

**The Influence of the Undergraduate Curriculum on
Medication Administration in Nursing**

by

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**A research thesis submitted in fulfillment of the requirements for
the degree of Research Masters in Biomedical Science**

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I. STATEMENT OF AUTHORSHIP

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III. ABSTRACT

There is a substantial body of research and reporting, both nationally and internationally, that demonstrates that medication errors are a major problem in health care. All members of the chain of health professionals involved from the prescriber (the medical practitioner), the dispenser (the pharmacist), to the person administering the medication (the nurse) have been found wanting in terms of safe practice (Roughhead, 1999, Thornton, 1999, Pallarino, 2002, Audit Commission, 2001). It is reasonable to assume that similar problems exist in Tasmania. There is certainly anecdotal evidence to suggest that some Tasmanian graduate nurses do not feel well prepared for practice in the area of medication administration. Personally in my work both as a preceptor for the University and as an assessor for the Nursing Board of Tasmania to evaluate pharmacology and medication administration knowledge, student nurses and newly graduated nurses have indicated that they lack confidence and competence in medication administration. Whilst there are many factors that contribute to this situation, for example a lack of emphasis on numeracy in secondary schools, under-resourced graduate programs, and work cultures, there was a need to understand the role of the undergraduate curriculum in the preparation of nurses for practice in this area.

A descriptive methodology was used to accurately convey the facts imparted and the meaning participants attributed to these events. The method consisted of a triangulated approach using focus groups; surveys; simulated nurse-client interaction; and documentary evidence. The triangulation was used to ensure validity of results, however, the sample size made generalisation difficult.

Forty seven per cent of the survey respondents indicated they had little or no confidence in their ability to administer medications safely as a new graduate. Fifty seven per cent of survey respondents and 44% of focus group participants acknowledged making one or more medication error.

The predominant issues raised in this research is that nursing is a practice-oriented profession and in the area of medication administration the Bachelor of Nursing does not appear to have the correct mix of theory and practice to produce safe practitioners. More education is needed in the area of deciphering the drug chart and the principles of pharmacology (actions, side effects and client education). Respondents would prefer a more structured approach in conjunction with clinical practice to be able to develop the theory-practice link. Screening of mathematical skills would be beneficial so deficits can be rectified. Teaching methods need to be examined and the principles of andragogy utilized to produce more confident and competent practitioners. Medication management in the Enrolled Nurse upgrade course needs to be investigated and improved. This research indicates that a lack of knowledge and confidence in relation to medication administration is directly related to medication errors.

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V. TABLE OF CONTENTS

I.	STATEMENT OF AUTHORSHIP	I
II.	AUTHORITY OF ACCESS.....	II
III.	ABSTRACT	III
IV.	ACKNOWLEDGEMENTS	IV
V.	TABLE OF CONTENTS.....	V
	FOREWORD	1
	IDENTIFYING A RESEARCH ISSUE	1
	IN SEARCH OF A QUESTION.....	1
	DEFINITION OF TERMS	3
1.	CHAPTER 1	4
	LITERATURE REVIEW.....	4
	1.1. INTRODUCTION	4
	1.2. EDUCATIONAL AND COMPETENCY REQUIREMENTS FOR REGISTERED NURSES	7
	1.3. MEDICATION ERRORS.....	9
	1.4. REGISTERED NURSES ACTUAL DRUG ADMINISTRATION & PHARMACOLOGY KNOWLEDGE	16
	1.5. CURRENT UNDERGRADUATE EDUCATION IN MEDICATION ADMINISTRATION IN NURSING	20
	1.5.1. Undergraduate Nurse Curricula	20
	1.5.2. Pharmacology Curricula	22
	1.6. ADULT TEACHING AND LEARNING.....	27
	1.7. OVERVIEW	36
2.	CHAPTER 2	39
	METHODOLOGY	39
	2.1. INTRODUCTION.....	39
	2.2. RESEARCH IN NURSING (A BRIEF OVERVIEW)	42
	2.3. RESEARCH APPROACHES.....	46
	2.3.1. Quantitative Research	47
	2.3.2. Qualitative Research	49
	2.4. DESCRIPTIVE RESEARCH	52
	2.5. DATA COLLECTION.....	54
	2.6. FOCUS GROUPS	55
	2.6.1. Background Information.....	55
	2.6.2. Development of the Focus Group questions	56
	2.6.3. Process of Administration.....	57
	2.6.4. Limitations and Problems.....	58
	2.7. SURVEY.....	59
	2.7.1. Background Information.....	59
	2.7.2. The Instrument.....	60
	2.7.3. Process of Administration.....	63
	2.7.4. Limitations and Problems.....	64
	2.8. SIMULATED NURSE- CLIENT INTERACTIONS	65
	2.8.1. Background Information.....	65
	2.8.2. Development of the Instrument.....	67
	2.8.3. Process of Administration.....	69
	2.8.4. Limitation and Problems	71
	2.9. OTHER DATA COLLECTED	72
	2.10. TRIANGULATION	74
	2.11. CONFIDENTIALITY AND ANONYMITY	75
	2.12. CONCLUSION	76

3. CHAPTER 3	78
RESULTS	78
3.1. FOCUS GROUPS	78
3.1.1. North West Regional Hospital	78
3.1.2. Launceston General Hospital	78
3.1.3. Royal Hobart Hospital	79
3.1.4. Focus Group Questions	79
3.2. SIMULATED NURSE-CLIENT INTERACTIONS	96
3.2.1. Deciphering the drug chart	97
3.2.2. Medication Administration	99
3.2.3. Pharmacology	102
3.2.4. Areas of overlap	105
3.2.5. Conclusion	107
3.3. THE SURVEY	108
3.3.1. Data Analyses	110
3.3.2. Results	112
3.3.3. Demographics	113
3.3.4. Confidence in Medication Administration	117
3.3.5. Errors since graduating	119
3.3.6. Medication Administration Knowledge	122
3.3.7. Basic Mathematical Skills	125
3.3.8. The Role of the Undergraduate Curriculum in Preparing Respondents for Practice as a Registered Nurse	127
3.3.9. Did the undergraduate curriculum meet overall learning needs to administer medications safely?	135
3.3.10. Relative importance of four major factors known to contribute to medication errors	149
4. CHAPTER 4	153
DISCUSSION	153
4.1. INTRODUCTION	153
4.2. DEMOGRAPHIC DATA	155
4.3. CONFIDENCE AND COMPETENCE	156
4.4. TEACHING AND LEARNING STRATEGIES	157
4.5. PHARMACOLOGY KNOWLEDGE IMMEDIATELY AFTER GRADUATION	161
4.6. MEDICATION ERRORS	162
4.7. MATHEMATICAL SKILLS	166
4.8. CONTRIBUTION OF BACHELOR OF NURSING SUBJECTS	167
4.9. ENROLLED NURSE UPGRADE COURSE	171
4.10. WORKPLACE ISSUES	174
4.11. LIMITATIONS OF THE STUDY	177
5. CHAPTER 5	179
CONCLUSION	179
5.1. RECOMMENDATIONS	185
APPENDIX ONE	188
1.1 ADVERTISEMENT FOCUS GROUPS	188
1.2 INFORMATION SHEET FOCUS GROUPS	188
APPENDIX TWO	192
CONSENT FORM FOCUS GROUPS	192
APPENDIX THREE	195
INFORMATION SHEET SIMULATED NURSE-CLIENT INTERACTION	195
APPENDIX FOUR	199
CONSENT FORM SIMULATED NURSE-CLIENT INTERACTION	199
APPENDIX FIVE	202

INFORMATION SHEET SURVEY	202
APPENDIX SIX	204
SURVEY	204
5.1.1. <i>Please place a tick ✓ in the appropriate box</i>	206
APPENDIX SEVEN	215
ETHICS PROPOSAL	215
APPENDIX EIGHT	216
FOCUS GROUP QUESTIONS	216
APPENDIX NINE	220
MARKING GUIDE ASSESSING THE CORE SKILL OF COMPLETING A PRESCRIPTION CHART	220
APPENDIX TEN	221
MARKING CRITERIA SIMULATED NURSE-CLIENT INTERACTION	221
REFERENCES	223

Foreword

IDENTIFYING A RESEARCH ISSUE

In Search of a Question

I have been a clinical nurse for many years with a strong background in nurse education. When I decided to improve my academic qualifications I wanted my research question to encompass both these areas. So I asked myself, which areas in nursing practice did students of Nursing and post graduate nurses identify as the one of most concern. Students of Nursing and postgraduate students voiced many concerns but the one that persistently arose was medication administration.

Students of Nursing indicated that they had little knowledge in this area of practice and fiercely sought any opportunity to practice in their supervised experiential clinical settings. Post graduate nurses stated this was an area of concern to them. They felt ill prepared, some admitted making errors and they stated the amount of pharmacology knowledge they had received was insufficient to practice safely, particularly with the added stressors in the clinical setting such as shift work, staff shortages and busy wards.

A preliminary search of the literature revealed that the concerns raised by Tasmanian nurses were similar to concerns raised in research conducted in other states of Australia. Furthermore literature reviewed both nationally and internationally confirmed that medication errors were a major problem in health care.

As a consequence I asked myself the following questions,

- What is the role of the undergraduate curriculum at the University of Tasmania, School of Nursing in producing safe and competent medication administration by registered nurses in practice?
- How well prepared for the role of medication administration do registered nurses consider themselves to be?
- What do registered nurses consider to be the influence of stressors on their capacity to administer medication safely and effectively?

This resulted in the development of the following research topic:

“The influence of the undergraduate curriculum on medication administration in nursing”

And the following objectives:

- To test the preparedness of late-stage final year undergraduates for medication administration in unsupervised clinical practice.
- To describe graduates’ perceptions of the undergraduate pharmacology/medication management curriculum in preparing them for practice
- To elicit graduates’ views on the relative importance of the various components of the pharmacology/medication management curriculum
- To seek graduates’ views on what were the most helpful educational strategies employed to impart knowledge successfully
- To identify techniques and strategies that assists them in their medication knowledge and practice.

Definition of Terms

Student of Nursing The Tasmanian School of Nursing (TSoN) uses this term to refer to students who are currently undertaking a Bachelor of Nursing. In this research the participants of the observational study are referred to in this way. This term is interchangeable with nursing student.

Post Graduate Nurses This term refers to nurses who have graduated with a Bachelor of Nursing and are registered nurses. In this research it refers to participants from the focus groups and the survey who graduated from the TSoN within the period 1997-2000.

Registered Nurses Is a person licensed to practice nursing under an Australian State or Territory Nurses Act (Nursing Board of Tasmania 2000).

Enrolled Nurse Is a person licensed under an Australian State or Territory Nurses Act to provide nursing care under the supervision of a registered nurse (Nursing Board of Tasmania (NBT) 2000).

Authorised/Endorsed Enrolled Nurse In order to administer substances listed in Schedule 2, 3 or 4 to the Poisons List an enrolled nurse, according to Regulation 59 of the Poisons Regulations 2002 must hold qualifications that the Nursing Board of Tasmania deems are appropriate for the administration of that substance. The practicing certificate of the enrolled nurse will then be endorsed as follows, "Authorised to administer Scheduled substances pursuant to the Poisons Regulations 2002" (NBT, 2003).

Experiential practice This refers to supervised nursing practice in a clinical setting.

1. Chapter 1

Literature Review

1.1. Introduction

There is a substantial body of research and reporting, both nationally and particularly internationally, that demonstrates that medication errors are a major problem in health care. All members in the chain of health professionals involved from the prescriber to the person administering the medication have been found wanting in terms of safe practice (Roughhead, 1999, Thornton, 1999, Pallarino, 2002, Lesar, 2001, Audit Commission, 2001, Australian Council for Safety and Quality in Health Care, 2002).

The key areas of nursing practice that have been identified as being problematic are:

- Overall pharmacology knowledge
- Knowledge of therapeutic effects of medications
- Knowledge of adverse effects of medications
- Client education in regards to medication administration
- Drug administration (omission, unauthorized drug, wrong dose, route, rate, dosage form, time preparation of the drug, incorrect administration technique)
- Legal aspects of medication administration

(Ives et al, 1996, Roger and Jones, 2000, Latter et al, 2000, Gillham and Chu, 1995, Manias et al, 1999)

It is reasonable to assume that similar problems may exist in Tasmania. Certainly anecdotal evidence suggests that some Tasmanian graduate nurses do not feel prepared for practice. Personally, in my work as a preceptor for the Tasmanian School

of Nursing students and as an assessor for the Nursing Board of Tasmania, newly graduated nurses have indicated they lack competence and confidence in medication administration. Many factors, such as lack of emphasis on numeracy skills in secondary schools, under-resourced graduate programs and work cultures may contribute to this. There is a perception amongst some graduate nurses that their educational preparation to administer medications was inadequate to practice safely as new graduates. This instigated the need to investigate the contribution of undergraduate curriculum in the preparation of nurses for practice. In this research project the undergraduate curriculum of the Tasmanian School of Nursing has been the focus of the study. Information was gathered in the following areas to determine:

- The educational and competency requirements for nurses
- The extent of medication errors
- Registered nurses actual pharmacology knowledge
- Current undergraduate medication administration and pharmacology education and
- Adult teaching and learning in relation to medication administration.

A comprehensive review was conducted using the following databases:

- PubMed – indexed for Medline
- Medscape Nursing
- Medication-errors.org.uk
- Cinahl <1982 to February 2004>
- Joanna Briggs
- Aus Nurse

- Medscape Drug Info
- Nursing Times
- Med Explorer

The review used the following search terms and combination of these:

Nursing# and drug# and education

Nurs# and pharmacology and curricui#

Nurs# and curricul# and medication

Nurs# and medication and education

University and nurs# and pharmacology

University and nurs# and medication

Nurs# and university and drug

Nurs# and undergraduate and medication

Undergraduate and nurs#

Drug error and Nurs#

Medication error.mp.

Nurs# and student and pharmacology

Nurs# and student and medication

Nurs# and student and drug error

Nurs# and pharmacology and learning

Nurses and pharmacology

Pharmacology and nursing and error

Nurses and pharmacology education

1.2. Educational and Competency Requirements for Registered Nurses

Educational and competency requirements for registered nurses (RNs) require nurses to have up to date knowledge of pharmacology for safe and appropriate nursing practice, as well as having sound knowledge and skills relating to medication administration and reasonable access to resources for reference.

Pharmacology is defined as:

...a branch of medical science, which deals with the properties and characteristics of drugs. It is particularly interested in the actions and effects of these chemicals on the human body (Galbraith et al, 2001).

The NBT has developed guidelines to emphasise the competencies expected of registered nurses in medication administration.

Registered nurses have the following general responsibilities:

- Nurses need to make sure that the patient is not allergic to the medication.
- The medication must be checked for compatibility.
- The patient must be educated about and observed after administration for possible side effects.
- There must be a valid prescription or order for that medication.
- The right medication must be given at the right dose and route to the right patient at the right time.
- If the drug needs preparation this must be done accurately.
- The medication must be checked to ensure that it has not expired or been contaminated.

- Adequate safety precautions must be taken during and after administration (Standard Precautions).
- Furthermore the medication administration must be documented correctly.
- Professional judgment needs to be exercised to withhold medication and to have the order verified with a medical practitioner where necessary.

Registered nurses have a duty of care to the patient/client for maintaining their competency to practice so that professional judgment can be exerted and informed decisions made about all aspects of drug administration (NBT, 2003).

The nurse must also have knowledge of common and statutory laws which govern medication administration. Registered Nurses owe a duty of care to their patients to prevent harm (The Joanna Briggs Institute for Evidence Based Nursing and Midwifery, 2000). This duty of care is clearly defined in the Australian Nursing Council Incorporated (ANCI) Code of Ethics for Nurses in Australia 2002 (Nursing Board of Tasmania, 2002), the ANCI Code of Professional Conduct for Nurses in Australia 1995 (Nursing Board of Tasmania, 1995) and the ANCI National Competency Standards for the Registered Nurse 2000 (Nursing Board of Tasmania, 2000). The competency, ethical and professional standards are a written account of the roles and functions expected of a nurse and identify what attributes are needed for the nurse to be deemed competent.

The Poisons Act 1971, Tasmania, sets out specific responsibilities for registered nurses in relation to various types of drugs and specific legislative requirements. The Nursing Board of Tasmania (NBT) authorises nurse registration:

The Nursing Board of Tasmania...is established by section 5 of the Nursing Act 1995...This Act gives the Board power and obligations regarding nurses in Tasmania (NBT, 2003).

The National Medicines Policy (NMP) states that all health stakeholders must work together to achieve improved health results for everyone. Their mandate is, 'Quality, Safety and Efficacy...in relation to prescribing, supplying or administering medicines...' (Commonwealth Department of Health and Aged Care, 1999).

To summarise, the administration of medications is potentially one of the most dangerous activities of nursing practice. Once registered, a nurse enters an implicit contractual agreement to practice in accordance with the ANCI policies and legislation relevant to nursing practice. Incorrect/inaccurate administration can result in long lasting and serious consequences for the nurse and the patient. Liability may arise from breaches of the Poisons Act, Nursing Act or under common law through failure to meet the requisite standard of care.

1.3. Medication Errors

Literature reviewed revealed that medication errors are common in hospitals, as common as one error per patient per day (Ives et al, 1996, p.13). Segatore et al (1993) cite the American Society of Hospital Pharmacists (ASHP) definition of a medication error as:

....a dose of medication that deviates from the physician's order as written...or from standard hospital practice and procedure.

A medication error is committed when any of the following occurs:

- omission of the medication
- unauthorized drug
- wrong route
- wrong rate
- wrong date
- wrong time
- wrong dose preparation
- wrong preparation of the dose
- incorrect administration (Segatore et al, 1993)

Baker and Roger (1994) state, that Australia has no national definition of medication errors or guidelines for their prevention. In this absence, guidelines from the American Society of Hospital Pharmacists are frequently used. This definition states that a medication error is not an error until the mistake reaches the patient. Therefore a prescribing error by a doctor or a dispensing error by a pharmacist is not an error until it is administered to the patient by a **nurse**. **The term medication error in this project refers to the ASHP definition which is consistent with the guidelines developed by the NBT (2003).** If a RN withholds medication because professional judgment has deemed it detrimental to the patient this does not constitute a medication error providing the doctor is notified and subsequently changes the written order.

The Australian Council for Safety and Quality in Health Care (ACSQHC) stated in its Second National Report (ACSQHC, 2002) that approximately 140,000 hospital admissions per year are related to medication incidents, at a cost of \$380 million

dollars per year in the public hospital system alone. They classified a medication incident as a problem with medication. The problem may be a near miss which does not harm the patient, or an incident that leads to serious health consequences. Their data suggests that between 2 and 3 per cent of all hospital admissions are associated with medication incidents that originate either within the hospital or the community.

The following medications which are most frequently prescribed to the elderly were most commonly involved: medicines used for cancer chemotherapy; pain treatment; anti inflammatory medication; and medications used to treat heart conditions and blood pressure. Errors occurred in prescribing, dispensing and administration and in hospitals were related to ineffective systems of checking medication doses and patient identities (ACSQHC, 2002). Inadequate systems to check doses of medicines and patient identity and failure to read the drug chart correctly were factors most commonly linked to adverse drug events in hospitals (ACSQHC, 2002).

Failure to read or misreading of the chart accounted for most errors, with prescription or order errors and an unclear or incomplete order being the next two categories most commonly identified (ACSQHC, 2002).

Studies done in Australian hospitals and reviewed by the ACSQHC identified the following errors;

- when medications were taken from common ward stock for administration the error rates were between 15-20% as compared to 5-8% when the patient's own supplies were used

- 8% of errors were of timing where a dose was administered either one hour before or after the ordered time. This was attributed to a busy ward environment and rarely caused harm
- Other errors included errors of omission, wrong dose, type (formulation) or route (ACSQHC, 2002).

It was also stated as incident monitoring are voluntary processes they cannot guarantee that the occurrence rates quoted are reliable, and therefore incident rates may be considerably higher.

In a retrospective review of Australian medical records, medication errors identified were in the method of use or dose (18%), inappropriate use of medication (14%, and inadequate monitoring of medications (12%). Underlying problems identified included lack of skills in calculation of drug doses, incorrect dilution rates, incorrect preparation or combining of drugs, inappropriate drug selection and use of incorrect route (Thornton et al, 1999). The authors of this report state,

General pharmacology knowledge amongst new graduates in both medicine and nursing appear poor (Thornton et al, 1999).

Recommendations for the reduction of drug errors include utilization of the National Medicines Policy whose overall aim is to promote optimal health outcomes by meeting medication and related service needs for all Australians. One strategy is to initiate the teaching of quality use of medicines as outlined in the policy into all undergraduate medical and nursing courses and clearly identifying the role of

education in reporting adverse drug events (Thornton et al, 1999, Commonwealth Department of Health and Aged Care, 1999). Roughead (1999) reviewed the Australian National Hospital Morbidity Collection, The Quality in Australian Health Care Study and other Australian drug related hospital admissions studies to ascertain the nature and the extent of drug related hospital admissions. The four studies assessed by Roughead found that between 32% and 69% of drug related hospital admissions were considered potentially avoidable and estimated that only 11-31% of all adverse drug events were reported. This view was supported by Wolf and Serembus (2004) who conducted a secondary analysis study using summarised findings from a number of studies to reveal the experiences of medical personnel associated with medication error reporting. They found that nurses did not report errors for fear of senior clinical management response and the resulting consequences. Medication errors were also not reported if they were thought of as unimportant. Rather than supporting the action of reporting medication errors, senior management persisted with the tactics of blame and reprimand.

In the United States, a report by the Institute of Medicine's stated that 98,000 people die each year due to medication errors (cited by, Pallarino, 2002). A review of literature in the United States by Lesar (2001) revealed that a wide range of medication problems and errors related to dosage occur in all steps of the medication process (prescribers, pharmacists, nurses, patients). Hospital costs resulting from medication errors were estimated at \$US 136 billion per year (Cohen, 2001). In the United Kingdom, the Audit Commission which collects data about medication management in England and Wales, stated that adverse events associated with medications cost the National Health Service (NHS) half a billion pounds each year

(The Audit Commission for Local Authorities and the National Health Service in England and Wales, 2001).

In an effort to reduce medication errors some hospitals are various trialing electronic systems for prescribing drugs which have shown to decrease errors. One system has been operating at a regional hospital in Victoria. An audit at the hospital had shown that 85% of nurses and pharmacists could not read doctors medication orders. The electronic system of prescribing drugs has reduced errors by nearly 20% in the first year (Mills, 2003). In the United Kingdom even though computerized prescribing and health records have shown to prevent 75% of medication errors made, they are still not used by many hospitals (The Audit Commission for Local Authorities and the National Health Service in England and Wales, 2001).

Automated dispensing systems (which store medications at one location) have also shown to decrease errors. Medications are then dispensed to a specific patient according to their medication file. Errors are particularly reduced if medications are linked to a barcode which ensures a match between the ordered medication and corresponding drug to be administered (Yin-yin and Heal, 2004).

There is substantial evidence in the literature of nurses in Australia and overseas making medication errors and the resulting repercussions for both the patient and the nurse. This indicates that medication errors are a persistent and disturbing problem associated with nursing practice (Castledine, 2003; Tingle, 2004; Ross et al, 2000; Cousins and Upton, 2000; Nursing Board of Tasmania, 2003).

The Tasmanian North West Regional Hospital (NWRH) revealed the results of a drug chart audit conducted in November 2003. The findings most relevant to nursing practice (as nurses administer the medication) were that complete drug dose was documented incorrectly on 11.23% and complete frequency was documented incorrectly on 14.5% (of the charts audited). This audit was conducted as part of a national incentive by the Safety and Quality Council involving 50 hospitals nationwide “to reduce harm caused by medication incidents in Australian hospitals, by 50% by December 2004” (Tasmanian Department of Health and Human Services, 2004). Strategies have been implemented to reduce medication incidences such as the implementation of a more user friendly drug chart, staff education sessions in regard to implementation of the chart, monthly medication audits and more importantly having pharmacists on the wards monitoring drug charts and medication policy (Tasmanian Department of Health and Human Services, 2004).

The following numbers of drug related incident reports/near-miss reports at the NWRH were documented as 10 in January, 18 in February and 3-4 in March and April (Tasmanian Department of Health and Human Services, 2004). The hospital has an average occupancy rate of 110-120 beds. Ten and 18 incidents in consecutive months is a high incidence rate for a small hospital and similar to research conducted by Thornton et al (1999), yet it clearly indicates that medication errors can be reduced with the strategies listed. Incidents have been reduced significantly to 3-4 per month since they have been instigated.

International and Australian literature reviewed indicated that medication errors occurred frequently and present major problems in health care in terms of morbidity

and cost. All members of the health profession are involved, from the prescriber to the administrator of the medication. Evidence exists that it is a persistent problem in nursing practice. The following section will review prior research to determine the actual drug administration and pharmacology knowledge of registered nurses which may be relevant to medication administration errors.

1.4. Registered Nurses Actual Drug Administration & Pharmacology Knowledge

Research indicates that the majority of registered nurses are ill prepared for the practice of medication administration. They lack adequate knowledge of pharmacology to administer drugs and monitor their effects safely and effectively, leading to adverse drug events (Ives et al, 1996; Latter et al, 2000; White, 1994; Manias et al, 1999; Rycroft-Malone et al, 2000; Roger and Jones 2000; Gladstone, 1995; Ashby, 1997).

Ives and coworkers (1996) sent a questionnaire survey to first year registered nurses whose details were on the Victorian Nursing Council's 1994 mailing list. Respondents were asked to complete one multi choice and one short answer question for each of the five areas related to medications: drug administration; therapeutic effect; adverse effect of drugs; client education; and legal aspects of drugs. Test scores ranged from 16-92% with a mean score of 55%. Recommendations for improved teaching and learning of pharmacology were made. Respondents indicated that the most important contribution to their current pharmacology knowledge was practical experience gained in the undergraduate curriculum and since graduating (Ives et al, 1996).

Latter et al (2000) evaluated the UK educational preparation of registered nurses as medication educators in practice. A case study design was developed which utilized multiple methods of data collection. Data collection consisted of focus group discussions with nurses and lecturers, individual interviews with stakeholders, non-participant observation of educational sessions, post observation interviews and curriculum analysis. The findings of the study revealed nurses perceived a deficiency in the amount of pharmacology knowledge gained and the amount required for their fitness to practice. Deficits were found in the following areas;

- there was insufficient pharmacology taught
- opportunities for applying knowledge to practice were limited
- there was limited opportunity for practice based learning

Recommendations were made by the researchers to enhance pre and post registration curricula (Latter et al, 2000).

Research indicates that a large percentage of under-graduate and postgraduate nurses have problems with medication calculations and numeracy skills. Medication calculations are a major risk area for nurses and can potentiate injurious or fatal consequences (Craig and Sellers, 1995; Gillham, 1995; Gladstone, 1995; Segatore et al, 1993; O'Shea, 1999).

In a study at the Edith Cowan University (Western Australia), traditional methods of teaching medication calculations to pre-graduate nursing students were not proving successful. Despite comprehensive teaching methods including tutorials, individual sessions, computer-aided learning packages and access to text books, assessment failure rates were high. In the Bachelor of Nursing curriculum, a medicine calculation

assessment policy was instituted requiring students to get an 85% pass rate in a 15 question test which they could sit three times if necessary. In the first test 34% of the 178 students achieved 100%. Seventy eight students had to resit the exam and only 16% of these achieved 100%. Six students had to resit for the third time and no one achieved 100% in the third test (Roger and Jones, 2000).

This prompted Roger and Jones (2000) to conduct research, which allowed students to visualise a given medication calculation problem and check the answer by using equipment and placebo drugs to try and reduce medication calculation errors. Students enrolled in the unit of medication calculations were asked to participate in the study. Students who volunteered were placed in either experimental or control groups. The experimental group was given a practical skill laboratory course and the control group was taught in the traditional way using lectures and tutorials. All students in the experimental group achieved 100% in their exam whilst in the control group 47% failed. This resulted in recommendations that this teaching method (practical skill laboratory course) be implemented into the curriculum (Roger and Jones, 2000).

Gladstone (1995) conducted a study over a one year period in a district general hospital in the UK. The study consisted of a review of drug related incident reports over this time, informal interviews with nurses who made errors, self-administered surveys to a sample of registered nurses who administered drugs, and self-administered surveys to nurse managers. During the period of the study there were 79 medication incident reports of which 50% of errors were dose related (32.9% were by intravenous route).

The reasons why errors occurred (as rated by the subjects) were:

1. Nurses failed to check name bands with prescription charts
2. Doctors' writing was unclear
3. Nurses were distracted by the environment
4. Drug dose was miscalculated.

Seventy four per cent of nurses did not report drug errors because of fear of disciplinary action. Recommendations indicated that nurse training should include mathematical and conceptual skills, pharmacology knowledge, the use of specialized equipment (intravenous) and personal accountability (Gladstone, 1995). These findings were supported by O'Shea (1999) who reviewed the literature of studies conducted into factors contributing to medication errors.

Gillham and Chu, (1995) nurse lecturers at the University of South Australia evaluated 158 second year pre-registration nursing students' ability in medication calculation. All students had completed year 11 mathematics. The students were given a written test in drug calculations. Results indicated that a large number of students had limited understanding of basic arithmetic. Most frequent errors were in the categories of division, formula use, multiplying fractions and approximation. The author's state it is possible that increased calculator use is leading to a decrease in emphasis on the importance of basic mathematics. The development of problem solving in mathematics method is essential so that students do not make errors. Merely repeating learned procedures, with or without a calculator, leads to difficulties if problems vary (Gilliam and Chu, 1995). Blais and Bath (1992) in a similar study supported this view.

In summary, the literature reviewed in this section indicates that post graduate nurses have inadequate knowledge in most areas of drug administration. A deficit exists between the amount of knowledge needed for safe medication administration and the amount of knowledge gained in the undergraduate curriculum. Problems also exist when nurses fail to follow drug administration guidelines. Illegible doctors' writing and distractions on the ward were also seen as contributing factors. One area identified, that has potentially fatal consequences, was medication calculations. Nurses were found to have poor basic mathematics skills, which could partly be attributed to an over reliance of calculator use in secondary schools.

Recommendations from the literature reviewed were to increase content and improve teaching and learning of medication administration and pharmacology and more practical experience in laboratories or health care settings. In light of these recommendations the following section will investigate what is being taught in undergraduate curricula.

1.5. Current Undergraduate Education In Medication Administration In Nursing

1.5.1. Undergraduate Nurse Curricula

A systematic review of nursing curricula was commissioned by the Queensland Nursing Council.

The aim of the review was to summarise the best available evidence related to undergraduate curriculumfor new graduates in terms of cost, benefits and effectiveness of the models identified (Department of Clinical Nursing,

The review found it was difficult to compare nursing curricula from universities both in Australia and overseas. There appeared to be some fundamental subjects the same in all curricula although their titles differed, but there were so many differences in the curricula that it was difficult to accurately summarise curriculum content. There was found to be no evidence of consistent and comprehensive evaluation of these programs of study. Therefore no curriculum could be considered of best practice standard showing evidence of highly successful outcomes in regards to teaching and learning against which the other curricula could be tested.

Research addressing nursing curricula was found to be fragmented and small in scale and did little to evaluate the ability of the nursing curriculum to prepare students for practice. The review highlighted the need for a large multicentre collaborative research project to provide baseline information which would allow informed decisions to be made about nursing curricula in Australia.

Nursing curricula in the United Kingdom have a unified approach to the pre-registration program whereby the first 18 months of study is a common foundation program which is the same for all nursing students. Once students successfully pass this they are then able to select a specialised program, such as child health for example, to complete their last 18 months (Department of Clinical Nursing, Adelaide University and Joanna Briggs Institute of Evidence Based Nursing and Midwifery, 2001).

1.5.2. Pharmacology Curricula

The nature of current undergraduate pharmacology education at Australian universities is diverse. It includes programs where pharmacology is taught as a separate subject, or as part of another subject (commonly biological science). Methods used include traditional lectures and tutorials, case studies utilising pharmacology, laboratory sessions, and some use computer aided learning. Many different pharmacology textbooks are used. Undergraduate clinical experience was considered important in most places. Competent lecturers have also been cited as a factor which improved learning. This could consist of a nurse lecturer, a bioscience lecturer, or a combination of both. Pharmacists and senior medical specialists were also used (Manias et al, 1999; Lamp, 1997; Ives et al, 1996; Latter et al, 2000).

To practice safely a registered nurse needs adequate knowledge of both medication administration (right person, drug, dose, time and route, medical abbreviations, ability to decipher the drug chart, drug calculations and so on) as well as pharmacology knowledge (for example, action, side effects, drug sensitivities, interactions). In the literature reviewed there appears to be a problem with the definition of pharmacology which in some cases is pharmacokinetics and pharmacodynamics, but other times is used more loosely to cover medication administration and/or appears to encompass both. Pharmacology and medication administration have very separate knowledge bases, however a registered nurse needs adequate knowledge in both areas to practice safely.

Although it is well documented that a large proportion of registered nurses lack an adequate knowledge of pharmacology to administer drugs safely, the level of

knowledge required by nurses to practice safely is not stated. Many authors recommend that changes are necessary to improve practice (Latter et al, 2000; White, 1994). The debate about pharmacology curricula is complicated by the absence of traditional guidelines and minimum standards for curricula (Jordan and Reid, 1997). As discussed previously a systematic review of nursing curricula found it was difficult to compare nursing curricula from universities in Australia, as there were so many differences in the curricula that it was difficult to accurately summarise curriculum content. Furthermore no evidence could be found of consistent and comprehensive evaluation of these programs of study (Department of Clinical Nursing, Adelaide University and Joanna Briggs Institute of Evidence Based Nursing and Midwifery, 2001).

Previous research into the adequacy of nurse education highlights a number of persistent and enduring features that warrant attention. Nurses state their overall pharmacology knowledge is not adequate for safe practice in the following areas;

- Knowledge of therapeutic effects
- Knowledge of adverse effects
- Client education
- Drug administration (drug calculations)
- Legal aspects (Manias et al, 1999; Ives et al, 1996; Latter et al, 2000).

Many authors argue that as a result of the move of nursing education into the tertiary sector the content of biological sciences units has been reduced, to the detriment of students of nursing. They argue that basic physiology is vital to the understanding of drug administration, and one cannot happen successfully without the other (White, 1994; Wynne et al, 1997; Jordan and Reid, 1997; Akinsanya, 1987; Courtenay, 1991).

Manias and Bullock (2002a) investigated pharmacology education from the perspective of lecturers and nursing students in 10 university settings in Victoria using focus group interviews (seven student interviews with 43 students and seven academic staff interviews with 16 staff). Both students and lecturers identified the need for increased pharmacology content. Students identified the following features of an 'ideal' pharmacology curriculum:

- Pharmacology principles (mode of action, distribution and metabolism of drugs) should be addressed continuously throughout the three year Bachelor of Nursing program.
- Pharmacology should be taught as a separate subject.
- Pharmacology principles should also be incorporated into all nursing subjects.

The majority of lecturers believed that the pharmacology curriculum should be integrated into nursing subjects, not taught as a separate unit, and addressed continuously throughout all three years of the program. Integrating pharmacology content into nursing studies provides an opportunity for nursing students to apply the knowledge to clinical practice. However the study based on the responses of lecturers and students demonstrated that pharmacology principles were inadequately covered in integrated subjects, received little emphasis and learning did not occur in a structured way. A common learning approach was self-directed learning. Students felt they preferred a more structured and formalized means of learning for an area of such importance (Manias and Bullock 2001a). Whilst this study's research design does not allow for conclusive results, student evaluation is an integral component of a universities teaching and learning program thus enhancing the impact of this research.

This project sought to determine which components of a pharmacology curriculum had the most impact and which educational techniques achieved optimal outcomes for the nurse's learning.

The formal pharmacology curriculum at the University of Tasmania, School of Nursing in 2004 is separated out within the Human Bioscience 3 & 4 body system reviews and is being taught by bioscience lecturers. The pharmacology education commences with the principles of pharmacology and is then incorporated into the body system reviews. For example, the urinary system is being taught in the following way. Students are taught normal and abnormal anatomy, microbiology, pathophysiology and pharmacology that relates to the renal system (University of Tasmania, 2004). Pharmacology education is based on pharmacokinetics and pharmacodynamics and this incorporates how the medication is absorbed into the systemic circulation, distributed to the tissues, metabolised and eliminated from the body. Education focuses on broad drug groups (diuretics) rather than discussing individual drugs (e.g. frusemide). However typical examples such as frusemide are used in case studies.

Medication administration and medication calculations are taught in second year in Supportive Care in Hospital and Community Settings. This unit also attempts to contextualise pharmacology according to the significance of the drugs in the management of illness. Common drugs are taught in relation to each system, for example the nursing care of someone with coronary artery disease would include best practice use of nitrates for the relief of chest pain, digoxin to control rate and strength of contraction, and diuretics to decrease the load on a diseased heart. Potassium

supplements would also be included. The experiential component of the course links pharmacology theory to clinical practice (University of Tasmania, 2004).

In the subject, Acute Care, in third year, students provide supervised care for individuals in a variety of acute care settings. In these settings they have pharmacology education which includes tests on drug administration, calculations and the actions and side effects of common drugs. Three days of every week are spent in the practice setting where students participate in supervised drug administration (University of Tasmania, 2004).

Medication administration issues are also covered in the following two units in third year, Legal and Ethical Issues in Health Care which examines legal issues and bioethics in nursing and Professional Issues in Nursing practice which examines the implications of law in clinical practice (University of Tasmania, 2004).

The medication curriculum is going through an accreditation process and this research project aims to provide information, which will assist in the restructuring of the curriculum if necessary and provide insight into appropriate teaching and learning strategies.

Currently pharmacology and medication administration education appears to differ markedly in Australian universities, as do the nursing curricula. Some fundamental subjects appear to be the same in all curricula, but not one curriculum that has been investigated is deemed to be of best practice standard. This indicates the need for research in this area. In Australia there appears to be no traditional guidelines or

minimum standards that govern these curricula as opposed to recent changes in the United Kingdom.

In summary research conducted into pharmacology education in Victoria suggests that the pharmacology curriculum should be integrated into nursing subjects to allow pharmacology principles to be applied to nursing practice. However pharmacology principles and learning techniques were found to be inadequate and undergraduate nurses felt the need for a more formalized and structured approach.

Literature will now be reviewed that looks at the teaching and learning techniques to ascertain where improvements are suggested and which areas have proved to be successful.

1.6. Adult Teaching and Learning

In the United States, litigation against nurses has been most successful in the area of medication administration (Segatore et al, 1993). Medication administration is one of the greatest risk areas for students of nursing and post graduate nurses in relationship to patient morbidity and/or mortality and nurse litigation. Literature reviewed indicates that there are many areas in the pharmacology curriculum that have a relationship to medication administration in the nursing that can be improved and regularly evaluated to reduce medication administration errors (Ives et al, 1996; Latter et al, 2000). In this section literature is reviewed in the following areas:

- Commentaries by educationalists on teaching content needed for accurate medication administration
- Research relating to medication calculations in medication administration

- Research evaluating teaching methods which successfully link theory with clinical practice.

One major issue identified by the following educationalists is that the bioscience component of the curriculum needs to be expanded, since without an understanding of the physiology of the body, nurses cannot gain an understanding of the drugs used in treatment to correct or maintain body functions (White, 1994; Wynne et al, 1997; Jordan and Reid, 1997; Akinsanya, 1987; Courtenay, 1991).

Wynne et al (1997) argued that when nursing moved away from cure to care, and embraced social and behavioral sciences, it did so at the expense of the biological sciences and this created a philosophy of 'incomplete holism'. Biological knowledge was perceived as supporting medical diagnosis rather than application for nursing care. They reject this assumption and suggest that the application of physiology had greater potential when integrated with nursing to improve the understanding and efficiency of nursing care. They argued that physical and manual skills (for example assessment and vital observations such as temperature, pulse, respirations and blood pressure), which are closely related to knowledge of biological sciences, had been relegated to a secondary position creating a theory-practice gap in nursing. The researchers found that nurse educators were ill prepared to teach the biosciences and suggested that physiologists with experience in teaching health related courses were used and that this was linked with a nurse who was both current and experienced in practice. The authors also believe nurse teachers must maintain a minimal level of input into clinical practice to have an awareness of the situations and demands encountered by nurses in these areas. The United Kingdom Central Council that sets

the standards required for nurse medication administration in the United Kingdom expects nurse teachers to teach at acceptable standards. To keep in touch with what is relevant to practice requires regular access to the appropriate clinical areas and contact with the staff in those areas (Wynne et al, 1997). This view was supported by research conducted by Jordan (1996) and White (1994).

Akinsanya (1987) believes that nursing procedures such as intravenous infusions and fluid and electrolyte balance were dependent upon knowledge of the biological sciences for safe practice. Nurses need considerable life science knowledge to implement nursing care such as vital observations, injections, bowel care and administration of drugs but traditionally nursing students find life science theory such as in the biosciences the most difficult to understand and integrate into practice. It is suggested that bioscience theory–practice links encourages nurses to look directly at the root of the problem, develop a better understanding of nursing principles, greater professional competence and enhanced patient care and welfare. Jordan (1996) suggests the use of case studies to forge theory-practice links. She stated that in health care case studies, clinical experience is examined and reflected on which then enhances learning. Whilst bioscience is not easy to learn, this approach can make it interesting and relevant to care and encourages active learning.

Research conducted by Courtenay (1991) in which she sought the perceptions of 140 third year students on the biological sciences by means of a survey indicated that 51% of students considered anatomy to be the most important subject in preparation for registration as compared with only 26% of teachers. Thirty seven point nine percent (37.9%) of teachers felt psychology was the most important compared to 22.7% of

students. Microbiology and pharmacology were the two sciences that nurses found the hardest to learn. Teachers felt ill prepared to teach anatomy and physiology and only 25% felt that their own knowledge was adequate. Courtenay concluded that with regards to microbiology and pharmacology only one of every ten of the sample of both students and lecturers considered their knowledge base to be adequate. Recommendations suggested that teachers needed to improve their skills for effective learning to take place.

Medication calculations present a major problem to nurses and many nurses appear to have limited understanding of basic arithmetic, possibly due to the increased use of calculators which encourages reliance on technology rather than developing the fundamental skills required to work it out for themselves (Gilliam, 1995; Roger and Jones, 2000; Segatore et al, 1993). Segatore et al (1993) recommended that universities establish introductory courses in mathematics. He ascertained medication calculation errors are the result of a failure in the secondary education system. Ashby (1997) recommended that nurse educators provide yearly educational updates on medication calculations and have reference material readily available. In research conducted by Blais and Bath (1992) three areas of medication calculation deficits were found. These consisted of mathematical errors, measurement errors and conceptual errors where nurses had problems visualizing the problem. Segatore et al (1993) and Blais and Bath (1992) have recommended that a problem solving approach is used which incorporates conceptual problems. This view was supported by research conducted by Roger and Jones (2000).

Pharmacology theory needs to be combined with practical medication administration to enable the students of nursing and registered nurses to integrate theory and practice (Lamp, 1997; Manias et al, 1999; Roger and Jones 2000; Latter et al, 2000). Briggs (1999) states, lecturers have the responsibility to present their teaching/ learning content in such a way to stimulate students to develop a deep approach to learning. He argues that higher learning (rather than superficial learning, for example, rote learning) will only be achieved when activities are used that stimulate deep learning.

Good teaching is getting most students to use higher cognitive processes that more academic students use spontaneously. Good teaching narrows the gap (Briggs, 1999).

Research conducted since 1976 into student learning suggests that educational content cannot be imparted by direct teaching methods but created through student learning activities, which encourage deep learning. Many factors affect the way adult learners approach new learning experiences and these include differences in ages, experiences, ability, self-perception, motivation as well as the structure of the teaching methods (Burns, 1998). Burns (1998) discusses andragogy, or the science of teaching adults and states:

Andragogy is based on the fact that the deepest learning need an adult has is to be treated as a self-directed person.

Andragogy must be student centered, experienced based, problem orientated and collaborative. Burns (1998) believes in the humanistic approach to teaching and education. The educator acts as a facilitator and guides the students through reflective

practice and supports their problem solving abilities. Students must be active participants in self-paced, self-directed learning and new information is introduced by relating it to existing knowledge and experience. Students experience and the educator's knowledge are rated equally and students are encouraged to have input into the formulation of the curriculum which is a reflection of this shared authority.

Adults judge the value of a learning activity and its relevance to their own lives. They are motivated to learn if the experience satisfies their perceived needs and interests and this encourages deep learning. To satisfy this need for self-directing it is advantageous to all concerned if all parties in the learning process are involved in mutual planning (Burns, 1998).

One method often used in nursing that has proven successful for engaging students in deep cognitive activity is problem-based learning. In problem-based learning the teaching method is to present the student with a problem, develop clear objectives, and assessment is based on how well the problem is solved in the context of the objectives. This type of self-directed learning allows students to create a relevant knowledge base, teaches them to undertake research and assessment and acts as a review process to ensure the student develops self management and monitoring skills (Briggs, 1999).

This view is supported by Manias et al (1999), who suggest that students have problems merging scientific pharmacology knowledge (pharmacokinetics) with nursing knowledge (drug administration) and applying it to clinical practice. Students tend to use superficial learning strategies such as rote learning lists of drugs without

recognizing common characteristics shared by drug groups due to the amount of pharmacology content and constraints on class time rather than deep cognitive activities. The authors have developed a computer assisted learning package called Pharmacology Resource for Nurses (PRN), to assist nurses to form better links with pharmacology education and clinical application. Two important principles that underpin safe drug administration inform this package:

- (1) A knowledge of drug families, and
- (2) An understanding of the clinical decision-making process (Manias et al, 1999).

Clinical decision-making emphasises the cognitive processes that students engage in when they solve problems. This form of computer stimulation encourages active learning by providing students with direct access to and control over the learning process. The PRN package is designed to be fully integrated into the teaching program and complements currently used lectures, tutorials, laboratory sessions, clinical experience and assessment. This program is currently being evaluated and students report that they feel the package “brings it all together” (Manias et al 1999). Research by Jefferies, (2001) supports this process. Using 42 nursing students Jeffries conducted experiential research in which she compared teaching medication administration in nursing using lectures or interactive multimedia CD-ROM and found the computer group demonstrating, “...higher student satisfaction and more cognitive gains than the lecture group.” Flynn et al (1996) used a pretest and posttest design to compare the effectiveness of three teaching methods, videotape, instruction book and lecture on 150 nurses to ascertain their knowledge of medication error risk

reduction strategies. They found there was no significant statistical difference between the teaching methods but the research subjects indicated methods other than lectures were more advantageous.

According to adult learning theory or andragogy, learning must be student-driven, activity based and experiential in nature to promote life long learning (The Centre for Professional Development in Health Science, Chapter 3). When students have been interviewed, they predominately report experiential methods of teaching and learning as the most effective as they provide a clinical focus which clarifies the purpose of tuition (Courtenay, 1991; Ives et al, 1996; Roger and Jones 2000).

In summary the content of a medication management curriculum is robustly debated amongst the authors of the literature reviewed. Research indicates changes in the pharmacology curricula in Australia are necessary to improve the pharmacology knowledge of undergraduate nursing students. There appears to be a significant amount of literature supporting the argument for expanding the bioscience component of nursing curricula. Researchers suggest that the social and behavioral sciences were embraced to the detriment of bioscience. They argue that without an understanding of the physiology of the body nurses cannot understand the action and side effects of medications, a competency requirement necessary for nurses to be registered.

In one research study microbiology and pharmacology were found to be the two sciences subjects' nurses felt were hardest to learn and one in ten indicated they felt their knowledge base was inadequate (Courtenay, 1991). In the same research, nurse educators felt ill prepared to teach the biosciences because they had limited

knowledge in this area. Fifty per cent of students indicated anatomy was important, but less than twenty five per cent of teachers felt the same. They felt that social and behavioral sciences were more important. This would indicate inconsistencies between what students perceive they need to learn and what teachers perceive is necessary. Perhaps this is related to educator's lack of knowledge of the biosciences resulting in more emphasis on the social and behavioral studies with which they felt more comfortable. Possibly resulting from the fact that nurse academics have predominantly utilized the following research approaches: phenomenological within philosophy; grounded social theory within sociology; and ethnographic within cultural anthropology creating a lack of knowledge in an area vital for medication administration (Courtenay, 1991, Thorne et al, 1997). Despite an extensive literature review no evaluation appears to have been conducted which demonstrates the effectiveness of a pharmacology and medication administration curriculum when it is integrated into nursing subjects.

Research conducted by Leape et al, (1995) found that lack of knowledge by nurses in administration of medications was a persistent problem. In a qualitative study nurses, doctors and pharmacists involved in medication errors were interviewed and lack of drug knowledge accounted for 29% of the 334 errors that occurred in a 6 month period, in nurses this accounted for 15% of the problems. Manias and Bullock, (2002b) interviewed clinical nurses and found that clinical nurses perceived large deficits in graduate nurses' pharmacology education which restricted their ability to administer medication safely.

Bioscience is more difficult to learn than other nursing subjects. Health care case studies were suggested as a way to encourage active learning approaches. Human biology was easier to learn when practical learning methods were used such as experiential practice (Courtenay, 1991). Jordan and Reid (1997) support this idea and found that case studies or clinical scenarios encouraged active learning and were able to demonstrate that biological knowledge was vital for holistic patient care and optimum practice. They state in relation to a case study, 'It provides an immediate clinical anchor and defines the purpose of tuition'. Researchers have also found medication calculations to be a major problem prompting the suggestion by Segatore et al (1993) that introductory mathematics be included in the undergraduate curriculum.

Research into students learning suggests that educational content cannot be imparted by direct teaching methods but only created through student learning activities. Learning activities suggested were problem based learning and clinical decision making through computer aided packages or clinical practice. Students indicated that experiential learning was the most beneficial.

1.7. Overview

In Tasmania, educational and competency requirements for nurses in relation to medication administration are governed by The Tasmanian Poisons Act 1971 and the Nursing Board of Tasmania Medication Guidelines (NBT, 2003) and ANCI Competencies (NBT, 2000) as well as common law which indicates registered nurses owe a duty of care to their patients to prevent harm. Research done in the United Kingdom, United States and Australia indicates medication errors occur frequently in

hospitals as often as one error per day. Australian data indicates 140,000 additional hospital admissions result yearly from medication errors in prescribing, dispensing and administration (ACSQHC, 2002). It is estimated that only 11-13% of errors are reported (Roughhead, 1999). In the United States of America 98,000 people die each year due to medication errors (Pallarino, 2002). In England medication errors are of such a concern that it has been recommended that nurses teach patients to self administer (The Audit Commission for Local Authorities and the National Health Service in England and Wales, 2001). Literature reviewed to assess nurses' actual competency in relation to medication administration indicates that nurses are ill prepared for practice and lack the knowledge to meet these competencies.

Ives et al (1996) found Victorian postgraduate nurses when tested on the five areas related to medication i.e. drug administration, therapeutic effect, adverse drug effects, medication education and legal aspects, had a mean score of 55%. This was supported by substantial research done by Latter et al (2000) in the United Kingdom which also found deficits in the amount of pharmacology knowledge nurses have, compared to what is required for practice. Leape et al (1995) found that a deficiency in medication administration knowledge in nurses was associated with 15% of the 334 medication errors that had occurred in a six month period.

A plethora of research indicates medication calculation and numeracy skills were not satisfactory resulting in many drug errors (Craig and Sellers, 1995; Gilliam and Chu, 1995; Gladstone, 1995; Segatore et al, 1993; Roger and Jones, 2000).

Current under-graduate nursing education in Australian Universities is diverse. In some Universities pharmacology is taught as a separate subject and in others as part of biological science. The debate about pharmacology curriculum is complicated by the absence of traditional guidelines and minimum standards for curriculum. The literature reviewed listed many areas for improvement, notably increasing the bioscience component of the curriculum to bridge the theory-practice gap which many state exists. Teachers need to use approaches that stimulate students to develop a deep approach to learning, such as problem solving, case studies, clinical decision making activities, student based learning activities and experiential learning. The latter was valued highly by students. Research also indicates a need for well educated lecturers with expertise in the area they teach.

From the literature reviewed evidence exists that medication errors are frequent and consequences are detrimental. Nurses interviewed have acknowledged a knowledge deficit in the area of medication administration. The nursing and pharmacology curricula are varied across Australia and there is no best practice curriculum to use as a standard for education. A multitude of studies exists to suggest changes to the curricula and implementation of strategies that improve knowledge.

This present study was conducted to investigate the undergraduate nursing curriculum in Tasmania. It is assumed problems that exist nationally and internationally also exist in Tasmania and this research will provide information to the Tasmanian School of Nursing which will be beneficial to nurses and clients in the area of medication administration.

2. Chapter 2

Methodology

2.1. Introduction

Nursing as an activity appears to have been in practice for as long as human existence itself. However as a formal, structured and scientific practice, modern nursing is remarkably recent and can be traced to the work of Florence Nightingale. Since the time of Nightingale nursing has continued to evolve and develop. The move of nurse education into the higher education sector, which encouraged scholarship within nursing, has been seen as an important milestone. Scholarship or the mental accomplishment of learning is based on nursing theory resulting from nursing research and its practical application to validate the discipline of nursing to others (Worrall-Carter, 1995).

Nursing research seeks to improve nursing practice. One hallmark of a profession is accountability and this is achieved by establishing a scientific knowledge base that allows the implementation of evidence based practice, evaluation of practice and justification for change.

Florence Nightingale's research into nursing actions in the Crimean War effected changes in nursing care and is said to be the origin of nursing research. Florence Nightingale changed the foundation of nursing by improving the standards for nursing training and hospital administration by, amongst other things, raising the entry requirements for nursing.

In the early years of nursing research (1900-1940), studies conducted concerned nursing education, which was then in its infancy. From the 1950s onward practice orientated research began to emerge influenced by tertiary nurse education in the United States. The move of basic nurse education to the tertiary sector in Australia in 1974 resulted in more nursing research with a focus on evidence based practice which persists today.

Nursing does not possess a unique research approach but utilizes research designs from other disciplines which are both quantitative and qualitative.

Quantitative research evolved with the traditional sciences and is used to test hypotheses and cause and effect relationships. This research has a high degree of validity and is also said to exhibit generalisability. Its disadvantages in nursing are that some variables are not amenable to manipulation, therefore aspects of human culture, values, opinions and relationships are unable to be investigated using this method.

Qualitative research studies human phenomena and is grounded in the social sciences. The researcher queries a particular phenomenon, discovers ways to answer the question which leads to the choice of method used. Researchers are committed to the participant's view point. Qualitative research is more holistic than quantitative but criticism of this method focuses on interpretation of data in an objective and replicable manner as well as relatively small sample sizes. Theory in qualitative research is derived by researching an impression or idea through identification, and investigation of interrelationships between and surrounding this idea or impression

and then organised into a framework from which observations can be made (Meleis, 1985; Grbich, 1999). Nurse researchers often embrace theory from other disciplines such as the phenomenological approach within philosophy or the grounded social theory approach within sociology (Thorne et al, 1997).

The research project developed here involves description and interpretation of one undergraduate pharmacology and medication administration curriculum from the perspectives of those who participated in it. The research design chosen is qualitative descriptive exploratory research. Although descriptive research is frequently used in nursing it is considered by some to be a weak research design. Sandelowski (2000) states, no methods are "...absolutely weak or strong, but more or less useful or appropriate in relation to certain purposes."

The descriptive design was chosen to enable the researcher to accurately portray the phenomena being investigated and the meanings attributed to the events from the participants' perspective. The researcher did not want to describe events in terms of a conceptual framework as this would result in the researchers own interpretative perspective and this was not the aim of the research. Consequently, no particular theoretical or conceptual frame work was employed.

The research methods used in this project are focus groups, surveys, simulated nurse-client interactions and documentary evidence, all of which are traditional methods within descriptive research. Focus groups were used to discover the relationship between the undergraduate pharmacology curriculum and its impact on clinical practice. Focus group interviews allow the researcher to observe a large amount of

interaction on a specific topic in a limited amount of time. In the present study focus groups were used as the preliminary study to inform the development of the surveys. The surveys addressed the issues discussed in the focus groups that were of importance to the group member. They were sent to all nurses who graduated from the Tasmanian School of Nursing from 1997-2000 in order to ensure that the pharmacology curriculum was the same. It was used to further explore and provide evidence of relationships between the variables under investigation.

Simulated Nurse-Client interactions (observational study) were used on 10% of third year students from 2002 following completion of their degree. The observational study assessed their adherence to the legislated and mandated requirements for medication administration in Tasmania prior to practice.

Other statistical data such as information from the Nursing Board of Tasmania was used to provide insight into the extent of the problem in Tasmania.

Triangulation using focus groups, surveys and the observational study has been used as a research strategy to strengthen and provide credibility to the research findings. The use of multiple data collection strategies forms part of the triangulation process and strengthens the credibility of the research finding (Streubert and Carpenter, 1999).

2.2. Research in Nursing (A brief overview)

Research in nursing is said to have been commenced with Florence Nightingale in the mid nineteenth century. She maintained and analyzed data on the effects of nursing actions on the health status of British soldiers during the Crimean war. This led to

changes in health care such as improved sanitation, ventilation and dietary intake and significantly decreased mortality rates in hospitals at that time (Polit and Hungler, 1995; Beanland et al, 2000; Roberts and Taylor, 1998).

Florence Nightingale established a training school for nurses under her patronage at St Thomas Hospital in London. The early students of this hospital were sent to other parts of the world such as Canada, Australia, New Zealand, Scotland, Ireland, Sweden, Germany, India, Holland, USA and Japan to introduce the Nightingale method of nursing (Russell, 1990).

Prior to 1868 there was no organized system of nurse training in Australia. Nursing vacancies were often filled by domestic staff who were elderly, impoverished and are reported at times to have come to work intoxicated. Hospitals were unsanitary and infested with vermin and wards men were often ex patients. The nurses sent to Australia to set up training schools for nurses went on to become Matrons in other hospitals thus spreading the Nightingale system of nursing throughout Australia (Russell, 1990).

The Australian Trained Nurses Association (ATNA) was formed in 1899 in New South Wales and its aim was to promote the interests of nurses in Australia, to establish a system of registration for nurses and to afford an opportunity for nurses to discuss and improve their work. The Australian Nurses Journal was consequently published in 1903. The ATNA was responsible for standardizing nurse training programs and the establishment of the Nurses Registration Board with the passing of the 1924 Nurses Registration Act (Russell, 1990).

Research studies conducted by nurses between 1900 and 1950 were predominantly concerned with nursing education. Nurse training took place within hospitals and the needs of the trainee nurse were subordinate to the service needs of the hospital. As the Nightingale system was so successful in improving the quality of nursing services in Australia attempts to change the system were strongly resisted for many years (Russell, 1990). Consequently early nursing leaders received their advanced nursing preparation in the field of education.

All aspects of nursing care were affected by the Second World War. There was an urgent need for increased nursing numbers due to increased hospital admissions from war casualties. This led researchers to investigate better management of nursing resources (Polit and Hungler, 1995; Beanland et al, 2000). In the post war period scientific medical knowledge escalated rapidly and new lifesaving technologies and drugs were introduced. This knowledge was applied to patient care and changed the practice of nursing substantially (Russell, 1990).

The 1950s saw an academic period of nursing begin in Australia influenced by the growing number of graduate and undergraduate programs in the United States, some of which included courses related to research. Thus in the 1960s practice orientated research began to emerge as well as the development of nursing practice based on a theoretical perspective. Nursing journals focusing on nursing research also emerged (Beanland et al, 2000).

The move of basic nurse education into the tertiary education sector, influenced the development of nursing research in Australia and helped to establish a group of

educated nurses who later on went on to carry out research themselves (Roberts and Taylor, 1998). The initial undergraduate nursing program commenced on mainland Australia at a diploma level in 1974. In 1978 the Sax report (Report of the Committee of Inquiry into Nurse Education and Training) made recommendations that all Australian nurse education should be at tertiary level. In 1982 the Tasmanian Institute of Technology commenced a pilot 3 year nursing course culminating in a Diploma of Applied Science in Nursing. This was followed in 1983 by a Bachelor of Nursing through the University of Tasmania. By 1992 all general nurse education was conducted through the University of Tasmania as a Bachelor of Nursing and a Masters of Nursing program had also commenced (Norris, 2001).

The establishment of nurse education in the higher education sector has impacted on the type of student attracted to the field and on teaching approaches within the curriculum. Teaching programs have had to embrace many of the norms and standards of the university sector. Linda Worrall-Carter notes that, "Central to the western concept of the university is the notion of scholarship" (In Grey and Pratt, 1995). Gathering information, assembling new ideas and creating new meanings is inherent to the concept of scholarship. Nursing has utilised the concept of scholarship to establish its identity as a profession in the university culture. Nurse academics are producing scholarly work by questioning current practices and issues in nursing. Ernest Boyer (1990) from the Carnegie Foundation of Advanced Teaching believes that scholarship should be broadened and that academic facilities need to showcase more accurately both academic and civic mandates as they complement each other and research. He goes on to say that knowledge is not gained from theory alone, but

that theory leads to practice and in turn practice influences theory and teaching moulds both.

The focus of nurse researchers from the 1990s onwards has been on clinically based studies, the development of which became the foundation for evidence based practice which evaluates practice according to patient outcomes, satisfaction and cost (Beanland et al, 2000; Roberts and Taylor, 1998).

Nurses are being continually challenged to design new and original programs that meet the rapidly changing health environment and deliver high quality care that is cost effective. Nursing research provides the scientific knowledge base to implement evidence-based nursing practice, assess outcomes and justify changes. This promotes accountability for nursing, the hallmark for all professions (Beanland et al, 2000).

2.3. Research Approaches

Moody (1990), cited by Roberts and Taylor (1998), defines scientific knowledge as that which is:

Generated from systematic study, through qualitative or quantitative modes of enquiry... this knowledge is commonly accepted by its community of scholars. (Moody, 1998)

Quantitative research evolved within traditional science. It is characterized by measuring, analyzing and replicating. Qualitative research studies human phenomena and is grounded in the social sciences (Streubert and Carpenter, 1999). In the following sections the research approaches will be defined.

2.3.1. Quantitative Research

Quantitative research is described by Polit and Hungler (1995) as:

The study of phenomena that lend themselves to precise measurement and quantification often involving rigorous control and design.

In this type of research the researcher tests hypothesis and actively seeks to bring about the desired effect. Experimental designs are suitable for testing hypothesis, cause and effect relationships and are particularly suitable for evaluating the impact of interventions (Beanland et al, 2000; Farrell, 1997). Experimental designs have three identifying properties: randomization; control; and manipulation. Randomization involves participants being allocated to either the experimental group or the control group by chance. Control means the introduction of one or more constants into the experimental situation including the control group. In experimental designs the comparison group is the control group who gets the usual intervention rather than the intervention being researched. Manipulation is what the researcher does to the experimental group that is to be compared (for example a new medication or education) to the group that gets the usual intervention. A sample population is chosen that is thought to benefit from a certain intervention. Participants are randomly allocated to a control or experimental group, any differences following the introduction of the intervention (independent variable) is deemed to be the result of the intervention.

Experimental research has a high degree of validity, which refers to the degree the presumed cause (independent variable) results in the presumed effect (dependent variable) (Polit and Hungler, 1995; Farrell, 1997). These types of studies also exhibit

generalisability, especially when the sample size is large. This indicates that findings from a particular study can be generalized to other similar populations or situations. Blind trials, where ethical, are said to have the highest credibility. In these trials neither the sample population nor the researcher knows which group is getting the intervention and which group is not. This prevents researcher bias and the placebo effect on the sample population (Farrell, 1995).

Disadvantages of experimental research are that some variables are not amenable to manipulation, particularly human and environmental characteristics; and that manipulation of some variables is prohibited ethically (those that are detrimental to health). A further weakness is that they are sometimes conducted in an artificial environment (laboratory) and they often do not translate into ordinary practice situations where many other variables affect outcome (emotions, ward dynamics, lack of training of staff). In hospitals the placebo effect can alter both staff and patient actions (as does the Hawthorne effect). Lastly, research on humans is rarely conclusive (Polit and Hungler, 1995; Farrell, 1997).

Other research approaches also under the umbrella of experimental designs are quasi-experimental and pseudo experimental research. These mimic experimental research designs but lack one or more of the three identifying properties, randomization, control and manipulation. The weakness of these approaches is the inability to make accurate cause and effect relationships. The designs, however, are more adaptable to real life settings than experimental designs (Beanland et al, 2000).

2.3.2. Qualitative Research

Qualitative research is defined by Polit and Hungler (1995) as:

The investigation of phenomena, typically in an in-depth and holistic fashion, through the collection of rich narrative materials using a flexible research design.

Qualitative research developed because aspects of human values, culture, opinions and relationships were unable to be investigated using the quantitative approach. This approach has expanded to clinical settings to answer difficult and urgent clinical questions in a more holistic fashion related to basic social processes that illustrate human health and illness event (Streubert and Carpenter, 1999).

The major types of qualitative research are exploratory/ descriptive design, ethnology, phenomenology, grounded theory, memory work, historical research, evaluation and action research (Grbich, 1999; Farrell, 1997).

Qualitative researchers have emphasized six significant characteristics in their research:

- a belief in more than one truth
- a commitment to finding appropriate methods to answer the research question
- a commitment to the informant's perspective of the topic of interest
- the research is conducted in such a way that it minimizes intrusion by the researcher and maintains the natural setting as much as possible
- acknowledgement of the researcher as an instrument in the research
- use of the participants' experiences to convey understanding of the phenomena by reporting in a literary style rich with their commentaries (Streubert and Carpenter, 1999).

Qualitative researchers endorse many truths and are committed to discovery through multiple ways of understanding. The researcher queries a particular phenomenon, discovers ways to answer the question and this leads to the choice of the method to be used. In some cases more than one method may be necessary to understand the circumstances being observed. An example of this is described by Jenkins (1993) who was researching clinical decision making in nursing. Based on information obtained during focus group discussions, she found that there was also a need to observe nurses in practice, as well as interviewing people individually, to answer her research question (cited by Streubert and Carpenter 1999).

Qualitative researchers are committed to the participants' viewpoint and conduct in-depth interviews, observations and examine relevant documentation in an effort to fully understand circumstances surrounding their research question. This provides a view of reality important to the study participants, rather than the researcher. The important factor in qualitative research is the significant attention given to discovering the participant's perspective. Because the researcher is involved with the participants in the study, the investigator accepts that the research is conducted with subjective bias. The researcher reveals their thoughts and personal perceptions to the participants and then attempts to maintain objectivity in order to explore reality from the viewpoint of the participants. This stops the researcher from leading participants in the direction of the researchers own beliefs. The participant's experiences are the findings of qualitative research (Streubert and Carpenter, 1999; Roberts and Taylor, 1997).

Qualitative research is generally more holistic than quantitative research, yields in-depth insights and is well suited to the purposes of description, hypothesis development, understanding causal processes and theory development. It is unable to establish cause and effect relationships, test hypotheses or generate knowledge from a large population as sample sizes are often small.

Criticisms of qualitative research concern the difficulty of interpreting data in an objective and replicable manner, the extremely time consuming nature of the research, use of relatively small samples and lack of convincing evidence to direct care practices (Polit and Hungler, 1995, Farrell 1997).

Early qualitative nurse researchers found quantitative scientific studies inadequate for answering all of nursing theoretical and practice questions. In order to place their research within the context of established scientific enquiry nursing researchers located their research within the coherent rationale of other disciplines. The primary directions chosen were the phenomenological approach within philosophy, the grounded social theory within sociology and the ethnographic theory within cultural anthropology (Thorne et al, 1997).

The nature of nursing knowledge is such that the nurse researcher often finds departure from the traditional qualitative approach to be necessary and appropriate. Due to the interdisciplinary nature of nursing science methodology, questions may need to be examined in the context of the overall objectives of the nursing science instead of following the methodological dictates of other disciplines. Often research involves description and interpretation of a shared health or illness phenomenon from the

perspective of those who live it. This is where qualitative descriptive research meets the unique needs of nursing researchers (Thorne et al, 1997).

2.4. Descriptive Research

Descriptive research is defined by Polit and Hungler (1995) as:

Research studies that have as their main objective the accurate portrayal of the characteristics of persons, situations or groups and the frequency with which certain phenomena occur.

A descriptive correlation design examines the relationship within one group without aiming to determine cause and effect. The variables of interest are identified by the researcher and the most appropriate ways of measuring are chosen. This is usually through observation, interviews or surveys. Statistical analysis is then carried out to determine whether there is a relationship between the variables, how strong it is and in which direction (Roberts and Taylor, 1998). An example of a study using this design is one that examined the relationship between passing school biology and success in nursing science courses. The researcher found that students who did well in secondary school biology also did well in nursing science courses. However some mature age students who had no science background were able to perform equally as well as students with a science background (Roberts and Taylor, 1998, cited Caon and Treagust, 1992).

Descriptive/ exploratory research gathers in-depth descriptions of existing variables and uses this information to justify and assess current conditions and practices or to make

more comprehensible plans for improving health care practices (Beanland and Schneider, 2000; Burns and Grove, 1987).

All research designs describe the phenomena being investigated and no description is exempt from interpretation. The challenge for qualitative research is to find a level of dialogue that demonstrates both the individual facts of the experience as well as how it reflects more general situations (Todres, 1998). Qualitative descriptive research embraces a kind of interpretation that has less insinuation as it is not dictated by a methodological structure and thus is more likely to result in easier consensus among researchers. It does not depend as much on the perceptions or impressions of the describer as it relies more on the statement of the facts. Description must accurately disseminate events in their exact progression (descriptive validity) and convey the meaning participants attributed to these events (interpretive validity). The researcher does not try to intentionally choose to describe events in terms of a conceptual framework (i.e. phenomenological, ethnographic). In this latter type of research the researcher must put much more of their own interpretive perspective on what they see and hear. They no longer read words or scenes but are required to read between the lines making consensus amongst researchers much more difficult (Sandelowski, 2000).

Qualitative description predominantly seeks to gather accurate and largely unembellished answers to questions of special relevance to nurse practitioners and policy makers for example 'what are the concerns of nurses about an event?' This methodology is ideally suited to this research which investigates graduate nurses' evaluation of the influence of the undergraduate curriculum on medication administration in nursing. Furthermore, data collection in qualitative description is

directed at gaining insight into the who, what and where of events and experiences by using minimally to moderately structured individual and/or focus groups interviews as well as observations of targeted events and examination of documents (Sandelowski, 2000). This present study uses these techniques as well as surveys in a triangulated approach to strengthen the research findings.

Descriptive research is one of the most frequently used approaches in practice disciplines but is not as well recognised as phenomenology, grounded theory, feminism, ethnology or narrative studies and is comparatively unacknowledged because of this. Descriptive designs are often considered weak research designs in comparison to experimental designs. Descriptive studies have the advantage that they are used to build up a clearer delineation of the phenomenon being studied and are often used for identifying problems within current practice or justifying current practice. The relationship between variables is identified to obtain an overall picture of the experience being observed. This research uses a descriptive design to clearly delineate the role of the undergraduate pharmacology curriculum at the University of Tasmania in producing safe and competent medication administration by registered nurses in practice. It draws on adult education theory and practice for assessment and analysis of the educational value of curricular materials and teaching and learning strategies.

2.5. Data collection

Data collection methods consisted of:

- Focus groups
- Surveys
- Simulated nurse-client interactions, and
- Documentary evidence

Purposeful sampling was chosen in this study. In other words the participants were selected according to the needs of the study (Morse, 1991). In this case it was according to the informants' knowledge of the research topic.

2.6. Focus Groups

Focus groups are defined by Grbich (1999) as:

...Semi-structured, person-to-person interviews that aim to explore a specific set of issues.

2.6.1. Background Information

Focus group interviews usually consist of a group of 5 to 15 people who have been assembled for a group discussion. The sample selected should constitute a fairly homogeneous group to promote comfortable group dynamics. The interviewer guides the discussion according to a written set of questions or topics to be covered. A major advantage of a group format is that it is efficient and the researcher obtains the viewpoint of many individuals in a short period of time. One disadvantage is that some people feel uncomfortable expressing their viewpoint in front of a group (Polit and Hungler, 1995). According to Suter (2000), focus group interviews allow researchers to observe a large amount of interaction on a specific topic of interest in a limited timeframe. Further clarifying discussions are often initiated by other group member questions allowing a wider range of responses. This type of interview is advantageous because participants may correct one another and this process may help jog memories (Morse, 1991). Focus group studies can be preliminary, hypotheses generating studies.

However the simplest use of focus groups is as a preliminary study to a questionnaire, used for testing the relevance of study variables or the language used in surveys (Daly et al, 1998). The focus group interviews in this research were used in this way.

2.6.2. Development of the Focus Group questions

Anecdotal evidence was the starting point of this research. Key issues were then thoroughly researched in the literature review. Within this context the aims of the focus group was to explore the participants' personal knowledge of the curriculum in relation to medication administration and its relationship to clinical practice. The researcher's objectives were to:

- elicit if post graduate nurses did lack confidence and knowledge to administer medications safely and why
- determine which units in the undergraduate curriculum that taught medication administration were considered to be the most effective/ineffective
- determine which adult teaching methods and tools used by the university in relation to medication administration were considered to be the most effective/ineffective
- ascertain which factors other than the nursing course are considered to affect medication practice
- ascertain what changes, if any participants consider need to be made to the curriculum in relation to medication administration

The focus groups questions were loosely based on the objectives. The focus group interviews were semi-structured around the areas of interest, whilst still allowing considerable flexibility in scope and depth during the process of investigating the

participant's perspective of the research topic (Morse, 1991). Closed and open questions were used. Open ended questions were used to allow a plethora of beliefs feelings and behaviors to be expressed (see appendix eight for the questions).

2.6.3. Process of Administration

Three focus groups were held one at each of the following hospitals: the North West Regional; Launceston General Hospital; and the Royal Hobart Hospital. There were 18 participants in total. The sample population consisted of registered nurses who responded to notices displayed at the three major hospitals (see appendix one for the notice used). The selection criterion was that participants had graduated from the Tasmanian School of Nursing within the period 1997-2000 in order to account for continuity in the pharmacology curriculum at the School of Nursing.

The volunteers at each site were sent detailed information about the project and their involvement and a consent form (see appendix one and two). Once the consent form was signed and returned, meeting times were arranged.

Focus group discussions were tape-recorded, and notes were taken by the researcher. Tapes and notes taken were analysed by thematic analysis with reference to the projects' aims and objectives. To demonstrate trustworthiness of the data the central feature of this research was to confirm that the findings accurately reflected the experiences and viewpoints of the participants, rather than the perceptions of the researcher. One means of verification was to have the participants evaluate the preliminary interpretations to ascertain that the researcher's thematic analysis was consistent with their experience

(Polit and Hungler, 1995; Morse, 1991). It was extremely difficult to assemble all the participants for this to occur so verification was restricted to a few participants who acknowledged that in their perception the thematic analysis was correct. To further verify the analysis the researcher tape recorded the focus group interviews, transcribed them, and then presented the literal transcription of the interviews and the tapes to the researcher's supervisor to validate that the material and analysis.

The data analysis process of involved clustering together related types of narrative information into a coherent scheme. As analysis and interpretation progressed, the researcher began to identify themes and categories, which were used to build a descriptive theory of the phenomenon being studied (Beanland et al, 2000). The information obtained became increasingly focused and purposeful as the study progressed.

Analysis and interpretation was on-going and used in conjunction with the literature review to inform the development of the questionnaire.

2.6.4. Limitations and Problems

It was extremely hard to get volunteers to participate. Only eight nurses volunteered the rest were recruited via their peers as a result of a personal request from the researcher. Once the numbers had been finalised, it was then extremely difficult to get the participants together on the same day due to shift work, holidays and sick leave. Even when the participants had agreed that a certain day was suitable some were unable to attend due to personal or work related issues. Consequently the focus groups all had a small sample size which may not make the discussions representative of the entire population. As well, participants may have volunteered because they felt

strongly about a particular issue, either positively or negatively. However information from the focus groups was used predominantly to test the validity of the issues raised in the literature review in order to inform the development of the surveys. The major issues raised by these respondents have been supported by other research findings in similar research.

2.7. Survey

Brink and Wood (2001) define a survey as:

...methods designed to collect primary self-reported data.....responses are limited to answers to predetermined questions.

2.7.1. Background Information

The answers to a survey may be used to explore relationships between variables and are often used in descriptive research designs. Structured surveys consist of a set of questions in which the wording of both the question and in most cases the response alternatives is predetermined. Subjects are asked to respond to the same questions, in the same order, and they have the same set of options for their responses. Most nurse researchers who collect self-report data use instruments with a moderate to high degree of structure such as Likert scales or yes /no answers. In developing structured instruments, a great deal of effort is usually devoted to the content, form, and wording of the questions (Polit and Hungler, 1995). The survey in this research followed this process and format.

Surveys when mailed to respondents are quick to administer and receive. Although they incur postal costs, they are relatively inexpensive compared to other data collection methods such as interviews and observation. In addition they allow the acquisition of large amounts of information from the target sample. Because they are mailed they can be distributed over a wide geographical area, much wider than could be easily accessed if the researcher had to travel to do interviews. Most surveys ask for anonymous replies therefore the respondents are more likely to answer candidly than in an interview situation. An information page is sent to all participants which gives respondents clear instructions (Dempsey and Dempsey, 1996).

Surveys tend to have low return rates unless they deal with a burning question or have been distributed by personal contact. In this research it was hoped that the content would be of interest as medication errors are a widely acknowledged problem. Although data collected from focus groups will help to strengthen the findings, if only a small sub sample of the respondents return their survey, it may be unreasonable to assume that those who did respond were somehow typical of the sample as a whole. A response rate of greater than 60% is probably sufficient for most purposes, but lower response rates are common. The use of follow up reminders has been found to be efficient in achieving higher response rates to mailed survey (Polit and Hungler, 1995; Roberts and Taylor, 1998). This was not used in this research due to the time and costs involved. The cost of the distribution although relatively inexpensive was still high.

2.7.2. The Instrument

An extensive literature review was conducted to search for an existing survey instrument that could be used or modified for this research (see details of literature reviewed on page 1 of literature review). Although the literature reviewed contained

some elements of the issues being investigated (Ives et al, 1996, Gilliam and Chu, 1995), no similar existing research could be located that was appropriate for the task, thus requiring the construction of a self developed instrument. This was a complex process and took approximately five months. The content of the survey was informed by the literature review and themes that emerged from the focus group discussions.

Questions used in the focus group discussions were loosely based on the objectives of the research (see appendix eight for focus group questions). Open questions were used in the focus group discussions when new information was elicited such as issues surrounding the Enrolled Nurse upgrade program. This information was incorporated into the survey content as well as those questions that elicited strong reactions from the focus group participants in order to ascertain if these were individual views or was of relevance to the entire post graduate population between the years of 1997-2000.

Literature on survey construction was researched (Beanland et al, 2000, Polit and Hungler, 1995) and existing community survey formats were examined and those features that were transparent (where the meaning was explicit), easy to read and use were incorporated into the present survey. For example features of the Tasmanian Community Nursing Post Graduate (CNPg) Community Nurse Surveys (2000) were incorporated in phrasing questions on demographic data. The English Board for Nursing, Midwifery and Health Visiting (1998) surveys on effectiveness of learning outcomes was used for guidance in sentence structure in relation to questions on teaching and learning. Care was taken to ensure the intent of the questions was clear as well as the information sought, and that the survey was written in a language

understandable to the respondents. Every effort was made to avoid leading questions so not to introduce researcher bias.

There were three question formats and these consisted of a multiple choice format that required a tick only in the appropriate box, Likert scales, and short answer questions. Tick boxes were used for demographic and objective data. While 4, 5 and 7 point Likert scales were used in a fixed response format asking respondents to choose from a list of statements. Statements were varied throughout the survey, some starting at excellent and ranging to poor, others from unsure and ranging to excellent, in an effort to ensure that respondents read the questions thoroughly and minimize bias by counter balancing positively and negatively worded statements. Short answer format was used to allow the researcher to more fully explore and elicit more information from some of the themes that arose from the focus group discussions. It was hoped that the use of multiple measures would give a more complete picture in relation to the objectives.

The survey was tested for reliability and validity by a variety of individuals and groups. These consisted of experts in the field of survey construction, university lecturers and fellow researchers, registered nurses, post graduate nurses and third year nursing students. It was also pretested on eight post graduate nurses and four third year students for test retest reliability and internal reliability providing an opportunity for detecting problems with clarity, bias and whether it adequately addressed the issues being researched (Polit and Hungler, 1995). Consequently this resulted in some changes being made. These changes were mainly in sentence structure to enhance clarity however one question was changed completely, it initially asked respondents to rate their peers

overall pharmacology knowledge as new graduates, and this was changed to rate the level of knowledge that the undergraduate program provided for new graduates in relation to medication administration in specific areas. The initial question was considered too judgmental on a personal level. Ethics approval was obtained as the survey was an amendment to the original ethics approval.

2.7.3. Process of Administration

The survey cohort was graduates of the TSoN between 1997 and 2000. The objectives of the survey were to:

- Describe graduates' perception of the undergraduate pharmacology/medication management curriculum in preparing them for practice
- Elicit their views on the relative importance of the various components of the pharmacology/medication management curriculum
- Seek their view on what were the most helpful educational strategies employed to impart knowledge successfully
- Identify techniques and strategies that assist them in their medication knowledge and practice.

Once the survey was developed (see appendix six), it was sent to all nurses working in the state who fitted the selection criteria; this had been estimated at 600. The Nursing Board of Tasmania agreed to facilitate this using their database. Once the cohort of nurses was identified by the Nursing Board of Tasmania, they sent out five hundred and ninety eight surveys to the addresses they had on their database on August 4th 2003. A letter accompanied the survey explaining the study and the voluntary nature of

participation and reply-paid addressed envelopes were included. The surveys were delivered to the Nursing Board of Tasmania in sealed envelopes ready to be addressed and sent. The surveys return date was September 14th 2003. Return of a completed survey was seen as consent to participate in the study.

2.7.4. Limitations and Problems

A problematic feature of survey design is that it is only suitable for use by people who understand them. For example they may be inappropriate for the very young, confused, elderly or the illiterate. Even with those capable of filling in a survey, there may be misunderstandings that cannot be clarified, resulting in incomplete or invalid data. The aim of this research was to produce a survey that was clear, unambiguous and easy to understand. The need to confine the length of the survey so that the respondents do not get tired or bored often means that it may be necessary to leave out information that could be relevant. In this research considerable effort was made to keep the length of the survey short whilst still including all necessary information. Themes derived from the focus groups and literature reviewed was used to inform development of the survey.

The preferred method would have been to use a tool that has already been tested for validity and reliability however this was not possible in this case as the research is original. Return rates are often low in this type of research and if only a small sub sample of the respondents return their survey, it may be unreasonable to assume that those who did respond were somehow typical of the sample as a whole; therefore the results are not generalisable.

2.8. Simulated Nurse- Client Interactions

Brink and Wood (2001) define observational research as:

...a method of collecting descriptive behavioral data [that] is extremely useful in nursing studies because one can observe behavior as it occurs.

2.8.1. Background Information

Observational studies in nursing research usually focus on studying human behaviors, individual characteristics, events, environment or objects. Skill attainment and performance are also phenomena amenable to this approach (Polit and Hungler, 1995). Observation may range from unstructured, in which the observer purely observes the scene, to the being highly structured which involves specifying in advance what behaviors or events are to be observed, preparing a tool for record keeping such as a checklist, categorization system or rating scale. The observer then watches the participants and marks on a recording form what was seen (Beanland et al, 2000, Roberts and Taylor, 1997). The latter was utilized in this research.

Structured observation is also used in quantitative research and is characterized by systematic planning and data recording according to a framework. This type of structure is said to improve the accuracy of the observation. The framework chosen should reflect the researcher's question, conceptual framework, hypothesis and operational definitions of the variables. The researcher needs to know what will be observed and how it will be recorded (Roberts and Taylor, 1997).

This research is often referred to as the use of directed settings, where the researcher stages a situation to provoke behavioral patterns. This type of data collection method is sometimes criticized on the grounds of artificiality and may suffer from serious problems of generalisability. The degree to which the observer is aware of the observation produces a reactive measurement effect, causing problems of behavioral distortion (Polit and Hungler, 1995). Data is also limited by the amount that can be seen and recorded and it is not possible for the observer to be completely objective as the observer's frame of reference is superimposed on what is seen. Two observers may see the same thing differently and the data is limited by the accuracy or framework of the observer. As well decisions need to be made about the number of observers. If there is only one observer there will not be a problem of data collectors making different observations. However the use of more than one observer may improve validity if they agree on the observation (Roberts and Taylor, 1997).

In medical education, medical students are given objective structured clinical examinations (OSCE). They were originally designed to reduce some of the problems associated with traditional clinical exams. In OSCE, medical students rotate around a number of stations and all students are asked the same questions at identical stations and students are tested on a set of core skills by 'standardized patients', who are also the examiners. They are used for testing basic procedural competence of the core skills as was done in this research. The strength of an OSCE is that it allows a wide range of knowledge and skills to be tested in an efficient and reliable way using specially designed marking guides. This allows the objectives of the curriculum to determine the objectives of the assessment which are, to examine for clinical competence. The

marking guide for assessing the core skill of completing a prescription chart is in appendix nine (Doran and Neil, 2000).

Flynn et al (2002) focused their research on a “Comparison of methods for detecting medication errors in 36 hospitals and skilled-nursing facilities.” In addition to reviewing charts and incident reports, they also used direct observation and compared each dose of medication evaluated, with the prescriber’s order. Deviations were considered errors. Of 457 errors detected, 71% were detected by direct observation. Direct observation was deemed more efficient and accurate than reviewing charts and incident reports in detecting medication errors (Flynn et al, 2002).

2.8.2. Development of the Instrument

In the simulation, students were given a medication chart (for the purpose of the study a Launceston General Hospital one was used) for a particular patient. The researcher who was unknown to the students acted as a patient in a bed in the clinical teaching facilities of the School of Nursing and the Surgical Procedure room in Medical Ward at the North West Regional Hospital. The students were asked to administer medications listed on the chart to the ‘patient’. Assessment of the students was based on their adherence to the legislated and mandated requirements for medication administration in Tasmania as per the guidelines of The Nursing Board of Tasmania. A marking sheet was developed and results were recorded on this. The marking sheet consisted of twelve criteria and each criterion related to one of the Nursing Boards guidelines for medication administration (see literature review). For example criterion one stated that the 5th drug on the medication chart was not signed for by a medical officer. A registered nurse cannot administer a medication unless she/he has a legal

order from a medical officer. If a medication is not signed for the nurse should contact the medical officer and have the order legitimized. The criteria are as follows:

1. Noticed that the 5th drug not signed by medical officer.
2. Noticed that the name on armband and drug chart not corresponding.
3. Noticed that the 4th drug was ceased.
4. Administered according to the 5 rights.
5. Gave client education in regards to:
 - Action of the drug
 - Side effects of the drug
6. Took apex beat prior to giving digoxin.
7. Checked and picked up, out of date potassium chloride.
8. Used standard precautions when handling the medications.
9. Asked the client to take the pills whilst supervising.
10. Signed the drug chart immediately after administration.
11. Checked that the patient was not allergic to the medications being given.
12. Noticed the digoxin was contaminated.

2.8.2.1. Marking Criteria

The marking sheet was developed in conjunction with the list of 12 criteria using the Nursing Board of Tasmania (2003) guidelines. An example of the individual guidelines were either incorporated onto the medication chart or assessed in the process of medication administration and awarded 1 mark except the five rights of medication administration (right patient, drug, dose time and route) which were awarded one mark each as they are vital for accurate administration. For example the

guidelines state that there must be a valid prescription or order for the medication on the medication chart. On the medication chart the fourth medication used for the simulation ceased. If the medication was not given one mark was awarded, if the medication was given regardless no mark was awarded. The guidelines state that safety precautions must be taken during and after administration, this was observed and one mark was awarded if care was taken not to physically handle the medication. The marking sheet and its marking criteria are included in appendix ten.

2.8.3. Process of Administration

The observational study was used to obtain information in relation to the first objective of this research project which states;

- To test the preparedness of late-stage final year undergraduates for medication administration as registered nurses in practice.

Third year student nurses were assessed prior to clinical practice to eliminate the factors which exist in the workplace that are known to contribute to medication errors. The researcher who was unknown to the students acted as a patient/assessor in a bed in the clinical teaching facilities of the School of Nursing and the Surgical Procedure room in Medical Ward. The assessment was purely to ascertain educational preparedness to practice. Medical students are often assessed in this way as discussed above (Doran and Neil, 2000).

This was a highly structured observational study which involved specifying in advance that the students would be assessed using the Nursing Board of Tasmania guidelines for medication administration. The simulations were conducted in two sessions. The first was conducted at the North West Regional Hospital in the Medial

Ward treatment room on October 13th 2002 with 7 volunteers on the students' last tutorial day of third year. The second was conducted at the TSoN clinical practice room on October 18th 2002 with 4 volunteers. This was the day the students had to come to the University for the end of year bar-be-cue and photos.

All third year students were spoken to by the researcher and/or clinical teacher in their tutorials in regards to the research as well as being given in-depth instruction on the information sheets (see appendix three). They were required to sign a consent form (see appendix four). It was made explicit that the curriculum was being investigated not individual students, that it was totally confidential and anonymous; each student would be given a number. Participation would help other students and patients in the future.

Third year students were extremely reluctant to participate for several reasons. The first was that it was end of semester and they were extremely tired and looking forward to a break and the last thing they wanted to do was more assessment on clinical practice which they had already passed. The second was the fear of being identified and their performance being reported back to their clinical teachers.

To get enough participants for this study the researcher not only had to offer a family block of Cadbury chocolate in appreciation for their time when they were so mentally drained, but also had to change some of the research process to obtain enough volunteers.

Participants only agreed to the research if the researcher was the sole observer with no one else participating. The reason for this was that the researcher did not know any of the students. The students agreed to be given a number and participate in the research only if their consent forms were shuffled and the researcher could have no way of identifying them. They shuffled their consent forms and even then, after the study, it was found that some had only signed with initials or “me” to guarantee anonymity.

It was estimated that about 115 third year nurses were to graduate. Final marks had not been completed but clinical teachers have assured the researcher that the students involved in the research had passed and would graduate. For the purpose of this study, a simulated interaction was used with 10% of the third year students of 2002. The students were informed in considerable detail that this research would have no effect on their registration, their results (which were already determined at the time of this simulation), or their future work prospects, and was entirely confidential between the researchers and the student. Students were encouraged to participate by an appeal to their collegiality and desire to help themselves and colleagues/fellow students in a difficult area of practice.

2.8.4. Limitation and Problems

The study had its limitations and these included;

- Artificial environment
- The degree to which the participants were aware of the observation produced a reactive measurement effect (exam-like conditions)
- Students were extremely tired at the end of second semester and were reluctant to participate

- Fear of identification and their performance being reported to their clinical teachers.
- Small cohort

2.9. Other Data Collected

Whilst the data provided by the Nursing Board of Tasmania is useful to provide an insight into the extent of the problem in Tasmania, only incidents of a serious nature are usually reported. Minor incidences are usually dealt with by the relevant health agency. The NBT data does not identify individuals responsible or when and where they trained. One of the primary functions of the Board is to protect the public and the source of the Boards authority to deal with these matters stems from the Nursing Act 1995.

There have been a number of complaints that have been handled by the Nursing Board of Tasmania (NBT) in regards to professional conduct.

The numbers of complaints handled by the NBT (2001; 2003) are as follows:

1998-1999	22
1999-2000	30
2000-2001	47
2001-2002	27

Not all these complaints were in relation to medication administration, “negligent/incompetent drug administration” and “incompetence in practice” (as defined by the NBT) accounted for 10-50% of the cases investigated. In 2002 two

RNs had their rights to practice suspended or partially suspended in relation to medication administration. An example given was as follows;

The complaint against Nurse A alleged multiple incidents of professional misconduct, including medication mismanagement, failure to document appropriately or at all and breach of confidentiality (NBT, 2003).

In 2003 the NBT received 22 complaints and 8 of these were related to substance abuse, misappropriation of medications and theft (NBT, 2003).

The North West Regional Hospital revealed the results of a drug chart audit conducted in November 2003. The findings most relevant to nursing practice as they administer the medication, were complete drug dose was documented incorrectly on 11.23% and complete frequency was documented incorrectly on 14.5% of the charts audited. This audit was conducted as part of a national incentive by the Safety and Quality Council involving 50 hospitals nationwide “to reduce harm caused by medication incidents in Australian hospitals by 50% by December 2004” (Tasmanian Department of Health and Human Services, 2004). Strategies have been implemented to correct these discrepancies such as the implementation of a more user friendly drug chart, staff education sessions in regard to implementation of the chart, monthly medication audits and more importantly having pharmacists on the wards monitoring drug charts and medication policy (Tasmanian Department of Health and Human Services, 2004).

The following numbers of drug related incident reports/near-miss reports at the NWRH were documented as 10 in January, 18 in February and 3-4 in March and

April (Tasmanian Department of Health and Human Services, 2004) .Whilst these figures are from only one hospital, these combined with the statistics from the NBT indicate that medication errors are a problem in Tasmania.

2.10. Triangulation

Triangulation was chosen as a research strategy to provide a more accurate and complete picture of the phenomenon being investigated. The use of multiple data collection strategies forms part of the triangulation process and strengthens the credibility of the research finding (Streubert and Carpenter, 1999). In this research triangulation has been chosen to confirm findings, to provide a more accurate and complete picture, strengthen the credibility of the research findings and overcome the limitation of a single strategy. Three data collection methods as separate entities are utilised drawing upon examples from the same research project. Multiple means of data collection encourages the cross checking of facts and subjective comments, which increases the likelihood that one's findings represent the research setting and participants faithfully (Hammell et al, 2000; Daley et al, 1998).

Method triangulation involves the use of multiple methods in collecting the extent to which an internally consistent picture of the phenomenon emerges. In qualitative studies a rich blend of methods produces a comprehensive understanding of the research topic (Polit and Hungler, 1995).

Streubert and Carpenter (1999) state:

When combining research methods, it is essential that the investigators meet standards of rigor for each method. Using qualitative methods, researchers

should ensure sampling is purposeful and should generate data until saturation occurs. Using quantitative methods, researchers should ensure sample size is adequate and randomly chosen.

In this research a descriptive design was used. Sequential implementation of methods was used starting with focus group interviews. Information obtained from the focus groups in conjunction with literature reviewed was used to structure the survey which was sent to all nurses residing in Tasmania who graduated from the TSoN from 1997-2000. Simulated nurse-client interactions evaluated the preparedness for nurses about to go into clinical practice. Using these methods allows for cross checking of the results and increases the probability that the findings are representative of the participant's views.

2.11. Confidentiality and Anonymity

Focus groups were interviewed in private meeting rooms at their place of work. Participants were asked to give assurance to maintain the anonymity of the group, but this cannot be guaranteed. The focus was on gathering evaluative information (nursing process), not the identity of individual participants and information gathered was of a non-sensitive nature. Confidentiality is ensured through the use of unnamed quotes in the final thesis. Surveys were sent to participants via The Nursing Board of Tasmania with a stamped, self-addressed envelope. Information returned was anonymous and contained no identifying data. Information obtained from simulated client interactions was anonymous. The marking sheets were not named and the students were unknown to the researcher.

The Information obtained was of a sensitive nature. The pharmacology program on offer at the University of Tasmania, School of Nursing, is continually undergoing changes to facilitate improvement to the curriculum and this research aims to provide insight into its effectiveness.

2.12. Conclusion

This chapter discusses how research evolved in nursing from the days of Florence Nightingale, who is said to be the founder of nursing research to present day research into evidence based practice.

It examines the types of research used in nursing which can be either quantitative, qualitative or a combination of both. It argues that quantitative research is not always appropriate in nursing as some variables such as the nursing culture or relationships in nursing are not amenable to manipulation. As a result some nurse researchers have embraced theory from other disciplines in order to research these areas.

This research project involves description and interpretation of the role of the undergraduate pharmacology curriculum in the Tasmanian School of Nursing from the viewpoint of post graduate nurses who participated in it. It also discusses the relationship of the curriculum to medication administration in practice.

The qualitative descriptive exploratory research design was chosen as it predominately seeks to gather accurate and largely unembellished responses to the research topic from the participants' perspective and was used to identify any problems with the curriculum.

Research methods used were focus groups, surveys, simulated nurse-client interactions and documentary evidence all of which are the traditional methods of descriptive research.

3. Chapter 3

Results

3.1. Focus groups

3.1.1. North West Regional Hospital

The focus group was held on the 13th October 2002 and had seven participants. It was held in a meeting room at the North West Regional Hospital. The researcher comes from the North West Coast and has worked in this hospital. Most of the participants knew the researcher or knew of the researcher. Lunch was supplied and the focus group members felt comfortable with each other and the researcher. This led to comfortable sharing of information.

3.1.2. Launceston General Hospital

This meeting was held on 21st November 2002 and had 5 participants. It was to be held in a meeting room at the Launceston General Hospital; however we found the room to be used had been double booked and other meeting rooms were unavailable. In the end a secluded area of the hospital dining room was used. Afternoon tea was provided. Not all the participants knew each other and none knew the researcher so time was taken to make people feel comfortable. Conversations were a bit stilted at times and were constantly interrupted by the loud speaker making announcements. At one stage the tape recorder the researcher was using also stopped working. The participants are to be congratulated that they continued to concentrate and supplied the relevant information.

3.1.3. Royal Hobart Hospital

This focus group was held on 29th November 2002 and had 6 participants. It was held at a meeting room at the Royal Hobart Hospital. Afternoon tea was provided. Most participants knew each other. Those who knew each other well were more confident to divulge information; the shyer members had to be encouraged to join in. Participants and the researcher in this group were very aware that they only had limited time before they had to resume work so some themes could not be explored to the depth that the researcher would have liked.

3.1.4. Focus Group Questions

The content of the questions was informed by the literature review which was conducted after hearing anecdotal evidence from Tasmanian post graduate nurses and third year nursing students who had commented that they did not feel well prepared for practice and lacked knowledge and confidence to administer medications safely. Questions used in the focus group discussions were loosely based on the resulting objectives of the research (see appendix for focus group questions). Open questions were used in the focus group discussions when new information was elicited.

Initially the participants were asked how confident they felt administering medications immediately after graduation. Sixteen out of the eighteen participants stated they lacked confidence as evidenced by the following quotes:

I didn't feel confident at all and they let you go. I didn't find any nurses went with you, so I was crying out for someone to help but because everyone else was busy and what not, you were left on your own

I was terrified too, like...I was terrified and you hear of all those terrible stories of people giving massive overdoses and you think, oh you know, what if it happened to me?

Two of the participants who had been medication endorsed ENs felt confident as they had many years experience.

I had been doing it for years. [So you felt quite comfortable?] Yeh I, I'm comfortable, if I don't know a drug I would look it up anyway...

Two other participants who were not medication endorsed but had administered medications for many years stated they felt pressured immediately after graduation.

...I was an enrolled nurse too. I found that with the limited amount of pharmacology we had in our course and the fact that we came out as registered nurses, as a grad in my first week on the ward I was told, oh but your already an EN you know what you are doing anyway and I was left to do things and I had to keep stopping and say no.....

Participants were then asked how confident they felt now. All participants' confidence had improved with experience.

...Oh I, I am...certainly much more confident now....

A lot more confident, yeh because I know how to look up stuff you know and it's not a big deal it doesn't make me feel like dumb or something, I don't look so dumb.

However some commented that they still lacked confidence if they were removed from a familiar environment.

But then like, if we were sent to another ward and another totally different area you would find it quite stressful.

The last question on confidence was how confident they thought their peers were immediately after graduation? Some participants had been part of a post graduate program, but others had not. Those who had participated were aware that their peers felt very much like them.

We were lucky; we had a GND [graduate nurse development] program so we had two in-services a week, so we could all get together and just...[debrief?]
Yes and I found we were all similar.

Um most would have the same way, we had one person that started the same time that I did, but they came from a pharmacology background like, so that was different, yeh they were confident

The next three questions were on safe practice. Participants were asked if they administered medications safely immediately after graduation. The majority stated they felt safe if they administered medication accurately.

I think that depends on each individual, like I pretty much set strict rules on myself which were law anyway. But I felt safe in myself if I did it properly, you know you feel safe.

When I gave out the pills I knew it was my responsibility and what I'm supposed to do and looking things up, I went into over kill.

I felt safe I always followed the guidelines and double checked everything which is the protocol for Children's Ward.

Some stated that they felt uncomfortable with complex medication administration.

I remember feeling...um...not unsafe...but particularly things like syringe drivers and stuff like that when it's a fairly complex activity and I always made sure I checked it with some one more senior and experienced than myself, not with another graduate or you know um, um because I wasn't confident enough in my own practice to know what I was doing....

Eight out of 18 (44%) stated they had made a medication error.

Participants were then asked how safe they thought their peers were immediately after graduation. All participants stated that whilst some of their peers were particularly careful and safe, others were more blasé.

I think there was a bit of a range, like some people probably I don't know were a bit blasé and some people might have been like you saying, like over kill I think it depends on each person,...

The next section of questions was on the pharmacology curriculum.

Pharmacology and medication administration were taught in the following units of study:

Human Bioscience 1

Human Bioscience 2

Human Bioscience 3

Human Bioscience 4

Supportive Care in Hospital and Community Settings

- a) Medication education theory
- b) Experiential learning

Acute Care

- c) Medication education theory
- d) Experiential learning

Legal and Professional Studies

Participants were asked how much knowledge they gained from the biosciences. The initial response from most of the participants was that bioscience did not contribute

very much to their pharmacology knowledge. However as the focus groups progressed most participants could remember learning pharmacology in Bioscience but many felt it was disjointed and they had no practice experience to relate it to. Once they had been out in practice they were able to remember some of this theory and it made sense.

I can remember them talking about pharmacology and receptors and stuff but it didn't make any sense until we got into practice.

The only memory I have of learning stuff in bioscience is very vague and general sort of stuff. I couldn't even be so specific

..In all this time on learning all this stuff on pathophys and trying to remember this disease and that disease and they spent five minutes a week on pharmacology. The stuff that you really should know now. You don't do any prac until your second year, you know and at the end of the semester what can you remember about drugs from your first year....

And the thing is it's broken up, it's broken up over the whole two years each system, it not a component.

They were then asked how much knowledge they gained from Supportive Care theory. Most of the participants stated they received some tuition on medication administration in Supportive Care. Four of the participants (previous ENs) did not do this unit as it is not included in the Registered Nurse Upgrade Course. The ones that

did do Supportive Care remember learning how to do drug calculations, medication administration and possibly a little about the Poisons Act.

Safety aspects were taught in Supportive Care like the five rights and workshops provided basic drug knowledge. We practiced IV, IMI and oral administration but the workshop numbers were too big for too much practice to be obtained.

I remember the test we got to sit in the big lecture five room and there were about 150 of us in there and they said if you don't pass this 100% you won't go, and I remember 3 of us walked out and passed and the rest had to resit.

I can't remember much about...drugs in Supportive Care.

No, they mainly focused on drug calcs

And about the legalities of actually administering drugs

Participants were asked how much knowledge they gained from the 3 week practicum in Supportive Care. All the participants who attended the practicum stated they were very beneficial and they gained a lot of knowledge on medication administration.

And I remember one nurse sitting me down and trying to go through like the 4 basic ones like analgesia, anti emetics, aperients and stuff like that and that

was good but it was separate from university to try, try and learn that in context with patients

Yeh, then you would have to look up the drugs anyway before you gave them and inform the nurse about what they were so you felt, um the light go on

We picked up heaps when you go on drug rounds and you go and look them up and stuff.

Participants were asked how much knowledge they gained from theory in Acute Care in third year. Most of the participants remember pharmacology lectures in Acute Care as well as writing portfolios and then presenting the drugs in them. Some stated they had very little of anything.

The most I remember... was a portfolio like you had to with your piece of paper profile where you had to look up your drugs and present them

For a few weeks you used to take turns with someone and go and talk about the drug

We had very little. We had a couple of work sheets on diabetes and one on thiamine, thyroid, they were learning packages that had a little bit of pharmacology thrown in, but they were actually like a disease process and had a couple of questions on the bottom of it on pharmacology

They were then asked how much knowledge they gained from practice in Acute Care. Most participants stated they obtained the majority of their pharmacology information during experiential learning. They also did weekly drug calculations.

I remember in our 13 weeks in the acute setting we had a weekly one then [Drug calculation test].

When you are dealing with it every day it becomes more familiar.

To me I guess that I don't know that we didn't get much theory, it made more sense when you got into practice and you could put it into a patient's perspective. It started to make more sense when you were seeing it in action.

I think they actually taught different things. Like we were taught the actions of beta blockers and we were taught the actions of ace inhibitors in theory but in practice you were taught which ones not to mix with which ones and you were taught what doses were too big for whom.

That also depends again on who your preceptors was because some of us had good preceptors obviously, but...I had a couple, a few bad preceptors. You don't get anything from them. You actually get quite the other way, you get nothing and I think because it is an experiential curriculum we are getting people out that have had obviously, the 5 of us have had very extremely different experiences. Even..... and I who was in the same year, about the

same point had extremely different experiences and so then it's going to make a difference about how we feel at the end of it.

Participants were asked if one area was more beneficial than the other. All stated the most beneficial component of the course was experiential learning in Supportive Care and Acute Care.

....our clinical teachers were quite good on making us understand what we were giving out and why and don't give it if you don't know

That's where we got the information on how to find the information, like you learn that it's okay to ask, alright if you don't know, pick up a book and look

It is a catch 22 you need a little bit of theory to give you the basics but if you...[have] the theory without the practice it doesn't make a lot of sense because you can't put it into perspective

The next section was on teaching and learning. The following methods are teaching and learning strategies used by the University:

Lectures

Tutorials

Laboratory Sessions

Experiential learning

Self directed learning

Problem solving approach

Reflective practice

Computer assisted learning packages

Case Studies

Participants were asked which types of learning tools helped them the most in medication administration. All participants stated experiential learning was the most beneficial.

That's when I learn things...then I have to, then I want to go and read about it...

Yeh, just seeing it in action ... like seeing it on paper, you don't realize it's going to happen.

Experiential learning was followed by self directed learning and case studies.

Really I did more problem solving say with my clinical teacher when I worked with her for the day, you know a case with a lowered blood pressure and would I give the Lasix and would you give the hypertensive, whole bloods or what ever?

All participants stated lectures were the least beneficial

And they are packing so much in, they're as boring as anything, you think how many hours am I going to have to go home and read up on this.

You are so overwhelmed with the amount of information we were getting anyway.

Participants were asked which method was most successful in helping link theory to practice. All stated nursing practice in experiential learning provided the link between practice and theory.

I remember bio, they used to talk about receptors and antagonists, yeh, but until you're actually out there, saw the symptoms that reach the patient

It (practice) linked bioscience to nursing studies, we did case studies

I think problem solving, reflective practice, case studies and experiential learning linked theory to practice.

Participants were then asked some general questions such as: 'What factors other than the nursing course affect medication practice?' The following factors were identified that affect safe practice:

- pressure to get the pills done on time
- lack of time
- busy ward
- interruptions
- new ward environment
- doctors written orders

- unfamiliar medications,
- shift work
- skill mix
- tiredness

I mean we magically are meant to be able to give out everyone's medications accurately and legally and appropriately but there's not actually sort of a time factor built into your day to be able to do that (all yeh) that's one of those factors that has to be done

It's not as if you sort of can go well I'll just take a couple of hours off here

I mean the amount of interruptions you get when you're got that stupid drug trolley, chart there and you've got out three of them and someone talks to you or the phone rings or someone else is asking stupid questions, it's unbelievable, it's absolutely unbelievable, we never actually go down that chart without some sort of interruption

I would say skills mix each shift and I would say probably um, the hours, shift work hours like late/earlies and trying to focus and work out drug calculations when you've only had 5 hours sleep and some people have got children at home you know, I mean it's the social issues around it.

Participants were asked how poor practice could be changed. All participants stated that either a pharmacology unit or package should be used. Most preferred a

pharmacology unit that included all aspects of medication administration and a practical element such as practical experience in a Health Setting.

But one that doesn't just tell you the, you know this is what they do. You've got to ask more questions like, does it affect the kidneys, and does it affect the liver?

And offer the legalities of it, like, that's a huge thing in the medication management...

If we had a pharmacology unit....we would have all that learning, but we would have also had all that reference we would have had at the end of it.

A package was also popular.

I was an EN. I started the package before I upgraded, obviously when they brought in drug endorsement and like was saying it's fairly over the top but people can work at their own pace then, in combination with their acute placement and stuff, fit experiential learning into that theory package that they've got, that looks at few systems as well as drug groups and it puts the big picture in rather than sitting in a class, you don't absorb it.

Most stated however if it was only offered as a resource many would not use it. The package would need to be handed in and marked.

As I was a university student I probably wouldn't have looked at it.

No because you've got so much else going on.

If it's not going to be related to your marks they are not going to do it. I wouldn't do it.

Some participants stated that poor practice can also be changed if all people become more professionally responsible, led by example and do not take short cuts.

...for people to be responsible and accountable and realize what their professional responsibilities are.

Poor practice? What all the other RNs' on the ward as well? (Yeh) Like if they've got good practice and they are checking DDs [dangerous drugs] and if they come with you to the bedside and supervise you and make sure that's done well then I think that then you are more likely to do that to. If there's good practice on the ward as well.

Participants were then asked if there were any areas we had not covered that they would like to talk about? The Enrolled Nurse upgrade course was an issue that arose. There were 4 participants. Many ENs are not medication endorsed. They do not do Supportive Care which teaches the Poisons Act and medication administration and they do only 2 Bioscience units. All felt they had minimal pharmacology education during their course and this was a great concern to them.

We did ours through Burnie Campus um because we didn't do 1,2,3,4 (Bioscience). I can only remember going to 3 lectures on um pharmacology and they were like...was saying a few groups and things. I don't remember being taught drug calcs apart from one little sheet, one acute care class and that was it.

I found that my past nursing experience was what got me through but there was a lot of ENs that upgraded in our group that had come from you know hospital placements or um nursing homes or hadn't nursed for years and I really don't know how they got through and maybe that's a reflection on why these people don't work. You know I only know of 4 people who stayed in acute care and they were all people with nursing backgrounds like acute nursing backgrounds.

But you know it was because you were an EN it was expected you just knew everything. It wasn't taken into consideration that you actually had deficits in your learning in your course because the way of thinking of most of the RNs on the wards who haven't done their degree is that the University teaches us everything.

The following are some comments that summarize the participants' thoughts on medication administration as a new graduate:

I think I took it seriously, but yeh you don't really realize you know what's going on here.... It's a huge responsibility that you have until you're out there and giving them out and you know. What if I do something wrong? What will happen? (All yeh)

I don't think that you can imagine as an undergraduate how much responsibility you've got, I can remember when they did legal studies and like they gave some examples of errors...you can imagine thinking well why would they have done that?(all yeh)

It's interesting that they had a whole semester on, like we had a whole unit on legal issues just telling us what would happen to us if we did something wrong. (All yeh & laughter) But we didn't have a whole block on telling us how to do it right in the first place.

Well it's hard..., isn't it, because one part of it's saying we're very busy and that's what's causing a lot of the errors and the other part is that we don't... know that we were ever in picture.

I think I it really needs to start back in the Uni. Um there needs to be a better pre, pre training [preparation], a specific unit even um so you have that knowledge before, or have a good knowledge base before you come out because when you come out there's so much other extraneous factors that effect you so you really can't still be trying to learn and comprehend all this stuff as well as doing your job.

In summary focus group participants indicated that medication administration had been taken seriously throughout the BN course. However awareness of the amount of knowledge needed to practice safely and consequently the knowledge deficit they had, only became explicit when practicing as a RN. Despite being informed in Legal Studies, of case studies where errors had occurred, these situations did not become real until they were faced with medication administration after graduation. Clinical practice and workplace issues such as busy wards and continuous interruptions raised their awareness of how easily errors can occur and how difficult it was to improve their medication knowledge under these circumstances. They indicated that there was a need for increased pharmacology content in the BN.

3.2. Simulated Nurse-Client Interactions

Eleven students or 10% of third year participated in the research. The marking was out of a total score of 17.

The results of the Simulated Nurse-Client Interaction were analyzed by looking at the BN curriculum and the units that were involved in medication management education. Nursing subjects from the School of Nursing such as Supportive Care in Hospital and Community Settings and Acute Care predominantly taught medication administration using the NBT's Guidelines in Medication Administration, drug calculations and discussed the actions and side effects of some drugs in relation to case studies and/or patient care. The School of Human Life Science in the units Human Bioscience 1, 2, 3 and 4 taught normal and abnormal biology of the body systems as well as relevant microbiology and pharmacology. Consequently the educational components necessary for medication management could be separated according to the educational units

from where they had been taught even though some areas of overlap exist. This division was necessary to determine where/if areas of knowledge deficit existed.

The following educational components have been chosen:

- **Deciphering the drug chart (taught by Nursing)**
- **Drug Administration (taught by Nursing)**
- **Pharmacological knowledge (taught by Human Bioscience)**
- **Areas of overlap**

The following sections reports the results of the Simulated Nurse-Client Interaction for each of the 12 criteria used in the assessment divided into the 4 educational components.

3.2.1. Deciphering the drug chart

Medication charts come in various formats, but in general the same essential information should be recorded on all of them to be an authorized legal document. Client details on drug charts must include the UR number, the client's full name and address, date of birth and sex. Marital status and religion are sometimes recorded as is a client's photograph. The chart always contains a drug idiosyncrasies section. Chart details include a list of medications (generic name preferred) with the prescribing doctor's signature and instructions for each medication including the dose to be given, which route is to be used and at what time they are to be given. Extra information may also be included such as before or after meals or to withhold the medication under

certain circumstances. There must also be the order date and a space for a cease date as well as a date and time section and a space for the administering person's signature.

In order to read a drug chart a student nurse must be able to decipher the relevant medical abbreviations that the ordering doctor will use and know the generic and trade name of a drug. For example frusemide 40mg 0 BD means to give frusemide (trade name Lasix) one 40 milligram tablet twice a day orally by mouth.

They must also be familiar with how to read the general information on the drug chart and what makes it a legal document for example ordered and cease by dates and the doctors signature. Lastly they need to sign the drug as given once the patient has taken it.

Criterion 1

3rd drug on the medication chart was not signed for by medical officer.

Five participants noticed this and did not give the drug stating they would have to clarify with the Medical officer. Six participants did not notice and gave the drug. The drug was potassium chloride which can cause hyperkalaemia and have potentially fatal side effects (Bryant, Knight, Salerno, 2003). **Accuracy rate 45.45%**

Criterion 3

Drug 4 on the medication chart was ceased

Three participants noticed the drug was ceased and therefore did not give it. The drug was simvastatin a cholesterol lowering drug that is normally given at night. One participant did not give the drug because it was due at night not because it was ceased.

Seven participants gave the drug despite it being ceased on the drug chart and should be given in the evening.

Accuracy rate 27.27%

Overall accuracy for this section 36.36%

3.2.2. Medication Administration

Drug administration in nursing is taught according to the Nursing Board of Tasmania Guidelines in Medication Management (2003) as already discussed in the Literature review, what is of relevance here is:

- The medication order must be signed by a registered medical practitioner
- Appropriate precautions must be used when administering medications (standard precautions)
- The person must be checked for drug idiosyncrasies before administering the medications
- Checking that the right person gets the right drug at the right dose by the right route at the right time
- Medications that have been ceased or are contaminated must not be given
- Ensuring that the patient takes the medication and it is not left on lockers or meal trays, for example
- Signing the drug chart after administration, and
- The RN can demonstrate knowledge in relation to pharmacology.

This information and how to read a drug chart has been taught to students by the School of Nursing in second year in the unit titled Supportive Care in Hospital and

Community Settings, along with drug calculations. Students could not go into practice and administer medications (under the strict supervision of a Registered Nurse) until they achieved competence in this area which was assessed by examination. This information continues to be taught thereafter in the Acute Care and Legal and Professional Studies Unit in third year.

Criterion 2

The patient name on armband and drug chart did not correspond.

Two participants failed automatically as they failed to check the armband which had a correct UR number but incorrect surname. The drug chart said Blackwell the armband Blackmore. Only one student noticed the incorrect name. The other 8 participants did not notice the discrepancy

Accuracy rate 9.09%

Criterion 4

Medications were administered to the patient according to the 5 rights.

Right patient.

Nine participants gave the drug to the right person and two did not. The drug chart said Blackwell the armband Blackmore. Only one student noticed the incorrect name and said they could not give the medications until they checked with the Medical Officer that the right patient was getting the right drugs. The other 7 participants asked the researcher their name and date of birth which meant they would have given the medications to the right person. A person suffering from dementia may remember their name but would have trouble recalling their date of birth. **Accuracy rate 81.82%**

Right dose.

All participants gave the right dose. **Accuracy rate 100%**

Right route.

All participants gave the drugs via the correct route. **Accuracy rate 100%**

Right drug.

Three participants gave all the right drugs. Eight participants gave one or more incorrect drugs (drug ceased or order not legal). **Accuracy rate 27.27%**

Right time.

All participants gave the drugs at the right time. Simvastatin was ordered daily but ceased. It is usually given in the evening. 8 participants gave it in the morning which is not therapeutically correct but not technically wrong.

Accuracy rate 100%

Criterion 7**Participants checked and picked up out of date potassium chloride.**

Six participants checked the use by date on the potassium chloride and said they would have to get another bottle, five did not notice. **Accuracy rate 54.55%**

Criterion 8**Participants used standard precautions when administering medications.**

All eleven participants used standard precautions. **Accuracy rate 100%**

Criterion 9

Participants asked client to take pills whilst supervising them swallowing the medications

All eleven participants asked the researcher to take the medications whilst they supervised. **Accuracy rate 100%**

Criterion 10

Participants signed the drug chart after administration of the medication.

Seven participants signed the drug chart, three did not. **Accuracy rate 63.64%**

Criterion 11

Participants checked for patient allergies.

Five participants checked for allergies. **Accuracy rate 45.45%**

Criterion 12

Participants checked medication for contamination. Digoxin which is normally a small white scored x tablet had coffee spilt on it and was a motley brown.

One participant noticed the digoxin was contaminated. **Accuracy rate 9.09%**

Overall accuracy for this section 65.91%

3.2.3. Pharmacology

Pharmacology is defined as:

...the study of drugs including their action and effects on living systems
(Bryant, Knight, Salerno, 2003).

Pharmacology includes pharmacokinetics and pharmacodynamics.

Pharmacokinetics is defined as:

How the body affects a specific drug after administration...how a drug is altered as it travels through the body (by absorption, distribution, metabolism, excretion) (Bryant, Knight, Salerno, 2003).

Pharmacodynamics is defined as:

What drugs do to the body and how they do it; it refers to the interaction of drug molecules with their target receptors or cells and their biochemical, physiological and possible adverse effect (Bryant, Knight, Salerno, 2003).

Pharmacokinetics and pharmacodynamics were taught by The School of Human Life Science to nursing undergraduates in first and second year in Bioscience 1,2,3,4 in relation to body systems (for example the cardiovascular system).

Nursing students need to have a good understanding of pharmacology to make clinical judgments in relation to medication administration. For example, they need to understand why it is important to take an apex beat prior to administering the medication digoxin. Digoxin increases the force of contraction of an ailing heart and slows and regulates heart beat and is commonly prescribed for heart failure. Digoxin decreases conduction through the AV node and an adverse reaction may lead to complete heart block therefore the apex rate needs to be monitored closely and if it drops below 60 beats per minute the doctor is notified and the drug may be withheld until the apex rises (Bryant, Knight, Salerno, 2003).

Client education regarding actions and side effects of medications also requires pharmacological knowledge. Student nurses need pharmacology knowledge to

ascertain if the dose ordered is within acceptable parameters, the route ordered is correct (for example suppositories are given rectally, pessaries vaginally, sublingual medication is administered under the tongue) and the time is appropriate. Simvastatin, for example if ordered daily should be administered at night or bed time as cholesterol synthesis is highest at night. Giving the drug at this time will allow for maximum effect (Bryant, Knight, Salerno, 2003).

Criterion 5

Participants educated the client about the;

(a) Action of their drugs

Only one participant asked the patient if she knew what the actions of her drugs were and explained in enough detail what they did. Two participants explained briefly what they did, for example digoxin lowers your heart rate. Eight participants did not explain the actions of the drugs. **Accuracy rate 27.27%**

(b) Side effects of their drugs

None of the eleven participants spoke about the side effects of the drugs. Seven stated they had to check the researcher's apex rate because they were on digoxin and they could not give it if the apex rate was below 60 but they did not explain why.

Accuracy rate 0.0%

Criterion 6

Participants took the patient's apex beat prior to giving digoxin.

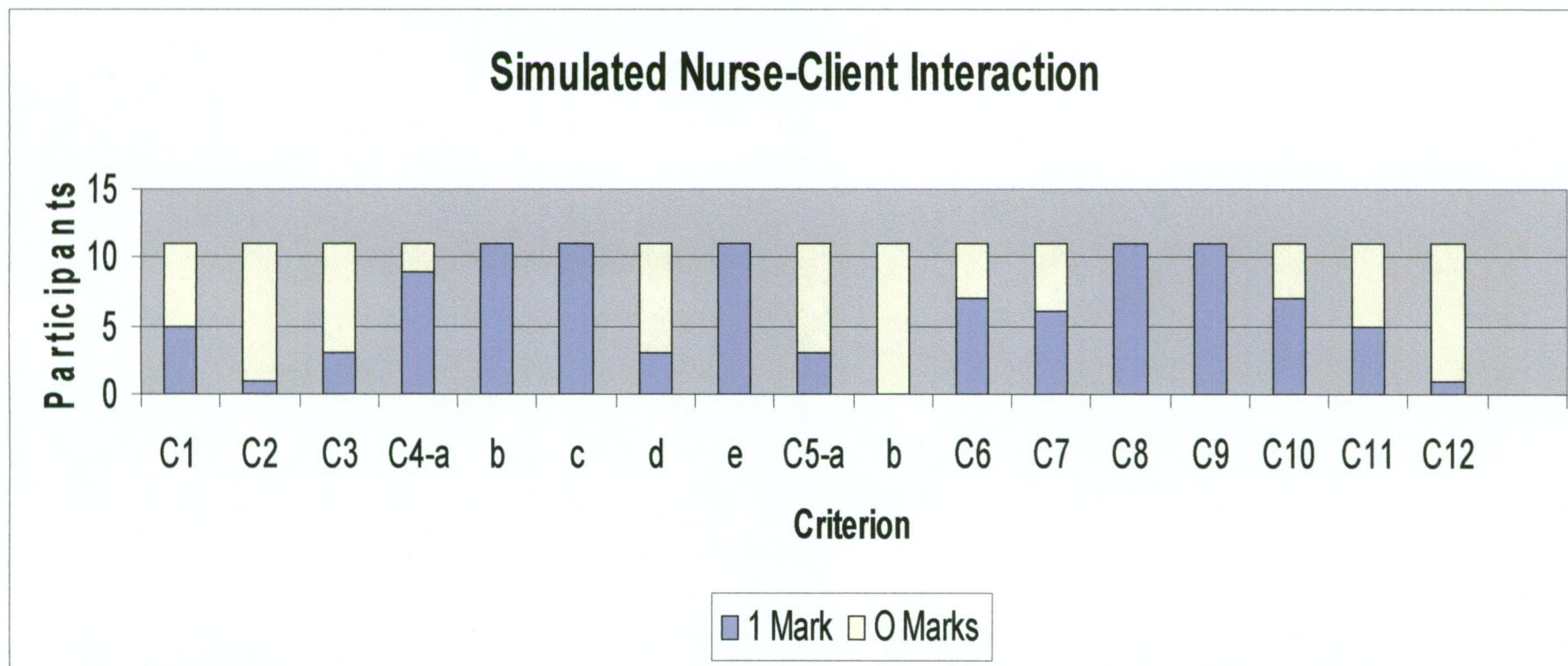
Seven participants stated they had to check the researcher's apex rate because they were on digoxin and they could not give it, if the apex rate was below 60. Four gave the digoxin without checking the apex rate. **Accuracy rate 63.64%**

Overall accuracy for this section 30.30%

3.2.4. Areas of overlap

- The right person requires deciphering of the drug chart and accurate drug administration (nursing)
- Other areas of overlap are the right drug at the right dose by the right route at the right time and client education re action and side effects. Both require knowledge from their Nursing education regarding drug administration and from their Bioscience education as they require pharmacological knowledge to prevent mistakes.

Figure 3.1 Overall Marks Awarded for criterion on the Marking Criteria for all Participants from the Simulated Nurse-Client Interaction.



Legend for criterion 1-12 see appendix 10. Marks awarded were 1 for the correct answer 0 for the incorrect answer

Table 3.1 Overall results for each participant in the Simulated Nurse-Client Interaction.

Participant Number	Result out of 17	Percentage
1	13	76.5%
2	*12	71%
3	*11	65%
4,5,6	10	59%
7	9	53%
8,9	8	47%
10,11	7	41%

***Technically these students passed on scores but they did not positively identify the right person therefore I would have failed them in an exam situation.**

3.2.5. Conclusion

Eleven students participated in the simulation. The overall results were as shown in Table 3.1. The highest score was 76%, the lowest 41.2%. Four participants failed as they had less than 50%, but overall 6 participants failed (see comment above). The median and mode score was 10 and the mean score 9.55 (56%). This research indicates that participants had a knowledge deficit in deciphering the drug chart (36.3% accuracy) and pharmacology knowledge (30.3% accuracy). The area in which they appeared to have the best knowledge was drug administration at 66% accuracy, but even in this area one third of participants lacked adequate knowledge to administer medications safely. In a clinical setting with added workplace issues one would assume accuracy rates would be further reduced.

3.3. The survey

The survey consisted of six sections. The **first** section of the survey sought data about demographics such as:

- Age group
- Sex
- Area of work
- Work setting
- Length of time since graduation
- Time period between finishing secondary school and commencing the Bachelor of Nursing (BN)
- Which school year secondary education was completed

The **second** section asked the participants to compare confidence in medication administration as a new graduate with their confidence now. It also sought the following information from the participants on:

- If they lacked confidence, what level of confidence did they perceive they should have had on graduating?
- Had they made any errors, and if so, describe what happened and why.

The **third** section asked participants to compare their overall pharmacology knowledge as a new graduate with their overall knowledge now. This section also sought information on participants rating of:

- The level of knowledge provided by undergraduate program for new graduates
- Knowledge of peers now
- Basic mathematical skills prior to commencing the BN

The **fourth** section asked for the participant's thoughts on the role of the undergraduate curriculum in preparing them for practice as a registered nurse. It asked them to rate the following:

- The contribution of BN subjects involved in medication administration education in ensuring safe medication administration as a registered nurse
- Teaching and learning strategies that were most useful in preparing participants for safe medication administration
- Strategies currently used to improve and/or maintain pharmacology knowledge
- Which part/s of the undergraduate experience was most helpful in developing the link between theory and practice in the administration of medications

The **fifth** section asked the participants if the undergraduate curriculum met their overall learning needs to administer medications safely. If they stated it did not the participants were asked to explain the problem/s they have found and state how they thought they could be improved.

The **last** section asked the participants to rate the relative importance of four major factors known to contribute to medication errors:

- Mathematical skills
- Undergraduate Nurse Education
- The Graduate Program, and
- Workplace issues.

If workplace issues were selected they were asked to rank which of the following factors they perceived to be the major contributors to medication errors:

- Busy ward
- Shift work (e.g. evening shift followed by a morning shift)
- Staff mix (e.g. RNs, ENs, permanent/casual staff)
- Home commitments (e.g. tiredness)
- Distractions (e.g. doctors rounds, ill patients)
- Interruptions (e.g. phone calls, patients' requests)
- Illegible doctors' writing
- Unclear doctors orders (e.g. eight hourly with meals)
- New ward environment
- Unfamiliar Medications
- Other.

3.3.1. Data Analyses

The response for each section of the survey was collated on a spread sheet and each survey was given a number and the responses to closed questions were inputted individually into the spread sheets. When all the data had been collated a summary was made and each topic was coded. Descriptive statistics were then used to analyse the data and bar graphs developed (Excel, Microsoft Corp).

Comparisons were made between certain data sets by correlation analysis or the chi-squared statistics using prism 4 (Graph pad Software Inc, San Diego) on a personal computer with Window 5XP operating system (Microsoft Corp). Statistical analysis was performed to assess for correlations and relationships between the following variables:

- Age groups into which the respondents were distributed and confidence in medication administration immediately after graduation (**correlation**)
- Age groups into which the respondents were distributed and medication errors made since graduating (**correlation**)
- Medication errors made since graduating and confidence in medication administration immediately after graduation (**chi-squared**)
- Medication errors made since graduating and basic math skills prior to commencing BN (**chi-squared**)
- Comparison of the participants perception of their overall medication administration knowledge as a new graduate and perceived level of knowledge that the undergraduate program provided for new graduates in medication administration (**correlation**)
- Medication errors made since graduating and if the curriculum met overall learning needs to administer medications safely (**chi-squared**)
- Age groups into which the respondents were distributed and Bachelor of Nursing subjects that taught medication management (**correlation**)
- Age groups into which the respondents were distributed and teaching and learning strategies used by the TSoN (**correlation**)
- Medication errors made since graduating and if mathematical skills were chosen as a major contributor to medication errors in the **last** section of the surveys (**chi-squared**)
- Basic mathematical skills prior to commencing BN and if mathematical skills were chosen as a major contributor to medication errors in the **last** section of the surveys (**correlation**)

Correlation analysis was used for comparison of data sets ranked on a 1-5 scale. For example in the comparison of age groups (20-29, 30-39, 40-49, 50-59, 60+) and confidence in medication administration immediately after graduation (Very confident, confident, a little confident, and not confident). Where yes or no responses were compared to ranked responses on a 1-5 scale Chi-squared analysis 2x5 contingency tables was used. For example, comparing respondents' perception of their mathematical skills on a scale of 1-5 (excellent, very good, good, satisfactory, poor) with actual errors made (yes/no).

Responses to open questions were analysed manually and themes were correlated by the researcher.

3.3.2. Results

One hundred and ninety six forms were returned or 32.78 %. Of these only 156 (26.09%) were completed with 34 returned to the Nursing Board of Tasmania return-to-sender. Two parents rang the researcher and stated that the addressee was working overseas. The researcher also received 4 blank surveys with notes from parents stating the addressees were working overseas.

Factors that may account for the low response rates are:

- Mobility of the group
- Staffing levels in Tasmanian hospitals
- Gender issues of the 156 participants only 9 (6%) were male
- Lack of incentives or reminder notices
- Medication errors may be a sensitive issue for some RNs.

Almost the entire cohort of graduates (95) from the year 2000 answered the survey whereas only 15 from 1999, 31 from 1998 and 11 from 1997 responded. Fifteen participants who no longer work in Tasmania replied, 14 work in other states and one works in London (the survey had been forwarded by their parents). One reason for the low return rate of the survey could be that many nurses no longer work in Tasmania or no longer work as RNs. Factors such as staffing levels in Tasmanian hospitals with many nurses already fatigued from working double shifts may also be responsible. The survey would have been an added burden and not a high priority.

Some RNs would not find this a difficult area of practice and therefore the survey would have been of little interest. Others may have felt uncomfortable by being asked if they had made a medication error and therefore chose not to reply. Very few males answered the surveys. The researcher did not send out reminder notices or offer any incentives and this may have increased the response rate. Surveys are known to get poor response rates. Most surveys were answered comprehensively, but some only had specific sections filled in that were perhaps of relevance to the respondent.

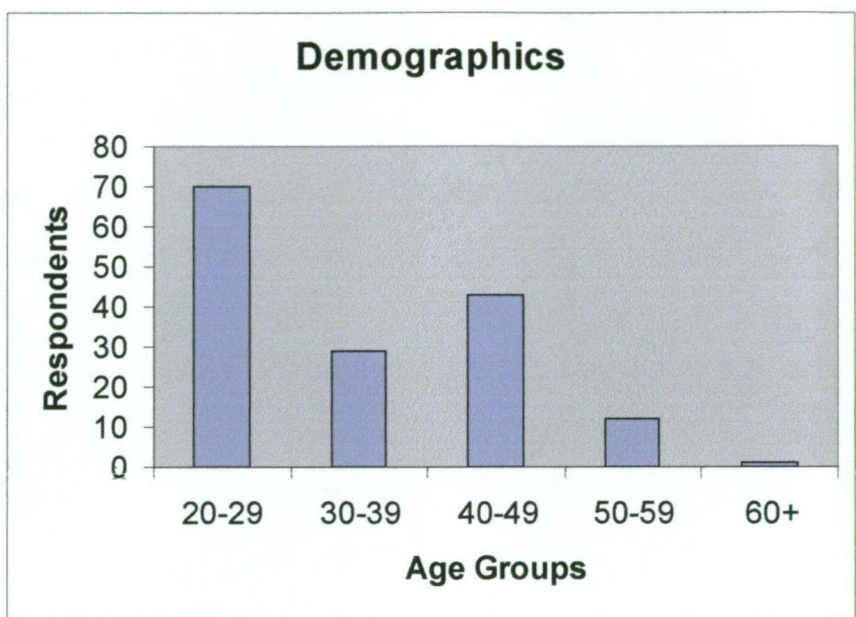
3.3.3. Demographics

Age groups

The majority of the participants that replied were in the 20-29 age groups (45%) and the 40-49 age groups (28%). This was followed by the 30-39 age groups (19%), the 50-59 age group (8%) and there was only one participant in the 60+ age group. One reason for this could be that there are more school leavers entering nursing than mature age students. Another reason for the predominance of the 20-29 and 40-49 age

groups could be the influence of child rearing. The 20-29 age groups may not have children whereas the 40-49 age groups would be more likely to have older children. Therefore these groups could have more time available to answer the survey as opposed to the 30-39 age groups who would be busy with small children (see figure 3.1).

Figure 3.2 Numbers of Respondents in Each Age Group



Gender

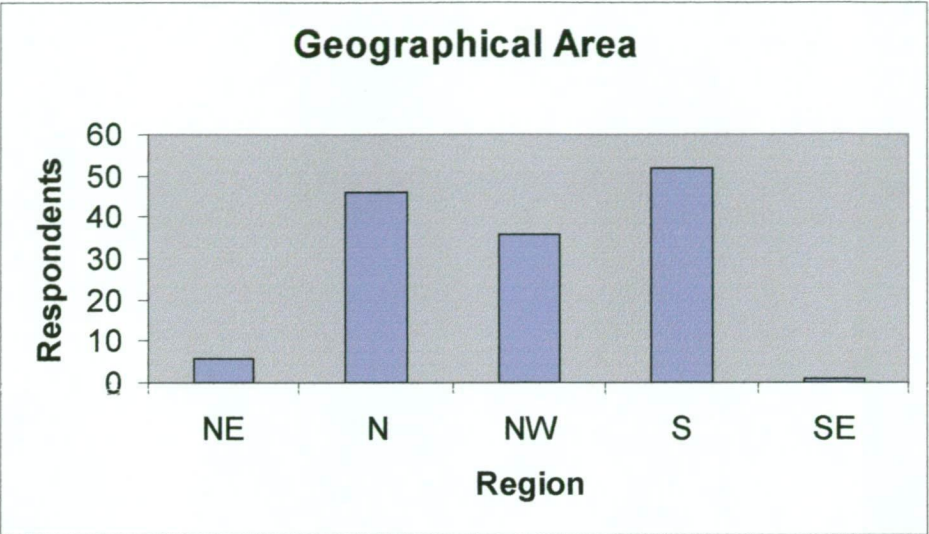
Ninety four per cent of respondents were female and only 6% male. The ratio of male to female graduates in the years 1997- 2000 is 10%. This would indicate that the ratio of male to female respondents is similar to the graduation figures.

Area of work

The majority of the respondents were employed in the South of the state (33%), with 29% in the North, 23% in the North–West and 10% worked in other states. The spread

of nurses across the state is in similar ratio to student nurse numbers sent to the three major urban and regional hospitals according to there size, for experiential practice by the University (TSoN, 2002).

Figure 3.3 Numbers of Respondents from each Tasmanian Geographical Area

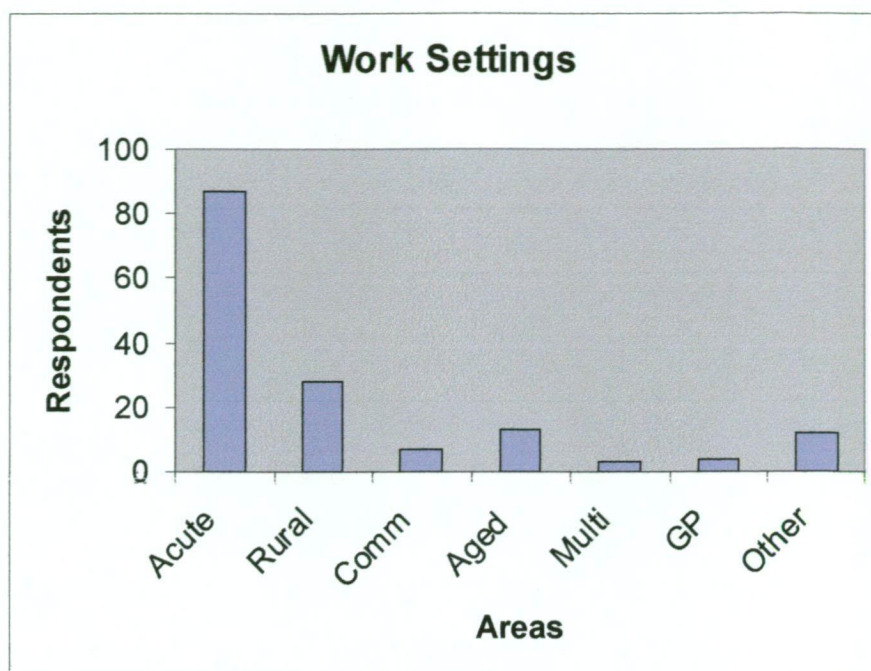


Legend NE = North East; N = North; NW = North West; S = South; SE = South East

Work Settings

The majority of participants worked in acute care urban hospitals (56%), or in rural/regional hospitals (20%). Aged Care settings were the next highest with 8%. While 8% selected ‘Other’, settings identified in this category included Mental Health facilities, Correctional Health Services, Rehabilitation Centre, and research.

Figure 3.4 Numbers of Respondents from Specified Work Settings



Legend Acute = Acute Care Urban Hospital; Rural = Rural/Regional Hospital; Comm =Community Health or Nursing Centre; Aged = Aged Care Facility; Multi = Multipurpose Centre/Service; GP = General Practice Nurse; Other = other settings not mentioned

Length of time since graduation

The majority of the respondents (60%) had graduated from the University in 2000 which consisted of 83% of the entire cohort of graduates from the year 2000 (TSoN, 2004). In other words, it had been 3 years since their graduation at the time of completing the surveys followed by 20% in 1998, 10% in 1999, 7% in 1997 and 2% in 2001. This could indicate that the most recent graduates questioned were still working in the state and were concerned about this important area of practice.

Time period between finishing secondary school and commencing BN

The average period of time after finishing secondary school and before commencing Bachelor of Nursing was 11 years but ranged from 0-46 years. Thirty five per cent of respondents commenced the BN within one year of leaving school, 44% within 4

years and 55% 11 years. This is consistent with the finding that the majority of the respondents were in the 20-29 age groups.

Highest year of secondary education completed

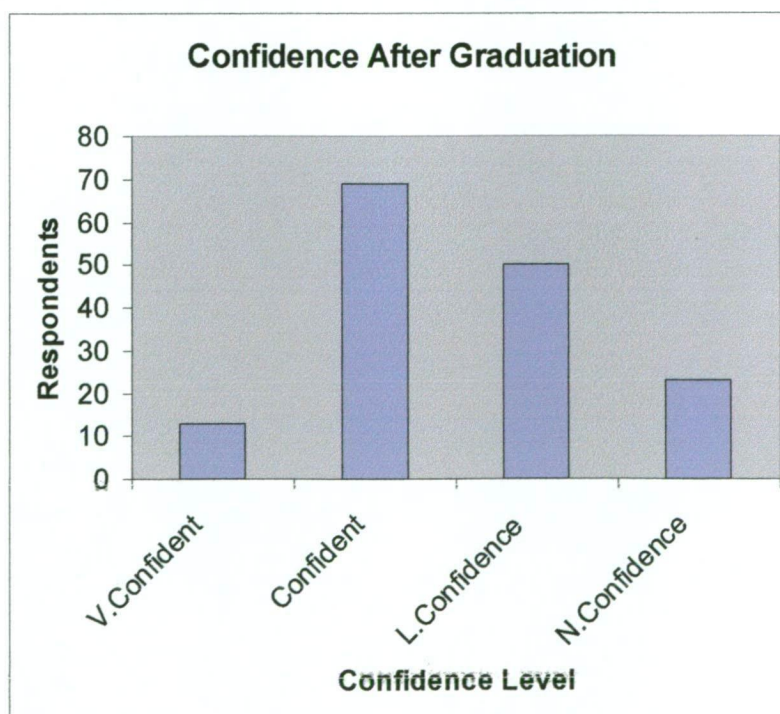
Sixty three per cent of all respondent completed their secondary education in year 12. Whilst 25% completed year 10, 12% completed year 11. This would be consistent with the entrance score (TCE score 32) needed to enroll for the BN (University of Tasmania, 2004).

3.3.4. Confidence in Medication Administration

Confidence immediately after graduation

Fifty three percent of respondents stated they were confident or very confident as a new graduate, whilst forty seven percent stated they were a little confident or not confident.

Figure 3.5 Level of Confidence in Medication Administration Immediately After Graduation



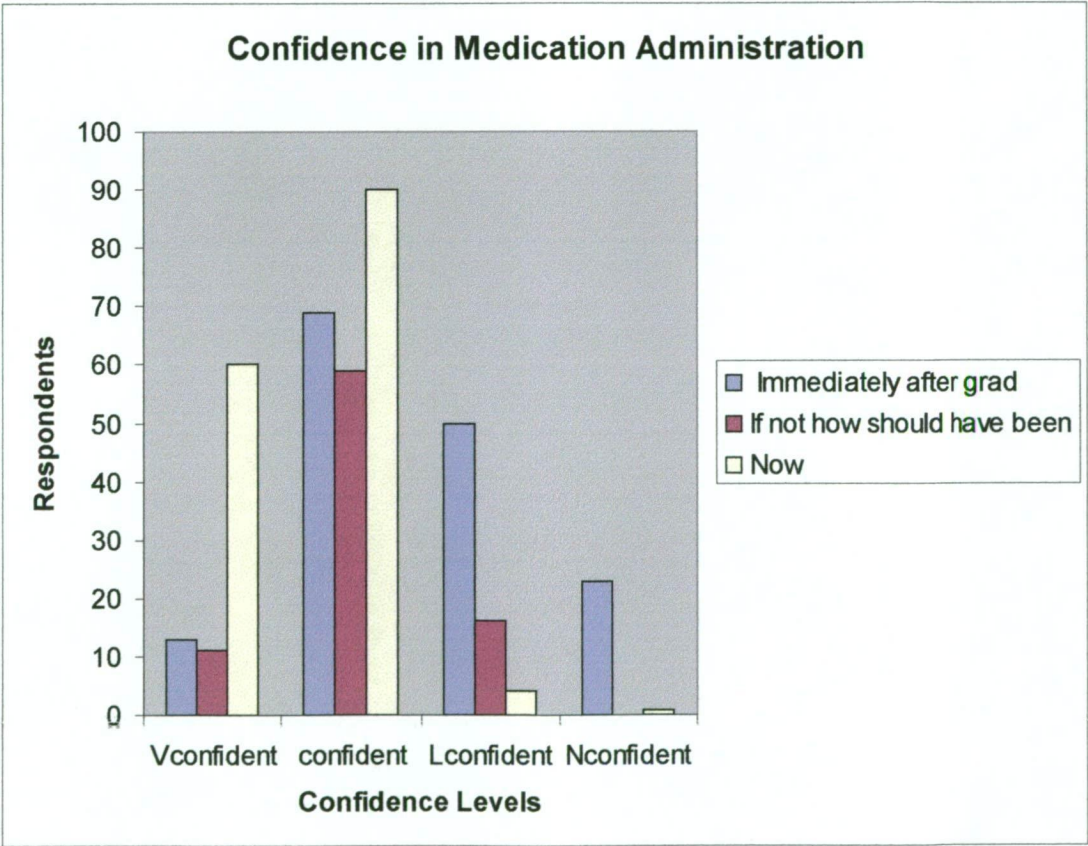
If confidence was lacking what should it have been?

Eighty six respondents answered this section with 81% stating they should have been confident or very confident. The remaining 19% stated they should have been a little confident.

Confidence now

Ninety six percent stated they were confident now and three percent stated they were a little confident or not confident.

Figure 3.6 Level of Confidence in Medication Administration:



Legend Immediately after grad=immediately after graduation, if not how should have been=if confidence was lacking immediately after graduation how confident did the respondent think they should have been, now=confidence now.

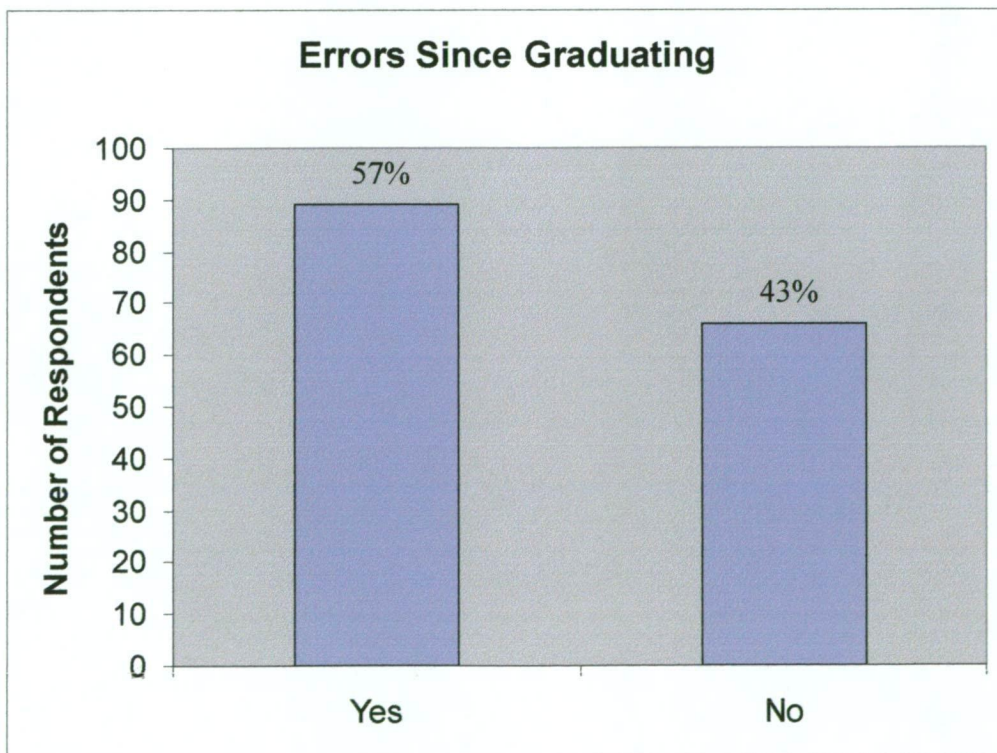
Comparison between age groups into which the respondents were distributed and confidence in medication administration immediately after graduation.

There was a significant correlation between the respondents' age and confidence post graduation, confidence was seen to decrease as age increased ($r = -0.2333$; CI 95% - 0.3776 to -0.07798; $p < 0.01$).

3.3.5. Errors since graduating

Fifty seven percent of respondents (89) stated that they had made a medication error since graduating and forty two percent (67) said they had not.

Figure 3.7 Number of Respondents who have made Medication Errors since Graduating



The commission of errors was significantly related to confidence in medication immediately after graduation. Errors increased with decreasing confidence (chi-square, 7.599, df 1, $p<0.01$).

The nurses were then asked if they had made medication errors, to describe what happened and why. Eighty nine respondents of the total one hundred and fifty six stated they had made a medication error. One hundred and eleven medication errors were identified as some respondents identified making more than one error. These errors were then categorised using the five rights of medication administration (according to the Nursing Board of Tasmania’s competencies for RNs): right person, right drug, right dose, right time and right route.

Table 3.2 Medication Errors made since Graduation Analysed using the 5 Rights

<u>Type</u>	<u>Number</u>
Wrong dose	40
Wrong person	26
Wrong time	15
Wrong drug	12
Not signed (chart)	9
Not stated	8
Wrong route	1

The medication errors were then analysed by cause of medication errors as stated by the respondents.

Table 3.3 Causes for Medication Errors

<u>Causes</u>	<u>Number</u>
Misreading the drug chart	42
Incorrect identification of patient	26
Illegible/unclear doctors orders	10
Drug chart unsigned by RN	9
Wrong drug strength	5
Forgetting (missed/late dose)	4
Lack of knowledge	4
Maths (incorrect workings out)	4
Leaving medication on tray	1
Errors undecipherable	6

Not all respondents identified the reasons why mistakes were made. Those who did listed the following causes: busy ward/overworked, misreading the drug chart, poor doctors writing/unclear orders, forgetting/poor concentration, tiredness, distractions, patients not wearing armbands (in Nursing Homes) and a lack of staff.

There was no correlation between age groups and errors made since graduating. This would indicate that errors were spread evenly over the age groups.

3.3.6. Medication Administration Knowledge

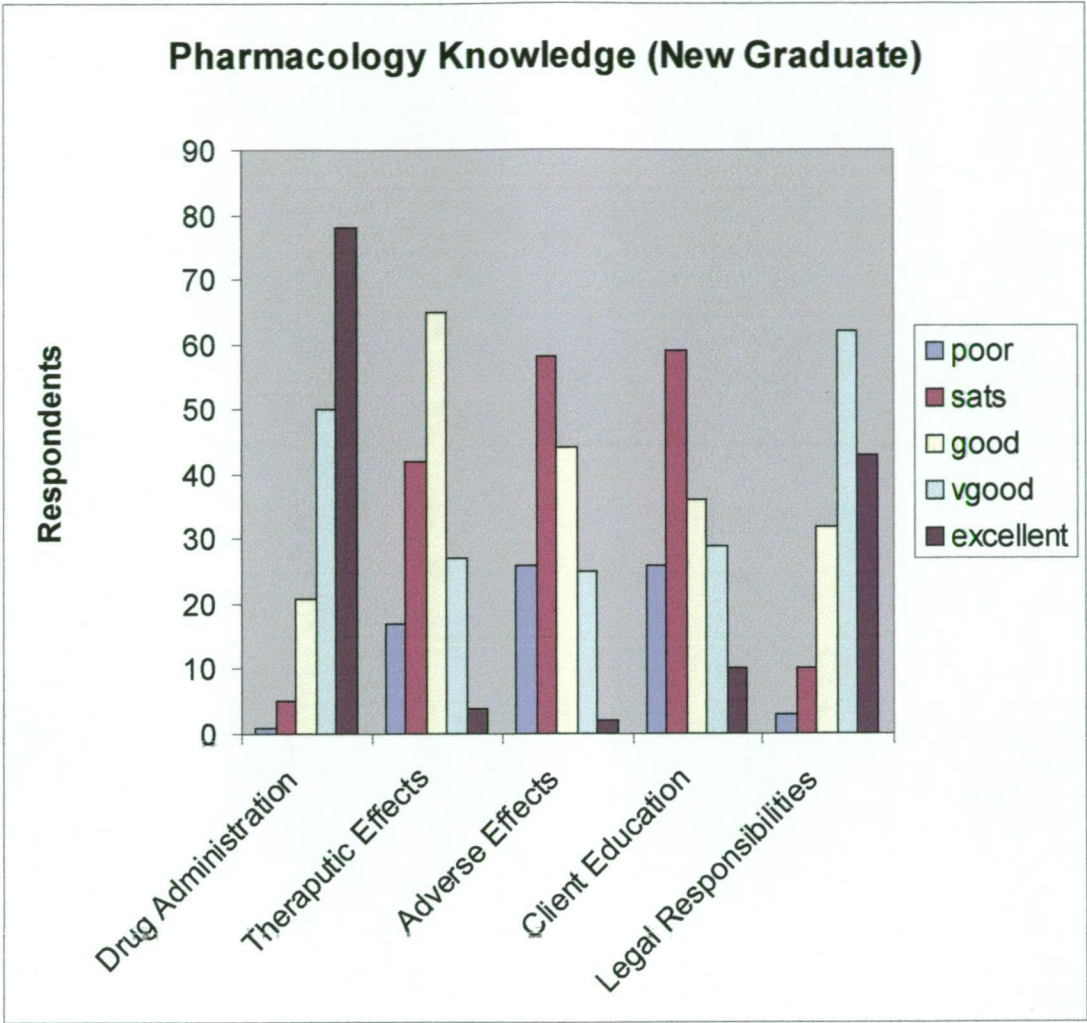
As a new graduate

Respondents were asked to rate their knowledge as a **new graduate** in the following areas:

- Drug administration (right person, drug, dose time and route)
- Therapeutic effects of drugs
- Adverse effects of drugs
- Client education
- Legal responsibilities

Ninety nine percent of respondents rated their knowledge of drug administration as satisfactory or above. Eighty nine per cent rated their knowledge of therapeutic effects of drugs as satisfactory or above. Eighty three percent rated their knowledge of adverse effects of drugs and giving client education as satisfactory or above. Ninety eight percent rated their knowledge of legal responsibilities as satisfactory or above.

Figure 3.8 Rating of Pharmacology Knowledge in Medication Administration in the stated areas as a New Graduate:



Legend Drug administration (5 rights), Therapeutic effects of drugs, adverse effects of drugs, client education in regards to their medication, legal responsibility in medication management

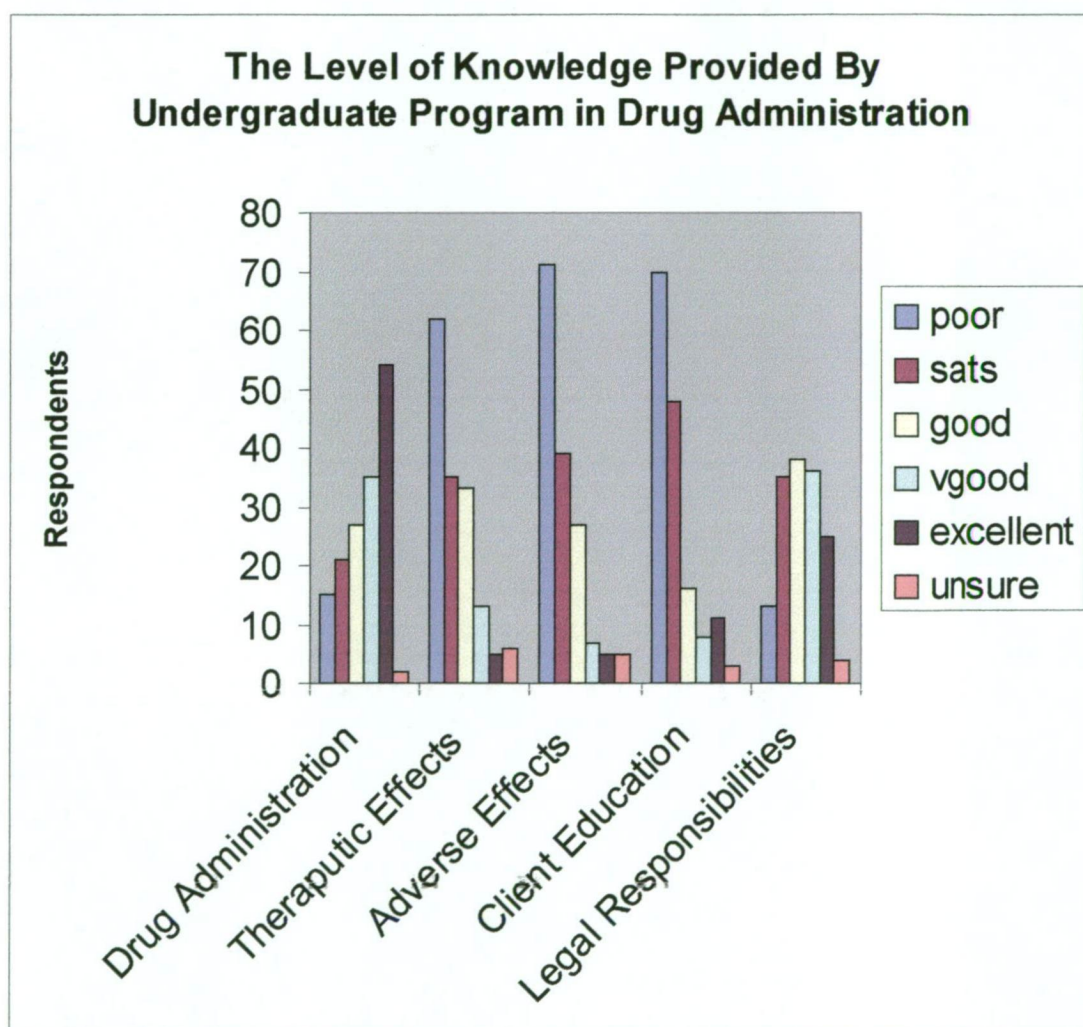
Now

When asked to rate their knowledge **now** in the above areas respondents rated their knowledge as satisfactory or above in drug administration and legal issues (100%), therapeutic effects as (99%) client education (98%) and adverse effects (97%) This indicates participants perceive that their knowledge had markedly improved with clinical practice.

Level of knowledge provided by the undergraduate program for new graduates

Respondents were then asked to rate the level of knowledge that the undergraduate program provided for new graduates in relation to the same areas. Results are expressed as the percentage of respondents who indicated their knowledge was satisfactory or above; Legal issues 92%, Drug administration 90%, Therapeutic effects 60%, Client education 60%, adverse effects 54%

Figure 3.9 Rating of the level of Knowledge provided by the Undergraduate Program to Students in relation to the stated areas in Drug Administration



Legend Drug Administration=Drug administration (5 rights), Therapeutic Effects=Therapeutic effects of drugs, Adverse Effects=adverse effects of drugs, Client Education=client education in regards to their medication, Legal Responsibility=legal responsibility in medication management

Respondents appear to rate their own knowledge in medication administration immediately post graduation more highly than their perception of the knowledge imparted by the undergraduate program, especially in the areas of therapeutic and adverse effects of medications and client education.

There was a **significant correlation** between medication management knowledge as a new graduate and level of knowledge that the undergraduate program provided for new graduates in medication administration, the higher students perceived their ability the higher they rated the knowledge imparted by the undergraduate curriculum ($r = 0.4851$; CI 95%.0.3541 to 0.5975; $p < 0.001$)

Knowledge of peers now

Participants were then asked to rate the knowledge of their peers in the above areas now. An average of 12% across the five areas stated they were unsure, an average of 4% across the five groups stated their peers' knowledge was poor and 84% stated their peers' knowledge was satisfactory or above.

3.3.7. Basic Mathematical Skills

The respondents were asked to rate their basic mathematical skills prior to commencing the Bachelor of Nursing. Nineteen percent stated they were excellent, 28% stated they were very good, 27% stated they were good, 21% stated they were satisfactory and 5% stated they were poor.

Figure 3.10 Rating of Basic Mathematical Skills prior to Commencing the Bachelor of Nursing

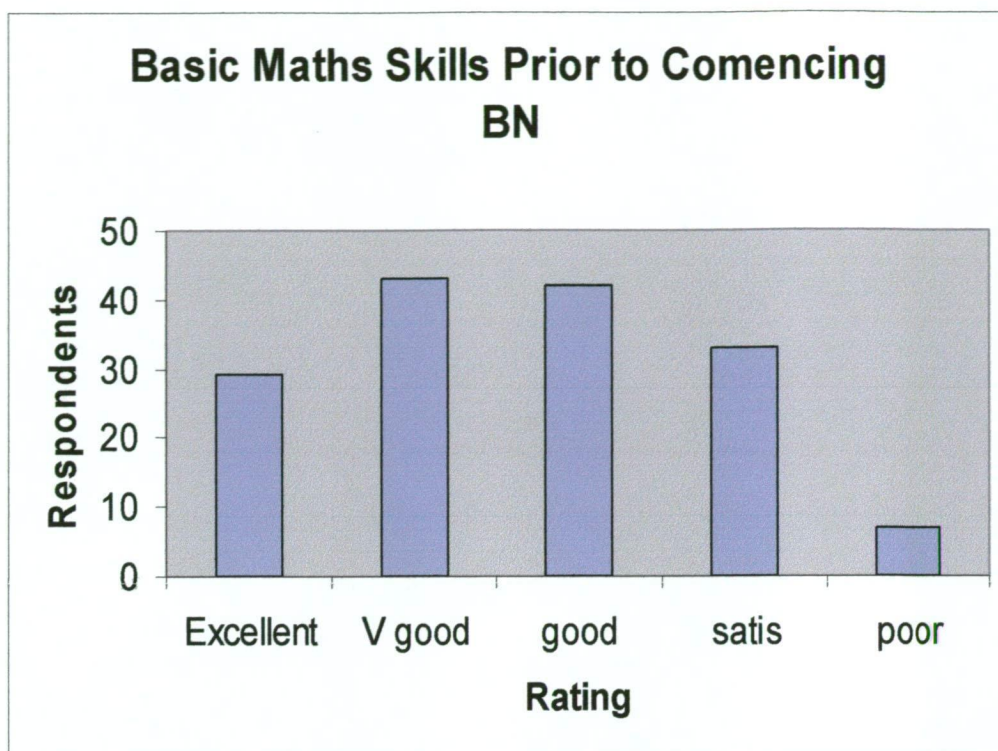
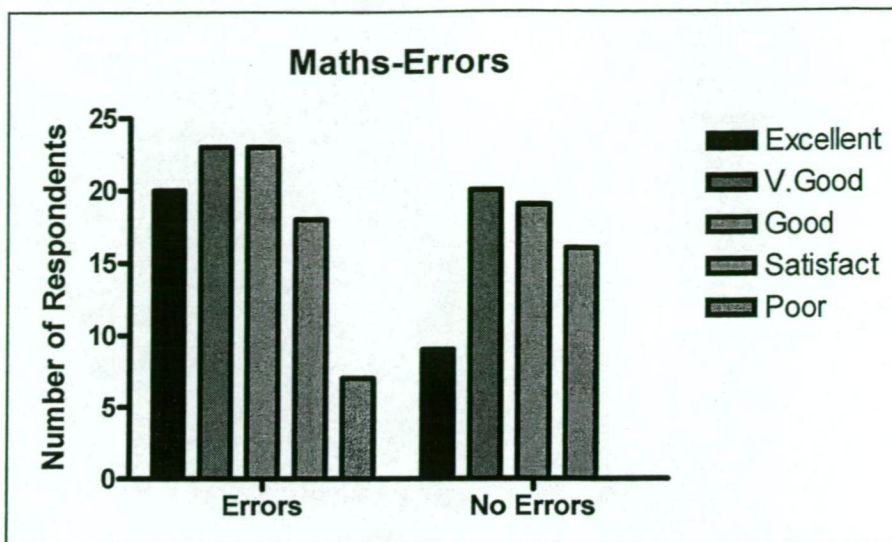


Figure 3.10 indicates that of those respondents who stated they had excellent mathematical skills approximately two thirds had made an error. Those who rated their mathematical skills as very good, good or satisfactory, just over half had made errors compared to just fewer than half who had not. Those who rated their skills as poor had all made errors. Perhaps this indicates that errors occur with overconfidence as well as no confidence. Those respondents that were aware of some deficits in their mathematical ability were more careful in their practice. There was no significant correlation between rating of mathematical skills and errors made.

Figure 3.11 Correlation between medication errors made since graduation and rating of basic math skills prior to commencing the BN.



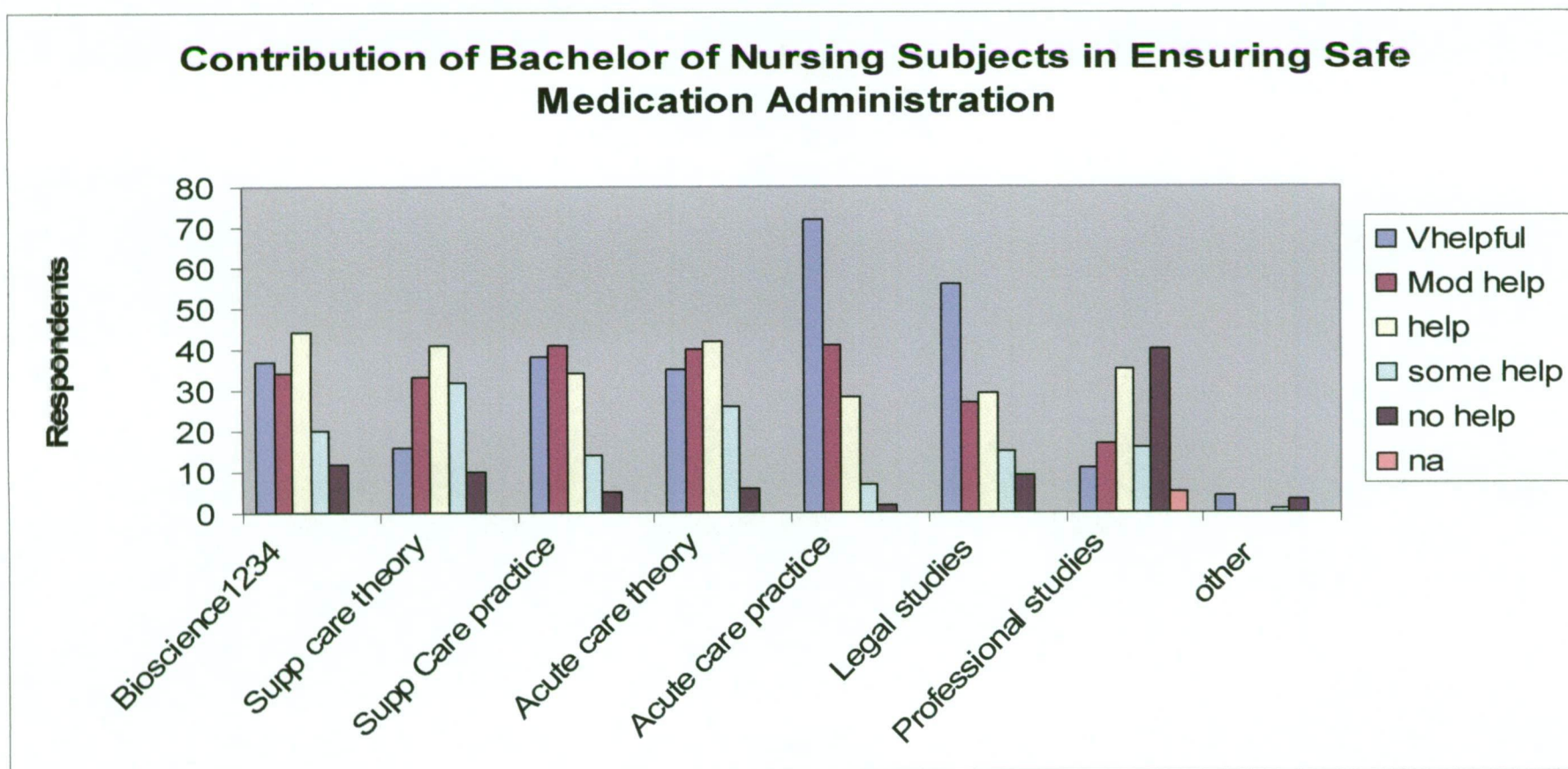
Legend Excellent, very good, good, satisfactory, poor compared to errors made yes/no

3.3.8. The Role of the Undergraduate Curriculum in Preparing Respondents for Practice as a Registered Nurse.

Contribution of Bachelor of Nursing subjects in ensuring safe medication administration as a RN

Participants were asked to rate the contribution of the Bachelor of Nursing subjects which contributed to their pharmacology knowledge in ensuring safe medication administration as a registered nurse. In ranked order 46% found Acute Care (experiential learning) very helpful and Legal Studies very helpful, 24% found both Bioscience 1,2,3,4 and Supportive Care (experiential learning) very helpful, 22% found Acute Care (theoretical) very helpful, 10% found Supportive Care (theoretical) very helpful whilst only 7% found Professional Studies very helpful.

Figure 3.12 Rating of the Contribution of Bachelor of Nursing Subjects in Ensuring Safe Medication Administration.



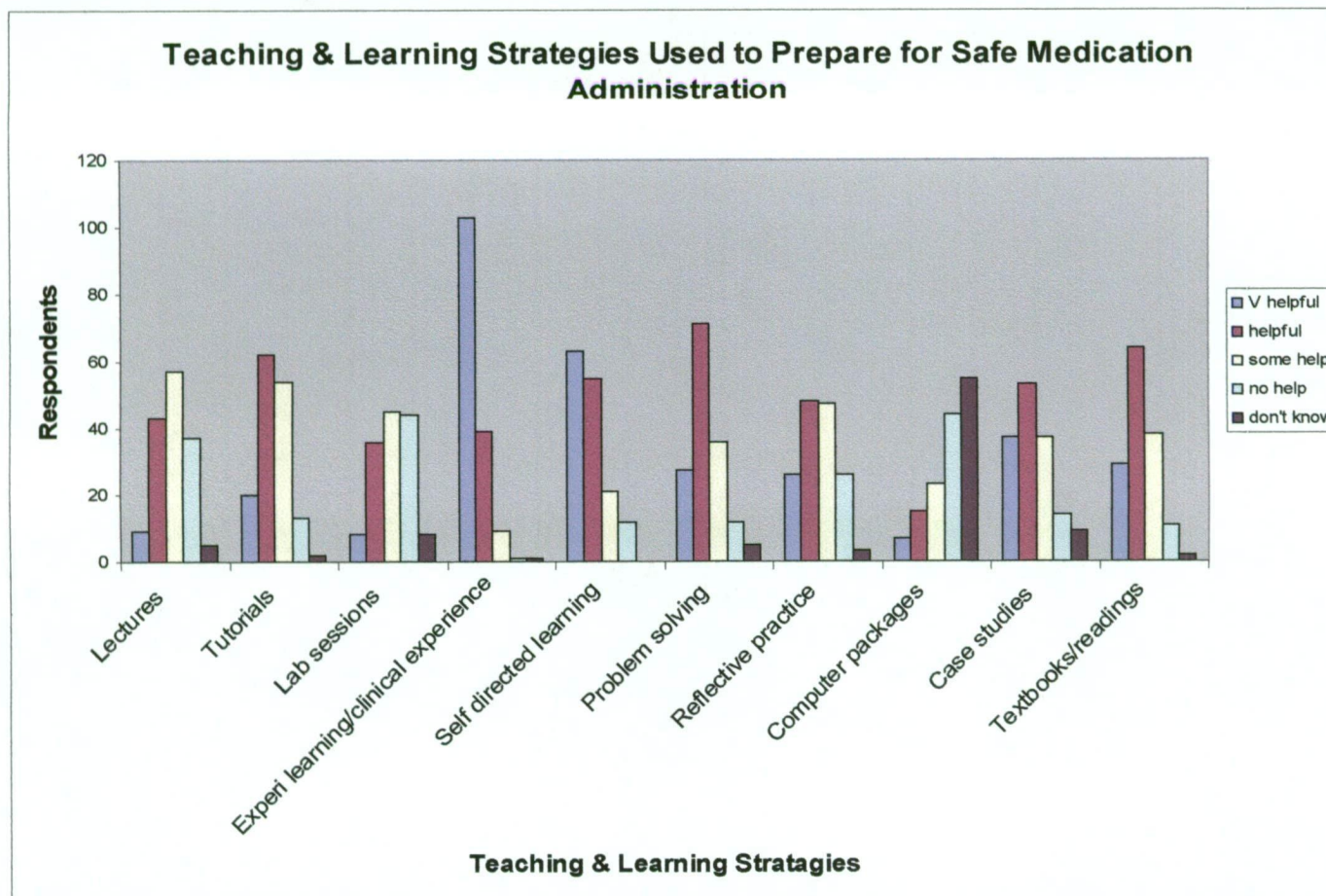
Legend Subjects in which medication management was taught were; Bioscience 1, 2, 3, 4, Supportive Care, theory and practice, Acute Care, theory and practice, Legal Studies, Professional Studies and other. **Ratings** were; very helpful, moderately helpful, helpful, some help, no help and not applicable.

There was significant negative correlation between the respondents' ages and legal ($r = -0.1996$; CI 95% -0.3609 to -0.02660 ; $p < 0.05$) and professional studies ($r = -0.2747$; CI 95% -0.4351 to -0.09741 ; $p < 0.01$) in ensuring safe medication administration. This indicates that these subjects were considered to be less relevant to the older respondents. All other subjects appeared equally relevant to all age groups.

Teaching and learning strategies that were most useful in preparing for safe medication administration

Students were then asked to rate which teaching and learning strategies they found most useful in their preparation to administer medications. Sixty six percent found experiential learning very helpful, 40% found self directed learning very helpful, 24% found case studies very helpful, 19% found textbooks/readings very helpful. The most helpful strategies in descending order were experiential /clinical practice, self-directed learning, case studies, textbooks, reflective practice, problem solving and lastly, tutorials. Only 6% found lectures very helpful and only 4% found computer assisted learning packages very helpful. Tutorials, self-directed learning, problem solving, reflective practice, case studies and textbooks were rated between 46 and 31% helpful. Computer assisted learning packages and laboratory sessions were rated at 28% not helpful followed by lectures 23% not helpful (see Figure 3.12).

Figure 3.13 Teaching and Learning Strategies used by the University to Prepare Students for Safe Medication Administration



Legend Teaching and Learning Strategies listed were; lectures, tutorials, laboratory sessions, experiential learning/clinical practice, self directed learning, problem solving, reflective practice, computer assisted learning packages, case studies, textbook/readings. **Ratings** were; very helpful, helpful, some help, no help and don't know

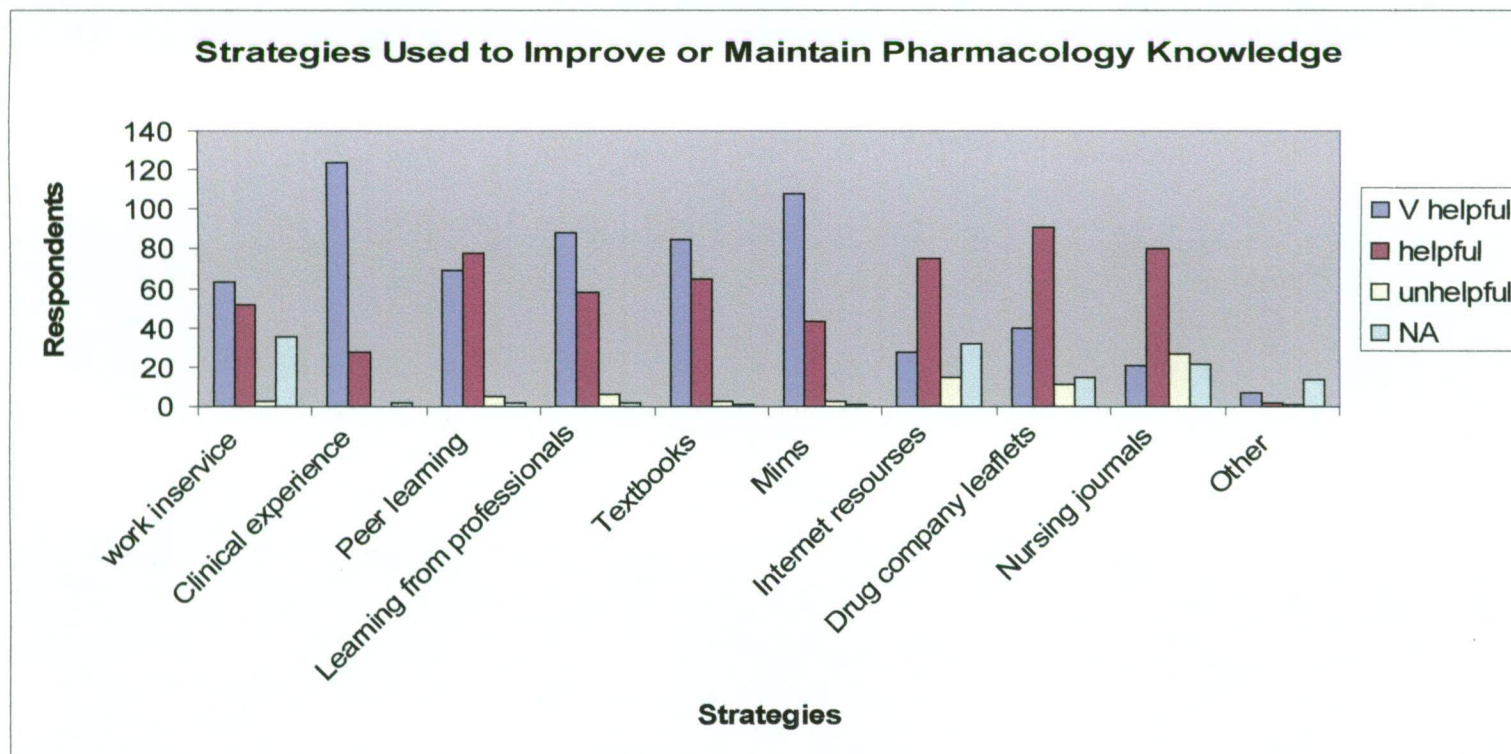
Correlation Between Age and Learning Strategies.

There was significant correlation between the respondent's age and lectures ($r = -0.2646$; CI 95% -0.4116 to -0.1042 ; $p < 0.01$) reflective practice ($r = -0.3003$; CI 95% -0.4437 to -0.1418 ; $p < 0.001$) and textbooks/readings ($r = -0.2838$; CI 95% -0.4319 to -0.1204 ; $p < 0.001$). Indicating that as the age of the respondents increased these teaching and learning strategies were less helpful. All other teaching and learning strategies were of equal relevance to all age groups.

Strategies currently used to improve and/or maintain pharmacology knowledge

Respondents were asked to rank in order of importance, strategies currently used to improve or maintain pharmacology knowledge. The respondents ranked clinical experience (working with drugs) as very help (79%) followed by use of MIMS (69%), learning from other professionals (56%), textbooks (54%), learning from fellow nurses (44%) and pharmacology in-service (40%). Nursing journals were ranked unhelpful (14%) followed by drug company leaflets (7%).

Figure 3.14 Ranking of Strategies Currently Used to Improve or Maintain Pharmacology Knowledge



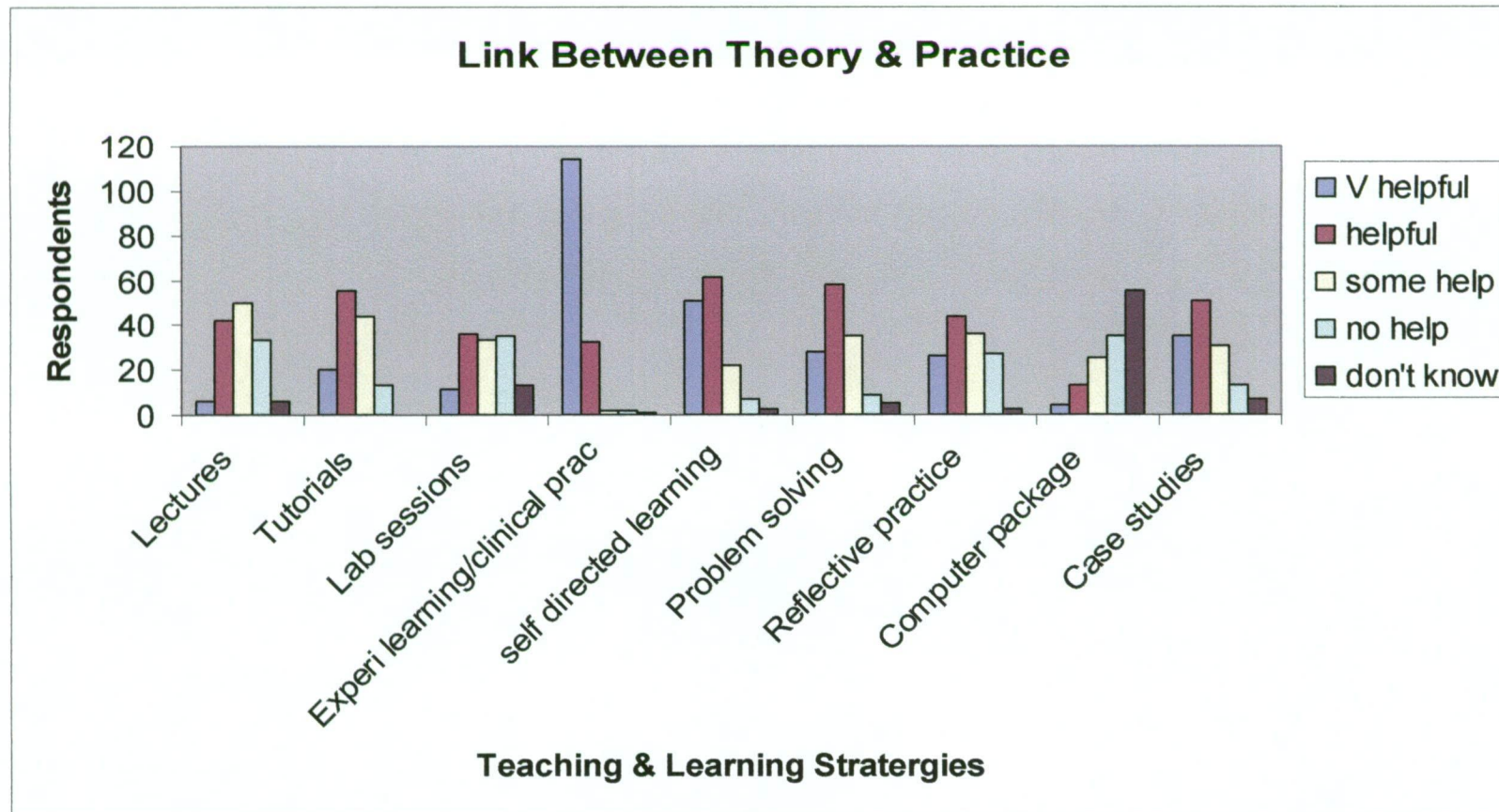
Legend *Strategies* listed were; pharmacology in-service provided by place of work, clinical experience (working with drugs), learning from fellow nurses, learning from other professionals, textbooks/other pharmacology references, Mims, internet resources, leaflets from drug companies, nursing journals, other strategies. **Ratings** were; very helpful, helpful, unhelpful and not applicable.

Which part of the undergraduate experience was most helpful in developing the link between theory and practice in the administration of medications?

This section asked the respondents which part of the undergraduate experience they thought was most helpful in developing the link between theory and practice in the administration of medications. In ranked order, 75% stated experiential learning/clinical practice was very helpful followed by self-directed learning (35%) and case studies (26%). While 31% found lectures helpful, 24% considered they were of no help and 42% found tutorials helpful and 33% found them of some help. Similarly, while 10% found computer assisted packages helpful, 24% found them to be of no help while 42% stated they did not know perhaps reflecting that this strategy was not widely used in the years the BN was taught to these students.

These findings are consistent with research conducted in this area which suggests educational content cannot be imparted by direct teaching methods but needs to be created through student learning activities such as experiential learning, self directed learning and case studies. Students found experiential learning most beneficial.

Figure 3.15 Which Teaching and Learning Strategies provide the Link between Theory and Practice



Legend Teaching and Learning Strategies listed were; lectures, tutorials, laboratory sessions, experiential learning/clinical practice, self directed learning, problem solving, reflective practice, computer assisted learning packages, case studies, textbook/readings. **Ratings** were; very helpful, helpful, some help, no help and don't know

3.3.9. Did the undergraduate curriculum meet overall learning needs to administer medications safely?

Enrolled Nurses

The first question in this section related to enrolled nurses **only** who had completed their Bachelor of Nursing. Sixty-three Enrolled Nurses who went on to complete their Bachelor of Nursing responded to the surveys, 27 (43%) stated they were happy with the medication administration education provided by the course and 36 (57%) stated they were not. Fourteen respondents did not indicate whether they had been enrolled nurse trained or not.

Twenty seven respondents who indicated that they were not happy with the course content in relation to medication administration stated that there was insufficient pharmacology content. Typical comments were as follows:

I had previous pharmacology knowledge from practice as an EN. I believe when I went through Uni, it was inadequate knowledge base for new undergraduates.

We had little teaching of medications. It was assumed we already knew a lot but as a RN it is different. I am not a pharmacist and do not know a lot about pharmacology. This would have been helpful if included in some way.

Considering the amount and depth of medications we deliver, the course provided no information about medications except the 5Rs. Clinical

experience and self directed learning (when time permits) and (learning as you go!!) are inadequate means of equipping us with the knowledge and skills and legal responsibilities required to administer medications. I recall only 1 hour of Bioscience that related to pharmacology in the 3-year course!

Needed more practical experience and knowledge of administration and use of IV and oral medications. My knowledge now makes me aware of my lack of knowledge as a new graduate.

Many respondents stated that there appeared to be an assumption that all enrolled nurses were medication endorsed when in fact many were not.

There appeared to be an assumption of prior knowledge and experience. For eg no classroom practice sessions for IV therapy- including IV drug administration. Although plenty of theory provided- told individuals were responsible to address own practice gaps. Insufficient clinical ed. on ward/unit.

Because we were ENs it was assumed that we already had adequate pharmacology knowledge. It depended on where you had been working/ or working at all. We were given very little from bioscience lectures (maybe 3-4 lectures in the first year) then nothing until Acute Care in 4th year.

As ENs it was expected that you knew the pharmacological component, [but] not all ENs were general based, some had psychiatric or mental disability certificate.

There seemed to be an assumption made that we were all pharmacology endorsed ENs, which I was not.

Many students stated that self-directed learning was the way they acquired their knowledge.

My own motivation for self directed learning in Acute Care was my main directive in learning to administer medications safely. Constantly looking up unknown medications in the MIMS was how I learnt the majority of medications.

I learnt far more in alternate courses and self directed learning (i.e. EN course). Useless subjects like Professional Studies were all about feminism (25% of the year) not important issues/information such as Bioscience. No mathematical education within course. (None at all)

Very little pharmacology taught in my course. Had to rely mainly on self-directed learning, reflective practice and ward experience.

All respondents expressed the need for more pharmacology content, either as a separate unit or a package in association with tutorials.

A unit that deals with medications. All nurses undertaking BN should require a unit that deals with medication administration and use. The package available to the ENs would be excellent in conjunction with tutorials and classes to work through the work books, instead of on your own.

I found Bioscience the only link with medications except on prac and the amount was significantly small. Perhaps a specific pharmacology unit would be significantly more important than feminist theory.

It seems ironic that it takes 4 years to become a pharmacist but ultimately it is the RN who administers the medications, in a course that has not designated one unit to pharmacology. The BN should have at least 1-2 units on pharmacology!

Other improvements suggested were more clinical practice, more case studies and clinical scenarios.

When I went through I spent 10 weeks on an acute clinical setting along with the undergraduates. This is not enough time to gain the knowledge about nursing in general, let alone pharmacy, to be able to perform within the scope required as a new graduate especially with the nursing shortage, lack of preceptor support and having to cope with shiftwork. There it is obvious more clinical experience is required for respondents during their training.

More clinical experience so the undergraduate can learn from other experienced nurses, practicing on a daily basis.

Slow down the pharmacology aspect early in the course. Increase time spent in tutorials on pharmacology. Have more case studies and related topics to bring signs and symptoms effects and adverse effects into the relationship with each other. I need examples to make it relevant

More scenario type activities. Mandatory 100% drug calculation tests.

Case studies and discuss treatment. (Drugs) do the pharmacological component as for other students.

I found that the overall course lacked practical experience for nurses. This I considered to be inappropriate and dangerous at times for some nurses.

The following comments seem to summarise the student's thoughts.

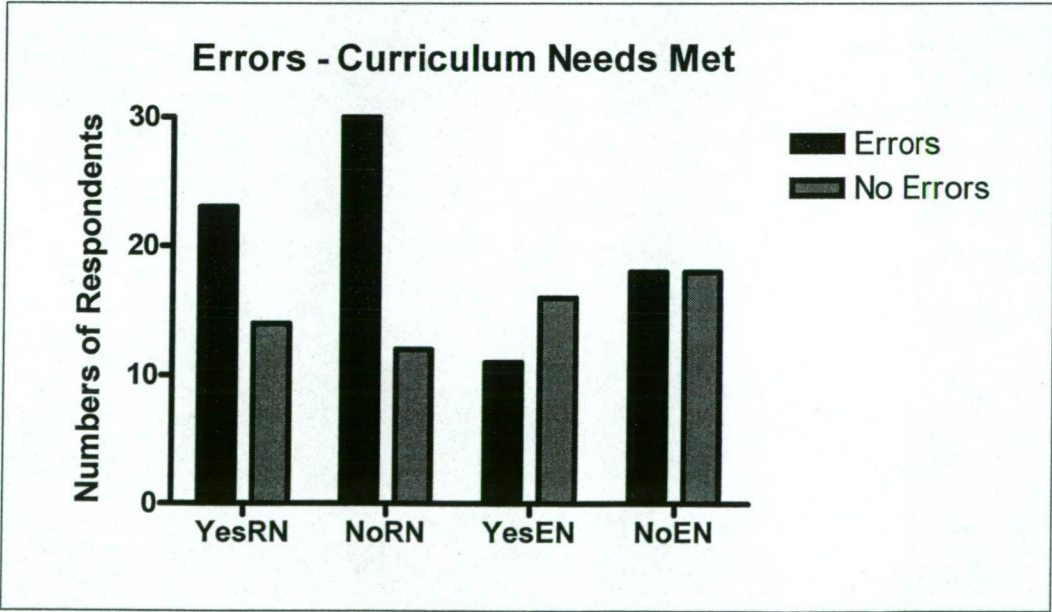
Pharmacology is such a huge part of the nursing role and should be focussed on throughout the whole degree. Most is committing facts to memory and does not require much critical analysis, which is what the degree is really focused on. Specific learning packages and tutorials should be made available.

Teach us basic nursing science in a properly structured way not ad hoc i.e. our medication course consisted of 3 lectures is it any wonder we look at the present day EN medication package and cringe! They go into far more depth and knowledge than we ever did. This is not the student RNs' fault but the fault of the university as it still goes on.

Comparison between Errors made since Graduation and if the Pharmacology Curriculum met overall Learning Needs to Administer Medications Safely

There was no correlation between errors made and whether the curriculum met the needs of the respondents. Figure 3.14 indicates that more errors (~2/3) were made by the respondents training to be RNs (with no prior nursing knowledge) when their curriculum needs were unmet. However the respondents training to be RNs (with no prior nursing knowledge) who stated their needs were met still made more errors (23) than were error free (15). EN's upgrading to RN status made fewer errors when their needs was met. The number of errors made, as compared to respondents who were error free was equal when their needs were not met. Perhaps this indicates that prior nursing knowledge is beneficial in reducing medication errors.

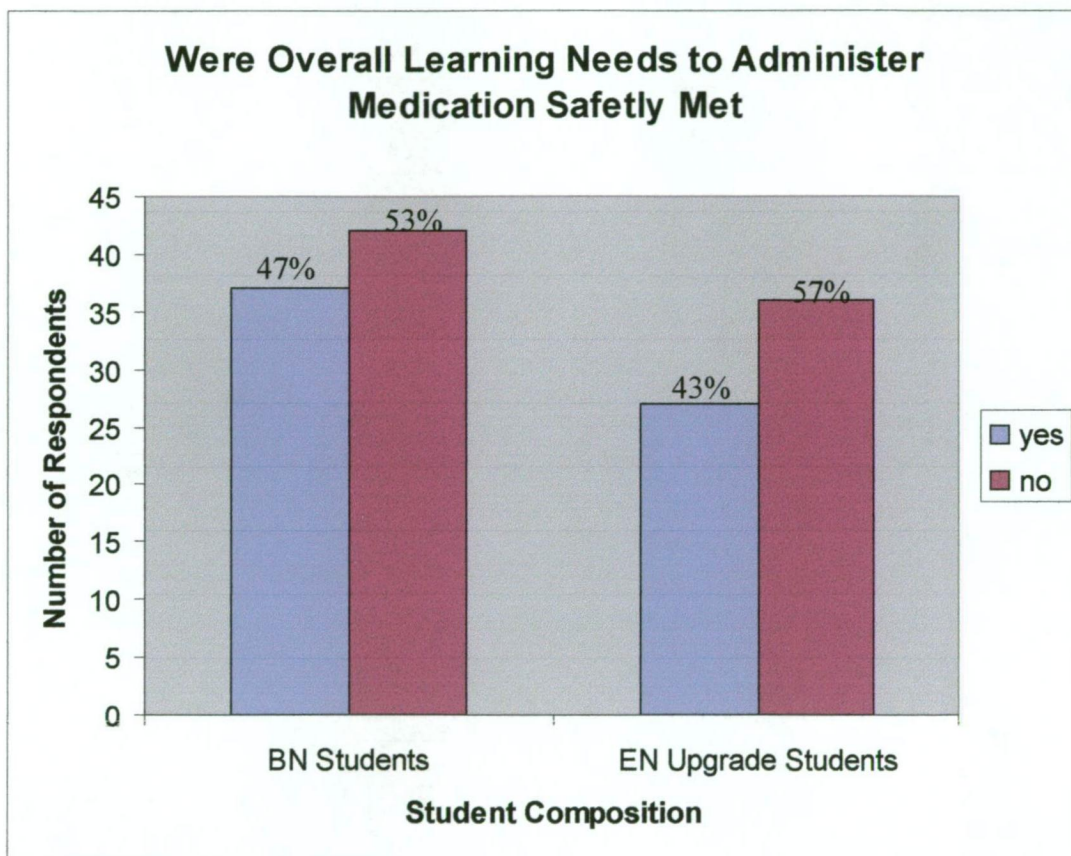
Figure 3.16 Errors made since Graduation and if the Pharmacology Curriculum meets overall Learning Needs to Administer Medications Safely



Legend *Errors* =errors made since graduation, *curriculum needs met* (yes/no) separates respondents into respondents with no previous nurse training=student RN, respondents who were enrolled nurses=EN

**These data are collated from the answers given on the surveys and it is highly probable that not all respondents have admitted to making medication errors and therefore the results may be skewed.*

Figure 3.17 Did the Pharmacology Curriculum from the BN meet overall Learning Needs of the Respondents to Administer Medications Safely



Legend Did the Pharmacology curriculum meet overall learning needs= (yes or no)
separates respondents into respondents with no previous nurse training = BN
respondents and respondents who were enrolled nurses = EN upgrade respondents

The Standard Undergraduate Program

The second question in this section related to registered nurses had no previous nursing qualification. Seventy nine nurses responded to the surveys; 37(47%) stated they were happy with the medication administration education provided by the course and 42(53%) stated they were not. Fourteen respondents did not indicate whether the respondents had been Enrolled Nurse trained or not.

Those respondents who indicated that they were not happy with the course content in relation to medication administration stated that there was insufficient pharmacology content.

No specific course in pharmacology. No pharmacology workbook of minimal requirements

There was no program as such; only in bioscience did I have pharmacology. Due to the constraints this meant I had (I thought) minimal information. I think I should have had a complete subject in pharmacology. Some of the subjects I did in the course could have been deleted to make room for an expanded pharmacology.

An overall knowledge of drugs, actions, side effects, adverse reactions, incompatibilities etc **were unknown to me!** While there is a sharp learning curve in the postgraduate year, I do believe patients are put at risk by receiving drugs by incompetent nurses. More practical sessions need to be incorporated into the degree rather than many pointless hours in a classroom studying

things, which don't have much to do with nursing (Especially in relation to a person who is not an RN yet).

Although the undergraduate course covered the legal aspects of pharmacology thoroughly- the fundamentals of pharmacology eg drugs, modes of action, etc was lacking.

Needed more time spent on pharmacology-particular adverse and therapeutic effects. We only learned the basics of what classes of drug were, not how to practically apply that knowledge in the clinical setting. I came out feeling I only knew the basics about medications and was not very confident administering as I felt there was so much I didn't know about how they act and adverse effects.

Pharmacology being such a complex subject in its own right should be a stand alone subject in the under graduate course rather than being buried away in the already over-loaded bioscience subjects.

Pharmacology theory was seen to be in too much depth to understand and not practice orientated.

The pharmacology unit in BN, while being comprehensive is perhaps a bit too abstract. For example frusemide; they tell us exactly how it affects osmosis in the Loop of Henle of the nephron, which is fine, but a less involved and intricate explanation would be easier to understand at first. Certainly it's good to know the intricacies, but it would be easier with a general overview at first,

so we can get our heads around it. Instead of focusing on all the details first, it would be helpful to have a general overview that is simplified, so you can have a base on which to work from. For example frusemide, used to reduce oedema. Makes the recipient urinate. Side effects include electrolyte imbalances. If this stuff was explained properly at the start, the rest would be so much easier to understand.

The theory of drugs was good, but not enough practical information relevant to patient care. For example if a patient is hypotensive then when doing drug round you will not give everything that is due- will need to withhold the hypotensive.

Education was too complicated in theory, not enough practical experience in medication administration

Many had difficulty finding a theory-practice link.

Did not clasp clearly the link between theory and practice. Competence I think comes from experience in the work setting; experience where the graduate is supported by both university and hospital staff. Fair enough to learn the concepts, but we need to learn and do at the same time.

To much info (Bioscience) that was not related to practical setting and cases i.e. real people.

There are such a large number of medications available. The BN attempts to fit such a lot of info into a short time often with the emphasis on the WRONG areas relevant to clinical practice. Medications were barely touched on as part of the curriculum.

Not enough case studies not time spent learning pharmacology. Not enough time effort spent linking disease/disorders to medications.

Undertaking Bioscience studies when we were spending little or no time in the hospital setting made it extremely difficult to link theory with practice (as we were not in a position to gain practical experience). Therefore, not only our pharmacology knowledge suffered, but our entire ability to understand disease processes was compromised.

All respondents wanted more supervised practice learning the complexities of drug administration such as intravenous therapy, blood transfusions and so on.

Having regular workshops for the students on the ward environment for them to learn the concepts of pharmacology, medication administration and all it entails and see the drugs, read the case studies, do the drawing up of medication in a work environment.

There is no where nearly enough education on pharmacology and adverse reactions, drug interactions, IV fluids and the way fluids and drugs can

adversely interact. Basic understanding on drug families and classes. There needs to be clinical placement/scenarios where you spend time (a decent amount) on learning about basic drug groups and their effects on the body and other medications. It was not taught in class and was just expected that you would learn it all on clinicals.

Not learning actions and side effects of enough drugs. Not enough experience in how to give certain drugs, i.e. how different IV medications are given, or more complex drugs like heparin infusions. Not enough practice giving injections.

Many respondents found the pharmacology curriculum ineffective in promoting and encouraging safe medication administration. They stated they felt insecure as post graduate nurses due to the lack of knowledge obtained.

Did not feel comfortable about using meds. Nervous about giving drugs, so many need to be looked up which is difficult when you are busy. Frustration from other staff at how long medication rounds can take.

I don't think that the undergraduate education is good enough to provide graduates with appropriate knowledge and skills. The best place to learn about medications was in practice, but you are so busy with other stuff as a SN [student nurse] you don't get time or effective education while on the job. You need education regarding the common drugs used in your area of practice while you are there.

The pharmacology curriculum in theory alone is ineffectual in promoting and encouraging safe medication administration. I personally found that it wasn't until these skills were put into real practice on the ward that my knowledge and skills and safety issues came into practice, and became competent.

Many stated that a pharmacology unit would improve the knowledge base of graduates.

A subject within the degree based solely on medications-1year long divided into classes of drugs. I understand that meds are forever changing with new ones always becoming available but it would be better than no education at all which I felt was the case.

It could have been improved by a separate university subject and getting rid of other subjects eg the feminist subject. Have pharmacology as a subject rather than just a small part of Bioscience subject (which is not undertaken in third year), as many things are forgotten in a year.

Spend more time studying pharmacology in depth. Perhaps make this a separate subject. The legal implications and responsibilities and accountability for RNs are not weighed equally by the amount of time spent learning pharmacology during the undergraduate course.

Most wanted more supervised clinical practice. More case studies and clinical scenarios were seen as a way to link theory to practice

Having regular workshops for the students on the ward environment for them to learn the concepts of pharmacology, medication administration and all it entails and see the drugs, read the case studies, do the drawing up of medication in a work environment.

Increase case studies, tutorial time spent learning drugs and time spent in hospital settings.

The improvements can be made by making a stronger impact on the graduate nurse integrating the medications- into practice. I.e. why the pt is actually on this medication- this will give knowledge of the pt history, current treatment, dose, effects, adverse effects and so on. This could be implemented with more case studies to students. Then they can link theory to practice.

Some summative comments;

There was lack of depth in pharmacokinetics full stop. More emphasis/education needed to be put in place in 3rd year- as you approach closer to working rather than the chemistry of drugs in 1st and 2nd year. A thorough education on name and action of common drugs encountered rather than only ones needed in emergencies has to be placed in the curriculum in a

formal manner. As above and more formal education sessions not only on drug calcs but their action and familiarity in 3rd year and the graduate year. As this is the most/ one of the most daunting/ time consuming activities faced as a graduate.

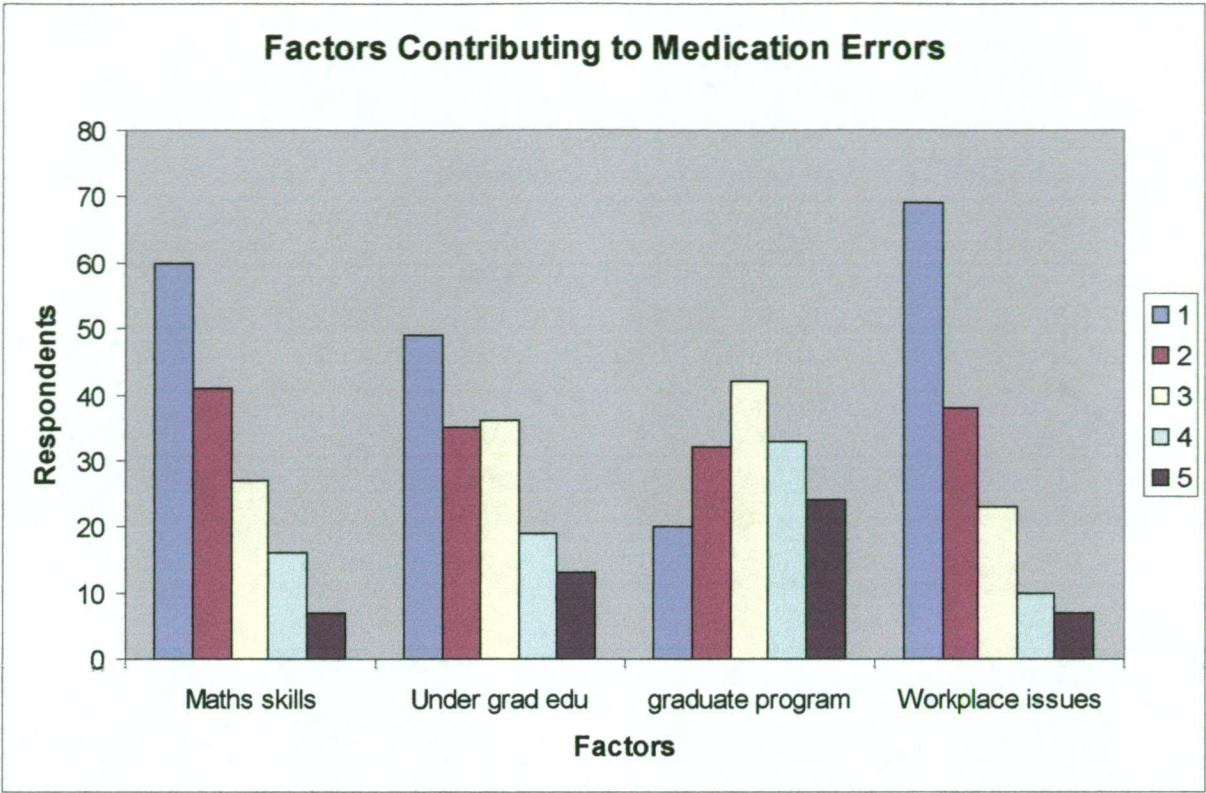
There is nowhere nearly enough education on pharmacology and adverse reactions, drug interactions, IV fluids and the way fluids and drugs can adversely interact. Basic understanding on drug families and classes.

3.3.10. Relative importance of four major factors known to contribute to medication errors

In the last section of the surveys respondents were asked to rank maths skills, undergraduate nurse education, the graduate program and work place issues by their perceived relative importance in relation to contributing to medication errors where 1 was a major contributor to medication errors and 5 did not contribute to medication errors.

Forty four per cent ranked workplace issues as a major contributor to medication errors, mathematical skills (38%) were second followed by the undergraduate nurse education program (31%), and graduate program (13%).

Figure 3.18 Ranking of Factors known to contribute to Medication Errors



Factors listed were mathematical skills, undergraduate nurse education, graduate program, workplace issues. **Rankings** were from 1 to 5 where 1 is a major contributor to medication errors and 5 does not contribute to medication errors

Chi-square analysis showed no trends between errors made and mathematical skills chosen as a major contributor to medication errors.

There is a positive correlation between respondents' perceived basic mathematical skills and mathematical skills chosen as a major contributor to medication errors. Respondents who believed that they had excellent mathematical skills have identified mathematical skills as a major contributor to medication errors whilst those with poor mathematical skills did not believe mathematical skills contribute to medication errors ($r = 0.1666$; CI 95% 0.001720 to 0.3227; $p < 0.05$).

Workplace issues

If respondents had listed workplace issues as being important, they were then asked to describe the relative importance of various workplace factors in causing medication errors where one was ranked as a major contributor to medication errors and five did not contribute to medication errors. The issues chosen were major issues identified in the literature reviewed and by the focus group participants. This section was answered by respondents in accordance with what they perceived to be the major issues with many ranking more than one issue as a major contributor to medication errors whilst some only ranked one or did not think any of the issues were relevant. The number of respondents on each issue is shown in Chart 4.3 in the following summary. The major contributors to medication errors were seen to be busy ward, illegible doctors writing, unclear doctors' orders and interruptions. Refer to Figure 3.1

Table 3.3 Workplace Issues that are known to cause Medication Errors

Issue	Number of Respondents	Major contributor (%)
Busy ward	154	62%
Illegible doctor's writing	141	58%
Unclear doctor's orders	138	54%
Interruptions	135	33%
Shift work	138	31%
Distractions	137	29%
Unfamiliar medication	137	28%
New ward	135	16%
Home commitments	135	13%

Figure 3.19 Ranking of Workplace Issues that are known to cause Medication Errors



Issues listed are busy ward, illegible doctor’s writing, unclear doctor’s orders interruptions, shift work, distractions, unfamiliar medication, new ward, home commitments. **Rankings** were from 1 to 5 where 1 is a major contributor to medication errors and 5 does not contribute to medication errors

4. Chapter 4

Discussion

4.1. Introduction

Medication management is one of the most time consuming components of the average registered nurses shift and has the most potential to inflict patient morbidity/mortality. More time is spent administering or supervising drugs than any other single component of nursing care (O'Shea, 1999).

Topics covered in this chapter will include:

- Demographic data
- Confidence and competence in medication administration.
- Contribution of Bachelor of Nursing teaching and learning strategies in ensuring safe medication administration
- Respondents' rating of their knowledge in medication administration
- A discussion of mathematical skills and medication errors made
- Contribution of Bachelor of Nursing subjects in ensuring safe medication administration
- Impact of workplace issues

The section on demographic data will discuss the distribution of age, gender and work settings of the respondents. Focus group participants will not be discussed separately as they were from the same cohort of nurses (1997-2000).

Confidence and competence in medication administration will be discussed as the research was initiated because the researcher had observed that students of Nursing and post graduate nurses lacked confidence and competence in medication administration. Confidence and knowledge will then be linked to teaching and learning strategies. This section examines the teaching and learning strategies that research participants from the focus groups and surveys found most helpful in preparing them for medication administration. It also discusses adult learning theory in relationship to confidence. The notion of scholarship is also explored.

The chapter then discusses how the respondents rated their knowledge in the area of medication administration. Medication errors made by surveys respondents will be analysed and reasons for errors and contributing factors will be examined. In this study self-reported mathematical skills did not appear to be a major contributor to medication errors as was suggested by some of the literature reviewed.

Bachelor of Nursing teaching and learning strategies in ensuring safe medication administration will be discussed in relation to which strategies were the most and least helpful and the respondents preferences will be related to relevant literature.

The contribution of Bachelor of Nursing subjects in ensuring safe medication administration will be looked at and whether the undergraduate curriculum met the overall learning needs of the respondents to administer medications safely as a registered nurse in practice. Discussions will then centre on the Enrolled Nurse upgrade course and concerns by both focus group and surveys participants regarding what they saw as inadequate medication management education.

Finally the impact of workplace issues are examined and discussed in relationship to medication administration. Limitations of the study are then summarised.

4.2. Demographic Data

Demographic data from the questionnaire surveys found that the majority of respondents were female and in the 20-29 age groups (45%). This would indicate that there are more school leavers entering nursing than mature age respondents. Thirty five percent of respondents had commenced the BN within a year of leaving school and 44% within 4 years. The next highest age group was 40-49 (28%). The predominance of respondents in the 20-29 and 40-49 age groups could be the influence of child rearing. The median age of women having a baby in Australia in 1999 was 29.7 years (Australian Bureau of Statistics, 1999). It is probable that those in the 20-29 age groups are childless whereas the 40-49 age groups are more likely to have older children. It may be that these two groups had more available time to answer the survey, as opposed to the 30-39 age groups who could be additionally busy with small children. It is also possible that RNs in this age group are not working for this reason.

The majority of respondents worked either in acute hospitals or rural hospitals which according to the NBT employ the majority of nurses in the state. Most had completed year 12 at secondary school, almost a necessity now to obtain the required entrance score for nursing. The average time since leaving school and starting their Bachelor of Nursing was approximately ten years. It ranged from 0 to 46 years thus catering for school leavers and mature age students many of whom had been enrolled nurses and

had upgraded to RN status. The male to female ratio was similar to nurse graduation numbers (TSon, 2004).

4.3. Confidence and competence

Prior to this research being conducted the researcher had anecdotal evidence that post graduate nurses lacked confidence and competence in medication administration as a new graduate. This observation is supported by the results in all three areas of research conducted for this project (observational study, focus groups and surveys). Forty seven per cent of surveys respondents stated they had little or no confidence in administering medications immediately after graduation. Whilst the observational study only used 10% of undergraduate students who had successfully completed the BN, it indicated that 55% of the participants were at risk of making medication errors. The fact that students volunteered for the study has relevance as it may indicate that they had a measure of confidence in their ability. The areas of medication administration where their knowledge was lacking (client identification, wrong dose and time, not reading the drug chart correctly) was consistent with errors identified by the surveys respondents and factors highlighted by the Australian Council For Safety and Quality in Health Care's report (2002) linked to adverse drug events in hospitals.

The focus group discussions highlighted perceptions from the participants that the BN course did not impart sufficient knowledge to administer medications safely. Participants felt that the knowledge needed for medication administration was imparted by many different units in an unintegrated way making learning difficult, particularly in regards to linking theory with practice. This view was supported by the

surveys and research conducted by Ives et al (1996); Courtenay et al (1991) and Manias and Bullock (2002a). Manias and Bullock (2002b) stated;

...the study also demonstrated that pharmacology principles were inadequately covered in integrated subjects, received little emphasis and learning did not occur in a structured way.

The surveys supported the preliminary findings from the focus groups with 47% of the respondents stating that they had little or no confidence when administering medications immediately post graduation. From the literature researched this problem appears not to be endemic to the University of Tasmania and would imply that the nursing curricula Australia wide need to be examined in terms of guidelines and minimum standards for curricula. The systematic review of nursing curricula (Department of Clinical Nursing, Adelaide University and Joanna Briggs Institute of Evidence Based Nursing and Midwifery, 2001) found that not one curriculum had been tried and tested and considered to be of best practice standard against which other curriculum could be tested.

4.4. Teaching and Learning strategies

Whilst confidence is directly associated with acquiring knowledge, it is also related to teaching and learning strategies/methods used by a University. Strategies that respondents ranked most helpful in the preparation to administer medications safely in this study were experiential learning/clinical practice 66%, self-directed learning 40%, case studies 24% and textbook and readings 19%. This was consistent with research findings from Ives et al (1996), Latter et al (2000), and Manias et al (1999). Manias

and Bullock (2002a) found that even though students stated self-directed learning was the most frequently used strategy, in an area of such importance they preferred more formalised means of learning. Surveys participants supported this view.

Teach us basic nursing science in a properly structured way not ad hoc i.e. our medication course consisted of 3 lectures is it any wonder we look at the present day EN (enrolled nurse) medication package and cringe! They go into far more depth and knowledge than we ever did. This is not the student RNs fault but the fault of the university as it still goes on.

Participants stated that pharmacology lectures were too complex and not close enough in time to practice and only 6% of respondents found them very helpful, with 23% finding them no help at all. This is demonstrated by the following comment from a surveys respondent:

Undertaking Bioscience studies when we were spending little or no time in the hospital setting made it extremely difficult to link theory with practice (as we were not in a position to gain practical experience). Therefore, not only our pharmacology knowledge suffered, but our entire ability to understand disease processes was compromised.

Briggs (1999) stated educational content needs to be imparted through student learning activities not direct teaching methods such as lectures. Manias et al (1999) supported this view and suggested that one of these student learning activities that achieved better cognitive gains was computer assisted learning packages. In research conducted by Jefferies (2001) computer assisted learning demonstrated higher student satisfaction and better learning outcomes than lectures.

However in this research only 8% of the participants rated computer assisted learning as helpful with 28% rating it unhelpful. This is unusual as currently more and more units studied at universities are studied online or have an online component and the internet is used widely for reference material. This may be an indication that in the years 1997-2000 nursing students were not as computer literate and computers were only used as a strategy in the fringe of teaching and learning. If the survey was conducted on current students it is assumed that these results would be very different. Web CT was not introduced into Human Bioscience until 2001.

A result of interest was that there was significant negative correlation between the respondents' age and lectures, reflective practice, textbook and readings indicating that as age increases these strategies were considered to be less helpful. This was supported by comments from mature age participants from the focus groups. The following comment was a recurring theme:

I can remember having one lecture with (lecturers' name) on the receptors, now the receptors do this and that was all I can remember and that was all I could take in and I had to go home and read for four hours to get it into my head anyway. (And you know it off pat now?) I haven't got a clue (laughter) To answer it like that I can say yes I did have had a lecture on that, not that I can remember the majority of it.....

Burns (1998) states, in relation to adult learning theory, that andragogy must be experience based, problem orientated and collaborative, a view also supported by Briggs (1999). Participants stated that experiential learning and case studies helped link theory to practice, a view supported by similar research (Manias and Bullock, 2002 a, Jordan and Reid, 1997).

Data analysis from the surveys indicated significant statistical correlation between age and confidence and between errors and confidence. Confidence decreases with age and errors increase with decreasing confidence. There was no significant correlation between age and errors indicating that in this research, errors were evenly spread across the age groups. Burns (1998) states:

The climate of learning must be one of respect, support and safety that enables adults to maintain their sense of identity, status and power.

He goes on to say a learner centered facilitative approach, with students having an input into the curriculum, is essential to promote personal mastery and raised self esteem. This would indicate that perhaps teaching methods could be reviewed in this area of nursing and more experiential practice included to promote a more confident practitioner.

Surveys respondents indicated that they would like to see an increase in the amount of clinical experience in the BN.

I found that the overall course lacked practical experience for nurses. This I considered to be inappropriate and dangerous at times for some nurses.

Worrall-Carter (1995) discusses how nursing has utilized the concept of scholarship to establish its identity as a profession in the university culture. Ernest Boyer (1990) from the Carnegie Foundation of Advanced Teaching believes that scholarship should be broadened and that academic facilities need to showcase more accurately both academic and civic mandates as they complement each other and research. Findings from the surveys indicate that the university needs to research this mix more thoroughly, acknowledge the concepts of andragogy and the respondents' stated needs for more experiential practice. This would increase the potential for the student to

form the much needed theory-practice link and become a safe and confident practitioner. The amount of clinical experience has increased since these participants graduated and it would be useful to see if this has been beneficial or if even more is needed.

4.5. Pharmacology Knowledge Immediately After Graduation

Participants rated their own knowledge in medication administration immediately post graduation more highly than their perception of the knowledge provided by the undergraduate program in this area

Table 4.1 Pharmacology Knowledge Immediately After Graduation

Own drug administration ability rated satisfactory or above		Level of knowledge provided by the undergraduate program (satisfactory or above)	
Drug Adm.	99%	Drug Adm.	90%
Therapeutic	80%	Therapeutic	60%
Adverse	83%	Adverse	54%
Client education	83%	Client education	55%

Legend Drug Adm=drug administration (5 rights), Therapeutic=Therapeutic effects of drugs, Adverse=Adverse effects of drugs, Client education=Client education in regards to their medication

Their perception of the knowledge provided by the undergraduate program in this area appears be more consistent with the results of the observational study (drug administration accuracy 66%, client education 30%) suggesting students overrate their own ability. Ives et al (1996) found this was the case in their research suggesting that this over estimation of the RN’s knowledge in medication administration may lead to

medication errors. Medication knowledge as a new graduate was rated highly with 99% stating their drug administering ability in relation to the five rights (right person, right drug, right dose, right time, right route) was satisfactory or above. Yet 57% of respondents stated they had **made one or more medication errors** and most of the errors made were in this area, for example, wrong dose 40% wrong person 26%, and wrong time 15% and wrong drug 12%. It is highly possible that not all respondents have admitted to making medication errors and **the percentage of errors made by this cohort is probably much higher**. Respondents only rated the level of knowledge that the undergraduate program provided new graduates as satisfactory or above in the following areas; therapeutic effects of drugs (60%) adverse effects of drugs (54%) and client education in relationship to drugs (55%) indicating that in these areas teaching and learning could be improved.

4.6. Medication Errors

When the drug errors were analyzed, the predominant reason for the drug errors was found to be a failure to read, or misreading the drug chart which accounted for 40/111 (36%) of the errors. The following are typical examples that respondents gave:

Realised on day 2 residents had only had 1 of each pill rather than 2, 3 or 4

Gave incorrect dose of sedative

Dose of IV steroid had been halved since last worked, did not pick it up and gave previous dose

Gave 1 tablet instead of 2, didn't read the order properly

Gave wrong dose of sliding scale insulin. Regime had been changed since I had read it previously

Gave digesic tablet to person who had previously only had one 2 hours before.

Administering paracetamol to someone complaining of headache pain that was already prescribed regular TDS paracetamol so they received an extra dose.

This is consistent with the findings from the observational study where 64% did not decipher the drug chart correctly. Findings from The Australian Council for Safety and Quality in Health Care 2002 report found failure to read/misreading the drug chart was the reason for most medication errors identified, closely followed by prescription errors. In a study conducted by Manias and Bullock (2002b), concerns were also raised about graduate nurses' inability to read medication orders.

The Nursing Board of Tasmania (2003) has developed guidelines which emphasise the competencies expected of registered nurses in medication administration. These competencies were taught in second year in Supportive Care and in third year in Acute Care as well as being discussed in Legal and Professional Studies (see literature review). Undergraduates must meet these competencies at beginning level before they are allowed to graduate and practice. Undergraduates who participated in the observational study had completed all their studies and passed the BN, yet in this group the accuracy rate of deciphering the drug chart was 36%. This study was not done on a ward environment and the participants volunteered their time. They were not rushed although they were observed, perhaps placing them under exam like conditions. However the students knew that this study was being conducted for research purposes and would have no impact on their marks. This would suggest that

the procedures and practices instilled by the education process need reviewing. These skills would be sorely tested in a busy ward environment, as signified by the following quote from a focus group participant:

I think I took it seriously, but yeh you don't really realize you know what's going on here....It's a huge responsibility that you have until you're out there and giving them out and, you know, what if I do something wrong...

The next common reason for drug errors, with 26/111 (23%), was incorrect identification where the nurse failed to check the patient's name band with the drug chart. Examples given were:

Incorrect drug and dosage given due to incorrect drug chart

Another patient's drug chart on her patient's bed. Gave wrong analgesia.

Drew up clexane and heparin and gave to opposite patients

Gave wrong drug to wrong patient (no armbands)

IV AB to incorrect patient. Both patients in the room required IV AB and I got them mixed up.

Two similar names of patients, mixed up their tablets

I gave an antibiotic to the wrong patient, I had two patients side by side having IV ABX and I gave the wrong ABX to the wrong patient even though it was all thoroughly checked, I didn't check the armband

Whilst these mistakes can be contributed to a busy ward environment, they also indicate a failure in the education process in regards to teaching the competencies as defined by the Nursing Board of Tasmania (2003). In the observational study, the name on armband and drug chart did not correspond. Two participants failed automatically as they neglected to check the armband which had a correct UR number but incorrect surname. The drug chart said Blackwell the armband Blackmore. Only one student noticed the incorrect name, the other 8 participants did not notice the discrepancy but verbally verified that they had the correct patient. Patients are often anxious in a hospital situation and many are confused, and if the identification of the patient is not made by checking the armband with the drug chart, errors can occur as indicated in the examples given by the participants of the surveys.

Other reasons for medication errors were not signing the drug chart resulting in a double dose for the patient (8%); poor/ unclear doctors writing (8%); forgetting when drugs were due or to be recommenced after fasting (drug omission); drawing up the wrong strength vials; wrong calculations; wrong intravenous rates and leaving medications on trays which were not taken. Four respondents indicated a lack of knowledge of the drug which resulted in the administration of a larger than therapeutic dose (prescription error).

The Australian Council for Safety and Quality in Health Cares (2002) report found that errors in timing were as high as 8%. They also found that when patients were given medications from ward supplies, error rates increased compared with giving medication from their own supplies. Factors that respondents indicated contributed to the errors were workloads, misreading drug charts, no armbands, staff shortages,

tiredness/lack of concentration, interruptions, doctors writing, lack of knowledge and inexperience. These results were consistent with research conducted by Gladstone (1995). This suggests that the potential to reduce medication errors in nursing is multidimensional. Changes to the workplace environment and computerised medication records would make it more conducive to practice safely, as well as improving the undergraduate education program so that graduates are better prepared for medication administration prior to practice.

4.7. Mathematical skills

When respondents were asked about their mathematical skills only 5% stated they were poor. The rest stated their skills were satisfactory or above. This finding is inconsistent with the literature which suggests mathematical skills are a major contributor to medication errors (Craig and Sellers 1995; Gillham, 1995; Gladstone, 1995). It is also inconsistent with the researcher's own experiences as a lecturer with second year nursing students. Only 4 of the 111 errors identified by the respondents were directly linked to incorrect drug calculations. Of these four respondents, two had rated their mathematical skills as satisfactory and two as good. Although many errors were dose related not enough information was given in the surveys by the respondents to determine if this was due to mathematical skills or difficulty/misreading of the documentation.

There was no significant statistical correlation between the self rating of mathematical skills and errors made. However of those respondents who stated they had excellent skills over 66% had made an error and those who rated their skills as very good, good or satisfactory, 50% had made errors. This may again suggest that some nurses

overestimate their skills leading to medication errors. Those who rated their skills as poor had all made errors and this is consistent with the literature reviewed (Roger and Jones, 1998).

There is a positive correlation between respondents' perceived basic mathematical skills and mathematical skill chosen as a major contributor to medication errors. Respondents who have stated that they had excellent mathematical skills prior to BN have identified mathematical skills as a major contributor to medication errors whilst those with poor mathematical skills did not believe mathematical skills contributed to medication errors. This could indicate that respondents with perceived excellent skills have more insight into how errors occur but were not as careful as they should have been possibly due to over confidence, as discussed previously, whilst respondents with poor skills, possibly lacked this insight and the ability to prevent errors in calculation. One possible solution would be a system whereby nurses can be screened and assisted to overcome this perceived deficit possibly by visualising medication calculations in a laboratory setting which proved successful in a Western Australian study reported by Roger and Jones (1998).

4.8. Contribution of Bachelor of Nursing Subjects

The nursing subject rated as being the most helpful in ensuring safe medication administration as an RN was Acute Care (experiential learning) in third year. Legal studies were the second most helpful followed by Bioscience 1, 2, 3, 4; Supportive Care (experiential learning) and Acute Care (theory) were almost equal third. Overall 55% of respondents who answered this section stated the undergraduate curriculum did not meet their overall learning needs to administer medications safely. The general

consensus was that there was not enough pharmacology in the course. Pharmacology was taught as a component of the biosciences and respondents felt that the amount provided was low in relation to the amount of anatomy and physiology that was provided and less than the amount needed to practice safely. This is consistent with the literature reviewed where many authors argued that the move of nurse education into the tertiary sector has resulted in a reduction of content in biological science units in favor of social and behavioral sciences to the detriment of the nursing student. These authors see the physiology component being vital to the understanding of drug administration (White, 1994; Wynn et al, 1997; Jordan and Reid, 1997; Akinsanya, 1987; Courtenay, 1991). This view was supported by the participants of both the focus groups and the surveys.

For the University Nursing Department to cut down on the feminist theory 'navel gazing' subjects, and put more emphasis in the subjects that will actually be of practical use to nurses once they are out in a work setting.

When asked for suggested improvements to the curriculum, one respondent replied:

But yes, there's other things that they could have condensed or combined and whatever [Health Care Studies and Society and Health] and given us an extra, even an extra semester on bioscience for enrolled nurses that could have been a really... [Beneficial] for medication administration

Participants believed that the theory they received from classroom lectures was too complicated and not practice orientated. Pharmacology theory was fragmented and delivered well before clinical practice occurred making it difficult to form the theory-practice link because most of the theory had been forgotten prior to practice. Nurses need a sound theoretical background in the principals of pharmacology as well as the

competencies needed for safe medication administration. But participants indicated that when this is not linked to clinical practice, the learning process is hindered. When nurses can see the patient, associate the signs and symptoms the patient is exhibiting with a disease, understand the purpose of the medication in treating or curing the illness, then they form the theory-practice link. Respondents have indicated if this does not happen soon after the theory has been delivered that the majority of the knowledge is soon forgotten

Research relating to nurses' perceptions of their ability to understand pharmacology principles supports this finding (Latter et al, 2000; Courtenay, 1991; Jordan and Reid, 1997). Research conducted by Courtenay (1991) indicated that student nurses found human biology with its pharmacology component difficult to learn. When experimental subjects were taught theoretically, students seemed to have difficulty in seeing relevance to the tasks performed on the ward. Human biology was easier to learn when practical learning methods were used (Courtenay, 1991). Jordan and Reid (1997) supported this and found that case studies or clinical scenarios encouraged active learning and were able to demonstrate that biological knowledge was vital for holistic patient care and optimum practice. They state in relation to case studies, 'It provides an immediate clinical anchor and defines the purpose of tuition'

The majority of respondents wanted more pharmacology content either in a specific unit or package in a more structured fashion throughout the entire course, with greater clinical focus and more clinical practice. This finding was supported by research conducted in this area (Ives et al, 1996; Latter et al, 2000; Manias et al, 2002a; Roger and Jones 2000).

Courtenay (1991) states,

The finding that the clinical environment is where respondents learn the most must have implications for universities in regard to the amount of time nurses spend in clinical areas and the classroom.

Components of the pharmacology curriculum have changed frequently. Pharmacology was taught as a component of Human Bioscience 1 and 2 in first year and 3 and 4 in second year. Since 2003 pharmacology is no longer taught in Human Bioscience 1&2. In first semester of the second year of the BN, pharmacology is introduced formally in Human Bioscience 3 in 7 lectures. In second semester the pharmacology component in Bioscience 4 consists of 5 lectures which have tutorials, case studies and practical (laboratory sessions) associated with them.

During the second year of the BN, undergraduate students participate in their first substantial block of experiential learning/clinical experience. By introducing the pharmacology component of Human Bioscience in the second year of the BN it is hoped that undergraduates will be able to link theory with practice. This may have a positive impact in the future in providing a **better theory-practice link** between pharmacology theory and clinical application and would be worth researching. There are no formal pharmacology lectures in third year as it is incorporated informally in case studies for example into experiential learning in the clinical health care environment.

Most respondents stated they benefited from Legal Studies which was taught in third year. However they stated it made them more aware of their knowledge deficit in pharmacology. This is depicted by the following quote from a focus group participant:

It's interesting that they had a whole semester on, like we had a whole unit on legal issues just telling us what would happen to us if we did something wrong [all group members said yes & laughed] but we didn't have a whole block on telling us how to do it right in the first place.

Perhaps if Legal Studies were taught in first year this may emphasize the importance of learning pharmacology and the concepts of medication administration when the legal implications are explicit from the beginning.

Strategies ranked in order of importance which were used by respondents to improve or maintain pharmacology knowledge were clinical experience (working with drugs) 79%, the MIMS 69%, learning from other professional 56%, textbooks 54%, fellow nurses 44% and pharmacology in-service 40% (not everyone had access to this). Again this indicates that nurses benefit most from clinical practice, peer learning and self directed learning.

4.9. Enrolled Nurse upgrade course

An unexpected finding from this research, which first surfaced in the focus groups and was therefore explored with the surveys, was the lack of pharmacology and medication management education provided by the university for ENs who were upgrading to RN. As quoted by the focus group and survey participants who fitted this category, there appeared to be a general assumption by the School of Nursing that all ENs are medication endorsed, therefore the pharmacology and medication

administration component of their course was considerably less than the general graduate program. However many ENs were not medication endorsed. In the graduate program they undertake they are given credit for prior learning and therefore exempted from Supportive Care theory and practice which teaches the Nursing Board's Guidelines for Medication Administration, the Poisons Act and practical medication administration under the strict supervision of a registered nurse. They did 2 Bioscience units as compared to four in the general graduate program and this was where pharmacology principles were taught. For many, Legal Studies were optional. Participants who fitted this category felt that they had minimal pharmacology education during their course and this was a great concern to them.

...because you were an EN it was expected you just knew everything. It wasn't taken into consideration that you actually had deficits in your learning ...most of the RNs on the wards who haven't done their degree [believe] University teaches us everything.

Some found that their past acute nursing experience assisted in the learning process, but expressed concern that some ENs attending the Conversion Course had not nursed for years or had worked exclusively in the Nursing Home setting. They indicated that only those in their group who had previous acute experience were still practicing today despite upgrading.

You know I only know of 4 people who stayed in acute care and they were all people with nursing backgrounds like acute nursing backgrounds.

Some participants found that there was tremendous pressure on them once they qualified because of their previous nursing background to practice without support even though they had not worked in acute care previously. Enrolled nurses even when medication endorsed are only allowed to administer schedule 2, 3, and 4 medications under the supervision of a Registered Nurse and assist in schedule 8 medications according to their scope of practice (NBT, 2004). Their scope of practice does not allow administration of medications intravenously. One participant from the Conversion Course stated:

There appeared to be an assumption of prior knowledge and experience. For eg no classroom practice sessions for IV therapy- including IV drug administration. Although plenty of theory provided, [we were] told individuals were responsible to address own practice gaps.

This is a particularly important issue that needs to be investigated thoroughly and rectified by the School of Nursing.

Correlation statistics were performed to determine if there was a correlation between survey respondents and who stated that the undergraduate program **did not met** their overall learning needs to administer medications safely and errors made and there was no correlation found.

However it was discovered that of the respondents who had graduated from the standard BN course and stated their **needs were met**, to administer medications safely 63% had made medication errors and 37% had not. Of those who stated their **needs were not met** 71% had made medication errors and 29% had not. Over half of both groups had made errors.

Respondents who had graduated from the EN conversion course were asked the same question, of those whose **needs were met** 41% had made errors and 59% had not. Those whose needs **were not met** 50% had made errors and 50% had not. These two groups had made substantially fewer errors.

This perhaps suggests that previous experience in nursing (not necessarily in medication administration) had made these participants more aware of their responsibilities and the potential of medication errors and their consequences, and therefore they practiced more carefully. These participants had substantially less medication education in their course than the normal BN course as previously discussed. Another possibility is that their previous nursing experience had facilitated a theory-practice link allowing a better understanding of diseases and medication and so self-directed learning was more successful. This could perhaps further strengthen the argument that more clinical experience produces a safer practitioner. This finding could not be substantiated by other research as this study appears to be the first research done on the Enrolled Nurse conversion course in relation to medication administration as a RN.

4.10. Workplace Issues

Nursing has received a plethora of media attention due to issues such as staff shortages, ward closures and many nurses working double shifts. This featured predominantly in the focus group discussions. Issues such as trying to cope with inadequate medication administration knowledge and skills requiring constant and ongoing self-directed learning (to perform within their scope of practice), staff

shortages, learning time management and coping with shift work became very stressful and often resulted in illness. Some participants had small children at home and often did not get enough sleep at home due to sick children, raising concerns about accurate medication calculations. Many were also asked to preceptor undergraduate students when they still needed mentoring themselves.

...I spent 10 weeks on an acute clinical setting along with the undergraduates. This is not enough time to gain the knowledge about nursing in general, let alone pharmacy, to be able to perform within the scope required as a new graduate especially with the nursing shortage, lack of preceptor support and having to cope with shiftwork

As a consequence of these and similar comments, respondents to the surveys were asked to list the relative importance of factors such as mathematical skills, the undergraduate program, graduate program and workplace issues in contributing to medication errors. Forty four percent ranked workplace issues as a major contributor to medication errors, 38% mathematical skills, 31% undergraduate nurse education, 13% the graduate program. The undergraduate program however was still seen as a much greater contributor to medication errors at 31% than the graduate program 13% despite the inclusion here of unavoidable workplace issues.

Workplace issues rated the most important in causing medication errors were busy wards and illegible/unclear doctors writing. These findings were consistent with research conducted by Gladstone (1995). Illegible doctors' handwriting is considered an important issue in Australia and world wide. Some hospitals are trialling electronic systems for prescribing drugs which has been shown to decrease errors (Mills, 2003; Pallarino, 2002).

Widely reported media cover indicates that hospitals will continue to have their services stretched to the limit for some time to come and with our aging population one would assume this trend will continue. Latter et al (2000) state that if you have what appears to be a chaotic approach to the curriculum and top that off with a chaotic clinical experience in which the clients' needs are unmet due to inadequate staffing levels, the student will get lost. Manias and Bullock (2002a) note that a common problem perceived by students was that when clinical staff was extremely busy, there was a lack of productive learning experienced by the student in the domain of medication administration and management. It could be argued that it is the responsibility of the universities to provide the best possible education for our future nurses, and that they should not rely so heavily on busy hospitals to provide all clinical learning experiences. Rather, appropriate education should enable graduates to qualify with adequate knowledge and confidence to cope in busy environments. Research conducted by Leape et al (1995) found that lack of knowledge in medication administration accounted for 29% of the 334 medication errors that occurred in a 6 month period. When Manias and Bullock (2002b) interviewed clinical nurses and asked them for their perception of the knowledge graduate nurses had in relation to medication administration knowledge, they stated they had large deficits in this area and that current teaching and learning opportunities appeared to be inadequate.

This research indicates that there are still many areas where improvements to the Bachelor of Nursing can be made and although errors will undoubtedly still continue to occur, strategies can be utilised to keep medication errors to a minimum. As stated by one respondent:

An overall knowledge of drugs, actions, side effects, adverse reactions, incompatibilities etc **were unknown to me!** While there is a sharp learning

curve in the postgraduate year, I do believe patients are put at risk by receiving drugs by incompetent nurses.

4.11. Limitations of the Study

The observational study was a small scale study using only 10% of undergraduate students who had successfully completed the BN in 2002. It may not be representative of the entire cohort of students from that year. The fact that students volunteered for the study has relevance as it can be assumed that they had a measure of confidence in their ability. This type of study can suffer from artificiality, but in this case the environment used was a clinical setting which was familiar to the participants. The study is not generalisable and may have produced a reactive measurement effect which could have affected the results.

The focus groups all had a small sample size which again may not make the discussions representative of the entire population. Participants may have volunteered because they had a particular grudge to bear. However information from the focus groups was used predominantly as an adjunct to the literature review to inform the development of the surveys.

Because of the low response rate of the survey the findings are limited and generalisations are difficult to make. However they provide valuable insights into the teaching and learning of medication administration at the TSoN. Self reports are known to have a problem with accuracy as some respondents will answer to make a favourable impression rather than a truthful one. The credibility of the research however has been strengthened through triangulation as all three methods used, have

supported the findings. The major issues raised by these respondents have also been supported by other research findings in similar research as documented in the literature review of this thesis.

5. Chapter 5

Conclusion

The majority of participants in this research project (observational study, focus groups and the surveys) have demonstrated that they consider that they lack adequate knowledge in medication management as a new graduate to practise safely. Forty seven per cent of surveys respondents state they had little or no confidence in administering medications immediately after graduation. There was significant statistical correlation between age and confidence and errors and confidence. Confidence decreases with age and errors increase with lack of confidence.

The following is of relevance:

- Literature reviewed indicates that this problem is not endemic to Tasmania; the development of a best practice curriculum against which other curricula could be tested would introduce minimum standards to achieve better outcomes.
- Whilst confidence is associated with the acquiring of knowledge it is also related to the teaching and learning strategies used by a University.
- Issues raised indicate the research participants favor a learning approach that incorporates the principles of adult learning theory or andragogy where an experience based, learner centered facilitative approach is used. This approach is known to produce a more confident practitioner.
- Strategies that participants found most helpful in preparing nurses to administer medication safely were experiential practice/clinical practice, self-directed learning, case studies and textbook and readings.

Although this research is small and has limitations as discussed, findings suggest the TSoN needs to research its mix of academic and experiential practice. The principles of andragogy are acknowledged to produce more confident practitioners and this research has shown that medication errors increase with decreasing confidence. Andragogy encourages student input into the formulation of the curriculum to encourage deep learning through shared ownership of the learning activity (Burns, 1998). Respondents have clearly identified the need for more experiential practice during the BN to improve their knowledge, confidence and competence.

When participants were asked to rate their own knowledge in medication administration immediately after graduation, they rated it more highly than their perception of the knowledge provided to them by the undergraduate program. Results from the observational study were more consistent with the participants' perception of the knowledge provided by the undergraduate program. This overestimation of knowledge may potentate medication errors and could be addressed by having Legal Studies as a first year unit thus preparing them for their responsibilities in relation to the Poisons Act and under common law in relationship to the law of negligence. Discussions here include case studies detailing civil action taken against nurses who have made medication errors. This may ensure that students of Nursing take their studies in medication administration seriously. Survey participants have already indicated that Legal Studies highlighted the need for sound medication administration knowledge.

Fifty seven per cent of survey respondents and 44% of focus group participants had acknowledged making one or more medication errors (it must be assumed that some

respondents did not acknowledge their mistakes therefore the percentage is probably much higher). Reasons given for the errors were: failure to decipher the drug chart correctly; incorrect identification of the patient; forgetting to sign the drug chart with the patient getting a double dose and unclear doctors' orders or writing. All reasons except for doctors' writing, which is being addressed Australia wide, can be substantially improved through education. This issue needs to be addressed to reduce medication errors. Practical skills could be provided in clinical laboratory sessions at the university so students of Nursing can build on these skills and become competent when they are on experiential practice.

Five percent of survey respondents stated they had poor mathematical skills and all these people had made medication errors. Undergraduate students' mathematical ability should be assessed and strategies put in place to rectify this such as visualization of formulas using equipment in laboratories. Eighteen per cent of respondents stated they had excellent mathematical skills yet 60% had made a medication error (although only a small percentage admitted to making a calculation error) again indicating an overestimation of self knowledge. Screening of all students of Nursing would provide a more accurate assessment of mathematical ability and this screening may be necessary throughout the course. The early introduction of Legal Studies would highlight the need for a sound knowledge base in all aspects of medication administration.

Nursing subjects rated by the surveys respondents as being most helpful in ensuring safe medication administration as a RN were Acute Care (third year experiential); Legal Studies; Bioscience 1,2,3,4, Supportive Care (second year experiential) and

Acute Care (theory) equal third. The University appears to be relying heavily on the hospital system to provide practical skills for nurses. Practical skills should be provided in laboratory sessions at the University so that students can then build on these skills when they are on experiential practice. This did not appear to be happening during 1997-2000. Further research could be done in this area to ascertain if this has changed in recent years.

Fifty five percent of surveys respondents indicated that the undergraduate curriculum did not meet their overall learning needs to administer medication safely. The following are the reasons given:

- Pharmacology content in the course needs to be increased in breadth and depth.
- Pharmacology was taught as a component of the Biosciences and the amount taught was less than the amount needed to practice safely
- The theory was too complicated and not practice orientated
- The theory was fragmented and delivered well before clinical practice was undertaken making it difficult to form a theory-practice link
- Respondents indicated if theory was not linked to practice the learning process was hindered.

The majority of respondents preferred a more formalized means of learning medication administration either in specific unit or package that was linked to practice. Respondents indicated that there was a need for pharmacology principles to be addressed continuously throughout all three years of the course and whilst they

preferred pharmacology to be a separate unit, they wanted the principles to be reinforced in nursing subjects and increased clinical practice opportunities.

Legal studies were rated highly because it made the respondents aware of their knowledge deficit in pharmacology and medication administration, and the consequent risks to them in practice. This is a third year unit and if it were utilized earlier in the degree undergraduates may become more aware of their legal responsibilities and this may emphasize the amount of learning required to become a competent practitioner.

Strategies used to improve or maintain pharmacology knowledge were predominantly clinical practice and self directed learning either through readings or educational updates.

There appeared to be an assumption by the TSoN that all ENs are medication endorsed therefore the pharmacology and medication administration component of their course was considerably reduced as compared to the general undergraduate program. Many ENs were not medication endorsed and this lack of knowledge was of great concern to them, putting extra pressure on them in practice. ENs need to be screened prior to enrolment and those who are not medication endorsed should be asked to undertake the NBT Medication Package in addition to the other units of the RN conversion course.

Workplace issues rated the most important in causing medication errors were busy wards and illegible/unclear doctors' writing. The issue of doctors' writing is being addressed nation wide by trialing electronic systems for prescribing drugs. Whilst staffing levels and rostering are a current statewide problem, universities have a responsibility to provide adequate knowledge to undergraduates so that they can cope in busy ward environments.

The predominant issue raised by this research is that nursing is a practice orientated profession and in the area of medication administration the Bachelor of Nursing degree does not appear to have the correct mix of theory and practice to produce safe practitioners. More education is needed in the area of deciphering the drug chart possibly in a clinical laboratory at the University. Respondents have indicated they want more pharmacology education delivered in a structured format and related to episodes of clinical practice. Screening would be beneficial, to ascertain the level of mathematical skills of students, so deficits can be rectified. Teaching methods need to be examined and the principals of andragogy utilised to produce more competent and confident practitioners. This research indicates that a lack of knowledge and confidence is related to medication errors. The deficiency of pharmacology and medication administration knowledge in the EN upgrade course needs to be investigated and rectified. Whilst workplace issues, such as a busy ward, will continue to prevail and in some cases lead to medication errors, if graduates qualify with the necessary knowledge and skills, medication errors can decrease.

5.1. Recommendations

- Literature reviewed indicates that medication errors are not specific to Tasmania; the development of a best practice curriculum against which other curricula could be tested would introduce minimum standards to achieve better outcomes.
- Issues raised indicate the research participants favor a learning approach that incorporates the principles of adult learning theory or andragogy where an experience based, learner centered facilitative approach is used. This approach is known to produce a more confident practitioner.
- Research participants have indicated educators need to use approaches that stimulate students to develop a deep approach to learning. Teaching methods such as problem solving, case studies, clinical decision making activities, student based learning activities and experiential learning is preferred. They state lectures result in superficial learning which is quickly forgotten. Experiential learning was valued highly.
- The TSoN needs to research its mix of academic and experiential practice to acknowledge the principles of andragogy and their graduates stated needs for more experiential practice
- Research participants (focus groups and survey) have indicated that the University appears to rely heavily on the hospital system to provide practical skills for nurses. Practical skills should be provided in clinical laboratory sessions at the university so students of Nursing can build on these skills and become competent when they are on experiential practice.
- The majority of respondents found pharmacology difficult to grasp and preferred a more formalized means of learning medication administration and

pharmacology either in a specific unit or package, providing resources to refer back to, and linked to clinical practice.

- Pharmacology content needs to be increased in breadth and depth.

Suggestions from research participants are:

1. Education needs to be continuous and incorporated over all three years of the course.
 2. Research participants have suggested an increase in the amount of tutorials to improve integration of pharmacology theory and principals into clinical practice.
 3. Teaching methods such as case studies were preferred as well as more education in medication administration such as intravenous therapy.
- More education is needed in the area of deciphering drug charts. Educational components in this area of the curriculum need to be investigated.
 - Legal Studies is currently a third year unit, if it were utilized earlier in the degree undergraduates may become more aware of their legal responsibilities. This may emphasize the serious nature of medication administration and indicate more accurately the amount of learning required to become a competent practitioner.
 - There appeared to be an assumption by the TSoN that all ENs are medication endorsed therefore the pharmacology and medication administration component of their course was considerably reduced as compared to the general undergraduate program. Many ENs were not medication endorsed and this lack of knowledge was of great concern to them, putting extra pressure on them in practice. This issue needs to be investigated and rectified. ENs who

are not medication endorsed should undertake the NBT Medication Package in addition to the other units of the RN conversion course.

- Screening would be beneficial to ascertain the level of mathematical skills in students of Nursing so deficits can be addressed.

APPENDIX ONE

1.1 ADVERTISEMENT FOCUS GROUPS

1.2 INFORMATION SHEET FOCUS GROUPS

Medication Errors!

Are you
concerned?

Would
you
like to do
something
about it???

Your assistance
is required

If you are:

- . a **post-graduate nurse**,
from
- . the **TSON**, who
- . **graduated** between
1997-2000, and
would like to
participate ...

Please contact:

Karin Cuff
Tasmanian School of
Nursing
Ph. 03 63 24 3227

Masters by
Research in Nursing
project ...

Influence of the
undergraduate
pharmacology
curriculum on
medication
administration
in nursing.

A pilot study.

Information Sheet-Focus Groups

The title of the proposed investigation is:

Influence of undergraduate pharmacology curriculum on medication administration in nursing. A pilot study

Anecdotal evidence suggests newly graduated nurses lack confidence and competence in medication administration. Literature reviewed indicates there may be many contributing factors, for example lack of emphasis on numeracy in secondary schools, under-resourced graduate programs, work culture and the role of the undergraduate curriculum in the preparation of nurses for practice. With your help this research hopes to identify techniques and strategies to assist graduate nurses in their medication knowledge and practices.

The Chief Investigator will be Dr Kate Blackmore, Associate Professor Rural and Community Nursing

The Associate Investigator will be Ms Karin Cuff

Purpose of the Study

This research is being undertaken for a Research Masters in Nursing .

Criteria for inclusion or exclusion

Nurses who graduated from the Tasmanian School of Nursing within the period 1997-2000.

Study Procedure

You will be asked to volunteer to participate in a focus group discussion in your geographical region at one of the following three sites: the Launceston General Hospital, Royal Hobart Hospital, and Burnie Regional Hospital. Focus group discussions will take

place at a convenient location but not at the hospitals unless this is requested by all participants.

The discussion in the focus groups will centre on the following:

- Self-rating of medication administration
- Assessment of peer practice in medication usage and administration
- Key factors affecting safe practice that are unrelated to the undergraduate curriculum
- Impact of the undergraduate curriculum on practice as 1) a new graduate nurse and 2) a later graduate
- Relationship between what participants learned as students and what they have learned in practice
- What participants see as key learning strategies to change poor practice
- Would participants like to see any curriculum changes implemented and if so in what areas.

Should you agree to participate in this study, you and approximately 11 other volunteers at each site will be requested to sign a statement of informed consent. Once the consent form is signed and returned, meeting times will be arranged.

Each group meeting will take approximately an hour.

With your permission discussions will be tape-recorded, and notes taken down by the Associate Investigator. Focus group members will be requested to maintain the anonymity of the group and you will be asked to maintain confidentiality of all subject matter discussed during this process. You will also be invited to only share information that you feel comfortable with.

You will be asked to choose a pseudonym/other name for the purposes of the project. This name will be used on all transcripts and in the final thesis.

You will be able to access the thesis when it is written at the Tasmanian School of Nursing.

Participation is entirely voluntary and you are free to withdraw at any time without repercussions.

Contact Persons

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University of Tasmania
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Tasmanian School of Nursing
University of Tasmania
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Launceston, TAS 7250
Phone (03) 63 243227

Concerns or Complaints

This project has been approved by the Southern Tasmania Health and Medical Human Research Ethics Committee. If you have any concerns of an ethical nature or concerns about the manner in which the research has been conducted, please contact the Chair, Dr Helen McArdle (6222 8430) or the Executive Officer Mrs Amanda McAully (6226 2763)

APPENDIX TWO

CONSENT FORM FOCUS GROUPS

CONSENT FORM-FOCUS GROUPS

Title of project: Influence of undergraduate pharmacology curriculum on medication administration in nursing. A pilot study

*A statement by the **subject**, in the following terms:*

1. I have read and understood the 'Information Sheet' for this study.
2. The nature and possible effects of the study have been explained to me.
3. I understand that the study involves the following procedures:

Volunteers are being asked to participate in focus group discussions at three sites: the Launceston General Hospital, Royal Hobart Hospital, and North West Regional Hospital (Burnie).

The discussion in the focus groups will centre on the following:

- Self-rating of medication administration
- Assessment of peer practice in medication usage and administration
- Key factors affecting safe practice that are unrelated to the undergraduate curriculum
- Impact of the undergraduate curriculum on practice as 1) a new graduate nurse and 2) a later graduate
- Relationship between what participants learned as students and what they have learned in practice
- What participants see as key learning strategies to change poor practice
- Would participants like to see any curriculum changes implemented and if so in what areas.

The first 12 volunteers at each site will be sent detailed information about the research and requested to sign a statement of informed consent. Once the consent form is signed and returned, meeting times will be arranged.

Each group meeting will take approximately an hour.

4. I understand that focus group members will be asked to give written assurance to maintain the anonymity and confidentiality of the group.
5. I understand that all research data will be treated as confidential and that the investigator will maintain anonymity through the use of pseudonyms in the transcript and final thesis.

- 6. Any questions that I have asked have been answered to my satisfaction.
- 7. I agree that research data gathered for the study may be published provided that I cannot be identified as a subject.
- 8. I agree to participate in this investigation and understand that I may withdraw at any time without prejudice.

Name of subject

Signature of subject..... Date

-
- 9. A statement by the *investigator* in the following terms:

I have explained this project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

Name of investigator

Signature of investigator.....

Date

—

APPENDIX THREE

INFORMATION SHEET SIMULATED NURSE- CLIENT INTERACTION

Information Sheet-Simulated Nurse-Client Interaction

The title of the proposed investigation is:

Influence of undergraduate pharmacology curriculum on medication administration in nursing. A pilot study

Anecdotal evidence suggests newly graduated nurses lack confidence and competence in medication administration. Literature reviewed indicates there may be many contributing factors, for example lack of emphasis on numeracy in secondary schools, under-resourced graduate programs, work culture and the role of the undergraduate curriculum in the preparation of nurses for practice. With your help this research hopes to identify techniques and strategies to assist graduate nurses in their medication knowledge and practices.

The Chief Investigator will be Dr Kate Blackmore, Associate Professor Rural and Community Nursing

The Associate Investigator will be Ms Karin Cuff

Purpose of the Study

This research is being undertaken for a Research Masters in Nursing.

Criteria for inclusion or exclusion

This study involve a 10% sample of third year undergraduate nurses who have successfully completed their Bachelor of Nursing degree requirements, who have volunteered and consented to participate.

Study Procedure

In order to establish the role of the undergraduate curriculum in preparing students for clinical practice, a simulated interaction with a client/s is being used with 10% of the third year students of 2002.

At the time of the simulated interaction, eligible students will have finished their final assessments and have passed. You are being asked to volunteer to participate towards the end of second semester via clinical teachers who work with you. It is very important to note the research will have no effect on registration, results (which will be determined prior to this simulation), or future work prospects, and will be entirely confidential between the researchers and the student. You will be encouraged to participate in order to help your fellow students and future students in a difficult area of practice.

In the simulation, you will be given a medication chart (for the purpose of the study a Launceston General Hospital one will be used) for a particular patient. A person unknown to you will act as a patient in a bed in the clinical teaching facilities of the School of Nursing. You will be asked to administer medications listed on the chart to the 'patient'. You will be observed to assess your adherence to the legislated and mandated requirements for medication administration as stated in the Nursing Board of Tasmania guidelines for medication administration..

The following assurance is given, that you will not be identified by the researchers and will not be addressed by name during the simulated client interaction or in the thesis. You will be requested to maintain the anonymity of the participating group and will be offered a debriefing session at the conclusion of the simulation to discuss any issues arising from the process and feedback on your medication administration practice.

You will be able to access the thesis when it is written at the Tasmanian School of Nursing.

Contact Persons

Dr Kate Blackmore
Associate Professor Rural and Community Health
University of Tasmania
Ann O'Byrne Centre
Charles and Howick Streets
Launceston, TAS 7250
Phone (03) 63244055

Karin Cuff
Research Masters in Nursing Student
Tasmanian School of Nursing
University of Tasmania

Locked Bag 1-322
Launceston, TAS 7250
Phone (03) 63 243227

Concerns or Complaints

This project has been approved by the Southern Tasmania Health and Medical Human Research Ethics Committee. If you have any concerns of an ethical nature or concerns about the manner in which the research has been conducted, please contact the Chair, Dr Helen McArdle (6222 8430) or the Executive Officer Mrs Amanda McAully (6226 2763)

APPENDIX FOUR

CONSENT FORM SIMULATED NURSE- CLIENT INTERACTION

CONSENT FORM-SIMULATED NURSE-CLIENT INTERACTIONS

Title of project Influence of undergraduate pharmacology curriculum on medication administration in nursing. A pilot study

Influence of undergraduate pharmacology curriculum on medication administration in nursing. A pilot study

A statement by the subject, in the following terms:

1. I have read and understood the 'Information Sheet' for this study.
2. The nature and possible effects of the study have been explained to me.
3. I understand that the study involves the following procedures:

In order to establish the role of the undergraduate curriculum in preparing students for clinical practice, a simulated interaction with a client/s is being used with 10% of the third year students of 2002.

At the time of the simulated interaction, eligible students will have finished their final assessments and have passed. Volunteers are being called from the student body towards the end of second semester via clinical teachers who work with the students. It is very important to note the research will have no effect on registration, results (which will be determined prior to this simulation), or future work prospects, and will be entirely confidential between the researchers and the student. Students will be encouraged to participate in order to help their fellow students and future students in a difficult area of practice.

In the simulation, students will be given a medication chart (for the purpose of the study a Launceston General Hospital one will be used) for a particular patient. A person unknown to the students will act as a patient in a bed in the clinical teaching facilities of the School of Nursing. The students will be asked to administer medications listed on the chart to the 'patient'. Students will be observed to assess their adherence to the legislated and mandated requirements for medication administration as stated in the Nursing Board of Tasmania guidelines for medication administration..

4. I understand that students will be given the assurance that they will not be identified by the researchers and will not be addressed by name during the simulated client interaction or in the thesis. They will be requested to maintain the anonymity of the participating group. Students will be offered a debriefing session at the conclusion of the simulation to discuss any issues arising from the process and feedback on their medication administration practice.

Students will be able to access the thesis when it is written at the Tasmanian School of Nursing.

- 5. I understand that all research data will be treated as confidential, test results will be completely anonymous with only a number that has been assigned to each students appearing in the results.
- 6. Any questions that I have asked have been answered to my satisfaction.
- 7. I agree that research data gathered for the study may be published provided that I cannot be identified as a subject.
- 8. I agree to participate in this investigation and understand that I may withdraw at any time without prejudice to my academic standing within the Bachelor of Nursing program

Name of subject

Signature of subject..... Date

9. *A statement by the investigator* in the following terms:

I have explained this project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

Name of investigator

Signature of investigator..... Date

APPENDIX FIVE

INFORMATION SHEET SURVEY

Dear Colleague,

My name is Karin Cuff, I am a registered nurse and I am currently completing a Masters by research in Biomedical Science. My research topic is:

The influence of the undergraduate curriculum on medication administration in nursing.

Medication errors occur frequently and are something we all fervently hope won't happen to us. Not only do they have the potential for devastating and sometimes fatal effects for the patient but they can have serious consequences for us as nurses.

Medication errors in Australia are estimated to cause approximately 140,000 hospital admissions each year at a cost of \$380 million in the public hospital system alone. Medication errors occur in prescribing, dispensing and administration.

So why do medication errors happen?

Anecdotal evidence suggests newly graduated nurses lack confidence and competence in medication administration. Research in Australia and overseas indicates there may be many contributing factors, for example lack of emphasis on basic mathematics in secondary schools, under-resourced graduate programs, work culture and the role of the undergraduate curriculum in the preparation of nurses for practice.

With your help this research hopes to identify techniques and strategies to assist graduate nurses in their medication knowledge and practices. I have enclosed a survey that addresses many of the above issues. It will take you about 15 minutes to complete. I recognize that you are busy but hope you will be able to find the time to complete the survey and thus address some of the problems you and others may have encountered.

Yours gratefully,

Karin Cuff

APPENDIX SIX

SURVEY

Medication Errors. Are you concerned?



This survey is being conducted to inform a Masters by Research project. It has been sent to all nurses who graduated from the Tasmanian School of Nursing between 1997-2000. By completing this survey you will have the opportunity to assist fellow nurses in a difficult area of practice. It is completely anonymous. (It will take approximately 15 minutes)

The survey uses two question formats. The majority are a multi-choice format that requires a tick ✓ only. The other asks you to provide information in short answer form. This project has the approval of the Human Research Ethics Committee, University of Tasmania/Department of Health and Human Services.

All information provided will be kept in strict confidence.

Please return your survey by September 14th
2003
in the envelope provided

If you have any queries please contact

Karin Cuff

Ph. 64 357327

Email Karin.Cuff@utas.edu.au



Thank you for participating

Karin Cuff, Research Investigator

1. What is your age group?

Please place a tick ✓ in the appropriate box

20-29	30-39	40-49	50-59	60+

2. Are you male or female?

Please place a tick ✓ in the appropriate box

Female	Male

3. Where do you work?

5.1.1. Please place a tick ✓ in the appropriate box

North East	North	North West	South	South East

4. In what kind of setting do you work?

Please place a tick ✓ in the appropriate box

Acute Care Urban Hospital	Rural/ Regional Hospital	Community Health or Nursing Centre	Aged Care Facility	Multi Purpose Centre/ Service	General Practice Nurse	Other

If Other please specify

5. How long ago did you graduate from University?

Please place a tick ✓ in the appropriate box

1 Year	2 Years	3 Years

6. What was the period of time after you finished secondary school, and before you commenced your BN?

Please write the period of time in the appropriate box.

Year/s	Months

7. In what school year did you complete your secondary education?

Please place a tick ✓ in the appropriate box

Year 10	Year 11	Year 12

The next three questions ask you to compare your confidence in medication administration as a *new graduate* and *now*.

8. Were you confident that your medication administration was safe? (error free) **immediately after graduation?**

Please place a tick ✓ in the appropriate box.

Very Confident	Confident	A little confident	Not confident

8a. If you indicated in question 8 that you lacked confidence, how confident do you think you should have been, **immediately after graduation?**

Please place a tick ✓ in the appropriate box.

Very Confident	Confident	A little confident	Not confident

9. Are you confident that your medication administration is safe (error free) **now?**

Please place a tick ✓ in the appropriate box

Very Confident	Confident	A little confident	Not confident

10a. **Since** graduating are you aware of having made any medication errors?

Please place a tick✓ in the appropriate box.

Yes	No

10b. If yes, could you briefly describe what occurred and why you think it happened?

The next 4 questions ask you to compare your overall pharmacology knowledge *as a new graduate* with your overall pharmacology knowledge *now*

11. How would you rate your knowledge as a **new graduate** in the following areas?

Please place a tick ✓ in the appropriate box.

	Poor	Satisfactory	Good	V. Good	Excellent
Drug administration (the 5 Rights)					
Therapeutic effects of drugs					
Adverse effects of drugs					
Client education in regards to their medications					
Your legal responsibilities					

12. How would you rate your knowledge in the following areas **now**?

Please place a tick ✓ in the appropriate box.

	Poor	Satisfactory	Good	V Good	Excellent
Drug administration (the 5 Rights)					
Therapeutic effects of drugs					
Adverse effects of drugs					
Client education in regards to their medications					
Your legal responsibilities					

13. How would you rate the level of knowledge that the undergraduate program provided for **new graduates** in relation to the following areas?

Please place a tick ✓ in the appropriate box.

	Unsure	Poor	Satisfactory	Good	Very Good	Excellent	Don't know
Drug administration (the 5 Rights)							
Therapeutic effects of drugs							
Adverse effects of drugs							
Client education in regards to their medications							
Your legal responsibilities							

14. How would you rate the knowledge of your peers (nurses with similar education and experience to you) **now** in the following areas?

Please place a tick ✓ in the appropriate box.

	Unsure	Poor	Satisfactory	Good	V.Good	Excellent	Don't know
Drug administration (the 5 Rights)							
Therapeutic effects of drugs							
Adverse effects of drugs							
Client education in regards to their medications							
Your legal responsibilities							

15. How would you rate your basic maths skills prior to commencing your BN?

Please place a tick ✓ in the appropriate box.

Excellent	Very good	Good	Satisfactory	Poor

The next four questions seek your thoughts on the role of the undergraduate pharmacology curriculum in preparing you for practice as a Registered Nurse

16. How would you rate the contribution of each of the following Bachelor of Nursing **subjects** in ensuring safe medication administration as a RN?

Please place a tick ✓ in the appropriate box.

	Very helpful	Moderately helpful	Helpful	Somewhat helpful	Not helpful
Bioscience 1,2,3,4					
Supportive Care in Hospital and Community settings (Theory)					
Supportive Care (Experiential learning)					
Acute Care (Theory)					
Acute Care (Experiential learning)					
Legal Studies					
Professional studies					
Other					

If **Other** please specify.....

17. Which of the following teaching and learning strategies did you find most useful in preparing you to administer medications safely?

Please place a tick ✓ in the appropriate box.

	Very helpful	Helpful	Somewhat helpful	Not helpful	Don't know
Lectures					
Tutorials					
Laboratory sessions					
Experiential learning/clinical experience					
Self directed learning					
Problem solving					
Reflective practice					
Computer Assisted learning packages					
Case Studies					
Textbooks/readings					
Other					

If **Other** please specify.....

18. Please rank in order of importance, strategies you currently use to improve or maintain your pharmacology knowledge.

Please place a tick ✓ in the appropriate box.

	V. Helpful	Helpful	Unhelpful	Not applicable
Pharmacology in-service provided by place of work				
Clinical experience (working with drugs)				
Learning from your fellow nurses				
Learning from other professionals				
Textbooks and other pharmacology references				
Mims				
Internet resources				
Leaflets from drug companies				
Nursing journals				
Other strategies				

If Other please specify.....

19. What part of the undergraduate experience do you think was most helpful in developing the link between theory and practice in the administration of medications?

Please place a tick ✓ in the appropriate box.

	Very helpful	Helpful	Somewhat helpful	Not Helpful	Don't know
Lectures					
Tutorials					
Laboratory Sessions					
Experiential learning/clinical practice					
Self directed learning					
Problem solving approach					
Reflective practice					
Computer assisted learning packages					
Case studies					
Other					

If Other please specify.....

The next section relates to Enrolled Nurses only who recently completed their Bachelor of Nursing.

20. Did the undergraduate curriculum meet your overall learning needs to administer medications safely?

Place a tick ✓ in the appropriate box.

☐ **Yes**

☐ **No**



Go to question 24.

21a. If no, could you please explain the problem/s that you have identified?

21b. In your opinion, how could this problem/s be improved?

The next section relates to registered nurses with no previous nursing qualifications who recently completed their Bachelor of Nursing.

22. Did the undergraduate pharmacology curriculum meet your overall learning needs to administer medications safely?

Place a tick ✓ in the appropriate box.

☐ **Yes**

☐ **No**



Go to question 24

23a. If no, could you please explain the problem/s that you have identified?

23b. In your opinion, how could this problem/s be improved?

We know that many factors contribute to medication errors. This question asks you to rate the relative importance of the following well documented major factors.

24. In your experience, what is the relative importance of each of the following factors in contributing to medication errors?

Please rank them from 1 to 5, where 1 is a major contributor to medication errors and 5 does not contribute to medication errors.

Place a tick ✓ in the appropriate box.

	1	2	3	4	5
Math's skills					
Undergraduate Nurse Education					
Graduate Program					
Workplace issues					

Comment

25. If you have listed *workplace issues* as being important could you please indicate the relative importance of each in causing medication errors?

Please rank them from 1 to 5, where 1 is a major contributor to medication errors and 5 does not contribute to medication errors.

Place a tick ✓ in the appropriate box.

	1	2	3	4	5
Busy ward					
Shift work (e.g. late/early)					
Staff mix (e.g. RNs/ENs, permanent/casual)					
Home commitments (e.g. tiredness)					
Distractions (e.g. doctor's rounds, ill patient)					
Interruptions (e.g. phone calls, patient requests)					
Illegible doctors writing					
Unclear doctors orders (e.g. 8hrly with meals)					
New ward environment					
Unfamiliar medications					
Other					

If Other please specify.....

Thank you for taking the time to complete this survey. Your responses hopefully will benefit nurses in the future.

APPENDIX SEVEN

ETHICS PROPOSAL



UNIVERSITY OF TASMANIA

Research and Development Office
GPO Box 252-01
Hobart, Tasmania 7001 Australia
Tel: 03 62262763 Fax: 03 62267148
Email: Human.Ethics@utas.edu.au

**HUMAN RESEARCH
ETHICS COMMITTEE**

**APPLICATION: INVESTIGATION
INVOLVING HUMAN SUBJECTS**

INVESTIGATION NUMBER (Office use)		
TITLE of proposed investigation ⁱ Influence of undergraduate pharmacology curriculum on medication administration in nursing. A pilot study		
A. OUTLINE OF PROPOSAL		
Applicants ⁱⁱ		
Title/Name	Position	School or Discipline
Dr Kate Blackmore (Chief Investigator)	Associate Professor Rural and Community Nursing	Tasmanian School of Nursing
Ms Karin Cuff (Associate Investigator)	Lecturer in Clinical Nursing	Tasmanian School of Nursing
Contact details for chief investigator		
'Phone 63 244055 Fax 63 244007 Email Kate.Blackmore@utas.edu.au		
Purpose ⁱⁱⁱ This study is conducted as a requirement of a Research Masters in Nursing.		
Aims ^{iv} This research aims to investigate the role of the undergraduate pharmacology curriculum at the University of Tasmania School of Nursing in producing safe and competent medication administration by registered nurses in practice.		
OBJECTIVES. <ul style="list-style-type: none">• To test the preparedness of late-stage final year undergraduates for medication administration in unsupervised clinical practice.• To describe graduate nurses' perceptions of the role of the undergraduate curriculum in preparing them for practice.• To elicit the views of graduate nurses on the relative importance of the various components of the pharmacology curriculum, and on the most helpful educational strategies employed.• To identify techniques and strategies that may assist graduate nurses in their medication knowledge and practices.• To locate the problem within a national and international research context that has addressed this problem extensively.		

Justification^v

There is a substantial body of research and reporting, both nationally and particularly internationally, that demonstrates that medication errors are a major problem in health care. All members of the chain of health professionals involved from the prescriber to the person administering the medication, have been found wanting in terms of safe practice. (Roughhead, 199 Thornton, 1999, Pallarino, 2002, Audit Commission, 2001)

The key areas of nursing practice that have been identified to date as being problematic are:

- Overall pharmacology knowledge
- Therapeutic effects of medications
- Adverse effects of medications
- Client education in regards to medication administration
- Drug administration (omission, unauthorised drug, wrong dose, route, rate, dosage form, time preparation of the drug, incorrect administration technique)
- Legal aspects of medication administration (Ives et al, 1996, Latter et al, 2000, Gilliam and Chu, 1995, Manias et al, 1999, Roger and Jones, 2000)

Within Australia, limited research appears to demonstrate that the majority of registered nurses lack adequate knowledge to administer drugs safely. (Ives et al, 1996, p.13, Roger and Jones, 2000, Manias et al, 1999, p.23).

Ives et al sent a questionnaire survey to first year registered nurses whose details were on the Victorian Nursing Council's 1994 mailing list. Respondents were asked to complete one multi choice and one short answer question for each of the five areas related to medications, drug administration, therapeutic effect and adverse effect of drugs, client education and legal aspects of drugs. Test scores ranged from 16-92% with a mean score of 55%. (1996, p. 13)

At Edith Cowan University (WA), traditional methods of teaching medication calculations to undergraduate nursing students were not proving successful. Despite the use of comprehensive teaching methods, assessment failure rates were high with only 34% of students gaining 100% in their first medication exam. This prompted Roger and Jones to conduct research, which allowed students to visualise a given medication calculation problem and check the answer by using equipment and placebo drugs to try and reduce medication calculation errors. Students enrolled in the unit of medication calculations were asked to participate in the study. Students who volunteered were placed in either experimental or control groups. The experimental group, were given a practical skill laboratory course and the control group was taught in the traditional way. All students in the experimental group achieved 100% in their exam whilst in the control group 47% failed. (2000, p. 9-11) This appears to indicate that clinically-based, or clinically simulated teaching techniques, that is teaching that occurs in a close approximation of a real life situation for a new graduate, is more effective than many other pedagogical techniques.

Gillham and Chu conducted research with 158 pre-registration second year nursing students and found that they had a limited understanding of basic maths which accentuated medication errors. The most frequent errors were in division, formula use, multiplying fractions and approximation. (1995, p. 61) This may indicate problems in mathematical literacy at a secondary level.

Manias et al, after many years of involvement in the education of undergraduate nursing students at the University of Victoria, found that students appeared to have problems integrating scientific knowledge (pharmacokinetics) with nursing knowledge (drug administration). They have subsequently developed a CD-ROM incorporating clinical scenarios as a teaching guide and are evaluating its effectiveness. (1999, p. 28)
None of these studies have been replicated.

Within this context it is reasonable to assume that similar problems may exist in Tasmania. There certainly anecdotal evidence to suggest that some Tasmanian graduate nurses do not feel well prepared for practice. Personally, in my work both as a preceptor for School of Nursing students, and as an assessor of pharmacological competency for the Nursing Board of Tasmania, newly

graduated nurses have indicated that they lack confidence and competence in medication administration. Whilst there are many factors that may contribute to this situation, for example a lack of emphasis on numeracy in secondary schools, under-resourced graduate programs, and work cultures, there is a need to understand the role of the undergraduate curriculum in the preparation of nurses for practice.

The research design will be descriptive and draw on adult education theory and practice for assessment and analysis of the educational value of curricular materials and teaching and learning strategies. The study uses standard qualitative methods: focus groups; questionnaires; simulated nurse-client interaction; and documentary evidence. The triangulation will ensure validity of results, however, the population size makes generalisation difficult. Since this is a pilot study (it is the first of its kind in Australia, and uses only one school of nursing, in one state), generalisation is not mandatory. However, it will provide a significant basis for further research in other states.

Period of investigation ^{vi}

Commencement date	March 2002	Completion date	December 2003
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Funding ^{vii}

Source/potential source of funding and amount: Nil

Do the investigators have any financial interest in this project?	NO
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Review of ethical considerations ^{viii}

Has this protocol previously been submitted to the University Ethics Committee?	NO
---	----

Does this project need the approval of any other Ethics Committee?	NO
If 'YES', what is its current status?	

Relevant references^{ix}

List references

(b) By associate investigator;

Audit Commission, (2001), A Spoonful of Sugar Medicines Management in NHS Hospitals, The Audit Commission for Local Authorities and the National Health Service in England and Wales, December, p. 2-11

Gilliam D.M., and Chu S., (1995), "An analysis of student nurses medication calculation errors", Contemporary Nurse, Vol. 4 No. 2, June, p. 61-64

Ives G., Hodge K., Bullock S., Marriott J., (1996), "First year RN's actual and self-rated pharmacology knowledge." Australian Journal of Advanced Nursing September-November; 14(1): p.13-19.

Latter S., Rycroft - Malone J., Yerrell P., Shaw D., (2000), "Evaluating educational preparation for a health education role in practice: the case of medication education," Journal of Advanced Nursing, November; 32(5): P.1282-1290.

Manias E., Bullock S., Bennett R., (1999), "A computer-assisted learning program in pharmacology: integrating scientific and nursing knowledge," Contemporary Nurse, June;8(2): p.23-29.

Pallarino K., (2002), "To Curb Medical Errors. Patients Should 'Speak Up'." Reuters Health Information, p. 1

Roger M., and Jones,B., (2000), "A Comparative Analysis of the Effects of Using the Objective Structured Clinical Examination to teach Medication Calculations." Edith Cowan University Faculty of Communication, Health and Science School of Nursing and Public Health , Perth Western Australia (A project funded by a Faculty Research Grant), P.1-8. Unpublished Report

Roughead E.E., (1999), "The nature and extent of drug-related hospitalisations in Australia," Journal of Quality in Clinical Practice, March;(19): p.19-22.

Thornton P.D., (1999), "Towards safer drug prescribing, dispensing and administration in hospitals," Journal of Quality in Clinical Practice, March;(19): p.41-45.

B. PROCEDURES

Detailed procedures^x

Research will commence following the granting of ethics approval.

The method consists of a triangulated approach using 1) focus groups 2) surveys 3) simulated nurse client interaction and 4) documentary evidence.

1)

The sample population will consist of registered nurses who respond to notices displayed at the three major hospitals (North West Regional Burnie, Royal Hobart and Launceston general)(see appendix A) using the selection criteria.

Volunteers will be called to participate in focus group discussions. The first 12 volunteers at each site will be sent detailed information about the project and their involvement and a consent form. Once the consent form is signed and returned, meeting times will be arranged.

Focus groups with registered nurses will seek information on:

- Demographic information (including educational background)
- Self-rating of medication administration
- Assessment of peer practice in medication usage and administration
- Key factors affecting safe practice that are unrelated to the undergraduate curriculum
- Perceptions of the impact of the undergraduate curriculum on practice as 1) a new graduate nurse and 2) a later graduate

- Relationship between what they learned as students and what they have learned in practice
- What they see as key learning strategies to change poor practice
- What curriculum changes, if any, they would like to see implemented
- Key factors they have recognised that affect safe practice and are unrelated to the undergraduate curriculum.

Themes derived from the focus groups will be used to inform development of the questionnaire. An amendment to the ethics approval containing the questionnaire will be sent to the Ethics Committee as soon as it is developed.

2)

The questionnaire will replicate the themes discussed in the focus groups, but also include issues not covered in the preliminary list of issues prepared by the investigator. For example, nurses in the focus groups might discuss their difficulty with drug calculations when first encountering this in the undergraduate curriculum. This may be a reflection of secondary schooling and thus would require a question that explored their assessment of their numerical competency when entering the tertiary program.

Once the questionnaire is developed, it is proposed to send it to all nurses working in the state who fit the selection criteria (See Selection of Subjects). The Nursing Board of Tasmania has agreed to facilitate this using their database.

3)

Simulated client Interaction

In order to establish whether the undergraduate curriculum prepares students for clinical practice a simulated interaction with a client/s will be used with 10% of the third year students of 2002. At the time of the simulated interaction, eligible students will have finished their final assessments and have passed. Volunteers will be called from student cohort towards the end of second semester via clinical teachers who work with the students. The students will be informed in considerable detail that this research will have no effect on their registration, their results (which will be determined prior to the time of this simulation), or their future work prospects, and will be entirely confidential between the researchers and the student. Students will be encouraged to participate by an appeal to their collegiality and desire to help themselves and colleagues/fellow students in a difficult area of practice.

In the simulation, students will be given a medication chart (for the purpose of the study a Launceston General Hospital one will be used) for a particular patient. A person unknown to the students will act as a patient in a bed in the clinical teaching facilities of the School of Nursing. The students will be asked to administer medications listed on the chart to the 'patient'. The encounter should take no more than 15 minutes. Assessment of the students will be based on their adherence to the legislated and mandated requirements for medication administration in Tasmania. Students will be offered a debriefing session at the conclusion of the simulation to discuss any issue arising from the process and for feedback on their medication administration practice.

4)

Other data collection will also consist of:

- Hospital error statistics (Permission has been obtained from the DON of each hospital)
- Adverse medication errors documented by the Nursing Board of Tasmania
- Other information as provided by the Nursing Board of Tasmania.

This data will be useful to provide an insight into the problem in Tasmania. Such data is unidentifiable.

Data Analysis

Focus group data

There will be three focus groups each aiming for membership of approximately 8 nurses (24 nurses in total). Focus group discussions will be tape-recorded, and notes taken down by the Associate Investigator. Tapes and notes taken will then be analysed by thematic analysis with reference to the projects aims and objectives

Survey information

Survey data will be processed using statistical data analysis software (i.e. SPSS) The results will then be analysed and written up.

Simulated client interactions

A mark will be given for each assessable criterion as stipulated the Nursing Board's guidelines. Each nurse will be marked and the mean score will be used to indicate overall competence in relation to medication administration.

Other information such as data from the NBT will be analysed and incorporated into the overall analysis as appropriate.

Where is this project to be conducted?

The focus group discussions will be held at booked rooms at University sites in Hobart, Launceston and Burnie to facilitate access for nurses in those regions. Simulated client interactions will occur in the clinical teaching facilities of the Launceston campus. Generally, the project will be conducted from the Tasmanian School of Nursing at Launceston.

SUBJECTS

Selection of subjects ^{xi}

Essential criteria for participation in focus groups and questionnaire: the participants must have graduated from the Tasmanian School of Nursing within the period 1997-2000 to account for continuity in the pharmacology curriculum at the School of Nursing.

Simulated client interaction: participants must be third year undergraduate nursing students at the Tasmanian School of Nursing in 2002

Recruitment of subjects ^{xii}

- Registered nurses fitting the selection criteria will be asked to respond to notices displayed at the three major hospitals (North West Regional Burnie, Royal Hobart and Launceston general) for focus groups
- Nurses who respond to the survey sent out by the Nursing Board of Tasmania
- Third year undergraduate students will be asked by their clinical preceptors in practice if they would be interested in volunteering for the simulated client interaction.

Information about subjects

(i) State whether information will be identified, potentially identifiable or unidentified ^{xiii}

Information will be potentially identifiable

Focus groups will be undertaken at the Tasmanian School of Nursing sites, not at the members' place of work.

Focus group members will be asked to give written assurance to maintain the anonymity and confidentiality of the group, but this cannot be guaranteed. The focus will be on gathering evaluative information (nursing process), not the identity of individual participants. The investigator will maintain anonymity through the use of pseudonyms in the transcripts and final thesis.

Questionnaires will be sent to participants via The Nursing Board Of Tasmania with a stamped, self-addressed envelope. Information returned will be anonymous with no identifying data.

Third year nursing students will be allocated a number for the purposes of the simulated drug administration. Students will be given the assurance that they will not be identified by the researchers and will not be addressed by name during the simulated client interaction or in the thesis. Only the mean score of the group will be reported in the thesis.

Information from hospital statistics and Nursing Board of Tasmania is anonymous.

(ii) State source(s) of information ^{xiv}

Information will be obtained through focus group interviews, from survey information, simulated client interactions and documentary sources (hospital error statistics and NBT data).

(iii) Will data on individual subjects be obtained from any Commonwealth Government agency? ^{xv}
If so, name agency. No

Potential risks ^{xvi}

<p>Information obtained is not of a sensitive nature and the pharmacology program on offer at the University of Tasmania, School of Nursing is currently going through an accreditation process and this research aims to provide insight into the effectiveness of the curriculum.</p>
<p>Post contact ^{xvii}</p> <p>Participants will be informed that a copy of the thesis will be available at each of the three sites (LGH, NWRH and RHH) A copy will also be sent to The Nursing Board of Tasmania.</p>
<p>Remuneration ^{xviii}</p> <p>NA</p>
<p>Confidentiality and anonymity ^{xix}</p> <p>The focus will be on gathering information on the curriculum and on practice issues in medication administration rather than on individual participants during group discussions and simulated client interactions. Information gathered from the focus groups will not be of a sensitive nature. The focus groups will be across three different hospitals and not held at members' place of work. The focus group members will be requested to maintain the anonymity and confidentiality of the group and asked to sign a written assurance to that effect. They will be assured that all subject matter discussed during this process is to be regarded as confidential. They will be invited to only share information that they feel comfortable with.</p> <p>Surveys will be completely anonymous and confidentiality will be maintained by the researcher.</p> <p>Third year nursing students will be assigned a number as they undertake the simulated interaction. Their assessments will be held at the Tasmanian School Of Nursing with only the researchers present and 'patients' will be unknown to the students. The researchers are evaluating the curriculum not individual students. Test results will be completely anonymous with only a student number allocated by the researchers appearing on the result.</p> <p>Audiotapes, test results and focus group notes will be kept in a locked filing cabinet in the Tasmanian School of Nursing at the Launceston Campus of the University of Tasmania. Pseudonyms will be used to maintain anonymity.</p> <p>In line with the National Health and Medical Research Council (NHMRC) guidelines, audiotapes and transcripts will be kept for five years following the completion of the study by the chief investigator and then destroyed.</p>
<p>Administration of substances/agents ^{xx}</p> <p>No</p>
<p>Human tissue or body fluid sampling ^{xxi}</p> <p>No</p>
<p>Other ethical issues ^{xxii}</p> <p>No</p>
<p>Information sheet ^{xxiii}</p> <p>Yes</p>
<p>Consent form ^{xxiv}</p>

Yes

C. DECLARATIONS

Statement of scientific merit ^{xxv}

The *Head of School** is required to sign the following statement:

This proposal has been considered and is sound with regard to its merit and methodology.

G. FARRELL

(Name of Head of School)

(Signature)

16/5/02

(Date)

* In some schools the signature of the Head of Discipline may be more appropriate.

* The certification of scientific merit may not be given by an investigator on the project.

Conformity with NHMRC guidelines ^{xxvi}

The *chief investigator* is required to sign the following statement:

I have read and understood the *National statement on ethical conduct in research involving humans 1999*. I accept that I, as chief investigator, am responsible for ensuring that the investigation proposed in this form is conducted fully within the conditions laid down in the *National Statement* and any other conditions specified by the University Human Research Ethics Committee.

B. KUMAR

(Name of chief investigator)

(Signature)

13/5/02

(Date)

Conformity with code of practice: human tissue and body fluid sampling

The *chief investigator* is required to sign the following statement in relation to relevant research projects/teaching exercises:

I have read the Human Research Ethics Committee *Code of Practice: Human Tissue and Body Fluid Sampling* and confirm that this Code will be followed.

B. KUMAR

(Name of chief investigator)

(Signature)

13/5/02

(Date)

Signatures of other investigators ^{xxvii}

Karin Cuff

(Name)

K. Cuff

(Signature)

18/5/02

(Date)

APPENDIX EIGHT

FOCUS GROUP QUESTIONS

Focus Group Questions

I am going to ask you some questions about your confidence in medication administration

How confident did you feel immediately after graduation?

How confident do you feel now?

How confident do you think your peers were immediately after graduation?

I would now like to ask you some questions about safe practice.

Did you administer medications safely immediately after graduation?

Do you think you are safe now?

How safe do you think your peers were immediately after graduation?

I would like to discuss the pharmacology curriculum now.

Pharmacology was taught in the following areas;

Human Biology 1

Human Biology 2

Human Biology 3

Human Biology 4

Supportive Care in Hospital and Community Settings

e) Pharmacology theory

f) Experiential learning

Acute Care

g) Pharmacology theory

h) Experiential learning

How much knowledge did you gain from the biosciences?

Was any particular bioscience more beneficial than the others?

How much knowledge did you gain from Supportive Care theory?

How much knowledge did you gain from the 3 week practicums?

Was any particular area more beneficial?

How much knowledge did you gain from theory in Acute Care?

How much knowledge did you gain from practice?

Did they complement each other?

Was one area more beneficial than the other?

We all learn in different ways. The following methods are standard adult learning tools used by the University.

Lectures

Tutorials

Laboratory Sessions

Experiential learning

Self directed learning

Problem solving approach

Reflective practice

Computer assisted learning packages

Case Studies

Can you tell me which types of learning tools helped you the most in this area?

Should any other methods be included?

Which methods are the least beneficial?

Which method was most successful in helping you to link the theory to practice?

Now just some general questions.

What factors other than the nursing course affect medication practice?

How can poor practice be changed?

Are there any areas we have not covered that you would like to talk about?

Background data

How old are you?

Are you **male** or **female**? (Please circle)

Please state the number of years since graduation.

List the areas you have worked in since graduation.

.....
.....
.....

What is your current work area?

Which do you work? (Please circle)

Shift work

Day work

Night Shift

Other (please state).....

APPENDIX NINE

MARKING GUIDE ASSESSING THE CORE SKILL OF COMPLETING A PRESCRIPTION CHART

Core skill: Completing a prescription chart

Information to be written on the cover page of the chart:

1. Full and accurate identification details, including:

Name

Age

Hospital number

Ward

Consultant

2. Any allergies.

3. Details of any other treatments which the patient is receiving and for which there may be a separate chart, e.g.:

Anticoagulants

Insulin

Diet.

A completed prescription is shown in Figure 6.4. The key features are:

4. Clear and legible handwriting, in ink.

5. Drug name in capitals.

6. Correct generic name of the drug.

7. Doses appropriately spaced through the day.

8. Dated.

9. Stop date specified (for an antibiotic); in this case, a 7-day course.

10. Legible signature.

APPENDIX TEN

MARKING CRITERIA SIMULATED NURSE- CLIENT INTERACTION

Simulated Nurse-Client Interaction

	<u>Marking Criteria</u>	<u>Mark</u>
1. 5 th drug not signed by medical officer.	Noticed and queried 1 Noticed but given ½ Not noticed 0	
2. Name on armband and drug chart not corresponding.	Noticed 1 not noticed Fail	
3. Drug 4 ceased.	Noticed 1 not noticed 0	
4. Administered according to the 5 rights.	Right patient 1 Right dose 1 Right route 1 Right drug 1 Right time 1	
5. Client education: Action	Brief : Digoxin works on the heart ½ Digoxin strengthens and slows the heart beat 1 No education 0	
Side effects	Brief ½ main side effects 1 No discussion 0	
6. Took apex beat prior to giving digoxin.	Yes 1 No 0	
7. Checked and picked up out of date potassium chloride.	Yes 1 No 0	
8. Used standard precautions	Tipped pills into pill pot 1 Handled with hands 0	
9. Asked client to take the pills whilst supervising	Yes 1 No 0	
10. Signed drug chart	Yes 1 No 0	
11. Checked for allergy	Yes 1 No 0	
12. Noticed digoxin contamination	Yes 1 No 0	

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