A Descriptive Survey of the Nursing Workforce in Critical Care Units in Hospitals of the Western Cape Province

SUBMITTED TO THE UNIVERSITY OF CAPE TOWN

In partial fulfilment of the requirements for the degree

Master of Science in Nursing

Division of Nursing & Midwifery

School of Health & Rehabilitation Sciences

Faculty of Health Sciences

UNIVERSITY OF CAPE TOWN

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ACKNOWLEDGEMENTS

I hereby wish to acknowledge the support provided by the Critical Care Society of Southern Africa, especially the members and Committee of the Cape Western Branch whilst undertaking this study. I am particularly grateful to the President of the Society, and past Chairperson of the Branch, Prof. Andrew Argent for his amazing encouragement and unwavering support at all times. Associate Professor Minette Coetzee never failed to encourage and provide valuable comment. Her role as facilitator of the November 2004 Workshop was invaluable, and made a lasting impression of the power of being positive amidst a crisis. Thanks are extended to the Committee of the Cape Western Branch Critical Care Society of Southern Africa for the funding that made the study possible.

I would like to thank each and every Nurse Manager, Hospital Director and Medical Superintendent of the hospitals in the Western Cape who participated and made the data collection process possible. My sincere thanks go to each Unit Manager who took the time and effort to provide the data required, despite a heavy workload - each one deserves a gold medal. The co-operation from both the private and public sectors has been phenomenal indeed.

Special thanks to my supervisor, Mrs. Una Kyriacos, for keeping me on track despite my tendency to get side-tracked by the overwhelming need of the services, and other diverse activities, and teaching me what research is really all about. My thanks also to my co-supervisor, Mrs. Pat Mayers, for always being there to encourage when the road ahead looked awfully daunting. Grateful thanks to Prof. Elmarie Terblanche for her guidance with the statistical analysis and helping to make sense out of the many numbers.

Many thanks are due to my boss, Dr. Ricky Raine, for understanding the needs of a post –graduate, part-time student who has to conduct research in-between the rest of the day's activities, and merely nodded when I ranted and raved or was given to fits of despair. Thanks are also due to my other boss, Prof. Lance Michell for his support and patience. And to my colleague, Dr. Ivan Joubert, for his valuable input during the entire study, always providing commonsense contributions to my many queries with his knack of clarifying concepts so that the rest of humanity can understand. Thanks are also due to Dr. Richard van Zyl-Smit, another colleague who was always

ready to help clarify concepts and contribute to our understanding of critical care service.

Many, many thanks are due to my long-suffering family, in particular, my husband, who had to share my precious time for many months with the research project, not understanding what it was about but always ready with a cup of tea. Thanks to my Mother who never failed to pray for me, and made do with short visits.

Lastly, but most importantly, my eternal thanks are to God for providing the strength to carry on, and eventually finish the study, despite the hurdles which He knocked down one by one. He is truly awesome.

My only wish is that this work will make a positive contribution to the delivery of service to critically ill patients by the provision of quality nursing care.

ABSTRACT

Introduction: A global shortage of Registered Nurses (RNs) has been reported internationally, and confirmed in South Africa by the National Audit of Critical Care services. Critical Care Nurses (CCNs) especially are in great demand and short supply. This has affected the quality of patient care.

The purpose of this study was to perform a workforce analysis and needs assessment of critical care nursing services in the Western Cape Province as at 1 January 2005.

The study design is a descriptive survey conducted on site in the critical care units of the private and public sector hospitals of the Western Cape, using a structured questionnaire, with a 96.5% return rate.

Findings showed that the 35 hospitals surveyed in the public and private healthcare sectors had 80 functional critical care units including Intensive Care Units and High Care Units for adults, children and neonates, and High Dependency Units for adults. Factors that contribute to the demand for critical care nurses include the number of critical care beds, patient admissions, severity of illness, available facilities, medical, nursing and support staff.

Compared to internationally accepted norms, the Western Cape units have a deficit of 74% of Registered Nurses (RNs) in the public sector hospitals, and a deficit of 82% in the private sector. This equates to an actual shortage of 3010 RNs for both sectors. If all categories of nursing staff are included in the calculation, the public sector meets 49% of its requirements and the private sector 24%. Half of the private sector and 28.9% of the public sector Registered Nurses are Critical Care Nurses. Few measures appear to be taken to recruit and retain nursing staff. The number of students being trained at both the undergraduate (300 during 2004) and the post-graduate (80 CCNs during 2004) level at the educational institutions, in conjunction with the hospitals, is inadequate. Clinical training institutions are available, but the numbers of educators and clinical mentors are inadequate to train the number of nurses required to meet the demand.

Keywords: *critical care nursing, intensive care, nurse staffing, workforce, scoring systems, and open unit.*

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OPERATIONAL DEFINITIONS AND ABBREVIATIONS

Critical Care is the provision of competent, specialised care to the critically ill patient, irrespective of age, in a specially designated and technically equipped unit within a hospital, that is "care for patients who have potentially recoverable conditions who can benefit from more detailed observation (with or without invasive treatment) than can be provided safely in an ordinary ward" (Cronin, Nielsen, Spollen, and Edwards, 2004 p. 1). This definition includes both Intensive Care (Level 3) and High-dependency Care (Level 2 that is High Care in South Africa), as per the UK DoH critical care modernisation plan of May 2000 described by the Expert Group (UK DoH, 2000).

Critical Care Nurse (CCN): A CCN is defined as a registered nurse who has the right knowledge, skills, and competencies to meet the needs of a critically ill patient without direct supervision (Royal College of Nursing, 2003a p. 3).

In the South African context a Critical Care Nurse (CCN) is a nurse registered with the South African Nursing Council (SANC) as a critical care clinical nurse specialist having completed a post-registration qualification in Critical Care Nursing, (either adult or paediatric), at a SANC-accredited institution, and defined as "a nurse who has chosen critical care nursing as a specific career path through experience and education, and is licensed by the regulatory body (that is SANC), for an expanded role based on a recognised qualification, and practices in this specific (clinical) area" (SANC Scope of Practice Regulations, 1997 p. 1).

"**Critical Care Nursing** is specialised nursing care of critically ill patients who have manifest or potential disturbances of vital organ functions. Critical care nursing means assisting, supporting and restoring the patient towards health, or to ease the patients' pain and to prepare them for a dignified death" (World Federation of Critical Care Nurses Constitution 2001, in WFCCN 2001-2005 Report, p. 17).

CCSSA: Critical Care Society of Southern Africa, an organisation of South African healthcare professionals who have specialised in the field of Critical Care, including various members of the multidisciplinary team, who provide a service in the context of critical care medicine related to patient care, teaching and/or research (CCSSA Constitution, 2002).

CCU: Coronary Care Unit, an Intensive Care Unit dedicated to providing critical care to patients with cardiac conditions.

Critical Care Units are specialised areas within a hospital that provide different levels of critical care services to critically ill patients, including Intensive Care Units that are able to provide Level 3 care, and High Care Units that are able to provide Level 2 care (levels as defined by the UK DoH Expert Group, 2000).

CWB: Cape Western Branch of the Critical Care Society of Southern Africa.

DoH: Department of Health.

Enrolled Nursing Auxiliary (ENA): In South Africa, an ENA means a person enrolled as such under section 16 of the Nursing Act, No. 50 of 1978, as amended.

According to the proposed new Nursing Act, an auxiliary nurse is a person who is educated to provide elementary nursing care in the manner and to the level prescribed under the proposed new Nursing Act (Nursing Bill, 2005).

Enrolled Nurse (EN): In South Africa, an EN (or staff nurse) means a person enrolled as a nurse under section 16 of the Nursing Act, No. 50 of 1978, as amended.

According to the proposed new Nursing Act, a staff nurse is a person educated to practise basic nursing in the manner and to the level prescribed under the proposed new Nursing Act (Nursing Bill, 2005).

Health care worker (HCW): A HCW is defined as an unregistered health care assistant, or unlicensed assistive personnel (UAPs) defined by the American Nurses Association as "individuals who are trained to function in an assistive role to the registered nurse in the provision of patient/care activities as delegated by and under the supervision of the registered professional nurse" (Zimmerman, 2000).

High Care Unit (HCU): A HCU is a designated area within a hospital that provides Level 2 care (UK DoH Expert Group, 2000) to acutely ill patients, capable of providing a high standard of general intensive care including basic cardiovascular monitoring. This definition supports Single Organ Support units.

High Dependency Unit (HDU): A HDU is a designated area within a hospital that provides Level 1 care (UK DoH Expert Group, 2000), that is a level of care intermediate between that available on a general ward and a HCU. It should be able

to provide care for patients at risk of their condition deteriorating, or those recently relocated from higher levels of care.

Intensive Care Unit (ICU): An ICU is defined as a designated area within a hospital that is specifically equipped to provide Level 3 care for critically ill patients, defined as advanced respiratory support (essentially endotracheal intubation and mechanical ventilation) alone, or basic respiratory support together with support of at least two organ systems (Cronin, Nielsen, Spollen and Edwards, 2004 p. 2 and p. 14). An ICU is capable of providing comprehensive critical care including complex multi-system life support including mechanical ventilation, renal replacement therapy, inotropic support and invasive cardiovascular monitoring.

ICUs are included in the definition of Critical Care Units.

Intensive Care: A service for patients who have potentially recoverable conditions, who can benefit from more detailed observation and invasive treatment than can be provided safely in an ordinary ward or high-dependency area. It is usually reserved for patients with threatened or established organ failure, often arising as a result or complication of an acute illness or trauma, or as a predictable phase in a planned treatment programme (British Intensive Care Society, 1997).

JFICANZCA: The Joint Faculty of Intensive Care Medicine of Australia and the New Zealand College of Anaesthetists.

MTS: Modernisation of Tertiary Services (SA).

Nursing SGB: Nursing Standards Generating Body, a body registered in terms of the South African Qualifications Authority (SAQA) Act No. 58 of 1995.

Nursing staff: All categories of nurses who work in the ICUs of the Western Cape, namely Enrolled Nursing Auxiliaries, Enrolled Nurses, Registered Nurses and Critical Care Nurses.

Nursing Workload Assessment refers to a score allocated to interventions and activities related to patient (and family) care to measure nursing workload.

PGWC: Provincial Government of the Western Cape.

Registered Nurse (or Professional Nurse): Is a person registered as a nurse under section 16 of the Nursing Act, No. 50 of 1978, as amended.

According to the proposed new Nursing Act, a professional nurse is a person who is qualified and competent to independently practise comprehensive nursing in the manner and to the level prescribed and who is capable of assuming responsibility and accountability for such practice, under the proposed new Nursing Act (Nursing Bill, 2005).

SAJCC: The Southern African Journal of Critical Care.

SAQA: The South African Qualifications Authority, established under the SAQA Act, No. 58 of 1995.

SASA: South African Society of Anaesthesiologists.

Staffing norms refer to the staffing requirements calculated for a particular work area that would meet the minimum standard of care provided by a specific service, for example the number of nursing staff required to provide safe patient care in a critical care unit, expressed as nurse-patient ratios, based on calculations that include several factors including nurse qualification and patient acuity.

Support staff are defined as staff other than nursing staff working in the ICU, who are available to perform non-nursing tasks for example, administration, lifting of paralysed patients and domestic duties, such as clerks, porters and housekeepers respectively (JFICANZCA Intensive Care Policy, 2003, and WFCCN Position Statement, 2005b).

Western Cape: Western Cape Province of South Africa.

WFCCN: World Federation of Critical Care Nurses.

Workforce analysis and needs assessment refers to an analysis of present staffing and an assessment of staffing needs of a particular work area, by investigating the factors that contribute to the demand and supply of staff.

Workforce planning for health is the process of estimating the required health workforce to meet future health service requirements and the development of strategies to meet those requirements. Essentially health workforce planning aims to balance workforce supply with requirements (Australian Health Workforce Advisory Committee (AHWAC) Report, 2004 p. 14).

CHAPTER 1

1. INTRODUCTION

A shortage of all categories of nurses within the various health services has been recognised as a global nursing crisis by a number of nursing organisations, including the International Council of Nurses (ICN, 2004 and ICN, 2006) and the British Association of Critical Care Nurses (BACCN, 2001). The ICN has identified the global shortage of Registered Nurses in particular as a crucial issue. Sufficient workforce capacity is required to enable health systems to function effectively (ICN Report, 2004). "Although the challenges of developing the health workforce vary greatly between and within countries, the absolute shortage of health personnel, particularly in sub-Saharan Africa, is recognised as the principal constraint to achieving the Millennium Development Goals and other health goals" stated by Buchan and Calman (ICN Report, 2004 p. 7) citing from conference proceedings of the World Health Assembly held in May 2004. These goals aim to improve the health and wellbeing of the global population. "A nursing shortage has a major negative impact on healthcare - failure to deal with a nursing shortage – be it local, regional, national or global – is likely to lead to failure to maintain or improve health care" (ICN Report, 2004 p. 7). Coffman, Spetz, Seago, Rosenoff and O' Neil (2001) conducted a study to describe the nursing practice and education issues in California, USA, reporting that, "as the largest, most widely dispersed, and most flexibly deployed of all of the health professions, nursing is the backbone of the health care delivery system. Without nursing, many of the services that are taken for granted would not be available or would be seriously compromised" (2001, p. i).

Specialists such as Critical Care Nurses (CCNs) are in great demand and in short supply. An international survey reported a widespread shortage of CCNs (Williams, Chaboyer, Thornsteindottir, Fulbrook, Shelton, Chan and Wojner, 2001). In the United States the situation has been described as the Critical Care Crisis with the demand for nurses outstripping the supply, and projections looking grim (Kelley, Angus, Crandall, Ingbar, Johanson, Medina, Sessler and Vender, 2004). This rising shortage of CCNs has resulted in a worldwide crisis, and the situation is particularly acute in South Africa. According to the South African Nursing Council (SANC) more than 1000 nurses (categories not specified, but likely to be registered nurses,

with or without post-registration qualifications) requested verification of their qualifications to be sent to health agencies abroad, in the time period from January to May 2004 (Bailey and Hawker, 2004). The average number of verifications requested from 2001 to 2003 was 4000 per annum (SANC Statistics, 2004). This request is usually made by a nurse with the intention of registration for the purpose of work outside of South Africa, often in the United Kingdom (UK) or Saudi Arabia.

Critical Care service delivery in both the public and private healthcare sector is dependent on a team of specially trained staff, the majority of whom are nurses who form the backbone of the service. The provision of an adequate nursing workforce is guided by norms applicable to specific areas such as intensive care/critical care. The BACCN position statement on nurse-patient ratios in critical care (BACCN, 2001 p. 59) is that "the one-nurse-to-one-patient ratio in intensive care has been the gold standard since it was first advocated by the British Medical Association working party in 1967". This ratio, set out in guidelines on qualified staffing for critical care, is suggested "to provide safe, research based and individualised patient care when nursing those who are unconscious, critically ill and requiring mechanical ventilation" (BACCN, 2002 p. 4). However, because of the continued shortage of intensive care/critical care trained nurses and the expense of nursing costs in particular related to intensive care, health care managers have had to rethink nurse-patient ratios. The Critical Care Forum of the Royal College of Nursing (RCN, 2003b p. 257) reports that "providing the right nursing care for critically ill patients is not simply a matter of applying standard nurse-to-patient ratios. The skill of the nurse, the complexity of the patient's needs and the physical environment of care will all influence nursing requirements". The Position Statement on the Provision of Critical Care Nursing Workforce of the World Federation of Critical Care Nurses (WFCCN) is that "[D]evelopment of the nursing workforce within critical care units requires careful planning and execution to ensure an appropriate balance and mix of staff skills and attributes that allow for safe and effective care. In parallel is provision of a learning environment for novice critical care nurses, a flexibility to respond to changes in demand and efficiencies to ensure economic sustainability without clinical compromise" (WFCCN, 2005b preamble). The shortage of appropriately trained nurses affects the quality of care delivered to patients, particularly in the speciality areas such as critical care units.

Results of studies reviewed by the BACCN (2001 p.60) showed that when the nurse-to-patient ratio was reduced there was "an increase in the time taken to wean patients from mechanical ventilation, and an adverse effect on nosocomial infection rates, patient re-admission rates, complications, medication errors, wound infection, patient injuries and patient deaths." There also appears to be an increase in the number of medico-legal incidents in South Africa, as indicated by an increase in the number of disciplinary hearings conducted by the SANC (ka Mzolo, 2002), and lack of care observed in practice, indicating that patient safety is being jeopardised. Pronovost, Dang, Dorman, Lipsett, Garrett, Jenckes and Bass (2001) found that the length of stay in ICU increased and more complications arose when fewer ICU nurses (that is CCNs) were available per patient. "Several international studies found that insufficient staffing levels expose nurses to medical and legal errors and risks. These studies have shown that there is no question that the safety and quality of care provided in health facilities is directly related to the number and staff's mix of direct care nursing staff' (Zondagh, 2004 p. 20). The delivery of quality patient care in Adult, Paediatric and Neonatal Intensive Care Units requires reasonable numbers of appropriately trained nurses. For this study, appropriately trained nurses refer to critical care nurse specialists (CCNs) (RCN, 2003a). Valerie Day, on behalf of the Expert Group in their review of the United Kingdom critical care services (UK Expert Group, 2000 p. 3), stated: "[W]hile no patient would wish to need critical care, those who experience the service, and their relatives, should be confident that they have received the best possible care".

Although there are verbal and reported incidents of inadequate nurse staffing of ICUs in South African hospitals, only one document, published by the South African Society of Anaesthesiologists (SASA, 1999), refers to formal staffing norms that have been developed for South African ICUs. This document suggests a minimum nurse-to-patient ratio of 1.5 ICU nurses for each category 3 (tertiary ICU facility/the most critically ill) patient, with not less than 50% of nurses with intensive care training (SASA, 1999 p. 23). The extent of the shortfall of trained nurses, especially CCNs, is however not known, and data is required to quantify the problem. Various factors contribute to this situation, none of which are new, or particularly unique to South Africa.

1.1 Contextual background to the research problem

In November 2001, concern arose regarding a perceived decline in the quality of nursing care provided to patients in the ICUs of the hospitals in the Western Cape. In her capacity as secretary of the Cape Western Branch of the Critical Care Society of Southern Africa (CCSSA), the researcher initiated a process of workshops and meetings to address this concern (Appendix 1). These meetings and the subsequent processes have specifically been undertaken under the auspices, and with the support of the CCSSA. The Society is an umbrella organisation of critical care professionals, working in all sectors of healthcare delivery, public and private, adult, paediatric and neonatal. Membership includes all the members of the multidisciplinary team, with the majority being nurses.

Critical care service delivery depends on a multidisciplinary team, ideally including the following: a critical care specialist as medical director, with a team of nurses including critical care nurses and registered nurses, specialist services such as clinical technologists, physiotherapists, dieticians and administrative and support staff. Of these team members, only nurses provide unbroken 24-hour shifts of bedside care. The Constitution of the Republic of South Africa, Act No. 108 of 1996, implies that it is the right of each critically ill patient requiring intensive care and admitted to an ICU to expect quality health care, including competent nursing care (Whittaker, Green-Thompson, McClusker and Nyembezi, 2000). The reality in South Africa appears to be far from the ideal, as the shortage of nurses in general, and Critical Care Nurses (CCNs) in particular, who are available to work in the ICUs, is reportedly impacting on service delivery. According to Bailey and Hawker (2004 p. 1) "the Provincial Health Department has reported that about 1700 of the 9500 (that is 18%) nursing posts in the Western Cape are vacant". The shortage of CCNs is not a new problem, but the severity of the problem has increased to a point where patient care is being compromised. In an interview conducted by Bailey and Hawker (2004 p 1), Clow states "intensive care units, (operating) theatres and labour wards are under the worst pressure regarding staff shortages".

The problem however, is not limited to South Africa (Global – ICN and the Florence Nightingale International Foundation, 2004; Australia - Williams *et al*, 2001; United States of America (USA) – Kelley *et al*, 2004; Balmes, 2003; United Kingdom – Audit Commission 1999; Africa – Dugger, 2004). In 2002 Calhoun found that in the

USA the shortage of nurses ranged from 8% to 20% (Calhoun, 2002). This is supported by a report published by the U.S. Department of Health and Human Services in 2002 (USA DoH, 2002). Healthcare providers and professionals throughout the world are concerned about the impact of nurse shortages on service delivery, and specialised areas such as Critical Care are especially at risk. "A projected 6% growth in the supply of nurses will not match a projected 40% increase in demand by the year 2020. The situation is more problematic in critical care with nurse vacancy rates at 20% and rising" (Kelly *et al*, 2004 p. 1514). The problem requires urgent attention if the predicted consequences of the lack of appropriately trained nurses are to be taken seriously. The impact on the quality of patient care seems obvious, but it is the researcher's opinion that patient care is indeed being compromised due to a perceived increase in medico-legal incidents. According to Calhoun (2002 p. 41), "the rising shortage of nurses in the United States has resulted in unnecessary loss of life, inappropriate care, unnecessarily extended hospitalisation, and additional costs of care". However, addressing the problem in a meaningful manner requires data to quantify the magnitude thereof.

1.2 Problem statement

A shortage of nurses in the Western Cape Province, particularly CCNs, has resulted in an apparent adverse effect on the delivery and quality of critical care nursing services and ad hoc temporary 'closure' of ICU beds. The actual shortage of registered nurses working in critical care units and, in particular, Critical Care Nurses, has not been adequately quantified in the South African context, other than preliminary data from the National Audit of Critical Care (CCSSA, 2005), nor have the factors been explored that contribute to both the supply and demand of nurses, in effect a workforce analysis and needs assessment. Data is therefore required to quantify the deficit between demand and supply.

1.3 Research Question

What is the actual shortage of registered nurses working in the critical care units, and, in particular, Critical Care Nurses, compared to the requirements of the units of the hospitals of the Western Cape Province, and what factors determine these requirements?

1.4 Purpose of the study

The purpose of this study was to perform a workforce analysis and needs assessment of critical care nursing services in the Western Cape Province by conducting a survey of the critical care units of the hospitals, and the educational institutions of the Western Cape Province between 1 January 2004 and 30 November 2005 to provide data to quantify the deficit between demand and supply of CCNs.

1.5 The aim

The primary aim of the study was to establish the actual number of nurses working in the critical care units, that is, the Intensive Care Units and the High Care Units, of the public and private sector hospitals of the Western Cape.

The secondary aim was to investigate selected factors that contribute to the demand and supply of critical care nursing staff, including the potential supply via the educational institutions.

1.6 Objectives

In order to perform a workforce analysis and needs assessment the following objectives were achieved:

1. To describe the profile of the critical care services in the hospitals of the Western Cape Province.
2. To establish whether staffing norms for ICUs in the Western Cape are available.
3. To describe the actual number and qualifications of the nurses, including CCNs, currently working in the ICUs of the Western Cape hospitals, in both the public and private sectors.
4. To identify the educational institutions and clinical resources that provide Registered Nurse and/or Critical Care Nurse training in the Western Cape Province.
5. To establish the number of Registered Nurses and CCNs being trained by the educational institutions of the Western Cape Province.
6. To establish if any recruitment and retention methods are employed by the services for critical care units.

1.7 Assumptions

The investigator has been a registered nurse for 26 years, of which 22 years have been as a CCN. Experience as a CCN includes full-time clinical practice, critical care nurse education and clinical research in the critical care units and therefore she feels able to comment on the quality and standard of practice and unit staffing.

The demands of the service are great, and the conditions under which most nurses have to practice are extremely stressful. Demands are placed by the service, the administrators, medical practitioners and also by patients. Every Nurse Manager spends a significant part of his or her working day trying to find staff to fill the gaps in the shifts for every working day. There is a shortage of nurses in all ICUs and a diminishing pool of agency nurses shared by all the hospitals. Questions are raised about what constitutes appropriate nurse-to-patient ratios, what skills are required by the nurse caring for critically ill patients, how to differentiate between Intensive Care and High Care, the deficit in the quantity and deficiencies in the quality of students coming through the system, why new graduates cannot be used effectively in the services, the lack of commitment of the new recruits, the lack of caring and compassion, and the lack of insight and support from administrators. There seems to be consensus amongst nurses that the quality of nursing care is deteriorating, mostly related to the overwhelming workload rather than a lack of effort by the nurses. The public sector situation seems more desperate than the private sector.

CHAPTER 2

2. LITERATURE REVIEW

A review of the critical care literature was undertaken. PubMed and CINAHL databases were searched for the terms: *critical care nursing, intensive care, nurse staffing, workforce, scoring systems, and open unit.* Only English-language articles were reviewed. In addition, related publications such as Government reports and Position Statements were reviewed and a search of the World Wide Web, using keywords, was conducted. Recent literature was sought, but specific articles of original works were also reviewed for their contribution to the concepts under discussion.

A literature review was specifically undertaken to identify variables suitable for performing a nursing workforce analysis and needs assessment. Findings from both the international and South African literature revealed that in an attempt to quantify the demand for staffing needs in a designated area such as an ICU, a Review or an Audit of the entire service is required, as the composition of a comprehensive service is multi-dimensional. The following factors, identified by The UK Expert Group (2000), Cronin, Nielsen, Spollen and Edwards (2004), SASA (1999), the Critical Care Society of South Africa (2005) and World (2004), contribute to determining staffing needs:

- Defining the type of service, namely Critical Care, including levels of care as described by the UK Expert Group (2000 p.10), provided by the designated area, for example the Intensive Care Unit, or categories of ICUs according to SASA (1999 p. 22).
- Determining the patient population served, for example age and gender, and admission types and indications (Cronin *et al,* 2004 p. 2).
- Establishing the provision of services within designated geographical areas served by the critical care services (CCSSA Audit, 2005).
- Determining the demand for critical care, including establishing the profile of an ICU patient, including severity of illness, and quantifying the demand from both within and outside of the hospital, including admissions and refusals or unmet demand (Cronin *et al,* 2004 p. 3-4).

- Determining acceptable staffing norms as recommended by an accredited body, for example the UK Expert Group (UK DoH, 2000 p. 19) or the Modernisation of Tertiary Services (MTS) Project in South Africa (SA DoH Strategic Plan, 2004), including support staff availability.
- Determining the actual numbers of staff currently available, particularly nursing staff (CCSSA, 2005).
- Identifying potential new recruits, especially nurses (World, 2004).
- Determining indicators of service delivery including outcome measures such as mortality and length of ICU stay, quality of life indicators such as Quality of Life scores, and cost effectiveness of the service including benefit estimates and cost of care (Cronin *et al,* 2004).

Given the volume of data required to perform a comprehensive workforce analysis and needs assessment, and the limitations of the scope of this study, the researcher focussed only on literature pertaining to staffing issues for ICUs related to profile of the service, staffing norms, workforce analysis, training, and the recruitment and retention of nurses.

2.1 Profile of a critical care service

Critical Care can be defined as the provision of competent, specialised care to the critically ill patient, irrespective of age, in a specially designated and technically equipped unit. The Joint Faculty of Intensive Care Medicine of Australia and the New Zealand College of Anaesthetists (JFICANZCA), describe an ICU as "a specially staffed, and equipped, separate and self-contained section of a hospital for the management of patients with life-threatening or potentially life-threatening, and reversible or potentially reversible organ failure, which provides resources for the support of patients and their families, and utilises the specialised skills of medical, nursing and other staff experienced in the care of critically ill patients" (JFICANZCA policy, 2003 p. 7).

The British Intensive Care Society (ICS) defines intensive care as "a service for patients who have potentially recoverable conditions, who can benefit from more detailed observation and invasive treatment than can be provided safely in an ordinary ward or high dependency area. It is usually reserved for patients with

threatened or established organ failure, often arising as a result or complication of an acute illness or trauma, or as a predictable phase in a planned treatment programme" (British ICS, 1997 p. 7). In their study of both UK and international research findings on adult critical care services, Cronin *et al* (2004 p. 1) describe critical care as "an important, high-profile and high-cost area of modern healthcare provision". In addition, the concept of Critical Care including both intensive care and high-dependency care is defined by the London Audit Commission (1998) as "care for patients who have potentially recoverable conditions who can benefit from more detailed observation (with or without invasive treatment) than can be provided safely in an ordinary ward" (in Cronin *et al*, 2004 p. 12). This concept was further refined by the work of the UK DoH Expert Group in their review of adult critical care services in the UK in 1999 that led to the critical care modernisation plan of 2000 and the concept of Comprehensive Critical Care which focuses on the level of care that individual patients need (UK Expert Group, 2000).

The Expert Group (2000 p. 10) maintain that "[T]he extent to which any individual hospital provides increasing levels of care, or supplementary specialist care, depends on the skills, expertise, specialities and facilities available within the hospital". In their review of adult critical care services in the UK, Cronin *et al* (2004 p. 6) maintain that ICUs are "critically dependent on adequate numbers of appropriately trained nurses". They suggest that an ICU should provide "a designated (medical) consultant as director, a minimum nurse-to-patient ratio of 1:1 throughout the 24 hours of the day, together with a nurse-in-charge, plus additional nurses according to patient needs, the total number of beds and geographical arrangements within the unit. The skills-mix of nurses should reflect the physiological instability of the patient, as well as administrative, technical and secretarial support" (Cronin *et al*, 2004 p. 15).

In the South African context, "the South African Constitution aims at ensuring that a health system is developed which is capable of delivering quality health care to all the citizens efficiently, and in a conducive and caring manner" (Whittaker, Green-Thompson, McClusker and Nyembezi, 2000 p. 248). The Western Cape Province Healthcare 2010 Plan indicates that "the Western Cape Government is committed to the provision of quality, equitable and accessible services to all its people" (PGWC, 2003 p. 4). The objectives of the Critical Care Society of Southern Africa (CCSSA)

include "the promotion of the standard of care of the critically ill, the promotion of education in the care of the critically ill and the promotion of the development of optimal facilities for this purpose" (CCSSA Constitution, 2002 p. 2).

2.1.1 Classification of critical care patients

In 1999 the UK National Health Service (NHS) established a National Expert Group tasked to "review adult critical care services in the UK, and to produce a national Framework for future organisation and care delivery" (Cronin *et al*, 2004 p. 1). This resulted in the UK Department of Health (DoH) Critical Care Modernisation Plan of May 2000 as noted by Cronin *et al* (2004 p.1). This Plan introduced the recommendation "that the existing division into high dependency and intensive care based on beds be replaced by a classification that focuses on the level of care that individual patients need, regardless of location" (UK DoH, The Expert Group, 2000 p. 9). The levels of care in Table 1 indicate the amount of support required.

Table 1. Classification of Critical Care Patients

Level 0	Patients whose needs can be met through normal ward care in an acute hospital.
Level 1	Patients at risk of their condition deteriorating, or those recently relocated from higher levels of care, whose needs can be met on an acute ward with additional advice and support from the critical care team.
Level 2	Patients requiring more detailed observation or intervention including support for a single failing organ system or post-operative care and those 'stepping down' from higher levels of care
Level 3	Patients requiring advanced respiratory support alone or basic respiratory support together with support of at least two organ systems. This level includes all complex patients requiring support for multi-organ failure.

(The UK Expert Group, Department of Health Comprehensive Critical Care report 2000 p. 10).

The context and profile of a critical care service must be established to determine the type of service provided, the types of patient admissions to the ICU, and what services these patients would require. For the purpose of classification of patients for levels of care needed, the age, diagnosis, acuity and technological support of a

critically ill patient are considered. Specific nursing skills and knowledge are required to provide the appropriate level of care. In terms of such classification nurses are then allocated for the purpose of providing quality critical care services. Cronin *et al* (2004 p. 3) state that "the need for intensive care is related to the severity of the patient's clinical condition and the need for invasive monitoring and treatment". The more complex the care that is required the greater the demand for staff able to provide this service safely and competently. The 2003 Audit of Critical Care services conducted in South Africa by Bhagwanjee and Scribanté (CCSSA, 2005) indicated an acute shortage of both medical and nursing critical care staff throughout South Africa. The study also revealed a deficit in the capacity (ICU facilities, ratio of ICU beds to the population, number of non-functioning ICU beds – adult, paediatric and neonatal) to provide critical care services to the South African population (CCSSA, 2005). This study aims to provide specific data regarding the actual number of nurses working in the critical care units of the Western Cape.

A recent study by Wild and Narath (2005) looked at methods and approaches to differentiate between need and demand in evaluating and planning ICUs. They based their study on an increasing demand for ICU services in most western countries, and concluded that "in countries with a high density of ICU-services – such as the USA, Austria or Germany – not an expanding of the capacities, but a better use of the existing resources is recommended" (Wild and Narath, 2005 p. 299). Countries with a low ICU-bed density however indicated a need to increase their capacity. In their review of the UK critical care services, Cronin *et al* (2004 p. 5) found indications that support an increase in the demand for critical care in the future, based on increasingly aggressive surgery. They also note the importance of the appropriate use of high-cost critical care facilities (p. 9) which is facilitated by the presence of Critical Care Specialists, with specific reference to admission and discharge guidelines, and the administration or withdrawal of appropriate ICU treatment.

2.1.2 Severity of illness Scoring Systems for critical care patients

Assessment instruments to score a patient's severity of illness or injury, and subsequent changes have been developed over time. Examples of scoring systems used in the critical care setting follow:

- To assess severity of illness and estimated risk of hospital mortality on admission to the ICU: the APACHE II score (Acute Physiology and Chronic Health Status Evaluation, Knaus, Draper, Wagner and Zimmerman, 1985), or the SAPS II score (Simplified Acute Physiology Score, Le Gall, Lemeshow and Saulnier, 1993).

- To determine the severity of injury, particularly in trauma patients: the ISS (Injury Severity Score, Baker, O'Neill, Haddon and Long, 1974), or the GCS (Glasgow Coma Score, Teasdale and Jennet, 1974) in patients with head injuries.

- To determine the pre-morbid health status: the NYHA classification (New York Heart Association, Cochran Foundation, 1997).

- To determine the baby's condition at birth, reference to the Apgar score (developed by Virginia Apgar, in Keet, Shore and Harrison, 1978 p. 176).

- To determine the mortality risk: the Euro SCORE (European System for Cardiac Operative Risk Evaluation score, Nasef, Roques, Michel, Gauducheau, Lemeshow and Salamon, 1999), a method of calculating predicted operative mortality for patients undergoing cardiac surgery, or the PRISM score (Paediatric Risk of Mortality) or the PIM score (Paediatric Index of Mortality) in children (van Keulen, Polderman and Gemke, 2005).

- To evaluate the patient's status on subsequent days post admission: the MSOF score (Multiple Organ System Failure score, Herbert, Drummond, Singer, Bernard and Russel, 1993), the SOFA score (Sequential Organ Failure Assessment score, Vincent, Moreno, Takala, Willatts, de Mendonca, Bruining, Reinhart, Suter and Thijs, 1996), or the MODS score (Multiple Organ Dysfunction Score, Marshall, Cook, Christou, Bernard, Sprung, and Sibbald, 1995).

- To facilitate early identification of critically ill patients on a general ward: the MEWS score (Modified Early Warning Score, Subbe, Kruger, Rutherford and Gemmel, 2001).

2.1.3 Nursing Workload Assessment Scoring Systems

Current trends include measuring the efficacy of treatment options by healthcare providers, particularly for an expensive service such as critical care, utilising a cost-benefit analysis calculation. The ultimate benefit to patients is also being assessed using measures such as the Quality Adjusted Life Years (QALY) score (Katzenellenbogen *et al*, 1999), or the Health-related quality of life (HRQL) of ICU survivors described by Chaboyer and Elliot (2000).

Scoring systems have also been developed to determine the workload that a critically ill patient generates for the nursing staff and therefore to measure the nursing workload. Examples include:

- The Therapeutic Intervention Scoring System (TISS) score (Cullen, Civetta, Briggs, and Ferrara, 1974), based on therapeutic interventions, originally designed to determine appropriate utilisation of ICU facilities and provide information on nurse staffing ratios for various patient care areas. Miranda, Nap, de Rijk, Schaufeli and Iapichino (2003) suggest that it was designed to classify nursing workload in relation to the severity of illness of patients in ICUs, and commonly used for measuring nursing workload. It has subsequently been updated, adapted and simplified.

- The Therapeutic Intervention Scoring System (TISS-76) score, (Keene and Cullen, 1983), an updated version of the TISS score.

- The Therapeutic Intervention Scoring System -28 (TISS-28) score, (Miranda, de Rijk and Schaufeli, 1996), a simplified version of the TISS-76, specifically useful in predicting the use of time dedicated to the nursing activities of the TISS score, and able to distinguish between different levels of the nurse's workload.

- The Nine Equivalents of nursing Manpower use Score (NEMS) (score, (Miranda, Moreno and Iapichino, 1997), developed to take into consideration the patient's severity of illness, based on TISS-28, as well as time required for nursing, to measure nursing workload at the ICU level.

- The Nursing Activities Score (NAS) score, (Miranda, Nap, de Rijk, Schaufeli and Iapichino, 2003), a system based on the real-time

assessment of the duration of nursing activities, independently of the severity of illness of the patient.

- The Comprehensive Nursing Interventions Score (CNIS) score, (Yamase, 2003), developed to quantify the overall workload of diverse nursing activities in the ICU, including the time needed to perform each nursing job, but also the number of nurses required, job intensity, muscular exertion, mental stress, and special skills.

Scoring systems such as these noted above, are useful in the management of a critically ill patient for the following reasons summarised from the literature above:

Patient Status

- Provision of a comparative description of the patient's acuity.
- Predicting the outcome of a critically ill patient (prognostication).
- Evaluating clinical outcomes.
- Evaluating the patient's pre-morbid status, or baseline function.
- Assessing morbidity and mortality risk.
- Measuring quality of life of ICU survivors.

Nursing Workload

- Quantifying and predicting nursing workload.
- Calculating staff requirements.
- Planning of nursing staff allocation at the individual patient level.
- Effective management of nursing manpower.

Quality Assurance

- Evaluation of the efficacy of interventions or treatment.
- Evaluation of the efficiency of ICUs.
- Quality assurance or evaluation of care.
- Comparison of performance between units, or over time.

Resource Utilisation

- Assessment of the allocation and the use of hospital resources, including nurses.
- Costing procedures.
- Measuring cost-benefit.

Research

- Randomised clinical trials and multi-centre ICU studies.
- Nursing research.

These assessments can provide useful information in objectively deciding on patient management strategies such as triage of critically ill patients, appropriate acceptance of admission to ICU or not, evaluation of interventions or efficacy of treatment options, changes in clinical management, de-escalation or withdrawal of therapy, discharge from ICU, determination of nurse staffing needs regarding quantity and qualifications, and planning of nursing staff allocation together with additional support staff where required. The mortality rate of a unit can give some indication of the efficacy of patient management and quality of nursing care of that particular unit when compared to another. Coulter (2001 p. 184) notes that "mortality prediction scores are used to quantify patients' risk of mortality based on criteria; such information can be used to evaluate the effectiveness of interventions, and to compare the performance of different ICUs". Ultimately the aim would be to improve patient care and optimise resource utilisation at all levels. The information gained from the scores could provide an evidence-based foundation for decisions that have medico-legal, ethical and human rights implications.

Coulter (2001 p. 183) maintains that severity of illness is an important concept for critical care nurses. She states that "[I]n everyday practice, critical care nurses make judgements about the severity and stability of patients' conditions and use this information to make decisions about nursing care". "Severity is often used to identify patients on a continuum ranging from no illness to mild, moderate, severe and moribund" (Sax and Charlson, in Coulter, 2001 p. 183). The Critical Care Nurse (CCN) plans patient care scientifically, based on underlying knowledge and skills, and with specific outcomes in mind. It is this ability that differentiates the CCN from other nurses in critical care settings, and renders the CCN a mandatory, but also a valuable asset in the critical care unit. Only one of the above-mentioned nursing workload scoring systems specifies the category of nurse working in the ICU as 'ICU nurses' while this is implied in the other studies, especially if the nursing activities listed are taken into consideration.

2.2 Staffing Norms

Zondagh (2004 p. 20) states that "[N]urse staffing levels are an important working condition issue for nurses and believed to be a determinant of the quality of nursing care and patient outcomes". The literature review focussed on recommended staffing norms for nurse staffing in providing critical care to the critically ill.

According to the UK Expert Group, "[S]taff should be able to work with enthusiasm, knowing that they are being enabled to give their best for their patients" (UK Expert Group, 2000 p. 3). The Review of Adult Critical Care Nursing undertaken by the Nursing Committee of the Expert Group found that "[C]urrently, even where there is a physical capacity to provide critical care beds, a shortage in the supply of experienced and trained critical care nurses has led to difficulties delivering services across the country" (UK Expert Group, 2000 p. 19). According to the BACCN (2001 p. 59), "these policy documents (the 1999 Audit Commission Report and the Expert Group Report) stipulate the need for more flexible working practices (specifically related to nurse-patient ratios) to meet the current and the future demands of critical care". They further state "[H]owever, increasingly the members of the BACCN have been voicing their concerns about the pressure of working with less than desirable nurse-patient ratios, and their subsequent inability to cope with the demands of the critically ill". The Royal College of Nursing (RCN) Guidance document comments on the use of health care assistants, noting that "when determining staffing levels, the use of health care assistants should not reduce the skill mix of nurses to an inappropriate level for the delivery of critical care (RCN, 2003a p. 7). The BACCN Position Statement on the role of health care assistants who are involved in direct patient care activities within critical care areas is that "[H]ealth care assistants must only take on direct patient care activities under the supervision of a registered practitioner; and must only undertake direct patient care activities for which they have received training and have been assessed as competent" (BACCN, 2002 p. 3).

In 2003 the Royal College of Nursing in the UK published a document entitled "Guidance for Nurse Staffing in Critical Care" (RCN, 2003a) based on the recommendations of the 2000 review of adult critical care services, namely the *Comprehensive Critical Care Review* initiated by the UK Department of Health (DoH) (RCN, 2003a p. 3). The recommendations of the DoH review suggested that

the "strict use of defined nurse-to-patient ratios should be replaced by a more flexible system. This was echoed in *The Nursing Contribution to the Provision of Comprehensive Critical Care for Adults: A Strategic Programme of Action* (UK Department of Health, 2001) and by the Scottish Executive Health Department's publication *Better Critical Care* (2000)" (RCN, 2003a p. 3). Furthermore, these recommendations "aim for a level of staffing and skill mix that is determined by patient need and level of dependency to ensure that patients' needs are met. Therefore, effective workforce planning is essential" (RCN, 2003a p. 3). Key recommendations from this document were published by the RCN Critical Care Forum in the ICCN Journal, concluding that "providing the right nursing care for critically ill patients is not simply a matter of applying standard nurse-to-patient ratios. The skill of the nurse, the complexity of the patient's needs and the physical environment of care will all influence nursing requirements" (RCN, 2003b p. 257).

In 1998 in New Zealand, Liley, Morley and Roberts conducted a survey of 25 hospitals with ICUs, and found that "all but one hospital had a policy of 1:1 nursing for ventilated patients" (in Morley, 2003 p. 2). Morley noted that the 1997 version of the Joint Faculty of Intensive Care Medicine of Australia and the New Zealand College of Anaesthetists' (JFICANZCA) Minimum Standards for Intensive Care states that "an artificially ventilated patient needs at least one nurse at the bedside at all times". It is noted that these nurses are presumed to be CCNs. These standards are unchanged in the 2003 version of the JFICANZCA Minimum Standards document (JFICANZCA, 2003 p. 1).

The Australian College of Critical Care Nurses (ACCCN) developed an Interim Position Paper on ICU staffing in 2000 (in Morley, 2003 p. 7). This work was further informed by a study conducted by Williams and Clarke in 2001 (in Williams, 2004) to determine current and projected nursing workforce needs for intensive care units in Australia. The benefit of the study was that the findings could provide recommendations "to plan strategically for the needs of the critical care nursing workforce (for the ICUs of Australia) in the first decade of the 21st century" (Williams, 2004 p. 43). The recommendations of the study suggest that 6.7 full-time equivalent (FTE) registered nurses are required per intensive care bed, and 3.89 FTE registered nurses are required per step down/high dependency unit bed, based on an assumption that at least 50% are qualified critical care nurses (p. 44 & 45). Their

recommendations included a 1:1 (registered) nurse-to-patient ratio for Intensive Care patients, and a 1:2 ratio for high dependency patients, as well as designated Clinical Co-ordinators, Nursing Managers, and Clinical Nurse Educators per unit. This Position Paper was ratified in 2002 and "outlines the appropriate nursing staffing standards in Australia for Intensive Care Units, taking into account accepted minimum national standards, best practice evidence and a rational economic health and government environment" (in Williams, 2004 p. 46).

The Australian recommendations (ACCCN) have been incorporated into the World Federation of Critical Care Nurses' Position Statement on the Provision of Critical Care Nursing Workforce (Appendix 9, WFCCN 2005b p. 2). A central principle noted in this Statement is that "[I]t is the right of patients whose condition requires admission to a critical care unit to be cared for by a registered nurse. In addition the patient must have immediate access to a registered nurse with a post registration Critical Care Nursing qualification". The Statement recommends the use of support staff, with the focus on non-nursing duties such as manual handling (lifting and turning of patients), "to allow nursing staff to focus on direct patient care and associated professional requirements" (WFCCN, 2005b p. 3). It also recommends that appropriately skilled and qualified medical staff are available for the unit at all times. It is of significance that this Position Statement was ratified at the 2005 World Congress of Intensive Care in Argentina by delegates from all the member countries, including South Africa. The WFCCN is a federation that represents more than thirty Critical Care Nurse organisations throughout the world. A large proportion of the member countries are from developing countries that face challenges very similar to South Africa. It is particularly significant that South Africa is a member of the WFCCN, endorses its principles and recommendations, and contributed to the finalisation and ratification of this document (Appendix 9).

In South Africa, the Modernisation of Tertiary Services (MTS) project, an initiative of the Department of Health (DoH) in discussion with tertiary services, has attempted to establish staffing norms for South African settings. The MTS is "aimed at the development of a long-term vision of tertiary and quaternary care within the South African public hospital system where these services are both modernised and reconfigured" (MTS, 2004 p. 1). The working group produced a policy framework document that states the minimum staffing requirements for the ideal unit as part of

the South African DoH's Strategic Plan. These suggest that for a National Referral Centre (tertiary level hospital), the ideal nurse-to-patient ratio for Critical Care Units should be: 1 ICU trained nurse to 2 but preferably 1 patient; 1:1 in case of a non-ICU trained RN; and 1:2 for high care patients, depending on severity of illness and turnover (MTS, 2004). It is noted however that these recommendations have yet to be formalised in a policy document.

As far as the researcher could establish, the only published nurse staffing norms for Critical Care in South Africa are contained in a document describing Guidelines for Intensive Care in South Africa, published by the South African Society of Anaesthesiologists, and which is currently being amended. These Guidelines (1999 p. 22) differentiate between three categories of Intensive Care Units, viz.:

- Category 3 being a tertiary ICU facility which offers the highest degree of patient care and admits critically ill patients –
    - Recommendation: 1.5 to 2 ICU nurses to 1 patient, not less than 50% of nurses with ICU training,
- Category 2 unit admits patients who require slightly less care than the above group, and include single organ failure patients –
    - Recommendation: 1 nurse to 1 ICU patient, at least 25% of nurses to be ICU trained,
- Category 1 unit admits patients who require intensive monitoring only –
    - Recommendation: 1 nurse to 2 patients, control nurse should be ICU trained.

The Guidelines further recommend that "[T]he above ratio of nurses may be slightly decreased if nursing assistants can be used for patient washing, as runners and to assist nursing staff in other ways. They should not, however, take over patient care responsibilities or monitoring responsibilities" (SASA, 1999 p. 24).

In the Western Cape, the current norm being used by one of the public sector hospitals is 1 registered nurse to 2 ICU patients, assisted by enrolled categories (GSH ICU Report, 2005). According to data from the National Audit this ratio appears to be the norm for the Western Cape, but not in the other provinces where a ratio of 1:1

is utilised in ICU, where possible. The private sector hospitals generally use a norm of 1 registered nurse to 1 ICU patient.

2.2.1 Consequences of inadequate staffing

Inadequate staffing has numerous negative consequences for both consumers and providers of healthcare services, including the potential to cripple healthcare delivery. Chaguturu and Vallabhaneni (2005 p. 1763) state that "[E]ntire public health systems are at risk of collapse because of the growing shortage of nurses in the developing world". Zondagh (2004 p. 20) states that "[L]imited resources and increasing demands on their services stress healthcare systems worldwide", and "several international studies found that insufficient staffing levels expose nurses to medical and legal errors and risks. These studies have shown that there is no question that the safety and quality of care provided in health facilities is directly related to the number and staff's mix of direct care nursing staff" (2004 p. 20). She further notes that worldwide, as workloads increase, and the nurse to patient ratios deteriorate, both patients and healthcare workers are increasingly at risk. A landmark study by Aiken, Clarke, Sloane, Sochalski and Silber in the USA in 2002 found a direct relationship between high hospital nurse staffing ratios, higher patient mortality, increased nurse burnout and greater job dissatisfaction. An earlier Australian study revealed similar results (Clarke, Mackinnon, England, Burr, Fowler and Fairservice, 2000). Carayon and Gürses (2005) found that nursing workload was a major contributor to patient safety in ICUs. Insufficient nursing staff was found to be associated with a high workload and resulted in the occurrence of adverse incidents. Carayon and Gürses (2005) found that human errors prolonged ICU stay, increased the risk of mortality, increased the occurrence of iatrogenic complications, and was associated with a significantly higher risk of mortality, and errors were often medication-related. An ICU nurse-patient ratio of less than 1:2 was specifically associated with an increased length of stay in the hospital and increased number of days in the ICU. The latter translates directly into increased expenditure for the patient and/or the service provider.

Pronovost, Jenckes, Dorman, Garrett, Breslow, Rosenfeld, Lipsett and Bass (1999 p. 1310) state that "morbidity and mortality rates in ICUs vary widely among institutions". They undertook a study to determine whether organisational characteristics of ICUs are related to clinical and economic outcomes for abdominal

aortic surgical patients who typically receive post-operative care in an ICU. Their findings confirmed that organisational characteristics impact on patient outcomes. They found that for example, not having daily rounds by an ICU physician was associated with a 3-fold increase in in-hospital mortality, and having an ICU nurse-to-patient ratio of less than 1:2 were associated with increased resource use.

With regard to healthcare provision, the adverse events noted above increase the costs of a service that already carries significant expenditure related to the required resources, both human and technical. Adverse events also decrease the quality of life of the clients of the healthcare service. Wheeler and Wheeler (2005 p. 257) reviewed medication errors in anaesthesia and critical care, and found that "many (medication) errors result in harm to patients and increased costs to healthcare providers". Their review revealed that adverse events experienced by patients (particularly related to surgery) included minor impairment, disability (temporary or permanent), and death. They refer to "the widely quoted US Institute of Medicine report of 1999, which estimated that there are between 44 000 and 98 000 fatal clinical errors annually in the US" (Kohn *et al,* 1999, in Wheeler and Wheeler, 2005 p. 258). The costs were noted to be "staggering" – US$ 17-29 billion annually in the US, £6 billion in the UK and Au$ 5 billion in Australia. They also found that the Adverse Drug Event rate was much higher in ICUs than in general wards. Adverse events should therefore be avoided or limited as far as possible to contain costs, promote the optimal utilisation of scarce resources and optimise the benefit of healthcare delivery, particularly in resource-poor developing countries.

A study by O'Reilly (1993) describes "Barriers to Effective Clinical Decision Making in Nursing" which impairs safe nursing practice. She emphasises the point that inadequate staffing levels create stressful working conditions, noting that inadequate staffing is not only related to the total number of nurses, but also the skill index as well. This is particularly true where the novice nurse requires more supervision and coping support (Farnell and Dawson, 2006). Pile (2005a p. 26) states that "nurses working in South Africa's public health system are reaching breaking point. Reports that they do not have access to the most basic resources, such as soap, in caring for patients coincide with increased claims of medical malpractice against doctors and nurses in public hospitals. These are merely symptoms of a system with insufficient staff buckling under increased demand for healthcare services".

2.2.2 Consequences of appropriate staffing

Zondagh (2004 p. 21) cites a US Department of Health-funded study about nurse-staffing levels and the quality of care in hospitals conducted by Needleman and Buerhaus, published in the NEJM of May 30, 2002, with findings consistent with other similar studies that patients fared better when registered nurses played a significant role in their care. These included a reduction in adverse outcomes such as urinary tract infections, shock (or cardiac arrest), length of stay, upper gastro-intestinal bleeding, and (hospital-acquired) pneumonia by 3-12% when there were higher numbers of registered nurses in the staffing mix. A decrease of 2-25% of these adverse outcomes was also associated with higher staffing levels of all nurses. In her research, Zondagh (2004) found that nurse staffing is a predictor of risk-adjusted mortality, and that an appropriate increase in the number of registered nurses, more nursing hours and an appropriate skills mix was associated with fewer patient deaths, lower rates of pressure ulcers, pneumonia, urinary tract infections, post-operative complications such as thrombosis and pulmonary compromise, medical errors and nosocomial infections. Patients were also more satisfied with nursing care, pain management, education and overall care.

Adequate staffing clearly contributes to the reduction of costly adverse events, and improved service provision. Appropriate nurse staffing norms should therefore be an essential component of the management strategy of a healthcare provider. These norms can be mandated by law, as was the case in California in the USA in 1999, which provided what is considered an international model for nurse staffing norms according to Zondagh (2004 p. 22). She notes that the Final Legislated Regulations on Staffing Ratios were implemented in 2004 following a process of incremental introduction, public comment and further research. The ratios are described as the maximum number of patients that may be assigned to a Registered Nurse during one shift. The Californian law requires additional Registered Nurses be assigned based on a documented patient classification system that measures patient needs and nursing care, including severity of illness and complexity of clinical judgement.

2.3 Workforce analysis

In the UK, Elston and Thornes (2002) conducted a study on the Nursing Workforce within the Children's National Service Framework (NSF), including the ICUs. In their report to the Royal College of Nursing and the Royal College of Paediatrics and

Child Health, they stated that "[I]t has been recognised that the workforce is a key constraining factor in the delivery of the NHS Plan" (Elston & Thornes, 2002 p. 3). The study was initiated due to limited available data on where registered children's nurses worked and whether there was a shortfall. Paediatric intensive care was a particular concern. This study found that the shortfall of children's nurses was indeed real and widely reported, with the vacancies ranging from 16% to 31% throughout English hospitals (Elston and Thornes, 2002). This study highlights the need for Paediatric Nurses, especially Paediatric Critical Care Nurses. The situation in South Africa is perceived to be far worse, as there were only two Paediatric CCNs registered with SANC in 2001 (SANC statistics, presented by Fouché, 2001).

In the USA, the estimated shortage of FTE (full-time equivalent) registered nurses was between 6% (or 110 000 nurses) and 12% in 2002 (US HRSA, 2002). According to Kelley *et al* (2004), Critical Care Services in the United States are in crisis, primarily because of a shortage of critical care professionals. This problem has been highlighted by the Leapfrog Group, which Balmes (2003) describes as a business consortium that studies ways to reduce healthcare costs for employers. Kelley *et al* (2004, referring to a systematic review conducted by Pronovost in 2002), state that Leapfrog promotes the wider use of critical care physicians because such staffing improves patient outcomes. The Leapfrog Group adopted the recommendation that hospital ICU care should be managed by a physician certified in critical care medicine as one of their patient safety standards specifically to reduce medical mistakes in hospitals (Leapfrog Group, 2003). Follow-up research conducted in USA hospitals that have implemented The Leapfrog Group's ICU Physician Staffing (IPS) standard demonstrated cost savings that ranged from $510 000 to $3.3 million for 6- to 18-bed ICUs, with significant reductions in patient morbidity and mortality rates (Pronovost, Needham, Waters, Birkmeyer, Calinanwan, Birkmeyer and Dorman, 2006).

Kelley *et al* (2004) also refer to a national survey of registered nurses conducted by the US Department of Health and Human Services, which states that the projected 6% growth in the supply of nurses will not match the projected 40% increase in demand by the year 2020. The National Centre of the US Department of Health and Human Services has published an extensive report illustrating current national supply and demand projections, clearly depicting the shortfall of nurses (US Department of

Health, 2002). This study highlights the reality of a worldwide shortage of nurses, especially CCNs, particularly as the US health facilities recruited nurses from overseas, including Africa, to alleviate their shortage during the past few years (World, 2004), and continue to do so. A US law, the Emergency Supplemental Appropriations for Defence, the Global War on Terror, and Tsunami Relief, was passed in 2005, facilitating the immigration of foreign nurses into the US healthcare system (Chaguturu and Vallabhaneni, 2005 p. 1761). This law includes approval for 50 000 new visas for nurses and their family members. They note that 126 000 nursing positions were unfilled in US hospitals according to the US Department of Health and Human Services at that time (2005 p. 1761). The strategy to address this shortfall has increasingly been to recruit nurses from other countries including India, the Philippines and Canada.

The UK has essentially used the same strategy, specifically targeting the African countries such as Botswana, Ghana, Malawi, Nigeria, Kenya, South Africa, Zambia and Zimbabwe (Chaguturu and Vallabhaneni, 2005 p. 1762). The authors report that 7000 African nurses have registered to work in the UK since 2001. These countries have huge shortages themselves, exacerbated by extreme demands on very fragile healthcare systems. The authors note that with a moratorium being placed on recruitment from countries with nursing shortages, the focus of recruitment has merely moved to India, the Philippines and Spain.

South Africa is one of the developing countries experiencing an acute shortage of nurses. Of particular concern is the ongoing active recruitment of South African nurses, especially CCNs, to Saudi Arabia, the United Arab Emirates, the UK, Australia, New Zealand and the USA, as seen in the advertisements placed in the monthly editions of the Nursing Update, the nursing magazine published by DENOSA, the Democratic Nursing Organisation of South Africa. Their successful recruitment merely depletes the number of CCNs available to care for South African patients. According to Pile (2005a and 2005b) 42% of all posts in the public sector health service remain vacant, with the Persal government payroll system indicating that there are 42 000 vacancies on the nursing payroll, and only 41 563 nurses (all categories) currently working in the service.

Statistics from the 2003 SANC register (Nursing Update, 2004 p. 13), reflect a total of 177 721 nurses (96 715 of which are registered nurses) for the whole of South

Africa, with its population of approximately 46.5 million people. Statistics published in the 2 December 2005 edition of the Financial Mail reveal that the 2005 mid-year estimate of the total SA population was 46.8 million people, with a ratio of 69 physicians per 100 000 of the population, and an HDI (human development index) ranking of 120 out of 177 countries (Quarshie and Byrd, 2005). The SANC has expressed concern regarding the shortage of nurses in South Africa in a report on the production of nurses over a 6-year period from 1998 to 2003. This has been ascribed to a decline in the number of nurses that have been trained – a 43% decrease in the number of professional nurses trained per annum from 1998 to 2003, and an attrition rate of 75% (production versus lack of growth in the number of professional nurses on the register) over the same time period (SANC, 2005 p. 2 and 5). The attrition rate for enrolled nurses was 19% over this time period and there has been a negative growth in the production of enrolled nursing auxiliaries. The decline in the production of nurses of all categories may have contributed to the emergence of new categories of healthcare workers e.g. Community Health Workers, Ancillary Health Care Workers, Home Based Carers and Lay Counsellors. Anecdotal reports indicate that these workers are also being placed in ICUs in some private sector hospitals to provide additional support for the nursing staff. The increased use of these healthcare workers in the ICUs of the public sector hospitals has been observed by the researcher.

The production of post-registration or post-graduation specialist nurses was not addressed in this SANC report. South African Critical Care Nursing appears to find itself in a dire position currently, but there is a lack of adequate data, and therefore the need to conduct a study within the South African context.

2.4 Training

In the BACCN Position Statement on nurse-patient ratios in critical care (BACCN, 2001), it was noted that there have been major advances in the technological aspects of patient care. The same can be said of pharmacological management of the critically ill patient. The position statement notes that "[T]hese advancements have simultaneously necessitated the development of a specialised nursing workforce, who are responsible for the care and management of patients within these specialised environments" (Rapin, 1987 and Hind *et al*, 2000, in BACNN, 2001 p. 59). Such a specialised workforce requires a period of specialised education and training to

achieve the appropriate qualification which provides the specific knowledge and clinical practice skills required in such a specialised environment. As Zimmermann points out "[N]ursing is more than a list of tasks; it is constant assessment, evaluation, and judgements...routine care often involves on-the-spot decisions requiring a depth of knowledge and trained critical thinking" (Zimmermann 2000, p. 316).

The World Federation of Critical Care Nurses recently ratified their Position Statement on the Provision of Critical Care Nursing Education which states that "[C]ritical or intensive care is a complex speciality developed to serve the delicate health care needs of patients (and families) with actual or potentially life threatening conditions" (Appendix 10, WFCCN Position statement on CCN education, 2005a preamble). One of the central principles of the Statement is that "CCNs must possess appropriate knowledge, attributes and skills to effectively respond to the needs of critically ill patients, to the demands of society, and to the challenges of advancing technology" (WFCCN Education Position Statement, 2005 p. 2). South Africa is a member of the WFCCN, supports its principles and recommendations, and contributed to the finalisation and ratification of this Position Statement. Scribanté, Schmollgruber and Nel (2005 p. 111) describe South African Critical Care Nurses as "independent, accountable practitioners who function within a professional ethical framework".

Within the South African setting, the need for CCNs is no less important than that of international critical care services; the South African patient has the same needs and deserves the same care. It is noteworthy that the majority of the 12 leading causes of death identified in 2001 in South Africa (Quarshie and Byrd, 2005) often result in an ICU admission. These patients require skilled staff to provide expert critical care and management.

2.5 Recruitment and Retention of Nurses

There has been some debate as to whether the shortage of nursing staff is real, or as bad as it seems. Zondagh (2004 p. 20) found that some authors in the US maintain that "the surprising truth is that there is not a genuine shortage of nurses in the US, instead there is a shortage of nurses willing to work under the conditions currently offered by the hospital industry". A press statement released on the 19th of March 2005 on the Nursing Crisis by Worrall-Clare, legal advisor to the Hospital

Association of South Africa (HASA), noted that 18.4% of South Africa's nurses (all categories) no longer practise their profession within a hospital setting according to the SANC register (2004 stats) (HASA, 2005 p. 1). He notes that various reasons have been cited for this decline in the clinically active nursing population including emigration, work pressure, and alternative careers, often within the greater healthcare sector such as case management or sales positions. He also notes that the situation has been aggravated by a general decrease in the number of nurses qualifying annually, and a decline in new entrants to the profession. A study conducted by the (SA) Human Sciences Research Council (HSRC) in 2003 revealed a 60% incidence of dissatisfaction with their working environments among practising nurses, with particular reference to greater workloads, increasingly stressful working conditions and little support from management (HSRC in HASA, 2005 p. 1). The HSRC had conducted a similar study in 1990 to investigate the working conditions of professional nurses in intensive care and high care areas in South Africa (HSRC, 1990). Their findings revealed the following problems that contributed to dissatisfaction among nurses working in these areas, namely: "inadequate remuneration, staff shortages, inflexible working hours, unsatisfactory working conditions, and undesirable staff relationships, including the lack of support and appreciation from nursing management and the lack of recognition from medical staff" (HSRC, 1990 p. 4, 5). Despite making a comprehensive list of recommendations in their report based on this study, the findings of the 2003 study were very similar. The ICN Report on the Global Shortage of Registered Nurses (ICN, 2004 p. 27) found the following "push" factors encouraged nurses to emigrate: "financial (low pay), poor working conditions, lack of professional development opportunities, lack of promotion opportunities, non involvement in decision making and lack of support from supervisors". According to the ICN report the outflow of registered nurses from South Africa to the UK alone between 1998 and 2003 was approximately 7000.

Zondagh states that "[T]he failure to recruit and retain sufficient numbers of registered nurses is reflected in high-stress conditions for nurses and lowered quality of care for patients, and creates significant costs for hospitals" (2004 p. 20). Her study found that "[M]ore than a decade of research shows that nurse staffing levels and skill mix make a difference in patient outcomes. Studies show that where there

are more nurses, there are lower mortality rates, shorter lengths of stay, better care, lower costs, and fewer complications" (Zondagh, 2004 p. 20).

The National Department of Health of South Africa published a 5 year 10 Point Plan in July 2004 to address the health needs of South Africans (Strategic Priorities for the National Health System: 2004 – 2009). The lack of significant key activities related to the Priority of human resource planning, development and management, is of serious concern (SA DoH, 2004). According to Pile (2005a), the Department of Health does not have a co-ordinated strategic plan to manage the human resource crisis, only a draft framework that highlights some of the problems (increased demand for healthcare, higher workloads, increased burden of disease), but does not appear to offer any real solutions. Strategies to recruit and retain healthcare workers such as attempts at increasing training have failed because of lack of policy co-ordination particularly between the Departments of Health, Education and Labour. Compulsory community service and scarce skills allowances have had minimal success in keeping healthcare workers in needy, especially rural, areas (Pile, 2005a).

Various strategies have been recommended to address the global nursing crisis, with most organisations attempting to address the causative factors. Boehm (2005) notes that the American Hospital Association has taken a stand specifically noting that its human resources are strategic resources. They list the following as specific strategies for addressing the nursing crisis: "improved compensation, empower employees/increase autonomy, invest in workforce recruitment, retention and development, increase the use of technology and promote education given that research indicates the higher the degree, the safer the patient". The ICN Report (2004 p. 31 and 32) states that "[F]actors such as an aging workforce (the average age of nurses in developed countries is 42 years), a decline in recruits in some countries, a diminishing pool of potential returners and the likelihood of increased demand, all point to the most effective balance of interventions to prevent or combat staff shortages". The report identifies four components of a policy-based interventions framework to address nursing shortages: workforce planning, recruitment and retention, deployment and performance, and utilisation and skill mix. The components and the interventions are interdependent for example, workforce planning and linkage with the education sector, or deployment and day-to-day matching of staff with workload. Policy alone will not achieve positive change,

according to the Report, and will require "effective leadership, stakeholder involvement and a strategic approach which recognises the interdependency of different policy interventions" (p.32), as well as "a co-ordinated effort across the range of interdependent components" (p.33). It is clear that the nursing crisis is not only a nursing problem, and requires a multi-sectoral approach with input from various sectors of the healthcare system and other relevant stakeholders.

HASA's Worrall-Clare (2005) suggests that strategies in South Africa should include training more nurses, attracting and retaining more candidates to the profession, skills development (so-called 'up-skilling' such as the extension to the scope of practice of especially the enrolled nurse), and the reduction in non-nursing functions of the registered nurse by developing new healthcare categories such as Clinical Engineering Technician Assistants. The private sector is training such technicians (unregistered health workers) to deal with the acute shortage of nursing staff in particular, but as Pile (2005a p. 26) points out "[T]here is concern, however, that unregulated health workers could increase the risk of the supervising doctor or nurse and of the facilities that they work in".

Zimmermann describes the increased use of unlicensed assistive personnel (UAP) in the USA as part of the skill mix changes in health care staffing during the 1990's re-engineering of the USA health care system, essentially driven by cost cutting (Zimmermann, 2000). She cites the American Nurses Association (ANA) definition of UAP as "individuals who are trained to function in an assistive role to the registered professional nurse in the provision of patient/client care activities as delegated by and under supervision of the registered professional nurse" (Zimmermann, 2000 p. 312). Although there were a few advantages to the use of UAPs, she reported that "thirteen studies found that patient morbidity and mortality are adversely affected by decreasing the total number of staff registered nurses and decreasing the registered nurse component in the skill mix" (Zimmermann, 2000, p. 314). The use of UAP often led to increased costs overall, and generally their training was minimal and not regulated for acute care settings (p. 315).

In the UK British nurses have increasingly been voicing their concern to the BACCN over the use of non-registered staff in critical care areas, and the roles and tasks that they are undertaking (BACCN, 2002 p. 5). It has been described as one of the biggest challenges currently facing critical care nurses. Whilst there is acknowledgement that

these workers can undertake tasks such as cleaning and preparing bed areas, mobilising patients and assisting with basic care provision, an extensive study by MacKinnon, Clarke, England, Burr, Fowler, and Fairservice in 1998, found that the use of health care workers could actually increase the work of the registered nurse due to the need to supervise these workers (in BACCN, 2002 p. 8). These workers can be successfully deployed in the critical care areas to alleviate the workload of the critical care nurse if, and only if, they are specifically educated and trained for their role (which implies regulation), their competence assessed, and their work directly supervised by registered nurses (BACCN, 2002 p.3 and 9). The nature and the boundaries of their role needs to be clearly defined in the critical care setting based on ethical and legal considerations to ensure safe patient care. The Statement also suggests "that each employing institution should accept vicarious liability for the health care assistant, providing they are working within defined boundaries" (BACCN, 2002 p. 21).

Summary

The literature review revealed that the shortage of registered nurses is an international problem, with the speciality of critical care nursing a particular area of concern. Critical care units have specific nurse staffing needs that are unique to the area and influenced by the acuity of the patient's condition, and the knowledge and competence of the nurse caring for the critically ill patient. Staffing ratios are utilized to allocate nursing staff to provide patient care. These ratios allow for a skills mix of different nurse categories. In some units ancillary healthcare workers are utilised to support the critical care nurse, particularly where shortages of qualified nurses are acute. The consequences of inadequate nurse staffing reflect an increase in adverse events and poorer patient outcomes. Adequate education and training of nursing staff is required to provide safe patient are. Data is required to determine the nurse staffing situation in the critical care units of the Western Cape hospitals.

CHAPTER 3

3. METHODOLOGY

3.1 Research Design

A quantitative study design, namely a descriptive study, also referred to as a survey that "sets out to quantify the extent of a problem" (Katzenellenbogen, *et al* 1999 p. 66), was considered the most suitable to address the problem statement, that is, that data was required to quantify the actual shortage of registered nurses, particularly CCNs, working in critical care units in South Africa, specifically in the Western Cape Province, as well as exploring factors that contribute to both the supply and demand of nurses in order to determine both the need and the deficit. Bias was avoided during the literature review process in that articles with both positive and negative outcomes were studied. Further bias was avoided by including the total target population. Objectivity was achieved during the selection process as respondents were designated by virtue of their positions, namely unit manager or educator, and not specifically selected by the researcher.

3.2 Study Population and Sampling

3.2.1 Target Population

The target or total population for this study consisted of the group of hospitals in the Western Cape Province, public and private, with critical care units, that is, both Intensive Care Units and/or High Care Units, for Adult, Paediatric and/or Neonatal patients, and the group of educational institutions that offer Registered Nurse and/or Critical Care Nurse training. Only the hospitals that provide critical care services, and recognised nursing education institutions that provide undergraduate/basic nurse training leading to the registration of a professional nurse (Registered Nurse), and/or postgraduate/postbasic Critical Care Nurse training were included. All of these hospitals and educational institutions were included in the sampling frame; therefore the total population was studied. It should therefore be possible to generalize the findings of this study to the total population.

The boundaries of the Western Cape are determined by the provincial geographical boundaries. The public and private sector hospitals that have the characteristics needed for this study were identified from the latest edition of the Hospital and Nursing Yearbook of Southern Africa (2004) which lists all the hospitals of the

public and private sector per province, with an indication of the number of beds and the services provided, including Intensive Care, High Care and Neonatal Intensive Care. The names and contact details of the relevant medical superintendents/hospital managers and nurse managers are also listed. The focus of the study was critical care services, therefore high care services were only included where acute care is provided for critically ill patients, for example requiring mechanical ventilation, and not for chronic care. The researcher identified 41 listed hospitals in total in the Western Cape, in both the private and public sectors, which had HCU and/or ICU facilities. One hospital was excluded from the survey as access to research in the institution was denied for national security reasons. Five of the listed hospitals did not provide HCU/ICU services during 2004, and were also excluded. Of the remaining 35 hospitals, 12 were public sector hospitals and 23 private sector hospitals.

The training schools accredited by the South African Nursing Council (SANC) to provide undergraduate/basic training leading to registration as a registered nurse and midwife (Regulation 425, 1985) and/or bridging courses leading to registration as a registered general nurse (Regulation 683, 1989), and those providing postgraduate/postbasic courses leading to registration in clinical specialities such as critical care nursing, are the only legitimate educational institutions recognised in South Africa. These training schools are listed in the Hospital and Nursing Yearbook of Southern Africa (2004 p. 92-108). Accredited educational institutions in the Western Cape such as Nursing Colleges, Universities of Technology (previously known as Technikons) and Universities, with their respective programmes, were identified from these lists, with the specific focus on undergraduate general nursing (potential postgraduate students), and postgraduate/postbasic critical care nursing. In the event that the data in the Hospital Yearbook may not have been up to date the details were compared with other sources to ensure validity. These sources included the current list of Private Nursing Education Institutions approved by SANC as listed on the SANC website (retrieved 11 February 2005). and the researcher's contact list of current institutions.

Private hospital details were compared with the current Hospital Association of South Africa (HASA, 2005) membership list.

In this way, the following institutions were identified:

1. Three (3) tertiary level and nine (9) secondary level public sector hospitals, that is, a total of twelve (12) hospitals, which have thirty eight (38) ICUs/HCUs in total.
2. One semi-state, military hospital, but access to hospital information was denied due to restrictions of the National Security Act, and therefore this hospital was not included in the Survey.
3. In the private sector three (3) major hospital groups and three (3) independent hospitals that have twenty-three (23) hospitals with forty-two (42) ICUs/HCUs in total.
4. A fourth group of private hospitals is currently establishing ICUs/HCUs, but none of these were fully functional during 2004, and therefore this group with its three hospitals was also excluded from the Survey after discussion with the Human Resources manager and the Unit Manager.

A total of **thirty-five (35) hospitals** with a total of **eighty (80) ICUs/HCUs** were thus identified as suitable for the sample. The exact number of ICUs or HCUs per hospital was not known prior to the study, and one of the objectives was to establish this number. These numbers were obtained telephonically from the Nurse Manager of each hospital.

5. Eight educational institutions were identified: three Universities, one University of Technology, one Nursing College, and three private nursing schools. The University of Technology did not train nursing students during 2004 and was therefore excluded from the Survey, leaving **seven (7) educational institutions.**

The next step was to identify the respondents. The number of **respondents (n = 87)** matched the number of research sites (80 units; 7 educational institutions). These respondents were identified as follows:

A. the ICU Nurse Managers and Critical Care Educators who attended the November 2004 workshop (Appendix 1) identified key contact persons at their respective institutions in order to identify the appropriate respondents;

B. the researcher then asked the key contact persons to identify the most appropriate respondents in their respective institutions;

C. the respondents for the health service sectors were the Nurse Managers of the respective units; and

D. the respondents for the educational institutions were the Nurse Educators;

E. the respondents were selected by virtue of their position within the institution and not selected by the researcher thus ensuring non-bias;

F. the researcher then made follow-up telephonic contact with the key contact persons to confirm that the respondents had been identified, and to facilitate the data collection process by creating a renewed awareness about the study, the data collection requirements, and establishing the process required to gain access to each institution.

3.2.2 Setting

The Western Cape Provincial boundaries cover a geographical area of 129 455 square kilometres (Hospital & Nursing Yearbook, 2004). The population of the Western Cape was recorded as 4.3 million in 2002 (Hospital and Nursing Yearbook, 2004 p. 131). However, due to the ongoing influx of people both from within South Africa (especially from the Eastern Cape), and beyond the borders from the Southern African Development Community (SADC) region countries, and various other countries in Africa, the true population of the Western Cape is unknown. According to Statistics South Africa (Nursing Update, 2004 p. 13), the 2003 mid-year population figures for the Western Cape were estimated to be 4.7 million persons. Statistics from the Mandisa database of the Disaster Mitigation for Sustainable Livelihood project (2005) showed that 16 000 persons are moving into Cape Town every year (Cape Argus, 1 August 2005), which adds to the burden of healthcare provision in the province, particularly for the public sector.

3.2.3 Healthcare Services

Healthcare services for the people of South Africa are provided by both the private and public healthcare sectors. The public healthcare service is based on a three-tiered system according to the National Health Act (No. 61 of 2003, South Africa). The Act is based on a Primary Health Care approach (ANC, 1994) which suggests that the first point of contact should be at the Primary Health Care level, which could be either at a community health centre (CHC), a general practitioner or a district hospital. Should the patient's condition warrant further investigation or treatment, the

patient is referred to the secondary level of healthcare service, which is a regional hospital within the Province. Should the patient's condition deteriorate, or specialised care be required (for example renal support services), the patient is referred to a tertiary/academic hospital where specialist services are available to provide further diagnostic and specialist management expertise. This in theory is the plan and preferred referral route. Data from the National Audit indicates that the average ambulance call-out time in the Western Cape is 1.5 hours to transfer patients for advanced critical care (CCSSA, 2005). Transfer between these levels of care requires an efficient healthcare transport system provided by an effective, well-equipped ambulance service. This system includes the use of specially equipped Metro ambulances, and in some cases, the air ambulance, to transport the critically ill patient. The severely injured trauma patient, or the acutely ill medical patient, should be taken directly to the tertiary level hospital for specialist attention, once his/her condition has been stabilised for safe transport.

3.2.4 Critical Care Services

The critically ill patient may receive healthcare at each level of the system as he/she is referred from one level to the next for further management. Ultimately, the critically ill patient receives specialised care in the High Care Unit (HCU) or the Intensive Care Unit (ICU) of a public or private sector hospital. The referral decision between these two sectors is determined by the patient's income and availability of medical aid cover. According to the Hospital and Nursing Yearbook (2004, p. 133), the Western Cape has **55 public sector hospitals,** a list which includes psychiatric, frail care and rehabilitation facilities. Of these, **only 12** (21.8%) have High Care or Intensive Care Units, as identified by the researcher. The Yearbook lists **62 private sector hospitals**, which includes day clinics and frail care centres. Of these, **only 23** (37%) had functional High Care or Intensive Care Units during 2004. The hospitals with the HCU/ICU facilities made up the healthcare institutions included in the Survey conducted by the researcher.

Van Zyl–Smit (2005 p. 8) states, "[T]he level of care that can be provided to ill patients varies throughout a hospital environment. Provision of care ranges from standard care on a general ward to advanced life support and monitoring in a specialised unit. Definitions of such levels of care remain under debate; the definition of what constitutes an intensive care unit (ICU) or high care unit (HCU) is based on

the level of service that can be provided". There are variations in the criteria that constitute either an ICU or a HCU.

Based on internationally accepted criteria (the UK Department of Health's Comprehensive Critical Care Report, prepared by the Expert Group, 2000, and the Joint Faculty of Intensive Care Medicine of Australia and the New Zealand College of Anaesthetists, JFICANZCA, 2003), local criteria (SASA, 1999), and current thinking and practice, the researcher compiled the following definitions to describe these services:

- An Intensive Care Unit (ICU) is defined as a designated area within a hospital that is specifically equipped to provide Level 3 care for critically ill patients, capable of providing comprehensive critical care including complex multi-system life support including mechanical ventilation, renal replacement therapy, inotropic support and invasive cardiovascular monitoring. Level 3 patients are defined by the Expert Group (UK DoH, 2000 p. 10) as "patients requiring advanced respiratory support alone (endotracheal intubation and mechanical ventilation), or basic respiratory support together with support of at least two organ systems. This level includes all complex patients requiring support for multi-organ failure".

- A High Care Unit (HCU) is defined as a designated area within a hospital that provides Level 2 care to acutely ill patients, capable of providing a high standard of general intensive care, including basic cardiovascular monitoring. This definition includes Single Organ Support units. Level 2 patients are defined by the Expert Group as "patients requiring more detailed observation or intervention including support for a single failing organ system, or post-operative care, or those 'stepping down' from higher levels of care" (UK DoH, 2000, p. 10).

These units were further identified by the researcher according to the age of patients generally admitted to the unit, where Neonatal units (ICU or HCU) cater for babies from birth to 28 days, Paediatric units cater for babies and children from one month to 14 years of age, and Adult units cater for all above 14 years.

- One other category of unit identified by the researcher as High Dependency Units (HDU) caters for ill adult patients that compare to Level 1 patients defined

by the Expert Group as "patients requiring acute ward care, with additional support and advice from the critical care team" (UK DoH, 2000 p. 10). These units tend to provide a focussed service and minimal invasive monitoring, for example renal transplant units.

3.3 Ethical and Legal Considerations

3.3.1 Ethical Considerations

The research proposal for this study was registered with the Division of Nursing and Midwifery, of the School of Health and Rehabilitation Sciences, Faculty of Health Sciences of the University of Cape Town in December 2004. The study proposal was submitted to the Departmental Research Committee for review in April 2005, and subsequently approved. The proposal was then submitted to the Faculty Research Ethics Committee (REC), for approval. Ethical approval to conduct the study was granted by the REC in May 2005 (Appendix 7). The proposal was subsequently submitted to the Postgraduate Dissertations Committee for approval, and this followed in June 2005.

The REC had approved a previous proposal co-authored by the researcher for a linked study leading to the refining of the data collection tool for this study, a questionnaire, by collecting data from critical care nursing experts, at a workshop of Managers and Educators held in November 2004 (Appendix 1) (REC reference No.435/2004). Although data from the workshop had informed the development of the questionnaire for the present study, the tool had subsequently been considerably improved by the researcher (Appendix 2). The present study was conducted as a continuation of this initial phase.

Sound ethical principles were adhered to during the study. Informed written consent, with full knowledge of the risks and benefits of the study, was obtained from each designated respondent, that is, the Nurse Manager and the Unit Manager of each unit surveyed, as well as each Educator. All documents were prepared in English, currently the language of communication in the hospitals and educational institutions of the Western Cape Province. An Informed Consent Document for a Health Care Facility (hospital) (Appendix 5) explaining the purpose, potential benefits and risks, and the data collection procedure for the study, with a section for the Medical Director or Superintendent of the hospital to sign if the institution required this, was

designed. The consent document was then adapted for an Educational Institution (Appendix 6), with a section for the Head of the Department to co-sign. The researcher explained that there were no known risks, and although the data would be used to suggest recommendations for planning, misuse of the data would be guarded against, by maintaining anonymity. The benefit of collecting accurate data would be to provide information about the actual number and training of CCNs in the Western Cape. This data could provide useful information that could assist the efficient strategic planning of an effective healthcare service. Anonymity was maintained by ensuring no identification of institutions, persons or place, and confidentiality was maintained throughout. It was made clear however that the data is to be used to analyse the current Critical Care Nursing workforce, with the intention of making recommendations based on the findings.

Anonymity was further achieved by allocating codes to each institution and each unit respectively so that no respondent or institution would be identifiable. These codes were subsequently used on all documents provided to each institution by the researcher. Only the researcher and the statistician had access to the identity of these codes to ensure confidentiality of the data. Autonomy was achieved by encouraging respondent participation to ensure a good response rate to result in a comprehensive assessment of the workforce and therefore accurate data collection, but participation was voluntary, and respondents were informed that they had the right to withdraw from the study at any time. An undertaking was given that feedback would be provided at the conclusion of the study to all respondents and relevant stakeholders. A final report of the findings of the study is to be made available to each institution. The completed questionnaires were kept in a safe storage area to which only the researcher had access.

3.3.2 Legal Considerations

Ownership of the data is retained by the researcher, whilst the University of Cape Town retains the intellectual property rights of the dissertation. The University provides professional indemnity insurance in return. Given the inclusion of data from both public and private sector institutions, and the ethical requirement to maintain confidentiality at all times, the researcher is ethically and legally obliged to protect the integrity of the data.

3.4 Data Collection

3.4.1 Phase 1: Development of the data collection tool: the Questionnaire

Quantitative data for a workforce analysis and needs assessment of the critical care nursing services in this study relate to factors that contribute to the demand for critical care services, current nursing staff numbers, numbers of students in training, and the number of tutors and mentors. To achieve the stated objectives, data were collected using a self-administered questionnaire (Appendix 2) designed by the researcher initially (2003), and refined with input from key stakeholders. Key stakeholders were invited to a meeting in November 2004 in the form of a workshop (Appendix 1). The aim of the workshop was to receive input from the stakeholders with regard to the nature of the questions that would have to be asked to obtain relevant data. Consensus data was obtained from this panel of nurse leaders during the preparatory phase of the present study. A nominal group technique was utilised to obtain data that contributed to the design of the initial questionnaire for the study. The stakeholders included ICU Nurse Managers and Critical Care Educators from the Western Cape healthcare and educational institutions, from both the public and private sectors. Ultimately, the survey, and subsequent strategic planning, cannot be complete without involving the public and private sector healthcare services due to the crossover of nursing staff at both training and service delivery levels. The respondents were to be the Unit Managers of each unit and the Nurse Educator of each relevant educational institution. With the assistance of the stakeholders the most appropriate respondents were considered.

The questionnaire was discussed with a biostatistician and a statistician to establish if the format of the questionnaire was acceptable, and how the data would be analysed. Suggestions were incorporated by the researcher, and adjustments were made to the questionnaire. The validity and reliability of the questionnaire were tested during the pilot study phase.

3.4.2 Phase 2: Pilot Study

3.4.2.1 Validity and reliability of data collection tool

The purpose of a pilot study is to ensure the validity and the reliability of the data collection tool. Validity refers to "the extent to which a measure actually measures what it is meant to measure", and reliability refers to "the degree of similarity of the

information obtained when the measurement is repeated on the same subject or the same group" (Katzenellenbogen *et al,* 1999 p. 90). Face validity "refers to the extent to which a measure or question makes sense" (Katzenellenbogen *et al,* 1999 p. 92). Validity and reliability were established by selecting a number of appropriate experts to review the questionnaire. The pilot study expert group comprised persons not included in the study sample to ensure objectivity, and were selected according to their research and content expertise. Nine persons, namely four nurse managers, three nurse educators, a physician working in an ICU and an intensivist from different institutions, both public and private, were selected by the researcher as appropriate experts, and invited to participate in the pilot phase of the study. Seven were able to participate, with one nurse manager being willing, but not available at the time, and one educator required managerial approval for which time constraints did not allow. Each of the experts received a copy of the draft questionnaire, with a cover letter requesting their input and a note to explain the context of the study. The pilot respondents were requested to review the example questionnaire for clarity of the wording of the questions to eliminate ambiguity, and to suggest changes where necessary. Each provided valuable input and the suggested changes were made to the questionnaire. Most changes required more specific clarification of time periods, concepts and terminology and some changes to the structure of the questionnaire. Their comments provided a common understanding of the concepts and added to the validity and reliability of the questionnaire. The pilot phase was concluded within ten days in June 2005. The questionnaire (Appendix 2) was finalised in June 2005 and the copies prepared.

3.4.3 Phase 3: Data Collection

3.4.3.1 The Process: Access

The list of respondents was cross-checked with a list of Nurse Managers in the public sector hospitals provided by the Deputy Director: Professional Support Services of the Provincial Government of the Western Cape to ensure an up-to-date respondent contact list. The researcher also used her personal contact lists, developed over the past five years of building up a network of current contact persons in critical care services to cross-check the accuracy of contact details.

Once approval for the study had been granted, and the pilot study had been completed, the process to establish contact with the respondents, and data collection

began. The Nursing Manager of the hospital and/or the ICU Nursing Manager, where applicable, were the first point of contact for the administration of the questionnaires. In general, the Nursing Managers assisted with the collection of the data for the hospital overall, particularly where there was more than one unit per hospital. They also assisted with the verification of the data supplied by the Unit Managers where queries arose. The data was therefore provided from a nursing management perspective.

Contact was made telephonically, via electronic mail, and/or in person with each respondent, with supporting documentation provided in electronic and/or hard copy format as required. Initial contact in each case included the provision of a cover letter by the researcher explaining the purpose and context of the study (Appendix 3). A copy of the questionnaire was provided on request, as respondents wanted to be clear as to the nature of the data required, and what the intention of the research project was.

Permission to conduct the study in the public sector hospitals at secondary and tertiary level was requested in a letter of permission submitted to the Deputy-Director of Health of the Provincial Government of the Western Cape, and which was subsequently granted. The Nursing Manager of each public sector hospital was then approached. The request for approval was referred to the Hospital Research Committee or Hospital Board of each hospital. In each case the process was slightly different, some taking more time than others, depending on the specific requirements and procedures of each institution. Permission to conduct the study in each public sector hospital was requested via the Nursing Manager who submitted the request to the Hospital Research Committee or Hospital Board, as appropriate, for review. The Medical Superintendent of each hospital was informed about the study. Permission was granted by each relevant committee or board for each hospital to participate in the study.

The Nursing Directors of each of the major private hospital groups were contacted to request access to the private hospitals for the purpose of the study. Permission to conduct the study was requested, and granted, via the Nursing Director and the Regional Nursing Directors of the one group. Permission for the second group was applied for, and granted, via the Director of Education at the Head Office, and for the third group permission was granted by the Nursing Manager of each hospital. The

Medical Directors of each hospital were informed about the study by their Nursing Directors, and reviewed the request at their respective Hospital Ethics meetings. The three independent hospitals were contacted via their Nursing Managers and permission to conduct the study was obtained from each of these private hospitals. Contact was also made with a further group, but the hospitals were not appropriate for the study as their units were not functioning during 2004, and were therefore excluded.

Approval for the study was requested from the Head of the Nursing Department of each public sector educational institution. In each case permission was granted to conduct the study. Private sector educational institutions were approached in a similar fashion, making contact with the respective Nursing Education Directors.

Once this approval had been gained for each institution, the researcher set up appointments with each respondent. Contact was made with the Nursing Manager of each hospital in the public and private sectors, including the independent hospitals, and each Head of the Nursing Education Departments. Contact was made electronically, telephonically and/or personally to explain the study to each Nurse Manager and each Critical Care Educator, and to set up appointments to deliver the questionnaires. A parcel of documents was prepared for each respondent, which included the following documents in a coded envelope, with a return note:

- A copy of the Questionnaire (Appendix 2).
- A copy of the researcher's cover letter explaining her request (Appendix 3)
- A copy of a letter of support from the President of the CCSSA endorsing the study (Appendix 4)
- A copy of the relevant consent forms (Appendices 5 and 6)
- A copy of the UCT REC approval for the study (Appendix 7)
- A synopsis of the study briefly explaining the purpose, and potential benefit of the study (Appendix 8)

The researcher devised a checklist of the documents provided to each institution for her own recordkeeping. A tracking sheet of contact made with the respondent of each institution was also devised to keep track of the telephonic and electronic communication.

An appointment was made for a personal interview to afford the researcher an opportunity to meet the Nurse Managers, Unit Managers and Nurse Educators in person, and explain the study and clarify any queries. Interviews varied according to the need and time constraints of each respondent, some more brief and some allowing for more discussion, generally never shorter than half an hour. This enabled the researcher to meet with, and personally deliver the questionnaires to the respondents in each institution. The interviews were specifically for briefing purposes, and not for data collection.

The delivery and collection of the questionnaires involved travelling approximately six hundred kilometres across the Western Cape and around the Metropole, including Paarl, Stellenbosch, Somerset West and Worcester. Delivery and collection of questionnaires to George, Knysna and Mossel Bay was achieved by arrangement with persons travelling to these areas. Interviews, for the purpose of briefing, were conducted telephonically with the Nurse or Unit Managers of these hospitals. The process of gaining access to each key respondent, and the administration of the questionnaire to each, varied between institutions, but took on average two months. The full period of collecting data spanned five months (July to November 2005), including gaining access, delivery of questionnaires, allowing adequate time for completion, collection of the completed questionnaires, and verification of data. Face and construct validity of the questionnaire was addressed during the pilot phase of the study. Validity and reliability of a study is dependent on the data collection process, the return rate of the questionnaires and the statistical analysis of the data. Every effort was made to retain consistency throughout the data collection and analysis phases. The researcher personally delivered and collected the questionnaires and verified the data. The questionnaire return rate was 96.5%. An independent statistician guided the statistical analysis of the data. Objectivity was enhanced throughout the supervision process, during which co-verification of data occurred.

3.5 Data Analysis

3.5.1 Data capturing

The questionnaires were delivered and collected by the researcher personally, with the exception of the George, Knysna and Mossel Bay areas for whom delivery and collection was arranged, to optimise the return rate.

A return rate of 96.5 % was achieved with 84 of the 87 questionnaires being returned. Several attempts were made to retrieve the 3 outstanding questionnaires, but these proved unsuccessful.

The researcher had prepared specifically designed spreadsheets to capture the data. The raw data from each unit and each educational institution were initially entered directly into Excel spreadsheets from each specified questionnaire. To analyse the data, categorical data, for example open or closed (unit), had to be coded in numeric codes, for example as a '1' or a '2', whilst numerical data for example bed numbers, remained unchanged. A second set of Excel datasheets was prepared and the data re-entered according to the allocated codes, for example, an answer of 'yes' was coded as a '1' and an answer of 'no' was coded as a '2'. The data was then sorted into the types of units, as described below, that is, into Adult ICUs, Adult HCUs, Adult HDUs, Paediatric ICUs, Paediatric HCUs, Neonatal ICUs and Neonatal HCUs, to facilitate the analysis of the data and discussion of the findings. The data were sorted and summarised per type of unit and entered into data tables. Totals, sub-totals and percentages were calculated for each variable.

In discussion with the statistician, a decision was made that descriptive statistical analysis would be the most appropriate method of data analysis. Data were summarised and frequencies were counted. Data were analysed and are presented graphically in percentages, frequency distribution tables and histograms. The data for the public and private sector institutions are presented separately.

3.5.2 Critical Care Unit Descriptions

The designation of a critical care unit as an ICU or HCU, or a High Dependency Unit (HDU), remains under debate. For the purpose of this study, and to be able to analyse the data, the researcher described the units as an ICU, HCU or HDU, for Adult, Paediatric or Neonatal patients. The description of each unit took the following factors into consideration:

- The description of a unit as discussed in section 3.2.4.
- A non-specific listing as noted in the Hospital Yearbook (2004).
- The capacity of the unit to provide a critical care service according to the levels described in section 3.2.4, based on the facilities and staffing available to

provide such a service. The description was informed by the data obtained from the present study.

- The description of the unit according to hospital management, as established with the Nurse Manager, as described in section 3.2.1.
- The description of the unit according to the respondents, as informed by the data.
- The number and type of patient admissions, as informed by the data.

For most of the units categorisation was straightforward. Discrepancies between these descriptions were generally related to the units that are designated as HCUs, but where staff feel they have to function as ICUs because they provide mechanical ventilation to critically ill patients. The researcher elected to describe these units according to their capacity as defined in section 3.2.4, which correlates with the definitions provided in the questionnaire. Five units were described as HDUs based on their capacity and patient numbers, as they did not meet the requirements of an ICU or a HCU.

3.5.3 Verification of data

There were a number of queries as the researcher could not adequately interpret certain answers provided by respondents. For example, the one question read "[A]re patients formally scored according to their severity of illness on admission by the attending doctor (e.g. APACHE score)?" with a yes/no answer option. The following question was "[W]hich scoring system is used (e.g. APACHE II)?" A blank box was provided for the answer and answers provided by respondents included "no" or "not applicable", regarding the use of scoring systems. In some instances the response had been "no" to the first question, and "no" was again the response to the type of scoring system in use instead of "not applicable". In other cases, the handwriting was not entirely clear, or data were missing. The researcher attempted to clean the data as far as possible by contacting each respondent telephonically in turn to establish the facts. The queries were generally straightforward and could easily be clarified, for example the intended answer in the above example was "not applicable" instead of "no".

Summary

A quantitative descriptive survey using a questionnaire for data collection was deemed appropriate for the present study. Eighty (80) critical care units of the public and private sector hospitals and seven (7) selected nursing education institutions within the Western Cape provided the setting for the study. Key contact persons within the health sector identified eighty (80) ICU Nursing Managers/Unit Managers, one for each of the eighty (80) units and seven (7) Nurse Educators, one for each selected Nursing Education Department as the eighty-seven (87) respondents for this study. Ethical approval was obtained, and ethical principles and legal considerations were taken into account during the study. Data collection by questionnaire included a pilot study, gaining access to respondents, delivery and collection from research sites. Data were verified in certain instances before descriptive statistical analysis was undertaken.

CHAPTER 4

4. FINDINGS

The findings of the study are presented in a manner that corresponds with the structure of the Questionnaire, with the discussion of the findings to follow in Chapter 5.

4.0 Introduction to the Findings and Profile of Respondents

Section 1 of the questionnaire reflects demographic data about the respondents of the study. The researcher had decided that the Nurse Educators and the Unit Managers should be the respondents by virtue of their position. The designation (position held) of each respondent rather than their qualification had been requested. The Unit Managers indicated that two (2) of them were Critical Care Nurses, twelve (12) were Registered Nurses, one (1) was a Chief Professional Nurse, and ten (10) were Nurse Managers while fifty-two (52) merely stated Unit Manager without giving an indication of their qualification as this had not been requested. Three (3) questionnaires had not been returned. Unit data were therefore provided by the Registered Nurse responsible for the management of the unit, and having an understanding of unit data.

Section 2 of the questionnaire reflects data about the Clinical Institutions or Hospitals, while Section 3 relates to the Educational Institutions surveyed.

4.1 Description and Number of Critical Care Units (Q.2.1-Q.2.3)

Definitions of the terms ICU and HCU were provided and, the majority [49/77 (63.6%)] of the hospital respondents, from both the public and private sector described their units as a combination of an ICU and HCU. After analysing all the data (Q.2.1 – Q.2.23), the researcher then reclassified the units in terms of the levels of care provided and by age of patient as described in 3.2.4. The distribution of critical care units is accordingly reflected in Table 2 and Figure1.

Based on pre-determined descriptions of levels of care for this study (3.2.4), the researcher had identified 38 critical care units in the 12 public sector hospitals to which questionnaires were delivered. A 100% return rate was achieved. Eighteen [18 (47.4%)] of these units were identified as ICUs, 15 (39.5%) as HCUs and 5 (13.2%)

as HDUs. The researcher had identified 42 critical care units in the 23 hospitals of the private sector hospitals, to which questionnaires were delivered. There was a 92.8% (39) return rate. Of these units, 37 (94.9%) were identified as ICUs and 2 (5.1%) as HCUs.

Data in Table 2 reflects the breakdown of these units into Adult, Paediatric and Neonatal ICUs, HCUs and HDUs.

Table 2: Distribution of Units per Unit Description

	PUBLIC		PRIVATE		
TYPE OF UNIT	Number	%	Number	%	Total Number
ICU	12	31.6%	27	69.2%	39
HCU	11	28.9%	2	5.1%	13
HDU	5	13.2%	0	0%	5
PICU	2	5.3%	0	0%	2
PHCU	1	2.6%	0	0%	1
NICU	4	10.5%	10	25.6%	14
NHCU	3	7.9%	0	0%	3
Total	**38**	**100%**	**39**	**100%**	**77**

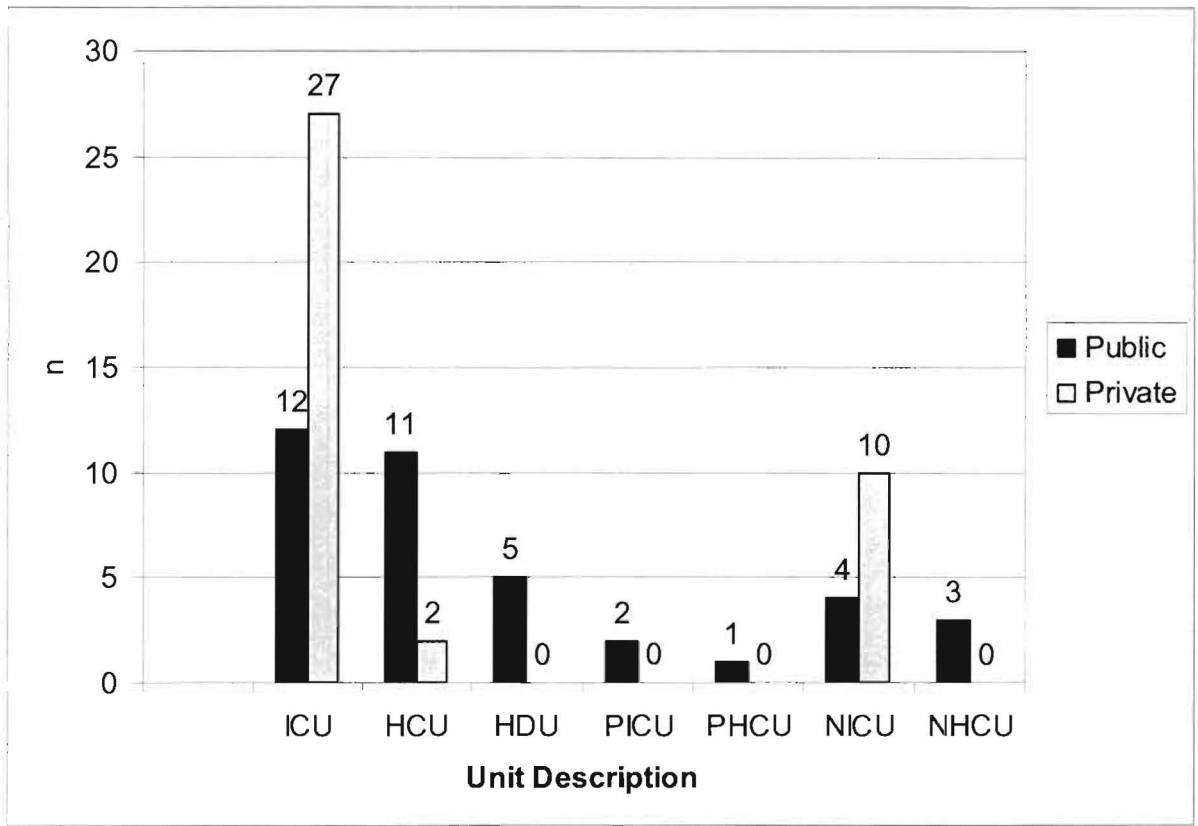
Legend:

ICU = Adult Intensive Care Unit
HCU = Adult High Care Unit
HDU = Adult High Density Unit
PICU = Paediatric Intensive Care Unit
PHCU = Paediatric High Care Unit
NICU = Neonatal Intensive Care Unit
NHCU = Neonatal High Care Unit

(Note: the abbreviations in the above legend are valid for all the Tables and Figures that follow).

The distribution of units between the public and private sectors is depicted graphically in Figure 1. The public sector has 12 ICUs compared to the 27 of the private sector. There are 3 units specifically dedicated to the care of critically ill children in the Western Cape, with 3 of these in the public sector, and none in the private sector. In the public sector, 7 of the units are dedicated to the care of sick neonates, and 10 in the private sector.

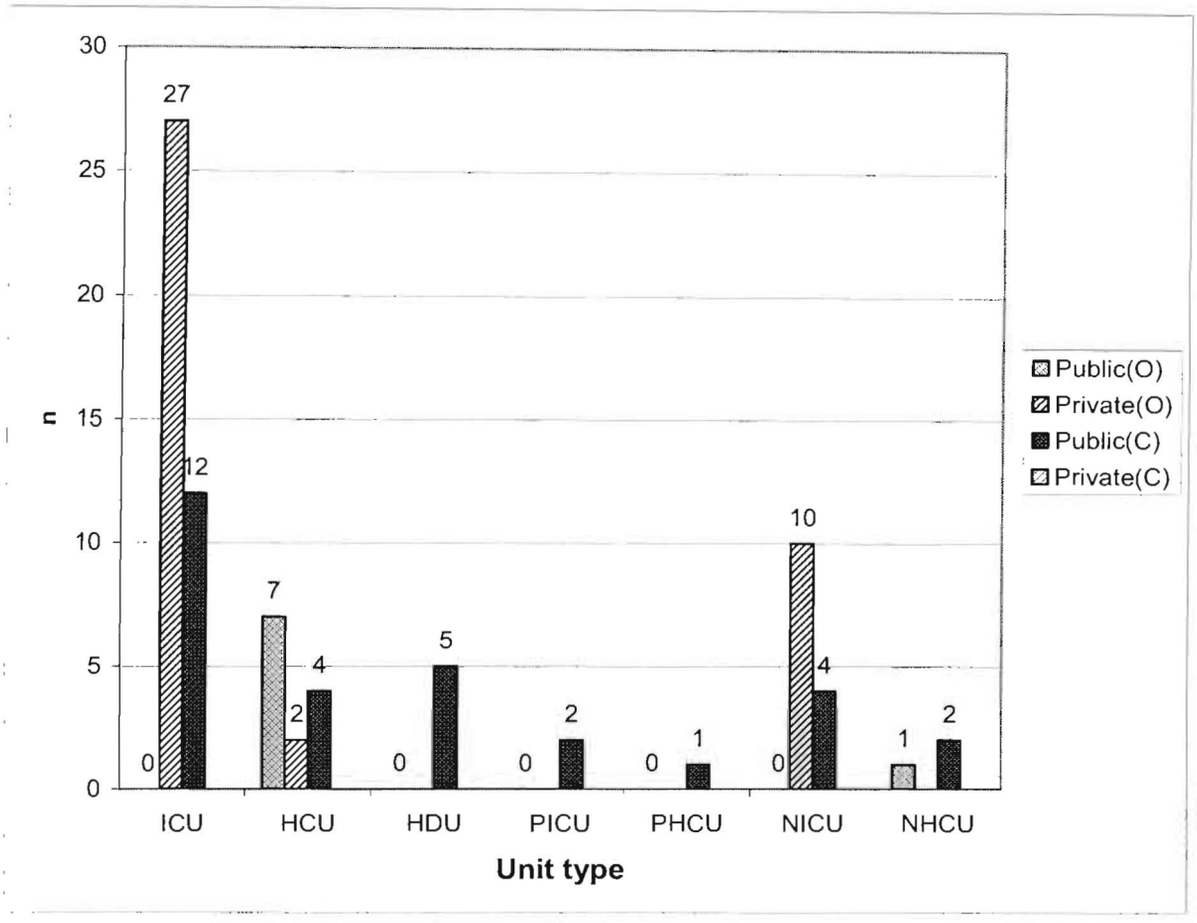
Figure 1: Distribution of Units in the public and private healthcare sectors.



4.2 Open/Closed Units (Q.2.4)

All 39 units in the private sector (100%), and 8 (21%) of the public sector units are managed as Open units, with the remaining 30 (78.9%) public sector units managed as Closed units (Figure 2). Further analysis of the data reveals that of the 13 units situated at the secondary level hospitals of the public sector, 8 (61.5%) are managed as Open units, whilst in the tertiary level hospitals 100% of the 25 units are managed as Closed units.

Figure 2: Distribution of Open versus Closed Units



Legend: O = open, C = closed

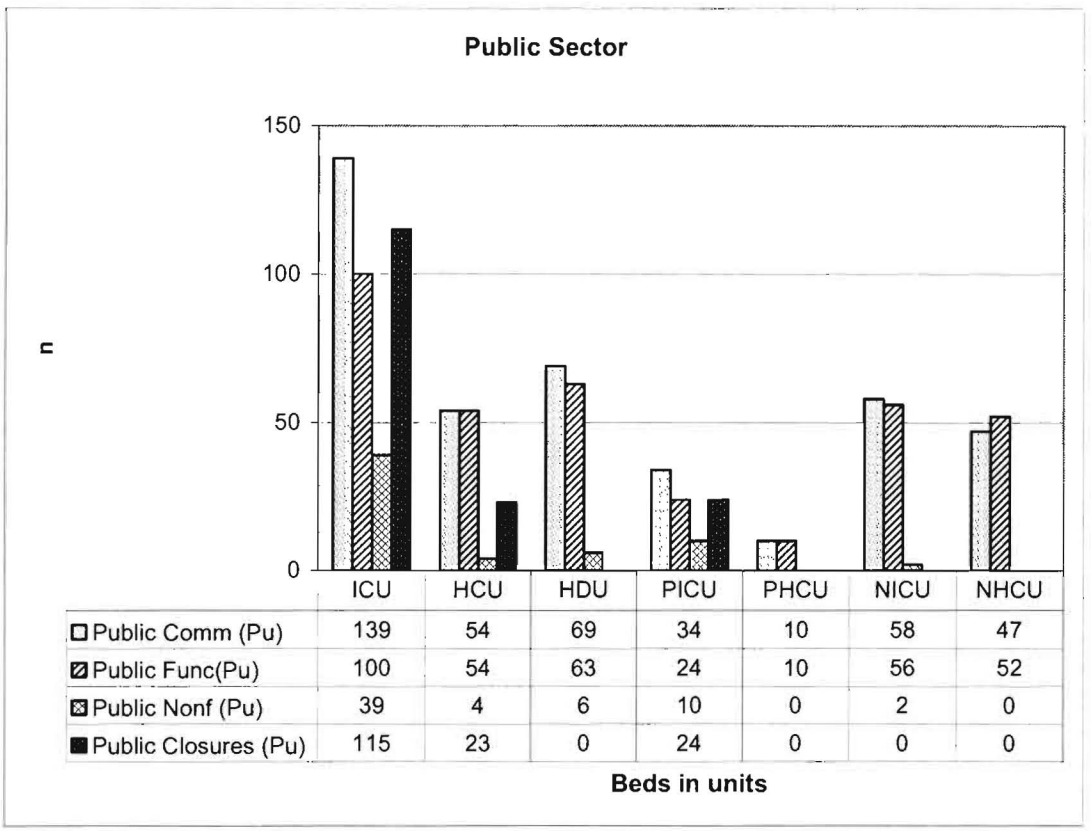
4.3 Bed Status (Q.2.5)

The respondents in this survey were asked about the availability of unit beds by definition as follows:

- Commissioned beds (Comm): the total, established beds in the unit, which could be either functional or closed. These are generally commissioned during the planning phase of a unit.
- Functional beds (Func): commissioned beds that are available for daily use, but dependent on staffing and adequate equipment, particularly monitoring facilities.
- Non-functional beds (Nonf): commissioned, but closed due to staff shortages (for an indefinite time period).
- Ad hoc closures (Closures): beds that are closed due to short-term nursing staff shortages, e.g. for 6, 12 or 24-hour periods.

Bed numbers inform the demand for critical care nursing staff. The unit bed status for the public and private sector hospitals is depicted in Figures 3 and 4 respectively.

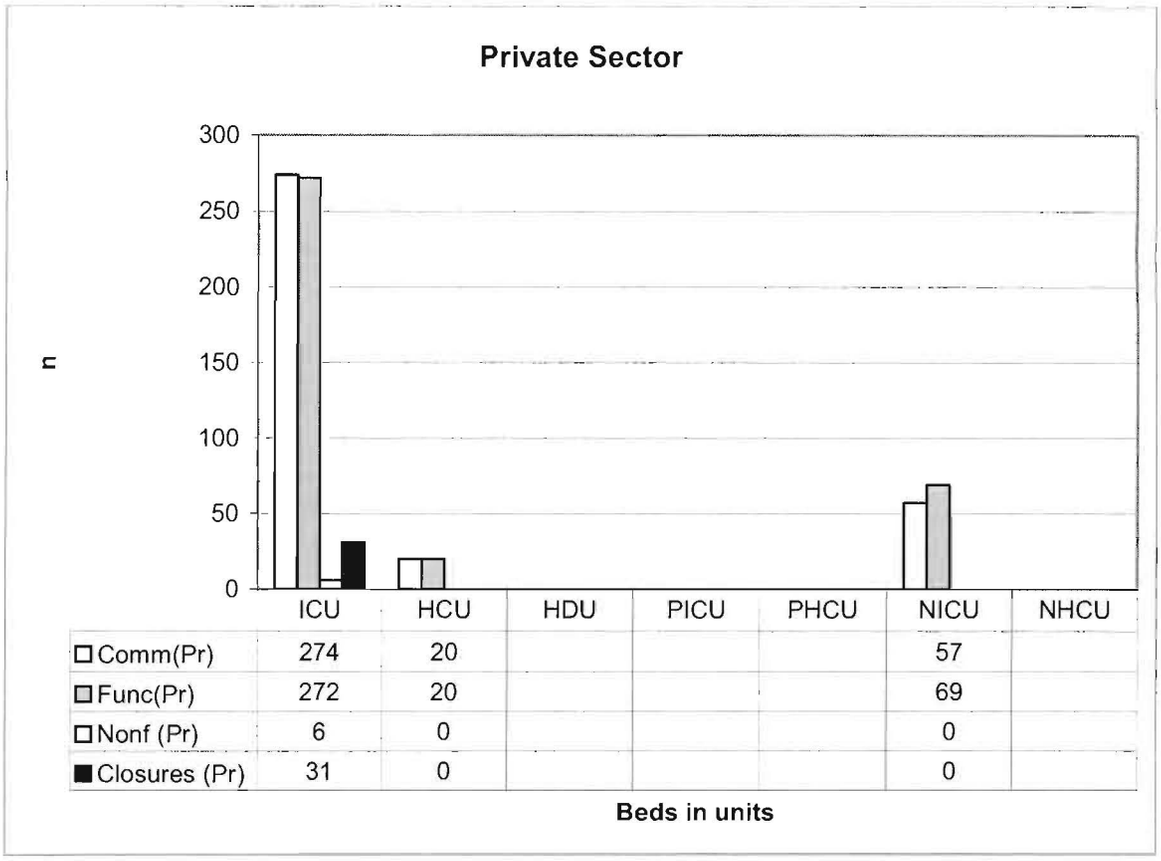
Figure 3: Bed Status (number) of the units in the public sector hospitals



Legend: Pu = public Comm = commissioned
Func = functional Nonf = non-functional

Of a total of 411 commissioned (potential) unit beds in the public sector, 359 were functional, or available on a daily basis, which included an additional 9 expansion beds. Expansion beds are beds that were not commissioned for the unit but are made functional on demand. Sixty one (61) of the commissioned beds were non-functional, that is, closed for an indefinite time period and not available for daily use, 51 of which were ICU beds (Figure 3). Of the 359 functional beds, 180 were functional ICU beds, and 116 were functional HCU beds.

Figure 4: Bed status (number) of the units in the private sector hospitals



Legend: Pr = private Comm = commissioned
Func = functional Nonf = non-functional

The private sector hospitals have 351 commissioned unit beds, with 10 additional expansion beds that can be made available, thus a potential of 361 functional beds. There are a minimum of non-functional beds, namely 6, (Figure 4). Of the 361 potential functional beds, a total of 331 are functional ICU beds, with an additional 10 expansion beds made available upon demand. Of the 351 commissioned beds, 20 are HCU beds. Respondents reported 31 episodes of ad hoc closures of beds for the period under review.

4.4 Patient Admissions (Q. 2.6 – 2.7)

Respondents experienced difficulty collecting the admission data, with data reportedly having to be retrieved by hand-searching admission books. These data were incomplete and therefore may have inaccuracies. Patient admission data were

sorted and analysed according to the type of unit, as previously described. The number of admissions per unit type is depicted in Figure 5 (p.55).

4.4.1 By age group (Q. 2.6)

Patient admission data is summarised in Table 3, and reveals that 22 232 patients were admitted to the public sector units during 2004. Of these patients 18 691 were admitted to the ICUs and HCUs, and 3541 patients to the HDUs. The private sector admitted 21 374 patients to their ICUs and HCUs. More adults were admitted to the private sector units (93%) than the public sector units (59.8%), but more paediatric and neonatal patients were admitted to the public sector units (40.2%), than the private sector units (7%).

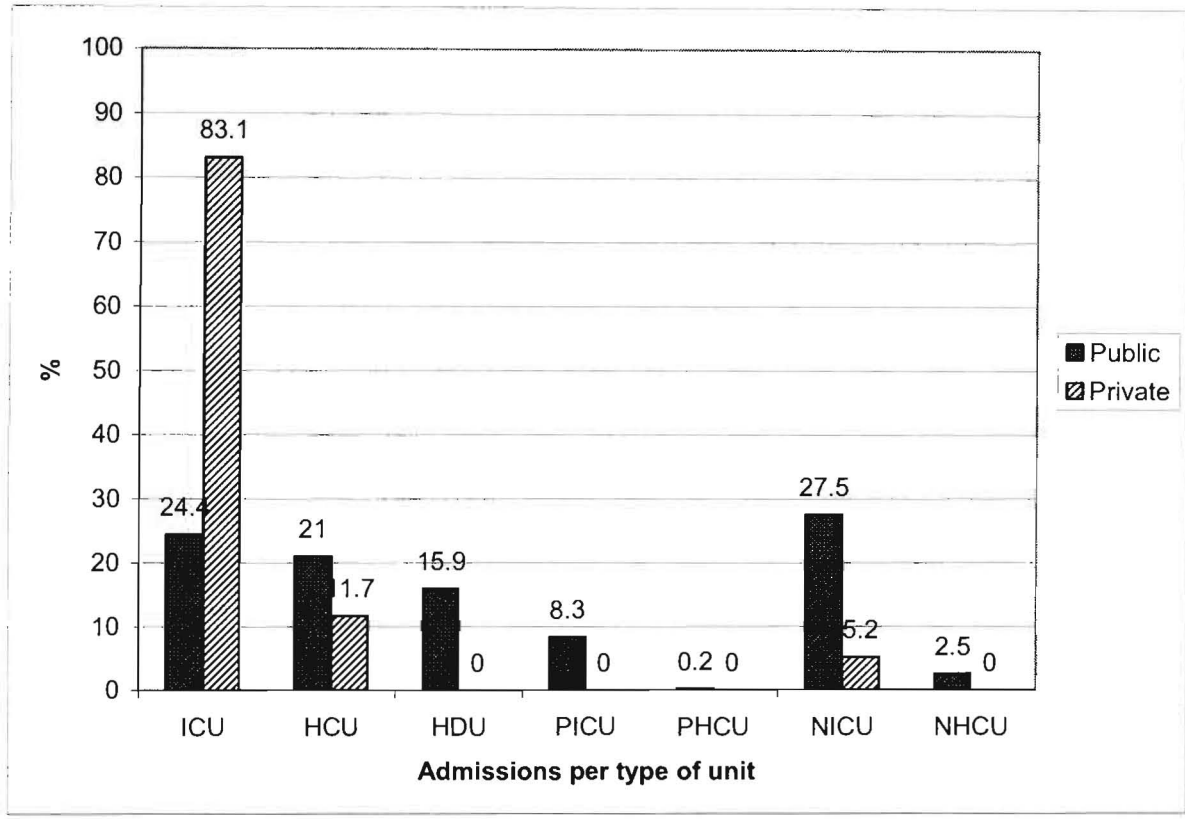
Table 3: Overall number of patients admitted to units during 2004

AGE GROUP OF PATIENT	PUBLIC SECTOR	PRIVATE SECTOR	SUB-TOTAL
Adults	13 292 (59.8%)	19 888 (93%)	33 180
Paediatrics	2 244 (10.1%)	369 (1.7%)	2 613
Neonates	6 696 (30.1%)	1 117 (5.2%)	7 813
TOTAL	**22 232**	**21 374**	**43 606**

The average turnover of patients across the units of the public sector was calculated to be 62 patients per bed for the 2004 year period, based on the total number of patient admissions for the year divided by the number of functional beds. The private sector had a turnover of 59 patients per bed for the same period. These calculations may be skewed as the accuracy of the admission data is questionable.

In the public sector hospitals, 24.4% of the critical care patient admissions were to ICUs, 21% to HCUs, 8.3% to Paediatric ICUs and 27.5% to Neonatal ICUs. In the private sector 93% of patient admissions were to ICU, 11.7% to HCUs and 5.2% to Neonatal ICUs.

Figure 5: Percentage of patient admissions per type of unit from 1 January 2004 to 31 December 2004.



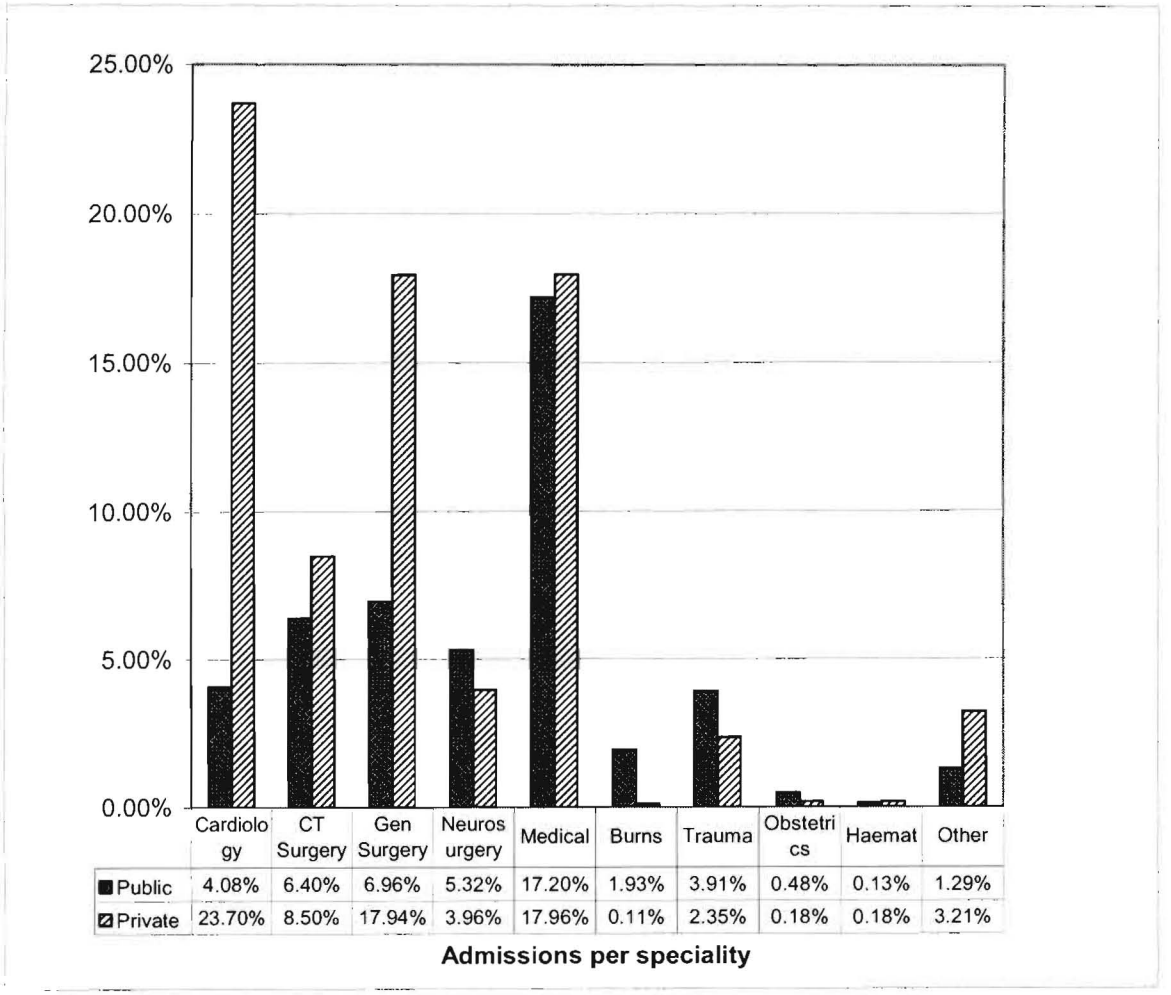
4.4.2 Patient Admissions by Diagnostic Category (Q. 2.7)

A selection of 10 broad diagnostic categories was provided to respondents for patient admission data. Data were nevertheless incomplete and during the verification phase respondents verbalised that data was not readily available, even from admission books. Possible overlap of the categories is acknowledged, however the study did not attempt to collect patient-specific data. The available data is depicted in Figure 6 and Table 4 to provide some indication of the frequency of the diagnostic categories for which patients are admitted to critical care units.

In the private sector admissions were mainly for cardiology (23.7%), which was significantly more than the public sector admissions (4.08%). This was followed by medical admissions, 17.96% and 17.2% respectively, with medical admissions accounting for most of the public sector admissions. General surgical conditions followed, 17.94%, again significantly more than the 6.96% of the public sector admissions. Thereafter admissions were for cardiothoracic surgery, 8.5% and 6.4%,

neurosurgery, 3.96% and 5.32%, trauma, 2.35% and 3.91%, burns, 0.11% and 1.93%, and a category of other (various) accounted for 3.21% and 1.29%, respectively for the private and public sector units.

Figure 6: Overall patient admissions per diagnostic categories



	Cardiology	CT Surgery	Gen Surgery	Neurosurgery	Medical	Burns	Trauma	Obstetrics	Haemat	Other
Public	4.08%	6.40%	6.96%	5.32%	17.20%	1.93%	3.91%	0.48%	0.13%	1.29%
Private	23.70%	8.50%	17.94%	3.96%	17.96%	0.11%	2.35%	0.18%	0.18%	3.21%

Legend: CT = cardiothoracic surgery Haemat = Haematology

Data in Table 4 provide more detail about these admissions per age group.

Table 4: Admissions per diagnostic category and age group

Diagnostic	Public			Private		
Category	Adult	Paediatric	Neonates	Adult	Paediatric	Neonates
Cardiology	6.8%	0%	0.01%	25.3%	1.4%	2.8%
Cardiothoracic Surgery	8.6%	11.9%	0.01%	8.7%	24.1%	1.2%
General Surgery	9.9%	9.5%	0.4%	18.5%	3.8%	3.8%
Neurosurgery	8.3%	3.7%	0.06%	4.1%	5.7%	0.7%
Medical	13%	35.1%	19.6%	14%	19.8%	8.6%
Burns	2.9%	1.9%	0%	0.1%	0%	0%
Trauma	6.0%	2.7%	0.2%	2.3%	11.7%	0%
Obstetrics	0.8%	NA	NA	0.2%	NA	NA
Haematology	0.02%	0%	0%	0.2%	0%	0.4%
Other	2.1%	0.2%	UK	0.03%	0.8%	3.6%

Legend: NA = not applicable, UK = unknown

The number of patient admissions to the units and the categories of medical diagnoses contribute to the demand for critical care nursing staff. Data in Table 3 show that 22 232 patients were admitted to the critical care units of the public sector hospitals between 1 January and 31 December 2004. Calculations from the data revealed that 40.2% of these admissions were children below 14 years and neonates, and 59.8% were adults. The private sector hospitals admitted 21 374 patients during the same period (Table 3), of which 6.95% were children and neonates, whilst 93% were adults. In the private sector, more paediatric patients required cardiothoracic surgery (24.1%) compared to the adults (8.7%). In the public sector most paediatric patients were admitted with medical conditions (35.1%) compared to the private sector (19.8%). Trauma accounts for more paediatric admissions in private (11.7%) than the public sector (2.7%). These figures indicate a need for critical care nurses who are qualified in caring for critically ill children and neonates.

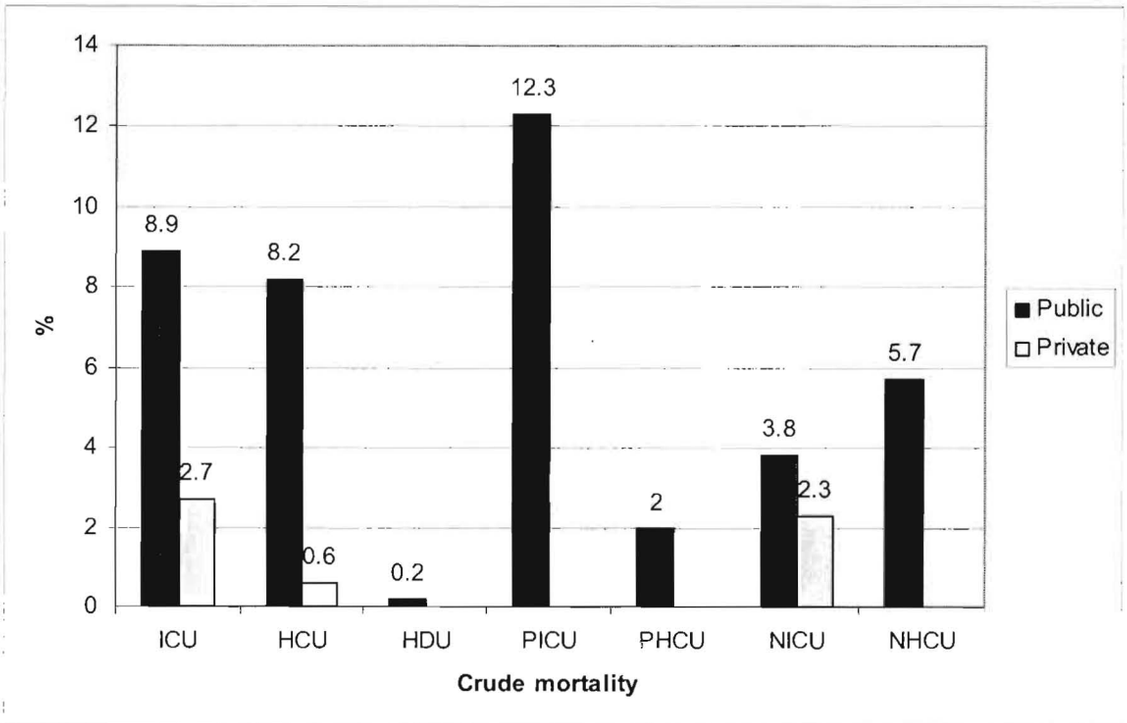
4.5 Mortality (Q2.19)

The mortality rate of a unit can give some indication of the severity of illness or injury of a patient on admission, the efficacy of patient management and quality of nursing care of that particular unit when compared to another.

Discharge data in this study included the number of patients who were discharged alive from ICU and those who died in the ICU. Patient acuity contributes to the

demand for critical care nursing staff. This data was incomplete due to ineffective information capturing systems in the units; nevertheless a crude mortality rate varying between 0.2 to 12.3% was calculated from the available data (Figure 7). There is a fair spread of critically ill patients admitted to the units within the public sector hospitals, an indication that the criteria for admissions are appropriate. Most of the deaths occurred in the paediatric ICUs (12.3%), followed by adult ICUs (8.9%), adult HCUs (8.2%), and then neonatal HCUs (5.7%) and neonatal ICUs (3.8%). The low crude mortality rates of the private sector patients, 2.7% in adult ICUs and 2.3% in neonatal ICUs, suggest that these patients are generally not so ill, and begs the question if all these admissions to ICUs are appropriate.

Figure 7: Crude Mortality rate of unit admissions



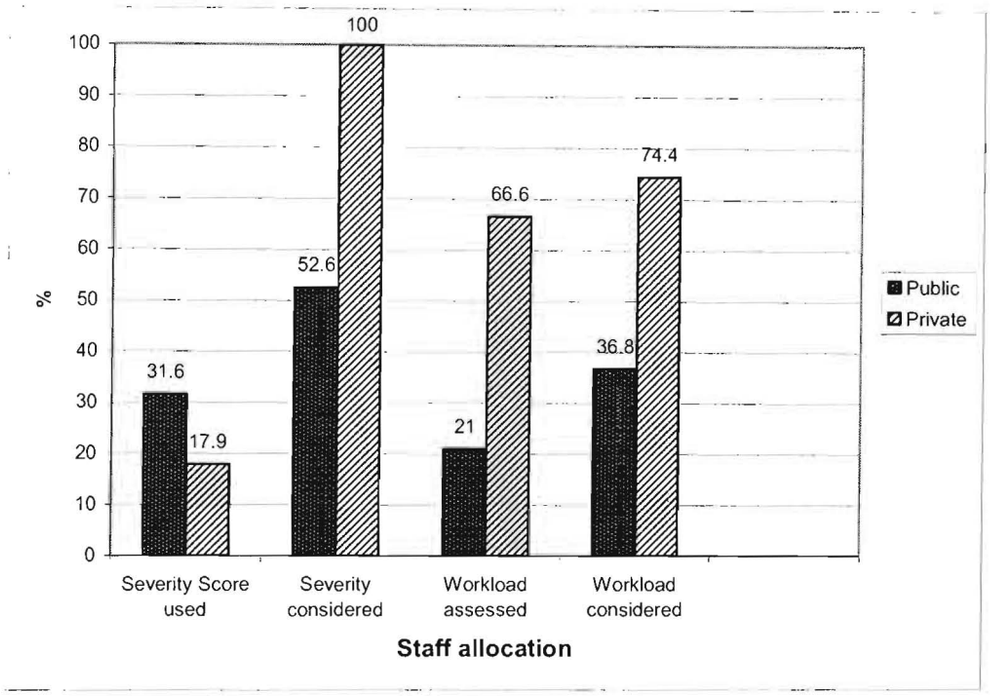
4.6 Scoring Systems and Staff Allocation (Q 2.8 – Q 2.10 and Q 2.22 – Q 2.23)

The patient's severity of illness or injury, and subsequent changes, can be scored according to various scoring systems that have been developed over time as assessment instruments. An example of such a score used in the critical care setting is the APACHE II score (Knaus *et al,* 1985). The patient's severity of illness

provides an indication of the level of skill and knowledge required of the nurse caring for the patient. The higher the score the greater the severity of the patient's condition, and therefore an increased use of advanced technology and equipment, complex medication regimes and the need for more investigations in the management of the critically ill patient, for example blood gas sampling, mechanical ventilation and inotropic support. The actual amount of work that a critically ill patient generates is also influenced by the severity of illness of the patient, and this is estimated by means of a nursing workload assessment score, such as the Nursing Activities Score (NAS) (Miranda *et al*, 2003).

Data in Figure 8 depict the factors that could have been taken into consideration when nursing staff were allocated to give patient care. The data reveals that in response to questions about severity of illness scoring on admission, type of scoring system and nursing workload scoring, and whether these factors are taken into consideration when allocating nursing staff to give nursing care, 31.6% of the public sector units and 17.9% of the private sector units formally score their patients according to severity of illness (Figure 8). In the public sector units 52.6 % consider severity of illness when allocating nursing staff, while this is 100% for the private sector. Of the public sector units, 36.8% indicate that they do consider nursing workload, yet only 21% formally assess or score the nursing workload. In the private sector units, 74.4% indicate that they do consider the workload, with 66.6% of the units using formal workload scoring systems. The implications are that category of nursing staff and level of experience are not necessarily matched to the severity of illness or the nursing workload generated by the severity of illness of the patients.

Figure 8: Factors taken into consideration when allocating Nursing Staff



4.7 Nurse-patient Ratios (Q 2.20 – Q 2.21)

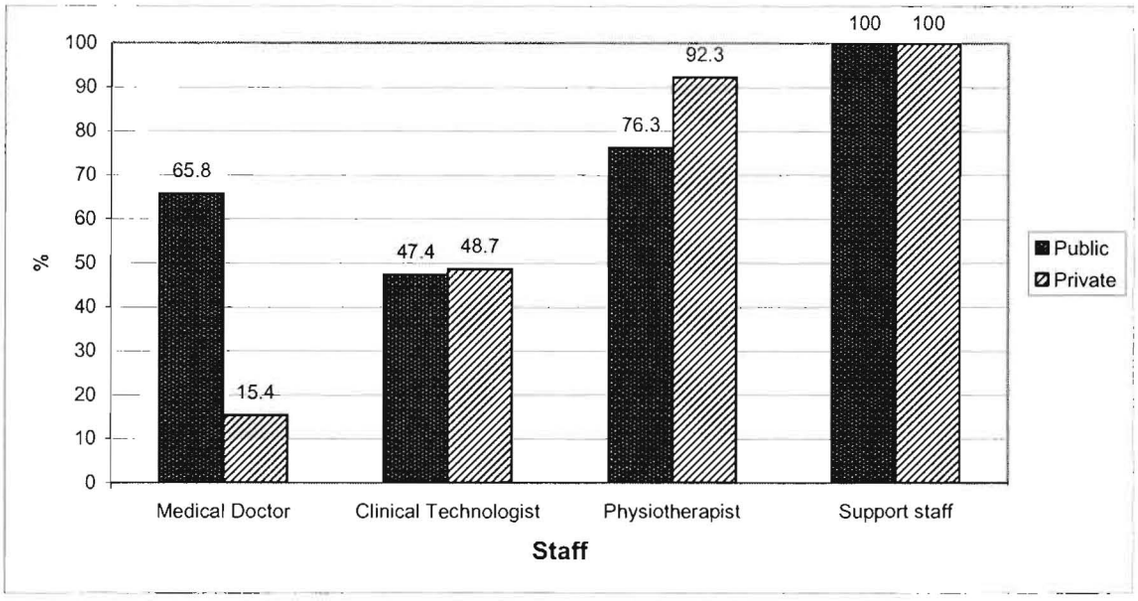
Data were collected to determine if hospitals use a specific nurse-patient ratio in their units when allocating nursing staff to the care of critically ill patients. The results showed that more than half of the public sector units (57.9%) overall, and 83.3% of the ICUs in particular, make use of specific nurse-patient ratios. All the private sector units use specific ratios. This data only indicates whether ratios were used or not.

Further data were collected to determine which ratios were used in cases where nurse-patient ratios were in use. Slightly more than half (54.5%) of public sector units use a specific nurse-patient ratio of 1:2 for ventilated patients. The rest used ratios that varied from 1:1 to 2:3 for ventilated patients. This ratio includes a skill mix of critical care nurses, registered nurses, enrolled nurses and nursing auxiliaries, and differs from unit to unit, depending on staff availability. A registered nurse to patient ratio of 1:1 for ventilated patients is used by 5.26% of public sector units and 100% of private units. In the case of non-ventilated critically ill patients, the nurse-patient ratios increase, dependent on severity of illness and staff availability. In the public sector these ratios vary from 1:1 but mostly 1:2 in ICU to 1:16 in a Neonatal High Care Unit, whereas in the private sector these ratios vary from 1:1 but mostly

1:2 in ICU to 1:4 in a Neonatal ICU. It is evident from the results that the nurse working in a public sector unit has a higher patient load.

4.8 Medical Staffing and Support Staff (Q 2.11 – Q 2.17)

Figure 9: Availability of staff for the unit



Legend: Support = Support staff such as housekeeping and administrative staff.

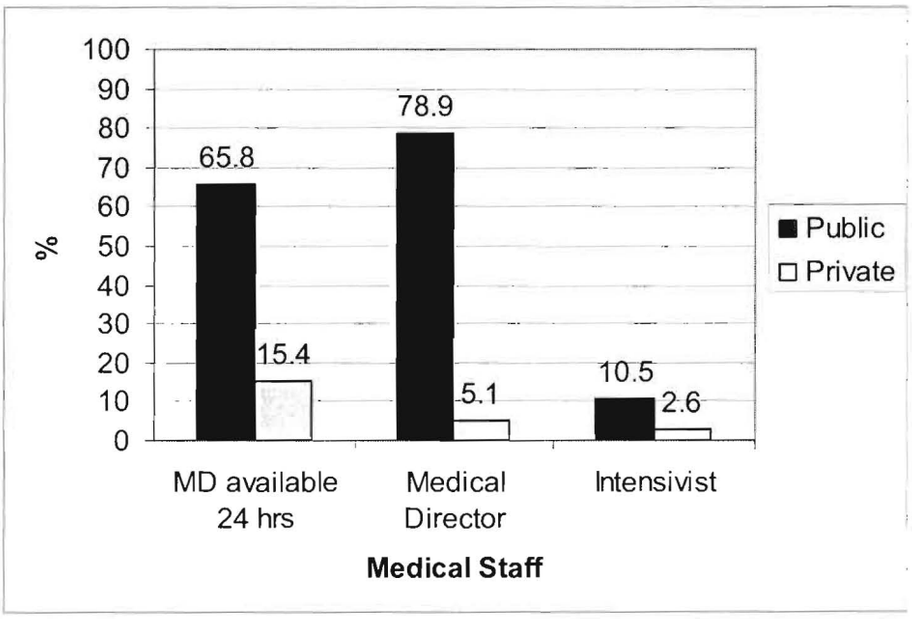
The results (Figure 9) show that a medical doctor was present for 24 hours per day for the unit in 65.8% of public sector units, and in 15.4% of private sector units. In the public sector medical doctors were present for 24 hours per day in 83.3% of ICUs specifically. The question referred to the on-site presence of the doctor 24 hours per day, either in or near the unit, or elsewhere in the hospital such as in the trauma and emergency unit. The off-site presence of a doctor available per telephone was not considered to be 'present, or available, for the unit'. The question relates to the immediate availability of medical expertise should an emergency arise for which the nurse at the bedside would require assistance. In the public sector units, medical cover is usually provided by on-duty registrars. Because most of the units are open in the private sector, each admitting doctor cares for his/her own patients and is generally available via telephonic contact. For five of the private hospitals a doctor was available for 24 hours of the day for the trauma and emergency department. For the purpose of data clarification respondents indicated that these doctors were also available for the units in case of emergencies.

In the public sector, clinical technologists were available on a daily basis in 18 of the 38 units (47.4%). In the private sector, this service was available in 19 of the 39 units (48.7%) (Figure 9). The service usually covers a 24 hour period, with a call-out system in place after normal working hours.

In the public sector units, physiotherapists were available to provide a daily service for 76.3% of the units, whilst in the private sector 92.3% of the units provided this service daily (Figure 9).

In both the public and the private sector hospitals the respondents indicated that support staff were available in all units (Figure 9). Following discussion with the respondents to clarify data queries during the verification process, it became apparent that the type and extent of the support staffing differs between units. Clerical, housekeeping and domestic staff were mentioned to be the most commonly available support staff.

Figure 10: Availability of Medical Staff



Data in Figure 10 depict a profile of the medical staffing of the critical care units. In 65.8% of the public sector units, a doctor was available for 24 hours per day and generally present in the unit, whilst in the private sector doctors were available for 24 hours per day in 15.4% of the units but generally on call (Figures 9 & 10).

Additional data revealed that 78.9% of the units in the public sector had a dedicated Medical Director in charge of the unit, whilst 5.1% of private sector units had Medical Directors (Figure 10). This is in keeping with the 79% closed units found in the public sector, and no closed units in the private sector (Figure 2). Specialists in the private sector manage their own patients. Even in the one private sector unit that had a Medical Director, other doctors could admit and manage patients in this unit.

Results show that 10.5% (4) of the Medical Directors in the public sector hospitals were critical care specialists, whilst in the private sector this was 2.6% (one) (Figure 10). Intensivists tend to be qualified anaesthetists or pulmonologists.

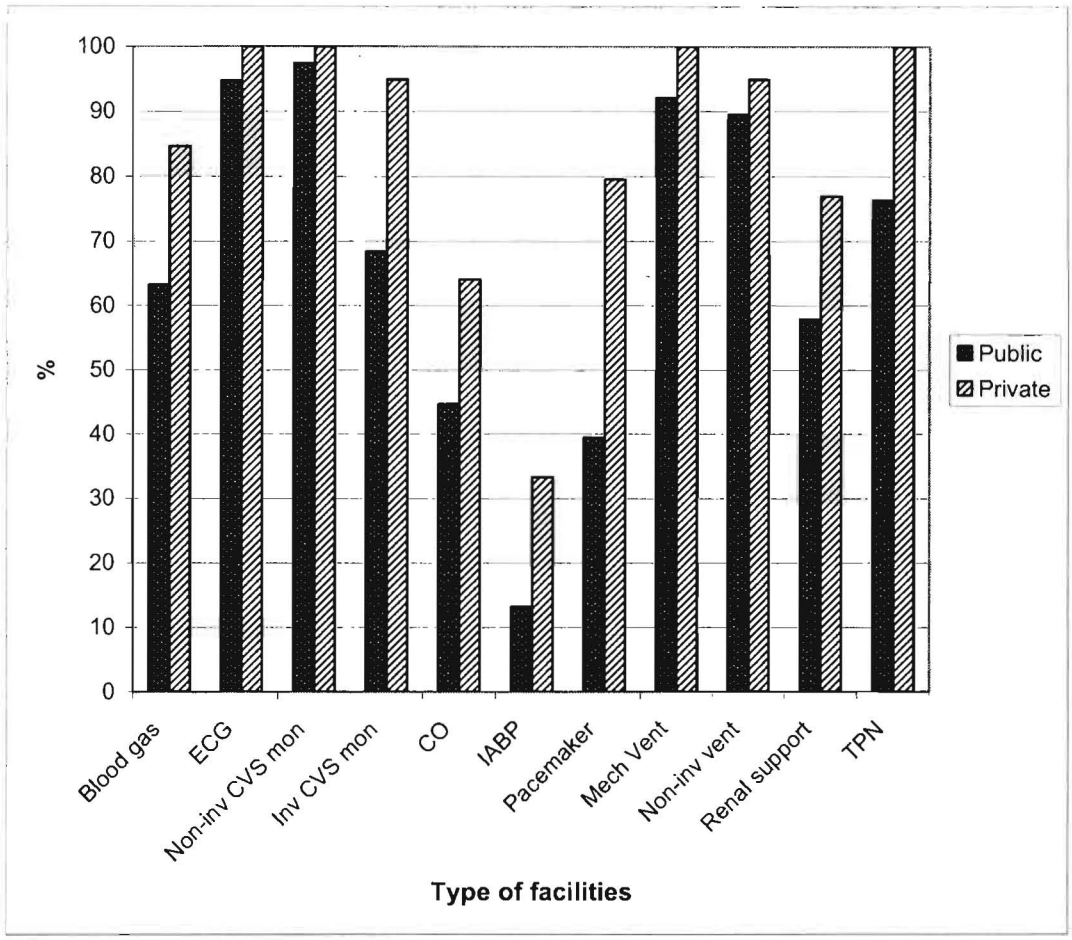
Medical Directors of the units that were not critical care specialists were specialists in a number of disciplines, such as: pulmonology, cardiology, surgery, neurosurgery, transplant surgery, cardio-thoracic surgery, nephrology, orthopaedics, obstetrics, haematology, medicine, trauma, paediatrics, neonatology, and burns.

4.9 Monitoring and Interventional Facilities (Q 2.18)

Data were collected to establish what monitoring and organ support facilities were available in the critical care units of the Western Cape hospitals. All of the critical care units had some facilities available to provide ICU or HCU level care (Figure 11). The private sector units had greater capacity, with more units being better equipped than public sector units, for example 94.9% of the private sector units have invasive cardiovascular monitoring available, compared to 68.4% of the public sector units. Of the units that provide mechanical ventilation (92.1% of public sector units and all private sector units), not all have blood gas analysis facilities in the unit (63.2% and 84.6% respectively), but tend to use the services of the nearest chemical pathology laboratory.

All the private sector units have ECG (electrocardiography), non-invasive cardiovascular monitoring and mechanical ventilation facilities and total parenteral nutrition available. Most public sector units also provide these facilities. The least available technology to support failing organs in both the private and public sector units is the intra-aortic balloon pump, 33.3% and 13.2% respectively.

Figure 11: Monitoring and Organ Support Facilities



Legend: ECG = Electrocardiography
CO = Cardiac Output
Non-Inv CVS mon = non-invasive cardiovascular monitoring
Inv CVS mon = invasive cardiovascular monitoring
IABP = intra-aortic balloon pump
Mech Vent = mechanical ventilation
Non-inv vent = non-invasive mechanical ventilation
TPN = total parenteral nutrition

4.10 Nursing Staff (Q.2.24 – Q 2.31)

Data were collected to establish specifically how many of the critical care units had a CCN as Unit Manager as at 1 January 2005. Results showed that 65.8% (25/38) of the public sector units and 92.3% (36/39) of the private sector units had CCNs as Unit Managers.

The actual numbers of nurses working in the critical care units who were employed in permanent positions in the hospitals and were on the staff establishment as at 1 January 2005 are reflected in Table 5. The findings revealed that 407 Registered Nurses, of which 118 were CCNs, and 361 Enrolled categories of nurses, were employed in the public sector units (N=768). In the private sector units there were 408 RNs, of which 204 were CCNs, and 127 Enrolled categories of nurses (N=535). More enrolled categories were employed in the public sector.

Table 5: Numbers of Nursing Staff

	CCNs	RNs	ENs	ENAs	**TOTAL**
PUBLIC SECTOR	118	289	127	234	**768**
PRIVATE SECTOR	204	204	81	46	**535**
TOTAL	322	493	208	280	**1303**

Legend: CCN = Critical care Nurse; RN = Registered Nurse
EN = Enrolled Nurse ENA = Enrolled Nursing Auxiliary

According to a nursing workforce planning method developed by Williams and Clarke in 2001 for staffing ICUs and HCUs in Australia, Williams (2004, p. 45) calculated that 255 registered nurse hours were required per ICU bed per week, based on the number of nurse hours per week, the number of supernumerary (ACCESS) nurse hours per week and industrial award leave cover. These hours were used in determining that 6.7 full-time equivalent (FTE) registered nurses were required per ICU bed. For the HCU, 148 registered nurse hours were required per HCU bed per week and 3.89 FTE registered nurses were required per HCU bed. The formula for this calculation was based on a 1 nurse:1 ICU patient ratio, a ratio of 1 nurse:2 HCU patients, the use of access nurses (additional nursing staff), leave consideration and a 26-hour nursing day and a 38-hour working week per nurse as worked by a full time nurse in Australia. A full nursing day adds up to 26 hours to allow for the handover period (Williams, 2004).

If these nurse hours are applied to the Western Cape critical care unit beds and a 40-hour working week used as worked by a full time nurse in South Africa, the calculation would reveal a significant deficit as follows:

- Public sector:
    - 180 ICU beds x 255 RN nurse hours per ICU bed per week = 45 900 hours
    - 116 HCU beds x 148 RN nurse hours per HCU bed per week = 17 168 hours
    - A total of 63 068 nurse hours per 40 hour week = 1577 RNs required

Data show that 407 RNs were available, compared to a calculated requirement of 1577 RNs, which equates to 25.8% of requirements, a deficit of 74% or a shortage of 1170 RNs.

- Private sector:
    - 341 ICU beds x 255 RN nurse hours per ICU bed per week = 86 955 hours
    - 20 HCU beds x 148 RN nurse hours per HCU bed per week = 2 960 hours
    - A total of nurse 89 915 hours per 40 hour week = 2248 RNs required

Data show 408 available RNs, compared to a calculated requirement of 2248 RNs, which equates to 18% of requirements, a deficit of 82%, or a shortage of 1840 RNs, thus a total shortage of 3010 RNs for both sectors.

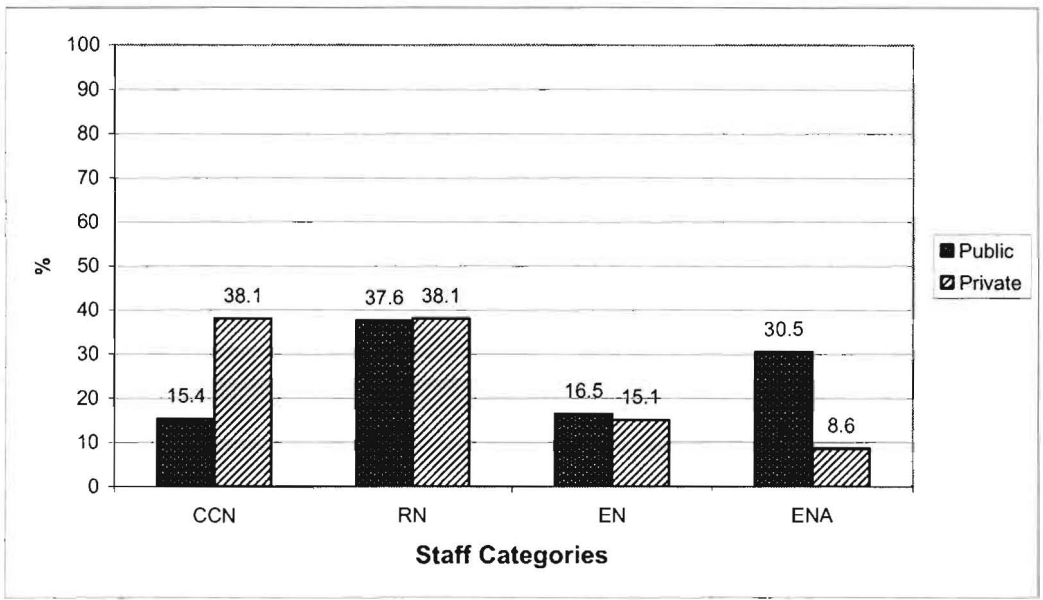
Even if one were to calculate the above requirements with the total number of nurses employed within by the Western Cape units (that is ENs and ENAs included), the public sector only meets 49% and the private sector 24% of its requirements. This is inadequate to staff the units on a 24 hour basis, requiring supplementation by nurses hired from various nursing agencies, or nurses working overtime in their own hospitals. Additional nurse staffing requirements are calculated on a daily basis by the Nurse Manager who spends a great deal of the working day finding staff. The comment made most frequently during the discussions at the time of the initial appointments with the Nurse Managers was "the agency cannot supply" (that is, enough nursing staff to meet the demand).

4.10.1 Additional Nurse Staffing

The researcher attempted to collect data about the number of additional nurses employed via the agencies or working overtime between 1 January 2004 and 31 December 2004, to quantify the deficit in nursing staff numbers. This information was particularly difficult to obtain, and not all the respondents could provide accurate data. Each hospital has its own method of calculating this requirement, some working with shifts, some with hours, and some with percentages. Data did however reveal that 84.4% of units in both sectors utilised agency nurses and 59.7% of permanent staff worked overtime. The data related to the number of additional nurses employed and the additional overtime shifts worked was however too diverse and too incomplete to analyse. The average number of agency nurses that a unit required per month to cover the shifts ranged from 2 to 200 during 2004. Some units indicated that 50% of their staff were agency staff. The average number of overtime shifts worked by the nursing staff from their own hospitals ranged from 1 to 128 shifts. This missing data constitutes a limitation of the study, particularly as the aim of the study was to determine the demand for nursing staff, and this data could have contributed to quantifying the demand. However, it enables the researcher to report that hospital information systems about staffing and additional staff utilisation are inadequate for data analysis purposes.

Data in Figure 12 depict the categories of nursing staff in percentages. Of these, 15.4% (118) of the nurses in full-time employment and allocated to the critical care units in the public sector hospitals were qualified Critical Care Nurses or Neonatal Intensive Care Nurses. The latter is recognised as a critical care nursing speciality, and these nurses tend to work only in the Neonatal units. In the private sector, 38.1% (204) of the full-time nurses were CCNs. Although there were more CCNs in the private sector, there was still a shortage of qualified CCNs in both sectors of critical care healthcare services. This deficit has implications for the safe nursing care of critically ill patients. Registered nurses made up 37.6% (289) and 38.1% (204) of the nurse staffing in the public sector and the private sector units respectively. Enrolled nurses, or staff nurses, made up 16.5% (127) and 15.1% (81) of the staffing respectively, and the balance was made up by Enrolled Nursing Auxiliaries (ENAs), namely 30.5% (234) and 8.6% (46) respectively. Public sector hospitals employed more ENAs in the units than the private sector at the time.

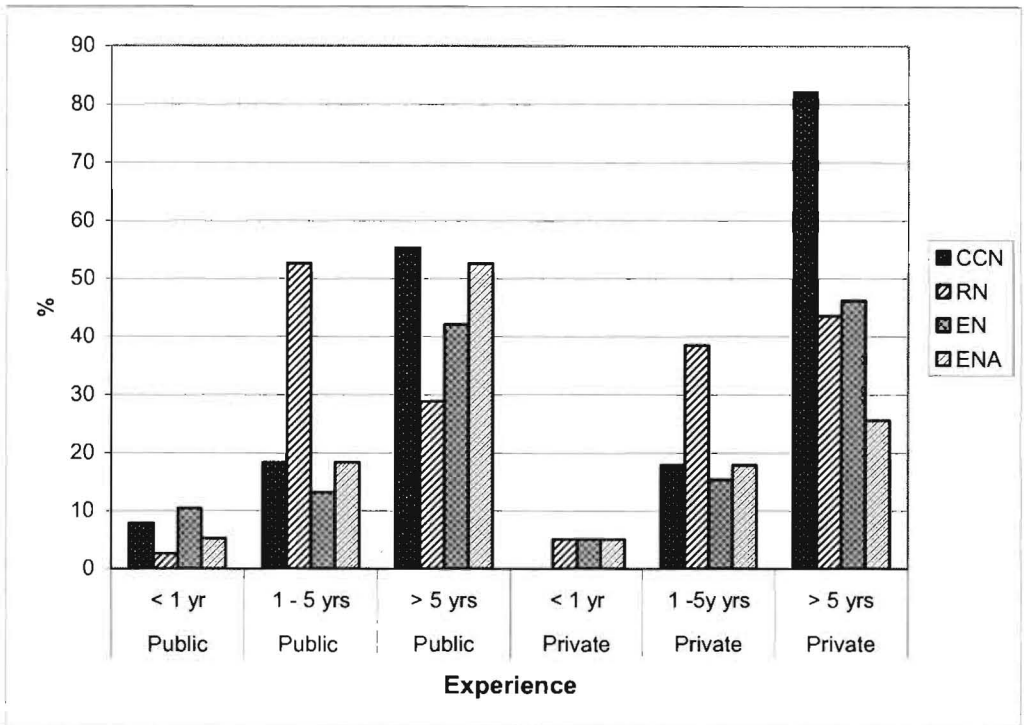
Figure 12: Categories of Nursing Staff



4.10.2 ICU Experience of Nursing Staff (Q.2.31)

Data in Figure 13 reflect the average number of years of ICU experience for each category of nurse (CCNs, RNs, ENs and ENAs). The majority of the CCNs working in the public and the private sector units have more than 5 years' experience of working in ICU. The ICU experience of the majority of the registered nurses in the public and the private sector units ranged from 1 to 5 years, and more than 5 years. The majority of the ENs and ENAs in both sectors have more than 5 years' ICU experience. These categories of nurses tend to be the stable workforce, remaining in one area for longer periods of time. The latter categories work under the supervision of the RN.

Figure 13: Experience of Nursing Staff



4.11 Recruitment and Retention of Nursing Staff (Q 3.34–2.35, Q 2.39–2.40)

Retention of staff refers to keeping staff in one's employ for a reasonable period of time and avoiding a high turnover of staff which impacts negatively on the stability of workforce. A loss of staff is described when a CCN has resigned from the permanent employ of the institution and is no longer available for that healthcare service as a full-time employee. In response to the question about the loss of CCNs from the hospitals data had to be verified with the Nurse Managers who have access to data for all the units, rather than unit–specific data only. In the public sector 47.4% of the units indicated that their hospitals had experienced a loss of CCNs, whilst 64% of private sector units indicated a loss. The reason for the greater loss of CCNs from the private sector was not apparent. The accuracy of the actual number of CCNs who had left each sector could not be verified. The public sector indicated a loss of 9 CCNs during 2004, and the private sector a total of 73 CCNs. This study did not investigate the loss of other categories of nursing staff.

Respondents were asked to indicate the reasons that the CCNs gave for leaving the service, and these are tabulated in Table 6 below. Each respondent provided more than one reason for leaving.

Table 6 Reasons for leaving the service

REASONS FOR LEAVING	PUBLIC SECTOR	PRIVATE SECTOR	TOTAL
1. To the Private sector	11	1	12
2. To the Public sector	2	0	2
3. To work overseas	12	18	30
4. Other work	4	10	14
5. Financial reasons	10	11	21
6. Lack of promotional opportunities	8	2	10
7. Social or family reasons	6	10	16
8. Other	3	7	10
9. Not specified	3	2	5

According to data from the public sector, the following reasons were most often given for leaving the service, ranked from the highest to the lowest number of reasons per category:

1. Going to work overseas
2. To work in private hospitals
3. Financial reasons
4. Lack of promotional opportunities
5. Social or family reasons.

It is not clear from the data how many of these nurses left the public sector to work for the nursing agencies on a full-time basis, as they can do agency work while in public sector employment, such as on their days off.

According to data from the private sector, the following reasons were most often provided for leaving the service, ranked from the highest to the lowest number per category:

1. Going overseas to work
2. Financial reasons
3. Other work (this included transfers to another hospital in the Western Cape within the same group)
4. Social or family reasons
5. Other (various).

The ranked reasons are very similar for both groups. With regard to retention, further data were collected to determine if CCN students were required to sign a contract specifying a period of time they would have to work for the institution after completion of their studies. A third (33.3%) of the public sector institutions required a contract, with time worked back ranging from 1 to 2 years, usually on a year-for-year basis, while 85.7% of the private institutions required a contract, with the time also ranging from 1 to 2 years.

When asked if the student receives additional remuneration upon completion of such a course (an incentive to study), 83.3% of the public sector hospitals and 81% of the private sector hospitals answered in the affirmative. The additional remuneration is however often in the form of a scarce skills allowance in the public sector.

4.12 Critical Care Nurse Education and Training

4.12.0 Clinical education and training resources (Q.2.32–Q.2.33, Q. 2.36–Q.2.38)

Data were collected from educational institutions and the hospitals where students gain practical experience regarding clinical resources available for Critical Care Nurse training, as all nursing programmes require both theoretical and practical input. Resources within the hospital setting refer to the critical care clinical training facilities, such as adequate numbers of beds and patient numbers, including a range of diagnostic conditions to provide appropriate learning opportunities. Resources include the availability of clinical teachers, and a regular in-service nursing education programme. These resources are only available for the training of critical care nursing students if the institution has been accredited by the South African Nursing Council (SANC) as a clinical training facility for that specific programme, and a working agreement has been put into place between the clinical institution and the educational institution. Resources within the educational institution refer to the

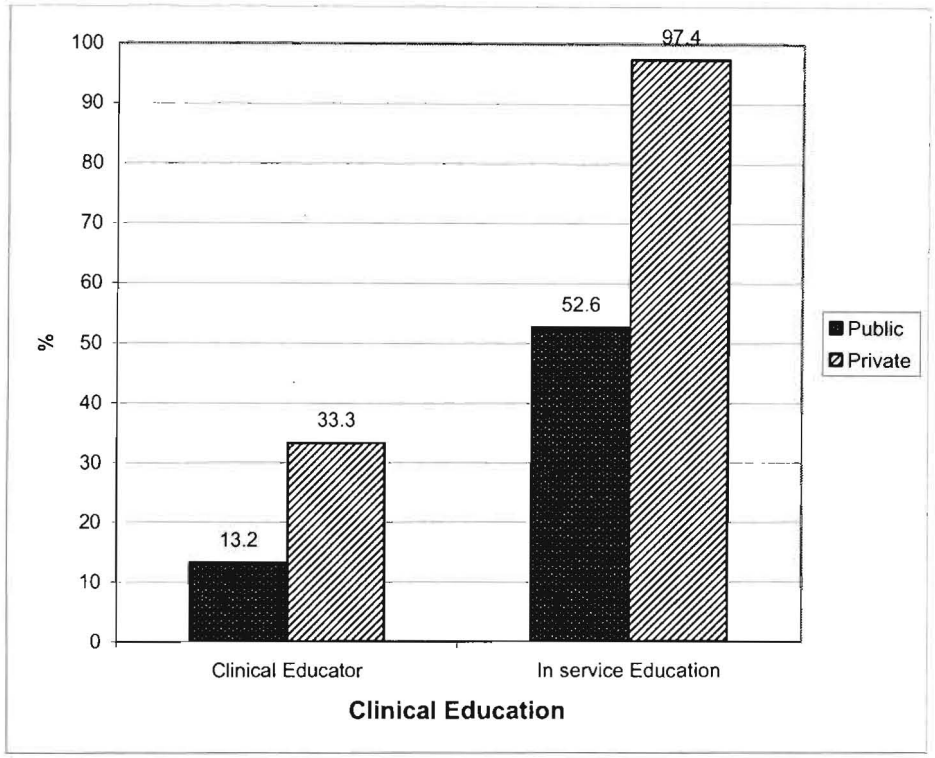
availability of the appropriate educational programme, the tutorial capacity and the availability of clinical mentors to provide clinical practice teaching.

4.12.1 Clinical Education Resources

Data collected from the hospitals regarding the availability of clinical teachers who can train new staff in the unit, and students rotating through the unit during their training period revealed that 13.2% (5/38) of the public sector units, and 33.3% (13/39) of the private sector units, had a clinical teacher available (Figure 14). These clinical teachers are not unit-based, and are generally responsible for the clinical teaching of all the nursing staff as the Unit Managers seldom have time to invest in teaching new staff or students. The converse is that 86.8% (33/38) of the public sector and 66.6% (26/39) of the private sector units did not have clinical teachers available.

Data were also collected to establish if a regular in-service nursing education programme was in place in these hospitals. Such programmes provide teaching opportunities, complement training programmes and promote the updating of information and techniques. Slightly more than half (52.6%) (20/38) of the public sector institutions and 97.4% (38/39) of the private sector institutions did have a regular programme in place (Figure 14). Respondents indicated both in writing and during verification discussions, that these programmes were not specific to critical care nursing and covered topics of a general nursing nature.

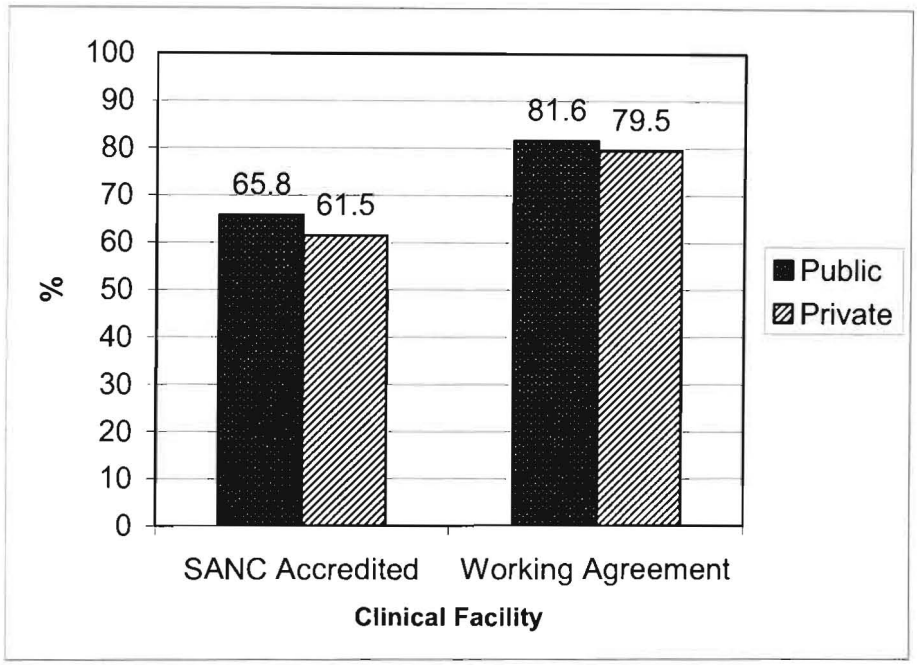
Figure 14: Clinical Education Resources



4.12.2. Clinical Facilities

SANC requires that all clinical institutions, that is hospitals, be accredited by SANC as a clinical learning facility for the provision of critical care nurse training. This accreditation is required by a training school or educational institution prior to placing students in such an institution, otherwise the practical training is not recognised by SANC and the qualification cannot be registered. The data revealed that 65.8% of public sector institutions and 61.5% of the private sector institutions were accredited by SANC to provide clinical training for critical care nurse training (Figure 15). A training programme requires that a working agreement be set up between the clinical facility, namely the hospital, and the educational institution. In the public sector 81.6% of the institutions had such an agreement in place whilst in the private sector 79.5% had these in place (Figure 15).

Figure 15: Education & Training - Clinical Facilities



4.12.3 Study Leave

Data about the supply of nursing workforce included the number of nurses who had been granted study leave for CCN training. Results showed that 33 nurses from the public sector and 42 nurses from the private sector had been granted study leave for CCN training during 2004.

4.13.0 Educational Institutions

Universities and nursing colleges provide nursing education programmes, while students gain practical experience at a clinical facility. The South African Nursing Council (SANC) is the regulatory body "established to control, and to exercise authority in respect of, all matters affecting the education and training of, and the manner of the exercise of the practices pursued by, registered nurses, midwives, enrolled nurses and nursing assistants (auxiliaries)" (The Nursing Act, No. 50 of 1978, as amended, Chapter 1). Only SANC-approved education and training programmes are legally recognised, and both educational and clinical institutions wishing to offer such programmes require accreditation by SANC in order to do so. Only SANC-accredited educational institutions were selected for this study as listed

in the Hospital and Nursing Yearbook of 2004, and listed on the SANC website (2005). SANC accredits both public sector and private sector educational institutions.

Based on the above criteria, eight (8) private and public sector educational institutions were identified in the Western Cape that offer nursing education programmes, with specific reference to the undergraduate programmes leading to the registration as a Registered Nurse (potential postgraduate students), and the postgraduate programme leading to the registration as a Critical Care Nurse (CCN).

Three Universities and one Nursing College were identified within the public sector of the Western Cape educational institutions that offer nursing education programmes. A University of Technology was also identified that offers nursing programmes, but no undergraduate or Critical Care Nurse (CCN) training programmes were offered during the study period of 2004, and therefore this institution was excluded from the study. Three private sector educational institutions were identified, namely Learning Centres. The programmes of Colleges and Learning Centres are generally moderated by a university with which a Memorandum of Agreement is concluded.

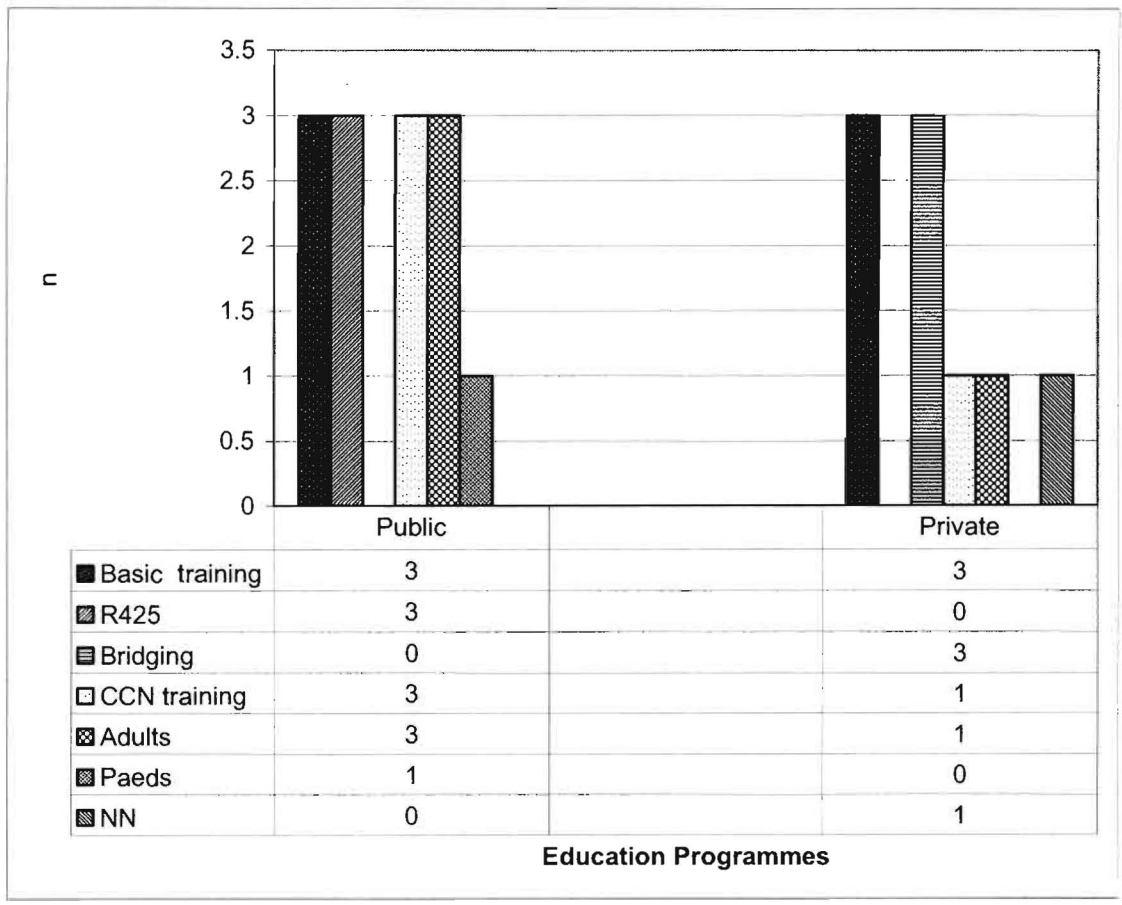
4.13.1 Basic / undergraduate Training (Q. 3.1 and Q. 3.5)

Critical Care Nursing is a specialised qualification that requires that the candidate be qualified as a Registered Nurse as a pre-requisite to gain entry to the CCN training programme. The speciality builds on the basic knowledge and skills gained during the undergraduate training programme leading to qualification as a Registered Nurse (RN). The two SANC-approved undergraduate/basic programmes that lead to obtaining an RN qualification are the Regulation 425 four-year comprehensive course (R 425) and the two-year Bridging Course (Regulation 683) whereby an Enrolled Nurse can qualify as a Registered Nurse.

The number of Registered Nurses being trained can contribute to the potential pool of candidates for CCN training programmes. Data revealed that during 2004 two Universities (one was phasing out the R425 programme) and one public sector College offered the R 425 undergraduate and diploma programmes for the Registered Nurse qualification respectively, but none offered the Bridging programme. The three private institutions offered the Bridging Course, but none offered the R 425 programme (Figure 16). The rationalisation process initiated by the Department of

Education in 1998 has resulted in only one of the three universities in the Western Cape being permitted to offer the R 425 programme. One university discontinued their undergraduate programme in 2001, and the other will discontinue at the end of 2006. These decisions were made as part of a rationalisation process by the Department of Education to transform the Higher Education landscape. Data concerning the number of Enrolled Nurses and Enrolled Nursing Auxiliaries in training were not collected.

Figure 16: Education Programmes



4.13.2 Critical Care Nurse Training (Q. 3.2 –Q. 3.8)

Critical Care Nurse training programmes specific to Adult, Paediatric or Neonatal patients are available. The data revealed that two of the three Universities and one College offered CCN education programmes in the Western Cape. The universities were considered by the researcher to be public sector educational institutions, which have the capacity to admit independent students and/or students from private sector

institutions (Figure 16). The three institutions offered Adult CCN education programmes on a full-time basis, the duration of which ranged from one to two years. Only one offered the Paediatric CCN programme as a part-time course, over two years. None however, offered the Neonatal Nursing programme, a six-month certificate course. Successful completion of either the Adult or the Paediatric programme leads to either a Diploma or an Honours degree (in the case of an undergraduate Bachelor's degree) in Critical Care Nursing, and registration as a Critical Care Nurse with SANC.

Only one of the private sector educational institutions offered CCN education during 2004 (Figure 16). The institution offered both Adult CCN and the Neonatal Nursing programmes, both on a full-time basis. The duration of the courses ranged from six months to two years for both the Adult and the Neonatal programmes. The student obtains a certificate for the six-month preparatory Adult CCN course, a diploma for the full Adult CCN course, and a certificate or a diploma upon completion of the Neonatal course, depending on duration. The Bachelor's student obtains an Honours degree upon completion of the Honours Programme, which was offered in conjunction with and moderated by a distant university.

The human resources available to train Critical Care Nurses at the educational institutions of the Western Cape are as follows: the two Universities and the one College of the public sector employed a total of three (3) full-time (Adult) and one (1) part-time (Paediatric) Critical Care Educators/tutors during 2004. The private sector Learning Centre employed three (3) Critical Care Educators. Respondents were asked to indicate whether the tutor also provided clinical accompaniment to the CCN students in the units or practical areas of placement. All four institutions answered in the affirmative.

Respondents were also asked if Clinical Mentors were available to provide additional clinical teaching in the units to assist with the practical instruction. The data revealed that one of the public sector institutions and the one private sector institution specifically employ Clinical Mentors to assist with the practical teaching.

The number of students who had completed training at both the basic or undergraduate level, as well as having completed a postbasic or postgraduate programme in Critical Care Nursing, at the Western Cape educational institutions by the end of 2004 are shown in Table 7.

Table 7: Number of student completions for 2004

	Registered Nurses	Adult CCNs	Paediatric CCNs	Neonatal CCNs	Total CCNs
Public sector institutions	**184 (86 degree) (98 diploma)**	**61**	**3**	**0**	**64**
Private sector institutions	**116 (bridging)**	**10**	**0**	**6**	**16**
Total	**300**	**71**	**3**	**6**	**80**

184 students completed the Registered Nurse education programme at public sector institutions (86 degree and 98 diploma students), and 116 at private sector institutions (all diplomas), a total of 300 for the whole Western Cape for 2004.

A total of 80 Critical Care Nurses completed training during 2004, of whom 71 were Adult CCNs, 3 Paediatric CCNs and 6 Neonatal CCNs. Applicants were from the private and public sector hospitals of the Western Cape as well as the public sector hospitals of the Eastern Cape hospitals, and even beyond South Africa's borders from countries such as Tanzania, or alternatively enter the programme as independent students (Q 3.10). The student generally returns to the clinical institution which granted the study leave, at least initially, but if no contract has been signed by the student and the hospital for time to be worked back, the student is able to leave the service at any time.

Summary

Study findings revealed that critical care services are in demand in the private and public sector hospitals of the Western Cape. Eighty (80) units were available throughout 35 hospitals, including ICUs and HCUs for adults, paediatric patients and neonates, as well as HDUs for adults. The majority of units were managed as open units, with the exception of public sector ICUs, and there is an acute shortage of intensivists (a total of 5 currently available). ICU beds were limited in the public sector to 180 functional beds compared to 331 functional ICU beds in the private sector. Patient admissions were similar in number, but differ by age group and diagnostic categories between the public and private sector hospitals. More children (below age 14 years) and neonates (40.2%) were admitted to public sector units than to private sector units (6.95%) and yet the public sector educational institutions

produced only 3 paediatric and no neonatal CCNs, while private sector educational institutions produced only 6 neonatal and no paediatric CCNs. Scoring systems measuring severity of illness and nursing workload assessment were not used widely despite indications that both were considered when allocating nursing staff to provide nursing care for critically ill patients. Nurse-patient ratios were generally used to allocate nursing staff but vary between public and private with regard to numbers and categories of nursing staff. Specific support staff such as clinical technologists (average of 48%) and physiotherapists (more than 75%), and general support staff such as clerical staff (100%) were available to the public and private sector units, and provide valuable support to nursing staff. Medical doctors were more commonly available in the public sector (65.8%) than in the private sector (15.4%) for 24 hours per day. Technology to provide ICU monitoring and organ support facilities was available in most units, but varies between units with regard to specific facilities, and the level of technical expertise per unit is unknown.

There was a shortage of nurses, particularly CCNs, in the hospitals of both sectors. Compared to international norms, the calculated requirement of Registered Nurses shows a deficit of 74% in the public sector and 82% in the private sector critical care units. Most nursing staff had ICU experience of one to five years, or more than 5 years. A number of CCNs had left the service in both sectors for a variety of reasons, but common to both sectors and ranked highest was leaving to work overseas.

Theoretical and clinical education and training facilities and resources are available to offer both undergraduate/basic nursing and postgraduate/postbasic critical care nurse training programmes. The number of students who complete training are however not adequate to meet the demand, particularly at postgraduate/postbasic level specialist level such as critical care nursing.

CHAPTER 5

5. DISCUSSION, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

This survey was conducted to describe the current nursing workforce of the critical care units of the public and private healthcare institutions within the Western Cape Province as at 1 January 2005, and to investigate the potential supply of nurses via the educational institutions. The purpose was to perform a workforce analysis and needs assessment, and to determine the factors that contribute to the demand and supply of critical care nursing staff. The respondents were the Unit Managers of the critical care units, each of whom was a registered nurse (RN), with or without a Critical Care Nursing qualification and the Nurse Educators of the relevant educational institutions.

The literature is discussed in relation to the study results, and the discussion of the study findings is based on the interpretation of the data for descriptions of the units, the type of service provided, the types of admissions per diagnostic category, use of scoring systems, facilities available, the staffing of these units and the training of Critical Care Nurses.

5.1 Profile of the critical care services in hospitals of the Western Cape Province (Table 2, Figure 1)

The 35 hospitals in the public and private healthcare sectors that were surveyed had 80 functional critical care units between them. These included Intensive Care Units and High Care Units for adults, children and neonates and High Dependency Units for adults. The designation of a critical care unit as an ICU or HCU, or a High Dependency Unit (HDU), remains under debate. This was clearly displayed by the majority of the respondents who described their units as a combination of an ICU and a HCU, generally based on severity of illness and the type of care patients require, with some being critically ill requiring ICU Care, others requiring High Care only, while some patients progress from ICU Care to High Care status, or regress from HCU to ICU status during their stay in the unit. The researcher however described (see Chapter 3) the same units specifically as an ICU, HCU or HDU, for Adult, Paediatric or Neonatal patients based on level of care and age of patient (UK DoH 2000; JIFCANZCA 2003; SASA 1999; van Zyl-Smit 2005).

5.1.1 Open/Closed Units (Figure 2)

Critical Care Units are managed on either an open or closed basis. An open unit does not have a designated Medical Director; any doctor or consultant can admit a patient to the unit, and remains responsible for the treatment of the patient during the patient's stay in the unit. A closed unit has a Medical Director as head of the unit, who is in charge of the unit full-time, and is responsible for the admission, treatment (with or without other full-time or part-time ICU doctors) and discharge of the patient during the patient's ICU stay (definitions as per the South African Critical Care Audit, 2005). This doctor may consult with other doctors, including the referring doctor about patient management. The Medical Director, ideally a Critical Care Specialist (Intensivist) in the case of an ICU, decides on admissions to, and discharges from, the ICU; determines the clinical management of the patient, including withdrawal of treatment if appropriate; and is responsible for the practice guidelines of the unit, including policies and protocols.

All the public sector tertiary level units (25) were managed as closed units, while all the private sector units (39) and 61.5% (8/13) of the public sector secondary hospital units were managed as open units. Two units (5.1%) were managed by a Medical Director in the private sector, compared to 30 (78.9%) in the public sector (Figure 10). One (2.6%) of the Directors in the private sector was a Critical Care specialist whereas there were 4 (10.5%) in the public sector units (Figure 10).

Research has shown that patients are more effectively managed in units that are closed and/or are intensivist-directed, and their outcome is better (Young & Birkmeyer, 2000; Multz *et al,* 1998 and Pronovost *et al,* 1999 and 2002). The Leapfrog Group in the USA has adopted the management of hospital ICU care by a certified ICU physician as one of their Patient Safety Standards (Leapfrog, 2005), and is promoting the concept of closed units throughout their hospitals. Recent research in the USA has demonstrated significant cost savings in hospitals where the Leapfrog Group's ICU Physician Staffing (IPS) standard has been implemented (Pronovost *et al,* 2006).

5.1.2 Bed Status (Figures 3 and 4)

The number of critical care beds available determines the number of patients that can be admitted to a unit and contributes to the demand for critical care nursing staff as

per the Williams and Clarke method of nursing workforce planning calculated by Williams (2004). The public sector had 359 functional critical care beds (180 ICU beds and 116 HCU beds) in their 12 hospitals, with an additional 61 beds (51 of which were ICU beds) that were non-functional or effectively closed for daily use (Figure 3). The closed beds were not available for use, despite a demand for more ICU beds mostly because of a lack of monitoring facilities, nursing staff and funding. The private sector had 351 functional critical care beds (331 ICU beds and 20 HCU beds) that could expand to 361 upon demand, spread throughout 23 hospitals between three major groups, and a few independent hospitals (Figure 4). The private sector hospitals appear to utilise their beds effectively, with a minimum of non-functional beds (6), and the capacity to expand their beds temporarily in busy times. Of the 351 beds, a total of 331 are functional ICU beds, which equates to a greater requirement for nursing staff, especially RNs and CCNs. Ad hoc closures occurred less frequently, with 31 episodes noted for the year.

This translates into less capacity to care for acutely ill patients in the public sector hospitals compared to private sector hospitals of the Western Cape, despite the demand. Data is currently being collected by the Medical Directors of the tertiary level units to quantify the unmet demand for ICU beds (that is admission denied), (Michell, personal communication, 2006), which appears to occur regularly in the large academic hospitals. This situation is exacerbated by the additional ad hoc closure of beds due to nursing staff shortages, which occurred 162 times between 1 January 2004 and 31 December 2004. If more nursing staff were available, more critically ill patients could receive the appropriate care their condition requires instead of being denied admission because of a nursing staff shortage.

5.1.3 Monitoring and Interventional Facilities (Figure 11)

The management and care of the critically ill patient requires monitoring equipment capable of providing accurate data about the patient's condition, and technological equipment to provide support for failing organs. A blood gas analysis can for example provide valuable information about the patient's respiratory status, in conjunction with a clinical assessment and other diagnostic tests such as chest x-rays. Based on this assessment, the patient may require endotracheal intubation and mechanical ventilation. The SASA Guidelines describe appropriate monitoring as "early detection of abnormalities requiring correction, continuous surveillance of the

patient's condition, and evaluation of the effects of any intervention" (SASA, 1999 p. 25). Organ support and related equipment is described according to categories of ICUs.

Most critical care units were equipped to provide basic ICU level care, but the working condition of the equipment and staff's knowledge of the use of the equipment is not known. Few (13.2%) public sector units and 33.3% of private units respectively have intra-aortic balloon pump facilities, and this is appropriate, as only patients with severe cardiac compromise would benefit from this intervention.

5.1.4 Patient Population

ICUs in both sectors admit and manage the most critically ill/Level 3 patients (UK Expert Group, 2000) (Figure 5) according to illness severity scores (Figure 8), clinical expertise (Figures 9 and 12) and organ support required, and have facilities to provide the critical care services required (Figure 11). Both public and private ICUs have HCU/Level 2 patients (UK Expert Group, 2000) in the units at times as the patient's condition improves prior to transfer to HCU (Figure 5) or a general ward; however private ICUs tend to admit a greater mix of ICU and HCU patients. Private patients are generally classified according to hospital group-specific scoring systems (Figure 8) that indicate the support and nursing interventions required rather than severity of illness. Without per-patient-specific severity scores and further supporting data it is not possible to determine whether all ICU admissions are warranted or not. The HCUs in the public sector admit patients who require endotracheal intubation and mechanical ventilation for days, and not only as an emergency measure to support the patient while awaiting a bed in an ICU. At times the HCU staff are obliged to care for critically ill patients because there are no ICU beds available in the tertiary level referral centres (Adams, personal communication, 2005). Critically ill patients who require ICU level support and management are therefore nursed in HCUs not equipped or staffed for this purpose. Private HCUs admit patients to units according to the level of care required. Children are generally admitted to Paediatric ICUs and HCUs in the public sector at tertiary level (Table 2 and Figure 1), but there are no Paediatric ICUs, or even HCUs, in secondary level hospitals, or in the private sector, and at times children are admitted to Adult ICUs or HCUs when in need of critical care services. Neonates tend to be admitted appropriately to Neonatal ICUs in both the public and private sectors and to Neonatal

HCUs in the public sector, although the demand is so great at times that bed numbers have to be expanded by making additional neonatal beds operational, particularly in the private sector. There were no Neonatal HCUs in the private sector.

Patient admission data provide some information as to how busy the units were during 2004 (Table 3) and contributes to the demand for nursing staff. The number of admissions to the public sector units (22 232) and to the private sector units (21 374) are similar. This represents a significant service provided by the private sector, relieving the public sector of a patient load that it does not have the capacity to accommodate. The number of patient admissions to the public sector units could have been higher if the data on the unmet demand for ICU/HCU beds were taken into consideration. Bed occupancy and patient turnover were not specifically addressed in this study, but turnover was calculated to be 62 patients per bed in the public sector and 59 patients per bed in private for the 2004 year period.

Adults accounted for 59.8% of patient admissions to the public sector units whereas this was 93% for the private sector units. Children and neonates accounted for 40.2% of patient admissions to the public sector, and 7% to the private sector units (Table 3). These patients were admitted particularly for critical care management of cardiac or medical conditions, or for cardio-thoracic or general surgery (Table 4).

Patients are admitted to an ICU/HCU for various types of conditions that fall within the most common groups of diagnostic categories, requiring organ support, and/or monitoring (Cronin *et al,* 2004 p.2). The researcher attempted to establish the proportion of patient admissions that fell into each diagnostic category (Table 4), but this data was not readily available and respondents had to hand-search for this information. The admission and discharge details are captured in handwritten admission books generally and are not always kept up to date, with the minimum of data recorded. The lack of readily available data was not identified during the pilot study phase of the study and proved to be a limitation for the study.

5.1.5 Diagnostic Categories (Figure 6 and Table 4)

The following comments are based on the incomplete data provided by the study (Figure 6 and Table 4), and the researcher's knowledge of the critical care units. The data has relevance for the type of service provided and the training requirements of the staff who provide this service. Nursing staff caring for these patients require

knowledge of the conditions that patients present with and the appropriate specialised medical management to provide effective nursing care for the critically ill patient.

The first 5 diagnostic categories (Table 4) make up the majority of ICU/HCU admissions in both sectors, namely cardiology, cardiothoracic surgery, general surgery, neurosurgery and medical.

Cardiology admissions include patients with dysrrhythmias, unstable angina, myocardial infarction and cardiogenic shock in adults. The private sector units admit approximately four times as many cardiology patients (25.3%) compared to the public sector units (6.8%), but appear to perform almost the same volume of adult cardiothoracic (CT) surgery as in the public sector (8.7% and 8.6% respectively). This is possibly due to an initial admission diagnosis of a cardiology condition that is subsequently managed surgically and therefore does not reflect the extent of CT surgery performed in the private sector. Private sector CT surgery predominantly involves cardiac bypass surgery, whereas public sector CT surgery also involves cardiac valve repair and thoracic surgery. Public sector patients with cardiac valve disease are likely to have rheumatic heart disease and a degree of cardiac disability (Kyriacos, 1993) and may therefore be more ill than patients in the private sector. CT surgery accounts for a higher proportion of Paediatric ICU admissions (24.1% in private and 11.9% in the public sector), and is usually required for pre- and/or post–operative care for repair of congenital cardiac defects, or for cardiac transplantation.

More general surgery is performed on adults in the private sector (18.5%), and tends to be more elective than in the public sector (9.9%). The former includes major vascular surgery, abdominal surgery and other gastrointestinal surgery. General surgery in the public sector often involves injuries inflicted by gunshot wounds, stabbings or the polytrauma of motor vehicle accidents. More children are admitted to public sector units for general surgery (9.5%) than to private sector units (3.8%), but more neonates have general surgery in the private units (3.8%) than in the public sector units (0.4%). Neurosurgical admissions are more common amongst adults in the public sector (8.3%) often related to traumatic head injuries, compared to 4.1% in the private sector. Paediatric admissions for neurosurgery were higher (5.7%) in the private units than in the public sector (3.7%).

Medical admissions are common in both the public and private sectors, amongst adults (13% and 14% respectively), children (35.1% and 19.8%) and neonates

(19.6% and 8.6%); however more children and neonates are admitted to the public sector with medical conditions than to the private sector. The admissions include a wide variety of conditions such as pneumonia, ARDS (Adult Respiratory Distress Syndrome), exacerbation of asthma or COPD (Chronic Obstructive Pulmonary Disease), diabetic keto-acidosis, status epilepticus, poisonings, meningitis, respiratory distress syndrome, renal failure, liver failure, HIV-related conditions, and many others.

Fewer patients are admitted for burn wounds and of these, most are to public sector units (2.9% of adults and 1.9% of paediatric patients). These patients are generally admitted to specific burns units in the public sector for specialised care as there are no dedicated burns units in the private sector.

Trauma admissions appear to be a deceptively small percentage (6% and 2.3% of adults in public and private respectively) and the observation is that the data does not reflect the true number of trauma admissions, possibly due to diagnostic coding discrepancies. Trauma is also a fairly common cause for Paediatric ICU admissions as is reflected in the private sector numbers (11.7%). In the public sector these admissions (2.7%) include accidents as well as cases of abuse (non-accidental injuries). Obstetric admissions account for a small but important number (0.8% in public and 0.2% in private sector units) of ICU admissions, as these patients are usually critically ill. Haematology admissions are usually to dedicated units and seldom seen (less than 1%) in general ICUs. Other conditions (on average less than 2%) include ICU/HCU admissions for orthopaedic conditions such as hip replacements requiring post-operative epidural analgesia.

5.1.6 Mortality (Figure 7)

Critical care units are designed to care for critically ill patients, some of whom will die, but most should be discharged from the unit in a much-improved state. Patient mortality rates and morbidity in critical care units provide information about patient acuity and the management of critically ill patients, including organisational aspects of ICU's, nurse staffing and the quality of care (Aiken *et al*, 2002; Coulter, 2001; Pronovost *et al*, 1999 and 2002). Severity of illness contributes to mortality risk prediction. Severity can be calculated using a scoring system such as the MSOF score (Multiple System Organ Failure score, Herbert *et al*, 1993).

Discharge data in this study included the number of patients who were discharged alive from ICU and those who died in ICU. This data was incomplete due to ineffective data capturing systems in the units but a crude mortality rate varied between 0.2 to 12.3% (Figure 7).

5.1.7 Scoring Systems (Figure 8)

Various scoring systems such as the APACHE score and the SOFA score can be used for assessment of severity of illness or injury of patients on admission and subsequent changes. These scores can contribute to assessing nursing workload. Twelve (12) of the 38 (31.6%) public sector ICUs/HCUs/HDUs (routinely) use a scoring system to assess the patient's severity of illness, while 68.4% do not (Figure 8). In the private sector only 7 of the 39 (17.9%) units use scoring systems for this purpose and 82% do not. The following scoring systems were reportedly in use: APACHE II (public sector 85.7%; private sector 57.1%), MEWS, NYHA, ASIA (Acute Spinal Cord Injury Assessment), GCS, ISS, EuroSCORE, PIMM II, and APGAR scores.

The reasonable expectation is that the most qualified and/or experienced nurse would be allocated to care for the most critically ill patient. Data in Figure 8 depict the factors that could have been taken into consideration when nursing staff were allocated to provide patient care. These include severity of illness scoring, nursing workload assessment and nurse-patient ratios. With regard to nursing workload assessments, 8 of the 38 (21%) public sector units used scoring systems and 79% did not. In the private sector, 26 of the 39 (66.6%) units used scores and 33.3% did not. Scoring systems in use were the following: ADLs (Activities of Daily Living, a workload assessment score used in public sector hospitals), CritScore, and group-specific Acuity Scores. Acuity scores are calculated to determine the number of staff required for every 24 hours of service delivery. The patient activity (for example, number of theatre cases per day), nursing hours required per activity, patient turnover, patient acuity (for example, patient requires monitoring only or full ICU care), and the nursing skill mix is taken into consideration when calculating this score to assess patient needs. Staffing is then planned according to these scores (Brannigan, personal communication, 2005). The validity of these scoring systems is not known, and it is uncertain how accurately these scores measure the true nursing workload of a critically ill patient.

In the public sector, 14 of the 38 (36.8%) units indicated that a nursing workload assessment was taken into account when allocating nursing staff to provide nursing care, and 63.2% did not. Given that only 7 (21%) of these units routinely use a scoring system for nursing workload assessment, the assumption is that these decisions were made based on nursing experience or that staffing requirements were planned by the Nursing Manager, and not at unit level. In the private sector, 29 of the 39 (74.4 %) units indicated that the nursing workload score was taken into account when allocating nursing staff, whilst in 25.6% of units this was not done. Given that only 66.6% of the private units indicated use of nursing workload scoring systems, it appears again that other factors related to nursing workload were considered when allocating nursing staff.

5.1.8 Staffing

Standards for ICU practice have been drawn up by Intensive Care Societies such as JFICANZCA (the Joint Faculty of Intensive Care Medicine of Australia and the New Zealand College of Anaesthetists), which contains policy documents related to minimum standards for intensive care units (JFICANZCA, 2003). In South Africa, the current Standards for Intensive Care Units are described in the SASA (South African Society of Anaesthesiologists) Guidelines for Practice document (SASA, 1999). These Guidelines include a description of the suggested staffing of intensive care units. These are described as "[L]evels of staffing by qualified medical, nursing, ancillary and support personnel should be appropriate to the patient mix, severity of illness, and levels of intervention, with facilities available for rapid effective communication between staff members within the unit and those providing back-up services" (SASA 1999, p. 23). With regard to medical staffing, the Guidelines suggest that an ICU/Category 3 ICU requires a full-time Medical Director, 24-hour consultant availability and 24-hour registrar/ equivalent availability, and 24-hour consultant and registrar availability for an HCU/Category 2 ICU.

5.1.8.1 Medical Directors (Figure 10)

The majority of the public sector units (30/38 or 78.9%) had a dedicated Medical Director in charge of the unit, whereas 2/39 or 5.1% of private sector units had a Medical Director (Figure 10). A Medical Director is associated with a closed unit, and allows for more consistency in the admission and management of patients, often based on a standardised approach with clinical practice guidelines, protocols or

policies in place to guide both medical and nursing staff. SASA Guidelines suggest that the responsibilities of the Medical Director includes "control of staff, policy decisions, selection of admissions to the unit, management protocols, arranging of training and research programmes, maintaining of records and equipment and general supervision of the daily running and forward planning of the ICU" (SASA 1999, p. 23). The patient's primary physician does not abdicate his/her responsibility whilst the patient is in ICU, but the ICU team determines patient management.

5.1.8.2 Intensivists (Figure 10)

The Medical Directors in four units (10.5%) in public sector hospitals were critical care specialists; while in the private sector this was 2.6%, that is, one unit (Figure 10). Data from the CCSSA National Audit found a shortage of intensivists throughout South African critical care units (CCSSA 2005), especially experienced intensivists. A number of studies, including a systematic review, have demonstrated that patient outcomes are better in critical care units that not only have adequate nursing staff (Needleman and Buerhaus, 2003), but are also directed by intensivists (Pronovost *et al* 2002). These outcomes include reduced adverse events, reduced hospital and ICU mortality, and reduced hospital and ICU length of stay. In an earlier study, Pronovost *et al* (1999) found that not having daily rounds by an ICU physician was associated with an increase in in-hospital mortality, as well as an increased risk of cardiac arrest, acute renal failure, septicaemia, platelet transfusion, re-intubation and increased resource use.

5.1.8.3 Availability of a Medical Doctor (Figure 10)

Medical doctors were readily available for the unit, that is, present for the unit on site on a 24-hour basis in 65.8% of the public sector units, and in 15.4% of the private units, providing medical support to nursing staff in the critical care units. Planning and providing nursing care and management of the critically ill patient is uninterrupted for 24 hours each day, and includes executing medical instructions and prescriptions. The patient's needs and management are reviewed daily, and often more frequently in the case of the haemodynamically unstable patient, requiring consultation with medical staff. Where the attending doctor is not available on site, the nurse consults telephonically regarding patient management.

Additional categories of staff provide a valuable contribution to critical care service delivery and decrease the workload of the nursing staff. These include clinical technologists, physiotherapists and support staff. In the absence of these staff the nurse has to take over their tasks which increases his/her workload.

5.1.8.4 Clinical Technologists (Figure 9)

Clinical technologists provide a valuable service with regard to technological support for both medical and nursing staff, with specific reference to mechanical ventilation, haemodynamic monitoring and renal dialysis, thereby decreasing the workload of the CCN to some extent. The SASA Guidelines for Practice (SASA, 1999 p. 24) describe the service that a Critical Care Clinical Technologist can provide as follows:

- Care, maintenance and decontamination of ICU equipment
- Operation of ICU equipment
- Setting up and calibration of monitoring equipment, e.g. blood gas analysers, etc.
- Blood gas analysis, oximetry, electrolyte estimations, etc.
- Education of nursing and paramedical staff in user care and operation of equipment.

The Guidelines also suggest that a technologist should be available on call for a unit on a 24-hour basis.

In the public sector, clinical technologists were available on a daily basis in 18 of the 38 units (47.4%). In the private sector, this service was available in 19 of the 39 units (48.7%) (Figure 9). The service usually covers a 24-hour period, with a call-out system in place after normal working hours.

5.1.8.5 Physiotherapists (Figure 9)

Physiotherapists provide chest physiotherapy and assistance with mobilisation to the critically ill patient. The SASA Guidelines (SASA 1999 p.24) suggest that "an ICU-experienced physiotherapist should be available on a 24-hour basis for respiratory therapy, inhalation therapy and general mobilisation of patients". In the public sector units, physiotherapists were available for 76.3% of the units, whilst in the private sector 92.3% of the units provided this service daily (Figure 9). The limited availability in the public sector is ascribed to a shortage of physiotherapists in these hospitals as they service the entire hospital, including the wards, and are therefore seldom able to treat an ICU patient more than once a day, unless specifically

indicated. These services are generally available on a referral basis only to areas such as the HCUs and HDUs.

5.1.8.6 Support Staff (Figure 9)

Support staff such as administrative staff and those who assist with manual handling and cleaning, free the nursing staff to focus on direct patient care and professional aspects of care (WFCCN, 2005b). The presence of support staff decreases the workload of the CCN related to non-nursing duties so that his/her specialised skills can be utilised optimally. In both the public and the private sector hospitals support staff were available in all of the units (Figure 9), but the type and extent of the support staffing differs between units. Clerical, housekeeping and domestic staff were the most commonly available support staff.

5.1.8.7 Nursing Staff and availability of staffing norms for the critical care units of the Western Cape (Figure 8)

Nursing staff were allocated to ICU patients according to specific ratios in 57.9 % of public hospitals and in 100% of private hospitals. These ratios ranged from 1:1 to 2:3 in mechanically ventilated patients in public sector hospitals and were 1:1 in private. The ratio for non-ventilated critical care patients varied from 1:1 to 1:16 and 1:1 to 1:4 respectively. Data from the literature reveal that nurse staffing ratios or norms are common practice in most healthcare systems worldwide, particularly in specialised areas such as ICU (WFCCN 2005b). Nurse-patient ratios have been calculated and are recommended in Critical Care Nursing Association Position Statements (BACCN, 2004) and in the SASA Guidelines (1999). Levels of nurse staffing should be flexible, appropriate and determined on a shift-by-shift basis, by consultation between the Unit Manager and the critical care physician in charge either directly or through the use of unit-based policies. The ratios are described per category of ICU, but essentially suggest a registered nurse to patient ratio of 1:1 (ventilated patient). If nursing assistants are available to assist with washing of patients they should act as runners and assist with other tasks as delegated (and supervised) by the registered nurse. A Category 3 ICU (equates to a Level 3 ICU) should have a minimum of 50% of the nursing staff qualified in critical care nursing. Furthermore, it is not appropriate for nursing assistants to take over patient care or monitoring responsibilities (SASA 1999).

The severity of illness of the patient is taken into consideration in 52.6% of public sector units when allocating nursing staff to patient care (Figure 8), and in all of the private sector units. The nursing workload assessment is considered in 36.8% and 74.4% respectively. These percentages do not match the actual percentage of scoring systems in use, therefore the assumption is that the Unit Manager utilises clinical decision making skills when allocating nursing staff at unit level.

5.1.8.7.1 Nursing Workload and Training

Public sector units generally tend to admit more acutely ill patients than private sector units, requiring more monitoring and interventions and associated with a higher nursing workload. A high workload contributes to creating a stressful environment in which the CCN works, particularly when the patient is acutely ill, support staff are few and additional nursing staff are inexperienced (Zondagh, 2004; Carayon and Gürses, 2005). Based on perception, observation, anecdotal reports and a paucity of South African data the researcher is of the opinion that the incidence of negligence and adverse events, including medication errors and other complications, is on the increase in South African ICUs. This could be ascribed to a number of factors including the acute shortage of nurses who are adequately trained, specifically Critical Care Nurses, higher workloads (Needleman *et al*, 2002), increasing levels of stress (Aiken *et al*, 2002), the increasing use of inexperienced novices and agency staff, the lack of evidence-based protocols or clinical practice guidelines, a lack of standardised equipment or appropriate training in the use of advanced technology (Wheeler *et al*, 2005) and a decline in ICU-specific in-service education activities and Continuing Professional Development (CPD) opportunities for nursing staff.

Critical thinking skills, based on sound theoretical knowledge, and practical competence related to the management of the critically ill patient, are required to monitor and problem-solve on a continuous basis (Zimmerman, 2000). This includes the ability to deal with emergency situations at any given time as critically ill patients are often haemodynamically unstable and their condition can change within minutes. It would be unreasonable to expect this level of performance of a nurse not qualified in critical care nursing as this is beyond their scope of practice. The staffing of ICUs and HCUs with appropriately trained Critical Care Nurses in adequate numbers, with

additional support staff available, is required to provide safe care for the critically ill patient (Dang *et al,* 2002; Needleman and Buerhaus, 2002).

5.1.8.7.2 Nursing Workforce (Table 5)

Nursing workforce describes the number and qualifications of the nurses, including CCNs, currently working in the ICUs of the Western Cape hospitals

In his opening address of the November 2004 Workshop for Critical Care Nurse Managers and Educators, the President of the Critical Care Society of Southern Africa commented that "[I]t is recognised that one of the most important threats to the development and maintenance of critical care services within South Africa is the shortage of appropriately trained critical care nurses" (Argent, 2004). Findings from this study showed that 65.8% of the public sector units and 92.3% of the private sector units had CCNs as Unit Managers as at 1 January 2005 (4.10). The World Federation of Critical Care Nurses' Position Statement on the Provision of Critical Care Nursing Workforce recommends that the Charge Nurse (Unit Manager) of a critical care unit should be a qualified Critical Care Nurse (WFCCN, 2005b). It also recommends that the Unit Manager has a qualification in (nursing) management, however this question was not asked in the study. A specialist nurse manager qualified in critical care nursing should manage a specialised unit dedicated to caring for critically ill patients.

A total of 768 nurses of all four categories worked in the units of the public sector on a full-time basis, of which only 118 (15.4%) were CCNs. The private sector had a total of 535 nurses, with only 204 (38.1%) CCNs. Analysis of the data revealed that there was especially a shortage of Critical Care Nurses in both sectors, with a skills mix that included Registered Nurses, Enrolled Nurses and Enrolled Nursing Auxiliaries that made up the balance of the nursing staff. The level of experience of all the categories of nurses working in ICU varied mostly from one to more than five years (Figure 13). The enrolled nurses generally had more than 5 years of ICU experience.

5.1.8.7.3 Clinical Education and Training Resources (Figure 14)

Appropriate clinical education and training contributes to the equipping of nursing staff in providing safe patient care in specialised areas such as critical care units (WFCCN, 2005b). The majority (86.8%) of units in the public sector and 66.6% of

units in the private sector did not have clinical educators (Figure 14), while 52.6% and 97.4% respectively indicated that an in-service programme was in place but it was not ICU-specific. The lack of clinical teaching and in-service education programmes is of concern in an area as specialised as the ICU which requires the application of new knowledge that is constantly produced, including changes in patient management strategies such as the management of sepsis (Dellinger, Carlet, Masur, Gerlach, Calandra, Cohen, Gea-Banacloche, Keh, Marshall, Parker, Ramsay, Zimmerman, Vincent, Levy, 2004), new medications and ever advancing technology. It appears that little time and few resources are invested in equipping and supporting nursing staff to cope in the critical care units in caring for critically ill patients and having to use sophisticated equipment. Research has shown that adequate support in the form of a structured mentorship programme can improve this situation (Farnell and Dawson, 2006). Novice registered nurses are placed in the units with very little experience in general nursing and are expected to cope in an under-staffed environment, as indicated by a deficit of 74% RNs in the public sector and 82% RNs in the private sector when compared against international norms. This creates a situation that is stressful for both the novice and the shift leader who has to supervise the work of the novice in addition to his/her own workload.

This situation is exacerbated by the shortage of nursing staff, requiring the employment of additional nursing staff from the agencies. The result at unit level is that the nursing workforce changes almost daily, with little stability or consistency of the staffing profile. This results in having to assess the individuals' qualifications, level of knowledge, experience and competence almost daily. Data was collected to determine the number of agency nurses employed during the study period, as well as the amount of overtime worked by the permanent staff, but the data was too diverse to analyse in a meaningful fashion. Data did however reveal that 84.4% of units in both sectors employed agency nurses and 59.7% of permanent staff worked overtime (4.10.1).

CCN students are encouraged to learn from qualified and/or experienced CCNs in the units, as well as other critical care team members such as the intensivist or attending doctor, the critical care technologist and the physiotherapist. The input from the nursing staff is limited by the demands of the unit, with patient care and administration being the priorities and teaching often just not possible. The shortage

of qualified, especially experienced, CCNs, impacts particularly negatively on the teaching of students. The shortage of nurses is supplemented by the use of agency staff, none of whom have an obligation to teach others, and often require supervision and teaching themselves. Permanent staff working overtime supplement the number of staff required, again with no obligation to teach.

5.2 Educational Institutions

5.2.1 Undergraduate/basic Nursing Education and Training

Nursing students who complete their undergraduate/basic training as Registered Nurses are potential postgraduate students. The supply of 300 students who completed their training at the Western Cape educational institutions during 2004 is inadequate to meet the demand of the healthcare services. Some of these newly-qualified registered nurses obtain a post in a hospital, either in the public or the private sector. Some are placed directly in the ICU, a practice that works against retention of staff as the novice is exposed to high levels of stress, with very little mentorship or supervision due to the shortage of nursing staff.

5.2.2 Critical Care Nurse Education and Training

According to the RCN Guidance for nurse staffing in critical care (RCN, 2003a p. 3) "[A] critical care nurse is a registered nurse who has the right knowledge, skills and competencies to meet the needs of a critically ill patient without direct supervision". Furthering one's education, and studying in order to complete a specialised programme to obtain a further qualification, empowers the student, is of benefit to his/her colleagues, improves patient care and promotes optimal resource utilisation. Critical Care Nurse Education and training in South Africa (SANC Regulation 212, 1993) is based on a comprehensive, problem-based approach aimed at preparing the student to provide competent care to critically ill patients, both adults and children, irrespective of their diagnosis. This is especially important for the critically ill child and neonate as there are special considerations in terms of physiological response to medication, for example, that is different to that of adults. Neonatal Intensive Care Nurses complete a specialised period of education and training as the needs of the neonate differ even from that of the child. Children are generally admitted to appropriate Paediatric units, but on occasion, often due to trauma or medical emergencies, have had to be admitted to adult units for critical care management.

This is particularly problematic when nursing staff are not comfortable or competent in providing such care to children especially when paediatric equipment is not routinely available. There are still very few qualified Paediatric Critical Care Nurses in South Africa, even in the Paediatric units. Neonates are generally admitted to appropriate Neonatal ICUs and NHCUs, particularly in the public sector (Figure 5), and are often managed by nurses who are qualified in Neonatal Nursing, but there are no NHCUs in the private sector.

The total number (80) of Critical Care Nurses (Table 7) trained by the educational institutions during 2004 is inadequate to meet the demand of the critical care services, especially if the healthcare system fails to retain qualified specialist nurses. In terms of educational resources, adequate SANC-accredited educational and clinical facilities are available (Figures 15 and 16). Learning opportunities are available such as large numbers of patients of all ages, with a variety of medical and surgical conditions, requiring critical care nursing (Figures 5 and 6, and Table 4). However too few students are being trained (Table 7), and there is a deficit in the teaching capacity both in the classroom and in the clinical areas to train more Critical Care Nurses, especially Paediatric and Neonatal CCNs (4.13.2).

5.2.3 Educators

Nurse educators provide the bulk of the theoretical input into the Critical Care Nursing course, but guest lecturers from various disciplines give specialised input. Practical training takes place at the bedside as determined by SANC requirements (SANC Regulation 212, 1993) and the specific curriculum of the educational institution until competence in specific clinical skills is achieved. Some practical training takes place in a skills laboratory, if available, or in the classroom.

All four institutions confirmed that the tutor provided clinical accompaniment for the CCN students in the units. The amount of time that the tutor actually spends in the clinical areas is unknown and is limited by factors such as a heavy academic administrative workload including liaison for clinical placements and allocations, preparation of teaching material, setting and marking of tests, assignments and theoretical and practical examinations, travel and accommodation arrangements and the general welfare of the student and teaching into other programmes as required by the specific educational institution (Fouché, personal communication, 2006).

5.2.4 Mentors

One of the public sector institutions and the one private sector institution specifically employ Clinical Mentors to assist with the practical teaching. The use of mentors has been seen to be beneficial in the education and training of CCNs and novices but this is dependent on the programme being structured to include regular contact sessions and with specific learning objectives (Farnell and Dawson, 2006).

5.2.5 Students

A total of 80 Critical Care Nurses completed training during 2004 (Table 7), 71 of whom were Adult CCNs, 3 were Paediatric CCNs and 6 Neonatal CCNs. Students came from both public and private sector institutions, from Western Cape or Eastern Cape hospitals, and even beyond South Africa's borders from countries such as Tanzania, or alternatively entered the programme as independent students (Q 3.10). These numbers are not adequate to meet the demands of the critical care units of the Western Cape healthcare services, particularly as some of the students came from beyond the Western Cape borders and return home. Some of the CCNs remain at their clinical institutions, particularly to fulfil their contractual obligations, but not all are bound by a contract. Without a contract in place CCNs can move to another institution or to work overseas.

5.2.6 Retention and Recruitment of nurses

Despite Zondagh's findings regarding the failure to retain nursing staff (2004 p. 20), it appears as if very few measures are employed to retain nurses, especially CCNs, in the South African healthcare sector. Judging by the salary scales allocated to nurses, especially professional nurses, little value is attached to their worth. A registered nurse earns approximately R 90 000 per annum (level 7) at entry level in the public sector and the maximum salary is R 130 000 per annum (level 8) for a CPN with years of experience (PGWC salary scales, 2004). An intervention that has created much dissatisfaction amongst nurses is that certain categories of public service healthcare workers, for example clinical technologists, have had their salaries uplifted and benchmarked, starting at level 8, but nurses' salaries have remained the same. There are few incentives to enter a profession that does not remunerate at market-related salaries, demands a great deal from its workers, offers very little support and recognition, places unrealistic demands on its students, particularly those

keen to study at postgraduate level, and does not adequately support the newly-qualified novice, or even the experienced staff. Despite active, aggressive, recruitment drives by agencies for the overseas market (Bevan, 2005), little appears to be done by the profession or the services to either recruit or retain expert nurses for South African patients.

Nurses continue to leave the units for a variety of reasons, mostly to go overseas, work for an agency, or for other financial reasons (Table 6). Without a contractual obligation to fulfil, the newly-qualified Critical Care Nurse is a valuable resource that is easily recruited by other/overseas institutions. Pond and McPake (2006, p. 1453) found that "[I]n the UK, increasing nursing pay would seem to make the single largest contribution to resolving the labour market imbalance that is draining poor countries (including South Africa) of their health staff".. Particularly in institutions where there are few opportunities for further education or promotion, a lack of a clinical career pathway, an improved remuneration package or other incentives, there is little reason for a CCN to stay in a system that does not value him/her. Nurses working in the UK can earn up to five times the salaries that are paid in South African hospitals (Bevan, 2005), while Australian agencies offer R 240 000 to R 500 000 per annum to South African nurses (Nursing Update, 2006), which is double to treble the salary of a Chief Professional Nurse in the public sector at the top of his/her salary scale.

Remuneration ultimately plays the deciding role when the CCN is "pushed or pulled" out of the healthcare service to work for an agency or to go overseas, or leaves for other reasons (ICN Report, 2006; Chaguturu and Vallabhaneni, 2005). Most (83.3%) of the public sector hospitals and the private sector hospitals (81%) indicated that students receive additional remuneration upon completion of such a course. The additional remuneration is however often in the form of a scarce skills allowance in the public sector which has generated a great deal of unhappiness because only CCN–qualified nurses working in ICU receive this allowance, despite the fact that other nurses contribute to the care of patients in ICU.

Despite measures that have been put in place to stop the recruitment of African nurses to the UK, Saudi Arabia and other countries, active recruitment drives continue. As recently as December 2005 The Lancet published an article accusing Britain of ignoring the nurse-recruitment ban as it continues to recruit nurses from

developing countries, including South Africa (Bevan, 2005). Bevan states that low pay, poor working conditions and stress contribute to driving the nurses out of the public sector, having a devastating effect on a health system that is already struggling with a desperate shortage of healthcare workers.

Current strategies being employed by both public and private healthcare sectors to address the nursing shortage appear to be focussed on the development of health care workers and the production of enrolled nursing categories (PGWC, 2003; Brannigan, 2000; Worrall-Clare, 2005), which raises questions regarding the role of these workers, their scope of practice, the supervision of their work and accountability of their actions, particularly in specialised areas such as ICUs. The cost effectiveness of such a strategy is questionable if equal attention is not paid to addressing contributory factors and specialist nurse training.

Very few educational measures appear to be employed to incentivise nurses as limited study leave is granted and few opportunities provided to teach novices or new staff. Few institutions provide support to the nurse working in ICU through the provision of a clinical educator (13.2% in the public sector and 33.3% in the private sector respectively) (Figure 14), with some non-ICU specific in-service training (52.6% and 97.4% respectively) provided. Support for staff working in ICU, a known high-stress area, appears limited.

Conversations with unit managers suggest that there are few opportunities for promotion in the public sector as these are linked to senior posts such as that of a Chief Professional Nurse which may be in a particular unit, whereas there are few options to choose in which unit one would prefer to work. Given the current salary structure the newly qualified CCN soon resigns from the institution to work for a nursing agency or to work overseas in order to earn a better salary. This situation does not lend itself to building a stable nursing workforce in any particular unit as the profile of nursing staff differs from day to day, especially when a unit on average employs 50% of its workforce from an agency. Ultimately, patient care is compromised. If complications set in and a patient's stay in ICU is prolonged the cost to the patient and the healthcare provider rises with each day.

competent staff are in using the equipment. Merely having the equipment available without competent staff does not equate to a safe or effective critical care service.

The crude mortality rates indicate that there is a fair spread of critically ill patients who are admitted to the units within the public sector hospitals, an indication that the admissions are appropriate. High patient mortality contributes to the stress of critical care nursing staff. The low crude mortality rates of the private sector patients suggest that these patients are generally not as ill as those in the public sector, and raises a question regarding the appropriateness of these admissions to ICUs. Critically ill patients require specialist care provided by appropriately trained medical critical care specialists and Critical Care Nurses, in conjunction with adequate support staff, as part of a multidisciplinary team. The matching of patient severity of illness and patient workload with staff allocation could contribute to more effective utilisation of nursing staff and safer patient care. The level and quality of care provided to patients is largely dependent on the number and quality of the nursing workforce available to service the hospital.

Critical care units could function more effectively with a dedicated Medical Director as head of the unit, especially if the Director is a Critical Care specialist. This contributes to safer patient care and improved morale amongst nursing staff. The CCN needs to consult with the attending doctor at any time to discuss problems or changes in the patient's condition, especially in a medical emergency, therefore availability of medical assistance is essential. The leadership provided by a critical care specialist as head of the unit, open communication channels, clear management guidelines, and the availability of a doctor 24 hours a day in case of emergencies, creates an environment which is conducive to staff satisfaction and contributes to retention of staff. Hospital managers who wish to provide quality patient care and retain their nursing staff should consider these factors. Different doctors having differing management strategies in the care of the same patient, as is the case in open units, is cause for potential conflict and added stress in the unit setting.

It is the responsibility of hospital management to provide a safe working environment for the nurse, and to provide safe care for the critically ill patient. The hospital therefore has a responsibility to ensure that equipment is safe, and that training in the use thereof is provided to the nurse who is expected to operate the equipment daily. The clinical technologist should play an important role in providing

some of this training. The Critical Care Nurse equally has a responsibility to ensure that he/she becomes competent in the use of the equipment.

The benefit of a physiotherapy service to the critical care nurse is that physiotherapy promotes improvement in the mobility and respiratory function of the critically ill patient, decreasing the nursing workload indirectly. The implication of a shortage of physiotherapists is that the nurse has to perform the functions of the physiotherapist when the physiotherapist is not available. Having adequate support staff in the unit, including clinical technologists, physiotherapists, administrative and housekeeping staff, contributes to decreasing the workload of the nursing staff in the unit. Their support allows the critical care nurse to provide direct nursing care and to conduct professional duties, rather than spend undue time on non-nursing duties. Providing the nurse with a safe environment, a reasonable workload to cope with, and adequate support structures in place, goes a long way to decreasing work-related stress and retaining staff. These measures enhance the provision of quality patient care.

There is a lack of data in South African literature that quantifies the consequences of a high workload and inadequate staffing such as the measurement of adverse events. Such information could contribute to improvement of the quality of critical care services if used to correct deficiencies in the system. As an educator and critical care nurse, the researcher is of the opinion that the severity of illness, the constant changes in the patient's condition, the development of evidence-based management strategies, the expanding array of medications and the use of advanced technology, demands that nurses assigned to care for critically ill patients should be appropriately trained. The majority of nurses in an ICU should be Critical Care Nurses, with adequate numbers of other categories of nursing staff and support staff to make up the recommended ratios.

The shortage of nursing staff, especially CCNs, and a lack of effective utilisation of patient scoring systems and nursing workload assessment scores contribute to the mismatching of nurse-patient ratios. This mismatch potentially results in non-critical care trained nurses or inexperienced nursing staff being allocated to care for acutely ill patients simply because there are insufficient CCNs available. This situation increases the stress of the nurses working under these conditions, and potentially jeopardises patient safety. There are too few nurses, especially CCNs, to meet the demands of large numbers of patients requiring ICU or HCU level critical care. This

deficit is particularly acute if the patients' medical diagnosis, severity of illness, interventions and management required, are taken into consideration. It is difficult to maintain an acceptable standard of care or ensure safe patient care in a stressful environment with minimal clinical education support and a constantly changing workforce. There is minimal responsibility and accountability beyond the one patient to whom the agency nurse is allocated, and even continuity of care suffers as a different nurse takes over the care of the patient day after day. There is no incentive to be loyal to the unit and the concept of the critical care team is lost.

Clinical education and training appears to have been reduced to a non-essential task in the units as nursing staff try to cope with the patient and administrative workload as priorities. This impacts negatively on the professional development of novice staff and students, and ultimately on patient care. Given the need for critical care services for the population of the Western Cape, more funding and posts should be made available to expand the tutorial and clinical capacity to train CCNs, and undergraduate nursing students. Selection should be considered to facilitate the entry of suitable candidates into the nursing profession. An increase in the tutorial capacity and the availability of mentors can contribute to an increase in the supply of appropriately trained nursing staff to meet the demands of the clinical service. More CCN students need to be recruited and trained within the Western Cape to meet the needs of the population of the Western Cape. Students should be obligated to meet contractual requirements to provide an effective critical care nursing service. Realistic recruitment and retention strategies will have to be employed if the healthcare sector is serious in its commitment to quality service and safe patient care.

5.4 Implications of the study

Critically ill patients requiring constant monitoring and pharmacological management in an Intensive Care Unit equipped with advanced technology, should be nursed by Critical Care Nurses, supplemented by adequate support staff.

The findings of this study show clearly that there is a deficit in the number of nursing staff produced compared to the number required by the public and private sector hospitals of the Western Cape.

5.4.1 Implications for Nursing Education

The implications of the findings of this study for educational institutions and especially for the critical care educators are that more students should be trained at both undergraduate and at postgraduate level. This can only be done if there is co-operation between the Department of Education, which funds nurse education at university level, the Department of Health which funds public sector nurse education at diploma level and the private sector which funds private nursing education.

Critical care educators should monitor trends in the types of patient admissions to critical care units, constantly updating curricula and ensuring relevance to clinical practice. This includes current patient profiles, disease conditions, current medical and pharmacological management and advances in technology to prepare a CCN who is able to meet the demands of the service in order to provide safe patient care. The educational institution should be preparing a generalist critical care nurse who meets the requirements of a comprehensive critical care service.

Educational institutions in the Western Cape should seriously consider the need for a specific Paediatric Critical Care Nursing programme, given that there are two dedicated Paediatric units located within the Western Cape healthcare service area, as well as the only Children's Hospital in sub-Saharan Africa. Considering the number of critically ill Neonates (7 813 admissions during 2004), there is an urgent need to increase the numbers of Neonatal nurses.

5.4.2 Implications for Nursing Management

The implications of the findings of this study for Nursing Management are that planning of nursing staff requirements should be based on a comprehensive plan addressing the many factors that contribute to the demands of the service, particularly for specialised areas such as the critical care units. Nurse staffing ratios and skills mix need to be evaluated to determine the level of staffing needed to provide safe nursing care for critically ill patients, adults, children and neonates. A concerted effort should be made with regard to the recruitment and retention of appropriate nursing staff, and this can only be done if all stakeholders appreciate the value of a well-qualified, competent nurse. Collaboration is required between the Department of Health, the Department of Labour and the private healthcare sector as these role-players determine the posts and the working conditions of nurses,

including salaries, and it is their healthcare institutions that require and pay for the services of the nurses.

The demand for critical care services has implications for both the healthcare service that employs or hires a nurse to work in the unit, and for the educational institution preparing the nurse for a specific qualification. The healthcare service is expected to provide safe nursing care for the patient, as well as safe working conditions for the nurse. Placing a novice nurse in a critical care environment to care for a critically ill, ventilated patient without adequate supervision and mentoring does not constitute a safe working environment, jeopardises patient safety and results in medico-legal situations. The consequences of inadequate staffing illustrate this point more specifically (Chaguturu and Vallabhaneni, 2005; Zondagh, 2004; Carayon and Gürses, 2005). A safe working environment has implications for the purchasing, maintenance, training and operation of equipment, particularly as 92.1% of public sector units and 100% of private units provide mechanical ventilation.

5.4.3 Implications for Nursing Practice

The implications of the types of patient admissions, and therefore the demands of the service as reflected in this study for clinical nursing practice are that nursing staff working in these units should be able to manage patients with any one of these conditions, including varying levels of severity of illness. This includes knowledge of and competence in the use of equipment and technology appropriate for the management of these conditions as most units were able to provide basic ICU facilities. The treatment options also require an extensive knowledge of pharmacology. Given that many of the units are general ICUs/HCUs or mixed units, patients are admitted with a variety of conditions, and therefore require Critical Care Nurses who are trained as generalists and not discipline specific (for example cardio-thoracic) CCNs. This is particularly relevant when an agency nurse can be placed in any unit where a CCN is required by the healthcare service.

The role and scope of practice of the nurse practitioner within the critical care unit must be reviewed with care given the pending changes in nursing practice legislation, and the push for the use of care workers, Enrolled Nursing Auxiliaries and Enrolled Nurses to fill the gaps left by the deficit in Registered Nurse and Critical Care Nurse numbers. Research has clearly shown that getting the balance right is tricky, (BACCN, 2002: RCN, 2003) but getting it wrong has serious repercussions for

patient safety, staff retention and costs to the patient and healthcare provider (Clarke *et al*, 2000).

5.4.4 Implications for Nursing Research

The implications of this study for nursing research are that further studies are required that could provide information which could contribute to the effective planning and deployment of nursing workforce in the healthcare sectors, with specific reference to critical care units. Further research is required to determine the most acceptable ratio for South African healthcare services and the impact of using care workers, novices and agency staff in the units. The number of cases of negligence and adverse events related to inadequate staffing should be investigated with the aim to improve quality of care.

This study has the potential to be conducted on a larger scale, possibly at a national level to determine the nursing workforce currently available versus the requirements for the critical care units in South Africa. This should be feasible given that findings from the National Audit (2003) have identified the location of all the units.

5.5 Potential Benefit

The potential benefit of this study is to contribute to a strategic planning exercise by making recommendations resulting from the findings of the study. It is hoped that the findings will provide information which will contribute to efforts by the healthcare authorities, both public and private, to plan more effectively in meeting the demand for adequate Critical Care Nursing service delivery to ensure safe patient care. The data provides information from which recommendations are made about nurse staffing for Critical Care Units in the Western Cape Province. Recommendations for CCN training programmes are also made.

5.6 Limitations of the study

Not all the required data could be collected during the study due to limitations related to admission book entries and the systems used for additional staff employment by the various hospitals. Questions for which data were missing related to the total number of admissions and deaths of patients (Q 2.6 and Q 2.19), and the number of patients per diagnostic category (Q 2.7), as well as the use of agency or overtime nurses (Q 2.29 and Q 2.30). The system of capturing data varied greatly between institutions, and was difficult to analyse. The admission information is not readily

available, particularly for a year-period. In discussions with the respondents, it seems that this data is captured in admission books and that the data is not detailed. Many Unit Managers had to calculate data manually to complete the questionnaire, as it appears that no hospital has a reliable electronic database of admissions in place in the unit to which the Unit Manager has access. Where the data was missing, it appeared that the information was generally not easily accessible as it was stored in archives and in some cases the Managers did not have the time to search for this data. This problem was encountered in both the public and private sector hospitals.

Establishing the frequency and the extent of the use of agency nurses and the number of nurses who worked overtime proved to be equally problematic because of a wide variety of methods of utilising additional nursing staff, and different recording systems. The reliability of the data is doubtful because of the wide disparity in responses, and the researcher ascribes this to a lack of clarity in the wording of the question despite an attempt to verify the data. The remainder of the questions did not appear to pose significant problems.

5.7 Recommendations

5.7.1 Planning of Critical Care Services

Strategic planning needs a multi-sectoral approach, involving all stakeholders as critical care service delivery cannot be planned in isolation. This is true also of the impact of one level of healthcare delivery on another such as the increased need for ICU beds resulting from the increased number of acute admissions to Level 3 hospitals from Level 2 hospitals, or the lack of staffing and funding that do not allow for 'opening up' more ICU or HCU beds.

For strategic planning purposes, the unmet demand and the future potential need should to be factored into the equation, for example in SA the impact of HIV on both the patient profile (Morris, Masur and Huang, 2006) and staff attrition rate is yet to be explored. The burden of trauma, violence and infectious diseases has increased the demand for ICU services, and increasingly, complications of lifestyle diseases contribute to ICU admissions, particularly in the private healthcare sector (Van der Merwe, 2000). The impact of infectious diseases such as SARS (Severe Acute Respiratory Syndrome) (Varia, Wilson, Sarwel, McGeer, Gournis, Galanis and Henry, 2003) on ICU's has yet to be experienced in South Africa, and pending

disasters such as the avian flu epidemic (Shortbridge, 2006) have yet to be factored into the equation.

5.7.2 Database

The researcher is of the opinion that an electronic database system for capturing admission and discharge data, together with other patient data such as illness severity scores, management details, complications, outcome and resource utilisation data would prove an extremely useful tool in the critical care setting. Admission data could be readily available and efficacy of care could be measured with the aim to improve quality of patient care and effective resource utilisation. This information could be of benefit to the entire critical care team, including the Unit Manager, the Medical Director and the Hospital Manager. Critical care databases are currently available from the CCSSA that would capture the required data.

5.7.3 Nursing Staff

More nurses should be appropriately trained to meet the demands of the healthcare services and ensure safe patient care in critical care units. If the consequences of inadequate nurse staffing are to be avoided, the problem needs to be addressed using a multi-sectoral approach, as the crisis not only affects nurses but impacts on the whole healthcare system. Nurses themselves need to start working on improving the image of nursing and the delivery of quality nursing care.

The findings of the present study support the following recommendations of the International Council of Nurses, that is, a policy-based interventions framework to address nursing shortages as an international collaborative response to a problem that affects healthcare systems across the world, set out in Table 8:

Table 8: The ICN Global Nursing Review Initiative: Policy Interventions Framework (ICN Report, 2005)

COMPONENTS	INTERVENTIONS	REQUIREMENTS
Workforce planning	- Needs assessment - Integrated planning - Linkage with educational sector - Scenario modelling - Geographical distribution	- Planning capacity - Workforce data/information - Stakeholder involvement
Recruitment and Retention	- Recruitment from traditional sources - Recruitment from "new" sources - Retention of current staff - Attract back returners	- Financial and non-financial incentives - Career structure and opportunities - Flexible working models - Safe working conditions - Nurse involvement in decision-making
Deployment and Performance	- Day-to-day matching of staff with workload - Flexible working models - Shift patterns for 24-hour care - Full-time/part-time/temporary staff - In-service training/"lifelong learning"	- Effective local management - Data on activity and workforce - Financial and non-financial incentives - Allocation of necessary equipment, material, drugs, etc. - Nurse involvement in decision-making
Utilisation and skill Mix	- Strategic/policy decisions on effective skill mix of staff - Regulatory infrastructure - Legislative infrastructure - In-service training/Lifelong learning"	- Effective strategic management - Data on activity/output/outcome - Job descriptions/role definitions - Financial and non-financial incentives - Nurse involvement in decision-making

Buchan and Calman, authors of the 2005 ICN report, state that "[T]he critical issue in examining this framework is to recognise that the components and interventions are interdependent...leadership is required, ...and the support of nurses, and other workers is required, as is the active participation of other stakeholders (education sector, regulators, nurses associations, and representatives of broader civil society)" in order to initiate a sustainable solution (ICN report, 2005, p. 9 & 10). The full report is a useful tool for a Hospital or Nursing Manager who is keen to address a nursing staff shortage and prepared to implement the policy framework.

In addition, from the findings of this study the researcher would recommend:

1. Clear guidelines in defining the level of service that a unit provides in order to staff and equip such a unit appropriately to ensure safe patient care and a safe working environment for the CCN.
2. An efficient, comparable database of patient and staff information for all hospitals, so that relevant information is readily available to assess the efficacy and resource utilisation of a healthcare service.
3. All units should institute relevant, useful severity of illness and nursing workload-scoring systems in order to assist with admission criteria, appropriate allocation of nursing staff and optimal use of scarce, expensive, resources.
4. A medical doctor with critical care knowledge should be available on site for the unit on a 24-hour basis to direct patient management and assist the CCN should an emergency arise.
5. Every effort should be made by healthcare institutions to strive for the recommendations set out by the WFCCN Position Statement on Nursing Workforce Provision in the interests of all critically ill patients.
6. Nurse-staffing ratios should be applied based on an acceptable nursing workload assessment, which also takes the patient's severity of illness and number and type of interventions required into account.
7. The role and scope of practice of all categories of nursing staff, and especially health care workers, should be clearly defined in a critical care unit, based on legal requirements and ethically sound principles.

8. Hospital management should recognise that the safe care of patients and therefore the efficacy of the service, is determined by the adequacy of its nursing staff, and that nurses need the active support of management.
9. All categories of support staff, including critical care team members such as clinical technologists and physiotherapists, should be employed effectively to facilitate the appropriate utilization of the skills of the CCN.
10. Team members should assist with the education and training of CCNs in the use of technical equipment, therapeutic interventions and the management of critically ill patients.
11. Clinical nurse mentors should be employed in every hospital to assist with the clinical teaching of CCN students and other nursing staff in the critical care units.
12. ICU-specific in-service education programmes should be instituted as a regular feature of the working week for all critical care staff.
13. Learning opportunities such as attendance of conferences should be made available for nurses to improve their knowledge and skills so that patients and the healthcare system can benefit.
14. More suitable candidates committed to a caring profession such as the nursing profession should be recruited into the undergraduate nursing programmes.
15. More CCNs, including more Paediatric and Neonatal CCNs, should be trained to aim for the WFCCN staffing goal, including having a CCN as Unit Manager in every unit.
16. Educators should monitor the diagnostic categories of patients admitted and current critical care practice including the specific conditions, management and interventions, to ensure up-to-date and relevant teaching content in their programmes.
17. Study leave should be granted so that students are not part of the workforce and able to benefit from learning opportunities yet contribute to patient care.

18. Students should be contracted to work back time allowed for study leave and expected to honour their contracts.
19. A concerted effort should be made to retain nurses in the profession, both novices and experienced nurses, in order to create a more stable environment in the unit. A stable environment is more conducive to teaching, and ultimately better patient care.
20. The working conditions of nurses should be reviewed, with specific reference to job descriptions, staffing and workloads that contribute to high levels of stress, and real improvements should be introduced.
21. The remuneration package of nurses in general, and CCNs in particular, should be seriously reviewed in the light of the value of a well-qualified, competent nurse.
22. A clinical career pathway should be created to keep the good CCN practitioner in the unit while remunerating him/her adequately.
23. The recruitment of nurses who have left the system should be explored and worthwhile incentives put in place to attract the CCN back into the system.
24. An expansion of private-public partnerships at various levels of management to meet the nursing staff needs of both sectors, especially as both sectors provide the facilities to utilise and train Critical Care Nurses (CCNs).

5.8 Conclusion

There is a need to train more nurses, especially Critical Care Nurses to meet the demands of the units in both the private and public sector hospitals. Attention to the recommendations of the study by public and private health care sectors in the Western Cape would contribute in some measure to addressing the problem of the nursing shortage in the critical care units. A serious commitment by all stakeholders and a realistic budget including appropriate remuneration for nurses is urgently required. In conclusion, this study demonstrates a shortage of nursing staff in the Critical Care units of the hospitals of the Western Cape Province which has implications for safety and quality of care.

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APPENDIX 1

Summary of Proceedings leading up to the Research Project

November 2001: Workshop – organised by the Cape Western Branch of the Critical Care Society of Southern Africa. Aims: • To discuss the perceived decline in the quality of nursing care of patients in the ICUs of the Western Cape (Metropole) with relevant stakeholders, including those involved in the training and employment of Critical Care Nurses. • To identify factors that potentially contribute to the problem.	Outcomes: Problem areas identified: • Staffing/training • Working conditions Potential solutions:-Address: • Staffing • Training • Working conditions • Research • Communication • Liase with the Nursing Standards Generating Body (Nursing SGB) – Western Cape CCNs Task Team set up under the auspices of the CWB of the CCSSA.
January 2002 to date: Western Cape Critical Care Nurses' Task Team Meetings: Aims: • To discuss the problem areas and contributory factors identified at the above workshop. • To explore potential solutions to address these problems.	Outcomes: • Ongoing regular meetings at 6-weekly intervals • Discussion and dissemination of information • Networking • Mandated as the critical interest group involved in generating Critical Care Nursing Education Standards, in conjunction with the Nursing SGB, according to the SAQA process, accreditation by SANC. • National consultation initiated.
May 2003: National Meeting organised with the support of the national CCSSA. Aims: • To formally expand the membership of the WC Task Team to include CCNs around South Africa to consult more widely. • To provide a network for communicating with CCNs at a national level	Outcomes: • The formation of a national network of CCNs named the National Critical Care Nurses' Forum. • The dissemination of information at a national level – ongoing. • Updating members at regular intervals – via minutes, newsletters in the SAJCC, presentations at the Critical Care Congress annually.

November 2003: Western Cape Survey proposed. Aims: • To collect data to quantify the actual shortage of CCNs. • To determine the demand and supply of CCNs in the WC hospitals. • To inform the Provincial Minister of Health regarding nurse staffing	Outcomes: • The design of a draft questionnaire to collect the required data. • Circulation of the questionnaire for comment, to the WC Task Team and the CWB Committee.
November 2003 – January 2005: National Audit of Critical Care Services throughout SA, conducted under the auspices of the CCSSA. Aims: • "To describe in depth the critical care resources and critical care patient profile in the public and private sector of SA" (SA National Audit, 2004, p. 1). • To compile a database of the critical care resources and patient profiles of South Africa.	Outcomes: • Data collected about critical care resources in all 9 provinces, public and private sector - completed October 2004. • Analysis of data completed by December 2004. • Initial presentation of findings to CCSSA Council – January 2005. • Subsequent presentations to Council, Department of Health delegations, private sector groups, critical care members at the annual Critical Care Congress in July 2005, and provincial delegations. • Formal reports to follow, publications in press.
November 2004: Western Cape Workshop organised under the auspices of the CCSSA – CWB: Aims: • To invite ICU Nurse Managers and Critical Care Educators to a workshop to discuss the shortage of nurses working in the ICUs of the Western Cape. • To invite input from these key stakeholders about relevant data required regarding staffing of ICUs and CCN training. • To debate what data would be useful to collect that would help to determine the demand for, and supply of, nurses for critical care services. • To utilise the contributions of the stakeholders in refining the original questionnaire regarding nursing workforce in ICU. • To utilise relevant data to inform the PGWC about the shortage of nurses providing critical care services.	Outcomes: • A successful workshop facilitated by an independent nurse consultant. • Valuable input received from stakeholders. • Raw data summarised. • A full report of the workshop proceedings compiled, and sent out to each delegate or designated contact person. • A brief summary compiled and sent out to each CWB member to keep members informed. • Questionnaire refined and administered to the Nurse Manager of each hospital with an ICU/HCU in the Western Cape Province, and the Head of Department of each educational institution Involved in training Critical Care Nurses.

APPENDIX 2

Reference number: (for official use only)	**E**	**H**	**U**

QUESTIONNAIRE SURVEY OF WESTERN CAPE

CRITICAL CARE NURSE STAFFING.

The purpose of this survey is to collect data on the current status of nurse staffing in the Critical Care Units of the hospitals in the Western Cape Province.

Thank you for taking the time to complete this questionnaire. The information that you provide will make a valuable contribution towards an accurate assessment of the current nursing workforce.

This research project is being conducted by Mrs. R. Gillespie, a Critical Care Nurse, in partial fulfilment of the requirements for the degree of Master of Science in Nursing at the University of Cape Town.
My telephone number: 021-404-4371 or cell: 083 364 5769.

Supervisor: Mrs. Una Kyriacos, Telephone number: 021-406-6410.

The study has been undertaken in collaboration with the Cape Western Branch of the Critical Care Society of Southern Africa, and is endorsed by the President of the Society.

PLEASE COMPLETE THE QUESTIONNAIRE BY .....

COMPLETED QUESTIONNAIRE WILL BE COLLECTED FROM .....

PLEASE NOTE:

1. ICU NURSE MANAGERS – please complete sections 1 & 2 only.

PLEASE COMPLETE ONE QUESTIONNAIRE PER UNIT.

2. CRITICAL CARE EDUCATORS – please complete sections 1 & 3 only.

1. FOR EACH QUESTION PLACE A TICK IN THE RELEVANT SPACE,
OR CIRCLE THE APPROPRIATE RESPONSE.

2. FILL IN THE NUMBERS WHERE REQUIRED IN THE SPACE PROVIDED AND/OR

3. PROVIDE ADDITIONAL INFORMATION WHERE RELEVANT.

Thank you for your assistance.

SECTION 1

This section to be completed by all respondents.

Q.1.1. Name and address of the Educational institution or Hospital.

Name of the institution: Postal Address:

Q.1.2 Public sector or private sector institution?

Please select one response.

PUBLIC	PRIVATE	BOTH

Q.1.3 Name, Designation and contact number of person completing the questionnaire?

Name:
Designation:
Contact number: Tel. Fax:
Cell:
Email address:

SECTION 2

CLINICAL INSTITUTION/HOSPITAL

To be completed by the ICU Unit Manager.

NOTE: Please complete one questionnaire per unit (ICU or HCU).

An Intensive Care Unit (ICU) is defined as a designated area within a hospital that is specifically equipped to provide Level 3 care for critically ill patients, capable of providing **comprehensive critical care** including complex multi-system life support including mechanical ventilation, renal replacement therapy, inotropic support and invasive cardiovascular monitoring.

Q.2.1 How many Intensive Care Units does your hospital have? ☐

A High Care Unit (HCU) is defined as a designated area within the hospital that provides Level 2 care to acutely ill patients, capable of providing a high standard of general intensive care including basic cardiovascular monitoring. This definition includes Single Organ Support units.

Q.2.2 How many High Care Units does your hospital have? ☐

Q.2.3 How would you describe your unit? Please tick one.

☐ ICU ☐ HCU ☐ ICU & HCU

Open Unit: Any doctor can admit a patient to the unit and is responsible for the treatment of the patient during the patient's stay in that unit.
Closed Unit: One doctor is in charge of the unit full-time, and is responsible for the admission and treatment (with or without other full or part-time ICU doctors) of the patient during the patient's ICU stay (National Critical Care Audit, 2004 p. 1). This doctor may consult with other doctors, including the referring doctor about patient management.

Q.2.4 Is your unit open or closed? ☐ OPEN ☐ CLOSED

Q.2.5 How many beds are available in your unit? Please see concepts below.

1. **Commissioned beds** are the total, established beds in the unit, can be functional or closed.
2. **Functional beds** are available for daily use, dependent on staffing.
3. **Non-functional beds** are commissioned, but closed due to e.g. staff shortages
4. **Ad Hoc Closures** are beds that are closed due to short-term nursing staff shortages, e.g. 6, 12 or 24 hour periods.

Q.2.5.1 Commissioned beds? ☐

Q.2.5.2 Functional beds? ☐

Q.2.5.3.1 Non-functional beds? ☐

Q 2. 5.3.2 How many times were Ad Hoc closures necessitated due to nursing staff shortages during 2004 in total from 1 Jan. to 31 Dec.?

☐

Q.2.6 How many patients were admitted from 1 January to 31 December 2004?

Q.2.6.1 Adults [ ]

Q.2.6.2 Paediatric (1 month to 14 years old) [ ]

Q 2.6.3 Neonates (birth to 28 days) [ ]

Q 2.7 What types of broad diagnostic categories of patient conditions are admitted to your unit? How many admissions during 2004 (1 Jan. to 31 Dec.)?

		Adults	Paeds	Neonates
2.7.1 Cardiology	YES / NO			
2.7.2 Cardio-thoracic surgery	YES / NO			
2.7.3 General Surgery (including Gynaecology) and Vascular Surgery	YES / NO			
2.7.4 Neuro-surgery	YES / NO			
2.7.5 Medical, including Respiratory	YES / NO			
2.7.6 Burns	YES / NO			
2.7.7 Trauma and Polytrauma	YES / NO			
2.7.8. Obstetrics	YES / NO			
2.7.9 Haematology	YES / NO			
2.7.10 Other	YES / NO			

Q.2.8 Are patients formally scored according to their severity of illness on admission by the attending doctor (e.g. APACHE score)? YES / NO

Q.2.9 Which scoring system is used? (e.g. APACHE II). [ ]

Q.2.10 Is a patient workload assessment performed utilising a Nursing Activity Score e.g. NAS? If yes, which? YES / NO [ ]

Q.2.11 Is a medical doctor present 24 hours per day for the unit? YES / NO

Q. 2.12 Does the unit have an in-house director as head of the unit? YES / NO

Q.2.13 Is the Head of the Unit an accredited Intensivist? (registered with the HPCSA as a Critical Care Specialist). YES / NO

Q 2.14 If not, what speciality does he/she hold?

Q.2.15 Is a clinical technologist available daily for the unit? YES / NO

Q.2.16 Are physiotherapists available daily in the unit? YES / NO

Q.2.17 Are additional support staff available e.g. clerks, housekeepers? YES / NO

Q.2.18 Which of the following facilities are available in your unit?

Blood Gas Analysis	YES	NO
Continuous ECG monitoring	YES	NO
Non-invasive cardiovascular monitoring	YES	NO
Invasive cardiovascular monitoring	YES	NO
Cardiac output monitoring	YES	NO
Intra Aortic Balloon Pump	YES	NO
Pacemakers	YES	NO
Invasive Mechanical Ventilation	YES	NO
Non-invasive Mechanical Ventilation	YES	NO
Renal Replacement Therapy, Incl. haemodialysis and/or CVVHD	YES	NO
Total Parenteral Nutrition	YES	NO

Q. 2.19 How many patients were discharged from the unit during the period from 1 Jan. 2004 to 31 December 2004?

ALIVE	DIED IN ICU

STAFFING:

Q.2.20 Does your institution use a specific nurse / patient ratio in ICU?

YES / NO

Q.2.21 If yes, please specify ratio (nurse: patient)?

Ventilated patients:

Non-ventilated patients:

Q 2.22 Is the patient's severity of illness taken into account when allocating nursing staff?

YES / NO

Nursing workload assessment refers to a score allocated to interventions and activities related to patient (and family) care to measure nursing workload.

Q 2.23 is nursing workload assessment (e.g. NAS score) taken into consideration when allocating nursing staff?

YES / NO

CCNs = Critical Care Nurses (ICU trained) RNs = Registered Nurses
ENs = Enrolled / Staff Nurses ENAs = Enrolled Nursing Auxiliaries
Unit staff establishment refers to permanent posts, i.e. staff available to work in ICU in your employ.

PLEASE NOTE: Answer the following questions as at 1 January 2005.

Q.2.24 Is the unit manager/sister-in-charge a registered CCN? YES / NO

Q.2.25 How many CCNs are on your unit staff establishment?

Q.2.26 How many RNs (not ICU trained) are on your unit staff establishment?

Q.2.27 How many ENs are on your unit staff establishment?

Q.2.28 How many ENAs are on your unit staff establishment?

Q.2.29 What was the average number of agency nurses that your unit required per month for the past year (1 Jan. to 31 Dec. 2004) to cover the shifts?

Q.2.30 What is the average number of overtime shifts that your own nursing staff worked per month during the past year (2004)?

Q.2.31 what is the average ICU experience (years worked in ICU) of the nurses working currently in the unit?

1. CCN's	< ONE YEAR	1 – 5 YEARS	> 5 YEARS
2. RN's	< ONE YEAR	1 – 5 YEARS	> 5 YEARS
3. EN's	< ONE YEAR	1 – 5 YEARS	> 5 YEARS
4. ENA's	< ONE YEAR	1 – 5 YEARS	> 5 YEARS

Q.2.32 Does your unit have a dedicated clinical teacher available to train new staff/students?

YES / NO

Q.2.33 Does your institution have a regular in-service nursing education programme in place?

YES / NO

Q.2.34 Has your institution experienced a loss of CCNs during the past year (1 Jan. to 31 Dec. 2004)?
If so, how many?

YES / NO	

Q.2.35 What reasons did these CCNs give for leaving? Please tick the appropriate responses.

1. To the private sector
2. To the public sector
3. Overseas
4. Other work
5. Financial
6. Lack of promotional opportunities
7. Social or family reasons
8. Other
9. Not specified

EDUCATION & TRAINING RESOURCES:

Q. 2.36 Is your institution accredited with SANC as a clinical training facility for Critical Care Nurse training?

YES / NO

Q.2.37 Does your institution have a working agreement with an accredited educational institution that offers CCN training?

YES / NO

Q.2.38 How many nurses were granted study leave for CCN training for 2004?

Q.2.39 Is a CCN student required to sign a contract? If so, for what period of time?

YES / NO

Q.2.40 Does a CCN student receive additional remuneration or an allowance upon completion of the course?

YES / NO

SECTION 3

EDUCATIONAL INSTITUTION.

This section to be completed by the Critical Care Educator.

PLEASE CIRCLE OR TICK THE APPROPRIATE RESPONSE.

Q.3.1 Does your institution offer undergraduate/basic nursing (R425 or bridging) training? Please tick specific course.

YES / NO	R 425	BRIDGING

Q.3.2 Does your institution offer post registration Critical Care Nurse training accredited by SANC? Select the applicable course/s.

YES / NO	1. ADULT CCN	2. PAEDS CCN	3. NEONATAL

Q.3.3 Is the CCN course full-time or part-time?

1. Adult	PART / FULL-TIME	DIPLOMA OR CERTIFICATE
2. Paeds CCN	PART / FULL-TIME	DIPLOMA OR CERTIFICATE
3. Neonatal CCN	PART / FULL-TIME	DIPLOMA OR CERTIFICATE

Q.3.4 What is the duration of the CCN course?

1. Adult	6mths – 1 yr.	1YEAR	2 YEARS
2.Paeds CCN	6mths – 1 yr.	1YEAR	2 YEARS
3. Neonatal CCN	6mths – 1 yr.	1YEAR	2 YEARS

Q.3.5 How many students completed the undergraduate (basic and/or bridging) nursing programme during 2004?

Q.3.6 How many students completed the CCN course during 2004?

ADULT	PAEDS CCN	NEONATAL

Q.3.7 How many qualified tutors are available to teach CCN at your institution?

3.7.1 FULL-TIME: | | **3.7.2** PART-TIME: | |

Q. 3.8 Does the tutor also provide clinical accompaniment in the units?

YES / NO

Q.3.8 Are clinical mentors available to provide clinical teaching?

YES / NO

Q.3.9 At which clinical facilities (hospitals) are your CCN students placed for their practical training components?

Q. 3.10 From which institutions do the students come from that apply for your CCN training course?

Within South Africa	**International**

APPENDIX 3

31 Camdebo Street
Tygerberg Hills
Bellville, 7530

17 June 2005

Dear Colleague

I am currently an MSc Nursing student at the University of Cape Town, and in order to comply with the degree demands I have to complete a mini dissertation.

My dissertation has evolved from a need identified regarding data required to analyse the Critical Care Nursing Workforce of the Western Cape. As secretary of the Cape Western Branch of the Critical Care Society of Southern Africa for the past few years I have undertaken this study in collaboration with the Branch. As a Critical Care tutor previously and a Clinical mentor to critical care nursing students currently, I have a passionate interest in Critical Care Nursing. Concern has arisen due to a perceived lack of quality care delivered to critically ill patients, a problem linked to a shortage of Critical Care Nurses. Currently, the extent of the shortfall is unknown. This study purposes to survey critical care units in the Western Cape to describe the current workforce, including supply and demand.

I have received permission from the School of Health and Rehabilitation Science of the Faculty of Health Sciences of the University of Cape Town, the UCT Research Ethics Committee (REC reference no. 182/2005), and the office of the Deputy-Director General of Health of the Provincial Government of the Western Cape to conduct the study. Liaison with the private hospitals and the educational institutions is via the respective Nursing Director and Head of Department. A copy of the approval is available upon request.

Your input is most valuable in collecting data to present an accurate assessment of the current nursing workforce in the critical care units of the Western Cape. The ultimate purpose of the study is to contribute to a more effective Strategic Planning exercise, to meet the demand for adequate Critical Care Nursing service delivery to ensure safe patient care.

It is appreciated if you would take the time to complete the enclosed questionnaire, and I will arrange for collection by the 15th of July 2005. Participation is voluntary, but I would urge you to assist us in obtaining a complete assessment of the current situation. All information used for the purpose of this study will be kept confidential and anonymous.

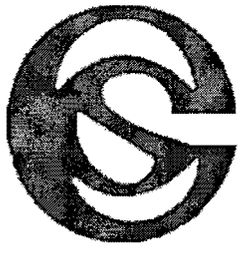
Should you require further information, please do not hesitate to contact me.
Thank you for your kind attention.
Yours sincerely

R. Gillespie

.....

Rencia Gillespie
Tel: 021-404-4371 Fax: 021-448-6187 Cell: 083 364 5769
rsgill@uctgsh1.uct.ac.za

APPENDIX 4



CRITICAL CARE SOCIETY KRITIEKE SORG VERENIGING

CAPE WESTERN BRANCH **WESKAAP TAK**

1 June 2005

.....
.....
.....
.....
.....

Dear,

Re. Organisation and staffing of Critical Care Services within the Western Cape.

In November 2001 the Critical Care Society of Southern Africa held a Workshop attended by Nursing Managers and Educators from the Western Cape within the discipline of Critical Care Services. As a result of that meeting very significant progress has been made contributing to programmes for training in Critical Care Nursing, and guidelines for patient management are being drawn up. (We would be happy to forward a summary of that meeting at your request).

During August 2004 the Critical Care Society was approached by the Hospital Services within the Provincial Government of the Western Cape for our input in terms of optimization of Critical Care Services. In response to that request a meeting was held at the Colleges of Medicine of South Africa in Rondebosch on 30 November 2004. Critical Care Nursing managers and educators, tutors and those involved in clinical accompaniment from both the Public and Provincial Sector in the Western Cape were invited to that meeting.

During the meeting the process of gathering the necessary information for planning of Critical Care Services was discussed. Subsequently the attached questionnaire has been developed as a tool for data collection. We would be very grateful if you could assist in the collection of this data by completing the questionnaire.

The collated data will be made available to all who provide the data. If appropriate, we would consider calling a meeting to discuss the collated data and appropriate future plans. After this process the data with suggestions for future development will be submitted to the Provincial administration.

Yours sincerely,

A C Argent
President, Critical Care Society of Southern Africa

APPENDIX 5

Health Care Facility- Consent Form

Title: A descriptive survey of the nursing workforce in critical care units in the hospitals of the Western Cape Province.

Researcher: Rencia Gillespie, RN, currently completing the degree of Master of Science in Nursing.

Purpose: To establish the actual number of nursing staff working in the Intensive Care Units (ICUs) of the hospitals in the Western Cape Province.

Study benefits: It is currently not known what the nursing workforce capacity is of the ICUs of the hospitals in the Western Cape Province. This makes the provision and planning of an efficient critical care nursing service problematic. This study will contribute to establishing a database of nursing workforce in both the public and private healthcare sectors. The potential benefit is that this data could be used to plan for an adequate nursing workforce that can provide quality patient care to critically ill patients. There are no known risks that the researcher is aware of.

Research procedures: Data will be gathered from ICU Nurse Managers and Critical Care Educators using a specifically designed questionnaire to collect data. Data will be recorded in a manner as to maintain confidentiality and anonymity. Any identifiable data will be recorded in such a way as to protect the identity of individuals and institutions. The participant has the right to withdraw from the study.

At the conclusion of the study the researcher undertakes to provide feedback to the participants, other staff and management at each of the health care facilities at which data is gathered. The final report of the completed study will be made available to the institution.

The attached synopsis has been read and understood and consent to proceed with the study is given.

.....	.....
CHIEF NURSING SERVICE MANAGER SUPERINTENDENT	MEDICAL
.....	.....
DATE	DATE
.....	.....
UNIT MANAGER	RESEARCHER
.....	.....
DATE	DATE

APPENDIX 6

Educational Institution Consent Form

Title: A descriptive survey of the nursing workforce in critical care units in the hospitals of the Western Cape Province.

Researcher: Rencia Gillespie, RN, currently completing the degree of Master of Science in Nursing.

Purpose: To establish the actual number of nursing staff working in the Intensive Care Units (ICUs) of the hospitals in the Western Cape Province.

Study benefits: It is currently not known what the nursing workforce capacity is of the ICUs of the hospitals in the Western Cape Province. This makes the provision and planning of an efficient critical care nursing service problematic. This study will contribute to establishing a database of nursing workforce in both the public and private healthcare sectors. The potential benefit is that this data can be used to plan for an adequate nursing workforce that can provide quality patient care to critically ill patients. There are no known risks that the researcher is aware of.

Research procedures: Data will be gathered from ICU Nurse Managers and Critical Care Educators using a specifically designed questionnaire to collect data. Data will be recorded in a manner as to maintain confidentiality and anonymity. Any identifiable data will be recorded in such a way as to protect the identity of individuals and institutions. The participant has the right to withdraw from the study.

At the conclusion of the study the researcher undertakes to provide feedback to the participants, other staff and management at each of the health care facilities at which data is gathered. The final report of the completed study will be made available to the institution.

The attached synopsis has been read and understood and consent to proceed with the study is given.

.....	.....
HEAD OF DEPARTMENT	CRITICAL CARE EDUCATOR
.....	.....
DATE	DATE
.....	
RESEARCHER	
.....	
	DATE

APPENDIX 7

UNIVERSITY OF CAPE TOWN

Research Ethics Committee
Faculty of Health Sciences
OMB E52, Room 24, GSH
Queries: Lamees Emjedi
Tel: (021) 406-6338
Fax: 406-6411
E-mail: lemjedi@curie.uct.ac.za

12 May 2005

REC REF: 182/2005

Mrs R S Gillespie
Division of Nursing
University of Cape Town

Dear Mrs Gillespie

A DESCRIPTIVE SURVEY OF THE NURSING WORKFORCE IN CRITICAL CARE UNITS IN THE HOSPITALS OF THE WESTERN CAPE PROVINCE

Thank you for your application to conduct Medical Research received by the Research Ethics Committee on 6 Mayl 2005.

It is a pleasure to inform you that the committee has approved the above-mentioned study on 9 May 2005.

Please quote the *REC REF* in all your correspondence.

Yours sincerely

PROFESSOR T ZABOW
CHAIRPERSON

APPENDIX 8

SYNOPSIS **22 June 2005**

Sufficient workforce capacity is required to enable health systems to function effectively according to a report compiled by Buchan and Calman on behalf of the International Council of Nurses (ICN) in 2004. The ICN identified a global shortage of Registered Nurses (ICN Report, 2004). The provision of nursing workforce is guided by norms applicable to specific areas, for example nurse-patient ratios in Critical Care as stated in the position paper of the British Association of Critical Care Nurses (BACCN, 2001). Specialists, such as Critical Care Nurses, are especially in great demand and short supply (Kelley, Angus, Chalfin, Crandall, Ingbar, Johanson, Medina, Sessler, and Vender, 2004). Critical Care Nursing services worldwide appear to be in crisis. In South Africa the situation is particularly acute according to Clow, as stated in an interview published in the Cape Argus in July 2004 (Bailey & Hawker, 2004).

Critical Care service delivery in both the public and private healthcare sector is dependent on a team of specially trained staff, the majority of whom are nurses who constitute the backbone of the service. Quality patient care can only be delivered if reasonable numbers of appropriately trained nurses are available in speciality areas such as Adult and Paediatric Intensive Care Units (ICUs). The generally accepted norm is that critically ill patients require one registered nurse at all times, with a dedicated head nurse who has a recognised post-registration qualification in Critical Care Nursing and adequate support staff (World Federation of Critical Care Nursing, 2004). Currently it is perceived that the quality of patient care is being severely compromised in South African Intensive Care Units, as the above-mentioned criteria are not being met. Various factors contribute to this perception, none of which are really new, or particularly unique to South Africa. The extent of the shortfall of nurses, especially Critical Care Nurses, is however not known, and data is required to quantify the various factors that contribute to the supply and demand of Critical Care Nurses.

The purpose of this study is to survey critical care units in the Western Cape Province to describe the current ICU nursing workforce, including supply and demand. The study aims to establish the actual number of nurses working in the ICUs, and to identify what the shortfall is, based on the demand or norms used in Western Cape hospitals. The potential supply of nurses via the training schools to meet this demand will also be investigated.

The aim of the study is to perform a Workforce Analysis of Critical Care Nursing services in the Western Cape, including supply and demand.

The potential benefit of the study is to contribute to a strategic planning exercise by making recommendations resulting from the findings of the study. It is hoped that this data could be used to contribute to planning for an adequate nursing workforce that can provide quality care to critically ill patients.

The study design is a descriptive survey. A questionnaire will be sent to key respondents who comprise the entire population of ICU Nurse Managers and CCN Educators in the Western Cape.
The setting refers to critical care units within the hospitals of the Western Cape, including public and private sector, and educational institutions that are registered with the South African Nursing Council to offer Critical Care Nursing programmes.
The results of this study will be reported to the relevant hospital managers, educators and interested stakeholders.

APPENDIX 9

THE WORLD FEDERATION OF CRITICAL CARE NURSES

27 August 2005

DECLARATION OF BUENOS AIRES

POSITION STATEMENT ON THE PROVISION OF CRITICAL CARE NURSING WORKFORCE

INTRODUCTION

In May 2003 the World Federation of Critical Care Nurses undertook a review of available national critical care nursing associations' position statements on critical care nursing workforce requirements. The current position statement aims to inform and assist critical care nursing associations, health services, governments and other interested stakeholders in the development and provision of appropriate critical care nursing workforce requirements.

The **first** draft of this position statement was distributed to member societies of the WFCCN between February 2004 and September 2004 and changes made following discussion and meeting of the WFCCN in Cambridge September 2004.
The **second** draft of this position statement was distributed to a wider audience including member societies of WFCCN, other international nursing and medicine organisations and individuals with an interest in critical care nursing between October 2004 and April 2005.
The **third** draft of this position statement was distributed to an ever-wider audience again including member societies of WFCCN, other international nursing and medicine organisations and individuals with an interest in critical care nursing between May2005 and August 2005.

A full meeting of the World Federation of Critical Care Nurses on Saturday 27 August 2005 at the Sheraton Hotel, Buenos Aires, Argentina, ratified this position statement.

<Signature>

Ged Williams
Chair, WFCCN
www.wfccn.org

WORLD FEDERATION OF CRITICAL CARE NURSES
DECLARATION OF BUENOS AIRES:
POSITION STATEMENT ON THE PROVISION OF CRITICAL CARE NURSING WORKFORCE

PREAMBLE

Critical or intensive care is a complex specialty developed to serve the diverse health care needs of patients (and their families) with actual or potential life threatening conditions.

Development of the nursing workforce within ~~of~~ critical care units requires careful planning and execution to ensure an appropriate balance and mix of staff skills and attributes that allow for safe and effective care. In parallel is the provision of a learning environment for novice critical care nurses, a flexibility to respond to changes in demand and efficiencies to ensure economic sustainability without clinical compromise.

Critical Care nursing workforce planning must be considered in the context of the total hospital requirement for access to critical care beds in addition to the regional requirement for integrated and accessible critical care services across a number of hospitals and institutions in a population defined health service.

Governments, hospital boards and professional bodies that inform and support the provision of critical care services must recognise the importance of providing adequately skilled, educated and available critical care nurses, doctors and other support staff to assure the health and safety of some of the most vulnerable patients in the health care system.

This declaration presents guidelines universally accepted by critical care professionals, which may be adapted to meet the critical care nursing workforce and system requirements of a particular country or jurisdiction.

CENTRAL PRINCIPLES

- Every patient must be cared for in an environment that best meets his or her individual needs. It is the right of patients whose condition requires admission to a critical care unit to be cared for by registered nurses. In addition the patient must have immediate access to a registered nurse with a post registration critical care nursing qualification (refer to WFCCN Declaration of Madrid on the provision of critical care nursing education)
- There should be congruence between the needs of the patient and the skills, knowledge and attributes of the nurse caring for the patient.
- Unconscious and ventilated patients should have a minimum of one nurse to one patient. High dependency patients in a critical care unit may have a lesser nurse patient ratio. Some patients receiving complex therapies in certain critical care environments may require more than one nurse to one patient.
- When calculating nurse-to-patient ratios and roster requirements in critical care, consideration and care must be given to the skill sets and attributes of nursing and support colleagues within the nursing shift team as they vary and require re-evaluation with fluctuations in patient care requirements.
- Adequate nursing staff positions must also be in place to assist with nursing education, in-service training, quality assurance and research programs, management and leadership activities, and where institutionally required, external liaison and support services beyond the confines of the critical care unit.
- Critical care nurses should focus their labour on roles and tasks that require advanced skill, expertise and knowledge of best practice in patient care. Therefore, adequate numbers of support staff should be employed to preserve the talents of critical care nurses for patient care and professional responsibilities wherever possible.
- Flexible workforce strategies and incentives should be employed by management to recruit, retain and remunerate expert critical care nurses at the patient bedside, and to ensure appropriate succession planning for future leadership needs. Additionally, contingencies should also be in place to respond to fluctuating and unexpected demands on the critical care service.

RECOMMENDED CRITICAL CARE NURSING WORKFORCE REQUIREMENTS

As a minimum, the critical care unit should maintain or strive to achieve the following nursing workforce requirements.

1. Critically ill patients (clinically determined) require one registered nurse at all times.
2. High dependency patients (clinically determined) in a critical care unit require no less than one registered nurse for two patients at all times.
3. Where necessary extra registered nurses may provide additional Assistance, Coordination, Contingency (for late admission, sick staff), Education, Supervision, and Support to a sub-set of patients and nurses in a critical care unit. (some times referred to as ACCESS nurse)
4. A critical care unit must have a dedicated head nurse (otherwise called Charge Nurse or similar title) to manage and lead the unit. This person must have a recognised post-registration critical care nursing qualification. It is also recommended the Head Nurse/Nurse in Charge have management qualifications.

5. Each shift must have a designated nurse in charge to deputise for the head nurse and to ensure direction and supervision of the unit activities throughout the shift. This person must have a recognised post-registration critical care nursing qualification.
6. A critical care unit must have a dedicated nurse educator to provide education, training and quality improvement activities for the unit nursing staff. This person (s) must have a recognised post-registration critical care nursing qualification.
7. Resources must be allocated to support nursing time and costs associated with quality assurance activities, nursing and team research initiatives, education and attendance at seminars and conferences.
8. Adequate support staff within the critical care area including: administrative staff, support staff to assist with manual handling, cleaning and domestic duty staff and other personnel exist to allow nursing staff to focus on direct patient care and associated professional requirements.
9. Appropriately skilled and qualified medical staff are appointed and accessible to the unit for decision making and advice at all times. A medical director is appointed to work collaboratively with the head nurse in order to provide policy/protocol, direction and collaborative support.
10. Remuneration levels for nursing staff are such that they are competitive with similar professions in the country and are scaled in such away as to reward and retain qualified, experienced and senior critical care nurses.
11. Appropriate, accessible and functional levels of equipment and technology are available and maintained to meet the demands of the expected patient load at any given time and nursing staff are adequately trained and skilled in the application of such equipment and technology.
12. Adequate occupational health and safety regulations should be in place and enforced to protect nurses from hazards of manual handling and occupational exposure.
13. Organised and structured peer support and debriefing procedures are in place to ensure nursing staff support and wellbeing following critical incident exposure.

Ref:

Australian College of Critical Care Nurses Position Statement on Intensive Care Nursing Staffing. www.acccn.com.au

British Association of Critical Care Nursing. Position Statement. Nurse-patient ratios in critical care. Nursing in Critical Care.2001. Vol No2.P59-63

Williams, G.F. & Clarke, T. 2001. "A Consensus Driven method to measure the Required Number of Intensive Care Nurses in Australia". Aust.Critical Care. 14(3):106-115.

International Nursing Council. The Global Shortage of Registered Nurses: An Overview of Issues and Actions (and accompanying Issues Papers) www.icn.ch/global/#3

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APPENDIX 10

THE WORLD FEDERATION OF CRITICAL CARE NURSES

27 August 2005

POSITION STATEMENT ON THE PROVISION OF CRITICAL CARE NURSING EDUCATION

INTRODUCTION

At the 6th World Congress on Intensive Care and Critical Care Medicine in Madrid, Spain 1993 the World Federation of Societies of Intensive Care and Critical Care Medicine endorsed what has become know as the Declaration of Madrid on the preparation of critical care nurses.

In May 2003 the World Federation of Critical Care Nurses under took a review of the Declaration of Madrid and recommendations from the Australian College of Critical Care Nurses position statement on critical care nursing education and other similar documents from member associations. The current position statement aims to inform/assist critical care nursing associations, health care providers, educational facilities and other interested parties in the development and provision of critical care nursing education.

The **first** draft of this position statement was distributed to member societies of the WFCCN between February 2004 and September 2004 and changes made following discussion and meeting of the WFCCN in Cambridge September 2004.
The **second** draft of this position statement was distributed to a wider audience including member societies of WFCCN, other international nursing and medicine organisations and individuals with an interest in critical care nursing between October 2004 and April 2005.
The **third** draft of this position statement was distributed to an ever-wider audience again including member societies of WFCCN, other international nursing and medicine organisations and individuals with an interest in critical care nursing between May2005 and August 2005.

A full meeting of the World Federation of Critical Care Nurses on Saturday 27 August 2005 at the Sheraton Hotel, Buenos Aires, Argentina, ratified this position statement.

<Signature>

Ged Williams
Chair, WFCCN

WORLD FEDERATION OF CRITICAL CARE NURSES DECLARATION OFMADRID: POSITION STATEMENT ON THE PROVISION OF CRITICAL CARE NURSING EDUCATION

PREAMBLE

Critical or intensive care is a complex specialty developed to serve the diverse health care needs of patients (and their families) with actual or potential life threatening conditions.

The role of the critical care nurse is essential to the multidisciplinary team needed to provide specialist knowledge and skill when caring for critically ill patients. The critical care nurse enhances delivery of a holistic, patient centred approach in a high tech environment bringing to the patient care team a unique combination of knowledge and caring. In order to fulfil their role, nurses require appropriate specialised knowledge and skills not typically included in the basic nursing programs of most countries.

Government, professional and educational bodies governing the practice of nursing must recognise the importance of dedicated specialised preparation for critical care nurses in order to assure the optimum health care delivery of their community. This declaration presents guidelines universally accepted by critical care professionals, which may be adapted to meet the educational and health care requirements of a particular country or jurisdiction.

CENTRAL PRINCIPLES

1. Critically ill patients and families have the right to receive individualised critical care from qualified professional nurses.

2. Critical care nurses must possess appropriate knowledge, attributes and skills to effectively respond to the needs of critically ill patients, to the demands of society, and to the challenges of advancing technology.

3. Where a basic nursing education program does not include these required specialised knowledge, attributes and skills, access to such further education must be provided to nurses responsible for the care of critically ill patients and their families.

4. Nurses with specialised knowledge and expertise in the provision of care to critically ill patients should play an integral part in the education of critical care nurses, even when a multidisciplinary, educational approach is utilised.

5. The preparation of critical care nurses must be based on the most current available information and research.

III. RECOMMENDATIONS FOR CRITICAL CARE NURSING EDUCATION

The World Federation of Critical Care Nurses believe that critically ill patients have very special needs and must be cared for by nurses with specialist skills, knowledge and attitudes.

The following recommendations have been adopted to represent universal principles to help guide health services, educational facilities and critical care nursing organisations in the development of appropriate educational programs for nurses who are required to care for critically ill patients and their families:

1. As a minimum, the critical care dimensions of the following topics should be included in programs to prepare critical care nurses. The categories are not listed in order of importance.
   - Anatomy and physiology
   - Pathophysiology
   - Pharmacology
   - Clinical Assessment (including interpretation of diagnostic and laboratory results)
   - Illnesses and alterations of vital body functions
   - Plans of care and nursing interventions
   - Medical interventions and prescriptions with resulting nursing care responsibilities
   - Psychosocial aspects (including cultural and spiritual needs)
   - Technology applications
   - Patient and family education
   - Legal and ethical issues
   - Professional nursing issues and roles in critical care, including clinical teaching strategies, team leadership and management issues
   - Use of current research findings to deliver evidence based multidisciplinary care
   - Caring for the carer (including dealing with stress and peer support)

2. Programs preparing critical care nurses to function at a specialist level of practice should be provided at a post-registration level and conducted by a higher education provider (for example, a university or equivalent provider).

3. The curricula of critical care nursing post-registration courses must provide an appropriate mix of theoretical and clinical experience, to prepare nurses to meet the challenges of clinical practice effectively.

4. WFCCN recommends that national critical care nursing associations establish agreed Standards for Specialist Critical Care Nursing to be

utilised as a framework for both critical care curriculum development and assessment of clinical practice.

5. Post-registration courses for critical care nurses must provide a balance between clinically oriented content and broader generic content that enables the specialist nurse to contribute to the profession through processes such as research, practice development and leadership.

6. Close collaboration between the health care and higher education sectors is important, in order that post-registration critical care nursing education be provided at a standard that meets the expectations of both sectors.

7. Graduates of post-registration courses in critical care must be able to demonstrate clinical competence as well as a sound theoretical knowledge base. A strong emphasis on the application of theory to practice, and the assessment of clinical competence, should be an integral component of post-registration critical care courses.

8. The provision of appropriate clinical experience to facilitate the development of clinical competence should be a collaborative responsibility between education and health care providers. Critical care nursing students should have access to support and guidance from appropriately experienced staff such as clinical teachers and nurse preceptors.

9. Clinical teachers and nurse preceptors for post-registration critical care nursing students should be appropriately supported in their role by both education and health care providers.

10. Critical care education providers should have in place policies and processes for recognition of prior learning and alternative entry pathways into formal post-registration specialist courses, in order to create a more flexible yet consistent means for students to attain recognition of competence.

11. Health care and higher education providers need to establish strategies to help reduce the financial burden faced by nurses undertaking post-registration critical care courses.

12. Education providers must implement educational strategies to facilitate access to post-registration courses for critical care nurses from a range of geographical locations.

13. Innovative strategies need to be implemented to address the deficit of qualified critical care nurses, rather than resorting to short training courses to resolve the problem. Such strategies could include comprehensive critical care workforce planning, innovative retention strategies, refresher 'training', professional development programs and the provision of greater support for nurses undertaking post-registration critical care courses.

14. Providers of short critical care training courses should seek credit transfer (recognition of prior learning) within the higher education sector for nurses completing these courses.

Ref:

Australian College of Critical Care Nurses, Critical Care Nursing Education Advisory Committee, Position Statement on postgraduate critical care nursing education – October 1999. Aust. Critical Care, 1999 (vol 12, No 4. p160-164

World Federation of Societies of Intensive and Critical Care Medicine. Declaration of Madrid on the preparation of Critical Care Nurses. Aust. Critical Care 1993 vol 6 No 2 p.24.

International Nursing Council. The Global Shortage of Registered Nurses: An Overview of Issues and Actions (and accompanying Issues Papers) www.icn.ch/global/#3

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Appendix 11

Changes made to the questionnaire after Pilot Study

The changes made to the questionnaire suggested by the pilot respondents were as follows:

Front page/Instructions

Replace "place an X" with "place a tick".

Section 1

Q. 1.2 Add an option to include institutions that have both private and public areas in one institution.

Section 2

Q. 2.1 Definition of an ICU elaborated to be clearer.

Q. 2.2 Definition of a HCU elaborated to be clearer, and the concept of a specialized/single organ support unit added to the HCU definition.

Q. 2.4 Definition of a Closed Unit redefined for clarity.

Q. 2.5 Definitions of the beds were rewritten to be clearer.

Q. 2.6 Start and end dates added to the year period, viz. 1 January to 31 December 2004.

Q. 2.6.2 Change the age of Paediatric patients from "birth to 14 years" to "1 month to 14 years".

Q. 2.7 Cardiac changed to cardiology.

Gynaecology added to the General Surgery category.

An additional category of "other" added to allow for conditions not included in the previous categories.

The categories pf patient conditions were further divided into 3 categories to separate out the adult, paediatric and neonatal admissions.

Q.2.8 The question was rephrased to clarify the assessment of patients according to their severity of illness score.

A repetitive question regarding patient admissions was removed.

Q. 2.11 Question regarding the 24 hour presence of the doctor for the unit clarified.

Q. 2.13 Define "intensivist".

Q. 2.14 added to determine speciality of non-intensivist unit directors.

Q. 2.15 Rephrase from "on call 24 hours" to available daily.

Q. 2.18 Change the term "interventions" to facilities".

Clarify "cardiac monitoring" – changed to continuous ECG monitoring.

Non-invasive and invasive cardiovascular monitoring added.

Renal Replacement Therapy specified to include haemodialysis and CVVHD.

Enteral feeding removed.

Q. 19 added to determine the number of patients discharged alive from the unit or had died in the unit.

Q. 2.21 "Nurse: patient" ratio added to the question to clarify the ratio required.

Q. 2.26 ICU trained RNs (CCNs) were differentiated from non-ICU trained RNs more clearly.

Q. 2.29 "how many additional agency nurses required" changed to "the average number of agency nurses required per month to cover the shifts" to clarify the question. Dates specified for the year period. Further detail regarding night and day shifts not requested.

Q. 2.30 Number of nurses that worked overtime shifts changed to the number of overtime shifts worked per month by the institution's nursing staff.

Q. 2.32 Clinical teacher changed to "dedicated clinical teacher" (for the unit).

Q. 2.34 Dates specified for the year period.
Q. 2.35 More than one response allowed – changed to "responses". "To the public sector" added as an option.
Q. 2.38 "or allowance added" (referring to the scarce skills allowance).

Section 3

Q. 3.1 Question elaborated to specify the two undergraduate courses.
Q. 3.2 Question elaborated to specify the three Post registration training courses, including Neonatal nursing.
Q. 3.3 Separate answer blocks added for each specific course, that is Adult, Paediatric and Neonatal, as well as part-time versus full-time and diploma versus certificate.
Q. 3.4 Separate answer blocks added for each course as above, with the three options of the course duration specified for each.
Q. 3.5 and Q. 3.6 Time period changed from "the end of 2004" to "during 2004".
Q. 3.7 Part-time and full-time added.
Q. 3.8 added to request data about clinical accompaniment provided by the tutor.

All of the above changes were made to the data collection tool, that is the questionnaire, prior to the administration of the questionnaire to the respondents, and this was stated in the text.