon of patients with non-urgent conditions being referred to the ED. All participants will be asked to provide signed consent prior to participating in focus groups.

Focus groups are advantageous in healthcare research, allowing researchers to include representation from various community groups and enabling researchers to investigate participants' knowledge and experience of situations while engaging in conversations that facilitate exploration of an issue (97). Based on the nature of this study, the

research team plan to conduct homogenous focus groups with a total of eight to 12 patient participants, with a subsequent homogenous GP focus group. The first group will be conducted with participants who have been referred to the ED with non-urgent conditions whilst the second will be with GPs and primary care providers who have referred patients with non-urgent conditions to the ED. Gerrish and Lacey (98) discuss homogenous versus heterogeneous groups and state that homogenous groups can assist facilitation of free discussion; they go on to recommend a group size of five to 12 to facilitate engaged group dialog.

Patient participants will be given an opportunity to discuss their decision-making process and episode of care from the community to the ED. Eligible patients will be provided with brochures by ED clinical staff and will have the opportunity to opt into focus group participation. The intent will be to recruit a stratified representative sample. Based on the profile of non-urgent attendees from our research (1) conducted in 2015, the proposed patient focus group will aim to consist of: two parent participants (whose young children attended the ED as patients); two participants under 25 years of age; three participants between 25 to 64 years of age, and one participant over 65 years of age. Consideration will also be given to focus group participants' presenting condition (in-line with the profile of non-urgent attendees from previous research) aiming to include a combination of presentations, such as musculoskeletal, general conditions such as headache, cold and flu-like symptoms, and gastrointestinal symptoms (1).

A purposive sample of GPs referring patients to the ED will be invited to attend the second clinician focus group. This group will consist of six to eight clinicians from a range of medical practices within the greater regional area.

The focus group agenda, informed by the quantitative data, will be presented by two researchers as the initial discussion point. Participants in the patient group will be asked to discuss their own experience of accessing ED with a non-urgent condition and to reflect on the earlier findings. Subsequent to this, the second focus group, comprised of GPs and primary care clinicians will be presented with the analysed quantitative trends and with themes identified during the analysis of the patient focus group. Discussion will seek to understand GP experiences in referring patients with non-urgent conditions to the ED and the health requirements of this group.

Both focus groups will be audio recorded and transcribed. These transcriptions will then be analysed using an inductive approach in order to identify emerging themes.

3.2.3.4 Translation of research knowledge into health service recommendations

The third objective for this project will aim to translate knowledge gained from the previous quantitative and qualitative phases. This will be done through presentation of the findings at a local forum involving primary and acute care clinicians, academics, patient representatives and policy makers. The goal will be to share the knowledge obtained during the first two objectives and to engage key stakeholders in the process of translating this into health service recommendations, policy and planning. The notion of knowledge translation has arisen out of concern for the time taken for research to influence healthcare. It is hoped that through engagement with local ED clinicians (nursing and medical), general practitioners, practice nurses, hospital administrators, patient representatives, academics, hospital administrators, policy makers and government officials, the process of research translation will facilitate clear identification of service needs and future planning of a suitable, sustainable needs-based and patient-focused health service model. The purpose of this stage will be to

discuss project findings and identify a service model designed to appropriately meet community needs and to facilitate timely access to services, the right service, at the right time and in the right place.

3.2.4 Discussion

The findings of this project will add to a body of research being conducted in Tasmania to address the issue of ED crowding. Previous research has demonstrated that a significant proportion (99) of patients with non-urgent conditions had attempted to access alternative services before arriving at the ED, with many stating they would prefer to be managed by their GP, and over a quarter of this patient group being referred (formally or informally) by their GP, therefore indicating the ED is not the preferred option for many patients. In this regional Australian city, if the 31% of non-urgent ED presentations could have been assessed and managed at an alternative service, up to 8000 presentations per year could have been directed away from the ED.

The research team anticipate the findings from this project will clearly identify local issues faced by patients who have attempted to seek medical attention from their GP, yet, are directed to the ED where they are triaged as non-urgent. These findings will be relevant within the local context and will be used to inform future service models aimed to provide the right service at the right time in the right place, thus improving equitable access to healthcare.

Abbreviations

ATS: Australasian triage scale; ED: Emergency department; GP: General practitioner; ITS: Interrupted time series; THS: Tasmanian Health Service

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Authors' contributions

MU, LK, SR and EC developed the research proposal. All authors have contributed to this paper through review and revision. All authors read and approved the final version. MU coordinated the submission process.

Ethics approval and consent to participate

Ethics approval for this project was provided by the Tasmanian Human Research and Ethics Committee, Low Risk. Ethics no: H0016504. Focus group participants provided an informed and written consent prior to participation in this study.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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3.3 Evolution of the methods: Introduction to complex systems and the nature of health service research:

Conducting health service research is challenging due to complex demands and changing systems. Health services are open systems; they are dynamic and have multiple interrelationships and challenges. This leads to uncertainty, unpredictability and emerging causalities (100), a stark contrast to the laboratory where research can be conducted in controlled environments and follows linear processes. In health services complexity is a distinctive feature and is defined as:

“... a dynamic and constantly emerging set of processes and objects that not only interact with each other, but come to be defined by those interactions” (101).

Research in such systems is complex and requires flexible study designs and emergent processes in order to explore phenomena and generate knowledge and insight (100). Greenhalgh and Papoutsi (100) discuss the need for pragmatic adaptation of processes and study designs to gain a deeper understanding and to generate meaningful findings. They argue for a shift from traditional models towards a new paradigm that is ‘complexity-informed’ and targeted to these complex environments. Good complexity-informed research demonstrates, “strong theory, flexible methods, pragmatic adaptation to emerging circumstances, contribution to generative learning and theoretical transferability” (100).

In this study, the original aim was to investigate the referral of patients with non-urgent conditions to the emergency department (ED). This is described in the study protocol in Section 3.1. However, due to limitations in data collection the design needed to adapt to provide flexibility in the methods while maintaining a strong theoretical and

pragmatic epistemological approach. This approach is a combination of natural and physical realities (quantitative methods) and psychological and social realities (qualitative methods) and is founded “... on the reality of the world in which we live and which we experience” (4).

The candidate planned an interrupted time series (ITS) analysis to determine whether the opening of an additional after-hours, walk-in general practice service affected the number of non-urgent ED presentations. The ITS was conducted on ED presentations but due to COVID-19 the candidate was unable to collect comparative data from the general practice service to determine a possible correlation between the new service and trends in ED presentations. As a consequence, the ITS was included in the presentation in phase 3 but was not included as a separate chapter in this thesis.

3.3.1 Removal of referral status as a variable

Due to the limitations in the entry of data under ‘referral status’ we were unable to analyse referral data during phase one. We are certain that the data entry of ‘referral status’ was not accurately reported, and the validity for this status was questionable. The research team determined that this variable would not be used in further analysis due to a high likelihood of inaccuracy and under-reporting.

The data used in this study was entered into the Emergency Department Information System (EDIS) by triage nurses, clerical staff and physicians during the patients’ presentation to the ED. The data is routinely collected and used by state and federal governments to inform reviews and reports, such as the Emergency department care 2017-18: Australian hospital statistics (102). Initial analysis of the data identified that only 4.8% of patients triaged as non-urgent (category 4 or 5) were recorded as being referred to the ED by a health professional. Yet, an earlier study of this patient

population in the same ED found 28.7% of patients had been advised to present by their GP (1). The discrepancy in the proportion of patients stating they were 'referred' and those who were recorded as 'referred' raised questions as to the accuracy of this variable. We discovered that if referral status is not manually entered by clerical staff, the EDIS system will record a default entry of 'self-referred'. After discussion with clerical staff it was learnt that not all patients are asked about referral. We believe patients answered the anonymous waiting room survey accurately and that referral to ED by a health professional is under-reported.

The initial aim of this study was to identify the service needs of patients referred to a regional Australian ED and subsequently triaged as non-urgent (103). The amended aim was to identify the health service requirements of patients with non-urgent conditions presenting to a regional Australian ED and to translate findings into key recommendations and priorities for future health service planning. The objectives were amended accordingly. Figure 3.2 represents the initial aim of the study with the amended aim and objectives represented in Figure 3.3.

Original aim: To identify the service requirements of patients with non-urgent conditions referred, formally or informally, to a regional Australian emergency department.

Objective 1: Identify trends in the referral of patients with non-urgent conditions to the ED.

Quantitative phase

Objective 2: Identify the perceived need and service requirements of patients referred to the ED with non-urgent conditions.

Qualitative phase

Objective 3: Interpretation and translation of research knowledge into local health service recommendations.

Translation phase

Figure 3.2. Original project flow diagram for 'Primary care to emergency department: right service, right time, right place'

Amended aim: To identify the service requirements of patients with non-urgent conditions presenting to a regional Australian emergency department and to translate findings into key recommendations and priorities for future health service planning.

Objective 1: To identify the profile of who presented to the ED with non-urgent conditions and when and why they presented.

Quantitative phase

Objective 2: To identify the perceived need and service requirements of over-represented patient groups presenting to the ED with non-urgent conditions.

Qualitative phase

Objective 3: To interpret and translate research knowledge into local health service recommendations.

Translation phase

Figure 3.3. Amended project flow diagram for 'Primary care to emergency department: right service, right time, right place'

The need for these changes to the study design, including modifying our initial aim due to the under-reporting of the incidence of referral, reflects the challenge of research in “dynamic and constantly changing” complex healthcare systems (100). To fit the new aim the research objectives were modified accordingly and are discussed below.

3.3.2 Objective 1: To identify the profile of who presented to the ED with non-urgent conditions and when and why they presented

To achieve this objective, we determined to:

1. Develop a profile and identify trends in who is presenting and when they presented
2. Identify patterns in over-represented patient groups
3. Identify trends in discharge diagnoses.

Once the profile of patients attending the ED with non-urgent conditions was established in the quantitative analysis, it was used to inform a purposive sample for the qualitative phase.

3.2.3 Objective 2: To identify the perceived needs and service requirements of over-represented patient groups presenting to the ED with non-urgent conditions

The steps taken to fulfil this objective remained in line with the study protocol, with the exception of the focus moving from patients who were referred to population groups over-represented in the first phase. This patient population were identified as over-represented during the quantitative analysis and consequently informed the purposive sample.

3.3.4 To interpret and translate research knowledge into local health service recommendations

The final objective followed the study protocol and adopted a nominal group technique (NGT) to set the agenda for the forum and to reach consensus. This was not originally stated in the protocol paper. The method for this phase is described below and in the manuscript submitted for publication (Chapter 6).

3.3.4.1 Nominal Group Technique

As a consensus method, NGT is recognised as a suitable method for bringing key stakeholders from varying backgrounds together to discuss a given problem. It was developed by Delbecq and Van de Ven in 1968 and has been widely used in healthcare, education and social services (104). It is recognised as an efficient, and expedient, decision-making tool in organisations and systems with limited time. Delbecq et al. discuss human behaviour characteristics where there is a tendency to identify and implement solutions before a problem is clearly understood; this is referred to as a 'problem-minded' approach.

Nominal group technique includes four clearly defined steps:

1. Silent generation of ideas
2. Round-robin including all participants (no discussion or clarification)
3. Group discussion and clarification of ideas
4. Voting (silent) and ranking (calculation) of priorities and recommendations.

One strength of NGT is that the problem and the surrounding knowledge are presented before solutions are identified (104). This method is a proactive problem-minded approach which facilitates the identification based on the problem and its causes. As highlighted by Morley and colleagues (11), a number of solutions to address population needs have been implemented, but rarely have the underlying causes been clearly

understood before the solutions have been implemented. By using NGT the research team planned to present the group with contextually relevant knowledge based on the drivers of ED demand by people with non-urgent conditions from the local community. This is discussed further in Chapter 6.

CHAPTER 4 – Phase 1 (qualitative)

Socioeconomic disadvantage as a driver of non-urgent emergency department presentations: A retrospective data analysis

4.1 Overview

This chapter contains the first phase of the study, the retrospective data analysis of seven years of routinely collected emergency department data. The data collection period was from July 2009 to June 2016. The chapter identifies the profile of who presented to the ED with non-urgent conditions and when and why they presented.

Section 4.2 of this chapter presents the contents of a paper published by *PLOS ONE* in April 2018. The paper was invited for inclusion in a special collection of research focusing on disparities and inequity in health. The formatting and referencing have been modified to ensure continuity within the thesis. The original publication and invitation to publish are included as Appendix 4 as per University of Tasmania guidelines. The Human Research Ethics Committee (Tasmania) Network approval letter H0016504 is included as Appendix 5

4.2 Socioeconomic disadvantage as a driver of non-urgent emergency department presentations: A retrospective data analysis

4.2.1 Abstract

Background: Globally, emergency departments (EDs) are struggling to meet the service demands of their local communities. Across Australia, EDs routinely collect data for every presentation which is used to determine the ability of EDs to meet key performance indicators. This data can also be used to provide an overall picture of service demand and has been used by health-care planners to identify local needs and inform service provision, thus, using ED presentations as a microcosm of the communities they serve. The aim of this study was to use ED presentation data to identify who, when and why people accessed a regional Australian ED with non-urgent conditions.

Method and materials: A retrospective data analysis of routinely collected ED data was undertaken. This included data obtained over a seven-year period (July 2009 to June 2016) in comparison with the Australian Bureau of Statistics census data. Analysis included descriptive statistics to identify the profile of non-urgent attendees and linear regression to identify trends in ED usage.

Results: This study revealed a consistently high demand for ED services by people with non-urgent conditions (54.1% of all presentations). People living in the most disadvantaged socioeconomic decile contributed to 36.8% of these non-urgent presentations while those under 25 years of age contributed to 41.1%. Diagnoses of

mental health and behavioural issues and of non-specific symptoms significantly increased over the study period ($p < 0.001$) for both diagnostic groups.

Conclusion: The over-representation by those from the most socioeconomically disadvantaged areas highlights an inequity in access to services. The over-representation by those younger in age indicates behavioural patterns based on age. These key issues faced by our local community and the disparity in current service provision will be used to inform future health policy and service planning.

4.2.2 Introduction

Emergency departments have been described as a microcosm of the communities they serve, meaning that they encapsulate features of the wider community (2). Challenges faced by emergency departments (EDs) can reflect deficits in community-based resources (3). As increasing demands for ED services continue to be reported globally, it is timely and necessary to identify drivers of ED demand. In Australia, over 8.3 million people accessed ED services between July 2018 and June 2019 (335 per 1000 population), 48% of whom were triaged to the two least urgent triage categories (8). The Australian Triage Scale (ATS) is a five-tiered triage system with ATS 4 and 5 being the least urgent categories, patients triaged to these categories are assessed as being safe to wait for one or two hours respectively (19). For the purpose of this study, we refer to ATS 4 and 5 presentations as non-urgent. We are confident that this group of patients included some who could have had their needs met in a primary care setting.

International research investigating these least urgent presentations has identified drivers of ED demand such as: patients' perceived need for urgent attention (36, 42, 70); age and gender (1, 35, 36); access to alternative services (46, 63, 67), and socioeconomic position (42, 46, 53). Identifying drivers specific to individual EDs can

inform service planning (3). Furthermore, a mismatch between the known causes of ED demand and solutions implemented was identified in a systematic review and highlights the need to develop interventions that address specific causes (11). These external drivers contribute to the challenge for hospitals and health services in implementing successful and sustainable solutions.

Furthermore, our understanding of the demand for ED services is complicated by contextual differences. These differences challenge the successful implementation of solutions. Variation in demographic profiles, community healthcare needs and service availability influence how and when people access services, including the decision to present to an ED with a 'non- urgent' condition (105). Socioeconomic position, for example, has been identified as having both a positive and negative correlation with populations accessing EDs. This correlation is observed to vary across contexts, with one study identifying greater representation by populations from mid-high socioeconomic areas [10] while others report greater representation from lower socioeconomic areas (42, 53). Of the studies that reported age and gender, one found a higher incidence among middle aged females (36) while another found a higher incidence among young males (35). These studies demonstrate the unique microcosm within EDs and provide an indication of healthcare needs within their respective wider communities.

Tasmania, Australia's smallest State, with a population of 517,000 (106), has the highest rate of non-urgent ED presentations, with 88,000 triaged as ATS 4 or 5 in 2018–19 (8). This island State is separated into three geographic regions with governing health services in the North, Northwest and South all operating under the overarching jurisdiction of the Tasmanian Health Service (25). The population of Northern

Tasmania is older (median age 43 years compared to 38 years nationally) and more socioeconomically disadvantaged (median weekly income \$537.00-AU compared to \$662.00-AU nationally) than other Australian regions (31), compounded by inequitable access to primary care services in regional and rural Tasmania (71). There are considerable regional differences in the profile of ED patients across these three regions highlighting the importance of identifying trends and types of ED presentations to inform service planning (11). These regional variations in population healthcare trends and the mismatch between identified causes and solutions to address ED demand highlight the importance of bringing together knowledge and understanding of the drivers for ED demand before implementation of sustainable solutions.

In research conducted in Northern Tasmania, 31% of patients who present to the ED with non-urgent conditions would have preferred to be managed by their general practitioner (GP) if they had been available (1). The limited service options (71) in this community and the distance to alternative EDs (the nearest is a smaller rural facility located 90km from the study hospital) contribute to ED demand. Moreover, there are no private EDs or urgent care facilities in Northern Tasmania. Northern Tasmanian residents also have limited access to primary care services within the community once business hours have ended. Business-hours have been defined as between 0800 to 1800 Monday to Friday and 0800 to 1200 Saturdays; public holidays and all other times are considered after-hours (107). These limited service options indicate potential challenges around timely access to alternative services.

Emergency departments are the ‘canary in the coalmine’ for health services and the communities they serve (2). Demands for ED services are reflective of broader population health- care needs (3) and are influenced by the availability of services

within the community (46, 49). The aim of this paper is to establish a profile of who, when and why ED services were accessed by people with non-urgent conditions. The objectives are to:

1. Develop a profile and identify trends in who is presenting and when.
2. Identify patterns in where people come from, including the socioeconomic position.
3. Identify trends in discharge diagnoses.

This paper forms part of a larger body of work using an explanatory sequential mixed method to gain a deeper understanding of factors contributing to the decision to present to an ED with non-urgent conditions and develop relevant and sustainable strategies for health service planning.

4.2.3 Materials and methods

Retrospective analysis of routinely collected hospital data was undertaken for all presentations triaged as ATS 4 or 5 at a single regional ED, between 1 July 2009 and 30 June 2016. This consisted of data entered into the Emergency Department Information Systems (EDIS) by ED staff at time of the patient's presentation, or at the time of discharge. Variables used in this analysis included: date, day of week and time of arrival to the ED; gender; mode of arrival; suburb of residence; discharge diagnosis; discharge destination, and referral on discharge. The first six variables were entered into EDIS by the triage nurse or clerical staff at the patient's time of arrival. The latter three were added by the treating physician or nursing staff at the time of departure. Diagnoses are based on International Diagnostic Codes, revision 10, as outlined by the World Health Organisation (108). It was beyond the scope of this project to review presentations across all triage categories.

Research ethics approval was granted by the Tasmanian Human Research Ethics Committee (H0016504). Deidentified data were provided by the Tasmanian Department of Health and Human Services (DHHS). This data is not publicly available

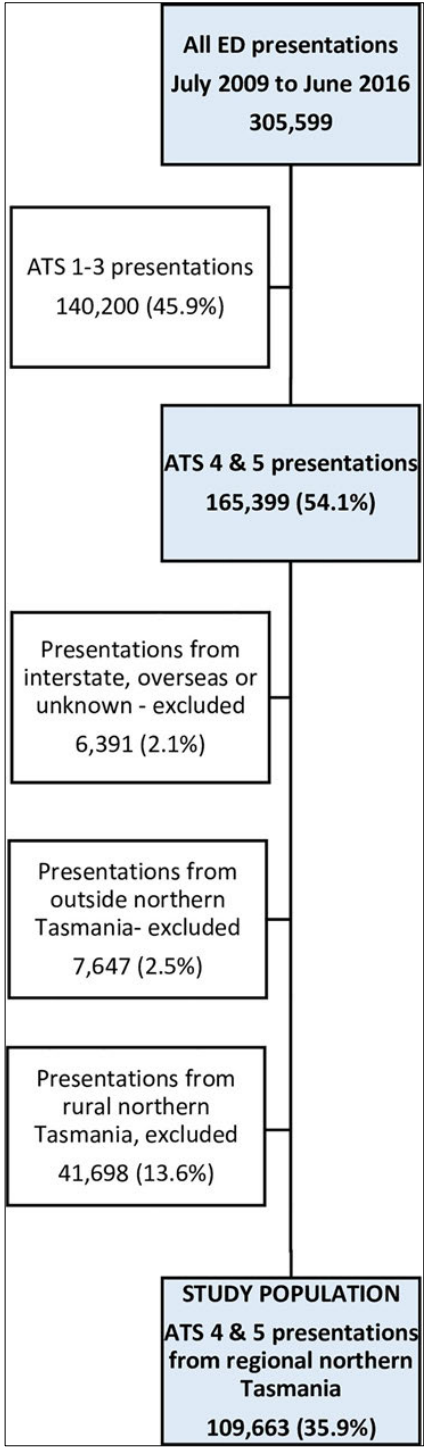


Figure 4.1. Summary of ED presentation numbers, July 2009 to June 2016

in Australia and permission was not provided for it to be made publicly available.

4.2.3.1 Study setting & participants

This study was undertaken in a large regional hospital in Northern Tasmania with a total bed capacity of 300 and a 26 bed ED (109). Serving as a referral centre for a population of 143,500 (106) dispersed across 20,000 square kilometres. Data used for this analysis was from July 2009 to June 2016, for ATS 4 and 5 presentations. The DHHS also provided the total count of all ED presentations by month across all triage categories so the proportion of ATS 4 and 5 could be calculated. Further explanation of the included study population is provided in Fig 4.1.

We have included all ATS 4 and 5 presentations who resided in the regional city (Launceston) and its surrounding suburbs. Excluding those from outside this region allowed us to develop a profile of who, when and why the local community choose to access ED services, thus focusing on

local drives of ED demand. This area was defined by using statistical area (SA) codes allocated by the Australian Bureau of Statistics (ABS). The greater Launceston area has an SA3 code of 60201. All suburbs with this code were included in the study area and total population was 81,029 in 2016 (110). Population growth in this region was just 2.5% between 2011 and 2016 compared to the national growth of 8.3% (110, 111).

Data relating to socioeconomic position was derived from ABS data. Five-yearly census data is used to calculate average values of various socioeconomic indexes across geographical areas, known as Socioeconomic Indexes for Areas (SEIFA). One of these is the Index of Relative Socioeconomic Disadvantage (IRSD), which is the preferred measure to use when investigating disadvantage or lack of disadvantage (112). This index is based on national socioeconomic classification, and takes into account income and additional variables including unemployment, disability, sole-parent status, level of education, employment classification, etc. (112). Each suburb is given a score based on these variables, the lower the score the greater the disadvantage. The ABS also aggregate suburbs into deciles, dividing Australia's population into ten evenly sized population groups. Ten percent of the Australian population fall into each decile with IRSD 1 being the 10% of those with greatest disadvantage and IRSD 10 being those with the greatest advantage. The histogram of IRSD scores has a long left-tail (at the end of greatest disadvantage), so the difference in disadvantage between decile 1 and decile 2 is larger than between other pairs of adjacent deciles (113). The IRSD score and deciles were linked to ED data using the suburb of residence in order to determine socioeconomic position.

4.2.3.2 Data analysis

Initial review of the data included all presentations to the regional ED triaged as ATS 4 or 5. The patient's suburb/town of residence was used to exclude attendees from outside this regional city. The decision to focus only on presentations from the local area was to gain greater insight and understanding of the local community and to limit outlying factors that may have influenced the decision by non-local attendees to present to the ED.

Descriptive statistics were calculated using SPSS (95) to summarise the profile of patients accessing the ED with non-urgent conditions throughout the seven-year study period. Linear regression was used to explore trends over time by mode of arrival, referral on departure, episode end status, time of arrival (in-hours versus after-hours) and International Classification of Diseases, version 10 (ICD-10) (108). ABS national census data from 2011 and 2016 (110, 111) were used to calculate age-standardised presentation rates by suburb (age-standardised to the overall age distribution profile of the Launceston region in 2016), with linear interpolation used to estimate populations in years between 2011 and 2016. Linear regression, weighted by 2016 suburb populations, was used to fit a trend-line showing the association between age-standardized presentation rate and IRSD, with an outlier suburb excluded. RStudio (114) was used for regression analyses and plots.

4.2.4 Results

Between 1 July 2009 to 30 June 2016, there were 305,599 ED presentations across all triage categories (ATS 1–5). Fig 1 provides a summary of how we determined the number ($n = 109,633$) included as the study population. Our objectives were to: describe the profile of ED attendees and trends over time through retrospective analyses of routinely

collected hospital data; identify the usual place of residence and socioeconomic position of people attending the ED with non-urgent conditions, and to summarise the most frequent discharge diagnoses of the study population and trends over time.

4.2.4.1 Profile and trends of people presenting with non-urgent conditions

The first objective was to develop a profile and identify trends in who is presenting and when. The number of non-urgent presentations to the ED revealed similar numbers between the first and last 12-month periods, July 2009 to June 2010 ($n = 15,322$) and July 2015 to June 2016 ($n = 15,139$). Over the seven-year study period the annual rate of non-urgent presentations among local residents varied between 186 to 205 per 1000 population. Figure 4.2a shows average daily rates by month of all non-urgent presentations. While there were short-term fluctuations in presentation numbers, regression analysis did not reveal any long-term linear trend in the number of presentations ($p = 0.61$). Over the seven-year study period non-urgent presentations by local residents ranged between 38 and 48 per day (Figure 4.2a).

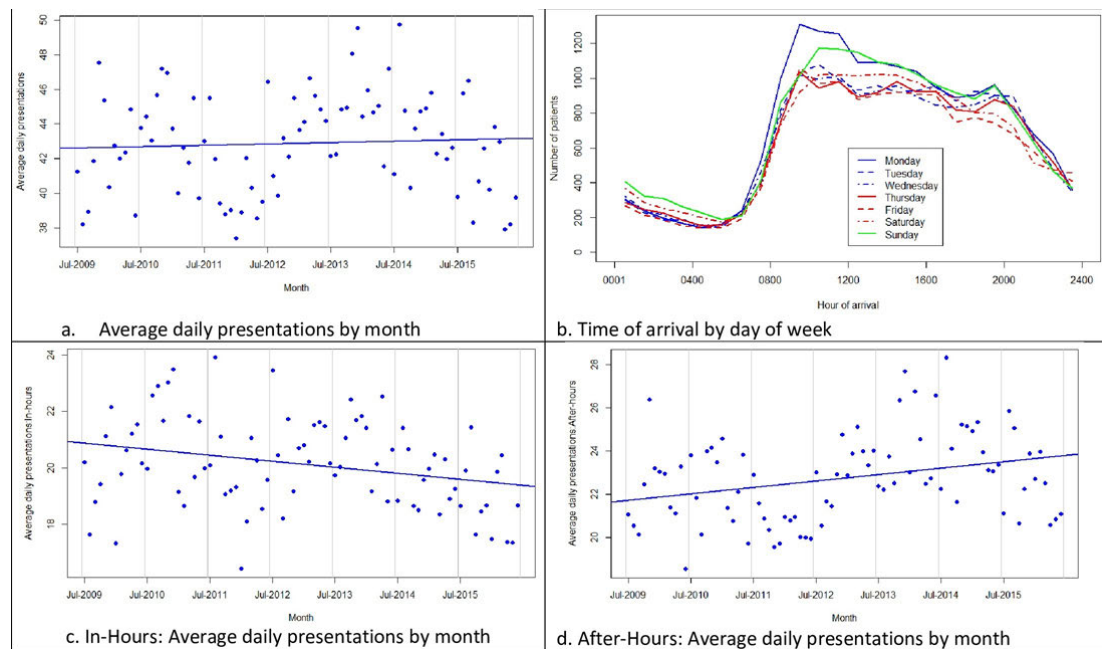


Figure 4.2. Trends in presentation numbers and time of arrival, ATS 4 and 5, July 2009 –June 2016.

4.2a. Average ATS 4 and 5 presentations by month, adjusted by days in month ($p = 0.6$).

4.2b. ATS 4 and 5 presentations, July 2009 to June 2016: time of day and day of week.

4.2c. Average in-hours ATS 4 and 5 presentations by month, adjusted by days in month (presentations 0800 to 1800 Monday to Friday and 0800 to 1200 Saturday). P-value for downward trend: 0.006.

4.2d. Average after-hours ATS 4 and 5 presentations by month, adjusted by days in month (presentations at times of week not included in Fig 2C, plus all presentations on public holidays). p- value for upward trend: <0.001 .

Analysis of age identified that younger people were over-represented among non-urgent presentations. The median age of the study population was 29 years compared to a median age in this regional city of 39 years (115). Table 1 provides a summary of presentation and population numbers aggregated by age. The age profile of the local population was recorded to remain stable between census periods, for example, those under 25 years of age continued to contribute to 31–33% of the local population between census periods.

Table 41. Profile of patients by gender, age and index for relative socioeconomic disadvantage (IRSD) versus profile of local population, ATS 4 and 5, July 2009 to June 2016.

	<i>No.</i>	<i>% (n = 109 633)</i>	<i>% of local population (n = 81,029: ABS, 2016)ⁱ</i>
<i>Gender</i>			
Male	56 281	51.3	48.2
Female	53 293	48.6	51.8
<i>Age (yrs)</i>			
0–4	9 543	8.7	5.9
5–14	11 936	10.9	11.9
15–24	23 531	21.5	14.5
25–34	18 296	16.7	12.5
35–44	13 737	12.5	12.1
45–54	10 902	9.9	13.3
55–64	7 955	7.2	12.0
65–74	5 907	5.4	9.8
75–84	4 819	4.4	5.2
85+	3 037	2.8	2.5
<i>IRSD by suburb (decile)ⁱⁱ</i>			
1 (greatest disadvantage)	40 379	36.8	26.4
2	5 058	4.6	1.2
3	9 993	9.1	9.5
4	20 098	13.1	22.5
5	8 218	7.5	3.6
6	11 576	10.6	17.8
7	1 828	1.7	7.6
8	4 562	3.9	5.6
9	1 080	1.6	1.6
10 (lowest disadvantage)	413	0.4	0.8

Trends in mode of arrival revealed a consistency in the number and proportion of patients arriving by their own means (87%; Table 4.2). Analysis of presentation outcomes revealed a large proportion of patients either did not require any follow-up or were referred to their GP (74.7%; Table 4.2) and were discharged home from the ED (85.3%). For these two variables (arrival mode and presentation outcome), increases were observed in the number of patients with non-urgent conditions who: arrived by ambulance (average increase of 34 annually, $p = 0.002$); arrived with police (average increase of 56 annually, $p < 0.001$), or who required admission to hospital (average increase of 56 annually, $p < 0.001$).

Table 4.2. Summary and trends in ED presentations for mode of arrival and outcome of ED presentation, ATS 4 and 5, July 2009 –June 2016.

	No.	% (n = 109 663)	Trend: average annual change in presentations per year (95% confidence interval)	p-value for trend
<i>Mode of arrival</i>				
Arrived by own means	95 412	87.0	-64 (-170, 41)	p = 0.2
Ambulance	12 350	11.3	34 (13, 55)	p = 0.002
Police	1 565	1.4	56 (44, 67)	p < 0.001
Other	336	0.3	2.2 (-0.5, 4.9)	p = 0.1
<i>Referred to on departure</i>				
GP or no further follow-up	81 914	74.7	88 (-8, 184)	p = 0.07
Emergency department	7 370	6.7	-135 (-166, -103)	p < 0.001
Outpatient department	8 916	8.1	-12 (-32, 8)	p = 0.2
Community services	3 010	2.7	10 (1, 20)	p = 0.03
Hospital admission (same day)	7 670	7.0	108 (93, 124)	p < 0.001
Other hospital admission	465	0.4	-4.7 (-8.3, 1.1)	p = 0.01
Other	318	0.3	-84 (-119, -49)	p < 0.001
<i>Episode end status</i>				
Discharged home	93 567	85.3	1 (-114, 115)	p = 1.0
Did not wait/Left at own risk	8 571	7.8	-43 (-76, -9)	p = 0.01
Admitted	7 336	6.7	75 (56, 94)	p < 0.001
Transferred	161	0.1	-3.1 (-5.5, -0.8)	p = 0.01
Other	28	0.0	5.3 (-0.6, 11.3)	p = 0.08

Time of day and day of week are presented in Fig 4.2b with most non-urgent presentations occurring between 0800hrs and 1800hrs with peaks observed on Monday and Sunday mornings. Analysis of presentations occurring in-hours or after-hours revealed that 47.0% arrived in-hours with significant trends to in-hours and after-hours presentation numbers (figure 4.2c and 4.2d). Average annual in-hours presentations fell at a rate of 78 per year (95% confidence intervals 18 to 140, p = 0.012). This was offset by a significant increase in after-hours presentations (rate of increase 108 annually, 95% confidence intervals 31 to 184, p = 0.006).

4.2.4.2 Non-urgent ED attendees and socioeconomic levels

The second objective was to establish a profile based on the IRSD deciles according to the patient's suburb of residence. This age-standardised analysis revealed an over-representation by residents living in suburbs categorised as having the greatest

socioeconomic disadvantage (IRSD decile 1; Table 4.1). Ten percent of the Australian population live in suburbs rated IRSD decile 1 compared to 26.4% of the Launceston population (110). In this study, residents of IRSD decile 1 suburbs contributed to 36.8% of non-urgent ED presentations. Further analysis using the underlying IRSD score for each suburb revealed a strong negative correlation between IRSD score and the age standardised rate of ED attendance (figure 4.3). Presentation rates for people with non-urgent conditions were 4.5 times higher from the most disadvantaged suburb compared to the most advantaged. Residents from the most advantaged suburb (IRSD score 1090) presented at a rate of 96 per 1000 population while residents from the most disadvantaged suburb (IRSD score 591) presented at a rate of 434 per 1000 population.

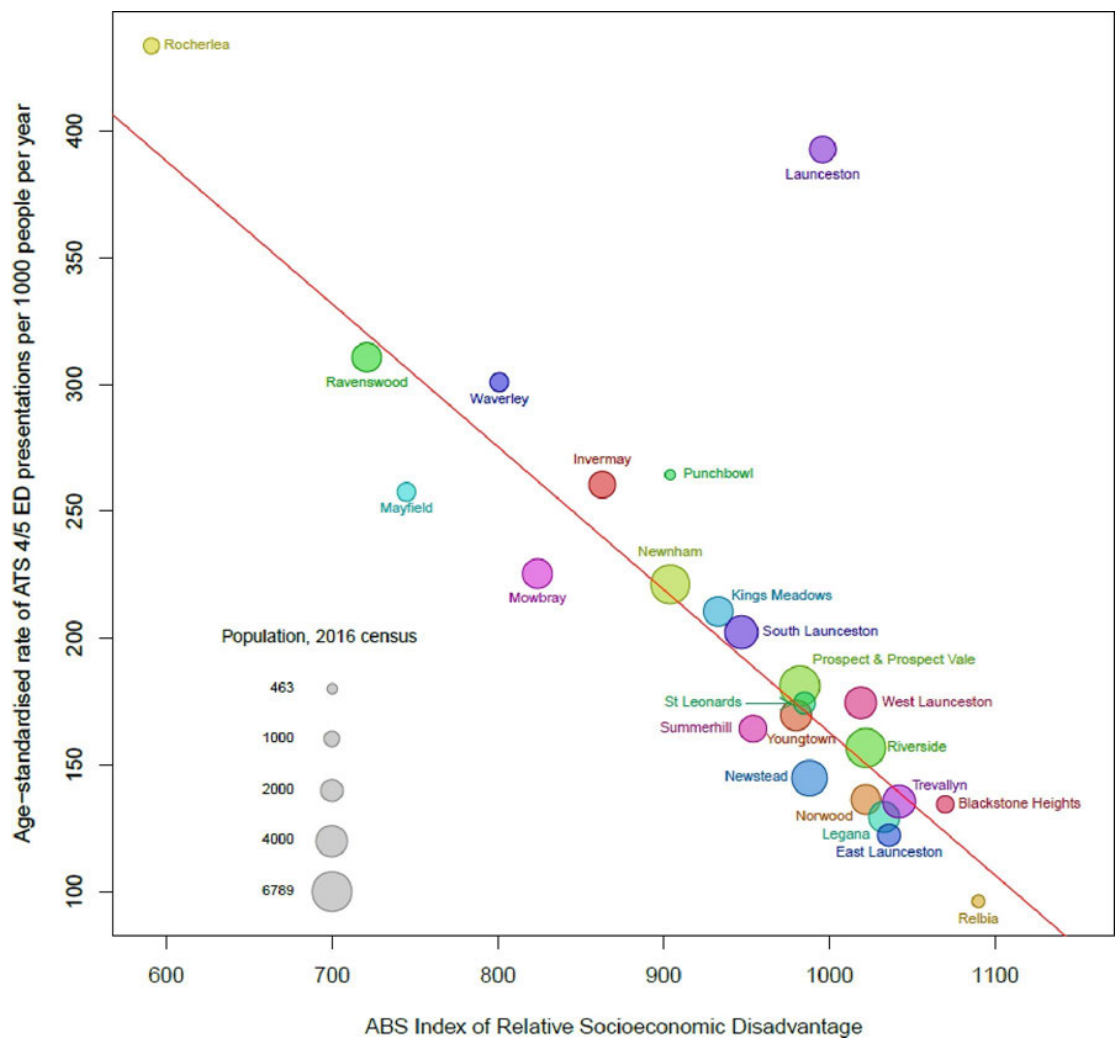


Figure 43. Age standardised ED presentation rates for ATS 4 and 5. Age standardised presentations per 1,000 (population), by suburb of residence and index for relative socioeconomic disadvantage (IRSD), July 2009 –June 2016.

4.2.4.3 Discharge diagnoses and trends over time

The number of presentations for the three most frequent overarching diagnostic groups are summarised in Table 3 along with the three most frequently recorded sub-diagnostic groups. Median age and results of linear regression analysis to determine trends in diagnostic groups are also reported in Table 3.

Table 43. Top three diagnostic groups and diagnostic groups with significant trends (based on international statistical classification of diseases and related health problems 10th Revision: ICD-10). ATS 4 and 5, July 2009 to June 2016.

Diagnosis, top three ICD-10 In order of frequency Most frequent sub- diagnoses	No. presentations (% of sub-diagnostic group)	Proportion presentations (n = 109 663) (%)	Median age (IQR, years)	Trend over time
XIX–Injury, poisoning, certain other consequences of external causes	36 567	33.3	25 (15–45)	No change (p = 0.973)
Injuries to wrist and hand; head; ankle and foot	19 988 (54.7%)			
XXI–Factors influencing health status and contact with health services	14 980	13.7	33 (21–50)	No change (p = 0.156)
Persons encountering health services for examination and investigation; in other circumstances; or for specific procedures and health care	14 443 (96.4%)			
XVIII–Symptoms, signs & abnormal clinical & laboratory findings, not elsewhere classified	8 442	7.7	34 (19–60)	Significant increase (p <0.001)
Symptoms and signs involving the digestive system and abdomen; general symptoms and signs; or involving the circulatory and respiratory systems	6 700 (79.4%)			
X–Diseases of respiratory system	7 024	6.4	22 (5–39)	Significant decrease (p = 0.002)
Acute upper respiratory infections; chronic lower respiratory diseases; or influenza and pneumonia	6 340 (90.3%)			
V–Mental & behavioural disorders	2 363	2.2	34 (23–48)	Significant increase (p <0.001)
Neurotic, stress-related and somatoform disorders; mental and behavioural disorders due to psychoactive substance use; or Mood [affective] disorders	1 664 (70.4%)			

The most notable results from this analysis were the high proportion of discharge diagnoses falling into the ICD-10 code for injury. One third of non-urgent presentations were diagnosed with an ‘injury, poisoning, certain other consequences of external causes’, the most frequent sub-diagnostic groups were injuries to distal limbs or head. These patients were younger and there was no significant trend over the study period.

Significant increases in ED attendance were observed in two diagnostic groups, the first being ‘symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified’. The proportion of patients diagnosed into this non-specific group increased

from 6.6% in 2009–10 to 9.1% in 2015–16 ($p < 0.001$), the equivalent of 70 additional presentations per year.

Mental health conditions also increased significantly between 2009–16. These presentations increased from 1.8% of the study population to 3.1% ($p < 0.001$), a 73.1% increase in diagnoses relating to mental and behavioural disorders over seven years and equivalent to 31 additional presentations annually.

4.2.5 Discussion

This research aimed to identify who, when and why people accessed the ED with non-urgent conditions. In the analysis of seven-years' worth of routinely collected ED data, we discovered:

- No increase in total number of non-urgent presentations.
- A significant over-representation by residents from socioeconomically disadvantaged areas and those younger in age.
- Increasing proportion of after-hours presentations.
- Significant increases in presentations for mental health and non-specific symptoms.

4.2.5.1 Consistent demand for ED services by patients with non-urgent conditions

The AIHW have consistently reported national increases in the number of annual ED presentations over the past five years (102), but an increase was not observed in the number of non-urgent presentations recorded to this ED during the study period. Monthly plots of presentation numbers demonstrate short-term fluctuations in ED usage for non-urgent conditions (Fig 2A and 2D), with presentation numbers between 186 to 205 per 1000 population per year. The simple linear regression we have performed does not adequately model fluctuations. Analysis of the fluctuations was

beyond the scope of this publication but is part of an ongoing investigation by the research team.

A consistent demand for ED services by patients with non-urgent conditions has also been reported in research conducted in North West Tasmania where limited general practices services were identified as a driver (21). Furthermore, international literature has identified links between the number of ED presentations and timely access to primary care services (46, 49, 63).

Presentation numbers across day of week and time of day were observed to peak between 0900 and 1100hrs and decreasing throughout the day (Fig 2B). This indicates that a significant proportion of non-urgent presentations arrive during hours when other services are open. Tuesdays to Saturdays demonstrated similar presentation times and trends, however, peaks were observed on Sunday and Monday mornings. General practice services on a Sunday are minimal in this regional community leaving residents with the ED as the primary option. The peak on a Monday morning is likely to reflect those, who have waited for regular services to open on a Monday morning but been unable to secure an appointment, thus, resulting in an ED presentation. This again highlights the availability of alternative services at the time of need as a driver of non-urgent ED presentations and may be of interest to local service providers aiming to identify peak times and plan services and staffing based on demand.

4.2.5.2 Over-representation by those from lower socioeconomic suburbs and those younger in age

The correlation between IRSD and the number of non-urgent ED presentations per 1,000 head of population demonstrates a striking over-representation by people living in the most disadvantaged areas. The ED is located close to the central business district

and is surrounded by suburbs with IRSD deciles between 3 and 7 (110). Furthermore, the suburb with the highest presentation numbers per 1,000 residents is the same distance from the ED as the suburb with the lowest presentation numbers, both being 11km from the ED. This shows that socioeconomic status is a stronger contributor to ED attendance than distance in our region. A higher proportion of non-urgent ED presentations by those living in close proximity has been previously reported (52, 63) however, this was not the case in this study and highlights the contextual nature of how local populations access health services.

The only exception to the correlation between socioeconomic position and incidence of ED presentation (Fig 3) is the city centre. This appears to have occurred when the person providing the patient's details or staff member entering the data has listed the over-arching area of Launceston as the suburb of residence rather than the patient's actual suburb of residence. For example, it is not uncommon for residents from Launceston's lowest IRSD suburbs to list their suburb of residence as Launceston where it shares the same postcode as their actual suburb.

These presentations were plotted in Fig 3 as they contribute to the overall number of presentations. However, the data from the city centre were excluded from the weighted regression analysis to fit a trend line due to the recording error.

Findings of over-representation among populations with greater socioeconomic disadvantage are varied across international literature. Some studies report similarly over-represented presentations by disadvantaged communities (42, 52, 53) while a Canadian study found mid-high-income communities were over-represented (46). Additionally, a study from the UK (67) reported that disadvantaged communities had lower ratios of GPs per 1,000 head of population. While it was outside the scope of this

study to measure the number of GPs per 1,000 during the study period, it was observed that none of the larger practices with ready access to additional services such as pathology and radiology are located within the most disadvantaged areas of this local community. Furthermore, northern Tasmania was reported to have fewer full-time equivalent GPs in 2014, 70.3 per 1,000 population, versus 85.4 per 1,000 in southern Tasmania (116). These findings highlight contextual differences in the ability of populations to access health services and demonstrates a disparity in the provision of healthcare services in the most socioeconomically disadvantaged areas of this community. Further supporting this finding, are two studies, one from the US focusing on paediatric presentations (54) and the other from New South Wales looking at all presentations (adult and paediatric) (22). Both studies found that fewer GPs per 1000 population contributed to higher rates of non-urgent ED presentations.

Being younger in age was also a significant factor with a clear over-representation by those in the 0 to 4 and 15 to 24 age groups. These two groups were 1.5 times more likely to present with a non-urgent condition than the rest of the study population. This finding is consistent with international studies from the United States (42, 52), Canada (63), Switzerland (5, 35), the United Kingdom (53), and Australia (1, 22) all observing an over-representation in non-urgent presentations by younger populations. Consideration of why this over-representation is occurring may contribute to further understanding of the decision-making processes of young people and access to alternative services for this group.

It is likely that the over-representation of residents from socioeconomically disadvantage areas and by those younger in age is reflective of challenges faced by these

populations in accessing the right service at the right time and located in the right place. This information will be of interest to future service planning.

4.2.5.3 Increased non-urgent presentations after-hours

An increasing number of people arriving after-hours was also identified (Fig 2D). Most GP services in this community are available within normal business hours (0800 to 1800 weekdays and 0800–1200 Saturdays, excluding public holidays). Access to services is limited outside these times. The increase in demand for after-hours services is likely to reflect a lack in available services within the community at the time of need. Two other Tasmanian studies also found increases in after-hours presentations (25, 117) while another local study identified 31% of patients attending the ED would have preferred to be managed by their GP if they had been available at the time of need (1). These findings further support the need for the right services to be available at the right time. As the third Tasmanian project to report a significant increase in the demand for after-hours services it is likely that further research exploring service demand and availability during these hours may assist in informing the provision of timely, patient-centred services and reduce ED demand.

4.2.5.4 Increased presentations with non-urgent mental health diagnoses and with non-specific symptoms

The final objective was to identify prominent reasons for presentations through analysis of discharge diagnosis (Table 3) based on ICD-10 codes (108). Unsurprisingly, presentations as a result of injury were the most common discharge diagnostic group with one third of all non-urgent presentations being as a result of ‘injury, poisoning, certain other consequences of external causes’. This is consistent with non-urgent presentations across Australia, the AIHW reporting that in 2017–18 (102), 32.7% of non-

urgent ED presentations were allocated into this principle diagnostic group. Other studies have also found similar proportions for this diagnostic group (1, 24).

A significant increase was observed in diagnoses into the non-specific group of 'signs and symptoms or abnormal clinical findings not elsewhere classified'. This includes people who present to the ED for simple examination, investigation or observation, the proportion found in this study is reflective of nationwide trends for this principle diagnostic group (102). The significant increase may be explained by international research which clearly identifies the patient's perceived need for urgent medical attention as a major theme when investigating reasons for accessing ED services with non-urgent conditions (1, 5, 42). The continued high proportion of patients who were discharged home and did not require specialist follow-up in this study raises questions around health literacy, health anxiety and timely access to alternative services.

Diagnoses of 'mental and behavioural disorders' was the only other diagnostic group observed to increase significantly with an additional 30 people per year presenting to this regional ED. To the best of our knowledge, this patient group has not been identified as an increasing proportion of non-urgent ED presentations. In 2017–18 the AIHW recorded 2.6% of ATS 4 and 5 presentations resulting in a mental health or behavioural diagnosis, for the same period this regional ED observed 3.1% (102). While these are similar proportions to national figures, we were able to identify a concerning increase of 73.1% between 2009–10 and 2015–16 in our regional ED. Limitations in AIHW reporting meant we were not able to compare this increase with earlier national numbers. A patient triaged as an ATS 4 or 5 with a mental health presentation must demonstrate the ability to provide a clear history without signs of restlessness or aggression (19).

It is not known what has caused this dramatic increase in mental and behaviour diagnoses within the local region. However, if the ED provides an indication of people's healthcare needs and the level of access to services within the community, this increase must be a warning to local service providers. Mental health was identified as the predominant concern for young people in a 2018 national survey of over 28,000 participants aged 15 to 19 years (118). This report identified for the first time in 17 years that the top concern for youth was mental health. This growing concern among young people and the increasing presentation numbers within this regional community provide policy makers and service providers with a clear local need.

4.2.5.6 Limitations

This longitudinal observational study was reliant on routinely collected hospital data; efforts were made to review data for possible discrepancies. The findings are largely reliant upon the quality of data collected at the time of the patients' presentation. Population and socioeconomic position data were based upon ABS data collected in 2011 and 2016 with changes occurring across this time period, to allow for these changes we presumed a direct linear relationship between the two data collection periods. This may not reflect true numbers but provided the closest solution to changes available between these two time periods.

Data provided by the DHHS were for ATS 4 and 5 presentations only, therefore it was not possible to compare presentation trends across all triage categories. This broader analysis was beyond the scope of this project and highlights an area for future enquiry.

4.2.6 Conclusion

The ED is a 'canary in the coalmine' for the greater health service and community. The over-representation of population groups and increases in demand provide clear

indicators of the healthcare needs of members of the local community. Patients presenting to this regional ED with non-urgent conditions were younger than the local demographic profile and up to four times more likely to live in the most disadvantaged communities, raising the question of service accessibility and availability in areas of need. In addition, patients are increasingly presenting with non-specific symptoms and with mental health and behavioural issues. These findings will be of use to policy-makers in planning for enhanced primary care service for the young and for people with mental health issues from our most disadvantaged communities.

Supporting information

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CHAPTER 5 – Phase 2 (qualitative)

Primary care or emergency department? Factors influencing the decisions of socioeconomically disadvantaged populations: a qualitative enquiry

5.1 Overview

Chapter 5 presents the second phase of this study. This phase was informed by key results contained in the previous chapter and contains the qualitative thematic analysis of patient interviews and general practice focus groups. The results from Phase 1 relating to younger age (0–4 or 15–24 years of age) and being from socioeconomically disadvantaged suburbs were of particular interest and informed the purposive sample for this phase.

The aim of this chapter was to explore the need and service requirements of young people with non-urgent conditions from disadvantaged suburbs attending a regional ED.

This chapter presents the content of a paper under review with the *Australian Journal of Primary Health* (AJPH). The Human Research Ethics Committee (Tasmania) Network approval letter H0017492 is included as Appendix 8

5.2 Abstract

Emergency department (ED) presentations reflect the profile and health care needs of the community. In regional Tasmania there is a known over-representation of young people from disadvantaged suburbs who present with non-urgent conditions, yet there is limited understanding of why this occurs. The aim of this study was to explore the need and service requirements of young people from disadvantaged suburbs.

We used purposive sampling and conducted nine interviews with patients and three focus groups with general practice staff. Thematic analysis revealed three key themes: a need for care or services; availability of services; and qualities valued by patients.

Findings highlight that young people have a genuine perceived need for urgent medical attention and experience challenges in accessing alternative services. This study will be useful in informing policy and primary health care service planning.

Summary text for table of contents (AJPH)

Equitable access to healthcare services is an essential aspect in the provision of healthcare and for improvement of health outcomes for populations. Annually, around half of all emergency department presentations across Australia are allocated to the two least urgent triage categories, some of whom could be more suitably managed elsewhere. The findings from this study will be of interest to policy makers and health service planners aiming to provide the right services at the right time and in the right place.

5.3 Background

The demand for healthcare services experienced by emergency departments (EDs) reflects the unique community profile in which they are located (119). Emergency departments have been referred to as the ‘canary in the coalmine’ for hospitals and healthcare services (2). In other words, trends in ED presentations regarding who, when and why can be used by policy makers and health service planners as an indication of community need and potential shortfalls in existing services (3). Global research indicates the causes of the demand for non-urgent services are not necessarily universal (3, 119).

Many studies have used ED patient questionnaires to gain greater understanding of why people with non-urgent conditions access ED services and to identify what type of primary health care (PHC) services could provide a suitable alternative to the ED. These studies provide insight into patient experiences and perceptions, including: limited access to general practice services (1, 38); patients’ perceived urgency (38, 67); and the convenience of ED services with access to radiology and pathology services (1, 5).

Quantitative methods provide valuable measures and trends, but the decision-making process and perceived access of PHC or ED services can be better understood through qualitative enquiry. Researchers who have used qualitative methods to investigate the PHC requirements of ED-users with non-urgent conditions have revealed common factors, including: limited knowledge of alternative services (68); past experience and communication with health services (67); referral to ED from PHC (4); and deep-rooted fear regarding symptoms (66). These studies provide insight into the international context, but there is little known from an Australian perspective.

5.3.1 Study context

Australia's smallest state, Tasmania, faces significant challenges in population demographics. With a dispersed population of 517,000 (120), Tasmanians are older than the national average (43 versus 38 years), experience greater socioeconomic disadvantage, and Tasmanians have the highest dependency ratio (59.7% versus 52.7%) (30). Additionally, Tasmania has the lowest rate of bulk-billing for GP services in Australia (74.6% versus 84.7% nationally) (121).

Recent analysis of seven years of non-urgent ED presentation data in Northern Tasmania identified that young adults from the most disadvantaged suburbs were substantially over-represented in attendances. The most common reason for presentation was for minor injury (33%) with half of the non-urgent presentations occurring during business hours (119). A qualitative approach was used to elicit the experiences and perceptions of patients and PHC professionals. The aim was to explore the need and service requirements of young people with non-urgent conditions from disadvantaged suburbs attending a regional ED.

5.4 Methods

5.4.1 Study design

This qualitative study forms part of a larger explanatory sequential mixed method project aiming to understand who presented to the ED with non-urgent conditions and when and why they presented. The first phase informed the profile of patients which was used to inform a purposive sample for this study. Findings from semi-structured interviews with patients were combined with findings from the earlier research in our region (1, 119) and used to inform focus groups in general practice.

5.4.2 Patient interviews

Patients aged under 25 years (or parents of children/adolescents) triaged to the two least urgent categories (4 or 5) and residing in socioeconomically disadvantaged suburbs were provided with study information and invited to express an interest in participation. Semi-structured phone interviews were conducted, and detailed notes taken by the researcher. The researcher checked responses with participants by repeating them back, allowing an opportunity for participants to add to or clarify responses and ensure accurate noting. The proposed interview guide is provided in Table 5.1.

Table 5.1. Guide for semi-structured patient interviews.

-
- | | |
|----|--|
| 1. | How did you come to make the decision to present to the ED? |
| 2. | How would you describe your visit to the ED? |
| 3. | What is the most important thing to you when deciding where to go? |
| 4. | In a 'perfect world' what would your best option have been? |
-

5.4.3 General practice focus groups

General practitioners, practice nurses and practice managers from general practices working with disadvantaged communities were invited to participate in focus groups. Participants were asked to share their perceptions and experiences in response to previous research undertaken in our region (1, 119). Focus group interviews were recorded and transcribed.

5.4.4 Analysis

We used an inductive process of thematic analysis (figure 5.1) (122). This involved the lead researcher using a manual approach of reading and re-reading notes and transcriptions for observations and familiarisation. Initial codes were identified; these were data-driven and helped organise the data. Codes were then sorted into

preliminary themes and sub-themes which were reviewed and refined. The process of refining and defining themes involved all members of the research team. Ethics approval was obtained from the Human Research Ethics Committee (H0017492).

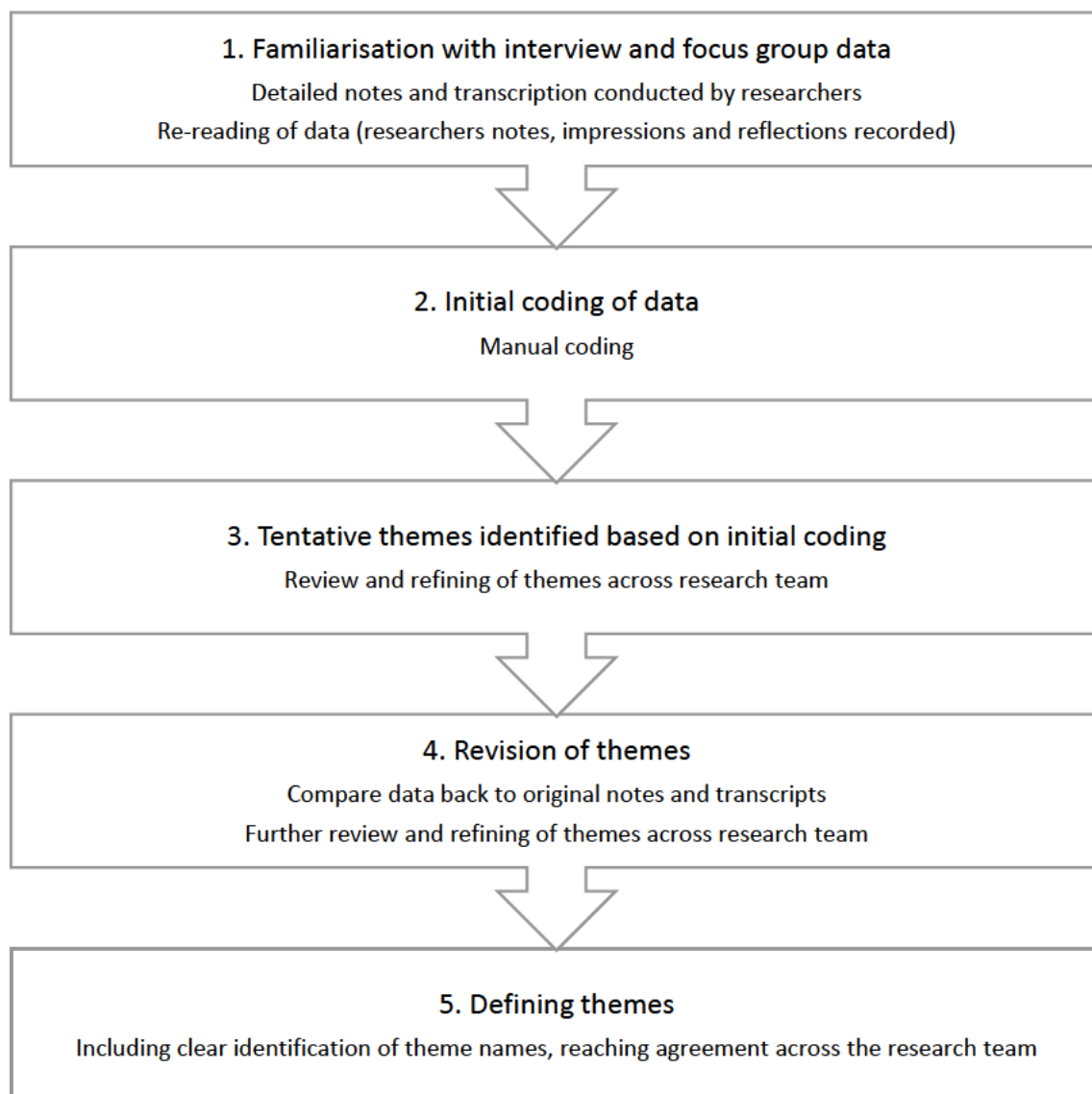


Figure 5.1 Process of inductive thematic analysis based on Braun and Clarke (122)

5.5 Findings

Nine patient participants were interviewed (Table 5.2), saturation was reached after the seventh with a further two conducted to ensure no new themes emerged. Fifteen general practice participants (GPPs) attended three focus groups. Semi-structured interviews included three interviews with young adults and six with parents. Focus group participants included general practitioners, practice nurses and practice

managers with years of experience ranging between one to twenty-five. Interviews took approximately fifteen minutes, while focus groups ran for sixty minutes. Pseudonyms were applied to patient participants, GPPs were allocated a code (GPP-1 to GPP-15). Three key themes were constructed from analysis of interviews and focus groups: a need for care or services; availability of services; and qualities valued by patients (Table 5.3).

Table 5.2. Demographic profile of semi-structured interview participants

Participants Name	Patient's Gender	Interviewee (Self/Parent)	Patient's Occupation	Age of Patient (years)
Abbie	F	Parent	Student	16
Brayden	M	Self	Student (University)	20
Cathy	M	Parent	Student	12
Deb	F	Self	Casual employee	25
Ethan	M	Self	Student (Technical College)	22
Faith	F	Parent	Student	15
Georgie	F	Parent	Student	16
Heidi	M	Parent	Student	15
Isabel	M	Parent	Student	4

Table 5.3. Key themes and sub-themes

Theme	Sub-theme
A need for care or services	Perceived urgency Need for reassurance
Availability of services	Timeliness Affordability Referral Location of services
Qualities valued by patients	Communication Connection Comfort

5.5.1 A need for care or services

Patients and GPPs identified a need for care or services as a driver for accessing ED services, defined as the ability of patients to identify and act upon their need for medical opinion. This was discussed as a perceived urgency for medical attention or reassurance regarding their symptoms.

5.5.1.1 Perceived urgency

In discussion of perceived urgency, patients and GPPs described anxiety or fear regarding symptoms:

"It was like three days before I could start treatment [from my GP]. I was [fairly] miserable, and then I went to the hospital 'cos I can't even drink water without throwing up. Not only do I live alone but all my family are in [another state]." (Brayden, young adult)

"I think there's a fear of something that they [patients] should have done but then didn't" (GPP-1)

Patients also identified the urgency of others in the ED: *"I know [ED staff] have to prioritise"* (Georgie, mother of 16-year-old female). Another expressed concern of taking healthcare providers away from more urgent needs of others:

"I don't want to be going and taking up space, because I understand that there's like a backlog ... if I'm just in the waiting room, burning people's time and there's a serious thing there, I don't want to take time away from someone." (Brayden, young adult)

5.5.1.2 Reassurance

Patients described their need for reassurance regarding symptoms, particularly in the instance of injuries where they identified the likely need for radiology services. One mother explained, *"I would still go to the ED because that's where [radiology] is,"* (Cathy, mother of 12-year-old male). For others, reassurance was described as a need for

information, *“The main thing was to know what the problem was.”* (Abbie, mother of 16year-old female). Or, *“I needed to know if my injury was serious”* (Ethan, young adult).

The GPPs identified reassurance and a potential relationship between reassurance and patients’ health literacy.

“[In disadvantaged areas there is] less education in relation to health matters and [patients are] probably less able to make a decision about whether they really need to be able to turn up in a hospital facility or not.”
(GPP-6)

The GPPs considered the role of social media and the growing awareness of and need for mental health services as increasing the need for reassurance and drivers of ED presentations.

“I think social media has got a lot to do with that as well [group agreement]. Somebody will access [social media] and when they do everything that they see sounds terrible.” (GPP-1)

“We are definitely seeing more mental health. You know, anxious kids and then they get depressed and they try a little bit of this and a little bit of that. Mum and Dad are wringing their hands - when you’ve got mum and dads involved, not knowing what to do - it’s very common.” (GPP-14)

5.5.2 Availability of services

The second theme, availability of services, refers to opportunity for patients to access medical services once a need was identified. During analysis, it was recognised participants discussed this in terms of timeliness of service, affordability, referral to the ED, and location of services.

5.5.2.1 Timeliness of services

Timely access to services was discussed by both groups. Patients focused on challenges accessing same-day appointments while GPPs discussed challenges in providing same-day appointments while balancing existing appointments. Patient participants stated:

“I tried the GP and I often try [after-hours in-home doctor] but they don’t always come out to my area. When they won’t come, I go to the hospital.”
(Faith, mother of 15-year-old daughter)

“Accessibility to care is the most important thing, it’s so hard to get an appointment. I would go to the GP if they were available but that’s unlikely, it usually takes two weeks to get an appointment unless I ring at 9am on the day.” (Isabel, mother of 4-year-old male)

All three GPP focus groups discussed managing daily demand:

“In relation to our bookings we have changed a fair bit, we’ve got almost 30% book on the day now.” (GPP-1)

“At least they can see the nurse first and then if a doctor is required then they always go and see them, as per the need, like a non-booked urgent appointment, it’s like ‘squeeze-ins’.” (GPP-8)

“Yeh, [we] do up to a point [have available appointments], up until about 9.30am and then they’re all gone. It’s a lot that are left free for the day, they fill up because there’s a demand. This is a [large] practice and they fill up.”
(GPP-14)

Timely access to mental health services was a concern among GPPs, who believed a lack of availability within the community may contribute to ED presentations:

“Mental health I think, knowing that the wait time at [local youth service] is extended. Yeh, there’s more patients [with mental health problems], because they can’t access other services, so they [young adults] can’t access psychology support from other providers in town, that adds to the frustration.” (GPP-1)

5.5.2.2 Affordability

Affordability of services was discussed with opposing responses. Some participants discussed a preference to pay for GP services rather than visit the ED.

“My job is casual, I don’t have sick leave, time off work is tricky, I’d prefer to go to the GP and pay to get it sorted.” (Deb, young adult)

“The savvy consumers look at the overall cost, in terms of four to five hours of sitting in an ED, versus getting an appointment and being able to sit at home, or at work until the GP appointment. So, overall, they’re looking at it from that time: cost equation.” (GPP-12)

Others discussed affordability of GP services.

“[Cost] is the most important thing. I’m willing to wait a long time [in the ED] because I can’t afford the GP and x-ray” (Ethan, young adult)

“For [young adults], if the practice charges they may not feel that they can pay for the service.” (GPP-5)

While GPPs discussed funding models as hindering the provision of affordable services.

“Ideally, I would love [to ask patients] just to pay \$20 and that’s it because most people will have \$20 in their bank account, as opposed to \$65, for some people that’s a lot of money to have. They do get their refund straight away, back from Medicare, but if they don’t have that initial \$65 up front you can’t charge a gap payment and then bulk-bill because that’s illegal, whereas to me that would be ideal.” (GPP-4)

5.5.2.3 Referral of patients to the ED

Patients discussed ‘referral’ as the advice from a family member/friend or a medical practitioner (GP or hospital specialist), they did not consider a letter as a necessary requirement of referral. For example, one patient participant was referred to the ED by a family member, another by a hospital specialist for the provision of a specialty

pharmaceutical script and, another by her GP for oral antibiotics and wound dressing provisions.

“I was talking to my mum, she’s a nurse and advised me I should have gone to the hospital like the day before. Yeh, they advised me to go to the hospital”
(Brayden, young adult)

“Yeh, I saw my GP, he sent me back to the emergency department because they didn’t give me dressings or antibiotics when I was discharged from hospital.” (Deb, young adult)

Conversely, GPPs discussed ‘referral’ as a formal process (letter or phone call) to the ED. They discussed using caution in referring patients to the ED yet acknowledged calls to the practice were not tracked so were unable to comment on how many are informally referred to the ED due to unavailability of appointments.

“I do take pride in trying to make sure anyone I send has got more than 50% chance of getting admitted, I hate sending people in and them getting sent home ...” (GPP-12)

5.5.2.4 Location of existing services

This sub-theme was discussed in all GPP focus groups. Their concern was the lack of services in areas of greatest need. When asked why they thought there was a higher rate of non-urgent ED presentations from socioeconomically disadvantaged areas, one participant stated: *“It doesn’t surprise me. When you look at that area, there’s no big super clinic or after-hours clinics, they’re all in town aren’t they”* (GPP-4). In another focus group a GP stated, *“[Disadvantaged suburbs] are crying out for more medical services”* (GPP-12).

5.5.3 Qualities valued by patients

The third theme related to the experiences of patients, the qualities they valued, and GPPs' perspectives on existing relationships and networks. This theme was defined as the characteristics of a service provider or support network important to patients and were discussed from the perspective of positive and negative experiences. Three sub-themes were recognised: communication, connection, and comfort.

5.5.3.1 Communication

Communication was the need to feel listened to by health professionals and the ability to understand what they were being told. Heidi (mother of 15-year-old son) and Ethan (young adult) identified the importance of being listened to, and another participant mentioned her difficulty with communication regarding her symptoms: *"It wasn't their [ED doctor] fault I couldn't understand them, but clear communication is important to me"* (Deb, young adult). A mother stated, *"They explained everything to us, I'd go to the ED again"* (Faith, mother of 15-year-old female).

5.5.3.2 Connection

The GPPs discussed connection in the context of changes within family networks. They identified these changes and the likelihood young adults have not yet engaged with a regular GP as contributing to ED demand.

"I think they're just not there too, because the extended family and nan would tell you, 'don't worry dear, he's just got a cough'". (GPP-15)

"... the under 25 [years of age], they are most likely to not have a regular GP practice. They rarely need to see a doctor, often more mobile." (GPP-5)

This was also commented on by a patient participant who discussed the experience of his flatmate:

“My housemate is from [another city], he was looking for someone, he struggled to get somewhere close that would see him, and they’ve gone ‘we won’t take any more patients’. (Brayden, young adult)

5.5.3.3 Comfort

Patients highlighted the importance of feeling comfortable when seeking health care and described the ED environment as unsuitable, uncomfortable or distressing. One mother explained, *“My son is autistic and it [the waiting room] is really hard with so many people.”* (Cathy, mother of 12-year-old male). Another stated, *“I’ve been to ED a few times and the long wait can be very distressing.”* (Georgie, mother of 16-year-old female). And, *“My son has a fear of hospitals since [his last visit], but the nurse was fantastic. She made him feel comfortable”* (Isabel, mother of 4-year-old male).

5.6 Discussion

Interviews and focus groups provided a deeper understanding of the perceived needs and service requirements of young people living in disadvantaged suburbs. The three key themes provide greater insight into factors influencing the decision to present to the ED with a non-urgent condition.

5.6.1 Perceived urgency and health literacy

Patient participants identified perceived urgency for medical assessment and a need for reassurance regarding symptoms as a major factor for presenting to the ED. This accords with international studies identifying perceived urgency as a driving factor in non-urgent ED attendances (68, 69). In our study we also found patients expressed anxiety and fear about the consequences of not seeking health advice. Fear and anxiety can arise from an anticipation or awareness of some form of danger – this finding provides deeper insight into how perceived urgency arises. Another research team also

observed uncertainty and fear could drive the patient's perceived urgency (66), which then contributes to the need for reassurance (70).

The GPPs discussed a possible deficit in health literacy and the use of social media sites as contributing to the need for services. Health literacy has been identified as one of many factors contributing to healthcare access as it influences to an individual's ability to identify their need for care and to subsequently seek care (123). In this study, patient participants demonstrated suitable health literacy when they discussed their need and clearly explained their perceived urgency for medical attention or reassurance. Patients demonstrated an awareness of the needs of others attending the ED and the need to prioritise care in the ED, expressing concern their presentation may take time and resources away from the more urgent needs of others. Patient participants also discussed their preference for GP services but their inability to access these services led to their ED presentation. No patients mentioned social media as the reason for their attendance. This was in contrast to some GPPs who instead perceived a lack of patients' health literacy and use of social media as contributors to ED presentations. Other studies have also observed a tendency by healthcare professionals to 'condemn' the behaviour of patients accessing ED services with non-urgent conditions (70, 92), yet in this study we did not observe a reason for this. This highlights the need for healthcare professionals, policy makers and health service planners to understand the factors influencing patients' decision-making processes when providing or planning services and strategies to manage demand.

5.6.2 Right time, right place, right service:

Timeliness of appointments in general practice was discussed by both groups as an actual or perceived unavailability of GP services and the convenience of EDs always

being open. The GPPs discussed their experience and challenges in accommodating the demand for same-day appointments despite efforts to leave appointments open and allow “squeeze-ins”. Limitations in timely access to GP services is a common theme internationally (67, 69). Limited timely access in our region is further supported by the high incidence of non-urgent presentations occurring during business hours (47%) (119).

The location of services was discussed by GPPs when asked to discuss findings of an earlier study which demonstrated a disproportionate representation in non-urgent presentations by residents from the most disadvantaged suburbs (119). One GP stated, “[disadvantaged suburbs] are just crying out for more of medical services” (GPP-12). Research conducted in Australia (22) and the USA (54) has demonstrated an association between greater GP density and fewer non-urgent ED presentations.

Affordability was predominately discussed by GPPs who expressed concern regarding current funding models and the cost to young and disadvantaged populations. They believed cost was a factor in patients’ decision-making processes. The GPPs also argued that the current model needs to be reviewed to ensure affordable access. Surprisingly, affordability was not a major theme among patient participants or in an earlier survey of 477 patients with non-urgent conditions (1). This finding was unexpected given the region’s low rate of bulk-billing. In the 2016 study, it was determined that factors contributing to non-urgent ED presentations went beyond cost. The response from patients in this current study was in conflict with what the GPPs expected, and again, demonstrates patients may be willing to pay for the right service available at the right time. Discussions around cost and affordability are complex and contextual. Healthcare

professionals in this study believed cost was a factor in patients' decision-making processes yet this was not a key factor for patients.

In our study, patients were referred for needs that could have been more suitably managed elsewhere (e.g. oral antibiotics and dressing supplies), highlighting the convenience of EDs for medical professionals. Studies investigating why patients are referred to ED with non-urgent conditions are limited; to date there is knowledge this occurs locally and internationally, but the underlying factors are yet to be understood (1, 4). More work is required to gain greater understanding of this practice.

Service qualities valued by patients included communication, connection, and comfort, highlighting important attributes of healthcare services. These are not new to the discussion of health care provision but are not frequently discussed in literature around non-urgent ED presentations. This finding assists in providing recommendations for service planning. Some patients did not feel the ED was the right place for them or their children and discussed the inconvenience of ED. Patients also discussed their preference to be seen and managed in general practice but were not able to secure timely appointments resulting in their ED presentation. This fits the conceptual framework of access to healthcare developed by Levesque and colleagues (123) who discuss service appropriateness and the ability of patients to engage.

5.6.3 Limitations

Our objective was to recruit a purposive sample based on the profile of over-represented groups in non-urgent ED presentations identified in earlier research. Potential participants included those living in socioeconomically disadvantaged communities and aged under 25. The majority of those who expressed an interest were parents of adolescents and only one young child. It is likely the perceptions and

experiences of other members of the community might be different. General practice focus groups were conducted among discrete groups of colleagues; it is possible there may have been some reluctance to share openly; however, the investigators experienced open and frank conversation and do not believe this was a limitation. A strength of this study is the contextual focus, building on previous work in our region, providing a picture of local needs and experiences.

5.7 Conclusion

This study aimed to gain a deeper understanding of the service requirements of children and young adults from socioeconomically disadvantaged communities attending the ED with non-urgent conditions. We discovered a genuine perceived need for urgent medical attention with timely access to alternative services being a contributing factor. The patients described using ED services with consideration, making rational choices based on their need and service accessibility. This was in contrast to the perceptions of health professionals who believed patients presented to the ED because it was free or because attendees had poor health literacy.

The convenience of ED services was a key factor for both patients and health professionals with patients valuing communication, connection and comfort when accessing services. The findings of this study would be useful to inform health policy and service planning aiming to meet PHC needs in disadvantaged communities locally and further afield.

Conflicts of interest:

The authors declare no conflicts of interest.

Funding:

This paper forms part of a larger study funded by the Clifford Craig Foundation (CCF; Project no. 157). The CCF is a philanthropic medical research trust.

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The supporting sources were not involved in the preparation of data or the manuscript.

CHAPTER 6 – Phase 3 (Interpretation)

Engaging health service leaders in research through nominal group technique

6.1 Overview

The final phase of this study is presented in this chapter. This phase was informed by key findings from the previous two phases, bringing them together to present to key stakeholders in a collaborative forum. The aim of this phase was to address the increasing number of mental health presentations to the emergency department (ED), and the over-representation of young people and those from the most socioeconomically disadvantaged suburbs presenting to the ED with non-urgent conditions, by establishing priorities and recommendations.

This chapter includes the content of a paper under review with the *Australian Journal of Rural Health* (AJRH). The Human Research Ethics Committee (Tasmania) Network approval letter H0018233 is included as Appendix 9

6.2 Abstract

Objective: In this paper we present a process for creative decision-making with key health service stakeholders using nominal group technique (NGT). The aim is to describe the use of NGT by researchers to assist in engaging stakeholders in a regional setting to interpret local research knowledge and translate it into targeted local health service recommendations. The purpose of the NGT was to develop priorities and recommendations to address the increasing number of mental health presentations to the emergency department (ED), and the disproportionately high number of young people from the most socioeconomically disadvantaged suburbs presenting to the ED with non-urgent conditions.

Method and design: This structured and democratic method enables all participants to have an equal voice in discussion and decision-making and is recognised as beneficial in time-pressured industries such as healthcare. The technique involved four steps: silent generation of ideas; round-robin focused sharing; group discussion and clarification of ideas; and voting and ranking of priorities and recommendations.

Setting and participants: This study was undertaken in Northern Tasmania and brought together a diverse group of seventeen participants from the local health service, university and community.

Results: Participants prioritised nurse practitioner and community paramedic models to enhance equitable access to primary health care services in Northern Tasmania.

Conclusion: Nominal group technique was highly effective in bringing together a diverse group of key stakeholders in our regional area. Evidence-based, contextually relevant and targeted solutions were identified to address access to primary health care services for vulnerable populations.

What is already known

- EDs are the canary in the coalmine for health services and the communities they serve. Over-representation of presentation types demonstrates community health needs and service availability.
- In 2018-2019 the equivalent to the combined populations of Brisbane and Adelaide presented to EDs across Australia and were triaged to the two least urgent categories.
- Rural and regional Australian areas demonstrate a higher proportion of non-urgent presentations than urban areas.

What this paper adds

- An effective approach to engaging key stakeholders in rural and regional health service planning using rigorously collected data and high-quality evidence-based findings.
- Nominal group technique can be used to establish evidence-based solutions which are targeted to meet the challenges of access to primary health services by vulnerable populations in rural and regional communities.
- Nominal group technique facilitated the identification of recommendations and priorities to improve access to primary health care services in a regional community among socioeconomically disadvantaged populations.

6.3 Background

Nominal group technique (NGT) is a consensus research method with a specialised purpose which engages a diverse group of participants in ‘creative decision-making’ during a face-to-face meeting (104). Nominal group technique was first used in aerospace program design by NASA (124) and has since been used across a number of industries, including health, education and business (104), and is growing in use by nursing researchers (125-127). Nominal group technique can be used to identify problems, establish priorities and to develop recommendations based on ranking and weighting, thereby obtaining group consensus through a democratic process (127). This technique provides an opportunity for researchers, field experts and lay people to work together in a collaborative process to establish priorities and recommendations, thereby enabling consensus on complex issues (104, 128). In NGT, all views are considered equal; the structured design limits the contribution of dominant personalities and provides participants with time to share ideas, discuss and vote (104). For example, NGT was recently used by an Australian research team to develop a clinical placement assessment tool for nursing students (127). Participants included nursing students, university lecturers and health sector clinical educators and the NGT facilitated “rich, all-encompassing creative face-to-face discussion where participants [could] openly articulate their ideas” (127).

Nominal group technique was developed by Delbecq and Van de Ven in 1968 and consists of four stages (104):

1. Silent generation of ideas
2. Round-robin including all participants (no discussion or clarification)
3. Group discussion and clarification of ideas
4. Voting (silent) and ranking (calculation) of priorities or recommendation

Nominal group technique is a ‘problem-minded’ approach, meaning a problem is presented and participants are given silent time to reflect and write their thoughts before ideas are shared (104). By allowing the process of silent generation, participants have time to reflect on the ‘problem’ presented, forming their own ideas rather than reacting to the ‘problem’. This is known as a ‘proactive search process’ and is a key feature of NGT (104). The process is proactive because participants are given the opportunity to silently consider the problem or question while writing down their thoughts. These are then summarised and each participant shares with the group. In contrast, a reactive process occurs when concentration is interrupted and decisions are rushed (104).

This paper describes the use of NGT in the final phase of a larger explanatory sequential mixed method study, a method which relies on findings from earlier phases to inform the next (40). The larger project sought to identify the health service requirements of patients presenting to the emergency department (ED) with non-urgent conditions and to translate findings into key recommendations and priorities to inform future service planning. These recommendations and priorities were informed by contextually relevant, high quality evidence-based research findings. A study protocol and the results from these first two phases are published elsewhere (99, 103, 119). A summary of Phases 1 and 2 are provided below.

6.3.1 Phase 1

The first phase was a large retrospective data analysis of seven-years’ routinely collected ED data. Descriptive and inferential statistics were used to establish a profile of patients and to determine trends in presentations (119). Key findings from this first phase were

used as foundational information to inform participants during the forum and are summarised in Table 6.1.

6.3.2 Phase 2

The profile of patients and trends identified in Phase 1 was used to inform a purposive sample of participants for Phase 2. Interviews with patients and focus groups with general practice staff were conducted to gain a deeper understanding of the factors contributing to patients' decisions to present to the ED (99). These findings are also summarised in Table 6.1.

Table 6.1. Summary of findings presented to group participants (based on earlier research)

How many?	1. 35.9% of all ED presentations were by local residents with non-urgent conditions. ¹
Who?	2. Median age of patients 29 years (median population age 43 years) <i>0-4 and 15-24 years of age were 1.5 times more likely to present than those in other age groups</i> ¹
	3. Residents from socioeconomically disadvantaged suburbs up to four times more likely to present ¹
When?	4. 46% occurred in regular business hours ¹
Why?	5. Lack of primary health care services in socioeconomically disadvantaged suburbs ¹
	6. Diagnostic groups: ¹ <ul style="list-style-type: none"> i. 33% as result of minor injury ii. 21.4% received non-specific diagnoses iii. 2.2% mental health diagnoses (with increase of 73% over 7 years)
	7. Interviews with patients and general practice staff revealed: ² <ul style="list-style-type: none"> i. A genuine perceived urgency for medical attention (fear and anxiety) ii. A need for reassurance iii. Challenges accessing/providing same-day appointments iv. Convenience of ED v. Cost was mentioned but not a major theme for patients but was a concern for GPs
	8. A time series analysis of non-urgent ED presentations demonstrated a privately run GP service with extended hours of operation and walk-in appointments reduced the number of non-urgent presentations to the ED by local residents by 7 per day over a two-year period (2014-2016)

¹ Socioeconomic disadvantage as a driver of non-urgent emergency department presentations: A retrospective data analysis (119)

² Access to emergency department services: factors contributing to non-urgent presentations by Northern Tasmanians (99)

A PowerPoint presentation of this research is attached as Appendix 10

6.3.3 Phase 3

The aim of the final phase (using NGT) was to interpret local research knowledge and translate findings into health service recommendations to enhance equitable access to primary healthcare services in Northern Tasmania. To achieve this, we engaged key stakeholders and invited them to attend a forum where results from the earlier research were presented. Each of the stakeholders brought their own expertise, experience, and local community knowledge to the group, adding further value to the priorities and recommendations put forward.

6.3.4 Study setting

The study was conducted in Northern Tasmanian, a region serviced by a 300-bed public hospital with a 30-bed ED (109). This is the only ED in the region and acts as a referral centre for the North and North West regions of Tasmania. Around 45,000 people per year present to this ED; over half are triaged to the two least urgent triage categories (8). Residents in this region experience greater socioeconomic disadvantage than in other Australian regions (median weekly income \$537AU versus \$662AU nationally) (31) and have a higher median age (median age 43yrs vs 38yrs nationally) (30). Tasmanians also experience a lack of primary care and inequalities in the major social determinants of health, including low education levels and high unemployment (71).

6.4 Method

Nominal group technique (NGT) was the preferred method for the third and final phase of the project due to its suitability for engaging a diverse group of participants with a broad range of expertise. The findings listed in Table 6.1 were the foundation for the NGT. Potential participants were identified as local leaders in primary and acute healthcare services, academia and community services, and included a consumer

representative. A letter of invitation was sent to potential participants and included information about the project and study aims. Participants who attended the forum were formally consented.

The forum was held between 1600 to 1900 on a weekday evening in an accessible central location. The four stages outlined by Delbecq and Van de Ven (104) were used to guide the forum structure, these being silent generation of ideas, round-robin sharing of ideas, group discussion and clarification of ideas, and voting and ranking. Each step was allocated a specific amount of time and a strict timetable was followed to ensure all steps could be completed within the allocated time and to ensure all participants contributed (Figure 6.1). The research team were each given a role during the forum to assist in the running of the evening. These roles were: primary facilitator; fieldnote recorder; summary of recommendations, scribe (whiteboard); and timekeeper. The primary facilitator was a PhD candidate also employed by the health service who worked under the supervision of a supervisor experienced in this method.

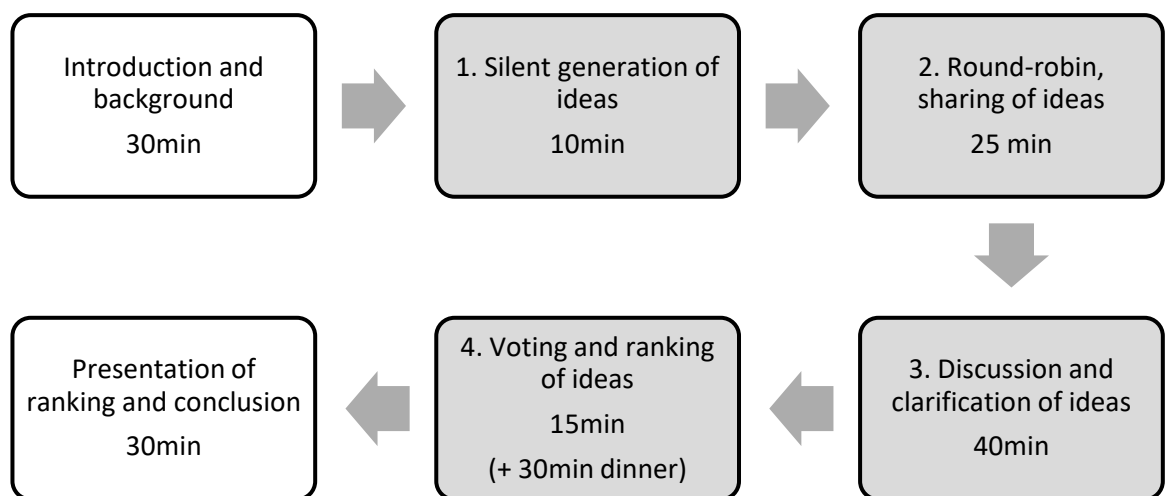


Figure 6.1. Forum structure for the Nominal Group Technique.

The first thirty minutes were allocated to group introductions, the agenda and brief overview of NGT, and a presentation of the data outlined in Table 6.1. Once the presentation finished, the participants were then given 10-minutes for silent generation of ideas, providing time to reflect and write down their ideas and recommendations. During the last two minutes of this step, the primary facilitator asked participants to write a sentence summarising their recommendations. Stage 2 was a facilitated round-robin, during which participants were asked to read their summary sentence without comment, clarification or questions. Responses were written on a whiteboard for all to see. Once all participants had shared their idea, stage 3 began with the group given 40 minutes to discuss and clarify ideas. This step required aggregation, refining, and defining of ideas to establish clear concepts for voting. Stage 4 proceeded with participants being asked to vote (confidentially) for their preferred ideas. The total number of votes given to each participant was calculated by dividing the total number of concepts by three (129). Votes were then tallied, and priorities established. Ranking and rating was achieved by providing the participants first preference with the highest number of points. In this study, participants were asked to vote for three concepts, a number one would be allocated three points, their second preference would receive two points and the final preference one point. The number of actual votes each idea received was also recorded. This enabled the research team to prioritise concepts, if two received the same number of points, the priority would be given to the one with the most votes (104).

To prepare for the forum the research team conducted a 'trial-run' with university academics. This allowed an opportunity for the team to familiarise themselves with the process, to test the planned structure and to receive critical feedback. Ethics approval was obtained from the Human Research Ethics Committee (H0018233).

6.5 Results

Seventeen participants attended the nominal group technique forum including: senior managers from the Department of Health, Tasmanian Health Services and Primary Health Network; clinical staff from the emergency department and general practices (nursing and medical); academics from the University of Tasmania; local Council and community groups; and a consumer representative. Years of experience in health (or as a consumer representative) ranged from five to forty years with a combined total of over 360 years' experience.

Participants put forward eighteen concepts at the end of the round-robin based on the findings from Phase 1 and 2 of the project. Following discussion, aggregation and defining, seven concepts were put forward for final voting and participants were allocated three votes each. Consensus was determined through ranking and scoring as were summarised in Table 6.2. The group also discussed the characteristics of services designed to meet the needs of young people and those living in socioeconomically disadvantaged areas. The researchers and forum participants recognised these characteristics as essential for all services seeking to address this need and a group decision was made to separate these out from the concepts (Table 6.3).

Table 6.2. Health service priorities

Ranking and concept	Number of votes	Score
1. In-community nurse practitioner and/or community paramedic	14	32
2. Urgent care centre	11	25
3. Online GP booking system activated by triage nurse in ED when patient meets criteria (GP to be funded at ED cost rate)	10	20
4. ED clinicians have the ability to refer directly to Community Rapid Response Service	7	9
5. ED clinicians have the ability to divert non-urgent presentations	5	8
6. Online access to view day-time availability of GPs	3	5
7. Increased education of the public about selecting suitable services	1	1

Table 6.3. Health service characteristics

Right service	High standard and primary health care focused Access to radiology, pathology, pharmacy etc Integrated with existing medical, health, mental health, and community services Interprofessional and socially inclusive Community led, driven and designed Consideration of funding (Medicare, other government funding) Patient safety – establish clear exclusion criteria
Right time	Open 7 days per week Extended hours of service
Right place	Located in the area of greatest need (northern suburbs) Remote from the ED Accessible by public transport for those living in other suburbs Ability to provide outreach services

The idea receiving the most votes was the establishment of an in-community nurse practitioner and/or paramedic who could assess, treat and subsequently refer to other

services if required. Participants also concluded service characteristics needed to include: high quality, socially inclusive, interprofessional primary health care; be open evenings and weekends; and be located remote from the ED in the area of greatest need with public transport access and an ability to provide outreach services.

6.6 Discussion

The findings from earlier phases of this project provided the cornerstone for this final phase, enabling the research team to inform and facilitate reflection and discussion, and to establish contextually relevant recommendations and priorities based on local profiles, trends, and experiences. The use of NGT supported a process whereby a diverse group of participants were presented with rigorously collected, analysed and summarised data and then voted, resulting in the decision that a community-based nurse practitioner (NP) or community paramedic would be the best fit for this setting. Forum participants identified the characteristics of an ‘ultimate model’ which would provide high quality primary health care, be socially inclusive, and located in the area of greatest need with the capacity to provide outreach services. The model would include an interprofessional approach to holistic healthcare provision including services such as GPs, NPs, community paramedics, dental health practitioners, mental health professionals, physiotherapists, and social workers. This would be community led, driven, and designed and provide extended hours of service, seven days per week. Words used by participants to describe this ‘ultimate model’ included accessible, affordable, reliable, consistent, trustworthy, responsive, attentive, and effective.

A similar model was discussed in a scoping review which aimed to understand existing evidence of strategies “to improve access to primary care by vulnerable populations” (73). The authors of the review concluded “approachability, availability and

affordability” are important factors for vulnerable populations in access to primary care; furthermore, the authors suggest access could be improved by “formal integration of services” (73). Interestingly, most discussions around primary care services focus on GP services; however, the diverse group of participants in this forum recommended primary care provided by NPs or community paramedics. The findings of Khanassov et al. (73) were echoed in the model put forward by forum participants and support the recommendations suggested to address the needs of Northern Tasmanians.

The use of NGT enabled us to achieve our aim to interpret research knowledge and translate it into local health service priorities and recommendations for the provision of equitable and accessible primary healthcare services. The forum was attended by a diverse group of health service, community and academic leaders and a health consumer representative. Diversity enabled discussion which included a broad range of perspectives, allowing the group to consider potential priorities and recommendations more deeply than a single professional group. Collaborative approaches with clear strategic frameworks prevent particular groups focusing solely on their own priorities (130). With a combined total of more than 360 years’ experience, the participants were able to contribute expert knowledge and contextual understanding to research findings and translate these into service recommendations. Further strengths and benefits of NGT include: time efficiency; the facilitation of a diverse group of participants to collaborate; the opportunity for solutions to be developed; and the determination of priorities (104). In this study we observed all of these benefits.

6.6.1 Time efficiency

The time efficiency of this method was particularly beneficial in our context where participants were from varied healthcare, community and university sectors with busy schedules. By holding the forum at the end of the working day and including a 30-minute dinner break, we were able to engage a diverse group of leaders to attend the forum. The forum ran for three hours, the maximum amount of time recommended by McMillan and colleagues (131). The research team determined this amount of time was needed to ensure adequate time for the round-robin and group discussion stages due to the large number of participants. Time efficiency is also experienced by the research team using this method because of the reduced time required to follow-up participants and collate questionnaire responses compared to other methods such as Delphi technique (104, 132).

6.6.2 Facilitation of the opportunity for a diverse group of participants to collaborate

The opportunity to collaborate is another benefit of NGT and was observed in our study. Engaging participants from a broad range of professional backgrounds, including managers, academics, community workers, clinically based nurses and doctors and a consumer would not usually be experienced in regular work meetings. This enabled broad perspectives of the problem to be considered and discussed, reducing professional silos and providing a holistic approach to priorities and recommendations. A limitation of diverse representation of participants can be the perceived or actual power imbalance. However, as a well-structured approach, NGT provides all participants with the opportunity to share their ideas during the round-robin stage. During discussion and clarification, the facilitator directs the meeting to ensure everyone has an opportunity to contribute and all participants have an equal voice

during voting. There were dominant personalities in our group, but all participants were able to contribute equally and the strong voices did not appear to sway the final ranking of recommendations and priorities.

6.6.3 Opportunity for solutions to be developed

The development of solutions was a key benefit in our study and assisted in reducing the traditional gap between research and practice. Through the provision of local research findings and the independent silent generation of ideas, participants were informed and able to consider the problem using a problem-minded approach. This stage and the round-robin stage allowed for ‘high quality’ ideas which then led into a proactive discussion developing the ideas and allowing the opportunity for clarification (104). Perkins, Farmer (133) published a policy analysis paper in 2019 and advocated for “communities, service providers and researchers” to take action in developing “authentic rural solutions”. By using NGT we established locally relevant recommendations and priorities through collaborative action in a regional setting. These recommendations and priorities aimed to address the increase in mental health presentations and the over-representation of patients with non-urgent conditions from socioeconomically disadvantaged suburbs.

6.6.4 Co-creation

Nominal group technique provides a framework for co-creation, which is a collaborative generation of knowledge that occurs when academics and stakeholders from sectors such as healthcare, academia and community work together (134). Co-creation is the move from knowledge translation to knowledge production. It takes a systems perspective and views research as a creative process which considers human experiences and includes an emphasis on “... the quality of relationships, and

governance and facilitation arrangements, especially power-sharing measures and the harnessing of conflict as a positive and engaging force” (134). The co-creation design in this project added strength to the recommendations.

This technique would be highly beneficial in other regional and rural studies aiming to develop evidence-based and contextually relevant solutions. In this study, many of the key stakeholders had already established professional relationships, which enriched the collaboration and allowed newly established research knowledge to be shared with health service leaders working within the regional context.

6.6.5 Limitations

A limitation of this study was the group size which was larger than generally used in NGT and may have limited group discussion. However, the research team felt the benefits of including participants from diverse backgrounds with varying perspectives outweighed the potential risk in this situation, particularly considering the problem being discussed is both multifaceted and complex. A lack of anonymity can be a limitation of NGT, but in this case we observed broad discussion from all members of the group who appeared comfortable sharing ideas. The time allowed for group discussion can also limit the number of ideas put forward by participants. In this study, participants were encouraged to put forward further recommendations during discussion. The research team were satisfied participants provided an extensive list of recommendations and were able to aggregate and define these ideas for voting and ranking. Community or hospital based mental health representatives were not able to participate in the NGT forum. It is likely representation from this group may have led to more specific recommendations to address the increasing demand for mental health services.

6.7 Conclusion

Nominal group technique was an effective and efficient method to achieve our aim of translating research knowledge into local health service priorities and recommendations. Using NGT, we engaged a diverse group and reached consensus that established priorities for healthcare service provision specific to our region. Through this process, the group identified priorities and recommendations relating to equitable access to a socially inclusive interprofessional model of primary health care.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the research, authorship, and/or publication of this article.

Supplementary materials

The corresponding author is willing to provide further research material upon request.

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CHAPTER 7 – Discussion

Who, when and why do patients present to the emergency department with non-urgent conditions? What can we do differently?

7.1 Overview

Chapter 7 brings the three phases of this research together with international literature to discuss what is known and explore the new knowledge that has been gained. Similarities and differences are discussed in relation to presentation profiles and trends, and patient and healthcare professionals' perspectives. Recommendations and solutions are presented along with supporting evidence and implications for policy and practice. Study strengths and limitations are also discussed.

7.2 Introduction

The overarching aim of the research contained in this thesis was to identify the service requirements of patients with non-urgent conditions presenting to a regional Australian emergency department and to translate these findings into key recommendations and priorities for future health services. Through a sequential approach combining seven years of ED data with patient interviews, primary care focus groups and a priority-setting forum with key stakeholders, this study found that young people from the lowest socioeconomic suburbs were over-represented in ED presentations, along with a significant increase in mental health presentations. Patients demonstrated making considered and rational decisions based on perceived urgency and service availability, and key stakeholders offered recommendations for the provision of unique and holistic healthcare services.

The research presented in this thesis provides unique insight into the service requirements of patients presenting with non-urgent conditions in Northern Tasmania. It provides a detailed, evidence-based picture of who presented to the ED with non-urgent conditions and when and why patients presented and outlines a service model that could address community needs. The importance of understanding health care demands before implementing solutions was highlighted in a systematic review published in 2018. The systematic review found the causes of ED demand to be poorly understood and predominately outside the walls of the ED, yet solutions were predominantly focused on strategies within the ED – a knowledge to implementation mismatch (1).

This study provides evidence of inequitable access to health services at the time of need and reflects a method that can overcome the mismatch between the causes of ED

demand and the solutions implemented. The National Institute for Health Research in the UK explains the importance of understanding the “... complex relationships between demand, access and service provision” (105) in addressing healthcare needs between primary health services and ED services. Knowledge of the profile and trends in non-urgent ED presentation provides an opportunity to target health services based on population needs (3). Findings of this study will be useful in informing future health service planning and policy.

7.3 What is known

The literature review conducted for this thesis (Chapter 2) analysed international peer-reviewed literature published between 2010 and 2020, and contributed insight into who presented to EDs with non-urgent conditions and when and why they presented. It also confirmed the complexity of the situation. Three key findings emerged from the literature review: first, the importance of understanding the local context; second, the need to consider vulnerable populations; and third, the need for timely access to primary care alternatives. Comparison between the findings of this study and those included in the literature review reaffirm the complexity of healthcare and the importance of understanding the local context before developing solutions.

7.3.1 Profiles, trends and perspectives

This study has identified an over-representation of young people from disadvantaged suburbs and a significant increase in mental health presentations among patients presenting to EDs with non-urgent conditions. Patients were observed to make sound, informed decisions to present to the ED; these were generally based on the lack of available alternative healthcare services. Patients presented to the ED because they were anxious about the possible seriousness of their symptoms. Discussion of cost

provided interesting insight with cost considered by health professionals to be a major driver of ED presentations (70, 92), but not by patients in this study, a finding that has repeated across international studies. Patients' profiles and perspectives and presentation trends are discussed with comparisons between this research and international literature. Emergency departments are faced with health care demands according to the needs of the community they serve; they are a microcosm. Consequently, it should not be surprising to find differences across geographic regions and health systems because each community is unique in its health profile and service availability.

7.3.1.1 Socioeconomic position

A significant population need was identified in the over-representation to the ED by patients from suburbs with low socioeconomic position (SEP) (Phase 1 of this research). Suburbs with lower SEP were identified to have limited access to primary care services (Phase 2). The research project found that patients from the most disadvantaged suburbs were up to four times more likely to present to the ED with non-urgent conditions than patients from more advantaged areas. Participants in the general practice focus groups identified a lack of primary care services in the areas of greatest need in this regional city. The Tasmanian Parliament Joint Select Committee Inquiry into Preventative Health raised inequitable access to health services as a concern and stated that "statistical correlations" needed to be used to inform future service planning (71). The striking correlation observed in this study – between ED presentations and social disadvantage – will be useful to governments and healthcare providers aiming to improve equitable service provision across Northern Tasmania and other communities.

7.3.1.2 Younger age

Another important finding was that parents of young children (0–4 years of age) and young adults (15–24 years of age) were 1.5 times more likely to present at EDs than the general population. Young patients reported difficulty accessing primary care.

services when needed. This study reaffirms a study from rural NSW that found a high proportion of young adults presenting to regional and rural EDs (23). In contrast, metropolitan EDs in NSW there did not demonstrate the same high incidence of presentations by young adults, demonstrating a potential challenge in accessing primary care services by young adults in regional and rural areas. International studies have also found over-representation of younger age groups. However, there is a lack of consistency in how ‘younger age’ was measured, ranging from 0-2 years (53) to 20-45 years (46). In this research, a high proportion of non-urgent ED presentations are by younger people and demonstrate the health needs of younger populations.

In 2019, the Australian Department of Health released the “National Action Plan for the Health of Children and Young People” which aimed to ‘drive action’ across jurisdictions (national, state and local) and to prioritise needs and inequalities in healthcare provision (135). The action plan acknowledges the importance of health outcomes and life experiences of children and young people, which influence “... future social and economic wellbeing and connectedness of our community” (135). It is necessary for healthcare services to ensure health needs are met across the lifespan to enable children and young people to achieve long-term benefits of better health.

Young people and parents of children were able to contribute their experiences and perspectives through interviews in Phase 2 of this research. The key findings were then used to inform the key stakeholder forum to ensure their voices informed key

recommendations and priorities. Including Phase 2 and sharing the findings at the forum enabled health service leaders to consider factors outside cost alone and identify a service model that would meet the patients' need for services where communication, connection and comfort were a priority.

7.3.1.3 Mental health

The research found that non-urgent mental health presentations had increased by 73% over the seven-year period of data collection. This was an alarming finding and to the best of our knowledge has not been reported in other studies looking at non-urgent ED presentations. A limitation of using the International Statistical Classification for Diseases and Related Health Problems (ICD-10) is that it does not capture all mental health presentations with some being allocated to other classifications. For example, self-harm may be listed as an injury. It is therefore likely that actual mental health presentation numbers are higher.

Patient participants for this study did not include patients with mental health conditions, so those perceptions and experiences were not able to be captured in this research. This methodological limitation occurred because patients with mental health conditions are seen and assessed in the main department of the ED, and the recruitment of interview participants was undertaken by nurse practitioners in the fast track area. Nevertheless, the general practice participants (GPPs) discussed their concerns regarding a growing need for mental health services in Northern Tasmania, and the extended waiting times from GP referral to professional mental health assessment. The significant increase in non-urgent mental health presentations to the ED, along with reported extended waiting times following GP referrals, indicates significant unmet demand for mental health assessment services in Northern Tasmania.

Following a national survey in 2018 of 28,000 people aged 15 to 19 years, Mission Australia reported increasing mental health concerns among young people. For the first time in the 17-year history of the survey, mental health was the number one health concern for young people (118). Furthermore, in 2019, the Royal Australian College of General Practice (RACGP) reported 65% of patients had discussed psychological health concerns with their GP, outweighing musculoskeletal (40%) and respiratory (39%) health concerns (28). These statistics are alarming and indicate a growing problem that requires further and urgent investigation. The explanatory sequential mixed method used in this research would provide a strong framework for future research as it enables the researcher to gain a holistic picture of complex issues and to translate key findings into health service recommendations.

7.3.1.4 Cost and education campaigns

An interesting finding of this study was the difference between patient and healthcare professionals' perspectives on the role of service costs. The GPPs assumed that cost was a major driver of non-urgent ED presentations, yet this was a relatively minor driver for patients who focused more on service availability, their perceived urgency and service characteristics. In contrast, the three focus groups with GPPs focused on cost, bulk-billing and funding models. Cost, bulk-billing and funding models were a dominant theme for GPPs but not for patients (Chapter 5). This contrast is supported by earlier research in Australia (92) and France (70). Both studies found healthcare professionals were likely to believe cost was a major contributing factor for patients, yet this was not reflected in patient responses.

Affordability will remain essential and has been highlighted by numerous health bodies, included the WHO (136), the Royal Australian College of General Practice (28) and

researchers (42, 73). Nevertheless, cost was not a major theme among patients in this study, despite its location in a regional area that experiences greater socioeconomic disadvantage than other Australian regions (Chapter 4) and has lower rates of GP bulk-billing than other Australian regions (29).

The topic of cost for primary care services versus free ED services has previously been discussed in a tone that attributes blame to patients (44, 92). Instead, patients in this study focused on the characteristics of services such as quality communication, connection with healthcare providers and a need to feel comfortable, not cost.

While the discussion of cost and affordability is complex, it was encouraging to compare the findings of this study with other studies that also found cost was not a major driver of non-urgent ED presentations (1, 6, 59, 61, 70). It is important for healthcare service providers, planners and policy makers to provide services that consider all characteristics valued by patients. The WHO lists these as:

“... high quality, safe, comprehensive, integrated, accessible, available and affordable for everyone and everywhere, provided with compassion, respect and dignity by health professionals who are well-trained, skilled, motivated and committed” (136).

Affordability is mentioned in this list, but it is one of sixteen characteristics. Healthcare providers, planners and policy makers must consider each of these characteristics in planning future models of healthcare and in providing care.

Education campaigns have also been suggested as a potential strategy for driving down non-urgent ED presentations. However, a study from Singapore demonstrated their limited long-term influence, with presentation numbers increasing once the campaign had ended (15). There is a need to move beyond the assumptions of cost barriers and

education, towards ensuring the right healthcare services are available at the time of need and in the location of need.

7.3.1.5 Health services

The number of non-urgent ED presentations by local residents ranged between 38 to 48 per day during the seven-year study period, close to half (46%) of which occurred in-hours. Patients discussed a preference for GP services but reported difficulty in accessing timely appointments. Some even reported the ED to be a “distressing” environment. The GPPs discussed the challenges in providing same-day appointments, stating that appointments typically fill by 10:00am. Furthermore, the GPPs discussed a lack of primary care services in the suburbs of greatest need (socioeconomically disadvantaged).

Limited access to primary care services was a common finding across international research that aimed to understand why patients accessed ED services with non-urgent conditions (1, 5, 6, 22, 33, 37, 38, 42, 43, 46, 54, 56, 60, 62, 63, 67, 68, 70). This presents a unique challenge in the Australian context where acute public ED services are funded and operated by state governments and primary care services are supported by federal Medicare funding government but are privately run. It is uncommon for these groups to work together in joint funding resulting in fragmented service provision.

Patients discussed healthcare service characteristics they valued, these being: communication, connection and comfort. These three characteristics were presented at the key stakeholder forum along with other key findings (Table 6.1). The priority put forward by stakeholders was to establish a service employing a nurse practitioner (NP) and/or community paramedic to triage, assess, treat and/or refer patients as required and within their scope of practice. The group envisaged this first step would then be

integrated into an urgent care-type service based in the area of greatest need (socioeconomically disadvantaged suburb) and would include additional services aiming to provide holistic community-based primary health services.

7.4 Research findings and recommendations

Australia is a mid-high income nation with good quality health care by international standards, yet services are not adequately meeting community healthcare needs (26). The Grattan Institute states that the organisation, management and funding of primary healthcare in Australia are lagging behind changing healthcare needs, economics, and technological improvements (26). Both the Grattan Institute and the Tasmanian Government have recommended better health data collection and analysis to inform service planning, distribution and provision (26, 71). The methods of data collection and analysis in this research could point the way forward to meeting this need. The following recommendations from the findings of this research suggest how this might be done.

7.4.1 Right service, right time, right place

This study highlights a lack of appropriate healthcare services available in areas of socioeconomic disadvantage at the time of need. The WHO released a document in 2018 calling for governments and healthcare providers to deliver “the right health” (137). In this document the WHO list the A-to-E’s for ensuring populations have access to the right services at their time of need and in the right place. These are: **Access to services**; **Breaking down barriers**; **Civil society**; **Determinants of health**, and **Equality and non-discrimination** (137). In Northern Tasmania this would consist of:

- Access to services through the provision of quality healthcare.

- Breaking down barriers through intentional and dedicated efforts to provide services in areas of need, ensuring disadvantage is not increased through a lack of access.
- Civil society would be addressed by ensuring disadvantaged communities are able to participate in the development of health policy and health service design to identify what the right services, available at the right time and in the right place would encompass.
- Determinants of health would also need to be given serious consideration. As discussed in Chapter 6;Section 6.3.4, Tasmanians experience inequalities in the major social determinants of health, including low education levels and high unemployment (71).
- Equity and non-discrimination, or the lack thereof, is reflected in Northern Tasmania through the lack of provision of primary care services located in the suburbs of greatest socioeconomic disadvantage.

The WHO recommends that a “holistic and united response” is required (137). By considering the A-to-E factors and engaging in processes to ensure these points are followed it is possible to establish healthcare providers to provide the right service at the right time and in the right place. The first priority identified at the key stakeholder forum (Chapter 6) was to establish an in-community nurse practitioner (NP) and/or community paramedic role. This innovative approach would address patient health care needs by providing timely services located within an area of socioeconomic disadvantage. In Australia, the majority of NPs are employed within acute care settings (26) yet they are endorsed to “... function autonomously and collaboratively in an advanced and extended clinical role” (138). Furthermore, the Tasmanian Parliament has recommended an expanded scope of practice for NPs to improve healthcare access (71).

This recommendation is in line with the International Nursing Council's guidelines for advanced practice nurses who provide healthcare services to "complex and vulnerable patients or populations" based on their expertise (139). A community paramedic's scope of practice is less clearly defined but they also have set prescribing authority with the "individual practitioner's scope of practice determined by their individual skills, training and competence" (140). The key stakeholders envisaged that these healthcare professionals would provide a unique model of care including triage, assessment and management of patients within their scope of practice, and referral as necessary.

The second priority was to establish additional interprofessional healthcare service in the socioeconomically disadvantaged suburb. This service would provide urgent care and be open seven days with extended hours of practice. The initial NP/paramedic model of care commenced in the lower SEP community would be integrated into this service. The key stakeholders envisaged this would provide high standard, socially inclusive primary health care. Recommendations included additional co-located diagnostic services (pathology, radiology) and the development of an integrated model to include nursing, paramedicine, medicine, pharmacy, allied health, mental health, and social and community services. Patient safety would be met by adopting best practice pathways for care with clear exclusion criteria for patients requiring referral directly to alternative healthcare services such as the ED.

The key stakeholders also recommended this new service be community led and financially viable to facilitate collaborative and integrated services primary healthcare services outside the ED. To achieve this, the stakeholders recommended working with young adults and parents of young children in socioeconomically disadvantaged

communities through existing networks (such as community houses) to further identify specific community needs and priorities to inform health service planning.

7.4.2 Supporting evidence

Work by the WHO (136, 141, 142), (Australian Government) Department of Health (135), Grattan Institute (26), Tasmanian Government (71) and international researchers (73, 105) provide both an evidence and policy foundation for the above recommendations. The WHO developed the Declaration of Alma-Ata in 1978, calling for urgent action to protect and promote health (142). This declaration became pivotal in the development of primary healthcare across international health services. In 2018, this historic document was updated at the WHO Global Conference on Primary Health in Astana (136). The vision for primary health care according to this declaration is stated in Table 7.1. This vision statement highlights a need for integrated, collaborative, person-centred approaches to health service planning, design and governance with suitably qualified professionals in the provision of health care.

Table 7.1. World Health Organization and United Nations Children’s Fund vision for primary health care (136).

<i>Governments and societies that prioritise, promote and protect people’s health and well-being, at both population and individual levels, through strong health systems.</i>
<i>Primary health care and health services that are high quality, safe, comprehensive, integrated, accessible, available and affordable for everyone and everywhere, provided with compassion, respect and dignity by health professionals who are well-trained, skilled, motivated and committed.</i>
<i>Enabling and health-conducive environments in which individuals and communities are empowered and engaged in maintaining and enhancing their health and well-being.</i>
<i>Partners and stakeholders aligned in providing effective support to national health policies, strategies and plans.</i>

The WHO Commission on Social Determinants of Health (CSDH) provides useful strategies for the provision of equitable health care. It emphasises health equity as a

matter of social justice, stating that the role of health systems becomes especially important “... through the issue of access, which incorporates differences in exposure and vulnerability, and through intersectoral action led from within the health sector” (141).

In this research we found limited healthcare services in the areas of greatest socioeconomic disadvantage contributing to inequitable access to healthcare services. The recommendations put forward by the key stakeholders would address this issue and in turn address a key aim identified in the CSDH document by fostering health care services that provide “... cooperative relationships between citizens and institutions” (141). Furthermore, Khanassov, Pluye (73) also recommended similar concepts in addressing the healthcare needs of disadvantaged populations by advocating for the integration of services which combine all primary health services including social and mental health services.

The findings of this study also provide insight into another vulnerable population. An over-representation of children and young adults presenting to the ED with non-urgent presentations was also observed. The focus for health service development should include focused consideration for the needs of younger patients. The National Action Plan for the Health of Children and Young People (Australian Department of Health) focuses on health equity, empowering parents and caregivers, and addressing mental health needs (135). It advocates for effective collaboration through the inclusion of children and young adults in planning processes:

“... it is imperative that children and young people feature at its very core. This includes actively engaging, collaborating and reflecting with children and young people so that they are central in determining and shaping the

services, strategies and approaches that affect them, and – ultimately – are empowered to be healthy, safe and thriving.” (135)

Engagement was achieved in this study by interviewing the parents of children and teenagers, and young adults who shared their perspectives and experiences. The National Action Plan highlights the need for healthcare services that continue to engage and address the needs of younger populations.

A key recommendation of this study was for a holistic, patient-centred model. Similar principles have been put forward elsewhere, but the reality of achieving this is more complex. A scoping review that aimed to identify existing “interventions that improve access to primary care services for vulnerable populations” across Australia and Canada (73), found a lack (research gap) of studies focused on primary healthcare services addressing vulnerability from a patient perspective:

“Formal integration of services means bringing all primary medical and social service providers together, typically with mental health service professionals, to meet the needs of the disadvantaged population.” (73)

The model put forward by this study’s key stakeholders included service integration targeted to community needs and is in line with Tasmanian Government recommendations to provide “proactive” strategies for tackling inequity in access to health care services (71). The review by Khanassov, Pluye (73) reinforces the model put forward by key stakeholders who envisaged an adaptation of services to meet community needs.

7.5 What this study adds

This study adds a unique, holistic approach to the conversation of access to primary healthcare services, non-urgent ED presentations and the needs of disadvantaged populations. Establishing a profile of who presents to the ED with non-urgent

conditions, and when and why they present, and trends in this area, has provided the opportunity to better understand the decision-making processes among over-represented populations. Young patients from socioeconomically disadvantaged areas were significantly over-represented in non-urgent ED presentations and described having limited options available when needed. Patients demonstrated making rational decisions based on service availability and their perceived urgency and unlike health professionals, did not rate cost as a major driver.

The addition of the final translation phase enabled local research knowledge to be presented to key stakeholders and provided the opportunity to develop priorities and recommendations based on the local context using a democratic method. The stakeholder forum resulted in a move away from traditional medical models of care to the recommendation for an interprofessional model of primary healthcare.

The explanatory sequential mixed method used in this study provided a framework to investigate a complex situation. This method was highly beneficial in identifying and explaining drivers of ED demand and included patient and primary care provider perspectives. It also provided clear, research-informed information on the drivers of ED presentations to key stakeholders which led to priorities and recommendations that focused on addressing those drivers. This research provides evidence for the causes of ED demand in Northern Tasmania and outlines recommendations and priorities based on findings. This approach provides an example of how to address the mismatch between causes and solutions as outlined by Morley and colleagues (11). The method used in this research proved effective in the investigation of who presents and when and why they accessed ED services with non-urgent conditions and will be of use to

other research teams aiming to gain deeper insights into complex health needs and service provision, such as understanding the increase in mental health presentations.

These findings will be valuable for policy makers and health service planners in addressing inequitable access to health services in Northern Tasmania and beyond. If the recommendations and priorities are implemented health care assessments and outcomes for vulnerable populations may be improved. Further work could focus on evaluation of interventions implemented to improve health service access and population health outcomes.

7.6 Study limitations

An explanatory sequential mixed method was used in this study. It is a method known to take a greater time due to the need for each phase to be analysed before moving to the next (40). While the time taken to do so was a potential challenge in this study it proved beneficial and facilitated a thorough investigation of the research problem.

Phase one was limited to the quality of data collected at the time of the patient's presentation to the ED. This data is not perfect but in investigation of complex systems there is a need to move beyond traditional models of research towards new 'complexity-informed' models (100). Routinely collected ED data is also used to inform state and federal government reports and is deemed the most suitable data for use in this kind of analysis. Furthermore, during the seven-year period of data collection the ED where this data was collected employed an Emergency Department Information System (EDIS) administrator with a role of verifying data entry. This role is not standard practice in EDs and adds strength to the data used in this study.

Patient interviews and GPP focus groups were conducted in 2018, two years after the retrospective analysis. The reason for this was due to concerns regarding continuity of

the quantitative data after June 2016 when the ED changed to a new data platform. The new platform presented a number of initial challenges and the EDIS administrator role no longer existed. A decision was made not to include data collected after June 2016. It is possible that further findings may have developed if data up until 2018 were included and this may have provided further insight to interviews, focus groups and the key stakeholder forum.

A further limitation of the explanatory sequential mixed method is its dependency on the researcher's ability to decide which quantitative results require further investigation in the qualitative phase. In this study, this was undertaken by revisiting the quantitative analysis and careful consideration of current international literature. Finally, patient interviews were limited to those of participants who agreed to participate and may have limited the perspectives and experiences of other patient populations. For example, it is likely that interviews with patients with mental health conditions may have contributed additional findings. Further investigation into the service requirement of patients with mental health conditions in this region is recommended.

7.7 Implications for policy and practice

This study provides greater insight into who presented to the ED in regional Northern Tasmania with non-urgent conditions and when and why they presented. The implications of this study will inform policy aiming to address inequity in healthcare service planning and provision. The results show that services aiming to meet the needs of socioeconomically disadvantaged populations must provide socially inclusive patient-centred services with extend hours of service. These services also need to be located within the area of greatest need.

Moving well beyond any notion of patient-blame, the findings of this study found a lack of primary care services for presenting patients. Holistic, socially inclusive, patient-centred models are needed to meet local community needs and provide sustainable models of care into the future.

7.8 Final discussion

The aim of this study was to identify the health service requirements of patients presenting to the ED with non-urgent conditions and to translate these findings into recommendations for local health services and areas for future research. The findings highlight inequitable access to healthcare services by young and socioeconomically disadvantaged populations and a rising demand for mental health services. Interviews revealed that patients made considered and rational decisions based on their perceived urgency for medical attention and the services available to them when needed. Key stakeholders believed that solutions should involve high quality primary healthcare providing access to a range of services including diagnostic and imaging, that would be integrated with holistic and interprofessional services, thus moving away from traditional medical-based primary healthcare models. Professional services would include nursing, paramedical, medical, allied health, mental health and social services and would be socially inclusive and informed by local community needs and priorities.

The findings of this study provide a clear picture of the healthcare needs of patients presenting to EDs with non-urgent conditions. This patient population contribute to over half of all ED presentations in Northern Tasmania and just under half of all presentations across Australia. Implementation of the recommendations and priorities put forward by the key stakeholders would improve equitable access to patient-centred primary healthcare services, available at the time of need and in the right location.

The Grattan Institute states:

“Internationally, the evidence suggests that primary care systems which provide universal access to a comprehensive range of local, community-based services that are well integrated, coordinated and continuous, produce better health outcomes and more efficient health services. Evidence remains limited, but to the extent it is available it suggests stronger primary care cuts the number of avoidable hospital visits, improves population health, ensures better access and reduces inequity.” (26)

It is foreseeable that the evidence-informed recommendations put forward by the stakeholders would provide ‘integrated, coordinated and continuous’ care leading to improved health outcomes for a vulnerable population. This study opens the way for future research aiming to ensure patient-centred, equitable access to health services.

Chapter 8 – Conclusion

8.1 Overview

This final chapter provides a summary of the research project along with its significance and contribution to its field. Suggestions for future research are summarised along with recommended methods for investigation.

Finally, the thesis finishes as it began, with a reflection. Reflection enables us to look back on past events and experiences and learn; it informs our future choices and actions – and hopefully ways we might improve.

8.2 Summary

Emergency departments are a microcosm of the communities they serve and act as the canary in the coalmine for health services, alerting governments, service providers and researchers of deficits in health care provision. Internationally EDs continue to face increasing demands. In 2019 Australian EDs saw over eight million presentations, and almost half were non-urgent. More than mere numbers, each of these eight million presentations signified a personal experience like those contained in the vignettes in Chapter 1 – patients, who like Danielle and Ryan, knew they did not need emergency care but were unable to access alternative healthcare services at the time they needed them.

Northern Tasmania's higher proportion of non-urgent ED presentations is driven by younger patients and those from socioeconomically disadvantaged suburbs. Their presentations were non-urgent and could have potentially been met by suitable local primary healthcare services, should these have existed. This research also identified a significant increase in mental health presentations among non-urgent ED presentations. Patients were found to make considered and rational decisions based on their perceived urgency and service availability.

Leaders in health service provision, academia and community services recommended a community-based nurse practitioner and/or community paramedic as a starting point for improved access to high quality, interprofessional and integrated health care. This recommendation was informed by the rigorously collected data from the first two phases of this research, which pointed to developing evidence-based solutions. These solutions also fit within the WHO's A-to-E recommendations for ensuring the right service is available at the right time and in the right place (137). The methods used in

this study provide a strong example of research that can address the current mismatch between the causes of ED demand and effective and sustainable solutions.

8.3 Study significance and contribution

Inequitable access to healthcare services by vulnerable populations coupled with a growing demand for mental health support was highlighted in this research and demonstrates the healthcare needs in this regional Australian community. The routinely collected ED data (2009 to 2016) used in this study has been used for multiple government reports, yet the conclusions drawn from this analysis have not been previously reported to the best of the candidate's knowledge. Using the data in this way has provided direction for future research and priorities for health service planning.

While focused on a local context this study is translatable across other healthcare settings and will be of use to health service planners and policy makers, particularly in regional and rural areas experiencing similar challenges. Findings from this study have already been used to inform state government and private health insurance reports (Appendixes 2 and 3).

The explanatory sequential mixed method was highly valuable in establishing evidence-based and contextually relevant recommendations. Through establishing a patient profile and identifying trends to inform a purposive sample for interviews this research provides deeper understanding of patient needs. New insight informed targeted strategies to address the situation of ED demand and access to primary healthcare services. This approach provides a strong example for how research in complex health systems can be conducted; it is strengthened by using quantitative analyses and patients' experiences to inform the collaborative recommendations put forward by key stakeholders.

The approaches used in this study will assist researchers to understand local health care needs and establish priorities for future service planning. This study found patient participants to understand when to present to primary care or ED; therefore a public health campaign to dissuade them from using the ED would be of little or no use. Limited service availability was a major driving factor of non-urgent ED presentations, but cost was not. Extended hours and better situated services will have more impact than bulk-billing. These conclusions negate the validity of the 'blaming' stance some health professionals held towards non-urgent ED-users. The patient's voice is integral to effective service change.

8.4 Suggestions for future work

This study has provided a foundation for future research and highlights the need for research that crosses between acute and primary models of care, and values patients' perspectives and experiences. Addressing the increasing presentations for mental health requires a program of research with further use of an explanatory sequential mixed method. This study focused on ATS 4 and 5 presentations; further investigation is required to determine the level of need for mental health services across all ATS levels. The findings of patients' experiences and perspectives in this study did not include any from patients presenting with mental health concerns. This additional knowledge would inform future patient-centred mental health services.

8.5 Reflection

As I reflect over my research experience beginning in 2015, I cannot forget my own initial biases and judgements of patients who presented to the ED with non-urgent conditions. I remember several occasions when I was triaging patients wondering why they had come to the ED and why they had not tried something more 'suitable'. In my mind these

presentations were 'inappropriate' – I was blaming these patients. This blame came out of my own misunderstanding of complex healthcare systems and the challenges for patients in navigating them. This research has led me to have a different view. I now realise that a lack of alternative primary care services is a major driver of ED demand. A moment that will be forever etched in my memory was when I was sitting in the office one afternoon, looking at the bubble graph which is presented here as (Figure 4.3. It so clearly demonstrated the over-representation of ED patients from the most disadvantaged suburbs. As I looked at the graph I mapped where these suburbs were and where the largest general practices were located. Despite having worked in healthcare in this city for over 25 years it was not until that moment that I realised how inequitable access to health services was. I was shocked by the revelation, shutdown my computer and went home. After hearing patients' experiences and researching this topic, I am forced to admit that even in a healthcare system like Australia's we are still a long way from having universal health care. My hope remains to see improved access to healthcare services and improved health outcomes for the most disadvantaged and vulnerable of our populations.

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Appendix 1

Emergency department crowding: A systematic review of causes, consequences and solutions

Morley C, Unwin M, Peterson GM, Stankovich J, Kinsman L. Emergency department crowding: A systematic review of causes, consequences and solutions. PloS One. 2018;13(8):e0203316.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0203316>

Systematic review undertaken during candidature; the candidate undertook the role of second reviewer. This review has informed this PhD research but is not an assessable component of the thesis.

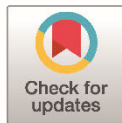
RESEARCH ARTICLE

Emergency department crowding: A systematic review of causes, consequences and solutions

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Abstract

Background

Emergency department crowding is a major global healthcare issue. There is much debate as to the causes of the phenomenon, leading to difficulties in developing successful, targeted solutions.

Aim

The aim of this systematic review was to critically analyse and summarise the findings of peer-reviewed research studies investigating the causes and consequences of, and solutions to, emergency department crowding.

Method

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed. A structured search of four databases (Medline, CINAHL, EMBASE and Web of Science) was undertaken to identify peer-reviewed research publications aimed at investigating the causes or consequences of, or solutions to, emergency department crowding, published between January 2000 and June 2018. Two reviewers used validated critical appraisal tools to independently assess the quality of the studies. The study protocol was registered with the International prospective register of systematic reviews (PROSPERO 2017: CRD42017073439).

Results

From 4,131 identified studies and 162 full text reviews, 102 studies met the inclusion criteria. The majority were retrospective cohort studies, with the greatest proportion (51%) trialling or modelling potential solutions to emergency department crowding. Fourteen studies examined causes and 40 investigated consequences. Two studies looked at both causes and consequences, and two investigated causes and solutions.

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Conclusions

The negative consequences of ED crowding are well established, including poorer patient outcomes and the inability of staff to adhere to guideline-recommended treatment. This review identified a mismatch between causes and solutions. The majority of identified causes related to the number and type of people attending ED and timely discharge from ED, while reported solutions focused on efficient patient flow within the ED. Solutions aimed at the introduction of whole-of-system initiatives to meet timed patient disposition targets, as well as extended hours of primary care, demonstrated promising outcomes. While the review identified increased presentations by the elderly with complex and chronic conditions as an emerging and widespread driver of crowding, more research is required to isolate the precise local factors leading to ED crowding, with system-wide solutions tailored to address identified causes.

Introduction

Emergency Department (ED) crowding has been described as both a patient safety issue and a worldwide public health problem [1]. While many countries, including Ireland [2], Canada [3], and Australia [4], report significant and unsustainable increases in ED presentations, a growing number of studies have found that these increases cannot be explained by population growth alone [4–6]. Crowding in the ED can occur due to the volume of patients waiting to be seen (input), delays in assessing or treating patients already in the ED (throughput), or impediments to patients leaving the ED once their treatment has been completed (output) [7]. Consequently, there are likely to be many different causes of crowding, depending on when and where in the patient journey the crowding occurs. Therefore, if the international crisis [8] of ED crowding is to be solved, it is crucial that interventions designed to resolve the problem are tailored to address identified causes.

Recognising that crowding had become a major barrier to patients receiving timely ED care, Asplin and colleagues [7], in 2003, issued a ‘call to arms’ to researchers and policy makers to focus their efforts on alleviating the problem. Many answered the call, and there now exists considerable published research addressing the ED crowding agenda. Despite this, and perhaps due to the relative lack of published studies investigating the causes of crowding, many myths seem to persist as to the drivers of the problem [9, 10], thereby making the implementation of successful, sustainable solutions difficult. A systematic and critical review of the available evidence can aid researchers, clinicians and managers to make decisions regarding the best course of action [11].

The most recent comprehensive synthesis of the literature, that we identified, investigating the causes, effects and solutions to ED crowding, was undertaken ten years ago (2008) [8]. With the fast changing pace of research in the emergency medicine arena, it was anticipated that in the intervening years there would have been many developments as regards identifying both causes and consequences of ED crowding, as well as the implementation of successful solutions. The aim of this review was to expand on and provide an updated critical analysis of the findings of peer-reviewed research studies exploring the causes or consequences of, or solutions to, ED crowding.

Method

Definition of crowding

There is currently no consensus on the correct tool or unit of measurement to define ED crowding [12], with one systematic review identifying 71 unique measures currently in use

[13]. We therefore elected to include papers that had used any of the most commonly accepted metrics. These included: ED length of stay (EDLOS), rates of 'left without being seen' (LWBS) or did not wait (DNW), hours of ambulance bypass/diversion, hours of access block/boarding hours, proportion of presentations meeting nationally mandated, timed patient disposition targets (e.g. the Australian National Emergency Access Target (NEAT), the UK 4-hour target or the NZ Shorter-stays-in-emergency-departments target), Emergency Department Work Index (EDWIN) score, National Emergency Department Overcrowding Scale (NEDOCS) and ED census. Some studies used more than one of these measures as the dependent variable.

Search strategy

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed (S1 Table) [11]. A search was performed on four electronic databases: Medline, CINAHL, EMBASE and Web of Science. Search terms used were: 'emergency department', 'accident and emergency', 'ED', 'emergency service' "AND" 'crowding', 'overcrowding', 'utilisation', 'congestion' "AND" "OR" 'consequences', 'outcomes', 'harm', 'negative impact', 'mortality', 'causes' 'strategies', 'solutions', 'interventions'. All research published in the English language between January 2000 and June 2018 was eligible for inclusion. There was no restriction on types of studies, with quantitative, qualitative and mixed-methods studies all eligible for inclusion. Studies had to satisfy the following inclusion criteria to be considered: full text original research articles, published in peer-reviewed journals, investigating the causes and/or consequences of, and/or solutions to, crowding in general EDs. As research suggests that crowding may have different effects in paediatric populations compared to adults [14], studies undertaken in paediatric EDs were excluded. Full details of the search strategy are available in supplementary material (S1 File).

Study selection, assessment and data extraction

One reviewer (CM) reviewed the titles and abstracts to identify relevant articles. Two reviewers (CM and MU) independently reviewed the full text articles to determine which of the studies met all of the inclusion criteria. Where consensus could not be reached by discussion, a third reviewer (LK) acted as adjudicator until unanimity was achieved. Two reviewers (CM and MU) used the Scottish Integrated Guidelines Network (SIGN) critical appraisal tools [15] to assess the quality of the studies. Four reviewers worked in two pairs (MU and GP, LK and JS), using a standardised form, to extract data from the included studies. Extracted data included study design, setting and population, sample size, primary and secondary outcomes, and whether consequences affected staff, patients or the system, and causes and solutions were related to input, throughput or output factors. Disagreements were resolved by discussion until a consensus was reached, with the fifth reviewer (CM) available to act as arbitrator, if required. Details of the protocol for this systematic review were registered on PROSPERO [16] (S2 File).

Results

The database search returned 5,766 articles. Thirteen additional articles were added after searching the reference lists from identified studies, leaving a total of 4,131 articles after duplicates were removed. After the initial review of titles and abstracts, 162 full text articles were retrieved for full review, with 102 of these satisfying all of the inclusion criteria, and therefore included in the final review (Fig 1).

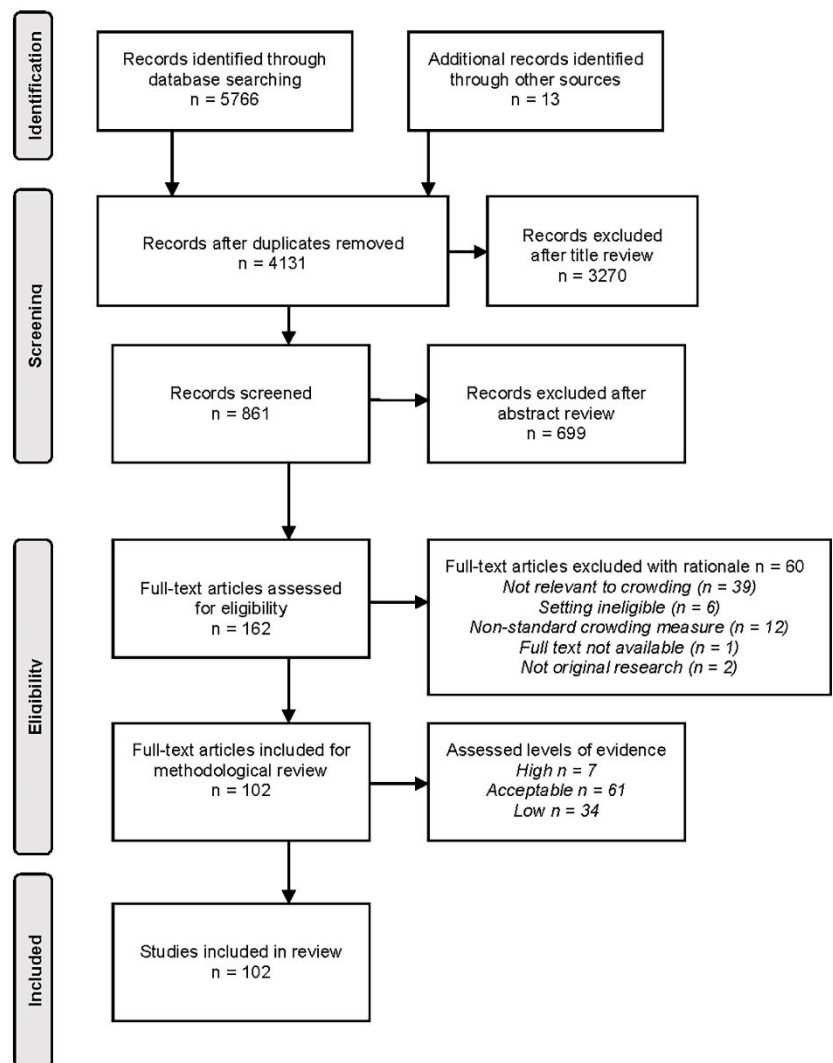


Fig 1. Preferred reporting items for systematic reviews.

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Study characteristics

The majority of studies were quantitative (95%) and retrospective in nature (87%), with eight prospective studies included, four each for studies investigating consequences [17–20] or solutions [21–24]. Four randomised control trials evaluating potential solutions were included [25–28], with the remaining studies being mixed-methods or statistical modelling. The majority of studies were from the USA (47%), Australia (18%) and Canada (9%), with 72% of studies having been published in the previous ten years (2009–2018). The largest proportion of studies addressed either the solutions to (51%) or consequences of (39%) ED crowding (Tables 1 and 2).

Table 1. Studies investigating potential solutions to reduce ED crowding ($n = 52$).

Author / Country / year	Design	Aim/s	Sample	Summary of intervention	Primary outcome measure/s	Level of evidence	Summary of findings
Anantharaman / Singapore / 2008 [32]	Retrospective cohort	To review the effects of 4 social interventions on ED utilisation		1. Three public education campaigns on proper use of ED 2. Financial disincentives for ED attendance 3. Redirection of non-emergencies from the ED 4. Provision of alternative clinics for those redirected and patients with minor complaints	Average non-emergency attendance	Low	1. Smaller reductions in non-emergency attendances post each campaign 2. Decrease in non-emergency attendances increased as ED fee increased 3. Number of patients redirected declined over time. Scheme ceased due to adverse public relations incidents 4. Decrease in non-emergency attendances seen with evening clinics, but time cost to ED showed no substantial benefit. Walk-in clinics had no impact on ED attendances
Arain / UK / 2015 [33]	Retrospective cohort and survey	To determine the impact of a GP-led WIC on the demand for ED care.	Minor attendances at 1 x Paediatric ED, 1 x Adult ED and 1 X MIU, 1 year pre and 1 year post opening of WIC 488 surveys completed	Opening of a GP-led WIC, 8:00–21:00 7 days a week	Minor attendances at 1 x Paediatric ED, 1 x Adult ED and 1 X MIU (Quant analysis) Attendances at the WIC by 'GP-Type' cases (Survey)	Acceptable	Significant 8.3% reduction in adult daytime GP-type attendances.
Arya / USA / 2013 [34]	Retrospective chart review	To determine the effect of a split-level ESI 3 flow model on LOS for all discharged patients.	20,215 pre 20,653 post	'Splitting' of patients with ESI 3 into low and high-variability	LOS for discharged patients.	Acceptable	Significant 5.9% reduction in LOS for all patients.
Asha / Australia / 2014 [35]	Pre-post, retrospective cohort	To determine if an emergency journey coordinator (EJC) improved NEAT compliance through resolving delays in patient processing	23,848 pre 20,884 post	Additional senior nursing role (EJC) in ED 7/7 from 14:30 to 23:00hrs. Conducted continuous rounds, focussed on patients approaching 2–3 hrs in ED, to identify delays and resolve issues to facilitate departure within 4 hrs	Proportion of patients meeting NEAT. ED occupancy. Ambulance transfer of care times. LWBS rates.	Acceptable	Significant 4.9% increase in patients meeting NEAT targets. Significant decrease of 2 patients in median ED occupancy. Non-clinically significant 56 second increase in ambulance transfer of care
Barrett / USA / 2012 [36]	Pre-post, retrospective, cohort	To assess the impact of a bed management strategy on boarding time of admitted patients in the ED	10,967 ED presentations	Implementation of new positions to ensure timely identification and allocation of inpatient beds. Improved communication around discharge and bed availability. Education for all clinical staff re new bed management policy.	EDLOS. Time from decision to admit until transfer to inpatient bed. LWBS rates. Hrs of ambulance bypass. Hold hrs (time >1 hr in ED post admission decision).	Low	21% reduction in mean EDLOS (admitted patients) 52% reduction in boarding time. 0.7% reduction in LWBS. 11% reduction in hrs of ambulance bypass. 61% reduction in hold hrs.

(Continued)

Table 1. (Continued)

Author / Country / year	Design	Aim/s	Sample	Summary of intervention	Primary outcome measure/s	Level of evidence	Summary of findings
Begaz / USA / 2017 [27]	RCT	To assess the impact of initiating diagnostic tests from the ED waiting room for patients with abdominal pain on EDLOS	848 intervention 811 control	Stable patients (usually triage cat 3) with a chief complaint of abdominal pain randomised to either undergo diagnostic testing while in the waiting room or no testing until assigned an ED bed, following a rapid medical assessment on arrival	Time in an ED bed EDLOS LWBS rate	High	Significant 32 min reduction in mean time in an ED bed Significant 44 min reduction in mean EDLOS
Buckley / Australia / 2010 [37]	Retrospective time series analysis	To assess the impact of an after-hours GP (AH GP) clinic on the number of daily low-urgency presentations to ED	345,465 ED presentations	Opening of a user-pays AH GP clinic in a large regional centre with one ED	Daily ED presentations	Acceptable	Significant reduction of 7.04 patients per day (ATS 4&5) or 8.2% reduction in total presentations Daily increase of 1.36 patients (ATS 1,2 & 3) or 1.6% in total presentations
Burke / Australia / 2017 [38]	Prospective observational	To assess the impact of a new model of care on EDLOS	35,428 intervention 35,623 Control	Combines clinical streaming, team-based assessment and senior consultation	EDLOS NEAT compliance LWBS rate	High	Significant reduction in mean EDLOS Significant increase in proportion of patients meeting NEAT targets Significant reduction in LWBS rate
Burley / USA / 2007 [39]	Retrospective cohort	To assess whether quality improvement initiatives can improve flow for ED admitted patients	6 months pre, 6 months post	Consensus from key stakeholders that admitted patients not remain in ED ED patients given priority for inpatient beds Nurse handover faxed rather than telephoned Transportation staff placed in ED with priority given to admitted patients Two-tiered response to capacity limitations	Median time from bed request to assignment Median time from bed assignment to disposition EDLOS for admitted patients	Low	Significant reduction in median time from bed request to assignment in 3 of 6 months Significant reduction in median time from bed assignment to disposition in all months Significant reduction in median EDLOS in 5 of 6 months
Burström / Finland / 2016 [40]	Pre-post, retrospective, cohort	To assess the impact of Physician led triage on efficiency and quality in the ED	20,023 pre 23,765 post	Senior physician and nurse triage all newly arrived patients. Next a team of junior physician, 1 x RN and 1 x nursing assistant care for patient following a detailed protocol to preform standardised work	Multiple time measures LWBS Unscheduled returns (24 and 74 hr) Mortality (7 and 30 day)	Low	Significant decreases in: EDLOS LWBS rates Unscheduled returns Mortality within 7 and 30 days of first visit

(Continued)

Table 1. (Continued)

Author / Country /year	Design	Aim/s	Sample	Summary of intervention	Primary outcome measure/s	Level of evidence	Summary of findings
Cha / Korea / 2015 [41]	Retrospective cohort	To determine the long-term effects of an independent capacity protocol (ICP) on ED crowding metrics	271,519 ED presentations over 6 years, 3 years pre, 3 years post	ICP converted ED into temporary, nonspecific ward. ED physicians assisted by specialists in determining disposition. When condition allowed, patients transferred to surrounding community hospitals.	EDLOS	Low	Significant decrease in EDLOS
Chang / USA / 2018 [24]	Mixed Method	To identify strategies among high-performing, low-performing, and high performing improving hospitals to reduce ED crowding		No intervention. Interview data from 60 key leaders in 4 high-performing (top 5%), 4 low-performing (bottom 5%), and 4 improving hospitals		Low	No specific strategies identified. Identified 4 organisational domains associated with high performance hospitals; executive leadership involvement, hospital-wide coordinated strategies, data-driven management and performance accountability
Copeland / Canada / 2015 [42]	Pre-post, retrospective, cohort	To determine if ED fast-track (FT) is an efficient strategy to reduce wait times in a single physician coverage ED	7,432 ED visits	Open from 09:00–21:00hrs. 5 acute beds plus some chairs allocated to FT. Specially trained triage nurses allocated patients to either acute care or FT. Once a number of FT patients together, physician assessed and treated sequentially.	Wait time LOS	Acceptable	Significant 6 min reduction in medium wait time Significant 3.6% increase in patients meeting Canadian standard time guidelines
Dolton / UK / 2016 [43]	Retrospective, case control	To evaluate the impact of a pilot of 7-day opening of GP practices on ED attendances	4 pilot GP practices 30 'control' practices	4 geographically dispersed GP clinics opened 7 days a week. Advertised in local area and at the local ED	ED attendance	Acceptable	Significant 9.9% drop in total ED attendances Significant 17.9% drop in weekend ED attendances
Douma / USA / 2016 [28]	RCT	To evaluate the effect of 6 nurse-initiated protocols on ED crowding	67 control 76 intervention	6 updated protocols for nurse-initiated treatment commenced. Training provided to 30 nursing staff on protocol use.	Time to diagnostic test Time to treatment EDLOS	Low	Significant 186 min reduction in time to analgesic administration Significant 79 min reduction in time to troponin measurement Significant reduction in EDLOS for 3 of 6 protocols

(Continued)

Table 1. (Continued)

Author / Country /year	Design	Aim/s	Sample	Summary of intervention	Primary outcome measure/s	Level of evidence	Summary of findings
^Estey / Canada / 2003 [31]	Exploratory field study	To describe the perceptions of health care professionals on potential solutions to ED crowding	Seven focus groups representing all 7 EDs in the region.	Suggestions from focus groups, no intervention		Low	Increased test turnaround-time (TAT). Better ED staffing. Faster response from admitting teams. Holding unit for admitted patients. More inpatient beds. 24hr outpatient appointments.
Fulbrook / Australia / 2017 [44]	Non-randomised controlled trial	To assess the effect of a nurse navigator role on NEAT performance	9,822 intervention 9,951 control	Nurse navigator worked 12:30–20:30 on a week-on, week-off basis for 20 weeks.	NEAT compliance EDLOS	Acceptable	Significant increase in proportion of patients meeting NEAT targets Significant reduction in mean EDLOS
Han / USA / 2008 [45]	Pre-post, retrospective, cohort	To determine the impact of physician triage on ED crowding measures	8,569 ED visits pre 8,569 ED visits post	After nurse triage, a dedicated physician initiated diagnostics and treatments of patients in the waiting room, 7/7 between 13:00–21:00hrs	EDLOS LWBS rates Ambulance diversion hrs	Acceptable	Significant 14 min reduction in EDLOS for discharged patients Significant 2% reduction in LWBS rates Reduction in ambulance diversion hrs
Holroyd / USA / 2007 [25]	RCT	To evaluate the implementation of triage liaison physician (TLP) shifts on ED crowding	136 shifts: 2,831 ED presentations (intervention) 133 shifts: 2,887 presentations (control)	3 x 2 week blocks where shifts randomly allocated to TLP shifts versus not (11:00–20:00hrs) TLP mitigated factors impeding throughput including: supported/assisted triage nurses, evaluated ambulance patients, initiated diagnostic studies	EDLOS LWBS rates	High	Significant 36 min decrease in EDLOS LWBS rates decreased significantly from 6.6 to 5.4%.
Howell / USA / 2008 [46]	Pre-post, retrospective, cohort	To measure the impact of an 'active bed management' intervention on EDLOS and ambulance diversion hrs	17,573 ED visits pre 16,148 ED visits post	Dedicated physician role, working in 12 hr shifts, 24/7. Physician freed from all other clinical duties. Assessed real time bed availability and made collaborative triage decisions re optimal clinical setting for patient's requiring admission. New bed director position who could call in extra staff and admit patients outside of speciality area.	Admitted and discharged EDLOS	Acceptable	EDLOS for admitted patients reduced by 98 min, with no change for discharged patients Reduction in ambulance diversion hrs

(Continued)

Table 1. (Continued)

Author / Country / year	Design	Aim/s	Sample	Summary of intervention	Primary outcome measure/s	Level of evidence	Summary of findings
Imperto / USA / 2012 [47]	Pre-post, retrospective, cohort	To determine if physician-in-triage (PIT) improves ED patient flow	17,631 patients	After nurse triage, PIT assessed and ordered diagnostics and treatments as required. Tasks performed by an RN and technician assigned to PIT.	Time to physician evaluation Median LOS Time to disposition decision LWBS rate	Acceptable	Significant reductions in: Median time to physician Median EDLOS Hrs on ambulance bypass
Jang / USA / 2013 [26]	RCT	To compare EDLOS between patients assigned to metabolic Point-of-care testing (POCT) versus central laboratory testing	10,244 patients	Patients randomised to either POCT or central laboratory testing	EDLOS	High	Reduced median EDLOS by 20 min in patients assigned to POCT
Jarvis / UK / 2014 [21]	Prospective, observational, cohort study	To compare the impact of an emergency department intervention team (EDIT) with a traditional nurse triage model on EDLOS	3,835 control 787 intervention	All ED patients assessed by EDIT Nurse history, observations and administration of initial treatments, compilation and execution of an investigation plan. All discharged patients thoroughly examined by consultant. POCT utilised as appropriate. Non-discharged patients transferred to central cubicle area for traditional care	"Time to ED ready" (i.e. time from registration to time all ED care complete). Time from arrival to first contact with clinical staff. Time from arrival to start of assessment by member of clinical staff.	High	Significant 53 min decrease in median time to ED ready Significant 8 min decrease in median time to assessment by member of clinical staff
Jones / NZ / 2017 [48]	Retrospective cohort	To assess for changes in clinically relevant outcomes after the introduction of a national target for EDLOS	5,793,767 ED presentations 2,082,374 elective admissions to 18 of 20 potential district health boards	Nationally mandated that 95% of ED presentations would be admitted, discharged or transferred within 6 hrs of arrival. Wide variety of process, staffing and structural changes implemented at different hospitals	EDLOS IPLOS ED representations ≤ 48 hrs Readmissions ≤ 30 days Access block	Acceptable	Significant reduction of *0.29 days in median IPLOS Significant reduction of *1.1 hrs in median EDLOS No change in ED representations ≤ 48 hrs Significant *1% increase in readmissions ≤ 30 days Significant *27% reduction in access block *Determined <i>a priori</i> to be of clinical significance
Kelen / USA / 2001 [22]	Prospective, pre-post, observational	To determine the impact of an inpatient, ED-managed acute care unit (ACU) on ED overcrowding	10,871 ED presentations, 1,587 patients in the ACU (14.4% of ED census)	Opening of a 14-bed monitored unit, located at a distance remote to the ED, within the hospital. Staffed by ED personnel. Designed to accept ED patients who required observation or management for >4 hrs.	LWBS rates. Hrs of ambulance diversion.	Acceptable	Significant decrease in LWBS rates. Significant decrease in hrs of ambulance diversion.

(Continued)

Table 1. (Continued)

Author / Country /year	Design	Aim/s	Sample	Summary of intervention	Primary outcome measure/s	Level of evidence	Summary of findings
Kim / Korea / 2012 [49]	Retrospective cohort	To evaluate the effects of a short text message reminder to decision makers who delay assessing patients in the ED on EDLOS	1,693 consulted patients pre 1,642 consulted patients post	2-4-8 SMS project When no decision on patient disposition entered on computer 2 hrs post referral, SMS reminder sent to resident. Same at 4 hr mark. Admissions delayed 8 hrs, SMS sent to relevant faculty/admissions office	EDLOS Consultation time Disposition time Boarding time	Low	Significant 36 min reduction in median EDLOS for admitted patients No effect on consultation time Significant decreases in disposition and boarding time
Lauks / Holland / 2016 [50]	Pre-post, retrospective, cohort	To assess the impact of implementing medical team evaluation (MTE) in the ED	47,743 ED visits	Physician teamed with a triage nurse, 7/7, between 09:00–22:00hrs. Physician initiated diagnostics and treatments and discharged ESI 5 patients.	Door-to-doctor time EDLOS	Acceptable	Significant 30 min decrease in median door-to-doctor time Significant 15 min increase in median EDLOS
Lee / Taiwan / 2017 [51]	Retrospective cohort	To assess the impact of high turnover 'ED utility beds' on ED crowding	70,515 control 69,706 intervention	14 beds for ED patient use only with strict regulations to govern occupancy. Restriction of 48-hr limit for each patient	EDLOS LWBS rates	Acceptable	Significant 1.7 hr decrease in mean EDLOS for all admitted non-trauma patients No change in EDLOS for discharged patients No change in rates of LWBS
Lee-Lewandrowski / USA / 2003 [52]	Pre-post, retrospective, cohort	To investigate the impact of a POCT satellite laboratory in the ED	369 patients	Clinicians had option of central laboratory or POCT for urinalysis, pregnancy testing, cardiac markers and glucose	Test TAT EDLOS	Low	87% reduction in test TAT Significant 41 min decrease in EDLOS for combined patients having 3 tests (excluding glucose) No significant decrease for patients having single test EDLOS for patients who did not receive POCT increased by non-significant 11 min
Lee-Lewandrowski / USA / 2009 [53]	Pre-post, retrospective, cohort	To evaluate the impact of implementing rapid D-dimer testing in an ED satellite laboratory	252 patients pre 211 patients post	24 hr satellite laboratory in the ED had ability to undertake rapid D-dimer testing	Test TAT EDLOS	Low	79% decrease in test TAT Significant 1.32 hr decrease in mean EDLOS for patients who received D-dimer testing
Mason / UK / 2011 [54]	Retrospective data analysis	To evaluate the effect of the mandated ED care intervals in England	735,588 ED visits from 15 hospitals over 4 years. Mix of high, middle and low performing	Nationally mandated 4 hr target for patient disposition for 98% of ED presentations. Specific interventions not detailed but hospitals expected to adopt a whole-systems approach	EDLOS Time to first ED clinician review	Acceptable	Proportion leaving ED within 4 hrs increased from 83.9 to 96.3% Median EDLOS for admitted patients decreased by 25 min

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Table 1. (Continued)

Author / Country / year	Design	Aim/s	Sample	Summary of intervention	Primary outcome measure/s	Level of evidence	Summary of findings
McGrath / USA / 2015 [55]	Retrospective cohort	To evaluate the impact of a flexible care area (FCA) on ED throughput measures	417 days over 2 years when FCA was operational	3 roomed area staffed by ED physician, RN and ED technician from 16:00–23:00hrs. Prioritised moderate acuity to expedite ordering of diagnostics	EDLOS LWBS rate	Low	Significant decrease in EDLOS for some ESI categories Significant reduction in rates of LWBS
McHugh / USA / 2013 [56]	Retrospective, cross-sectional	To evaluate the efforts of five hospitals (a-e) that introduced various interventions to reduce ED crowding		a. PIT b. Faxed report from ED to admitting unit and bed coordinator c. Adoption of ESI triage scale, bedside registration and staff resourcing for ED fast-track area d. More efficient intake process for non-urgent patients e. Improved process to request specialist consults	EDLOS LWBS rates	Low	a. Significant reduction in EDLOS for mid-acuity patients (target group) b. Significant reduction in LWBS rates c. Significant reduction in EDLOS d. Significant reduction in EDLOS e. Increase in EDLOS
Mumma / USA / 2014 [57]	Retrospective cohort	To determine the effects of ED expansion on ED crowding	42,896 pre 48,358 post	ED expanded from 33 to 53 beds No substantial changes to physician staffing or nurse/technician to patient ratios	LWBS rates Daily boarding hrs	Low	No change in LWBS rates Significant increase in boarding hrs from 160 hrs per day to 180 hrs per day
Nagree / Australia / 2004 [58]	Retrospective, cohort	To model the capacity of after-hours GP services to reduce low acuity presentations (LAPs) to metropolitan EDs	183, 424 ATS 3–5 patients	No intervention. Modelling the impact of AII GP services	Excess LAPs	Acceptable	After-hours GP services for LAPs are unlikely to significantly reduce total ED attendances or costs
Ngo / Australia / 2018 [59]	Retrospective cohort	To assess the impact of the Western Australia (WA) 4 hr target on ED functioning and patient outcomes	3,214,802 ED presentations across 5 hospitals (2002–2013)	Implementation of a 4 hr rule (NEAT) whereby 90% of ED patients in the state of WA were to be admitted, discharged or transferred within 4 hrs of arrival	Access block ED occupancy rate ED re-attendances ≤ 1 week EDLOS	Acceptable	Significant decrease in percentage of access block at all hospitals Significant decrease in median ED occupancy at 4 of 5 hospitals Significant decrease in median EDLOS at 4 of 5 hospitals
Partovi / USA / 2001 [60]	Retrospective, cohort	To investigate the effect of Faculty triage on EDLOS	8 intervention days 8 'control' days	A faculty member was added to the triage team of 2 nurses and one emergency medicine technician. Their role included: rapid evaluation, move serious patients to main area, order diagnostics and fluids, discharge simple cases and encourage rapid registration	Nurse triage time Nurse discharge time LWBS rates	Low	Significant 82 min reduction in mean EDLOS

(Continued)

Table 1. (Continued)

Author / Country / year	Design	Aim/s	Sample	Summary of intervention	Primary outcome measure/s	Level of evidence	Summary of findings
Patel / USA / 2014 [61]	Pre-post, retrospective, cohort	To assess the effect of a leadership-based program to expedite hospital admissions from the ED	25 months pre 47 months post	Team of hospital leaders convened. Computerised tracking system used to monitor ED bed status in real time. Agreement to admit patients within 1 hr of decision to admit	Proportion of ED patients admitted to inpatient bed within 60 mins of bed request	Acceptable	Significant 16% increase in proportion of patients admitted within 60 mins of bed request
Perera / Australia / 2014 [62]	Pre-post, retrospective, cohort	To assess the effect of NEAT on common crowding metrics	76,935 patients	Hospital-wide education program to increase awareness of NEAT initiative	EDLOS IPILOS Proportion of admissions meeting NEAT Mortality rates	Acceptable	Significant improvements in: EDLOS NEAT admission targets Access block Significant increase in IPILOS No change to mortality rates
Quinn / USA / 2007 [63]	Pre-post, retrospective, cohort	To determine the impact of a rapid assessment policy (RAP) on EDLOS	10,153 pre 10,387 post	ED physicians directly admit patients to inpatient beds. Admitting physicians not required to assess patients in the ED prior to admission. No requirement for all laboratory and radiological test results to be complete prior to admission	EDLOS Time on ambulance diversion. LWBS rates.	Acceptable	Significant 10 min decrease in EDLOS Significant 65% decrease in hrs of ambulance diversion
Sharma / Australia / 2011 [64]	Statistical modelling	To model the determinants of duration of wait of ATS 2 patients in an ED and test whether diverting ATS 5 patients away from the ED, or increasing ATS 5 patients' choice of EDs reduces ED waiting times for ATS 2 patients.	84,291 ATS 2 199,973 ATS 5	No intervention. Modelling the impact of co-located GP and choice of ED for ATS 5 patients on outcomes for ATS 2 patients	EDLOS	Low	Co-located GP significantly reduced mean wait of ATS 2 patients by 19% Increasing choice of ATS 5 patients beyond a certain number of ED options had a negative effect on duration of wait for ATS 2 patients
Shetty / Australia / 2012 [23]	Prospective, interventional	To assess the impact of the 'Senior Streaming Assessment Further Evaluation after Triage (SAFE-T) zone' concept on ED performance	10,185 pre 10,713 post	Developed an assessment zone around triage to facilitate early physician review, disposition decision-making, and streaming to bypass the ED acute area	EDLOS LWBS rates	High	Significant reductions in: EDLOS for ATS 2–5 LWBS rates

(Continued)

Table 1. (Continued)

Author / Country / year	Design	Aim/s	Sample	Summary of intervention	Primary outcome measure/s	Level of evidence	Summary of findings
Shin / Korea / 2017 [65]	Retrospective cohort	To measure the effect of an improved speciality consultation process on EDLOS	6,967 pre 7,301 post	Between 7am and 6pm only senior emergency physicians (as opposed to emergency residents) consult internal medicine (IM) physicians re patients requiring admission. If required, the IM physician reviews the patient in the ED and organises prompt resident review for admission	EDLOS of IM patients Admission order to ED departure Overall EDLOS Discharged EDLOS	Acceptable	Significant 290 min reduction in mean EDLOS Significant 120 min decrease in mean time from admission order to ED departure No change to overall EDLOS No change to discharged EDLOS
Singer / USA / 2008 [66]	Retrospective, cohort	To investigate the effect of a dedicated ED 'stat' laboratory on EDLOS	5,631 ED visits pre 5,635 ED visits post	A stat laboratory dedicated to ED patents set up within the main laboratory, staffed by dedicated personnel, 24/7	EDLOS for admitted patients	Low	Significant 21 min reduction in median EDLOS for all patients with laboratory tests performed Significant 62 min reduction in median EDLOS for admitted patients with laboratory tests performed
Sullivan / Australia / 2014 [67]	Retrospective, pre-post, interventional	To evaluate the effect of various reforms (throughput and output) to meet the NEAT target of disposition from ED within 4 hrs	All ED presentations for the same 3-month periods in 2012 (pre), 2013 (post) and 2014 (maintenance)	Senior staff taskforce set up to provide oversight, direction and monitor NEAT compliance. Business intelligence unit set up to make reporting transparent. Compliance seen as whole-of-hospital flow problem. Major redesign of clinical processes, including bed management operations	Proportion of patients exiting ED within 4 hrs Mean transit times within the ED Inpatient mortality LWBS rates 48 hr representation rates	Acceptable	Significant increase in: Proportion of patients exiting ED within 4 hrs Mean transit times within the ED Significant decrease in: Inpatient mortality LWBS rates
Takakuwa / USA / 2006 [68]	Retrospective, cohort	To investigate the effect of bedside registration on EDLOS	52,225 patient encounters	When beds were available, patients brought immediately back to patient care area following triage where they were registered by a clerk whilst being simultaneously assessed by medical staff	Time from triage-to-room Time from room-to-disposition	Low	Significant decrease in time from triage-to room with bedside registration for non-urgent patients

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Table 1. (Continued)

Author / Country /year	Design	Aim/s	Sample	Summary of intervention	Primary outcome measure/s	Level of evidence	Summary of findings
Tenbensen / NZ / 2017 [69]	Mixed method	To assess the impact of a national 6 hr target for ED admissions on EDLOS To identify particular actions that impacted on identified reductions in EDLOS	4 hospitals covering 25% of NZ population 68 semi-structured interviews	Nationally imposed target of 95% of all ED presentations seen, treated or discharged within 6 hrs	Reported EDLOS Total EDLOS (includes time in short-stay unit) Staff perceptions of successful interventions	Acceptable	Reductions in median reported EDLOS in all hospitals Smaller reductions in median total EDLOS in all hospitals Results from interviews Hospital leadership prior to target New resources (beds and staff) Processes to improve flow within the ED and hospital wide Improved information and communication
van der Linden / Holland / 2013 [70]	Retrospective, cohort	To investigate the effect of a flexible acute admissions unit (FAAU) on EDLOS for admitted patients and inter-hospital transfers	8,377 ED visits pre 8,931 ED visits post	Between 4pm and 8am daily at least 15 potential FAAU beds were identified across several inpatient units. During office hours, patients were transferred back to 'home' departments where possible. Employment of an 'admissions coordinator' who assessed the bed status in real time	Number of admissions transferred to other hospitals EDLOS for patients requiring 'regular' admission (non-specialist) EDLOS for discharged patients	Low	Significant decrease in number of patients transferred to other hospitals due to bed unavailability No change in EDLOS for patients admissible to FAAU in comparison to increased EDLOS for 'other' admissions
^van der Linden / Holland / 2017 [20]	Mixed Method	To compare staff perceptions of causes and solutions of ED crowding in two EDs: one in Pakistan and one in The Netherlands	18 one-hour staff interviews 12 in Pakistan 6 in The Netherlands	Suggestions from interviews, no intervention		Low	An additional triage room More staff to reduce delays in decision to admit More efficient processes for bed management and diagnostics An acute admissions unit More effective bed coordination
^White / USA / 2012 [71]	Pre-post, retrospective, cohort	To assess the impact of 'Supplemented Triage and Rapid Treatment' (START) on ED throughput	12,936 pre 14,220 post	After nurse triage, non-FT patients assessed by a physician who ordered diagnostics and identified patients whose disposition could be accelerated without further need for clinical work-up in the ED.	EDLOS LWBS rates	Acceptable	Significant decrease in: Median EDLOS LWBS rates

(Continued)

Table 1. (Continued)

Author / Country / year	Design	Aim/s	Sample	Summary of intervention	Primary outcome measure/s	Level of evidence	Summary of findings
Whittaker / UK / 2016 [72]	Retrospective cohort	To investigate the association between extending GP opening hrs and ED visits for minor injuries	2,945,354 ED visits	4 'schemes' (each scheme serves population of 200–300,000 people) received funding to provide additional urgent and routine GP appointments between 5–9pm Mon–Fri and on both days of the weekend	Per capita (per 1,000) patient-initiated ED referrals for minor problems Total ED visits	Acceptable	Significant 26% relative reduction in patient-initiated ED referrals for minor problems in intervention practices Insignificant 3.1% relative reduction in total ED visits
Willard / USA / 2017 [73]	Retrospective cohort	To examine the effectiveness of a Full Capacity Protocol (FCP) to reduce ED crowding	20,822 ED encounters control 22,357 ED encounters intervention	A predetermined response to specific circumstances in the hospital and ED. Additionally, can be activated by ED coordinator in response to reduced throughput. When activated, hospital leaders gather in ED to collaboratively identify and remove barriers to obtaining disposition.	LWBS rates EDLOS Ambulance diversion hrs	Acceptable	10.2% non-significant decrease in LWBS rates Significant 34 min increase in mean EDLOS Significant 92% decrease in total hrs of ambulance diversion

^Papers also looked at causes of crowding

ACU = acute care unit AH = after hours ATS = Australian triage scale ED = emergency department EDIT = emergency department intervention team
EDLOS = emergency department length of stay EJC = emergency journey coordinator ESI = emergency severity index FAAU = flexible acute admissions unit
FCA = flexible care area FCP = full capacity protocol FT = fast-track GP = general practitioner ICP = independent capacity protocol IM = internal medicine
IPLOS = inpatient length of stay LAP = low-acuity presentation LOS = length of stay LWBS = left without being seen MIU = minor injury unit MTE = medical team
evaluation NEAT = National Emergency Access Target PIT = physician in triage POCT = point-of-care test RAP = rapid assessment policy RN = registered nurse
SMS = short-message-service TAT = turnaround-time TLP = triage liaison physician WIC = Walk-in centre

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Only 14 included studies (14%) investigated potential causes (Table 3). Two studies looked at both causes and consequences [29, 30], and two studies investigated causes and potential solutions [20, 31].

Study quality

The SIGN appraisal tools guidelines [15] recommend that all retrospective or single cohort studies receive a rating of no higher than 'acceptable'. Consequently, the majority of the included studies (59%) were rated as being of acceptable quality. The remaining studies were rated as high (7%) and low (34%) quality. The main area of weakness was inadequate consideration of potential confounders, leading to uncertainty about claims of cause and effect. The level of statistical analysis was often basic, with confidence intervals frequently absent in the reporting of results and few multivariate analyses. Similarly, although percentage and time improvements were frequently noted, often there was no indication whether or not the improvement values were statistically significant. Two survey studies [29, 30], one focus group study [31], and two interview studies [20, 24] without confirmatory numerical data, were also included. Furthermore, with the exception of one study [19], all of the 40 studies that

Table 2. Studies investigating potential consequences of ED crowding ($n = 40$).

Author/ Country /year	Design	Aim/s	Sample	Primary outcome measure/s	Level of evidence	Summary of findings
^a Bond / Canada / 2007 [29]	Non-comparative survey	To investigate the frequency, determinants and impacts of ED crowding	158 ED Directors	Frequency, determinants and impacts of ED crowding	Low	Increased stress of clinical staff Increased wait times Provider dissatisfaction Risk of poor patient outcomes and delay in improvements in patients' wellbeing
Chiu / Taiwan / 2018 [74]	Retrospective cohort	To investigate the effect of crowding on clinical efficiency, diagnostic tool use and patient disposition	70,222 ED visits in 2 EDs	Time to disposition decision EDLOS Patient disposition Diagnostic interventions ordered	Acceptable	Increased odds of being admitted in times of crowding Slightly increased odds of CT scanning and laboratory testing during crowding
^a Derlet / USA / 2002 [30]	Non-comparative survey	To determine the incidence, causes and effects of crowding in EDs in three US states	210 ED directors	Incidence, causes and effects of ED crowding	Low	Delayed commencement of therapy across a range of conditions leading to poor outcomes for patients
Diercks / USA / 2007 [75]	Secondary data analysis from an observational registry	To evaluate the association between EDLOS, guideline- adherence to recommended therapies and clinical outcomes of patients presenting to the ED with non-ST-segment-elevation myocardial infarction (non- STEMI)	42,780 patients with non-STEMI	Adherence to 5 acute guideline medication recommendations (defined as receiving medications within 24 hrs) Occurrence of in hospital adverse events (death, recurrent MI)	Acceptable	Long ED stays associated with decreased use of guideline- recommended therapies and a higher risk of recurrent MI No observed increase in inpatient mortality
Fee / USA / 2007 [76] ^c	Retrospective cross-sectional, chart review	To determine the association between ED volume and timing of antibiotic administration in patients admitted via the ED with community acquired pneumonia (CAP)	405 patients with CAP	Did/did not receive antibiotics within 4 hrs in relation to total ED volume. Time to antibiotics in relation to number of patients in the ED who were ultimately admitted.	Acceptable	Higher ED volume independently associated with a lower likelihood of patients with CAP receiving antibiotics within 4 hrs (OR 0.96 per additional patient). Number of patients in the ED ultimately admitted had a slightly stronger, but non- significant, effect than the number of patients ultimately discharged, on time to antibiotics (OR 0.93 Vs 0.97).
Gaieski / USA / 2017 [77]	Retrospective cohort	To investigate the hypothesis that ED crowding would impact negatively on the care of patients with severe sepsis or septic shock	2,913 patients with severe sepsis	Time to administration of intravenous fluids (IVF) Time to administration of antibiotics Initiation of protocolized care (Y/N) Inpatient mortality	Acceptable	ED occupancy had significant negative impact on odds of patients receiving IVF within ≤ 1 hr and antibiotics within ≤ 3 hrs Number of boarders in the ED had significant negative impact on the odds of receiving protocolized care No impact on inpatient mortality
Guttmann / Canada / 2011 [3]	Retrospective cohort	To determine whether patients discharged from the ED during shifts with long waiting times are at risk for adverse events	13,934,542 patients discharged from ED	Admission to hospital or death within seven days	Acceptable	Patients presenting to EDs during shifts with long mean waiting times might be at increased risk of death and admission in subsequent 7 days, regardless of acuity on presentation

(Continued)

Table 2. (Continued)

Author/ Country /year	Design	Aim/s	Sample	Primary outcome measure/s	Level of evidence	Summary of findings
Hwang / USA / 2006 [78]	Retrospective cohort	To evaluate the effect of ED o/c on assessment and treatment of pain in older adults with a hip fracture	158 patients	Documented pain assessment Time to pain assessment Documentation and administration of analgesic Type of analgesic administered	Low	When the ED was at >120% capacity there was a significant reduced odds of patients having their pain documented on first assessment and a longer time to pain assessment. No impact on time to administration of analgesic
Hwang / USA / 2008 [79]	Retrospective cohort	To evaluate the association of ED crowding factors with quality of pain care	1,068 ED visits	Time to documented pain assessment Time to medications ordered and administered Type of analgesia ordered	Acceptable	ED census directly associated with significant delays in: Pain assessment Time to analgesic ordering and administration
Jo / Korea / 2015 [80]	Retrospective cohort	To evaluate the association between ED crowding and inpatient mortality among critically ill patients admitted through the ED	1,801 critically ill patients (systolic BP<90mmHg)	Inpatient mortality	Acceptable	ED crowding associated with increased inpatient mortality
Kulstad / USA / 2009 [81]	Retrospective cohort	To determine the association between percutaneous coronary angiogram (PCI) for patients presenting to ED with an acute myocardial infarction (AMI) and ED crowding	17 patients who underwent PCI over a 2-month period	Time to first Electro- cardiogram (ECG) Time to arrival at cardiac catheterisation lab (CCL) Time to first balloon inflation	Low	No relationship between time to ECG and time to arrival in the CCL and crowding Significant delay in time to balloon inflation during times of crowding ($p = 0.008$)
Kulstad / USA / 2010 [17]	Prospective, observational	To determine the association between ED crowding and the frequency of medication errors	6,728 EDWIN scores and 283 medication errors	Correlation between the average daily EDWIN score and total number of daily medication errors detected	Low	Significant positive correlation between average daily EDWIN score and medication error frequency ($p = 0.001$)
Lee/ Taiwan / 2012 [18]	Prospective, chart review	To investigate the factors related to blood culture contamination in the ED	558 patients with positive blood cultures	Rates of contaminated blood cultures in relation to ED crowding as measured by the NEDOCs	Low	ED overcrowding independently associated with contaminated blood cultures (OR 1.58, $p = 0.04$). Strong correlation between contamination rate and degree of ED crowding (Pearson correlation = 0.99, $p = 0.001$)
Liew / Australia / 2003 [82]	Retrospective cohort	To examine the association between EDLOS and IPLOS	17,954 admissions	Mean IPLOS Excess IPLOS	Low	EDLOS is associated with excess IPLOS
Liu / USA / 2011 [83]	Retrospective cohort	To examine the relationship between ED boarding and quality of care amongst patients admitted for chest pain, pneumonia or cellulitis	1,431 patients included	Medication delays and errors. Adverse events.	Acceptable	Boarding time associated with home medication delays (AOR 1.07 CI 1.05–1.10)
McCarthy / USA / 2009 [84]	Retrospective cohort	To quantify the relationship between ED crowding and EDLOS	235,928 ED visits at 4 EDs	Waiting room time Treatment time Boarding time	Acceptable	Crowding delayed waiting room and boarding time but not treatment time Crowding delayed the care of ATS 2 patients at all sites
McCusker / Canada / 2014 [85]	Retrospective cohort	To examine the association of ED occupancy with patient outcomes	677,475 patients at 42 EDs	Deaths at 30 days for both admitted and discharged patients Return ED visits for discharged patients Admission following return ED visit	Acceptable	A 10% increase in ED bed relative occupancy ratio was associated with a significant 3% increase in death

(Continued)

Table 2. (Continued)

Author/ Country /year	Design	Aim/s	Sample	Primary outcome measure/s	Level of evidence	Summary of findings
Medley / USA / 2012 [86]	Retrospective chart review	To determine if there is an association between ED occupancy rates and violence towards ED staff	278 included cases	The presence of violent incidents	Acceptable	A significant association between crowding and violence towards staff
Mills / USA / 2009 [87]	Secondary data analysis from a prospectively collected database	To evaluate the association between ED crowding and analgesic administration in adult ED patients with acute abdominal pain	976 patients with abdominal pain	Receipt of analgesia Delays in administration of analgesia	Acceptable	ED crowding not associated with failure to treat with analgesia Higher crowding levels in ED independently associated with significant delays in administration of analgesia
Nippak / Canada / 2014 [88]	Retrospective cohort	To identify the relationship between EDLOS and IPLOS	4,743 ED visits	EDLOS IPLOS	Low	Positive significant correlation between EDLOS and IPLOS
Pines / USA / 2006 [89]	Cross-sectional, data-linkage	To assess the association between ED crowding and antibiotic timing in pneumonia and PCI in AMI	Administrative data from 24 EDs	Time to antibiotic administration in patients with pneumonia Time to PCI in patients with AMI	Low	An increase in overall EDLOS associated with a significant decrease in percentage of patients receiving antibiotics within 4 hrs ($p = 0.04$) No association between ED crowding measured and time to PCI for patients with AMI
Pines / USA / 2007 [90]	Retrospective cohort	To assess the impact of ED crowding on delays in antibiotic administration for patients with community acquired pneumonia (CAP)	694 patients with CAP	Time from patient triage until antibiotic administration	Acceptable	Crowding in the ED is related to delayed and non-receipt of antibiotics in patients with CAP
Pines / USA / 2008 [91]	Retrospective cohort	To study the impact of ED crowding on ED patients with severe pain	13,758 patients	Receipt of any analgesia Delay of >1 hour from triage to receipt of analgesia Delay of >1 hour from arrival in a treatment room to receipt of analgesia	Acceptable	Increasing levels of ED crowding were significantly associated with failure to treat or delayed treatment with analgesia
Pines / USA / 2009 [92]	Retrospective cohort	To examine whether ED crowding was associated with adverse cardiovascular outcomes in patients with chest pain syndrome	4,574 patients	The development of an adverse cardiovascular outcome that was not present on ED arrival, but that occurred during hospitalisation	Acceptable	A positive association between some measures of ED o/c and rates of adverse cardiovascular outcomes
Pines / USA / 2010 [93]	Retrospective cohort	To study the association between ED crowding and the use of, and delays in administration of analgesia in patients with back pain	5,616 patients	Receipt of any analgesic Time to administration of analgesia	Acceptable	Higher crowding levels in the ED independently associated with significant delays in analgesia administration
Reznek / USA / 2016 [94]	Retrospective cohort	To investigate the hypothesis that ED crowding is associated with longer door-to-imaging time (DIT) in patients with acute stroke	463 patients	DIT ≤ 25 mins (Y/N)	Acceptable	Crowding had a significant negative impact on DIT
Richardson / Australia / 2002 [95]	Retrospective cohort	To assess the relationship between access block in the ED and IPLOS	11,906 admissions	EDLOS and IPLOS	Acceptable	Patients who experienced access block had a significant mean IPLOS 0.8 days longer than those who did not experience access block

(Continued)

Table 2. (Continued)

Author/ Country /year	Design	Aim/s	Sample	Primary outcome measure/s	Level of evidence	Summary of findings
Richardson / Australia / 2006 [96]	Retrospective stratified cohort	To quantify any relationship between ED o/c and 10-day inpatient mortality	34,377 patients (o/ c shifts) 32,231 patients (non-o/c shifts)	In-hospital death recorded within 10 days of most recent ED presentation	Acceptable	ED patients presenting in times of o/c had significantly higher 10 day in-hospital mortality than those presenting to a non- o/c ED
Richardson / Australia / 2009 [97]	Retrospective cohort	To identify any relationship between access block and the time to definitive care of patients with fractured neck of femur.	369 cases of fractured neck of femur	Time to surgery (<24 hrs = 'timely') in relation to ED crowding as measured by access block occupancy (ABO) quartile	Acceptable	Significant relationship between ABO quartile at presentation and delayed surgery (p = 0.006)
Sikka / USA / 2010 [98]	Retrospective cohort	To measure the correlation between ED occupancy rate and time to antibiotic administration for patients with pneumonia	334 patients	Initial antibiotic administration within 4 hrs of ED arrival	Acceptable	Significant negative association between time to antibiotic treatment and ED crowding, as measured by ED occupancy rate
Singer / USA / 2011 [99]	Retrospective cohort	To explore the association between ED boarding and clinically important patient outcomes	41,256 admissions from the ED	In-hospital mortality	Acceptable	Prolonged ED boarding negatively associated with significant increase in in- hospital mortality and significant increase in IPLOS
Sprivulis / Australia / 2006 [100]	Retrospective cohort	To examine whether high hospital occupancy and ED access block are associated with increased inpatient mortality	62,495 hospital admissions	Deaths on days 2, 7 and 30 evaluated against an overcrowding hazard scale	Acceptable	Hospital and ED o/c is associated with a 30% relative increase in mortality by Day 2 and Day 7 for patients requiring admission via ED to an inpatient bed
Sun / USA / 2013 [101]	Retrospective cohort	To assess the association of ED crowding with subsequent outcomes in a general population	995,379 ED visits resulting in admission to 187 hospitals	Inpatient mortality	Acceptable	High ED crowding associated with: 5% greater odds of inpatient death 0.8% increase in IPLOS
Tekwani / USA / 2013 [102]	Retrospective cohort and patient survey	To evaluate the impact of ED crowding on satisfaction of patients discharged from the ED	1,591 patient satisfaction scores over 497 8-hr shifts	Mean patient satisfactions scores Modified EDWIN score ED census Ambulance diversion rate	Low	ED crowding significantly associated with decreased patient satisfaction (p < 0.001)
Tsai / Taiwan / 2016 [103]	Retrospective cohort	To investigate the impact of crowding and number of ED staff on efficiency of ED care processes for patient with acute stroke presenting ≤ 3 hrs of symptom onset	1,142 acute stroke patients	Door-to-assessment time (DTA) Door-to-computed tomography completion time (DTCT) Door-to-needle (DTN) time where appropriate	Low	DTA and DTCT times significantly increased in times of crowding No effect on DTN time
van der Linden / Holland / 2016 [104]	Retrospective Chart review	To assess the impact of ED crowding on triage processes	45, 539 ED presentations	Target time to triage (mandated target time = 10 mins) Any triage score assigned	Acceptable	ED crowding associated with: significant delay in target time to triage significant number not assigned a triage score
Verelst / Belgium / 2015 [19]	Prospective observational	To determine whether ED crowding was independently associated with in-hospital death within 10 days of ED admission	32,866 admissions	Risk-adjusted HR for in- hospital death occurring within 10 days of ED admission in crowding quartile 4 vs. occupancy quartiles 1, 2 and 3	High	No significant association between ED crowding and overall risk of mortality

(Continued)

Table 2. (Continued)

Author/ Country /year	Design	Aim/s	Sample	Primary outcome measure/s	Level of evidence	Summary of findings
White / USA / 2013 [105]	Retrospective cohort	To investigate the effect of boarding hospital inpatients in the ED on LOS of patients discharged from the ED	179,840 discharged patients	Discharged patient LOS	Acceptable	As boarder burden increased, EDLOS for discharged patients increased by 10%
Wickham / Sweden / 2017 [106]	Retrospective cohort	To investigate the effect of crowding on EDLOS of ten most common medical or surgical complaints	19,200 ED visits 4,456 high acuity 14,744 low acuity	Median EDLOS for 10 chief complaints, stratified by high acuity (triage scores 1&2) and low acuity (triage scores 3–5)	Acceptable	Significant 46% increase in EDLOS for high acuity patients in times of crowding, true for all complaints except 'wound' Significant 82% increase in EDLOS for low acuity patients in times of crowding, true for all 10 conditions studied
Zhou / China / 2012 [107]	Retrospective cohort	To investigate whether patients boarded in the ED are subjected to increased serious complications	20,276 admitted patients	New onset of shock Need for intubation Death within 24 hrs of decision to admit	Acceptable	Positive correlation between high daily hospital occupancy and rates of shock and intubation, but not death within the initial 24 hrs post- admission request

* Papers also looked at causes of crowding

ABO = access block occupancy AMI = acute myocardial infarction AOR = adjusted odds ratio ATS = Australian triage scale BP = blood pressure CAP = community acquired pneumonia CCL = cardiac catheterisation laboratory CT = computerised tomography DIT = door-to-imaging time DTA = door-to-assessment time DTCT = door-to-computed-tomography time DTN = door-to-needle time ECG = electrocardiograph ED = emergency department EDLOS = emergency department length of stay EDWIN = Emergency Department Work Index IIR = hazards ratio IPLOS = inpatient length of stay IVF = intravenous fluid NEDOCs = National Emergency Department Overcrowding Scale o/c = overcrowding/ed OR = odds ratio PCI = percutaneous coronary angiogram

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investigated the consequences of crowding reported negative effects. Similarly, all included studies evaluating potential solutions, with two exceptions [57, 58], reported significant improvements in measures of crowding, leading to questions about the potential for publication bias in this area of research. As regards the solution studies, in many cases it was not possible nor advisable to blind clinicians to the interventions. This makes them vulnerable to the Hawthorne effect, whereby an initiative improves outcomes as participants are aware that their practice is being observed and therefore modify their behaviour. However, for the majority of the interventions in this type of health services improvement research it could be unethical to undertake a blinded randomised control trial.

Consequences of ED crowding

Forty of the included studies examined the consequences of ED crowding, with three of these being prospective [18, 19, 81] (Table 2). Almost all were undertaken in single EDs and reported negative consequences associated with ED crowding. The included studies investigating the consequences of ED crowding can be broadly categorised into patient, staff or system level effects (Table 4).

Patient

Effects on patients included delays in being assessed and receiving required care [29, 30, 76–79, 81, 83, 84, 87, 90, 91, 93, 94, 97, 98, 103, 104], increased frequency of exposure to error [18], including medication errors [17], reduced patient satisfaction [102], increased inpatient length of stay (IPLOS) [82, 88, 95, 99, 101] and poorer outcomes [29, 30, 75, 92, 107]; the latter included increased inpatient mortality [3, 80, 85, 96, 99–101].

Table 3. Studies investigating potential causes of ED crowding ($n = 14$).

Author / Country / year	Design	Aim/s	Sample	Outcome measure/s	Level of evidence Quality assessment	Summary of findings
Aboagye-Sarfo / Australia / 2015 [108]	Population-based longitudinal study	To analyse recent trends and characteristics of ED presentations in Western Australia (WA)	All ED presentation in WA between 2007–2013	Annual number and rates of ED presentations	Acceptable	Key drivers of increased ED presentations (4.6% annually) were people with urgent and complex care needs
*Bond / Canada / 2007 [29]	Non-comparative survey study	To investigate the frequency, determinants and impacts of ED crowding	158 ED Directors	Frequency, determinants and impacts of ED crowding	Low	Access block EDLOS Increased complexity and acuity of patients Lack of access to primary care Non-urgent patients
*Derlet / USA / 2002 [30]	Non-comparative survey study	To determine the incidence, causes and effects of o/c in EDs in three US states	210 ED directors	Incident, causes and effects of ED o/c	Low	Access block Increased severity of conditions Increased ED volume
Cowling / UK / 2013 [109]	Cross-sectional, population based	To examine the association between access to primary care and ED visits	7,856 GP practices	Number of self-referred, discharged, ED visits by the registered population of a general practice	Acceptable	Significantly less self-referred, discharged, ED visits from practices that provided timely access
Dunn / Australia / 2003 [110]	Pre-post, retrospective, cohort	To determine if changes in hospital occupancy would affect ED occupancy and ED wait time performance	1,133 ED visits pre 2,332 ED visits post	Hospital occupancy Access block days EDLOS LWBS rate	Acceptable	Significant decrease in: Hospital occupancy Access block days EDLOS LWBS rate
^Estey / Canada / 2003 [31]	Exploratory field study	To describe the perceptions of health care professionals regarding service pressures that result in ED overcrowding	Seven focus groups representing all 7 EDs in the region. Groups consisted of ED physicians (8), ED managers (8), and other ED staff including nursing and allied health (42).		Low	Shortage of inpatient beds Change of role of ED as 'holding unit' for the rest of the healthcare system Shortage of nursing staff Limited access to diagnostic services Increased numbers of high-acuity, elderly patients
Fatovich / Australia / 2005 [111]	Retrospective data analysis	To systematically evaluate the relationship between access block, ED o/c, ambulance diversion and ED activity	259,580 ED attendances	Hrs on ambulance diversion Hrs of access block	Acceptable	Ambulance diversion and poor ED performance were related to poor inpatient flow, access block
Forster / Canada / 2003 [112]	Retrospective data analysis	To identify the effect of hospital occupancy on EDLOS for admitted patients and patient disposition	351,385 ED visits	EDLOS Rate of daily referral from ED to specialist admitting teams	Acceptable	EDLOS significantly associated with hospital occupancy No association between hospital occupancy and decision to admit
Kawano / Japan / 2014a [113]	Cross-sectional, single-centre	To assess and model associations between types of ED staff and ED crowding	27,970 ED visits	Proportion of patients with a clinically significant delay EDLOS	Low	No significant negative association between presence of junior residents and clinically significant delay Results of modelling: Adding 1 junior resident increased EDLOS for all patients Extra senior resident reduced EDLOS for discharged patients Extra attending physician reduced EDLOS for all patients

(Continued)

Table 3. (Continued)

Author / Country /year	Design	Aim/s	Sample	Outcome measure/s	Level of evidence Quality assessment	Summary of findings
Kawano / Japan / 2014c [114]	Retrospective data analysis	To estimate the increase in EDLOS with the trend of an ageing society	15,840 ED visits	EDLOS	Acceptable	Increase in older patients visiting the ED has a significant negative effect on ED o/c
Knapman / Canada / 2010 [115]	Retrospective, cohort	To assess the impact of aged patients (>65) in the ED on ED crowding, wait times and patient flow for non-emergent patients	223 patients	Wait time to see a physician	Low	Strong relationship between aged patients in the ED and increased wait time for non-emergent patients
Lucas / USA / 2009 [116]	Retrospective, cohort	To determine the effect of hospital census variables on EDLOS	27,325 ED visits	EDLOS Daily ED volume Proportion of ED admissions Daily hospital census Daily census of critical care and cardiac telemetry units Daily number of scheduled surgeries	Low	Significant negative relationship between EDLOS and ICU census, cardiac telemetry census and percentage of ED patients admitted
Moineddin / Canada / 2011 [117]	Data modelling	To assess the factors resulting in increased demand for ED services in a Canadian province	53,353 respondents to a Canadian nationwide survey exploring (among other things) health system utilisation	Number of ED visits in a year	Acceptable	Access to a primary care provider significantly reduces the odds of an ED presentation for low-severity conditions (triage categories 4&5)
van der Linden / Holland / 2017 [20]	Mixed method	To compare staff perceptions of causes of ED crowding in two EDs: one in Pakistan and one in The Netherlands	18 one-hour staff interviews 12 in Pakistan 6 in The Netherlands	Staff perceptions of causes and solutions to ED crowding	Low	Increase in elderly patients and patients with complex conditions Delays in triaging Wait time for diagnostic procedures Delays in decision to admit Access block

* Papers also looked at consequences of crowding

^ Paper also looked at solutions to crowding

ATS = Australian triage scale CT = computerised tomography ED = emergency department EDLOS = emergency department length of stay GP = general practitioner ICU = intensive care unit LAP = low-acuity presentation LWBS = left without being seen o/c = overcrowding/ed

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Delayed assessment and treatment. A significant delay in time to balloon inflation for patients experiencing an acute myocardial infarction and transferred to the cardiac catheterisation laboratory (CCL) from the ED during times of crowding, was identified in one American retrospective cohort study [81]. Similarly, delays in undergoing surgery for patients presenting to crowded EDs with a fractured neck of femur, were identified in one Australian study [97]. A number of studies investigated the effects of crowding on time to medication administration in the ED. Findings were predominantly adverse, with crowding associated with delays in time to receive analgesic [79, 87, 91, 93] and antibiotic therapy [76, 77, 89, 90, 98], as well as delays in patients receiving their usual prescribed or 'home' medications [83]. Two studies reported negative impacts of crowding on timely care for patients with acute stroke [94, 103]. One study reported significant delays in triage times, with a significant number of patients not assigned any triage score in times of crowding [104].

Table 4. Studies reporting consequences of ED crowding.

Patient Effects
Poor patient outcomes e.g. for patients with chest pain [29, 30, 75, 92, 107]
Increased mortality [3, 80, 85, 96, 99–101]
Delayed assessment and care [29, 30, 76–79, 81, 83, 84, 87, 89–91, 93, 94, 98, 103, 104], including surgery [97]
Increased IPLOS [82, 88, 95, 99, 101]
Risk of readmission [3, 74]
Reduced patient satisfaction [102]
Exposure to error [17, 18]
Staff Effects
Non-adherence to best practice guidelines [18, 75–79, 90, 91, 93, 94, 98, 103, 104]
Increased staff stress [29]
Increased violence towards staff [29, 86]
System Effects
Increased IPLOS [82, 88, 95, 99, 101]
Increased EDLOS [29, 84, 105, 106]

IPLOS = inpatient length of stay EDLOS = emergency department length of stay

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Exposure to error. One American prospective observational study identified an increased frequency of medication errors, including the administration of incorrect and contraindicated medications, during times of crowding [17]. As well as delays in receiving medication, three studies reported an association between crowding and total failure to administer required analgesics or antibiotics [87, 90, 91]. ED crowding was independently associated with increased rates of blood culture contamination in one Taiwanese study, with the rate of contamination strongly correlated with the degree of crowding [18].

Increased IPLOS. All of the five studies examining the relationship between ED crowding and IPLOS reported a positive association [82, 88, 95, 99, 101]. One Australian study compared the effect of access block on the IPLOS of 11,906 admitted patients, and reported a mean increased IPLOS of 0.8 days in patients who experienced access block [95]. Richardson's study highlighted that the access block effect on IPLOS was relatively independent of illness severity or diagnosis, but was greatest in patients admitted in the out-of-hours period [95]. Similarly, Sun and colleagues reported a 0.8% increase in IPLOS for patients admitted via an ED which was experiencing crowding, defined by this group as the top quartile of the daily number of ambulance diversion hours [101].

Increased inpatient mortality. Although the majority of papers investigating the effects of ED crowding on inpatient mortality reported that as crowding worsened mortality increased, three studies found no relationship [19, 75, 77]. Two of the studies were focussed on specific groups of patients, namely patients presenting with non-ST-segment-elevation myocardial infarction (non-STEMI) [75] and patients with severe sepsis [77]. The third study, undertaken in a tertiary teaching hospital in Belgium, was the only prospective study included in this review that specifically investigated inpatient mortality [19]. Verelst and colleagues measured the outcomes of 32,866 adult patients admitted via the ED over a two-year period. They divided crowding into four quartiles, based on the ratio of the total number of ED patients to the total number of treatment bays, with quartile four considered as ED crowding. After adjusting for severity of illness they reported no association between ED crowding and risk of inpatient mortality at 10 days [19].

Conversely, the seven retrospective studies that investigated the effect of ED crowding on inpatient mortality all reported that mortality increased as crowding worsened [3, 80, 85, 96, 99–101]. The varying results can be partially explained by differences in study designs, making it difficult to compare findings between studies. There were wide-ranging differences in

measures of crowding, with daily hours of ambulance diversion [101], boarding time for admitted patients [99], mean ED occupancy [96], EDLOS [3] and relative ED occupancy [80, 85] variously applied as proxy measures of crowding. Similarly, there were differences in study populations, with most studies including all adult admitted patients [96, 99–101]. However, one study included only critically ill admitted patients [80], another included admitted and discharged patients [85], and another study considered only the outcomes for patients discharged from the ED [3]. However, Verelst et al. justified their finding of no association between ED crowding and increased risk of inpatient mortality as being due to their large sample size, controlling for multiple confounders and their use of a validated measure of crowding, in this case ED occupancy rate [19].

Staff

Identified negative effects on staff included increased stress [29], increased exposure to violence [29, 86], and non-adherence to best practice guidelines during times of ED overcrowding [18, 75–79, 89–91, 93, 94, 98, 103, 104]. Arguably, the latter could also be positioned with consequences for patients, but here we use it in the context of staff being unable to properly undertake their roles during times of increased crowding.

Increased stress and violence. In a Canadian survey study of 158 ED directors, increased stress among nurses was the most commonly perceived major or serious impact of ED crowding [29]. Staff stress was identified by more participants as an issue than increased wait times or poor patient outcomes. Increased physician stress was also identified as being driven by crowding [29]. A significant association between ED crowding and violence towards staff was reported in one study involving a retrospective chart review [86]. Physical violence was the most frequently documented type, with violence directed towards staff the majority of the time [86].

Adherence to guidelines. Poor adherence to approved guidelines was reported to be a consequence of ED crowding in 13 studies [18, 75–79, 89–91, 93, 94, 98, 103]. Increased time to assessment of pain and/or delays in administration of analgesics were found to be positively associated with ED crowding in all four studies investigating this issue [78, 79, 91, 93]. Similarly, of six studies investigating the effects of crowding on time to antibiotic therapy initiation, five identified a positive association between delayed time to administration and ED crowding [76, 77, 89, 90, 98]. One American study, involving the analysis of data from a voluntary registry tracking guideline adherence, found that patients with non-STEMI who boarded for long periods of time in the ED were less likely to receive guideline-recommended therapies and were at higher risk for repeat MI [75].

System

System-level consequences identified were those that led to ‘bottle-necks’ in the system, namely increases in length of stay (LOS), both within the ED itself (EDLOS) [29, 84, 105, 106] and also for those patients admitted to the hospital (IPLOS) [82, 88, 95, 99, 101]. Again, these could also be viewed as consequences for patients.

Increased EDLOS. The three studies that investigated the impact of crowding on EDLOS reported that EDLOS increased with increased crowding. An American, multi-site, retrospective cohort study investigated the effect of crowding on the EDLOS of 226,534 ED presentations at four sites over 12 months [84]. McCarthy and colleagues reported that (i) the number of patients in the waiting room had the greatest impact on time spent in the waiting room, (ii) the number of boarders in the ED was the most consistent factor associated with delays in ED care and (iii) more positively, ED crowding had little effect on time to treatment [84]. While

studying only the outcomes in terms of EDLOS of discharged patients, White et al. reported a 10% increase in EDLOS for patients who presented during times of crowding, defined by this group as the top quartile of boarder burden [105]. One Swedish study reported significant increases in median EDLOS for both high and low acuity patients presenting with one of the ten principal medical or surgical complaints during times of crowding [106].

Increased IPLOS. As reported under patient effects previously, all of the studies examining the relationship between ED crowding and IPLOS reported a positive association [82, 88, 95, 99, 101]. It should be noted that in the literature this is generally taken to mean that ED crowding leads to increases in IPLOS; however, as is the case with all observational studies, this type of research can only identify an association between EDLOS and IPLOS rather than identifying with any certainty a causative relationship in either direction. For instance, long IPLOS could reduce the availability of beds for patients in ED waiting to be admitted, thereby worsening ED crowding. This limitation is identified in the majority, but not all, of the observational studies included in this review.

Causes of ED crowding

Fourteen included studies investigated potential causes of ED crowding. The majority were retrospective cohort or data analysis studies, with four qualitative explorations [20, 29–31], and two data modelling studies [113, 117] (Table 3). Using the conceptual model of ED crowding developed by Asplin et al. [7], which divides ED crowding into three interdependent components, the studies that focussed on the causes of crowding can be broadly categorised as identifying input, throughput or output causes (Table 5).

Input

Causes of crowding related to the input phase of the ED process suggested increases in types of presentations, including those with urgent and complex needs [20, 29–31, 108], low-acuity presentations (LAPs) [29, 117], and presentations by the elderly [20, 31, 114, 115], as the main drivers. Access to appropriate care outside of the ED was identified as an issue in four studies [29, 31, 109, 117].

Types of presentations. Increased complexity and acuity of patients were perceived to be a cause of ED crowding by 54% of respondents in one American survey study [29]. A similar finding was replicated in an interview study comparing perceived causes of crowding in the Netherlands and Pakistan [20]. Similarly, a 4.6% annual average increase in ED presentations

Table 5. Studies identifying causes of ED crowding.

Input
Presentations with more urgent and complex care needs [20, 29–31, 108]
Increase in presentations by the elderly [20, 31, 114, 115]
High volume of low-acuity presentations [29, 117]
Access to primary care [29, 109, 117]
Limited access to diagnostic services in community [31]
Throughput
ED nursing staff shortages [30, 31]
Presence of junior medical staff in ED [113]
Delays in receiving test results and delayed disposition decisions [20]
Output
Access block [20, 29–31, 110–112]
ICU and cardiac telemetry census [116]

ICU = Intensive Care Unit

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over a six-year period was attributed to increases in presentations of people with urgent and complex care needs, in a population-based longitudinal study in one Australian state [108]. Aboagye-Sarfo and colleagues reported significant increases in presentations allocated Australian Triage Score (ATS) 2 and 3 (high acuity), as well as increases in patients requiring admission, and found that a greater proportion of patients admitted over the six-year period were aged 65 years and older [108]. Increased ED presentations by the elderly, as a factor contributing to crowding was a finding of two Canadian studies, one a retrospective cohort study [115] and the other exploratory field work involving seven focus groups with key ED staff [31]. Likewise, a Japanese study that undertook a cross-sectional analysis of all adult ED presentations at one ED concluded that older people in the ED had a significant negative impact on ED crowding [114]. Kawano et al. reported that crowding worsened as the mean age of patients in the ED increased [114].

Conversely, two studies reported that increased presentations by patients with LAPs was a driver of ED crowding [29, 117]. One was the result of survey research with 158 ED directors [29], while the other was the result of statistical modelling undertaken using the results of a large number of surveys exploring Canadian health system utilisation [117]. Moineddin et al. reported that improved access to primary care could significantly reduce the odds of ED presentations for patients with LAPs [117].

Access to other forms of care. Poor access to primary care was identified as a cause of ED crowding in four studies [29, 31, 109, 117]. A large UK study that used a cross-sectional, population-based design to investigate whether timely access to GP care led to fewer self-referred ED visits, reported an association. The model developed by this group predicted 10.2% fewer self-referred ED visits for those GP practices ranked in the top quintile for access, with patients able to secure a GP appointment within two days less likely to self-refer to the ED with low acuity conditions [109]. Similarly, a Canadian study concluded that having access to a primary care provider had the potential to reduce non-urgent ED visits (patients allocated triage categories 4 or 5) by 40% [117].

Throughput. ED nursing staff shortages as a cause of ED crowding was highlighted in exploratory fieldwork undertaken with 158 ED directors in Canada [31], and in one American study that surveyed 210 ED directors [30]. Adding one junior doctor to a shift increased the EDLOS for discharged patients by one minute, while having no statistically significant effect on EDLOS for admitted patients, in one Japanese study that modelled the effect of additional staff on EDLOS [113]. One interview study that compared the views of ED staff in the Netherlands and Pakistan on causes of crowding identified delays in receiving laboratory test results and delays in patient disposition decisions as issues in both countries [20]. These low quality, predominantly opinion-based studies, were the only included publications to suggest a throughput cause for crowding.

Output

All studies that reported on output factors as a cause of ED crowding concluded that access block, that is, the inability to transfer a patient out of the ED to an inpatient bed once their ED treatment has been completed, was the major contributor [20, 29–31, 110–112, 116].

Access block. Two studies analysed both ED and inpatient datasets to understand the relationship between hospital occupancy, access block and ED crowding [111, 112]. The Canadian study reported a significant relationship between ED crowding and hospital occupancy, with a 10% increase in hospital occupancy leading to an 18 minute increase in average EDLOS [112]. The Australian group found a linear relationship between ED occupancy during periods of hospital access block and total ED occupancy, with a similar relationship noted between

access block and ambulance diversion and EDLOS, two other commonly used indicators of crowding [111]. An American multi-site, retrospective cohort study reported a significant positive relationship between mean EDLOS for both intensive care and telemetry bed census, but did not find a significant relationship between ED crowding and total hospital census [116]. Lucas et al. acknowledged that EDLOS is likely to be impacted by total hospital census in times of high occupancy (>90%) but as the majority of their study was undertaken on days of occupancy <90%, the study would have been unable to detect this association [116].

One small Australian study used a novel approach to investigate the effect of access block on crowding. A short period (13 days) of industrial action led to the cancellation of all elective surgery and therefore to significant improvements in bed availability for ED admitted patients [110]. Dunn compared ED performance during the time of increased bed access with a 13-day period prior to and a 13-day period after the industrial action. When there was no elective surgery and an associated reduction in hospital occupancy, there were significant reductions in access block days, EDLOS for patients allocated triage categories 2–5 (ATS 1 excluded from analysis), and patients who did not wait for treatment [110]. Similarly, results of survey research with ED directors [29, 30] and multi-site, focus group research with key ED staff [31], highlighted lack of inpatient bed availability as one of the main perceived causes of ED crowding.

Solutions to ED crowding

Fifty-two of the included studies trialled, modelled or suggested potential solutions to ED crowding. The majority were retrospective, with four RCTs [25–28], one statistical modelling [64], and four prospective interventional studies [21–23, 38] (Table 1). Again, Asplin's [7] conceptual model can be used to categorise the studies that investigated potential solutions to crowding in the ED (Table 6).

Table 6. Studied and suggested solutions to ED crowding.

Input
GP-led walk-in centres / Co-located GP [32, 33, 64]
Extended GP opening hours [37, 43, 58, 72]
Choice of ED [64]
Social interventions including: education campaigns, financial disincentives, redirection [32]
Throughput
Split ESI 3 on presentation [34]
Earlier physician assessment [21, 23, 38, 50, 63, 65, 67, 71], including physician-led/supported triage [25, 40, 45, 47, 56, 60]
Fast-track / flexible care area [42, 55, 56]
Shorter turnaround-times for laboratory tests [26, 27, 52, 53, 66]
ED nurse flow coordinator [35, 44, 69]
Bedside registration [56, 68]
Nurse initiated protocols [28]
Earlier inpatient consultation [49]
Increased ED bed numbers [57, 69]
Increased ED staff [69]
Output
Active bed management [20, 36, 39, 46]
Leadership program/Support [39, 61, 67]
Implementation of nationally mandated, timed patient disposition targets [48, 54, 59, 62, 67, 69]
ED staff direct admit rights [63, 67]
Admitting team prioritise ED admissions [67]
Alternative admission policies [22, 41, 69, 70, 73]
Increased inpatient beds and staff [69]

GP = general practitioner ESI = Emergency Severity Index

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Input

Input factors focused on improved access to other forms of care, such as GP-led walk-in centres (WIC) [32, 33], a co-located GP within or near EDs [64], extended GP opening hours [37, 43, 58, 72] or providing a choice of ED [64]. Results of a number of social interventions were trialled over a 12 year period in one study from Singapore [32].

Co-located GPs and walk-in centres. The effect of a co-located GP on duration of wait for triage category 2 (high acuity) patients in the ED was modelled in one Australian study [64]. Sharma and Inder reported a 19% lower wait time for category 2 patients in EDs with a co-located GP, when compared to EDs without a GP [64]. The impact of a GP-led WIC on demand for ED care was the focus of one UK study [33]. This group used linear modelling to estimate the effect of the WIC on daytime GP-type attendances to other urgent care services in the area. A significant reduction of 8.3% in GP-type presentations to adult EDs was reported [33]. Opening of a WIC in Singapore was found to have no effect on ED presentations as the authors reported that the WICs attracted their own clientele who were unlikely to have attended the ED [32].

Increased GP opening hours. Another UK group evaluated the impact of a pilot 7-day opening of GP practices in central London [43]. Their analysis highlighted a significant, 17.9% reduction in weekend ED attendances by patients registered with practices involved in the pilot program. Dolton and Pathania also reported both a 19% fall in admissions among the elderly and a 29% reduction in elderly cases arriving by ambulance [43]. Similarly, another UK study that investigated the effect of later opening hours and 7-day opening of GP practices reported a 26% relative reduction in patients registered with the intervention practices self-referring to EDs with minor problems [72]. The opening of an after-hours (AH) GP located in a large regional Australian town, serviced by one ED and with limited AH services, resulted in a significant 8.2% daily decrease in total ED presentations of patients allocated ATS 4 and 5 (low acuity) [37]. Buckley et al. also reported an unexplained increase in ED presentations of those allocated ATS 1–3 (high acuity), of 1.36 per day, but that the opening of the AH service led to a ‘gradual permanent change’ in ED presentations [37].

Conversely, another Australian study that modelled the effect of AHs GPs on LAPs to six EDs in Perth, Western Australia, concluded that providing AHs GP LAP services was unlikely to reduce ED attendance, as LAPs were an ‘inexpensive but constant part of ED workload’ [58].

Social interventions. A study that reported on a number of social intervention trialled in Singapore over a 12-year period reported mixed results. Public education campaigns were found to be effective initially but presentations reverted to pre-campaign levels some months after the end of each campaign [32]. Implementation of financial disincentives for non-emergency presentations began to reduce presentations once the fee exceeded the fees charged by primary health care clinics [32]. Redirection of non-emergencies to alternate facilities was successful initially, but was discontinued due to adverse public relations incidents [32].

Throughput

The majority of studies (60%) that reported on potential solutions to ED crowding focussed on expediting patients’ throughput within the ED. These potential solutions mainly concentrated on ‘front-ending’ care earlier in the patient journey by providing earlier physician assessment [21, 23, 38, 50, 63, 65, 67, 71], including physician-led triage [25, 40, 45, 47, 60]. Dividing patients by level of acuity on arrival has also been successful in increasing throughput times, whether by opening a fast-track or flexible care area for lower acuity presenters [42, 55], or dividing patients within the same triage code [34]. Other throughput interventions included

reducing the turnaround-time of laboratory tests [26, 27, 52, 53, 66], the introduction of an ED nurse flow coordinator [35, 44, 69], increasing medical and nursing staff numbers in the ED [69], bedside registration immediately following triage [68], nurse initiated protocols [28], strategies to ensure earlier review by admitting teams [49] and increasing bed numbers in the ED [57, 69].

Early physician assessment. Eight included papers investigated the effects of early physician assessment on measures of ED crowding [21, 23, 38, 50, 63, 65, 67, 71]. Seven of these studies reported significant decreases in EDLOS [21, 23, 38, 63, 65, 67, 71], while four reported significant decreases in numbers of patients who either LWBS or DNW [23, 38, 67, 71]. One Australian group introduced a suite of interventions to improve throughput and output within their large tertiary ED, which had previously been named as the worst performing ED in Australia in terms of its NEAT '4-hour-rule' compliance [67]. Sullivan et al. also reported significant reductions in inpatient mortality rates between baseline and the post-reform period.

Conversely, when one Dutch urban ED initiated Medical Team Evaluation as a means of improving 'front-end operations' through a host of initiatives, including team triage and a quick registration process, results showed a significant increase in EDLOS for patients in triage categories 2–4, regardless of discharge destination [50]. Lauks and colleagues attributed this rise to the increase in orders for diagnostic radiology during the intervention period [50].

Five groups investigated the effect of a physician in triage (PIT) model on common ED crowding metrics [25, 40, 45, 47, 60]. Although the interventions were slightly different, all involved a senior physician triaging patients early in their arrival to the ED. All reported a significant reduction in EDLOS post implementation; however, one found this decrease to apply only for patients who were subsequently discharged [45]. Han and colleagues did report an increase in boarding time for admitted patients during the intervention period, a potential reason for the intervention having little effect on EDLOS for admitted patients [45]. Only one study reported a significant decrease in patients who left without being seen [40], and two studies reported significant reductions in the number of hours on ambulance bypass during the intervention period [45, 47]. Significant decreases in both 7-day and 30-day mortality post ED visit were also reported by Burström et al. after the introduction of a PIT scheme [40].

Fast-track and flexible-care areas. Fast-track [42] or use of a flexible-care area [55] to improve flow within the ED were reported in two papers. Both of these studies reported significant reductions in EDLOS for triage category 4 (low acuity) patients only. As the majority of patients diverted to these areas were triaged as category 4, it is not surprising that the intervention had the greatest effect in this patient group. The fast-track group also reported significant improvements in meeting national standards for wait times for patients triaged as category 4 [42]. Similarly, an American group that geographically separated triage category 3 patients with low variability (that is, with conditions likely to follow a standardised work flow), in order to fast-track these patients through the department, reported significant decreases in EDLOS for all category 3 and 4 discharged patients [34]. Arya and colleagues attributed the decreased LOS for higher variability category 3 patients to the decreased throughput of patients through the urgent area of the ED, thereby reducing the workload of staff in this area [34].

Reducing laboratory test turnaround-times. Reducing the time taken to turnaround laboratory tests as a means of reducing EDLOS was investigated in four studies. Three studies reported on the use of point-of-care testing (POCT) in the ED versus central laboratory pathology testing [26, 52, 53], while one employed dedicated laboratory technicians within the central laboratory who were available 24/7 to undertake all laboratory testing for the ED [66]. All four studies reported significant reductions in EDLOS attributed to the interventions, although one noted that the reduction in EDLOS was only significant if patients had all three

available tests performed [52]. One American group undertook a RCT to assess the impact of earlier initiation of diagnostic tests whilst triage category 3 patients with abdominal pain were in the waiting room [27]. Begaz and colleagues reported a significant 44 minute reduced mean EDLOS for patients randomised to the intervention versus the control arm of the trial [27].

ED nurse flow coordinator. The introduction of a senior nurse (emergency journey coordinator), focussed on identifying and resolving delays for patients who had been in the ED for 2–3 hours, led to a 4.9% significant increase in the number of patients meeting NEAT targets in one Australian ED [35]. Similarly, a nurse navigator role trialled as part of a non-RCT reported significant increases in the proportion of patients meeting NEAT time and reductions in mean EDLOS during days when the trial was operational [44]. A NZ group, who investigated the impact of nationally mandated times for patient disposition at four hospitals, reported the introduction of nurse flow coordinators at all four institutions as one of many interventions introduced to successfully reduce crowding [69].

Other. Bedside registration immediately following triage, occurring concurrently with physician evaluation, resulted in a significant decrease in time from triage to treatment room allocation for non-urgent patients, in one American before-after intervention study [68]. However, after an initial significant reduction in room-to-disposition time, this improvement was not sustained to 12 months after the intervention [68]. Three of six nurse-initiated protocols were reported to significantly reduce mean EDLOS in one American study [28]. A Korean study that used short text message reminders when ED patients waited more than two and more than four hours for inpatient consultations resulted in a significant 36 minute reduction in median EDLOS for admitted patients [49]. The expansion of the ED from 33 to 53 beds, with no changes to staffing ratios, resulted in a significant 20 hours per day increase in ED boarding in one American study [57]. Conversely, in one NZ study, provision of extra ED beds in three out of the four hospitals studied, as well as the provision of additional ED nursing and medical staff, resulted in a decreased median EDLOS [69].

Output

Solutions looking at output factors exclusively focused on getting admitted patients out of the ED in a timely manner once their ED assessment and treatment was complete, that is, reducing access block. Suggested and trialled strategies included more active bed management [20, 36, 39, 46], leadership support to expedite hospital admissions from the ED [24, 39, 69] including leadership programs [61, 67], and implementation of nationally mandated timed disposition targets [48, 59, 62, 67, 69], which have included; giving ED staff admitting rights [63, 67], ensuring admitting teams prioritise patients waiting in the ED during times of high ED census [67], and increasing inpatient bed capacity [69]. Alternative admission units, including an ED-managed, acute care unit [22] and flexible acute admission units [51, 69, 70], have also been trialled. Implementation of an independent or full capacity program to provide alternative options for admission in times of crowding has been trialled in two studies [41, 73].

Bed management. An active bed management strategy to alleviate ED crowding was evaluated by one American study [46]. The initiative resulted in a 98 minute average reduction in EDLOS for admitted patients, as well as a reduction in the number of hours the hospital was on alert, in this case limiting the types of patients that could be transported by ambulance to the ED [46]. The intervention strategy involved introducing a bed manager who assessed bed availability in real time and who could triage and admit patients to inpatient beds, and a bed director who could call on other resources, including extra staff or admitting medical patients to non-medical beds, to avoid the hospital being put on alert [46]. Similarly, an intervention that included the implementation of a position to ensure timely identification and allocation

of beds, coupled with improved communication and education for staff around a new bed management strategy, resulted in a mean 21% decrease in EDLOS for admitted patients, and a 52% reduction in mean boarding time in one American ED [36]. When ED patients were given priority over inpatient beds, as one of a number of quality improvement initiatives to reduce crowding in one American study, there was a significant reduction in median time from bed assignment to disposition and significant reductions in median EDLOS [39].

Leadership programs and leadership support. One American hospital convened hospital leaders and ED staff to work collaboratively to expedite hospital admissions from the ED [61]. This group introduced a computerised tracking system to ensure the ability for real time tracking of ED admit wait times. The group agreed to measurable goals in terms of the time between the decision to admit and final transfer to an inpatient bed. Patel and colleagues reported a significant 16% increase in patients transferred to an inpatient bed within 60 minutes of the decision to admit [61]. The group also reported significant decreases in boarding time, patients who LWBS and hours of ambulance diversion [61]. An Australian group also convened a taskforce with senior executive sponsorship to provide oversight and direction for initiatives to improve hospital admission targets [67]. Results of this initiative have been discussed under throughput solutions above and access targets, below. An American study that endeavoured to identify the different strategies used by high performing, low performing and improving hospitals, in relation to their levels of ED crowding found that no specific interventions were related to performance level [24]. They did, however, report that four organisational domains were associated with high performing hospitals, one of which was executive leadership involvement [24]. Tenbensen and colleagues reported that leadership involvement in influencing cultural change was a key factor in implementing hospital-wide initiatives to meet mandated, timed admission targets in NZ [69].

Introduction of nationally mandated, timed, patient disposition targets. Six studies have recently reported on the effect of timed patient disposition targets on commonly reported ED crowding measures [48, 54, 59, 62, 67, 69]. One Australian study reported hospital-wide education to increase awareness of NEAT in the six months prior to its implementation as the only intervention [62]. Perera et al. reported a significant increase in the number of patients leaving the ED within the guideline recommended 4-hours, post-NEAT implementation, which was sustained in their second evaluation period, one-year post-implementation [62]. A significant reduction in access block was also reported. However, this group also found a significant increase in IPLOS and in the numbers of inter-unit transfers within 48 hours of admission. They attributed this to the possibility of 'rushed referrals' by ED staff in an effort to meet NEAT targets [62].

Conversely, Sullivan et al. report on a plethora of reforms introduced at their large, tertiary referral hospital [67]. These included reforms both within the ED itself, as well as hospital-wide interventions. Many of these initiatives were aimed at reducing access block in the ED, such as: ED staff able to organise direct admission for stable patients, clear limits on response times to ED referrals by inpatient teams, and improved processes for timely discharge of inpatients [67]. As discussed under throughput solutions above, this group reported significant decreases in EDLOS and inpatient mortality [67]. The only negative outcome reported by this group was a small, but statistically significant, increase in re-presentations to the ED within 48 hours, which was seen by the researchers to be clinically insignificant [67].

Ngo and colleagues reported on a longitudinal analysis of the effect of NEAT on five hospitals in Western Australia, without giving the specifics of interventions introduced at each hospital prior to NEAT implementation [59]. Similar to the above studies, they reported significant reductions in percentage of access block hours in all five hospitals and significant decreases in median EDLOS, primarily for high acuity (ATS 1–3) patients, at three out of the

five hospitals [59]. The UK study did not give the specifics of interventions but stated that a whole-system approach was expected to be adopted to achieve the target [54]. Mason et al. reported a 29% reduction in the proportion of patients who remained in the ED after four hours as well as a 25% reduction in unadjusted median EDLOS for admitted patients [54].

The NZ studies also reported reductions in median EDLOS post target implementation [48, 69]. One study reported on the outcomes in relation to when they had the biggest impact and their success in relation to the increased use of short-stay units (SSU) [69]. Tenbensen and colleagues found that after an initial reduction in total EDLOS (time in ED plus time in SSU), this reduction slowed in later years, indicating an increased reliance on the use of SSUs to meet target disposition times [69]. Their interview data indicated that transfer to a SSU was sometimes initiated without clinical justification in an effort to meet targets. Nevertheless, they acknowledged that from a patient perspective, time in the SSU is preferable to a longer EDLOS [69]. Jones et al. determined *a priori* quantitative changes that were deemed to be of clinical importance, regardless of statistical significance [48]. They reported clinically significant reductions in median IPLOS, median EDLOS, and access block hours [48]. Although there was no change in 2-day ED representations, they did report a clinically significant 1% increase in 30-day readmissions. Similar to Tenbensen and colleagues [69], Jones et al. reported an increase in use of SSUs, with < 5% of ED admissions to SSUs in 2009 (pre implementation) versus almost 13% in 2012 [48]. However, the latter study found statistically and clinically significant reductions in total EDLOS, which was greatest for admitted patients, indicating that the SSUs were not merely used to 'stop the clock'.

Alternative admission policies. One American study explored the impact of a 14-bed monitored inpatient unit, staffed by the ED, on ED crowding [22]. Kelen and colleagues reported significant decreases in both rates of LWBS and hours of ambulance diversion [22]. Similarly, a Taiwanese study reported significant reductions in mean EDLOS for admitted patients after the introduction of a 14-bedded 'high turnover' unit, specifically used for ED admissions [51]. Utilising empty beds throughout the hospital in the out-of-hours period to accommodate non-specialist admissions to reduce EDLOS and avoid the need for inter-hospital transfers was trialled in one Dutch hospital [70]. The group reported no change in the EDLOS for patients eligible for admission to the new model, at a time when EDLOS for other patients increased significantly [70]. Providing the ED with extra assistance from hospital leaders and specialists during times of crowding in order to expedite patient disposition from the ED has been reported in two studies (capacity protocols) [41, 73]. The Korean study, which was investigating the long-term effects of the protocol, as it had been in place for six years, reported significant reductions in EDLOS [41]. Conversely, the American study, which reported on the effect of a relatively new intervention, reported a significant 34 minute increase in EDLOS on days when the full capacity protocol was operational [73]. They also reported a 92% significant decrease in hours of ambulance diversion related to the intervention [73].

Discussion

Consequences of crowding

A key finding of this review is that the consequences of ED crowding are well established. Reported consequences can be categorised as affecting patients, staff and the healthcare system, with some overlap. Some of the negative effects of crowding identified, such as adverse outcomes for patients, including treatment delays and increased mortality, were similar to those identified in Hoot's review [8]. However, the previous review identified provider losses as a potential negative effect [8], a finding that was not replicated in the current review.

Similarly, Hoot et al. reported impaired access to ED care, as measured by rates of LWBS and ambulance bypass, as potential consequences [8], whereas both of these measures were used as indicators of crowding in the current study.

The quality of the studies investigating consequences of crowding were variable, with only one high quality, prospective study included [19]. This was also the only study that did not find a link between crowding and the primary outcome measure, in this case increased inpatient mortality [19]. It did appear that the authors of some of the lower quality studies were determined to prove a negative consequence between ED crowding and their outcome of interest. For example, Kulstad and Kelly [81] concluded that crowding decreased the likelihood of timely treatment for acute myocardial infarction (AMI), when their study showed no relationship between crowding and time to first electrocardiogram or time to arrival in the cardiac catheterisation laboratory (CCL), which are the time stamps that ED staff have most influence over. Their study found a relationship between crowding and time to balloon inflation in the CCL, a delay that is presumably outside of the control of the ED [81].

Similarly, Hwang and colleagues [78] concluded that crowding is significantly associated with poorer pain management. Their study identified a negative association between crowding and time to assessment and documentation of pain, but no relationship to time to analgesic administration, that is, the outcome that affects patient care [78]. Rather than identifying negative outcomes for patients who present to crowded EDs, both of these studies could be taken to show the opposite. That is, that even when the ED is under stress, patients identified as having urgent clinical needs, such as those suffering from an AMI or being in severe pain, still receive appropriate, timely care. We acknowledge that the complexity of health services research provides challenges in terms of research design, often influencing investigators' decisions to measure outcomes for which data is easily accessible. However, care needs to be taken when designing studies and interpreting results to ensure reported outcomes are robust and reflect the most appropriate measure of the phenomena under study.

Solutions to crowding

Trialled and modelled solutions to ED crowding included providing alternative options to the ED for patient care, moving patients through the ED more quickly and expediting patients' exit from the ED on completion of care. Many of these solutions were identified in the previous review [8], particularly the solutions aimed at resolving access block and providing alternative admission options. However, Hoot's review identified many demand management strategies, including diverting patients to other forms of care and focussing on frequent visitors, which was the focus of only one, older study included in this review [32]. The demand management and patient diversion papers in the earlier review were all published more than twelve years ago, perhaps indicating the lack of long-term success of these initiatives at reducing ED crowding.

All studies included in this review evaluating solutions, with two exceptions [57, 58] reported significant improvements in measures of crowding related to the intervention, whether trialled or modelled. It should be noted that in Nagree's study [58], that concluded that AHS GPs would have little impact on LAPs to EDs, the Sprivulis method [118] was used to calculate LAPs. This method consistently estimates a lower proportion of presentations as 'GP-type' than other methods [119, 120]. One Australian group reported a range of 15–69% of ED attendees as 'GP-type', depending on which of four definitions were used to calculate the proportion [119], with the Sprivulis method [118] producing the lowest percentage. Another Australian group [37] speculated that their finding of reduced LAPs to the ED following the opening of an AHS GP differed from Nagree's findings because of the relative rural nature and

therefore, lack of alternative options in the study locality, compared to the urban area studied by Nagree [58]. This finding is a clear indicator that a 'one size fits all' model to alleviate crowding is unlikely to be successful, as the causes of crowding are contextually specific to the environment in which the crowding occurs, and therefore requires solutions explicitly designed for that environment. The above also highlights the difficulties in comparing research outcomes when non-standardised definitions are employed as study outcome measures. This issue has been highlighted before [12, 13], with calls for a consensus on definitions for crowding, 'GP-type' presentations and LAPs to enable more accurate measuring and reporting of these issues.

Quality of solutions studies. The quality of the evidence evaluating solutions to ED crowding was higher than for the other two areas (causes and consequences) with 60% of the studies assessed as providing high or acceptable levels of evidence. Many input, throughput and output solutions, including WICs, providing earlier physician assessment on arrival to the ED, and providing alternative admission options during times of inpatient access block, have been found to have promising results. While POC'I was trialled in five included studies, only two of these, both RCTs [26, 27], were assessed as providing high levels of evidence, suggesting more research needs to be undertaken in this area.

While the majority of the included papers, particularly those that looked at throughput initiatives, did not measure unintended 'upstream' effects of the interventions to reduce crowding, a number of the more recent 'target' papers did [48, 54, 62, 67]. The Australian papers reported increased in-hospital transfers, increased IPLOS [62], and a small clinically insignificant increase in ED representations within 48 hrs [67] as potentially negative clinical outcomes post-NEAT implementation. One NZ study reported a clinically important 1% increase in readmissions within 30 days [48]. The UK study found an unexpected increase in time to be seen by a clinician and reported that when EDLOS was adjusted for clustering by hospital, there was an increase in total time in the ED for admitted patients [54]. Overall, the 'target' studies provided acceptable levels of evidence of both improved processes and patient outcomes following their introduction, indicating that more research into the specific interventions undertaken to achieve targets, with an emphasis on understanding what worked, where and why, could go some way towards addressing ED crowding. Similarly, more recent studies have highlighted the positive effects of undertaking a whole-of-system approach, including involvement of system leaders and using available data for more effective communication as important strategies to reduce crowding [24, 67, 69].

Although one of the NZ 'target' studies [69] acknowledged some input strategies were implemented in at least one of their test sites, in the main 'target' studies focussed their reporting on throughput and output initiatives to address crowding. The two UK studies that reported reduced ED presentations following 7-day opening of GPs [43, 72], as well as the successes achieved after the opening of an AH GP clinic in a large regional centre [37], provide evidence to support further trials of increased access to primary care as a potential solution to crowding in areas where increased input has been identified as a causative factor.

Costs of solutions. A number of studies identified financial costs associated with the interventions [35, 43, 53, 69, 72], but did not provide any cost benefit analysis. One exception is an Australian study that calculated a \$2,121 AUD per day saving to the ED after the introduction of a nurse navigator role [44]. Similarly, although not providing a comprehensive cost benefit analysis, Nagree et al. estimated that LAPs accounted for only 2.5% of total ED costs in the Perth metropolitan area, and therefore AH GPs were not a worthwhile investment if their aim was to reduce LAPs to the ED in a metropolitan setting [58]. Whittaker et al. acknowledged that while extended GP opening hours was seen to reduce patient-initiated ED referrals, extended opening hours may not produce a cost saving to the healthcare system [72].

Causes of crowding

Surprisingly, the least number of studies included in this review investigated the causes of ED crowding. Causes included increases in types of ED presentations, limited access to primary care and access block for patients requiring admission. Access block, inadequate staffing and LAPs were also identified in Hoot's [8] review as causes of crowding. However, a notable new identified cause in this review is the increase in presentations by patients with complex and chronic conditions, including the elderly, as a driver of ED crowding [29, 108, 114, 115]. This finding may indicate the emergence of a new driver of crowding, namely the elderly with multiple chronic conditions, and merits further investigation. The quality of the evidence investigating causes was mixed, with only seven (50%) studies assessed as being of acceptable quality, while the remainder were scored as low. Three of the higher quality studies identified access block as having a negative impact on ED crowding; however, all of these studies are more than ten years old [110–112]. The remaining four studies identified increased presentations by patients with chronic and complex care needs, including the elderly, and limited access to GPs, as causative factors of crowding [108, 109, 114, 117], adding further weight to the suggestion that increasing access to primary care may help to reduce crowding.

Fifteen years ago, Asplin [7] proposed in his conceptual model, that ED crowding could be partitioned into three interdependent components, input, throughput and output. Of the 14 studies that investigated the causes of ED crowding, only four identified a throughput issue, namely experience level of staff [113], shortages of staff within the ED [30, 31], and delays in test results and disposition decisions [20] as potential causative factors. However, of the 52 papers that trialled or modelled potential solutions to crowding, 31 (60%) involved improving patient throughput as a means of resolving the issue, with none of the interventions specifically targeted at improving staffing issues. This suggests a mismatch between the proven or accepted causes of crowding and the solutions developed and implemented to address the problem. There is general agreement that many of the causes and therefore solutions to crowding lie outside of the ED. However, our findings suggest that, as the most immediate effects of crowding are visible in the ED, ED clinicians have perhaps taken it upon themselves to change what they can influence to try to ameliorate the problem.

This review identified many new studies focussed on the ED crowding agenda. However, there is a paucity of research aimed at identifying the specific, contextual factors causing the phenomenon, with only eight new studies aimed at identifying causes published in the last ten years. The imbalance between the vast number of studies investigating the consequences and trialling solutions to ED crowding, versus the scarcity of studies aimed at identifying the causes, warrants attention. As stated by Asplin et al., 'the development of valid and reliable measures of the factors **contributing** to ED crowding is the **first step** in developing a coherent research and policy agenda' [7]. It appears that 15 years after this recommendation the ED research community is yet to thoroughly address that 'first step'.

Limitations

The literature search was limited to research published in English and in peer-reviewed journals. Potentially, a wider search strategy may have located a greater number of relevant studies; however, with the number of studies appraised and included, we feel this review provides a comprehensive analysis of the current research on ED crowding. Only seven of the included studies were assessed as being of high quality. This is an issue that has been highlighted before, with authors also acknowledging that it is difficult to critique complex and multi-faceted health service research using evaluation criteria designed for drug trials [121]. However, we elected to assess the quality of the evidence using traditionally accepted methods to enable the

comparability of our results with previously published reviews. When allocating causes and solutions studies as related to either input, throughput or output, every effort was made to follow the original intentions of the study authors; however, this intention was not always clear.

Conclusion

There is an abundance of research illustrating the negative consequences of ED crowding for patients, staff and the healthcare system. While many solutions have been trialled and modelled, with varying levels of success, there is a mismatch between the identified causes of crowding and the initiatives implemented in efforts to resolve the problem. More recent studies investigating the effects of timed disposition targets and extending GP opening hours have provided some promising results and warrant further investigation and evaluation, with a particular focus on which interventions worked in which contexts, relative to identified local causes of crowding. A significant finding of this review is the growing body of evidence suggesting elderly patients with complex, multi-morbid conditions represent an increasingly important driver of ED crowding. This review has highlighted the need for further, high quality research into the specific, contextual issues that lead to ED crowding and the tailoring of evidence-based solutions to address identified causes. There is agreement that the problem and therefore the solutions to ED crowding lie largely outside of the ED. Therefore, it is imperative that the whole of the system, including patients, are involved in identifying both the causes of and acceptable, sustainable solutions to ED crowding.

Supporting information

S1 Table. PRISMA checklist.

(PDF)

S1 File. Details of search strategy.

(PDF)

S2 File. Study protocol.

(PDF)

Author Contributions

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Appendix 2

Conference Abstracts

Four conference presentations were given by the candidate during candidature and were based on the research contained in this thesis.

Unwin M, Morley C, Stankovich J, Rigby S, Peterson G, Crisp E, Kinsman L. The state of our emergency departments: Tasmanian trends and perspectives. Paper presented at 15th International Conference for Emergency Nurses; Sydney, Australia 2017 October 11-13.

The state of our emergency departments: Tasmanian trends and perspectives.

Introduction: Tasmania has the oldest population of all Australian states and territories, and the second highest proportion of residents living in the most disadvantaged quartile of the Socio-Economic Indexes for Areas (SEIFA), with the whole state classified as regional or remote. These factors are all known to increase the probability of attending an emergency department (ED). Faced with this challenging profile, it is essential for future planning to characterise the drivers behind ED utilisation in Tasmania. This presentation will detail a program of research seeking to understand why, where and when people attend EDs in Tasmania.

Method: A retrospective analysis of ED presentation data to Tasmania's four public hospital EDs over a four-year period (July 2010 to June 2014) was undertaken. Also, a waiting room survey of non-urgent (triage categories 4 and 5) patients was conducted to identify factors influencing decision making processes to attend the ED.

Results: There was a 3.4% increase in state-wide presentations with a 6.8% increase in high acuity (triage categories 1 to 3) presentations, over the studied timeframe. Variations in regional ED presentations included a 16% increase in the South (with a significant increase in the elderly), a 5.1% increase in the North and a 3.9% decrease in the North-West. The waiting room survey established that 40% of patients had attempted to access alternative health care options before attending the ED, 31% would have preferred to be managed by their own general practitioner and 29% were referred to ED by a healthcare professional.

Discussion: This research identified regional variations in ED attendances and demonstrated the preferences of non-urgent patients to be managed outside the ED. A summary of ongoing work focusing on the drivers behind the increased presentations in the South and service requirements of non-urgent patients presenting to ED will also be presented.

Unwin M, Crisp E, Rigby S, Kinsman L. The emergency department and non-urgent presentations: What is Northern Tasmania's experience? Paper presented at 2018 Emergency Tasmania Conference; Cradle Mountain, Australia; 2018 August 10-12.

The emergency department and non-urgent presentations: What is northern Tasmania's experience?

Each year there are in excess of seven and a half million presentations to emergency departments (EDs) across Australia, half of these are triaged into the two least urgent triage categories. A total of 3.8 million presentations arrived at EDs across Australia between July 2016 and June 2017 with non-urgent conditions, the equivalent of the entire population of Melbourne. Within Tasmania, just under 84,000 (54%) were triaged into these least urgent categories. Recent research in Northern Tasmania demonstrated that 40% of patients presenting with non-urgent conditions had unsuccessfully attempted to access alternative services before arriving at the ED, 29% indicated they had been referred to the ED by their GP or practice nurse. This current body of work aims to identify the healthcare needs of patients presenting to the ED with non-urgent conditions who have been unsuccessful in accessing alternative services.

Initial findings demonstrate an over-representation of patients from suburbs with a low socio-economic index for advantage (SEIFA) scores, with individuals from the lowest ranking suburbs being up to four times more likely than those from mid to high ranked suburbs in their incidence of ED access. Patients under 25 years of age were also over-represented whilst the most frequent discharge diagnosis was the result of minor injuries.

This presentation will also include discussion from patient and general practice interviews in order to identify factors contributing to ED access with non-urgent conditions. It is anticipated that findings from this project will be used in future planning of healthcare services across Tasmania.

Unwin M, Crisp E, Rigby S, Kinsman L. Investigating why young people from vulnerable communities are more likely to present to the ED with non-urgent conditions. Paper presented at 3rd Global Conference on Emergency Nursing and Trauma Care; Noordwijkerhout, The Netherlands; 2018 October 4-6

Investigating why young people from vulnerable communities are more likely to present to the ED with non-urgent conditions

Background and Aim: Two factors identified in increasing ED demand are the high volume of non-urgent ED presentations and limited timely access to primary care services (PCS) (Bond et al., 2007, Moineddin et al., 2011). Across Australia, the number of presentations to EDs with non-urgent conditions annually is the equivalent to the entire population of our second largest city, Melbourne (3.8 million). Between July 2016 and June 2017 these presentations contributed to 50.0% of all ED attendances nationwide. This trend continues in Tasmania, whose population represents some of Australia's most disadvantaged communities, with 54% (84,000) of presentations triaged as non-urgent between 2016-17 (AIHW, 2017). Furthermore, research in Northern Tasmania identified 31% of non-urgent patients would prefer to be managed by their PCS (Unwin et al., 2016). The aim of this project was to investigate the use of ED services in Northern Tasmania by patients with non-urgent conditions, including those unable to access timely PCSs and those referred from PCS. These findings will then be used to inform future patient-centred service planning.

Methods: An explanatory sequential mixed-method was adopted, with the first stage identifying the profile of patients attending ED with non-urgent conditions and revealing trends over time. This included a retrospective data analysis of routinely collected ED data from July 2009 to June 2016 and included time-series analysis to determine the impact of co-located nursing and medical services. The second stage was to identify the perceived need and service requirements of patients who were unable to access timely PCS or who were referred to the ED with non-urgent conditions. Focus groups will be conducted with patients and with clinicians from PCS to investigate this phenomenon.

Results: Residents of suburbs with a low socioeconomic index for advantage (SEIFA) score were up to four times more likely to access the ED with non-urgent conditions than residents from suburbs with a medium to high SEIFA. Children, adolescents and young adults (under 25 years of age) were over-represented and contributed to 41% of non-urgent ED attendances. The most common presentations were a result of injury or

poisoning (35%). Results of yet to be conducted focus groups with clinicians and young adult ED attenders from poorer suburbs will also be presented.

Conclusions/Discussions: This presentation will provide new insight into why young patients from vulnerable communities access ED services with non-urgent conditions and will underpin future health service planning and inform evidence based policies.

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Unwin M, Crisp E, McCann D, Francis K, Kinsman L. Access to emergency department services: factors contributing to non-urgent presentations by Northern Tasmanians. Paper presented at The National Nursing Forum: Nursing Now – Power of Policy; Hobart, Australia; 2019 August 21-23

Access to emergency department services: factors contributing to non-urgent presentations by Northern Tasmanians

Introduction/Purpose: Around 50% of people attending Australian emergency departments (EDs) present with non-urgent conditions. Of the eight million ED presentations between July 2017 and June 2018, 3.8 million (48.7%) were triaged into the two least urgent categories. In Tasmania this proportion was 53.6% (n=87,012). Research conducted Northern Tasmania in 2015 identified that 31% of non-urgent ED patients would have preferred to be managed by their general practitioner (GP). This is the equivalent of 8,000 fewer presentations annually, or 22 per day. The aim of this current project is to understand the factors that contribute to the decision to access ED services in Northern Tasmania by people with non-urgent conditions, and to inform future service planning.

Methods: An explanatory sequential mixed method was implemented with three key objectives: to identify trends in ED attendance by people with non-urgent conditions through retrospective analysis of seven years of routinely collected ED data; to identify the perceived needs and service requirements of this patient population; and interpretation and translation of these findings into local health service recommendations.

Results: Analysis of the ED data included establishing a profile of ED attendees based on demographic data. This analysis revealed that 41% of presentations were by young people (under 25 years of age). Socio-economic factors also demonstrated a significant correlation, with those living in the most disadvantaged suburbs being up to four times more likely to attend the ED than those from more advantaged suburbs. Data from focus groups with people who have attended the ED from these over-represented communities (currently in progress) will also be presented.

Conclusion: This presentation will provide new insight into why Northern Tasmania's most disadvantaged communities are over-represented in non-urgent ED data and will highlight key areas for future consideration in health services planning and inform evidence-based policies.

Appendix 3

Publication: Investigation the referral of patients with non-urgent conditions to a regional Australian emergency department: a study protocol

Unwin M, Crisp E, Rigby S, Kinsman L. Investigating the referral of patients with non-urgent conditions to a regional Australian emergency department: a study protocol. *BMC Health Services Research*. 2018;18(1):647.

<https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-018-3411-4>

Copy of published article contained in Chapter 2 (as per University of Tasmania thesis requirements).

STUDY PROTOCOL

Open Access



Investigating the referral of patients with non-urgent conditions to a regional Australian emergency department: a study protocol

Maria Unwin^{1,2*}, Elaine Crisp³, Scott Rigby² and Leigh Kinsman^{1,4}

Abstract

Background: Australia's only island state, Tasmania, experiences one of the nation's highest incidences of non-urgent emergency department (ED) presentations in a healthcare system regularly faced with service demands that exceed resource availability. Service-demand mismatches are acknowledged to contribute to ED crowding which in turn, has been documented to have a correlation with poorer patient outcomes. Crowding within EDs is complex, non-urgent presentations alone are not the primary cause, but have been reported to be a contributing factor. In 2015–16 Tasmania recorded over 153,000 ED attendances, 55% of these fell into the two least urgent triage categories. Recent research in the State's North established that 29% of non-urgent presentations were referred, formally or informally, from primary healthcare providers and that, for many patients (39%), the ED was not their first choice of service provider. This study aims to identify the service needs of patients referred to a regional Australian ED and subsequently triaged as non-urgent.

Method: In order to achieve this aim, three objectives have been identified. The first two objectives use an explanatory sequential mixed-method approach while the third objective will incorporate an implementation science approach. These three objectives are: first, a retrospective analysis of seven years of routinely collected hospital data to identify trends in referral of patients with non-urgent conditions; second, focus group interviews with patients and primary care providers to further understand perceived need and service requirements of those referred to the ED, and third, translation of findings into local health service recommendations.

Discussion: Identification of the needs of patients referred to the ED with non-urgent conditions will inform future service planning aiming to facilitate access to the right service at the right time and in the right place.

Keywords: Emergency department, Non-urgent presentations, Referral, Primary care, General practitioner

Background

Worldwide interest in the demand for emergency department (ED) services is evidenced by a growing body of work demonstrating links between ED crowding and patient outcomes. Crowding occurs when the demand for services exceeds resource and space availability, and has been linked to negative consequences for both patients and the healthcare system. In 2000, Derlet and Richards

[1] identified a number of concerns held by ED physicians across the United States which included: increased risk to public safety; increased time to analgesia; extended waiting time; patient dissatisfaction; decreased physician satisfaction; increased violence; miscommunication; and negative impact on teaching. Since then, these themes have remained constant; with increased hospital length of stay, morbidity and mortality also shown to be associated with ED crowding [2–8]. A Canadian team in 2014 [3] conducted a retrospective analysis of over 600,000 ED presentations to 42 hospitals, and they reported significant risks to patient safety occurring during periods of crowding. To date, there is considerable evidence indicating links between ED crowding and poorer outcomes for patients,

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but there appears to be less knowledge around the causes driving patients to attend EDs. These drivers have been referred to as ED input factors [9]. Recent studies have demonstrated a link between ED crowding and the presence of patients with non-urgent conditions in the ED and limited access to primary care services [10–14].

In 2017, Crawford and colleagues [15] published a systematic review and discussed the increase in non-urgent presentations (input factor) and the growing demand placed on EDs, worldwide, by potentially avoidable presentations. Much debate exists over whether these presentations add a significant burden to the workload and resource demands of crowded EDs, with some arguing they do not add a significant burden [16–18]. In Australia, attendances by patients triaged into the two least urgent categories have continued to exceed 50% nationwide [19–22], it is timely to consider the healthcare needs of this patient group and whether alternative models might lead to improved access to timely care and ultimately, to better patient outcomes. Research conducted in Switzerland and Australia [23–25] have reported a younger demographic amongst patients with non-urgent conditions with the most common presenting complaint among these patients being musculoskeletal. Furthermore, two studies [13, 26] report considerable discrepancies between patients' reasons for attending versus clinicians' perception of the reasons for ED usage by patients presenting with non-urgent conditions. Durand and colleagues [13] concluded that thorough investigation of the healthcare demand is required before strategies are planned and implemented.

Compounding the issue is the lack of a universal definition of 'non-urgent ED presentations'; within the Australian context these are most frequently referred to as those presentations allocated the least urgent triage categories of 4 or 5 [24, 26–28] on arrival. Furthermore, a literature review by Forero and colleagues [29] reviewing the ATS discussed the complexities of classifying patients triaged as ATS 4 and 5 as 'primary-care suitable', 'general-practitioner type' or 'inappropriate'; however, for the purposes of this study, the research team include all patients triaged as ATS 4 or 5. The authors acknowledge that this patient group, considered to have non-urgent conditions, will include patients presenting with both low-urgency needs who are unsuitable for primary care and those who are potentially suitable for primary care. Recent Tasmanian research has demonstrated that if primary care services were available at the time of need in regional Northern Tasmania this could result in up to 8000 less ED presentations annually [24].

An Italian research team conducted a retrospective cohort study and identified excessive referrals of patients with non-urgent conditions as a contributor to ED crowding [12]. These authors identified that few studies

have considered referrals to ED and how such referrals may contribute to crowding. The question of where to best manage the needs of this patient group has not been clearly answered. This is a concern for healthcare providers who face growing demands for services, and for patients who may experience poorer health outcomes in crowded EDs [2, 3, 8].

In Australia, between July 2011 and June 2016 the percentage of ED patients triaged as ATS 4 and 5 has continued to exceed 51% of total ED presentations. From June 2015 to July 2016 these non-urgent presentations totalled over 3.8 million nationwide [22]. Tasmania has one the highest incidences of non-urgent ED presentations at 55.3%. In Australia, residents are free to choose between their General Practitioner (GP) and ED services for management of their acute, non-urgent conditions. GP services provide a limited number of same-day appointments, and once these are fully allocated patients must consider alternatives, of which ED is perceived as a convenient option [24]. Additionally, there are a small number of privately run GP services that provide after-hours services. Research from the UK demonstrated that commencement of a co-located after-hours clinic reduced ED presentations [10], yet a systematic review by Crawford and colleagues concluded that evidence on the effect of GP walk-in centres was infrequent and further research is required to determine the proficiency of services as alternatives to EDs [15].

This project has arisen out of research conducted in 2015 at a regional Tasmanian ED in which the researchers [24] identified that 39% of patients with non-urgent conditions had attempted to access alternative healthcare services before arriving at the ED. This surveyed patient group also indicated that 31% would have preferred to be managed by their GP. These findings demonstrated that the ED is not necessarily the first point of contact, nor in fact, the first preference of this patient group. Furthermore, 29% of patients with non-urgent conditions were referred to the ED by a healthcare provider. The term 'referral' used in this instance, includes both formal and informal referrals. The findings of this project will provide greater understanding of local issues and service needs.

Variation in health-seeking behaviour across Tasmanian regions was identified by Morley and colleagues who were able to demonstrate that despite its small geographical and population size, each of Tasmania's three regions (South, North and Northwest) contribute a unique profile to the State's ED attendances [30]. They concluded that future research needs to consider factors driving the various trends and implement services specific to regional demands. This project will provide a local, contextually relevant picture of the issues driving the demand for non-urgent ED presentations in Northern Tasmania.

This study will aim to identify the service requirements of patients with non-urgent conditions referred, formally or informally, to a regional Australian ED. The objectives to address this aim are: first, to identify trends in primary care referral of non-urgent patients to a regional Tasmanian ED over the previous 7 years; second, to identify the perceived need and service requirements of patients referred from primary care to ED; and third, to translate findings into local health service recommendations.

Methods

Overall design

In order to achieve the aim of identifying service requirements of patients who have been referred, formally or informally, with non-urgent conditions to a regional Tasmanian ED, this project will implement an explanatory sequential mixed-method approach. The primary objective will be to identify trends in the referral of patients with non-urgent conditions to the ED. The second objective will be to identify the perceived need and service requirements of patients referred to the ED with non-urgent conditions, while the third objective will facilitate translation of these findings into health service recommendations. Figure 1 (below) provides a summary of the research plan and is based on Creswell's design for sequential explanatory mixed methods [31] with the addition of a third objective to disseminate and translate research findings.

Objective 1: Identification of trends in the referral of patients with non-urgent conditions

The focus of the first objective will be to identify trends in the referral of patients with non-urgent conditions, including changes over time, in order to establish a profile of who, when and why patients have accessed ED services with non-urgent conditions. This will involve the analysis of routinely collected ED attendance records for patients presenting and triaged as ATS 4 or 5 during

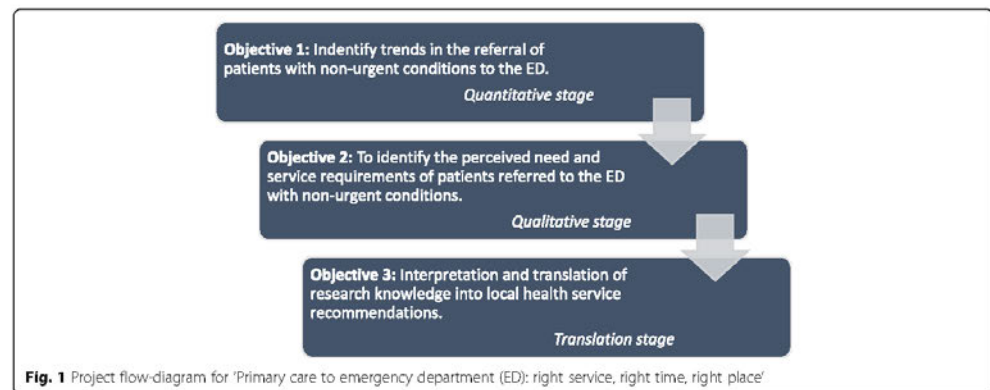
a seven-year period, from July 2009 to June 2016 at a regional Tasmanian hospital. This data is routinely collected by the Tasmanian Health Service (THS) and stored on a data platform by the Department of Health and Human Service, Tasmania.

The study population for this objective will include all ATS 4 and 5 patients presenting to the ED from July 2009 to June 2016. Data collected will include: date, day of week and time of presentation; age and gender; mode of arrival; triage category on arrival; residential suburb; time to first seen by ED physician or nurse practitioner; total ED length of stay; referral sources into ED and on discharge, and discharge diagnosis and destination. Presentations will be excluded if: their usual place of residence is outside of THS-North's catchment area.

Once obtained, the data will be entered into a statistical software package (SPSS, V22) [32] and analysed for themes, trends and relationships. An interrupted time series (ITS) analysis will be undertaken to determine whether factors such as the number of available general practitioners within the local area or the opening of an additional after hours, walk-in service has affected the number of patients referred with non-urgent conditions or has influenced the overall number of ED presentations. ITS allows researchers to control for trends when comparing data pre and post an intervention and is known to provide robust quasi-experimental research design [33].

Objective 2: Identification of perceived needs and service requirements of patients referred to the ED with non-urgent conditions

The second stage of this project will involve focus groups with patients referred to the ED and with primary care providers who have referred patients to the ED. Themes, trends and relationships identified during the first objective will be summarised and presented to participants to facilitate further exploration of the local context and to



understand the phenomenon of patients with non-urgent conditions being referred to the ED. All participants will be asked to provide signed consent prior to participating in focus groups.

Focus groups are advantageous in healthcare research, allowing researchers to include representation from various community groups and enabling researchers to investigate participants' knowledge and experience of situations while engaging in conversations that facilitate exploration of an issue [34]. Based on the nature of this study, the research team plan to conduct homogenous focus groups with a total of eight to 12 patient participants, with a subsequent homogenous GP focus group. The first group will be conducted with participants who have been referred to the ED with non-urgent conditions whilst the second will be with GPs and primary care providers who have referred patients with non-urgent conditions to the ED. Gerrish and Lacey [35] discuss homogenous versus heterogeneous groups and state that homogenous groups can assist facilitation of free discussion; they go on to recommend a group size of five to 12 to facilitate engaged group dialog.

Patient participants will be given an opportunity to discuss their decision-making process and episode of care from the community to the ED. Eligible patients will be provided with brochures by ED clinical staff and will have the opportunity to opt into focus group participation. The intent will be to recruit a stratified representative sample. Based on the profile of non-urgent attendees from our research [24] conducted in 2015, the proposed patient focus group will aim to consist of: two parent participants (whose young children attended the ED as patients); two participants under 25 years of age; three participants between 25 to 64 years of age, and one participant over 65 years of age. Consideration will also be given to focus group participants' presenting condition (in-line with the profile of non-urgent attendees from previous research) aiming to include a combination of presentations, such as musculoskeletal, general conditions such as headache, cold and flu-like symptoms, and gastrointestinal symptoms [24].

A purposive sample of GPs referring patients to the ED will be invited to attend the second clinician focus group. This group will consist of six to eight clinicians from a range of medical practices within the greater regional area.

The focus group agenda, informed by the quantitative data, will be presented by two researchers as the initial discussion point. Participants in the patient group will be asked to discuss their own experience of accessing ED with a non-urgent condition and to reflect on the earlier findings. Subsequent to this, the second focus group, comprised of GPs and primary care clinicians will be presented with the analysed quantitative trends and

with themes identified during the analysis of the patient focus group. Discussion will seek to understand GP experiences in referring patients with non-urgent conditions to the ED and the health requirements of this group.

Both focus groups will be audio recorded and transcribed. These transcriptions will then be analysed using an inductive approach in order to identify emerging themes.

Objective 3: Translation of research knowledge into health service recommendations

The third objective for this project will aim to translate knowledge gained from the previous quantitative and qualitative stages. This will be done through presentation of the findings at a local forum involving primary and acute care clinicians, academics, patient representatives and policy makers. The goal will be to share the knowledge obtained during the first two objectives and to engage key stakeholders in the process of translating this into health service recommendations, policy and planning. The notion of knowledge translation has arisen out of concern for the time taken for research to influence healthcare. It is hoped that through engagement with local ED clinicians (nursing and medical), general practitioners, practice nurses, hospital administrators, patient representatives, academics, hospital administrators, policy makers and government officials, the process of research translation will facilitate clear identification of service needs and future planning of a suitable, sustainable needs-based and patient-focused health service model. The purpose of this stage will be to discuss project findings and identify a service model designed to appropriately meet community needs and to facilitate timely access to services; the right service, at the right time and in the right place.

Discussion

The findings of this project will add to a body of research being conducted in Tasmania to address the issue of ED crowding. Previous research has demonstrated that a significant proportion [24] of patients with non-urgent conditions had attempted to access alternative services before arriving at the ED, with many stating they would prefer to be managed by their GP, and over a quarter of this patient group being referred (formally or informally) by their GP, therefore indicating the ED is not the preferred option for many patients. In this regional Australian city, if the 31% of non-urgent ED presentations could have been assessed and managed at an alternative service, up to 8000 presentations per year could have been directed away from the ED.

The research team anticipate the findings from this project will clearly identify local issues faced by patients who have attempted to seek medical attention from their GP, yet, are directed to the ED where they are triaged as non-urgent. These findings will be relevant within the local context and will be used to inform future service models aimed to provide the right service at the right time in the right place, thus improving equitable access to healthcare.

Abbreviations

ATS: Australasian triage scale; ED: Emergency department; GP: General practitioner; ITS: Interrupted time series; THS: Tasmanian Health Service

Acknowledgements

The research team would like to thank the Tasmanian Health Service (THS) for their support of this project. Thank-you also to the Clifford Craig Foundation for their overall encouragement, support and funding provided for this project.

Funding

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Authors' contributions

MU, LK, SR and EC developed the research proposal. All authors have contributed to this paper through review and revision. All authors read and approved the final version. MU coordinated the submission process.

Ethics approval and consent to participate

Ethics approval for this project was provided by the Tasmanian Human Research and Ethics Committee, Low Risk. Ethics no: H0016504. Focus group participants provided an informed and written consent prior to participation in this study.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Appendix 4

Ethics approval – H0016504 (Phase 1)

19 June 2017

Professor Leigh Kinsman
C/- Launceston general Hospital

Sent via email

Dear Professor Kinsman

REF NO: H0016504

TITLE: Primary Care to Emergency Department: Right service, right time, right place

Document	Version	Date
Low risk application dated		07 April 2017
CED Finance and Administration form		07 April 2017
Renshaw Letter of Support		

The Tasmanian Health and Medical Human Research Ethics Committee considered and approved the above documentation on 19 June 2017 to be conducted at the following site(s):

Launceston General Hospital

Please ensure that all investigators involved with this project have cited the approved versions of the documents listed within this letter and use only these versions in conducting this research project.

This approval constitutes ethical clearance by the Health and Medical HREC. The decision and authority to commence the associated research may be dependent on factors beyond the remit of the ethics review process. For example, your research may need ethics clearance from other organisations or review by your research governance coordinator or Head of Department. It is your responsibility to find out if the approvals of other bodies or authorities are required. It is recommended that the proposed research should not commence until you have satisfied these requirements.

All committees operating under the Human Research Ethics Committee (Tasmania) Network are registered and required to comply with the *National Statement on the Ethical Conduct in Human Research* (NHMRC 2007 updated 2014).

Therefore, the Chief Investigator's responsibility is to ensure that:

- (1) The individual researcher's protocol complies with the HREC approved protocol.
- (2) Modifications to the protocol do not proceed until approval is obtained in writing

from the HREC. Please note that all requests for changes to approved documents must include a version number and date when submitted for review by the HREC.

(3) Section 5.5.3 of the National Statement states:

Researchers have a significant responsibility in monitoring approved research as they are in the best position to observe any adverse events or unexpected outcomes. They should report such events or outcomes promptly to the relevant institution/s and ethical review body/ies and take prompt steps to deal with any unexpected risks.

The appropriate forms for reporting such events in relation to clinical and non-clinical trials and innovations can be located at the website below. All adverse events must be reported regardless of whether or not the event, in your opinion, is a direct effect of the therapeutic goods being tested. <http://www.utas.edu.au/research-admin/research-integrity-and-ethics-unit-rieu/human-ethics/human-research-ethics-review-process/health-and-medical-hrec/managing-your-approved-project>

(4) All research participants must be provided with the current Patient Information Sheet and Consent Form, unless otherwise approved by the Committee.

(5) The Committee is notified if any investigators are added to, or cease involvement with, the project.

(6) This study has approval for four years contingent upon annual review. A *Progress Report* is to be provided on the anniversary date of your approval. Your first report is due 19 June 2017. You will be sent a courtesy reminder closer to this due date.

(7) A *Final Report* and a copy of the published material, either in full or abstract, must be provided at the end of the project.

Should you have any queries please do not hesitate to contact me on (03) 6226 6254.

Yours sincerely

Jude Vienna-Hallam
Ethics Administration Officer

Appendix 5

Publication: Socioeconomic disadvantage as a driver of non-urgent emergency department presentations: A retrospective data analysis

Unwin M, Crisp E, Stankovich J, McCann D, Kinsman L. Socioeconomic disadvantage as a driver of non-urgent emergency department presentations: A retrospective data analysis. Plos one. 2020;15(4):e0231429

. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0231429>

Copy of published article contained in Chapter 3 (as per University of Tasmania PhD thesis requirements) and copy of email to advise published article had been added to Health Inequities and Disparities Research Collection.

RESEARCH ARTICLE

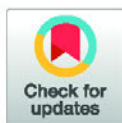
Socioeconomic disadvantage as a driver of non-urgent emergency department presentations: A retrospective data analysis

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Abstract

OPEN ACCESS

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Data Availability Statement: The data used in this analysis was provided by a third party (Tasmanian Department of Health and Human Services). In Australia this data is not publicly available, and

Background

Globally, emergency departments (EDs) are struggling to meet the service demands of their local communities. Across Australia, EDs routinely collect data for every presentation which is used to determine the ability of EDs to meet key performance indicators. This data can also be used to provide an overall picture of service demand and has been used by health-care planners to identify local needs and inform service provision, thus, using ED presentations as a microcosm of the communities they serve. The aim of this study was to use ED presentation data to identify who, when and why people accessed a regional Australian ED with non-urgent conditions.

Method and materials

A retrospective data analysis of routinely collected ED data was undertaken. This included data obtained over a seven-year period (July 2009 to June 2016) in comparison with the Australian Bureau of Statistics census data. Analysis included descriptive statistics to identify the profile of non-urgent attendees and linear regression to identify trends in ED usage.

Results

This study revealed a consistently high demand for ED services by people with non-urgent conditions (54.1% of all presentations). People living in the most disadvantaged socioeconomic decile contributed to 36.8% of these non-urgent presentations while those under 25 years of age contributed to 41.1%. Diagnoses of mental health and behavioural issues and of non-specific symptoms significantly increased over the study period ($p < 0.001$) for both diagnostic groups.

permission has not been provided for the research team to make it publicly available. In order to access this data, the required ethics approvals must be obtained. Once this has been done the research team would be able to access this data by special request in writing to: The Secretary, Department of Health and Human Services, GPO Box 125, Hobart, Tasmania, 7001, Australia. All ABS data are available online. URLs are located in the Supporting Information.

Funding: Authors who received funding: MU, LK, EC Grant numbers awarded: One grant provided. Full name of funder: Clifford Craig Foundation URL: <https://cliffordcraig.org.au/> No - the funder did not play a role in study design, data collection & analysis, decision to publish, or preparation of the manuscript.

Competing Interests: No authors have competing interests.

Conclusion

The over-representation by those from the most socioeconomically disadvantaged areas highlights an inequity in access to services. The over-representation by those younger in age indicates behavioural patterns based on age. These key issues faced by our local community and the disparity in current service provision will be used to inform future health policy and service planning.

Introduction

Emergency departments have been described as a microcosm of the communities they serve, meaning that they encapsulate features of the wider community [1]. Challenges faced by emergency departments (EDs) can reflect deficits in community-based resources [2]. As increasing demands for ED services continue to be reported globally, it is timely and necessary to identify drivers of ED demand. In Australia, over 8.3 million people accessed ED services between July 2018 and June 2019 (335 per 1000 population), 48% of whom were triaged to the two least urgent triage categories [3]. The Australian Triage Scale (ATS) is a five-tiered triage system with ATS 4 and 5 being the least urgent categories, patients triaged to these categories are assessed as being safe to wait for one or two hours respectively [4]. For the purpose of this study, we refer to ATS 4 and 5 presentations as non-urgent. We are confident that this group of patients included some who could have had their needs met in a primary care setting.

International research investigating these least urgent presentations has identified drivers of ED demand such as: patients' perceived need for urgent attention [5–7]; age and gender [7–9]; access to alternative services [10–12], and socioeconomic position [6, 10, 13]. Identifying drivers specific to individual EDs can inform service planning [2]. Furthermore, a mismatch between the known causes of ED demand and solutions implemented was identified in a systematic review and highlights the need to develop interventions that address specific causes [14]. These external drivers contribute to the challenge for hospitals and health services in implementing successful and sustainable solutions.

Furthermore, our understanding of the demand for ED services is complicated by contextual differences. These differences challenge the successful implementation of solutions. Variation in demographic profiles, community healthcare needs and service availability influence how and when people access services, including the decision to present to an ED with a 'non-urgent' condition [15]. Socioeconomic position, for example, has been identified as having both a positive and negative correlation with populations accessing EDs. This correlation is observed to vary across contexts, with one study identifying greater representation by populations from mid-high socioeconomic areas [10] while others report greater representation from lower socioeconomic areas [6, 13]. Of the studies that reported age and gender, one found a higher incidence among middle aged females [7] while another found a higher incidence among young males [9]. These studies demonstrate the unique microcosm within EDs and provide an indication of healthcare needs within their respective wider communities.

Tasmania, Australia's smallest State, with a population of 517,000 [16], has the highest rate of non-urgent ED presentations, with 88,000 triaged as ATS 4 or 5 in 2018–19 [3]. This island State is separated into three geographic regions with governing health services in the North, Northwest and South all operating under the overarching jurisdiction of the Tasmanian Health Service [17]. The population of Northern Tasmania is older (median age 43 years compared to 38 years nationally) and more socioeconomically disadvantaged (median weekly income

\$537.00-AU compared to \$662.00-AU nationally) than other Australian regions [18], compounded by inequitable access to primary care services in regional and rural Tasmania [19]. There are considerable regional differences in the profile of ED patients across these three regions highlighting the importance of identifying trends and types of ED presentations to inform service planning [14]. These regional variations in population healthcare trends and the mismatch between identified causes and solutions to address ED demand highlight the importance of bringing together knowledge and understanding of the drivers for ED demand before implementation of sustainable solutions.

In research conducted in Northern Tasmania, 31% of patients who present to the ED with non-urgent conditions would have preferred to be managed by their general practitioner (GP) if they had been available [8]. The limited service options [19] in this community and the distance to alternative EDs (the nearest is a smaller rural facility located 90km from the study hospital) contribute to ED demand. Moreover, there are no private EDs or urgent care facilities in Northern Tasmania. Northern Tasmanian residents also have limited access to primary care services within the community once business hours have ended. Business-hours have been defined as between 0800 to 1800 Monday to Friday and 0800 to 1200 Saturdays; public holidays and all other times are considered after-hours [20]. These limited service options indicate potential challenges around timely access to alternative services.

Emergency departments are the 'canary in the coalmine' for health services and the communities they serve [1]. Demands for ED services are reflective of broader population healthcare needs [2] and are influenced by the availability of services within the community [10, 21]. The aim of this paper is to establish a profile of who, when and why ED services were accessed by people with non-urgent conditions. The objectives are to:

1. Develop a profile and identify trends in who is presenting and when;
2. Identify patterns in where people come from, including the socioeconomic position, and;
3. Identify trends in discharge diagnoses.

This paper forms part of a larger body of work using an explanatory sequential mixed method to gain a deeper understanding of factors contributing to the decision to present to an ED with non-urgent conditions and develop relevant and sustainable strategies for health service planning.

Materials and methods

Retrospective analysis of routinely collected hospital data was undertaken for all presentations triaged as ATS 4 or 5 at a single regional ED, between 1 July 2009 and 30 June 2016. This consisted of data entered into the Emergency Department Information Systems (EDIS) by ED staff at time of the patient's presentation, or at the time of discharge. Variables used in this analysis included: date, day of week and time of arrival to the ED; gender; mode of arrival; suburb of residence; discharge diagnosis; discharge destination, and referral on discharge. The first six variables were entered into EDIS by the triage nurse or clerical staff at the patient's time of arrival. The latter three were added by the treating physician or nursing staff at the time of departure. Diagnoses are based on International Diagnostic Codes, revision 10, as outlined by the World Health Organisation [22]. It was beyond the scope of this project to review presentations across all triage categories.

Research ethics approval was granted by the Tasmanian Human Research Ethics Committee (H0016504). Deidentified data were provided by the Tasmanian Department of Health and

Human Services (DHHS). This data is not publicly available in Australia and permission was not provided for it to be made publicly available.

Study setting & participants

This study was undertaken in a large regional hospital in Northern Tasmania with a total bed capacity of 300 and a 26 bed ED [23]. Serving as a referral centre for a population of 143,500 [24] dispersed across 20,000 square kilometres. Data used for this analysis was from July 2009 to June 2016, for ATS 4 and 5 presentations. The DHHS also provided the total count of all ED presentations by month across all triage categories so the proportion of ATS 4 and 5 could be calculated. Further explanation of the included study population is provided in Fig 1.

We have included all ATS 4 and 5 presentations who resided in the regional city (Launceston) and its surrounding suburbs. Excluding those from outside this region allowed us to develop a profile of who, when and why the local community choose to access ED services, thus focusing on local drivers of ED demand. This area was defined by using statistical area (SA) codes allocated by the Australian Bureau of Statistics (ABS). The greater Launceston area has an SA3 code of 60201. All suburbs with this code were included in the study area and total population was 81,029 in 2016 [25]. Population growth in this region was just 2.5% between 2011 and 2016 compared to the national growth of 8.3% [25, 26].

Data relating to socioeconomic position was derived from ABS data. Five-yearly census data is used to calculate average values of various socioeconomic indexes across geographical areas, known as Socioeconomic Indexes for Areas (SEIFA). One of these is the Index of Relative Socioeconomic Disadvantage (IRSD), which is the preferred measure to use when investigating disadvantage or lack of disadvantage [27]. This index is based on national socioeconomic classification, and takes into account income and additional variables including unemployment, disability, sole-parent status, level of education, employment classification, etc. [27]. Each suburb is given a score based on these variables, the lower the score the greater the disadvantage. The ABS also aggregate suburbs into deciles, dividing Australia's population into ten evenly sized population groups. Ten percent of the Australian population fall into each decile with IRSD 1 being the 10% of those with greatest disadvantage and IRSD 10 being those with the greatest advantage. The histogram of IRSD scores has a long left-tail (at the end of greatest disadvantage), so the difference in disadvantage between decile 1 and decile 2 is larger than between other pairs of adjacent deciles [28]. The IRSD score and deciles were linked to ED data using the suburb of residence in order to determine socioeconomic position.

Data analysis

Initial review of the data included all presentations to the regional ED triaged as ATS 4 or 5. The patient's suburb/town of residence was used to exclude attendees from outside this regional city. The decision to focus only on presentations from the local area was to gain greater insight and understanding of the local community and to limit outlying factors that may have influenced the decision by non-local attendees to present to the ED.

Descriptive statistics were calculated using SPSS [29] to summarise the profile of patients accessing the ED with non-urgent conditions throughout the seven-year study period. Linear regression was used to explore trends over time by mode of arrival, referral on departure, episode end status, time of arrival (in-hours versus after-hours) and International Classification of Diseases, version 10 (ICD-10) [22]. ABS national census data from 2011 and 2016 [25, 26] were used to calculate age-standardised presentation rates by suburb (age-standardised to the overall age distribution profile of the Launceston region in 2016), with linear interpolation used to estimate populations in years between 2011 and 2016. Linear regression, weighted by

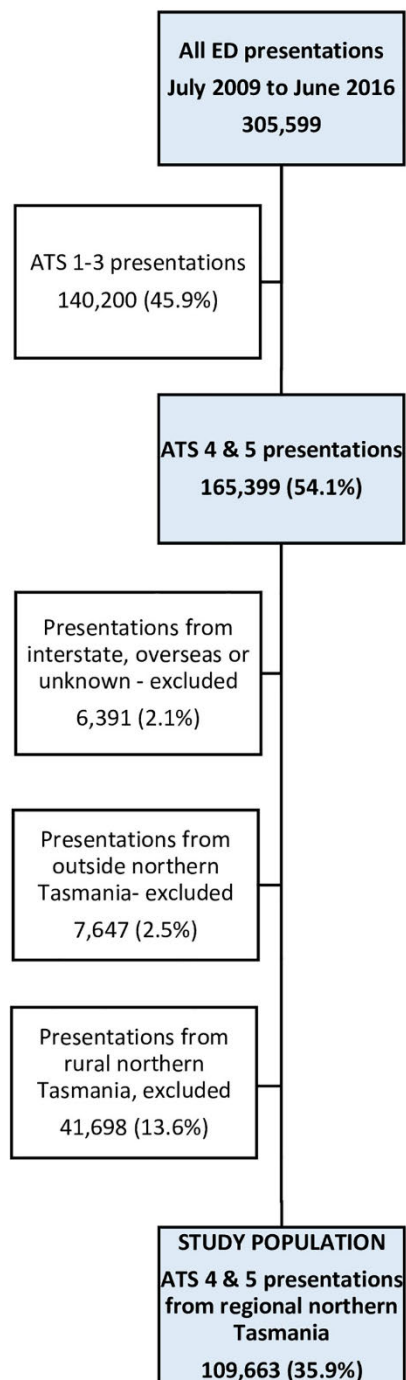


Fig 1. Summary of ED presentation numbers, July 2009 to June 2016.

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2016 suburb populations, was used to fit a trend-line showing the association between age-standardized presentation rate and IRSD, with an outlier suburb excluded. RStudio [30] was used for regression analyses and plots.

Results

Between 1 July 2009 to 30 June 2016, there were 305,599 ED presentations across all triage categories (ATS 1–5). Fig 1 provides a summary of how we determined the number ($n = 109,633$) included as the study population. Our objectives were to: describe the profile of ED attendees and trends over time through retrospective analyses of routinely collected hospital data; identify the usual place of residence and socioeconomic position of people attending the ED with non-urgent conditions, and to summarise the most frequent discharge diagnoses of the study population and trends over time.

Profile and trends of people presenting with non-urgent conditions

The first objective was to develop a profile and identify trends in who is presenting and when. The number of non-urgent presentations to the ED revealed similar numbers between the first and last 12-month periods, July 2009 to June 2010 ($n = 15,322$) and July 2015 to June 2016 ($n = 15,139$). Over the seven-year study period the annual rate of non-urgent presentations among local residents varied between 186 to 205 per 1000 population. Fig 2A shows average daily rates by month of all non-urgent presentations. While there were short-term fluctuations in presentation numbers, regression analysis did not reveal any long-term linear trend in the number of presentations ($p = 0.61$). Over the seven-year study period non-urgent presentations by local residents ranged between 38 and 48 per day (Fig 2A).

Analysis of age identified that younger people were over-represented among non-urgent presentations. The median age of the study population was 29 years compared to a median age in this regional city of 39 years [31]. Table 1 provides a summary of presentation and population numbers aggregated by age. The age profile of the local population was recorded to remain stable between census periods, for example, those under 25 years of age continued to contribute to 31–33% of the local population between census periods.

Trends in mode of arrival revealed a consistency in the number and proportion of patients arriving by their own means (87%; Table 2). Analysis of presentation outcomes revealed a large proportion of patients either did not require any follow-up or were referred to their GP (74.7%; Table 2) and were discharged home from the ED (85.3%). For these two variables (arrival mode and presentation outcome), increases were observed in the number of patients with non-urgent conditions who: arrived by ambulance (average increase of 34 annually, $p = 0.002$); arrived with police (average increase of 56 annually, $p < 0.001$), or who required admission to hospital (average increase of 56 annually, $p < 0.001$).

Time of day and day of week are presented in Fig 2B with most non-urgent presentations occurring between 0800hrs and 1800hrs with peaks observed on Monday and Sunday mornings. Analysis of presentations occurring in-hours or after-hours revealed that 47.0% arrived in-hours with significant trends to in-hours and after-hours presentation numbers (2c and 2d). Average annual in-hours presentations fell at a rate of 78 per year (95% confidence intervals 18 to 140, $p = 0.012$). This was offset by a significant increase in after-hours presentations (rate of increase 108 annually, 95% confidence intervals 31 to 184, $p = 0.006$).

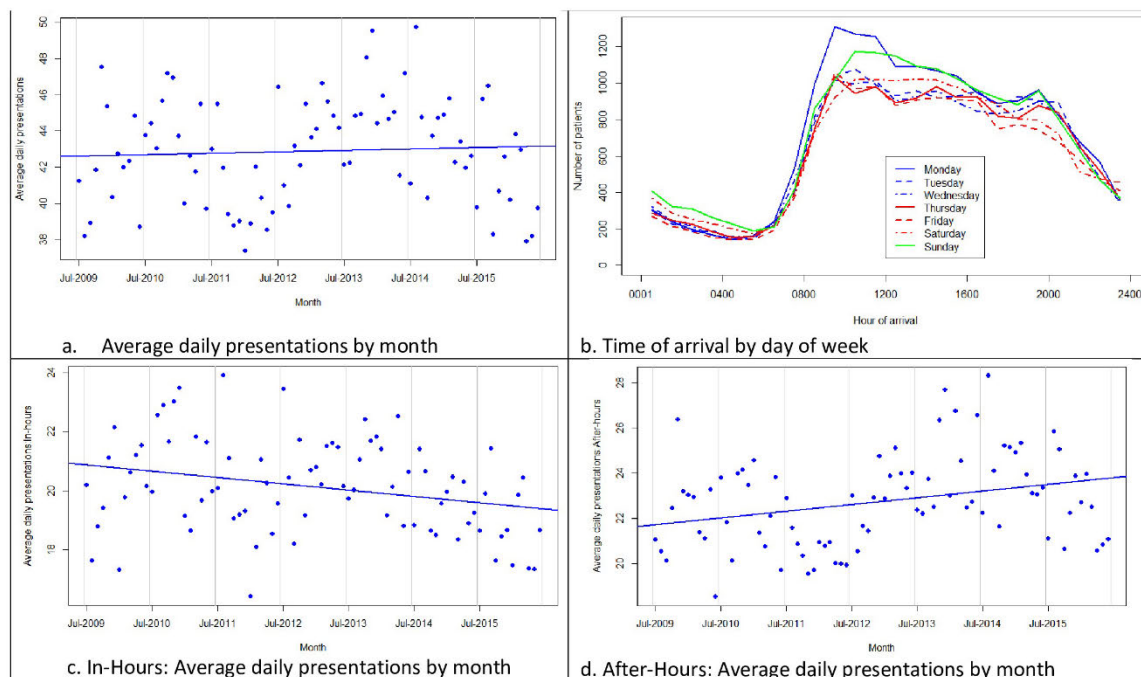


Fig 2. Trends in presentation numbers and time of arrival, ATS 4 and 5, July 2009 – June 2016. 2a. Average ATS 4 and 5 presentations by month, adjusted by days in month ($p = 0.6$). 2b. ATS 4 and 5 presentations, July 2009 to June 2016: time of day and day of week. 2c. Average in-hours ATS 4 and 5 presentations by month, adjusted by days in month (presentations 0800 to 1800 Monday to Friday and 0800 to 1200 Saturday). P-value for downward trend: 0.006. 2d. Average after-hours ATS 4 and 5 presentations by month, adjusted by days in month (presentations at times of week not included in Fig 2C, plus all presentations on public holidays). P-value for upward trend: < 0.001 .

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Non-urgent ED attendees and socioeconomic levels

The second objective was to establish a profile based on the IRSD deciles according to the patient's suburb of residence. This age-standardised analysis revealed an over-representation by residents living in suburbs categorised as having the greatest socioeconomic disadvantage (IRSD decile 1; Table 1). Ten percent of the Australian population live in suburbs rated IRSD decile 1 compared to 26.4% of the Launceston population [25]. In this study, residents of IRSD decile 1 suburbs contributed to 36.8% of non-urgent ED presentations. Further analysis using the underlying IRSD score for each suburb revealed a strong negative correlation between IRSD score and the age standardised rate of ED attendance (Fig 3). Presentation rates for people with non-urgent conditions were 4.5 times higher from the most disadvantaged suburb compared to the most advantaged. Residents from the most advantaged suburb (IRSD score 1090) presented at a rate of 96 per 1000 population while residents from the most disadvantaged suburb (IRSD score 591) presented at a rate of 434 per 1000 population.

Discharge diagnoses and trends over time

The number of presentations for the three most frequent overarching diagnostic groups are summarised in Table 3 along with the three most frequently recorded sub-diagnostic groups.

Table 1. Profile of patients by gender, age and index for relative socioeconomic disadvantage (IRSD) versus profile of local population, ATS 4 and 5, July 2009 to June 2016.

	No.	% (n = 109 633)	% of local population (n = 81,029: ABS, 2016)*
Gender			
Male	56 281	51.3	48.2
Female	53 293	48.6	51.8
Age (yrs)			
0–4	9 543	8.7	5.9
5–14	11 936	10.9	11.9
15–24	23 531	21.5	14.5
25–34	18 296	16.7	12.5
35–44	13 737	12.5	12.1
45–54	10 902	9.9	13.3
55–64	7 955	7.2	12.0
65–74	5 907	5.4	9.8
75–84	4 819	4.4	5.2
85+	3 037	2.8	2.5
IRSD by suburb (decile)**			
1 (greatest disadvantage)	40 379	36.8	26.4
2	5 058	4.6	1.2
3	9 993	9.1	9.5
4	20 098	13.1	22.5
5	8 218	7.5	3.6
6	11 576	10.6	17.8
7	1 828	1.7	7.6
8	4 562	3.9	5.6
9	1 080	1.6	1.6
10 (lowest disadvantage)	413	0.4	0.8

* Australian Bureau of Statistics, 2016 Census Data Packs

** IRSD deciles divide 10% of nationwide population into each decile

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Median age and results of linear regression analysis to determine trends in diagnostic groups are also reported in [Table 3](#).

The most notable results from this analysis were the high proportion of discharge diagnoses falling into the ICD-10 code for injury. One third of non-urgent presentations were diagnosed with an 'injury, poisoning, certain other consequences of external causes', the most frequent sub-diagnostic groups were injuries to distal limbs or head. These patients were younger and there was no significant trend over the study period.

Significant increases in ED attendance were observed in two diagnostic groups, the first being 'symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified'. The proportion of patients diagnosed into this non-specific group increased from 6.6% in 2009–10 to 9.1% in 2015–16 ($p < 0.001$), the equivalent of 70 additional presentations per year.

Mental health conditions also increased significantly between 2009–16. These presentations increased from 1.8% of the study population to 3.1% ($p < 0.001$), a 73.1% increase in diagnoses relating to mental and behavioural disorders over seven years and equivalent to 31 additional presentations annually.

Table 2. Summary and trends in ED presentations for mode of arrival and outcome of ED presentation, ATS 4 and 5, July 2009–June 2016.

	No.	% (n = 109 663)	Trend: average annual change in presentations per year (95% confidence interval)	p-value for trend
<i>Mode of arrival</i>				
Arrived by own means	95 412	87.0	–64 (–170, 41)	p = 0.2
Ambulance	12 350	11.3	34 (13, 55)	p = 0.002
Police	1 565	1.4	56 (44, 67)	p < 0.001
Other	336	0.3	2.2 (–0.5, 4.9)	p = 0.1
<i>Referred to on departure</i>				
GP or no further follow-up	81 914	74.7	88 (–8, 184)	p = 0.07
Emergency department	7 370	6.7	–135 (–166, –103)	p < 0.001
Outpatient department	8 916	8.1	–12 (–32, 8)	p = 0.2
Community services	3 010	2.7	10 (1, 20)	p = 0.03
Hospital admission (same day)	7 670	7.0	108 (93, 124)	p < 0.001
Other hospital admission	465	0.4	–4.7 (–8.3, 1.1)	p = 0.01
Other	318	0.3	–84 (–119, –49)	p < 0.001
<i>Episode end status</i>				
Discharged home	93 567	85.3	1 (–114, 115)	p = 1.0
Did not wait/Left at own risk	8 571	7.8	–43 (–76, –9)	p = 0.01
Admitted	7 336	6.7	75 (56, 94)	p < 0.001
Transferred	161	0.1	–3.1 (–5.5, –0.8)	p = 0.01
Other	28	0.0	5.3 (–0.6, 11.3)	p = 0.08

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Discussion

This research aimed to identify who, when and why people accessed the ED with non-urgent conditions. In the analysis of seven-years' worth of routinely collected ED data, we discovered:

- No increase in total number of non-urgent presentations;
- A significant over-representation by residents from socioeconomically disadvantaged areas and those younger in age;
- Increasing proportion of after-hours presentations;
- Significant increases in presentations for mental health and non-specific symptoms.

Consistent demand for ED services by patients with non-urgent conditions

The AIHW have consistently reported national increases in the number of annual ED presentations over the past five years [32], but an increase was not observed in the number of non-urgent presentations recorded to this ED during the study period. Monthly plots of presentation numbers demonstrate short-term fluctuations in ED usage for non-urgent conditions (Fig 2A and 2D), with presentation numbers between 186 to 205 per 1000 population per year. The simple linear regression we have performed does not adequately model fluctuations. Analysis of the fluctuations was beyond the scope of this publication but is part of an ongoing investigation by the research team.

A consistent demand for ED services by patients with non-urgent conditions has also been reported in research conducted in Northwest Tasmania where limited general practices services were identified as a driver [33]. Furthermore, international literature has identified links between the number of ED presentations and timely access to primary care services [10, 11, 21].

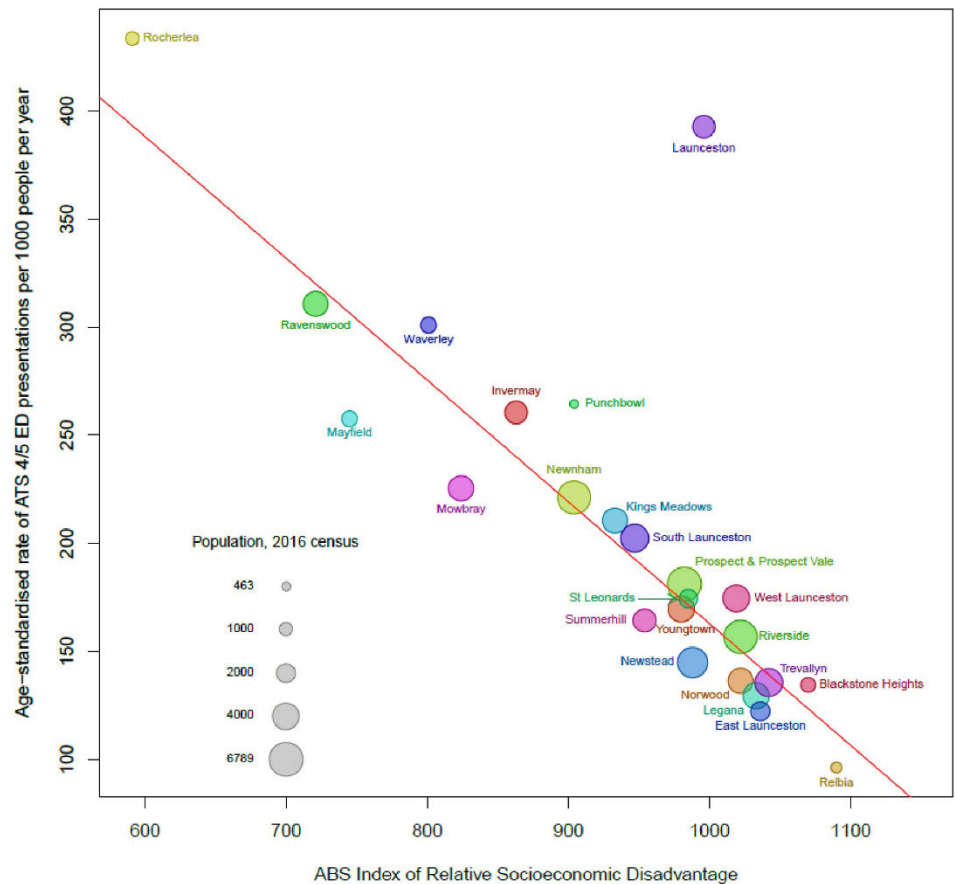


Fig 3. Age standardised ED presentation rates for ATS 4 and 5. Age standardised presentations per 1,000 (population), by suburb of residence and index for relative socioeconomic disadvantage (IRSD), July 2009 – June 2016.

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Presentation numbers across day of week and time of day were observed to peak between 0900 and 1100hrs and decreasing throughout the day (Fig 2B). This indicates that a significant proportion of non-urgent presentations arrive during hours when other services are open. Tuesdays to Saturdays demonstrated similar presentation times and trends, however, peaks were observed on Sunday and Monday mornings. General practice services on a Sunday are minimal in this regional community leaving residents with the ED as the primary option. The peak on a Monday morning is likely to reflect those, who have waited for regular services to open on a Monday morning but been unable to secure an appointment, thus, resulting in an ED presentation. This again highlights the availability of alternative services at the time of need as a driver of non-urgent ED presentations and may be of interest to local service providers aiming to identify peak times and plan services and staffing based on demand.

Table 3. Top three diagnostic groups and diagnostic groups with significant trends (based on international statistical classification of diseases and related health problems 10th Revision: ICD-10). ATS 4 and 5, July 2009 to June 2016.

<i>Diagnosis, top ten ICD-10 In order of frequency Most frequent sub-diagnoses</i>	<i>No. presentations (% of sub-diagnostic group)</i>	<i>Proportion presentations (n = 109 663) (%)</i>	<i>Median age (IQR, years)</i>	<i>Trend over time</i>
XIX—Injury, poisoning, certain other consequences of external causes	36 567	33.3	25 (15–45)	No change
<i>Injuries to wrist and hand; head; ankle and foot</i>	<i>19 988 (54.7%)</i>			<i>(p = 0.973)</i>
XXI—Factors influencing health status and contact with health services	14 980	13.7	33 (21–50)	No change
<i>Persons encountering health services for examination and investigation; in other circumstances; or for specific procedures and health care</i>	<i>14 443 (96.4%)</i>			<i>(p = 0.156)</i>
XVIII—Symptoms, signs & abnormal clinical & laboratory findings, not elsewhere classified	8 442	7.7	34 (19–60)	Significant increase
<i>Symptoms and signs involving the digestive system and abdomen; general symptoms and signs; or involving the circulatory and respiratory systems</i>	<i>6 700 (79.4%)</i>			<i>(p < 0.001)</i>
X—Diseases of respiratory system	7 024	6.4	22 (5–39)	Significant decrease
<i>Acute upper respiratory infections; chronic lower respiratory diseases; or influenza and pneumonia</i>	<i>6 340 (90.3%)</i>			<i>(p = 0.002)</i>
V—Mental & behavioural disorders Neurotic, stress-related and somatoform	2 363	2.2	34 (23–48)	Significant increase
<i>disorders; mental and behavioural disorders due to psychoactive substance use; or Mood [affective] disorders</i>	<i>1 664 (70.4%)</i>			<i>(p < 0.001)</i>

ICD-10 –International Classification of Diseases, version 10 [22]

IQR—Interquartile range

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Over-representation by those from lower socioeconomic suburbs and those younger in age

The correlation between IRSD and the number of non-urgent ED presentations per 1,000 head of population demonstrates a striking over-representation by people living in the most disadvantaged areas. The ED is located close to the central business district and is surrounded by suburbs with IRSD deciles between 3 and 7 [25]. Furthermore, the suburb with the highest presentation numbers per 1,000 residents is the same distance from the ED as the suburb with the lowest presentation numbers, both being 11km from the ED. This shows that socioeconomic status is a stronger contributor to ED attendance than distance in our region. A higher proportion of non-urgent ED presentations by those living in close proximity has been previously reported [11, 34]; however, this was not the case in this study and highlights the contextual nature of how local populations access health services.

The only exception to the correlation between socioeconomic position and incidence of ED presentation (Fig 3) is the city centre. This appears to have occurred when the person providing the patient's details or staff member entering the data has listed the over-arching area of Launceston as the suburb of residence rather than the patient's actual suburb of residence. For example, it is not uncommon for residents from Launceston's lowest IRSD suburbs to list their suburb of residence as Launceston where it shares the same postcode as their actual suburb. These presentations were plotted in Fig 3 as they contribute to the overall number of presentations. However, the data from the city centre were excluded from the weighted regression analysis to fit a trend line due to the recording error.

Findings of over-representation among populations with greater socioeconomic disadvantage are varied across international literature. Some studies report similarly over-represented

presentations by disadvantaged communities [6, 13, 34] while a Canadian study found mid-high-income communities were over-represented [10]. Additionally, a study from the UK [12] reported that disadvantaged communities had lower ratios of GPs per 1,000 head of population. While it was outside the scope of this study to measure the number of GPs per 1,000 during the study period, it was observed that none of the larger practices with ready access to additional services such as pathology and radiology are located within the most disadvantaged areas of this local community. Furthermore, northern Tasmania was reported to have fewer full-time equivalent GPs in 2014, 70.3 per 1,000 population, versus 85.4 per 1,000 in southern Tasmania [35]. These findings highlight contextual differences in the ability of populations to access health services and demonstrates a disparity in the provision of healthcare services in the most socioeconomically disadvantaged areas of this community. Further supporting this finding, are two studies, one from the US focusing on paediatric presentations [36] and the other from New South Wales looking at all presentations (adult and paediatric) [37]. Both studies found that fewer GPs per 1000 population contributed to higher rates of non-urgent ED presentations.

Being younger in age was also a significant factor with a clear over-representation by those in the 0 to 4 and 15 to 24 age groups. These two groups were 1.5 times more likely to present with a non-urgent condition than the rest of the study population. This finding is consistent with international studies from the United States [6, 34], Canada [11], Switzerland [9, 38], the United Kingdom [13], and Australia [8, 39] all observing an over-representation in non-urgent presentations by younger populations. Consideration of why this over-representation is occurring may contribute to further understanding of the decision-making processes of young people and access to alternative services for this group.

It is likely that the over-representation of residents from socioeconomically disadvantaged areas and by those younger in age is reflective of challenges faced by these populations in accessing the right service at the right time and located in the right place. This information will be of interest to future service planning.

Increased non-urgent presentations after-hours

An increasing number of people arriving after-hours was also identified (Fig 2D). Most GP services in this community are available within normal business hours (0800 to 1800 weekdays and 0800–1200 Saturdays, excluding public holidays). Access to services is limited outside these times. The increase in demand for after-hours services is likely to reflect a lack in available services within the community at the time of need. Two other Tasmanian studies also found increases in after-hours presentations [17, 40] while another local study identified 31% of patients attending the ED would have preferred to be managed by their GP if they had been available at the time of need [8]. These findings further support the need for the right services to be available at the right time. As the third Tasmanian project to report a significant increase in the demand for after-hours services it is likely that further research exploring service demand and availability during these hours may assist in informing the provision of timely, patient-centred services and reduce ED demand.

Increased presentations with non-urgent mental health diagnoses and with non-specific symptoms

The final objective was to identify prominent reasons for presentations through analysis of discharge diagnosis (Table 3) based on ICD-10 codes [22]. Unsurprisingly, presentations as a result of injury were the most common discharge diagnostic group with one third of all non-urgent presentations being as a result of 'injury, poisoning, certain other consequences of

external causes'. This is consistent with non-urgent presentations across Australia, the AIHW reporting that in 2017–18 [32], 32.7% of non-urgent ED presentations were allocated into this principle diagnostic group. Other studies have also found similar proportions for this diagnostic group [8, 39].

A significant increase was observed in diagnoses into the non-specific group of 'signs and symptoms or abnormal clinical findings not elsewhere classified'. This includes people who present to the ED for simple examination, investigation or observation, the proportion found in this study is reflective of nationwide trends for this principle diagnostic group [32]. The significant increase may be explained by international research which clearly identifies the patient's perceived need for urgent medical attention as a major theme when investigating reasons for accessing ED services with non-urgent conditions [6, 8, 38]. The continued high proportion of patients who were discharged home and did not require specialist follow-up in this study raises questions around health literacy, health anxiety and timely access to alternative services.

Diagnoses of 'mental and behavioural disorders' was the only other diagnostic group observed to increase significantly with an additional 30 people per year presenting to this regional ED. To the best of our knowledge, this patient group has not been identified as an increasing proportion of non-urgent ED presentations. In 2017–18 the AIHW recorded 2.6% of ATS 4 and 5 presentations resulting in a mental health or behavioural diagnosis, for the same period this regional ED observed 3.1% [32]. While these are similar proportions to national figures, we were able to identify a concerning increase of 73.1% between 2009–10 and 2015–16 in our regional ED. Limitations in AIHW reporting meant we were not able to compare this increase with earlier national numbers. A patient triaged as an ATS 4 or 5 with a mental health presentation must demonstrate the ability to provide a clear history without signs of restlessness or aggression [4].

It is not known what has caused this dramatic increase in mental and behaviour diagnoses within the local region. However, if the ED provides an indication of people's healthcare needs and the level of access to services within the community, this increase must be a warning to local service providers. Mental health was identified as the predominant concern for young people in a 2018 national survey of over 28,000 participants aged 15 to 19 years [41]. This report identified for the first time in 17 years that the top concern for youth was mental health. This growing concern among young people and the increasing presentation numbers within this regional community provide policy makers and service providers with a clear local need.

Limitations

This longitudinal observational study was reliant on routinely collected hospital data; efforts were made to review data for possible discrepancies. The findings are largely reliant upon the quality of data collected at the time of the patients' presentation. Population and socioeconomic position data were based upon ABS data collected in 2011 and 2016 with changes occurring across this time period, to allow for these changes we presumed a direct linear relationship between the two data collection periods. This may not reflect true numbers but provided the closest solution to changes available between these two time periods.

Data provided by the DHHS were for ATS 4 and 5 presentations only, therefore it was not possible to compare presentation trends across all triage categories. This broader analysis was beyond the scope of this project and highlights an area for future enquiry.

Conclusion

The ED is a 'canary in the coalmine' for the greater health service and community. The over-representation of population groups and increases in demand provide clear indicators of the

healthcare needs of members of the local community. Patients presenting to this regional ED with non-urgent conditions were younger than the local demographic profile and up to four times more likely to live in the most disadvantaged communities, raising the question of service accessibility and availability in areas of need. In addition, patients are increasingly presenting with non-specific symptoms and with mental health and behavioural issues. These findings will be of use to policy-makers in planning for enhanced primary care service for the young and for people with mental health issues from our most disadvantaged communities.

Supporting information

S1 File.
(DOCX)

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From: [Meghan Hom](#)
To: [Maria Unwin](#)
Subject: PLOS ONE: Your published article has been added to Health Inequities and Disparities Research Collection
Date: Wednesday, 12 August 2020 12:05:15 PM

Title: Socioeconomic disadvantage as a driver of non-urgent emergency department presentations: A retrospective data analysis
Manuscript Number: PONE-D-19-35242
DOI: 10.1371/journal.pone.0231429

Dear Dr. Unwin

Thank you so much for submitting to our "Health Inequities and Disparities Research" Call for Papers. I am happy to inform you that the collection has been officially released and your paper has been added to the collection, which can be found here:
<https://collections.plos.org/health-inequities>

Your manuscript can be viewed here: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0231429>

Please note that we will continue to add manuscripts in weekly batches until all accepted articles are added. You are encouraged to view the open-access articles presented in the collection by PLOS ONE and to share the collection in your network and among your co-authors. There are currently 33 research articles presented in the collection, and we expect another 45 or so articles to publish and be added to the collection throughout the next few months.

Please feel free to reach out if there is anything I can assist with. Your support is very much appreciated.

Kind Regards,
Meghan Hom
Publications Assistant, PLOS ONE

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plosone@plos.org

Appendix 6

Summary of research into non-urgent emergency department presentations in Northern Tasmania

Research summary requested based on preliminary data to inform Price Waterhouse Coopers feasibility study into the establishment of Urgent Care Centres in Launceston and Hobart.

Requested by Ian Bell, Manager of Primary, Rural and Palliative Care, Health Planning, Planning, Purchasing and Performance, Department of Health (Tasmania)

Date: 29 November 2018

Summary of research into non-urgent emergency department presentations in Northern Tasmania

Honours and PhD (ongoing) research by Maria Unwin (UTAS) 2015 – 2018

Supervised by Prof Leigh Kinsman, Dr Elaine Crisp and Mr Scott Rigby

This summary includes a combination of data from: patient surveys; statistical analysis of local non-urgent emergency department (ED) presentations and, review of international literature.

The aim of this research program is to identify the service requirements of non-urgent ED presentations in Northern Tasmania. Data analysed to date were collected between July 2009 and June 2016, and have provided insight into who, when, where and why residents present to the ED in Launceston, Tasmania.

Key points to date:

Who?

Non-urgent presentations are more likely to be young adults and children (42% were under 25 years of age), based on seven years of ED data (figure 1).

How many?

Over 151,300 non-urgent presentations over seven years, consistently over 50% of total ED presentations. Surveys indicated that 40% had attempted to access alternatives services before presenting to the ED.

When?

The number of non-urgent presentations is consistent across all days of week (including weekends) and overwhelmingly between the 8.00 am and 10.00pm

Where?

The incidence of presentations is higher in suburbs with a low Socio-Economic Indexes for Area (SEIFA) ranking. For example, a resident of Rocherlea is four times more likely to present to the ED than a resident of East Launceston (figure 1). The patient survey demonstrated that cost is not a factor in decision to present. Service mapping indicates there is a mismatch between primary demand and supply (figure 2 and 3).

Why?

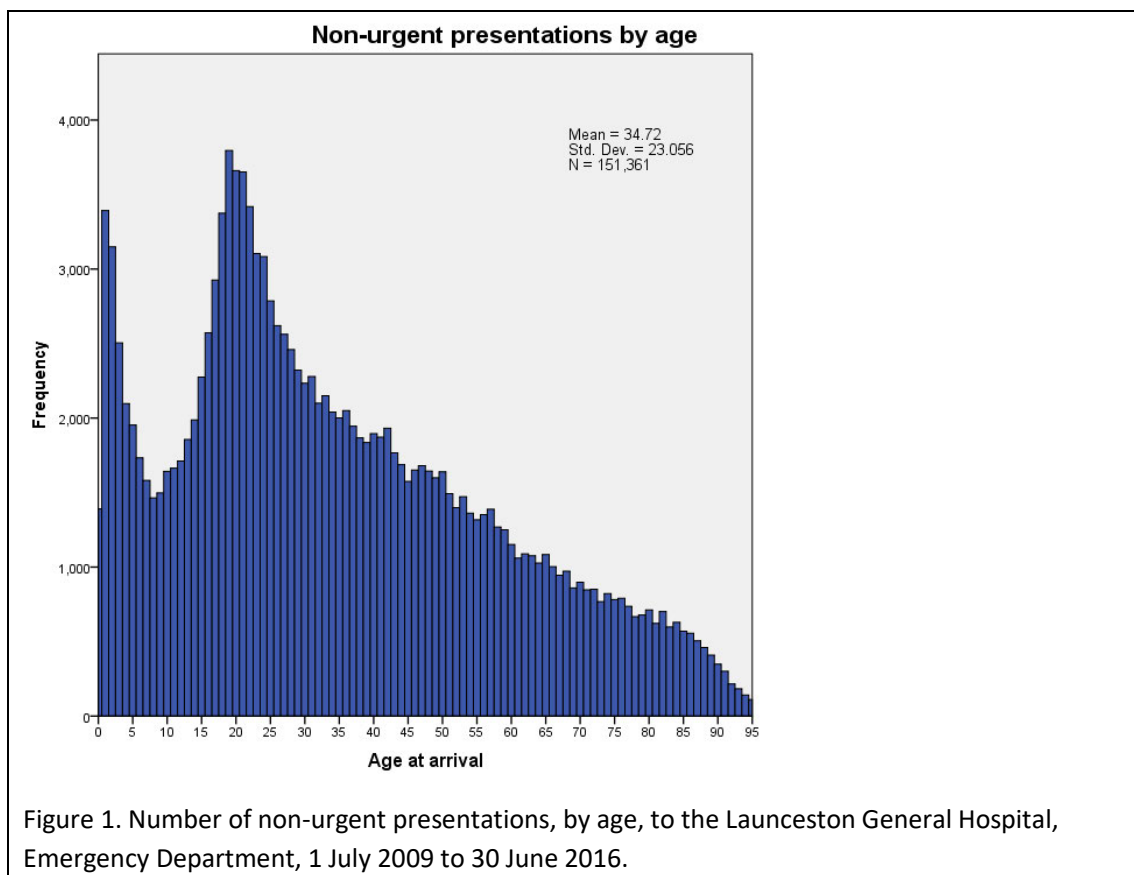
The survey identified that 29% of non-urgent ED presentations were referred by their GP. The most frequent presenting problem was for musculoskeletal concerns. Presentation trends over the seven years remained constant with just two areas of increase:

1. mental health presentations, and;
2. admissions of elderly patients.

Characteristics of successful models to reduce ED demand

This is a growing body of international research identifying successful strategies for the implementation and integration of services to reduce ED demand. International literature has identified that the following factors are integral to successful projects:

- Contextually relevant and designed to meet local demand. According to our results, contextual relevance in Launceston would mean catering to people in the poorest suburbs, young adults, the elderly, people with musculoskeletal problems, and those with mental health issues.
- Interprofessional teams to provide a range of healthcare, including management of acute needs and chronic disease management, mental health and social services.
- Co-designed with service users to ensure local needs and priorities are identified.



Non-urgent ED presentations per capita based on Socio-Economic Indexes for Areas.

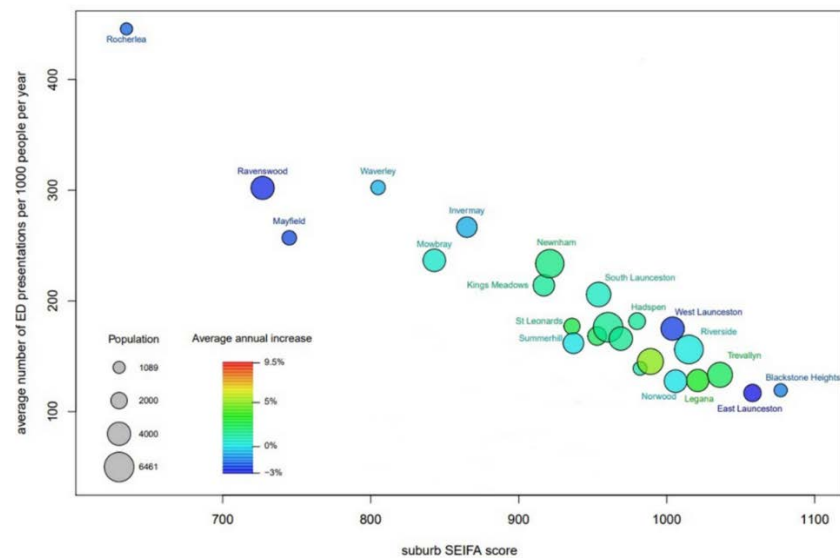


Figure 2. Average number of non-urgent presentations, per capita, based on Socio-Economic Indexes for Areas (SEIFA). The greater the socioeconomic index the higher the SEIFA score.

Geographical location of over-represented services and major primary care services

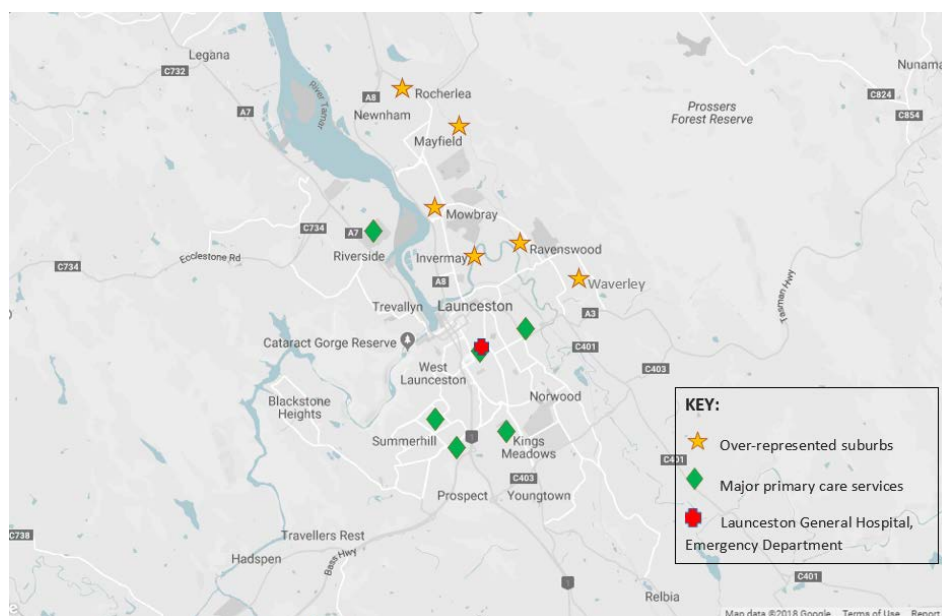


Figure 3. Six suburbs with highest proportion of non-urgent ED presentation in relation to six large primary care services in Launceston.

Appendix 7

Non-urgent emergency department presentations, Northern
Tasmania – 25 to 34 years of age

Research summary requested based on preliminary data to inform Health Data for
Health Outcomes report, for St Lukes Health.

Requested by Lucy Byrne, Manager Director, Health Tasmania Pty Ltd

Date: 15 August 2018

Non-urgent emergency department presentations, Northern Tasmania (Report to St Lukes)

25 to 34 years of age (July 2009 to June 2016)

Ms Maria Unwin, Dr Elaine Crisp, Prof Leigh Kinsman, School of Health Sciences, College of Health and Medicine, University of Tasmania.

The report is based on data obtained for the 'Primary care to emergency department: right service, right time, right place' project (HREC H0016504) and forms part of a PhD project currently being conducted by Maria Unwin (data is currently unpublished). The data used in this analysis was provided by the Department of Health and Human Services and contributes to a larger data set routinely collected by the emergency department (ED) at the Launceston General Hospital (LGH). All data is unidentifiable.

For the purposes of this report, data for ED presentations of patients aged between 25-34 years of age were compared to overall presentations. Only patients with a home address based within the LGHs catchment area on Northern Tasmania were included.

If you have any queries please feel free to contact Maria Unwin (maria.unwin@utas.edu.au).

Number of presentations with non-urgent conditions between the ages of 25-35 years:

The number of presentations to the ED at the LGH in this age group has remained relatively consistent over the seven-year period, around 3,500 per year and contributed to 15.6% of all non-urgent ED presentations over the seven years of data collection. However, this age group contribute to just 11.1% of the overall population in Northern

Tasmania¹. Consequently, this age group is slightly over-represented in those presenting to ED with non-urgent conditions. Gender split was relatively even with 52% being male. Those aged between 25 to 29 years contributed to just over half (54.1%) of presentations within this sub-group of 25-34-years of age.

Suburb of residence and Socio-Economic Index:

Suburbs have been analysed based on Socio-Economic Indexes for Areas (SEIFA) (ABS, 2013²), non-urgent ED presentations were more likely to be by patients from the most disadvantaged suburbs with those residing in a suburb with a SEIFA of 1 or 2 contributing to 41.3% of non-urgent ED presentations, yet the actual population of Northern Tasmanians, within this age group and living in these areas contribute to just 31.1%.

Mode of arrival:

The vast majority of presentations by this age group arrived by their own means of transport (89.2%), this was slightly higher than the overall study population (85.8%). Those who arrived by ambulance, in this age group, contributed to 7.2% of arrivals, while the arrival mode of the overall study population triaged to ATS 4 or 5 was 12.1%.

Diagnosis and outcome of the presentation:

The most common reason for presenting to the ED was for injury/poisoning (based on ICD 10 codes), in the 25-34 year old age group this diagnosis contributed to 31.1% of all presentations while it was slightly higher in the overall study population 34.6%. The second most common diagnosis was relating to general complaints 'influencing health

¹ AUSTRALIAN BUREAU OF STATISTICS, 3235.0 – Population by Age and Sex, Regions of Australia, Data Cube only, 2016, Table 6, Estimated Resident Population by Age, Tasmania, Persons, Released 30 June 2016, accessed 13 February 2018.

² AUSTRALIAN BUREAU OF STATISTICS, 2033.0.55.001 - Socio-economic Indexes for Areas (SEIFA), Data Cube only, 2011, Table 3, State Suburb Index of Relative Socio-economic Disadvantage, Released 28 March 2013, accessed 15 February 2018.

status and contact with health services', with 15.8% versus 13.2% in the study population. This diagnostic group most commonly refers to general conditions, or signs and symptoms without a diagnosis.

Non-urgent ED presentation by patients in this age group were less likely to require admission to hospital as an outcome of their presentations, 4.7% versus 7.7% in the overall population while those discharged home contributed to 86.4% of those aged 25-34 years and 84.6% of the overall study population. This age group were also slightly more likely to 'leave at own risk' or 'did not wait' 8.4% versus 7.2% overall.

A method of identifying non-urgent ED presentation that could have been potentially managed within a primary care setting such as a general practice is to consider those who were discharged without referral or only with referral back to their general practitioner (GP). Over the seven-year period, 73.6% of presentations by patients aged 25-34 years fell into this category, this is consistent with the overall study population at 73.2%.

Summary:

In summary, presentations to the LGH ED by Northern Tasmanians aged between 25-34 years are over-represented and are more likely to come from disadvantaged communities. They are more likely to arrive by their own means of transport and less likely to be admitted to hospital.

Appendix 8

Ethics approval – H0017492 (Phase 2)

25 September 2018

Professor Leigh Kinsman
C/- University of Tasmania

Sent via email

Dear Professor Kinsman

REF NO: H0017492

TITLE: Primary care to emergency department: right service, right
time, right place

Document	Version	Date
Tasmanian Health and Medical Low Risk Application		24 September 2018
PCED CONSENT General Practice		16 July 2018
PCED CONSENT Patient		16 July 2018
PCED Invite To Participate Pts		16 July 2018
PCED Invite To Participate General Practice		16 July 2018
Northern Suburbs Letter of Support		13 July 2018
Radford Letter of Support		13 July 2018
Renshaw Letter of Support		13 July 2018
Starting Point Neighbourhood House Letter of Support		13 July 2018
PCED PIS Patients		16 July 2018
PCED PIS General Practice		16 July 2018

The Tasmanian Health and Medical Human Research Ethics Committee considered and approved the above documentation on **27 August 2018** to be conducted at the following site(s):

Launceston General Hospital

from the HREC. Please note that all requests for changes to approved documents must include a version number and date when submitted for review by the HREC.

(3) Section 5.5.3 of the National Statement states:

Researchers have a significant responsibility in monitoring approved research as they are in the best position to observe any adverse events or unexpected outcomes. They should report such events or outcomes promptly to the relevant institution/s and ethical review body/ies and take prompt steps to deal with any unexpected risks.

The appropriate forms for reporting such events in relation to clinical and non-clinical trials and innovations can be located at the website below. All adverse events must be reported regardless of whether or not the event, in your opinion, is a direct effect of the therapeutic goods being tested. <http://www.utas.edu.au/research-admin/research-integrity-and-ethics-unit-rieu/human-ethics/human-research-ethics-review-process/health-and-medical-hrec/managing-your-approved-project>

(4) All research participants must be provided with the current Patient Information Sheet and Consent Form, unless otherwise approved by the Committee.

(5) The Committee is notified if any investigators are added to, or cease involvement with, the project.

(6) This study has approval for four years contingent upon annual review. A *Progress Report* is to be provided on the anniversary date of your approval. Your first report is due 19 June 2017. You will be sent a courtesy reminder closer to this due date.

(7) A *Final Report* and a copy of the published material, either in full or abstract, must be provided at the end of the project.

Should you have any queries please do not hesitate to contact me on (03) 6226 6254.

Yours sincerely

Jude Vienna-Hallam
Ethics Administration Officer

Appendix 9

Ethics approval – H0018233 (Phase 3)

26 July 2019

Dr Elaine Crisp
C/- Nursing, University of Tasmania

Sent via email

Dear Dr Crisp

REF NO: H0018233
TITLE: Primary care to emergency department: right service, right
time, right place

Document	Version	Date
Low Risk Application Form		
Project Description/Protocol		
Participant Information Sheet - Key Stakeholders Forum		8May2019
Consent Form Health Leader Participant		21May2019
Invitation to Participate		

The Tasmania Health and Medical Human Research Ethics Committee (HREC) considered and approved the above documentation on 19 July 2019 to be conducted at the following site(s):

Launceston General Hospital

Please ensure that all investigators involved with this project have cited the approved versions of the documents listed within this letter and use only these versions in conducting this research project.

This approval constitutes ethical clearance by the Health and Medical HREC. The decision and authority to commence the associated research may be dependent on factors beyond the remit of the ethics review process. For example, your research may need ethics clearance from other organisations or review by your research governance coordinator or Head of Department. It is your responsibility to find out if the approvals of other bodies or authorities are required. It is recommended that the proposed research should not commence until you have satisfied these requirements.

In accordance with the National Statement on Ethical Conduct in Human Research, it is the responsibility of institutions and researchers to be aware of both general and specific legal requirements, wherever relevant. If researchers are uncertain they should seek legal advice

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to confirm that their proposed research is in compliance with the relevant laws. University of Tasmania researchers may seek legal advice from Legal Services at the University.

All committees operating under the Human Research Ethics Committee (Tasmania) Network are registered and required to comply with the *National Statement on the Ethical Conduct in Human Research* (NHMRC 2007 updated 2018).

Therefore, the Chief Investigator's responsibility is to ensure that:

- (1) All investigators are aware of the terms of approval, and that the research is conducted in compliance with the HREC approved protocol or project description.
- (2) Modifications to the protocol do not proceed until approval is obtained in writing from the HREC. This includes, but is not limited to, amendments that:
 - (i) are proposed or undertaken in order to eliminate immediate risks to participants;
 - (ii) may increase the risks to participants;
 - (iii) significantly affect the conduct of the research; or
 - (iv) involve changes to investigator involvement with the project.

Please note that all requests for changes to approved documents must include a version number and date when submitted for review by the HREC.

(3) Reports are provided to the HREC on the progress of the research and any safety reports or monitoring requirements as indicated in NHMRC guidance. The appropriate forms for reporting such events in relation to clinical and non-clinical trials and innovations can be located at the website below. All adverse events must be reported regardless of whether or not the event, in your opinion, is a direct effect of the therapeutic goods being tested. <http://www.utas.edu.au/research-admin/research-integrity-and-ethics-unit-rieu/human-ethics/human-research-ethics-review-process/health-and-medical-hrec/managing-your-approved-project>

(4) The HREC is informed as soon as possible of any new safety information, from other published or unpublished research, that may have an impact on the continued ethical acceptability of the research or that may indicate the need for modification of the project.

(5) All research participants must be provided with the current Participant Information Sheet and Consent Form, unless otherwise approved by the Committee.

(6) This study has approval for four years contingent upon annual review. A *Progress Report* is to be provided on the anniversary date of your approval. Your first report is due 19 July 2020, and you will be sent a courtesy reminder closer to this due date. Ethical approval for this project will lapse if a Progress Report is not submitted in the time frame provided

(7) A *Final Report* and a copy of the published material, either in full or abstract, must be provided at the end of the project.

(8) The HREC is advised of any complaints received or ethical issues that arise during the course of the project.

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(9) The HREC is advised promptly of the emergence of circumstances where a court, law enforcement agency or regulator seeks to compel the release of findings or results. Researchers must develop a strategy for addressing this and seek advice from the HREC.

Should you have any queries please do not hesitate to contact me on (03) 6226 6254 or via email Human.ethics@utas.edu.au.

Yours sincerely

Ailin Ding
Administration Officer

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Appendix 10

Presentation: Key stakeholder forum

Date: November 2019

What do we know?

What can we do?

Using nominal group technique to discuss 'Primary care to emergency department: right service, right time, right place'

*Maria Unwin, Elaine Crisp,
Damhnat McCann and Leigh Kinsman*



Primary care to emergency department

UNIVERSITY OF TASMANIA



Nominal Group Technique (consensus method):

- First described by Delbecq & Van de Ven 1968

AIM:

To use local research findings
to identify contextually
relevant solutions
to inform policy.

Primary care to emergency department

UNIVERSITY OF TASMANIA



2017-18

(AIHW, 2018)



LGH - ED

45,132

124 people / day

54% in

two least urgent triage categories

Triage explanation

ATS 1 – Potentially life or limb threatening

(to be seen immediately)

ATS 2 – Emergent

(To be seen within 10)

ATS 3 – Urgent

(To be seen within 30 minutes of triage)

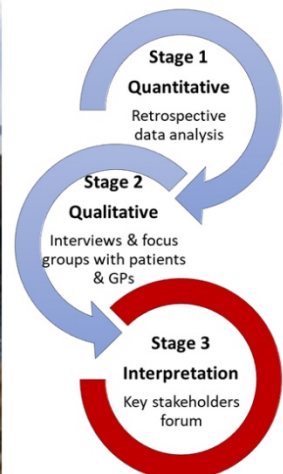
ATS 4 – Semi-urgent

(to be seen within 1 hour)

ATS 5 – Non-urgent

(To be seen within 2 hours)

Explanatory Sequential Mixed Method



WHEN?

46% = In-hours

54% = After-hours

In-hours = 8.00am to 6.00pm Monday – Friday

8.00am to midday Saturday

(excludes public holidays)

After-hours = All other times

(Primary Health Tasmania)

WHO?

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Gender	% (n=109,663)
Male	51.3
Female	48.6
Median age	Years
Study population	29
Regional population	39

0-4yrs and 15-24yrs are 1.5 times more likely to present

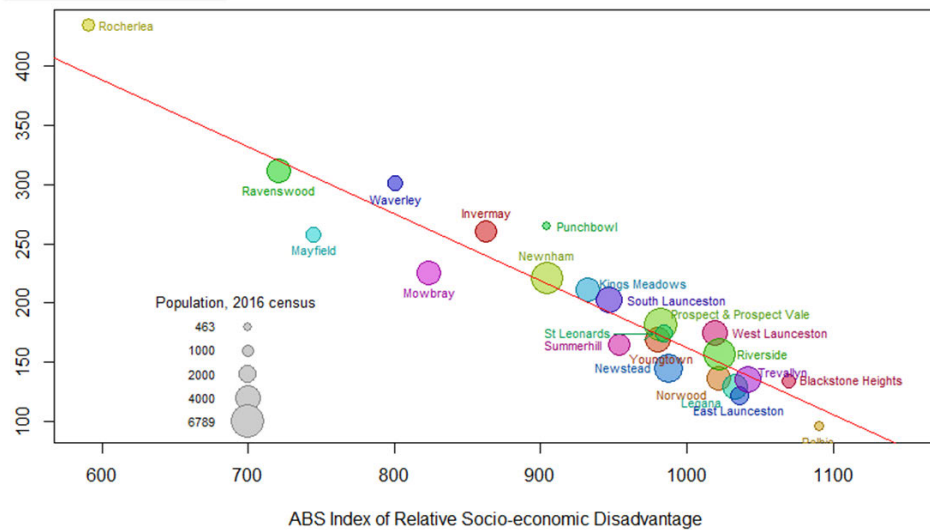
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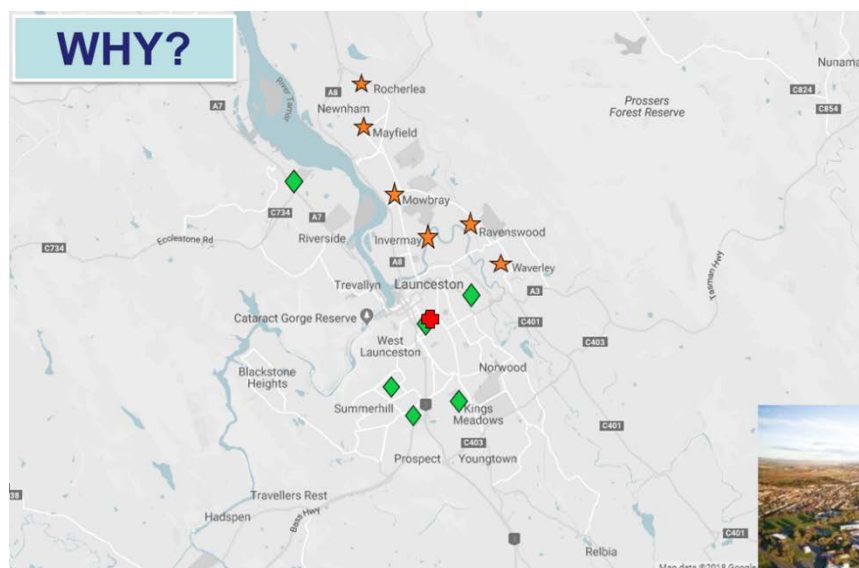
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FOUNDATION

WHO?

Age-standardized rate of ATS 4/5 ED presentations per 1000 people per year



WHY?



- ★ Over-represented suburbs
- ◆ Large primary care services
- ✚ Hospital (Emergency Department)



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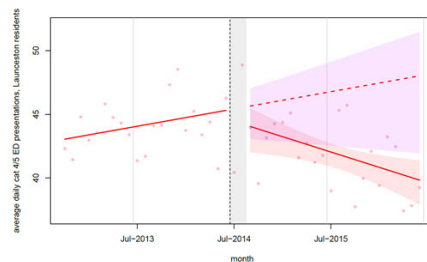
Top conditions presenting to the ED (non-urgent)

Injury	33.3%
Non-specific presentations (non-specific diagnoses)	21.4%
Mental health disorders	2.2%

Presentations diagnosed with a mental health condition
increased by 75% over 7 year (9/month)

Primary care to emergency department

Time series analysis



Two years post HUB opening
=
7.5 less patients per day

Primary care to emergency department

Objective 2 – Qualitative

Patient interviews

10 interviews

General Practice

3 Focus Groups

(included 11 GPs, 3 Nurses and 2 Practice Managers)

What have I heard from patients?

1. **Young** people and parents are genuinely concerned & uncertain – **perceived need**.
 2. **Patients Value:** timely access, good communication and rapport.
 3. **Convenience of ED** with access to radiology and/or pathology.
- * **Cost not** a major theme.

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What have I heard from GPs?

1. **Surprise** re proportion of younger age and in-hours presentations.
2. **Cost and funding models:** Bulk-bill or charge full fee with rebate.
3. **Balancing** booked appointments and on-the-day needs
4. **Increasing mental health** and difficulty in **referring** to services.

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SUMMARY OF FINDINGS

NON-URGENT ED PRESENTERS

WHO? Young (0-4; 15-24) from northern suburbs
WHY? Injuries and increasing mental health diagnoses
WHEN? Almost equally in-hours & out-of-hours

PRIMARY CARE

Limited access in northern suburbs
 Targeted models reduce ED presentations
 Providers identify issues of cost, finance models, mental health services access

"Convenience of all services"

"Perceived emergency"

"Community value timely access, good communication and rapport"

We know what we know!

What can we do?



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Acknowledgements:

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Dr Elaine Crisp (University of Tasmania)

Dr Damhnat McCann (University of Tasmania)

Prof Leigh Kinsman (University of Newcastle)

Statistician

Jim Stankovich

Clifford Craig Foundation

Tasmanian Health Service - North

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