

**UNIVERSITY OF KWAZULU NATAL**

**A DESCRIPTIVE STUDY OF THE STRUCTURE AND PROCESS  
STANDARDS IN THE INTENSIVE CARE UNIT (ICU) AT THE  
UNIVERSITY CENTRAL HOSPITAL OF KIGALI (CHUK) IN  
RWANDA**

**BY**

**SHAHIDI TWAHIRWA TIMOTHEE**

**JULY, 2009**

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STANDARDS IN THE INTENSIVE CARE UNIT (ICU) AT THE  
UNIVERSITY CENTRAL HOSPITAL OF KIGALI (CHUK) IN  
RWANDA**

**A DISSERTATION SUBMITTED TO THE SCHOOL OF NURSING IN THE  
FACULTY OF HEALTH SCIENCES UNIVERSITY OF KWAZULU NATAL  
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DEGREE IN NURSING (NURSING MANAGEMENT)**

**BY**

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**JULY, 2009**

## DECLARATION

I, TIMOTHEE SHAHIDI TWAHIRWA, declare that this dissertation titled **"A descriptive study of the structure and process standards in an Intensive Care Unit (ICU) at University Central Hospital of Kigali (CHUK) in Kigali"** is my original work. It has never been submitted for any other purpose, or at any other university. Sources of information utilized in this work have been acknowledged in the reference list.

Signature: .....



Date: .....

14 Aug 2019



## **DEDICATION**

**This dissertation is dedicated to my wife Godelive Tuyisenge, and our six children Fidele Ntwali, Yannick Shyaka, Eric Ingabikwiye, Christian Shahidi, Aimee Isheja Shahidi and Bryan Nshuti Shahidi for their love, support and encouragement.**

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## **ABSTRACT**

### **Introduction**

Patient safety is fundamental to quality health and nursing care and the ongoing improvement of patient safety is one of the most urgent issues facing health care today. Quality health and nursing care is a process which can be monitored, but which requires ongoing evaluation and change.

The poor quality of patient care is a major problem of many hospitals in Rwanda and the University Central Hospital of Kigali, (CHUK), is no exception, especially in the Intensive Care Unit, (ICU). (Rwanda Ministry of Health Report, 2005).

### **Purpose of study**

The purpose of this study was to describe and explore the structure and processes of quality patient care at CHUK Intensive Care Unit, using the JFICM minimum standards, in order to improve the current quality of patient care and to further highlight gaps that might exist in this care for further research.

### **Methodology**

The research was conducted in the Intensive Care Unit at CHUK.

A checklist and self-reporting questionnaires, which were developed by the researcher, guided by the Joint Faculty of Intensive Care Medicine (2003), constituted the instrument for this study.

The sample consisted of 41 participants who were health care workers in the ICU and 20 of the patient's files. These files were used for researcher's observations during the period of data collection being 20<sup>th</sup> June to 20<sup>th</sup> July 2008. A descriptive quantitative design was used.

## **Results**

**Design:** While the ICU was in a self contained area with easy access to other departments the actual work environment did not comply with the recommendations of the JFICM (2003) minimum standards of ICU.

**ICU staffing:** The staff consisted of only 1 medical doctor consultant and three specialist anaesthetists. There were 11 Registered nurses (RNs) and 16 Enrolled nurses (ENs).

A physiotherapist and dietician were available, but there was no biomedical engineer.

The quantity of equipment was not adequate for the workload in the unit. There were no guidelines or protocols for nursing care and the unit had neither in-service training programmes nor research programmes available to the medical and nursing staff.

While vital signs, ECG and oxygen were well monitored by using the nursing file (Appendix 10), the monitoring of patients was done without any guidelines or written procedures. The nursing reports, also, did not follow any guideline or procedure. Communications were generally poor because of the lack of equipment. The phone was not working for most of the time and there was no biotechnical engineer available to monitor the material and equipment.

## **Conclusion**

According to the analysis of the structure and process standard based on JFICM (2003), the minimum standard of quality of ICU patient care at CHUK needs to be improved because the unit does not comply with an appropriate design, fulfil the staffing and



operational requirements, or have the necessary equipment. Due to the shortage of qualified staff, plus the unavailability of protocols or guidelines, the processes of quality patient care were inadequate and need to be improved.

## **LIST OF ABBREVIATIONS**

ACS:	Acute Coronary Syndrome
BTC:	Belgium Technical Cooperation
CHUK:	University Central Hospital of Kigali
CTB:	Cooperation Technique Belge.
ECG:	Electrocardiograph
ETI:	Endotracheal Intubation
HHRP:	Health human resource planning
ICU:	Intensive Care Unit
ICCU:	Intensive Care Cardiac Unit
IPPV:	An invasive positive pressure
JFICM:	Joint Faculty of Intensive Care Medicine
KFH:	King Faysal Hospital
NHS:	National Health System
NIH:	National Institutes of Health
NIPPV:	Non-Invasive Positive Pressure Ventilation
SPSS:	Statistical Package for the Social Sciences
UK:	United Kingdom
USA:	United States of America
WFCCN:	World Federation of Critical Care Nurses
WHO:	World Health Organisation

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## **CHAPTER ONE: INTRODUCTION**

### **1.1 Background to the study**

Patient safety is fundamental to quality health and nursing care. Improving patient safety is one of the most urgent issues facing health care today. The focus on the quality and safety of health care in intensive care units (ICU) is increasing and calls for urgent attention (Early, Roberts, Golden, Chassin and Donaldson, 1999). Shannon, Patel, Cummins, Shannon, Ganguli and Lu (2006) stated that poor quality care is not only costly, but also causes human suffering because poor quality care results in an increase in morbidity and mortality.

Although quality is a process that can be managed, it still requires ongoing evaluation and change (McMillan and Robert, 2007). In the health care setting, quality is the first and most important thing that should be available to patients when they come for consultation or for hospitalisation (Garland in McMillan and Robert, 2007). According to Kunkel, Rosenqvist and Westerling (2007), the quality systems can help to manage change while still maintaining a high quality of care. Research done by Borgermans, Goderis, Ouwens, Wens, Heyrman and Grol (2008) in Belgium on diabetes care programmes, revealed that a high quality care programme was linked to quality indicators at the structure, process and outcome levels.

Quality is a reflection of the values and goals currently perceived in the health care system and in the larger society (Donabedian, 2005). The same author, in 1988, identified that overall quality in health should include three aspects: structures (inputs), processes and results (outcome). For each of these aspects, distinct instruments to assess and maintain quality are suggested. To measure the aspects of quality, literature suggests the use of indicators which are defined as measurable items and which are operationalised by using review criteria and standards (Campbell, Braspenning, Hutchinson and Marshall, 2003).

Curtis, et al. (2006) argues that in quality care improvement the structures, processes and clinical activities occurring in a critical care setting should be evaluated and considered for possible improvement initiatives.

Structure represents the first component of the quality of care and can be defined as the way we design, resource and organise the health facility or unit. Design includes how an Intensive Care Unit should be integrated within the hospital alongside other services and other departments such as the X-ray department, the Operating Theatre and the Emergency Department. Integration may also include the relationship of the hospital to other health care facilities to accommodate the referral system. To facilitate integration, the importance of clinical record systems cannot be over-emphasised in the support of rapid clinical decisions (Tackley, 2006). This is supported by Hansen et al. (2008) who suggest that information systems are able to provide an integrated view of all the data pertaining to a patient.

The structure standards are the standards which include the integration of ICU with other services or health systems, the ICU building design, its size, the number and qualifications of staff, its equipment and operational requirements. According to Gunning and Gillbe (2006), an ICU design includes the building and its layout, its size, patient area and bed space with a move towards 100% single bedded rooms. Storage areas, an isolation area/room, the flow of soiled linen and organic waste, an office space for designated health workers, a waiting room for visitors and grieving families and a seminar room all need to be taken into account.

These requirements are also used by the Joint Faculty of Intensive Care Medicine (JFICM) (2003) in their publication of minimum standards for Intensive Care Units. Robinson (1966), suggested that the total number of beds in the ICU must be limited and most units which fall within the real definition of intensive care have only between eight and twelve beds. The size of the building, the patient area or the working area, the bed space or number of beds, the placement of ICU material, the isolation room, office space or waiting rooms for visitors, the one way traffic for soiled linen, equipment or organic waste, an ICU laboratory, the sufficient space and equipment for training and education all have an effect on quality.

According to Bastos, Knaus and Zimmerman (1996) variation in these structural features can affect the quality of care and therefore the potential for recovery from critical illness

Designing an ICU depends on staffing requirements, the type and amount of technology and equipment available, operational tools such as policies and procedures and job descriptions of the ICU staff (Donabedian, 1988).

Gunning and Gillbe (2006) stated that quality care in an Intensive Care Unit should be delivered by appropriately and fully trained staff. To improve the quality of patient care in the ICU, human resources must be well planned (World Health Organisation, 2000). The ICU staffing should include a medical director trained in intensive care medicine, specialist doctors available to the unit and a number of registered nurses with the nurse in charge having been trained in Intensive Care nursing. There should be sufficient support staff, including, for example, a physiotherapist, a dietician, an infection control officer and a microbiologist specialist on an ad hoc basis.

Level III ICU equipment, as suggested in Donabedian (1988), should include a complex multi-system life support capable of providing mechanical ventilation, renal replacement therapy and intensive cardiovascular monitoring for a period of at least several days. The list also includes oxygen, medical air, ICU beds, infusions pumps and drugs, to name a few. Technology that is inadequate for an ICU's case-mix can adversely affect the outcome of patient care.

Nurses in ICU are predominantly directed by operational tools such as guidelines, protocols, policies, procedures and job descriptions to facilitate the quality of care they provide. Therefore it is important that the structure quality considers the availability of

these operational tools. These tools should be implemented by the unit manager together with the unit director to improve quality of care (Southeast Missouri Hospital-Nursing Units and Nurse Managers, 2009). These authors argued that the quality of patient care improved where a guideline and protocol of an infection control programme was implemented.

Process represents what we do or fail to do for patients, and includes the measures taken during patient care; for example, the monitoring of care, documentation, management, education, infection control, communication within the ICU and all other clinical activities. Process quality is ensured by the implementation of guidelines and protocols.

Outcomes standards represent the third component of the quality standards and refer to the results we achieve. These include the mortality rate, the morbidity rate, patient satisfaction, length of stay and patient readmission. Outcome quality is assessed by the use of specific indicators such as mortality prediction models, incidence of readmission, and post-admission morbidity. In an attempt to establish quality assessment, the outcomes of care in terms of recovery, restoration of function and of survival, has been frequently used as an indicator of the quality of health care. Nursing and Medical audits are used to continuously improve the processes and outcomes (Donabedian, 1988). Rello (2007, p. 199) maintains that “infection control results in improved outcomes such as reduced infection rate, increased case-specific patient survival, fewer complications and a reduction in hospitalized days”.

Woodhead, Welch, Harrison, Bellingan and Ayres (2006) on the other hand revealed that mortality is related to the time between hospital and ICU admissions, with a 46.3% mortality rate seen in those admitted to the ICU within 2 days of hospital admission, rising to 50.4% in those admitted between 2 and 7 days and 57.6% in those admitted later than 7 days after hospital admission. Despite the lower mortality associated with early ICU admission, overall mortality remains high in these patients.

Donabedian (1988), however, argues that many factors other than medical care may influence outcomes, and precautions must be taken to hold all significant factors other than health care constant if valid conclusions are to be drawn. In some cases long periods, perhaps decades, must elapse before relevant outcomes are manifest.

The Joint Faculty of Intensive Care Medicine (JFICM) (2003) developed minimum standards for quality patient care in ICU based on Doanbedian's classification. In addition, these standards are classified into three levels (level I, II, and level III) depending on the purpose of the ICU. The JFICM minimum standards will be discussed below under the headings of design, staffing, equipment, operational requirement, monitoring of patient and the monitoring of equipment for the ICU, level III and will be detailed in the conceptual framework.

According to Mathihva (2002), South Africa, as a middle income country in Africa, which is predominantly constituted by developing countries, is comparable to developed countries. In South Africa, the classification of ICU levels of care are determined in the same way as international classifications, but their numbering is in the other way round.

In the public sector, Level I academic ICUs are university affiliated tertiary referral hospitals run on a closed unit principle.

Level II units are those with a specific purpose, such as a coronary care unit or a neuro ICU.

Level III units are community hospital ICUs with limited invasive monitoring.

Level IV is high dependency units. South Africa has highly sophisticated equipment and can manage a wide spectrum of critical illness and disease processes. The units have dedicated medical director and 24-hour dedicated medical staff coverage in the form of specialists, residents and medical officers. A nurse to patient ratio of 1:1 is adhered to in some units, but in others this ratio is on a 1: 2 basis. There is a parallel private health care structure in South Africa catering for the small percentage of patients with medical insurance plans. This private health care sector runs profit-driven level II–IV ICUs that are staffed by non-intensivists.

Lipman, in South Africa, (2005), argues that the training of medical practitioners in the rest of Africa varies from country to country and in some places formal training for Intensive Care is limited, even lacking. Post registration Intensive Care Nurse Training is a one year certificate qualification run at Colleges of Nursing and universities as diplomas and degrees and is regulated by The South African Nursing Council Regulation R212. Formal training is even more limited for technologists wanting to work in Intensive Care (South African Nursing Council Regulation, 2009).



The shortage of highly skilled nurses has been documented in many countries around the world and is considered a factor influencing the quality of care (Williams, Donaldson and Watts, 1997; Scholes and Albarran, 2005). Williams, Chaboyer, and Thornsteindottir, et al. (2001) studied critical care nursing organizations in 23 countries and found that staffing levels and working conditions were the two most important issues and priorities facing critical care nursing. Similar findings were reported in Rwanda, a post conflict and war country. Many doctors and nurses died in the war and genocide of 1994 and others left the country.

The shortage of qualified medical and nursing personnel, plus the lack of new material and equipment, was reported to be high in Rwanda as a whole, but also at the ICU at CHUK in particular (Rwanda Ministry of Health Report, 2005).

According to Kristina, Damon, and Neill (2009), participation in pay-for-performance programmes is a potential opportunity for intensivists and ICU teams to improve outcomes for their patients. This could be achieved in partnership with regulatory agencies and healthcare funders. These authors argued that the improvement of ICU quality of care should include a centres of excellence approach whereby patients could be referred to centres with excellent outcomes, the public reporting of ICU outcomes and payments to hospitals participating in quality improvement programmes (Kristina, et al., 2009).

Because many aspects of these programmes in ICUs are yet to be tested, robust evaluations of their effect on healthcare quality should be integrated into any implementations.

To date, the available literature on ICU standards seems to focus on outcome standards while articles on structure and process standards are old and outdated.

For example, Anderson's (1966) findings about "The use of an anaesthetic simulator to assess single-use laryngoscopy equipment" dated from 1964 and 1966 and Donabedian's study, "Evaluating Quality in Medical Care", quoted authors from 1950-1966 (Donabedian, 2005).

Nurses and medical researchers also tend to focus on outcomes, i.e. the effect of nursing and medical treatments to the patient, rather than looking at structure and process. Furthermore, most of the studies were conducted in developed countries, with very little attention given to developing countries like Rwanda. In Rwanda, the Nursing Schools for higher education began only after the war and genocide of 1994 which aggravated the situation in number of qualified nurses (Rwanda Ministry of Health Report, 2005).

In 2003, however, an accreditation process had been initiated at CHUK which is on target for the training of qualified medical and nursing staff, the allocation of new equipment to the unit and standards for the implementation of quality patient care (CHUK annual report, 2007).

Improvement in the quality of health care and intensive care has become a national and international policy issue. This includes the health facilities in Rwanda, and Kigali Central Hospital, in particular, as a level III referral hospital for the whole country. According to Donabedian (2005), practice patterns and the quality of care vary widely

from place to place and health care providers are becoming increasingly interested in having objective information about their performance. In addition, publicly reported measures of quality of care should be readily available for patients and purchasers who are more aware of their rights and who want to know more about the quality of care available to them (Donabedian, 2005).

In this study, only the structure and process components of the standards of quality patient care will be looked into using the JFICM (2003) minimum ICU standards, with the aim of investigating quality patient care in the context of the ICU at CHUK.

## **1.2 Study context**

The study was conducted in the Intensive Care Unit (ICU) at the Central University Hospital of Kigali (CHUK) in Rwanda. CHUK is situated in Kigali, the capital city of Rwanda. The hospital serves a population of approximately 1,000,000 inhabitants within the city and approximately 789,330 inhabitants of the rural areas around the city (Rwanda National Population and Housing, 2002). CHUK serves as a referral hospital for other hospitals in the country, for hospitalisation and ambulatory consultation (Rwanda National Population and Housing, 2002).

CHUK has been classified as a level III hospital because of its status as a referral university teaching hospital and is thus expected to accommodate patients referred from lower level facilities (Rwanda Ministry of Health Report, 2005).

For the purpose of this study the JFICM (2003) minimum standards of ICU level III will be applied.

The ICU at CHUK, which is equipped for critically ill patients, is divided into three blocks. The unit admits both male and female patients, adults or children, who suffer from a variety of critical illnesses. The first block contains four beds the second has three beds and the third block is an isolation room with only two beds (CHUK Monthly Report, 2007).

### **1.3 Problem statement**

The poor quality of patient care is a major problem of many hospitals in Rwanda and CHUK is no exception, especially in the ICU (Rwanda Ministry of Health Report, 2005). This, according to Shannon et al. (2006), is not only costly, but also causes human suffering, which may lead to an increase in morbidity and mortality.

The ICU statistics at the Central Hospital University of Kigali show that, in the period of 12 months from January to December 2007, out of an average of 34 admissions, 12.25% deaths were registered.

In a study done by the researcher in 2007 in the ICU at CHUK; the findings indicated that out of 100% (n=128) files reviewed in the ICU from January to March 2007, 2.3% patients were readmitted, the average length of stay was 9 days, with the shortest length of stay of 1 day and the longest length of stay of 30 days (CHUK annual report (2007)).

This suggested that a need to explore further the quality of patient care at this hospital, because of these results about ICU patient's outcome.

Owing to the fact that every country, hospital, unit, nurse, and patient is different, it may seem at first glance impossible to establish guidelines on workforce and education standards that are applicable across the board.

In spite of the difficulty of this task, one of the early expectations of the World Federation of Critical Care Nurses (WFCCN) was to develop practice guidelines to assist member associations to set standards of practice in their respective countries (Williams, Schmollgruber and Alberto, 2006). In support of this initiative, Campbell, et al. (2003, p.816), argues, "Care rarely meets absolute standards and standards have to be set according to local context and patient circumstances".

In the light of Rwanda being a post-conflict country, further compounded by limited resources, it is important to analyse the structure and processes of quality patient care to identify the minimum standards in ICUs that may ultimately improve indicators such as morbidity and mortality rates, length of stay and readmission rates.

#### **1.4 Purpose of the study**

The purpose of this study was to describe the structure and process standards in order to establish the baseline in the ICU at CHUK and to highlight gaps in the current quality patient care for further improvement.

## **1.5 Objectives of study**

The study objectives were to:

- Determine the current structures contributing to the quality care in the ICU at CHUK.
- Explore the processes standard in place for the implementation of quality patient care in ICU at the CHUK.

## **1.6 Research questions**

The study will seek to answer following research questions:

- What are the current structures of quality patient care in ICU at CHUK?
- What are the processes of quality patient care in ICU at CHUK?

## **1.7 Operational definition of concepts**

The following are the key concepts, which have been defined to indicate their meaning in the context of this study.

### **1.7.1 Quality**

Quality refers to the attributes and characteristics of excellence. These features of excellence are, however, perceived differently by the respective role players in

accordance with their different expectations concerning excellence in nursing (Muller, 2005, p.199). Quality represents how well the work is done in the ICU, in terms of structure (inputs) and process. The outcomes will not be covered in this study.

### **1.7.2 Quality patient care**

According to the definition suggested by the University of California, San Francisco (UCSF) Medical Center and UCSF Children's Hospital (2009), quality patient care can be defined as, to continually refine the care provided to the patient, monitor and measure the treatments the patients received, and evaluate the performance. It's the good care and outcome, outstanding patient safety, excellent service and patient satisfaction. In this study quality patient care is the satisfaction of the needs of both patients and staff during the administration of care, working in a team and doing what's right for the patient. Staff must be properly trained to satisfy the requirements of quality patient standards.

### **1.7.3 Standards**

A standard is a written description or statement of the expected level of performance with reference to structure, process and outcome (Booyens, 2005, p. 606). In this study, the standards are written statements of the expected level of performance required for all nurses and doctors and other health workers working in the ICU and those standards can also guide visits within the ICU. The Biot Report (2005) also defines a standard as a statement of expectations that defines a hospital's capacity to perform processes well and

achieve desired outcomes. A standard may be used as a criterion or acknowledged measure of comparison for quantitative or qualitative value. The description of those standards should refer to structure, process, and outcome intended in that organization.

#### **1.7.4 Structure standards**

Structure is the way in which the parts of something are connected together, arranged or organized (Hornby, 2005, p.1468). In this study the structure of ICU includes the ICU design and how it integrates with other departments and health care systems. It includes the building, the bed space, the ICU environment and the special equipment necessary to high care. It also includes medical and nursing staff with the required qualifications as indicated in the JFICM (2003) minimum standards, the ICU's operational requirements, definitions of nurse to patient ratios and formal guidelines and protocols to be followed.

According to Spath (2008), "Structure" in health care delivery refers to the way a health care entity organizes itself and sets up operations.

In this context, the structure standard refers to the structure as described in the JFICM (2003) on the "Minimum standards for an ICU". In this study, the structure standards will be based on the ICU design, the staffing requirements, ICU operational requirements and the equipment requirements.



### **1.7.5 Process standards**

A process is a step by step working activity to achieve a particular result, a method of doing or making something especially one that is used in natural changes (Hornby, 2005, p.1157).

According to the Biot Report (2005), a process measure is related to an interrelated series of activities, actions, events, mechanisms, or steps that transforms structures (inputs) into processes (outputs) for a customer.

Spath (2008), states that the processes refer to specific interventions performed by health care professionals.

Other examples of processes related to continuity of care are transfer of communication among a multidisciplinary team, patient assessment and the development of a discharge plan.

Process in this study, however, is how nurses assess the implementation of nursing care plans, the monitoring of patients, the documentation of nursing care according to specific guidelines and protocols, management, education and communication. In this study, the standards set according to the process guidelines described in the JFICM (2003) minimum standards for an ICU were used as indicators.

Once standards or norms are properly implemented in the ICU, it should improve the quality of patient care and then serve as a model to other units in the hospital and other local hospitals who should, hopefully, emulate what the ICU has applied.

There are no published studies on the standards of quality patient care or on the gaps existing in the implementation of quality patient care in ICU at CHUK. This report will be documented and distributed to those to whom the report concerns. The researcher hopes that the findings of this study will influence policy makers to change policies with regard to quality improvement in Rwandan health care settings. This study will highlight gaps that need to be addressed, and will recommend possible solutions.

It is hoped that the study will identify education and training gaps that can be filled by nursing education institutions and continuing education initiatives in health services. This study focuses on structures and processes and can form the baseline for future studies in the country for outcomes research.

### **1.9 Conceptual framework**

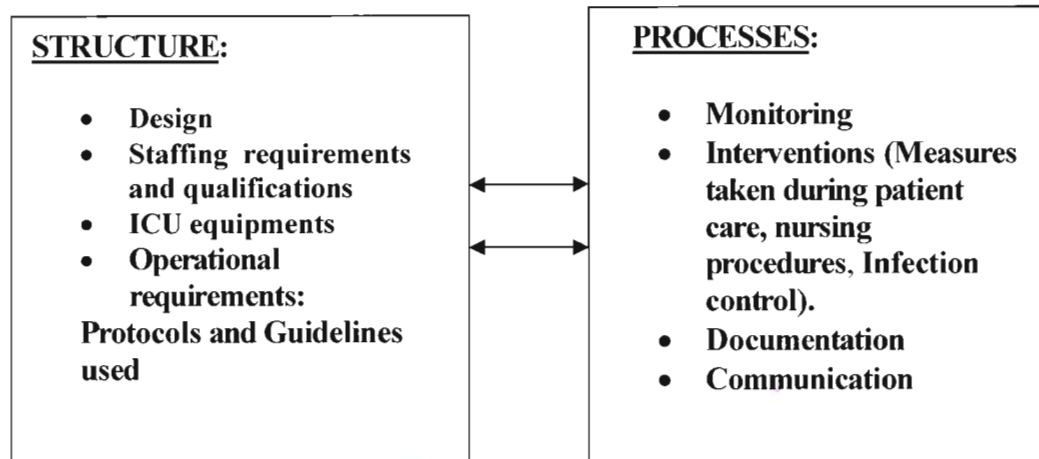
This study utilised the conceptual framework leading to the quality improvement programmes that utilise the conceptual framework developed by Donabedian (1980-1988) with its three components, structure, process and outcome. Donabedian's structure, process and outcome model and continuous quality improvement frameworks (1980-1988), posits that elements of quality care can be viewed in three major categories:

structure which means the physical and organizational work settings (e.g., hospital facility, staffing ratios); process of care which means the set of activities that occur within and between staff and patients (e.g., giving aspirin to a patient with coronary artery disease); and outcome which means change in a patient's current and future health status due to earlier health care (e.g., death, medical complications, health-related quality of life). Each of these three elements has strengths and weaknesses. Structure has an effect on quality, but is a more distal measure. Process measures have face validity to clinicians since they are often under the providers' control. Presumably process affects outcome. Outcomes have logic as quality measures because they represent the actual living state of the patient, but they are also affected by factors beyond the quality of care.

For the purpose of this study, only the two classic quality care components of structure and process standards were considered in exploring the quality patient care in the ICU at CHUK. These concepts (structure and process) provide a useful framework for determining the current standard of quality patient care in the ICU and can establish a baseline for future research in Rwanda. Campbell, et al. (2003) recommends that indicators to measure quality should be used. Indicators actively and retrospectively measure elements of practice performance of which there is evidence or consensus that it can be used to assess quality of care provided and therefore can change in the event of quality improvement. Such indicators must be acceptable, feasible, reliable and sensitive to change. Indicators are operationalised by using standards. Hence, this study uses the JFICM minimum standards as indicators for quality since these standards were developed by consensus.

For the purpose of this study, only the structure and process will be considered.

**Figure representing the conceptual framework**



**Fig 1.1: Conceptual framework adopted from Donabedian’s conceptual frameworks (1980-1988) using JFCIM (2003) minimum standards.**

**1.10 Conclusion**

In this chapter, the background of the study, the problem statement, the objectives, the purpose of the study and the research objectives have been presented.

The significance of the study, the operational definition of concepts and the conceptual framework have also been presented. The literature review will follow in Chapter Two.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

This chapter will cover the topics that deal with the factors that influence quality care in the ICU. Articles were selected from a variety of sources, including information from countries like Australia, the United Kingdom (UK), the United States of American (USA), and Canada. Health databases such as Eric, Cinhal, Medline, Science Direction, WHO, Google Scholar for the Academic Search and others like Oxford University Press have been used.

The ICU is a sensitive department of a hospital, which is specifically equipped for critically ill patients. It is important that the nurses, doctors, and other specialists who visit the ICU give the utmost care as they handle the patient. This chapter deals with the basic activities that should be carried out in the ICU and these are referred as norms or standards. A norm is a situation or a pattern of behaviour that is usual or expected. Norms are therefore standards of behaviour that are typical of, or accepted within a particular group or society (Hornby, 2005, p.995). Standards are either written or verbal, and are important in the ICU.

Standards serve as guidelines to the ICU staff in terms of the manner in which nurses, doctors and others professional team must deal with the patients and conduct themselves while in the ICU.

Because of the nature of the critical condition of its patients and the specialized care they require, discrepancies between the real and the ideal situation will provide an answer for why certain phenomenon e.g. increased morbidity, mortality, and length of stay is on the increase or decrease (Weller, 2005, p.256).

## **2.2 Quality of patient care concept**

According to Feld (2007), quality patient care, as defined by the Institute of Medicine, “is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.” Quality of Medical Care should be defined specifically to include all the elements of quality care. Continuous quality improvement means improving the processes used in fulfilling each element of quality care.

The elements of quality care include recognizing the patients at risk for diseases, doing the appropriate evaluation, making the appropriate diagnosis, starting the appropriate treatment, scheduling the appropriate follow-up and stimulating the appropriate compliance/adherence to treatment. The goal is to decrease the complication rate, morbidity, mortality and cost of care. According to Nurse Staffing and Quality of Patient Care Research (2007), nurse patient ratios and nurse work hours were associated with patient outcomes in acute care hospitals, factors that influence nurse staffing policies and nurse staffing strategies that improved patient outcomes. The results were that higher registered nurse staffing was associated with less hospital-related mortality, failure to rescue, cardiac arrest, hospital acquired pneumonia and other adverse events. The effect

of increased registered nurse staffing on patients' safety was strong and consistent in intensive care units and in surgical patients. Greater registered nurse hours spent on direct patient care were associated with decreased risk of hospital-related death and shorter lengths of stay.

### **2.3 ICU Structure**

The structure represents the first component of the quality of care and can be defined as the way we provide for care. Sources of structural variation include how the ICU is integrated into the hospital or health care system, the size of the ICU, whether the unit is open or closed, the type and amount of technology available and the number, roles and responsibilities of the ICU staff (Pronovost, Angus and Dorman, 2002). In this study the structure is the requirements of ICU design, the staffing such as number and qualifications, the operational requirements such as guidelines and protocols and the ICU equipment. It includes also the integration of ICU into other services such as the X-Ray Department, the Emergency Department, the Operating Theatre and other services in order to facilitate the transfer or discharge of patients.

The structure standards were based on the main points which are developed in the concept framework being the ICU design, staffing requirements and training, ICU equipment and operational requirements and the protocols and guidelines used.

### **2.3.1 ICU Design**

Designing an ICU is an important issue because the environment in which a patient receives treatment will have a good or bad impact on the future of that patient. According to the Joint Faculty of Intensive Care Medicine (2003), the ICU design should provide a suitable environment with adequate space for patient care, delivery, storage of equipment, staff accommodation (including office space), education and research and family support. As showed in JFICM (2003) minimum standards, the generic requirements for an Intensive Care Unit should have at least 20m<sup>2</sup> floor areas for each bed space in the adult section and 20m<sup>2</sup> in the paediatric unit when utilising cots rather than beds. The working area must include adequate space for staff to work in comfort while maintaining visual contact with the patient and must allow adequate space for patient monitoring.

The unit needs space for resuscitation equipment such as monitors and aspirators, a mobile x-ray, and associated equipment. There must be space for ventilators, infusion pumps and syringes, dialysis equipment, disposables, fluids, drip stands, trolleys, blood warmers, suction apparatus, linen and large items of special equipment.

The environment should have air conditioning, which allows control of temperature, humidity and air change. In addition, the ICU must have an isolation area capable of isolation procedures.

There must be areas for cleaning appliances, urine testing and provision must be made for appropriate movement pathways for contaminated equipment.



Hasin, et al. (2005) indicates that the desired ICU structure of the intermediate cardiac unit and their relations to the other facilities in the hospital includes specific recommendations for the minimal number of beds, monitoring systems, respirators, defibrillators, and necessary additional equipment. The optimum number of physicians, nurses, and other personnel working in the unit is also included in the recommendations. In addition, Brill, Spevetz and Branson, (2001) state that, ICUs consume an intense proportion of the hospital's resources because of their heterogeneous activities. The greatest challenge in provision of ICU care, however, is deciding who would and would not benefit from ICU and, thus, who should ideally be cared for in these resource-intensive facilities. These arguments are supported by Edbrooke, Ridley, Hibbert and Corcoran (2001).

The Joint Faculty of Intensive Care Medicine (2003) indicates that a Level III ICU should have at least six staffed and equipped beds to adequately discharge clinical, teaching and research commitments consistent with the functioning of an intensive care unit in a tertiary referral centre. Furthermore, there should be sufficient clinical workload and case mix of patients to maintain a high level of clinical expertise and to provide adequate clinical exposure and education of staff, including intensive care trainees if necessary.

Therefore the ICU should distinguish between the high and low-risk groups taking into account their widely differing characteristics such as age, nature of ICU admission, presence of chronic illness, ICU-specific procedure performed, and ICU and hospital outcomes. Most low-risk ICU monitored admissions, especially postoperative cases,

could safely be cared for in an extended recovery area (Zimmerman, Wagner, Knaus, Williams, Kolakowski and Draper, 1995).

### **2.3.2 Staffing requirements and training**

An ICU must have trained doctors and nurses with the level of knowledge to deal with any situation that arises with the critically ill patients in the ICU.

Hasin, et al. (2005), who published research on the intensive care cardiac units, argued that the intensive care cardiac unit should be staffed by at least one physician for every three to four patients. The director of the unit should be a board certified cardiologist, specially trained and accredited as an acute cardiac care specialist. Cardiologists are the physicians better trained to assist patients with Acute Coronary Syndrome (ACS) and life-threatening cardiac diseases.

As shown in JFICM (2003) ICU minimum standards, the ICU at CHUK should have: the Medical Director and the majority of senior staff, of Level III units and paediatric units, trained in intensive care medicine. All nurses involved in direct patient care should be registered nurses, and the nurse in charge should have a post registration qualification in intensive care, or in the specialities of the unit.

For the nursing staff, the patient ratio and the total number of nursing staff required by each unit depends on many variables such as a total number of patients, severity of illness of patients and the method of rostering nursing staff on eight or twelve hour shifts.

There should be a nurse to patient ratio of 1:1 for all critically ill or unstable patients. An artificially ventilated patient needs at least one nurse at the bedside at all times while ventilated patients with more complex support need two nurses per patient. Post-operative patients admitted with continuous epidural may require one nurse per 2-3 patients. A social worker should also be included in the ICU multidisciplinary team.

Other staff depends on the needs of the unit.

The ICU serves many purposes: post-operative care and the duplication of both a medical and a surgical intensive care unit. It also serves the patient requiring mechanical aid to support vital function until the disease process is arrested or ameliorated. If these factors are taken into account then the planning and control of such units becomes much simpler (Robinson, 1966). All ICU staff must have undergone specialised training in the critical care of critically ill patients and must be trained to respond to life-threatening situations such as respiratory or cardiac emergencies (JFICM, 2003).

Michael, Brian, Martin, et al. (2004), examining whether a supplemental remote intensive care unit (ICU) care program, implemented by an integrated delivery network using a commercial telemedicine and information technology system, can improve clinical and economic performance across multiple ICUs, concluded that the addition of a supplemental, telemedicine-based, remote intensivist program was associated with improved clinical outcomes and hospital financial performance. A shortage of intensivists represents the major obstacle to widespread adoption of this care model. According to Hasin, et al. (2005), updated comprehensive recommendations concerning the structure,

organisation, and function of the modern Intensive Care Cardiac Units (ICCU) and Intermediate Cardiac Units are essential.

The number of older and sicker patients requiring prolonged and more complex intensive care are both reasons why specially trained cardiologists and cardiac nurses, who can manage patients with acute cardiac conditions, should staff the ICUs. Boldt (2002) argues that a malfunctioning monitor and the wrongly trained intensivist may be a greater risk for the patient than his/her original problem.

### **2.3.3 ICU equipment**

In the evolution of technology in medicine, the treatment of patients is improving.

Because ICU deals with critically ill patients, there needs to be particular concern about proper equipment and their regular monitoring. According to Boldt (2002), manufacturers of more sophisticated ICU equipment, such as mechanical ventilators and patient monitoring devices, should provide clinical training for all staff involved in ICU treatment when the device is purchased. The use of high-technology based strategies enhances patient safety and improves patient outcomes even though they may compromise the dignity of a patient. As showed in JFICM (2003) minimum standards, the generic requirements for an Intensive Care unit suggested that the quantity of equipment will vary with the type of level, size and function of the unit and must be appropriate to the workload of the unit, judged by contemporary standards.

Basic equipment that must be in the unit should include a ventilator, suction apparatus, airway access equipment, vascular access equipment, bronchoscopy equipment, monitoring equipment, equipment for the control of patients' temperatures, chest drainage equipment, infusion and specialised pumps and beds. There must be a regular system in place for checking the safety of all equipment.

Boldt (2002), stated that one of the problems in managing the ICU patient is whether a specific monitoring technique has an impact on patient outcome.

ECG, oximetry or other well established monitoring techniques have been proven in large trials to have an impact on patient outcome but, interestingly, it has never been shown that a specific hemodynamic monitoring technique improves the outcome. There is the risk that all these techniques may delay or prolong what could otherwise have been a quick, simple, and safe procedure, and they may render the procedure much more expensive.

The same author Boldt (2002), added that modern technology has provided a large number of sophisticated monitors and therapeutic instruments, particularly in the past decade. Most of these techniques have enhanced the understanding of the mechanism of the patient's condition and have helped to guide appropriate therapeutic interventions. The most important aspect in monitoring the critically ill patient is the detection of life-threatening derangements of vital functions.

According to JFIM (2003), ICU equipment and their monitoring must be suitable for the function of the unit, and appropriate as judged by contemporary standards and should be strictly controlled by the biotechnical engineers.

#### **2.3.4 Operational requirements**

In the operational requirement we have the policies, procedures and management issues.

There should be defined roles for the nurse in charge as well as the registered nurses.

There should be written criteria and procedures for the admission and and discharge of patients and these must be clearly defined.

Policies and procedures must be available in the ICU and known to every body that has opportunities to admit or transfer the patient from ICU to ward or from ward to ICU.

The ICU policies must be clearly defined because of high dependency of critical ill ICU patients and the cost of ICU, which is high. Curran and Grounds (1998) argued that improper selection of patients for ICUs which then congests ICU beds often limits bed availability for those who would really benefit from it. This, in turn, adversely affects the dynamics of the whole hospital.

The operational requirements will look at the protocols, guidelines, and other necessary procedures which can guide workers in implementing their everyday tasks.

#### **2.3.4.1 Protocols and guidelines used**

A protocol is a convention or standard that controls or enables connection and communication. The admission or discharge protocols of patients in the ICU should follow clear written protocols and these must be readily available to the staff working in the unit so they can be correctly implemented. Curran and Grounds (1998) argue that identifying patients who are unlikely to benefit from ICU care before ICU admission could have avoided some futile admissions.

On the other hand, it is well accepted that early appropriate referral of patients to an ICU can significantly reduce early, and possibly late, mortality in the critically ill. The two authors also comment that necessary surgeries being delayed may adversely affect the patients' health, besides exposing them to the risk of hospital-acquired infections due to their prolonged hospital stay. This suboptimal utilisation of beds is an avoidable drain on the hospital's resources

#### **2.3.4.2 Necessary guidelines for referring patients**

The referral system may be of importance in the quality patient care if done in time. Manthous, Amoateng-Adjepong, Kharrat, et al. (1997) argued that, there is increasingly strong evidence that 'closed' ICUs, staffed by intensivists, provide better outcomes for patients. This has been confirmed by Hanson, Deutschman, Anderson, et al. (2007) in their study about effects of an organized critical care service on outcomes and resource utilization: a cohort study. High quality and cost effective performance can best be

achieved when responsibility and management are given to those who have the special expertise. Critical care medicine can be more efficient when experts, especially competent in critical care (i.e. “intensivists”), are involved in the treatment.

### **2.3.5 Structure standards indicators**

#### **Design**

The ICU must be fully integrated into other departments and health systems.

There must be specific policies for admissions and the transfer of ICU patients which must be written and available to the health care workers.

It is important that nursing care plans always be documented and available for consultation.

Nursing duties reports must also always be documented. The ICU must have 24 hours access to the tertiary imaging services (X-ray, Operating Theatre, Education, etc.).

#### **Staffing**

There must be a dedicated, 24 hour Medical Director who is trained in intensive care medicine as well as a dedicated, 24 hours, Medical Intensivist and Anaesthetist. The nurse in charge must have a post registration qualification in intensive care and there must be at least one nurse educator in the unit. A physiotherapist, dietician and biomedical engineer, all specialists in their fields must be available to the medical staff as well as consultants and specialist doctors. There must be a specific cleric, and social worker dedicated to the unit. Secretarial support and cleaners, must also be available.



## **Equipment**

There must be a piped gas failure alarm and oxygen failure alarm, an oxygen analyser to measure the oxygen concentration delivered by the ventilators or breathing systems.

There must be an alarm on the breathing system to indicate disconnection or ventilator failure.

There must be a humidifier and a cardiac monitor which continually displays electrocardiographs. The list is long.

## **Operational requirements**

These include an isolation policy and procedure, the role of the nurse in charge to be clearly defined and in writing, outlining a clear job description and a written policy supporting the nurse/patient ratio of 1:1.

### **2.4 ICU Monitoring: Process**

The processes represent the second component of the quality of care standard and are generally based on what staff do, or fail to do for patients. Delivering high-quality care in the ICU requires the synchronous efforts of large numbers of clinical and nonclinical processes (McMillan and Robert, 2007).

Patient care that is well done encourages the patient to reintegrate in a normal life.

During patient care a number of adverse events such as accidents, misunderstandings, and confusions can occur and certain measures need to be taken to avoid these.

These can be administration of medicines, frequencies of nursing procedures, interactions of patient and nurse, helping the patient with good comfort and infection control. Good documentation and procedures can be used to guide the implementation of techniques. In this study, the process will look at the measures taken during the patient care, nursing procedures, infection control, documentation of nursing procedures, monitoring haemodynamics, urinary catheters, tracheotomies, head injuries and intubated patients. ICU communication between personnel and other multidisciplinary teams must make use of written policies to communicate the doctors' instructions or nursing reports. The unit phone can also be used in communicating with other services.

### **Monitoring**

Monitoring is a major part of the ICU standard because it includes the monitoring of the ICU patient and the monitoring of the ICU equipment. How should this monitoring of ICU patients be done? After admission, the patient is stabilized in his bed, haemodynamics are checked and all connections to the ICU machines are connected to the patient.

The nursing file is filled in by the nurse and the doctors complete the patient file in prescribing treatment. Now the monitoring will follow the doctors' prescriptions and the patient's needs. Secondly, the ICU equipment is monitored by nurses as well by ICU technicians who check that the equipment is in working order. According to Hasin, et al. (2005), the ICU monitoring standard of electrocardiographic, haemodynamic, and

respiratory assessment, will continue to be the basis of the Intensive Cardiac Care Unit (ICCU).

The process of measuring the quality of patient care in the ICU will deal with the measures taken during patient care which include nursing procedures, infection control, documentation of nursing procedures and monitoring.

This includes the monitoring of patient's hemodynamics, urinary catheters, intubated patients and patients with head injuries.

#### **2.4.1 Measures taken during patient care**

All procedures, including the use of equipment, patient positioning, special considerations, possible complications and documentation guidelines form the backbone of an efficient and successful ICU (Quattrin, Pecile, Conzuti, Majori, Brusaffero and Gisio group, 2004).

Nursing procedures are the main and most important points which help the patients to overcome illness.

Care given by the nurses includes admission of a new patient, administration of medicine, wound dressing, urinary catheter care, central line care, tracheotomy care and the feeding and comfort of the patients. Flynn and Ray (1987) suggested that the process of quality care follows the following steps: assessment, analysis of information collected during the assessment, planning to correct or maintain community health nursing practice, taking

Another important process of care focus for quality initiatives is the transfer of patients between the ICU and other parts of the hospital or between different clinicians within the ICU (McMillan and Robert, 2007). In the tracheotomy care, Shaha (1998) indicated that, to assure quality care include the washing hands, unlocking the inner cannula and removing it, gently scrubbing the inner cannula with a small bottle brush or pipe cleaner. In the nursing procedures, nurses have to follow written guidelines, which will be of reference if problems arise.

#### **2.4.2 Nursing procedures**

Nursing procedures include nursing care and documentation procedures. Jacquerye (1990), in the “Quality care in nursing: structure and process of nursing care”, argued that quality nursing care is essential in the intensive care unit environment. The unit must first recruit its nursing personnel and then, more importantly, maintain it. Without manpower, quality assurance obviously cannot survive. These require following the guidelines and protocols implemented in the hospital.

According to Maanen (2006), health care should not be identified with curative care only. It involves the prevention and promotion of people's state of health as well. Nurses have an important contribution to make in the promotion of health. The nursing profession has a responsibility to develop standards for the evaluation of the nurses' contribution to patient care. Uwe, Waheedullah, Frank, et al. (1998), argued that positioning the patient

in a coma in the ICU is one of the basic elements of good nursing care because it provides comfort to patients and helps to alleviate many of the health problems that bedridden patients in the ICU are likely to encounter. Such problems may relate to limited mobilisation, limited blood circulation, and the development of pressure sores, paralysis, respiratory problems and infection. These elements of good nursing are the protocols and guidelines of nursing processes, which nurses follow in the implementation of nursing care.

#### **2.4. 2.1 Enteral tube feeding**

Given the critical condition of patients in the ICU, enteral tube feeding is used to feed unconscious patients, patients who have paralysis of the oesophagus as well as those who have undergone surgery of the alimentary canal or have any other conditions that limit the intake of food. (Spain, 1999).

This is carried out by the nurses once the dietitian has prepared the food. According to Spain (1999), numerous factors may impede the delivery of enteral tube feedings in the ICU. Such factors include the failure of physicians to make timely orders of enteral tube feeding and the failure of nurses to execute the prescription and the interruption of the enteral feeding that is dependent on the patient's condition. Nurses should document the time of feeding as well as the amount, and also make remarks.

#### **2.4.2.2 Infection control**

Infection control is concerned with preventing the spread of infections within the health-care setting and is an essential part of the infrastructure of health care. Infection control concerns itself both with prevention such as hand hygiene/hand washing, cleaning/disinfection/sterilization, surveillance and with investigation and management of demonstrated or suspected spread of infection within a particular health-care setting (Wikipedia, the free encyclopedia, 2009). According to Eggimann and Petter (2001), the nosocomial infections (NIs) now concern 5 to 15% of hospitalized patients and can lead to complications in 25 to 33% of those patients admitted to ICUs. The most common causes are pneumonia related to mechanical ventilation, intra-abdominal infections following trauma or surgery, and bacteremia derived from intravascular devices.

This overview is targeted at ICU physicians to convince them that the principles of infection control in the ICU are based on simple concepts and that the application of preventive strategies should not be viewed as an administrative or constraining control of their activity but, rather, as basic measures that are easy to implement at the bedside.

Infection control is the standard established at either national or local level in the institution or the department to prevent patients from nosocomial infection (Quattrin, et al. 2004). Quattrin, et al. (2004), points out that the surveillance and control of nosocomial infections represents a key aspect for the good functioning of health care organisations. Owing to the fact that the ICU manages the critically ill patients, these

patients are more susceptible to infections, because the microbes in the ICU are often more resistant than those in other environments.

There is, therefore, the need for measures to be put in place to protect patients from these infections.

There are various methods of infection control that can be found in the ICU and some of these include hand washing, the wearing of gowns, sterilisation, disinfection, ventilation, and isolation. Nurses who practise infection control play an essential and evidence-based role for optimal infrastructure and essential activities of infection control and epidemiology programmes in hospitals. These are discussed below.

#### **2.4.2.3 Hand washing**

Hand washing is a technique of cleaning of hands for nurses, doctors and visitors before and after handling the patient. The importance of hand washing is to prevent micro-organisms transferring from the clinicians to patients.

The spread of many pathogens can be prevented with regular hand washing (Creedon, 2005). He states also that, for hand washing to be effective, health care workers should follow the ICU rules, meaning they should follow the pre-established ICU guidelines for infection control in the ICU. According to Creedon's guidelines, clinicians' hands should be washed with soap and water immediately after visiting the toilet as well as before and after the handling of food, patients or equipment. Hands should be washed using soap, a brush and running water and should always be done before coming into contact with a patient. Hands should be properly rinsed to remove all traces of soap and disinfectant.

#### **2.4.2.4 Waste disposal**

The disposal of infectious waste that has been contaminated with blood or other body fluids should be handled with heavy-duty gloves and placed in waste plastic bags marked “Infectious Waste”. Needles and other sharp contaminated objects are put in the “sharps containers”. All infectious containers are incinerated to prevent occupational hazards.

The patients in ICU should be washed in the morning before any other procedures are carried out after which all disposable materials, water and soiled bedding must be put in the sluice room for cleaning (Avila, 2004).

#### **2.4.2.5 Isolation**

Isolation is an act of separating or setting aside something or somebody from the public.

In a hospital ward, people with infectious diseases are isolated to prevent other patients from contracting their infections. Some of the patients that need isolation are patients with dialysis, patients with burns and patients with meningococcal meningitis or other highly infectious diseases. According to Cassidy (2006), nurses have a critical role in ensuring that the needs of patients in isolation are met. Such needs and demands include psychological demands, stresses and uncertainties. It is vital to make sure that these stresses are not exacerbated by nursing interventions, but are reduced to promote effective coping.



#### **2.4.2.6 Sterilization**

Sterilisation is the process of ensuring that all used materials, equipment, bed linen and other hospital appliances or substances are completely clean and free from bacteria. The aim of disinfection is to reduce the number of micro-organisms to a level below the dose that will cause infection in vulnerable people. Sterilisation is the chosen method of decontamination in situations when it is necessary to destroy all micro-organisms present, including spores (Gould, 2005).

In an ICU, it is necessary to sterilize all the surgical equipment, dressing materials and ventilator parts. All surgical and dressing instruments are first decontaminated in a highly active disinfectant for at least 10 minutes before they are washed in soapy water (ICU Protocol of Sterilisation CHUK, 2005).

#### **2.4.3 Documentation of nursing procedures**

Documentation is very important.

At the time of admission, the patient's file will include demographic details such as name, gender, religion, address, diagnosis, treatment, nursing procedures, monitoring of cardio respiratory results such as BP, pulse and breathing, insertion and removal date of urine catheter, wound aspects and the positioning of the patient. Avila (2004) states that the importance of documentation is to enable proper monitoring of the patient's condition, so that the medical staff know the evolution of the illness. It may serve as a legal document that can demonstrate how the patient was nursed. A nurse must ensure

that the patient is monitored and the findings recorded at stipulated intervals. This should be timeous, accurate, and legible.

Nursing procedures must be written down for administrative purposes and for good communication between members of nursing and medical teams. Previous studies have shown that nursing documentation is often deficient in its recording of pain assessment and treatment. According to Linda, Elaine, Bruce and Donna (2004), a descriptive study of 100 nursing personnel at a large Magnet hospital in Southwest Florida was conducted to assess their needs, preferences, and perceptions associated with the Electronic Health Record (EHR) documentation methods. Nurses' attitudes about the use of electronic health records and their perceived effects on patient care were assessed. The five-item, likert-type attitude scale explained 54% of the variance in attitude scores and demonstrated sound construct validity and internal consistency ( $r = 0.77$ ). More than one third, 36%, perceived that EHRs had resulted in a decreased workload. The majority of nurses, 64%, preferred bedside documentation but reported that environmental and system barriers often prevent EHR charting at the bedside.

Linda, Elaine, Bruce and Donna's (2004) results indicated that 75% of nurses thought EHRs had improved the quality of documentation and 76% believed electronic charting would lead to improved safety and patient care. Nurses with expertise in computer use, 80%, had a more favorable attitude toward EHRs than those with less expertise. These results have been used to implement clinical system changes and this demonstrates the importance of documentation in nursing care.

Ewa, and Anna (2002), reviewed nursing records involving 172 patients and 63 Registered Nurses from surgical wards in a central county hospital in Sweden for content and comprehensiveness based on regulations and guidelines for the postoperative pain management on the second postoperative day.

They used three different auditing instruments. The nurses were asked if the documentation concurred with current regulations and guidelines and about 73% of the nurses reported that the documentation did concur with current regulations and guidelines.

The results showed that pain assessment was based mainly on patients' self-report, but less than 10% of the records contained notes on systematic assessment with a pain assessment instrument. Pain location was documented in 50% of the records and pain character in 12%. Avila (2004), argues that documentation is very important in a clinical setting because it helps to make a study of previous cases in order to effectively manage them. A case in point is an administrative problem that may result in a patient's death or in the situation where there is a misunderstanding between nurses and doctors. In such a case, documented evidence may help explain whose fault it was and facilitate rectifying the situation. Monitoring the patient in the ward is done by recording vital signs, urine output, the evaluation of fluid intake, vomiting and the fluid-electrolyte balance.

#### **2.4.4 Communication**

Communication in the ICU is also very important because every thing done must be communicated, such as the transfer of the patient, the night shift report, the admission of new patient to name a few.

The referral protocol must be clear and available in the unit. The presence of the phone and other means of communication are important in the unit and hospital in the referral network. Pronovost, Berenholtz, Dorman, Lipsett, Simmonds and Haraden, (2005) stated that clear communication is imperative if teams in any organisation expect to make improvements. These authors confirm in the re-study that an estimated 85% of errors across industries result from communication failures (Pronovost, Berenholtz, Dorman, Lipsett, Simmonds and Haraden, 2005).

#### **2.4. 5 Monitoring of Patient**

Intensive care unit equipment includes patient monitoring, life support and emergency resuscitation devices and diagnostic devices. Intensive care units are equipped with many medical devices to monitor patients including heart monitors, pulse oximeters, and arterial lines.

Many patients in the ICU have catheters and chest tubes. Life support devices, such as ventilators, may be used in some ICU patients. The intensity of the care provided in ICU requires many monitoring devices. Patients in the ICU generally have many wires attached to them for various types of monitoring.

Monitors have alarms that notify members of the care team when a measurement is detected that is out of the acceptable range and the constant alarming of these can be frightening to patients and their families.

It is important to remember that this highly sophisticated equipment is designed to provide the best possible care (Monitoring ICU equipment, 2008). Zimmerman, et al. (1995), who based their study on 40 United States hospitals, suggested that if ICU low-risk monitor patients were admitted to an intermediate care unit; they would require less concentrated nursing care with a nurse to patient ratio of 1:3 or even 1:4, and limited technologic monitoring.

Another study of patients receiving neurological care at ICUs concluded that those, who only receive monitoring during their first ICU day and have a <10% predicted risk of active treatment, can safely be transferred to an IMCU (Zimmerman, Junker, Becker, Draper, Wagner and Knaus, 1998). Essouri, et al. (2006) states that patients with hypercapnic and hypoxemic respiratory failure and patients with neuromuscular disorders an improvement in patient's monitoring can contribute in reduction of length of stay and mortality in the ICU

#### **2.4.5.1 Monitoring of patient with head injury**

Patients, admitted to the ICU with head injuries, are usually in a critical condition and require particular nursing care and continuous monitoring of vitals signs (temperature, blood pressure, pulse, breathing and blood gas analysis). For such a patient, intravenous lines and surveillance of neurological signs are important aspects of nursing care. In the care of patients with head injuries, the evaluation of their status was done using the Glasgow Coma Scale (Woodrow, 2000).

Woodrow (2000) argues that head injuries cause a significant number of deaths and disabilities each year, many of these occurring in children, adolescents and young adults. Each year about 1.4 million people in the UK suffer head injuries, of whom 150,000 will be admitted to hospital. Most will be discharged within 48 hours.

The same author added also, that recovery from severe injury can take years and might never be complete. Only half of those patients with serious head injury return to work.

While some centres specialize in neurology, patients with head injuries are seen in most adult and paediatric departments and in most areas of nursing.

As the severity of head injuries can range from minor cases, which people do not consider serious enough to warrant a visit to the hospital, to major life-threatening and fatal damage nurses should be familiar with the principles behind medical treatments and, if they are not, they should seek further information about them from medical staff or texts.

#### **2.4.5.2 Monitoring of patients' haemodynamic**

Patients requiring intensive care usually require support for haemodynamic instability (hypertension/hypotension), airway or respiratory compromise (such as ventilator support), acute renal failure, potentially lethal cardiac dysrhythmias and frequently, the cumulative effects of multiple organ system failure

Patients admitted to the intensive care unit who do not require support for the above, are usually admitted for intensive/invasive monitoring, such as the crucial hours after major

disorders, chronic obstructive pulmonary disease, and respiratory distress in the immunocompromised patient, and where cardiologic pulmonary edema is present.

#### **2.4.5.3 Monitoring of Urinary catheter**

Nurses should regularly monitor the urinary catheter by checking the quantity and colour and they must write those results of their observations on the nursing care file dedicated to every patient. The urine balance must also be updated on the files after 24hours.

According to Kralik, Seymour, Eastwood and Koch (2007), urinary catheters, often referred to as Foley catheters, are inserted through the urethra into the bladder.

Once in the bladder, the catheter is kept in place by a balloon, which is inflated, at the end of the catheter. Urinary catheters continuously drain the bladder and allow for the accurate measurement of urinary output. This is extremely important in fluid management and in assessing kidney function. Adequate nursing care is indicated and should be documented.

Catheterisation may be considered for patients who have difficulty in the complete emptying of the bladder as a result of neurological disease or injury and those with bladder outlet obstructions. It also may be considered for patients with chronic urinary incontinence, where alternative methods are inappropriate or unsuccessful.

A long term catheter can be acceptable to people whose lives have been restricted by incontinence (Kralik, et al., 2007). Nurses can assist patients with the control of these

permanent devices as they can be very inconvenient to the patients and urinary tract infections, caused by urine catheters, are associated with increased mortality. This highlights the fact that urinary catheter care is a nursing procedure, the importance of which is sometimes overlooked (Marklew, 2004).

#### **2.4.5.4 Nursing care on intubated patients**

Because breathing is essential to life, nurses should always carefully observe the patient and the tube and make sure the airways are clear. The aspirator must be close to the patient. According to a study about non-invasive ventilation for acute exacerbations of chronic obstructive pulmonary disease, Brochard, Mancebo, Wysocki, et al. (1995), demonstrated that for patients with such conditions, non-invasive ventilation may be used in an attempt to avoid endotracheal intubation and the complications associated with mechanical ventilation.

Although endotracheal intubations and mechanical ventilation can be a life-saving procedure, the use of artificial airways may lead to infectious complications and injury to the trachea (Pingleton, 1988). As stated by Leger in Brochard, et al. (1995), non-invasive ventilation was introduced as an alternative approach that was developed to avoid these complications in patients with acute respiratory failure and is often used in cases of acute exacerbations of chronic obstructive pulmonary disease because these may be reversed rapidly. It seems also that the hypercapnic ventilatory failure that occurs in patients with this disorder, responds well to non-invasive ventilation. Because a patient is connected to the ventilator by an endotracheal tube, it is often necessary for the patient to be sedated



which may limit his or her ability to respond. This is necessary for the patient's comfort as well as enabling the ventilator to work effectively. As a patient's lungs recover, the amount of ventilator support is gradually decreased until it is felt a patient can breathe on his or her own, (Intensive Care Unit (ICU) equipment, tubes and catheters, life supportive devices, informed consent, 2008).

#### **2. 4. 6 Monitoring of ICU's equipment**

Patient and machine variables are monitored and their relative importance in the field are also explored by (McGuire, 2006). The alarm of the ventilator machine is extremely important and patient ventilation is one condition which a nurse must monitor very well in the ICU, because anything can happen, at any time, if nurses do not intervene in time. According to Walsh, Dodds and McArdle (2004), the process of weaning a patient off mechanical ventilation is central to the management of critically ill patients. Delayed or unnecessarily prolonged weaning increases the patient's length of stay in ICU, thus increasing the cost of ICU care and at the same time decreasing the availability of ICU beds which can adversely affect patient outcome.

In the study published by Walsh, et al. (2004), to evaluate the standard used to predict successful weaning from mechanical ventilation in intensive care patients, 325 subsequent admissions to the ICU were assessed. Of these, 97 % were mechanically ventilated on admission. Overall, 205 of the 308 ventilated patients (67%) achieved ventilator independence while the remaining 103 patients died or were transferred still

under ventilation to other ICUs. They concluded that a simple checklist can assist nurse assessment of suitability for weaning and could be used as a trigger to commence a weaning protocol.

#### **2.4.7 Process standards indicators**

##### **Monitoring**

Regular monitoring and assessment of the vital signs of the patient as scheduled on the nursing file,

Regular monitoring and assessment of the patient's BP

Monitoring of tracheotomy patients as scheduled on the nursing file.

Zeroing or calibrating the monitoring equipment.

##### **Interventions**

Dressing wounds, comforting and feeding patients etc.

##### **Infection control**

Protective masks must always be worn by nurses in the isolation room, when dressing wounds and monitoring the oxygen delivery through ABC (Air way, Breathing, and Circulation) There must be systematic sterilization of the ward after a patient's discharge.

### **Documentation**

The oxygen monitoring documentation, arterial blood pressure monitoring(BP) documentation, and respiration documentation must be assessed as scheduled on the nursing file.

### **Communication**

There should be written policies for transfer or admission of patients from other hospital levels (I and II).

A full report, following the guidelines, must be completed after the patient is discharged.

## **2.5 ICU standards or norms, protocols and guidelines**

All standards of practice provide a guide to the knowledge, skills, judgments and attitudes that are needed to practice safely. They reflect a desired and achievable level of performance against which the actual performance can be compared. Their main purpose is to promote, guide and direct professional nursing practices (Registered Nurses Association of British Columbia (2003) and the College of Nurses of Ontario (2002).

The general status of patient admission conditions the type of quality care and the type of ventilation and monitoring administered to the patient as nurses follow the established protocols and guidelines and also the doctors' prescriptions.

Roche, MacKinlay, McLaughlin, Panikkar and Young (2003), in the United Kingdom, conducted a study to assist progress towards the use of a protective ventilation strategy in

intensive care units. They devised a simple, robust audit method where the ventilation of patients at a district hospital was re-evaluated resulting in a significant improvement in ventilation practice at that hospital. They showed how, with the introduction of nurse-run protocols, this method can give a more uniform practice of ventilation in critical care units.

The protocols and guideline for the quality of patient care should be available in the unit to guide practitioners in the working procedures. According to the Standards for Health Promotion in Hospitals from WHO European Office for Integrated Health Care Services in the World Health Organisation (2004), the objective of these protocols and guidelines is to support patient treatment, improve prognosis and promote the general health and well-being of patients. To achieve this, the hospital must ensure the availability of protocols and procedures to assess specific needs of patients. Lemeshow, Teres, Klar, Avrunin, Gehlbach, and Rapoport (1993), suggest that implementing protocols to target ICU care for patients who are most likely to benefit from it may decrease the number of low-severity ICU admissions and thus improve the cost effectiveness of ICU care. Rapoport, Teres and Lemeshow (1996), suggested that in order of particularly early in ICU stay, was associated with a significant reduction in the use of resources.

According to Arabi, Venkatesh, Haddad, Malik and Shimemeri (2004), who published a paper on “The characteristics of very short stay ICU admissions and implications for optimising ICU resource utilization: the Saudi experience”, hospitals must draw up

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

This chapter will deal with the research approach which includes the design of the study, population, sampling technique, data collection procedure and ethical considerations and which is guided by the conceptual framework and objectives.

### **3.2 The research paradigm**

Evidence for a study in the positivist paradigm is gathered according to a specific plan, using formal instruments to collect the needed information (Polit and Beck, 2003, p.15). Positivism is a philosophical concept, and refers to a particular set of assumptions about the world and about appropriate ways of studying it.

Positivism predominates in science, and quantitatively measures independent facts about a single apprehensible reality. Data and its analysis are value-free and data does not change because it is under observation (Healy and Perry, 2000).

### **3.3 Approach**

The research approach used was an exploratory descriptive, using a prospective approach. The researcher collected information from the files of patients who were admitted to the unit during the period of data collection, 20th June to 20th July 2008.

The researcher collected information continuously every day.

### **3.4 Research design**

A quantitative approach was used in this study because the researcher described the structure and process of ICU to provide evidence to quality patient care. For this study, a non-experimental design was adopted (Polit and Hunger, 1993). A descriptive exploratory design was carried out to analyse the structure and processes of quality patient care in the ICU at CHUK. In a descriptive design, more information is required in a particular field through the provision of a picture of the phenomenon as it occurs naturally (Brink, 2006). A prospective descriptive design was used for the record review.

The consequences of an ICU without guidelines and protocols to help health workers was the researcher's main focus and also the hope that, by the implementation of such protocols and guidelines, there could be an improvement of ICU patient care in the future.

The researcher was motivated by the fact that no other research has been carried out in this domain at CHUK.

Hopefully, the findings will help as a guideline to implement the ICU standards in the future.

A questionnaire and checklist were used to gather the data.

### **3.5 Setting description**

The study was conducted in the Intensive Care Unit (ICU) at the University Central Hospital of Kigali (CHUK) in Rwanda. The ICU at CHUK, which is equipped for critically ill patients, is divided into three blocks.

The first block contains four equipped beds for patients, the second has three beds and the third block is an isolation room containing two beds. The unit admits both male and female patients, adults and children, suffering from different types of critical illnesses.

### **3.6 Population**

CHUK has only one ICU.

The study population comprised of 4 doctors, 27 nurses, 5 medical students and 5 student nurses who were working in the ICU during the period of data collection. Every body of my population were sampled even those that were on leave. The ICU has only 4 permanents doctors, 27 nurses; all filled out my questionnaire even those which were on leave were reached by the researcher.

The total population was forty-one health care workers (N=41) including;

- Doctors= 4, (3) specialist anaesthetists and (1) consultant intensivist
- Nurses=27, some enrolled nurses (ENs) and some registered nurses (RNs).
- Student-nurses= 5
- Medical-students= 5

### **3.7 Sample technique**

Two techniques were used: one for the participants and one for the records.

#### **Participants**

There were 41 participating health workers.

A non probability purposive sampling was used to use the total population in this study.

Due to limited numbers of health workers, the total population was sampled meaning that the sample of 41 participants included all the health care workers who were working in the ICU during the period of data collection, 20<sup>th</sup> June to 20 July 2008.

#### **Records**

The researcher consulted the files of twenty patients (20) in order to fill in the checklist during the data collection period. It was the total files, which were in the ICU at that period of data collection. The checklist comprised of data from patients' files and other observations concerning the structure and process in the ICU at CHUK.

### **3.8 Sampling technique**

A non-probability, purposive sampling technique was used.

In this study the researcher notes the limitation of a purposive sample in quantity, but took the whole personnel as sample. All doctors, medical-students nurses and student



nurses working in ICU at CHUK during the period of data collection constituted the study population so there was no exclusion criteria used.

All doctors, medical students, nurses and student nurses used the same questionnaire which was a simple description of what they observed in the unit and what they were using or needing during their practices.

All relevant documents, namely the nursing care files and monthly reports, were consulted by the researcher, as well as the patients' files during the period 20<sup>th</sup> June to 20<sup>th</sup> July 2008. The patients themselves were not involved in the study because of intensive care ethical procedures, which protect vulnerable patients who are unconscious or heavily sedated.

### **3.9 Data collection**

Data collection is the method of selecting participants and gathering data from them (Burns and Gove, 1997).

The researcher requested permission from the Ethics Committee of the School of Nursing at the University of KwaZulu-Natal first, and then from the Hospital Direction and Nursing Department at CHUK, before collecting data.

### **3.10 Data collection procedures**

The process of data collection included:

- collecting data from the participants and

- collecting data from the records

## **Participants**

The researcher made an appointment with hospital management to explain the process of data collection and the expectations requested of them.

After obtaining permission from the hospital administration and nursing department (Appendix 9) for collecting data, the researcher then delivered the questionnaires (Appendices (1) in English and (3) in French) to the participants.

The researcher explained the content and procedure of completing the questionnaires (Appendices (4) written in English and (6) written in French) to the participants and gave them the consent form to sign (Appendices (5) in English and (7) in French). The researcher also explained to the participants how they would receive feedback on the research. The questionnaire was written in English and translated into French by the Linguistic Department at Howard College/ UKZN as both these languages are used in the workplace.

Participants were given the questionnaire at lunch time and were requested to complete them after signing their consent forms (See Appendices 5 and 7). In addition, a box where the questionnaires could be dropped, was made available to the participants.

The researcher returned later in the day to collect the filled in questionnaires.

## **Documents**

The researcher examined the documents in a private room within the ICU.

All the documents and patients' files fell within the same period of data collection (from 20<sup>th</sup> June to 20<sup>th</sup> July 2008) and were used to fill in the checklist (Appendix 2).

The total number of patients' files examined during that period were 20, these being: the total number of patients present in ICU at the beginning of data collection period (20<sup>th</sup> June 2008) as well as those admitted during the period.

According to the guideline for assessing ethical sensitivity (2009), the checklist requires a judgment about the level of sensitivity for each issue that is identified.

A checklist was developed to describe the structure and process of quality patient care in the unit (Appendix 2) and the research followed the (JFICM, 2003) minimum standards.

**Structure standards include the** design, the integration of ICU with other departments and health systems, management (policies and protocols), staffing (including doctors, RNs and ENs and other staff), equipment and operational requirements.

**Process standards.** These involve the care given to patients and includes the monitoring of patients themselves, monitoring of equipment, infection control, documentation and communication.

There were also some observations done by the researcher on the structure standard and the nursing process that needed to be filled in on the checklist.

The checklist was filled in during the data collection period.

According to Huber (2000), checklists determine the level of basic skill attainment and are also used for performance appraisal.

### **3.11 Data collection tool**

#### **Questionnaire for the participants**

A self-developed instrument was used guided by the JFICM (2003) minimum standards. According to the self-report methods (2009), a questionnaire is a set of written questions, which are usually very structured. The researcher will normally assemble a number of questions which are then posed to a representative sample of the relevant population.

The questionnaire covered the demographics and ICU structure, the design, staffing requirements, operational requirements and the ICU equipment.

A Likert scale: Yes, No, Don't know were used in presenting and analysing data. The researcher used the structure standards and the processes of the ICU at level III because CHUK is considered to be at that level, according to its status as a referral, university and teaching hospital (Rwanda Ministry of Health Report, 2005).

### **Reliability of the instrument**

The researcher was guided by the Joint Faculty of Intensive Care Medicine (2003) ICU minimum standards to develop the instrument for this research. The steps as indicated in this article included design, operational requirements, work practices, staffing requirements, suitable training, equipment and monitoring.

Sections of the JFICM (2003) minimum standards were selected to form the tool.

Before collecting data, the instrument was given to a specialist in ICU, at the School of Nursing, to be scrutinized and validated.

The Assistant Biostatistician of the School of Nursing supervised the researcher in checking the tool.

A pilot study was conducted to check this instrument before its use.

According to Polit and Beck (2008, p.213), a pilot study is necessary to check that the instrument measures exactly what it is intended to.

### **Validity**

The validity refers to the degree to which an instrument measures what it is supposed to measure (Uys and Basson, 2000, p. 80).

The content of the instrument covers the objectives of the study.

The content validity was ensured before using the questionnaire.

For the first objective, the questionnaire was used which corresponded with the structure of the ICU.

For the second objective, the checklist was used to direct the researcher's observations regarding the following:

- design (integration and building size, environment)
- operational requirements
- ICU staff requirements
- equipment
- monitoring of ICU patients and equipment
- interventions done
- infection control
- documentation, and communication.

### Table of content validity

The instrument validated the objectives of the study as indicated in Table 3.1.

Objectives	Instrument	Questions to correspond
<p><b><u>Objective 1:</u></b></p> <p><b>Structure</b></p>	<p><b><u>QUESTIONNAIRE:</u></b></p> <p>(Appendix 1)</p> <p>Demographic data</p> <p>Staffing requirements and training</p> <p>Operational requirement</p> <p>ICU design</p> <p>ICU equipment</p>	<p>1, 2, 3 and 4.</p> <p>5, 6, 7, 8, 9, 10 and 11</p> <p>12, 13, 14, 15, 16, 17, 18, 19.</p> <p>20, 21, 22, 23, 24, 25, 26, 27 and 28.</p> <p>29, 30, 31, 32, 34, 35 and 36</p>
<p><b><u>Objective 2</u></b></p> <p><b>Process</b></p>	<p><b><u>CHECKLIST</u></b></p> <p>(Appendix 2)</p> <p>Structure standards</p> <p>Process standards</p>	<p>1 to 25</p> <p>26 to 43</p>

### **Data for the Pilot study**

The data for the pilot study was collected and analysed before the collection of data for the main study.

The pilot study took place over two days, 16<sup>th</sup> June and 17<sup>th</sup> June 2008.

Participants were sampled within the ICU at the King Faisal Hospital which has an ICU similar to the ICU at CHUK.

The results were interpreted and analysed on the 17<sup>th</sup> June 2008.

A simple random sampling was used to select five participants from all personnel working in the department to fill out the instrument of the pilot study.

They were doctors and nurses working in the unit at that hospital.

The participants were given the questionnaire to complete after having been given an explanation on how they fill in it.

The aim of the questionnaire to the researcher and to themselves was explained.

A consent form was presented, explained and signed.

The pilot study used only the questionnaire.

The participants filled in the questionnaire during their lunch time in the room allocated by the unit manager.

The questionnaire was left in the room by the participants to be collected later by the researcher.

The anonymity and confidentiality was insured because the documents did not require the names of the respondents.



The researcher then analysed the responses to establish if there had been any difficulties in completing the instrument.

### **Result from the pilot study**

All questionnaires were returned to the researcher completely filled in.

Findings from the pilot study demonstrated that the tool was easy to understand.

There was no ambiguity or misunderstanding.

### **3.12 Data Analysis**

The data was analysed by means of a quantitative data computer statistical analysis software package called Statistical Package for the Social Sciences (SPSS) Version 15.0.

The data was presented in graphs, frequencies and tables according to the responses of staff participants.

The analysis of minimum standards contributing to quality patient care in the ICU using structure and process in this context doesn't have the relationship which exists between structure and process in the context of quantity systems.

The study is purely descriptive.

The analysis of data was carried out under the supervision of the biostatistician of the School of Nursing (Appendix 13).

### **3.13 Data management**

The data was entered into the computer for analysis.

Only the researcher had access to it on the computer by using a password.

The questionnaires were kept in a locked cabinet to which only the researcher and the supervisor had access.

These questionnaires and checklists will be kept for a period of five years after which they will be incinerated.

### **3.14 Ethical considerations**

Permission to conduct this study was granted by the Ethics Committee of the Social Sciences and Humanities via the faculty of Health Sciences office (Appendix 14), the Hospital Director, the Head of the Research Committee at CHUK and the ICU management (Appendix 8).

Permission was granted to collect the data of the pilot study at King Faysal Hospital (Appendix 11).

Written consent forms (Appendices (5) in English and (7) in French) were signed by the participants after they had been given the explanation of the research and had read the covering letter.

The participants were assured that their names would not be mentioned in the study. Anonymity and confidentiality was maintained throughout the study by not putting

names of the respondents on the questionnaires. Their privacy was thus ensured when filling in the questionnaire.

The information was never divulged to any person known or unknown to the participants. The participants were also informed that the information emanating from the study would be published, but could not be traced back to them. Participants were allowed to withdraw from the study at any time should the need arise. After filling in the questionnaire, a box was made available to them, in the staff nurses' office, where they could drop the questionnaires themselves. These were collected by the researcher at the end of each day. A coded padlock was applied to the cupboard where the questionnaires were kept. Only the researcher had access to these codes for the duration of the study. The participants were informed that the feedback on the results of the study would be reported in the report book, which would be submitted to the Hospital Director and to the Department of Nursing.

They would be able to consult the book in the library of the hospital.

### **3.15 Conclusion**

This chapter has focused on the research methodology.

The next chapter will look at the presentation and interpretation of results.

## **CHAPTER FOUR: RESEARCH FINDINGS**

### **4.1 Introduction**

The presentation of data findings have been structured according to:

- Demographic data which enlisted gender, age, professional categories and experience.
- Data from questionnaire including ICU design, staffing requirements, ICU equipment, and operational requirements;
- A checklist was also used to document observations and document analysis made by the researcher.
- The summaries of the results of the questionnaires and observations were categorised according to structure standards and process standards.

### **4.2 Sample realisation**

The questionnaires were administered to the participants in the ICU at CHUK and the checklist was filled in by the researcher during the period 20<sup>th</sup> June to 20<sup>th</sup> July 2008. The researcher realised a sample of 41 participants (100%), which is actually the total population of the ICU establishment.

### **4.3 Findings from the study**

Data will be presented as extracted from the questionnaire, beginning with the demographics, as well as data from the two instruments, namely the questionnaires and checklist.

The questionnaire deals predominantly with structure standards while the checklist included data from structure and process standards, as observed and/or analysed by the researcher.

#### **4.3.1 Presentation of demographic data**

The demographic data included gender, age, professional category and experience.

##### **Repartition of the participants according to gender (N=41)**

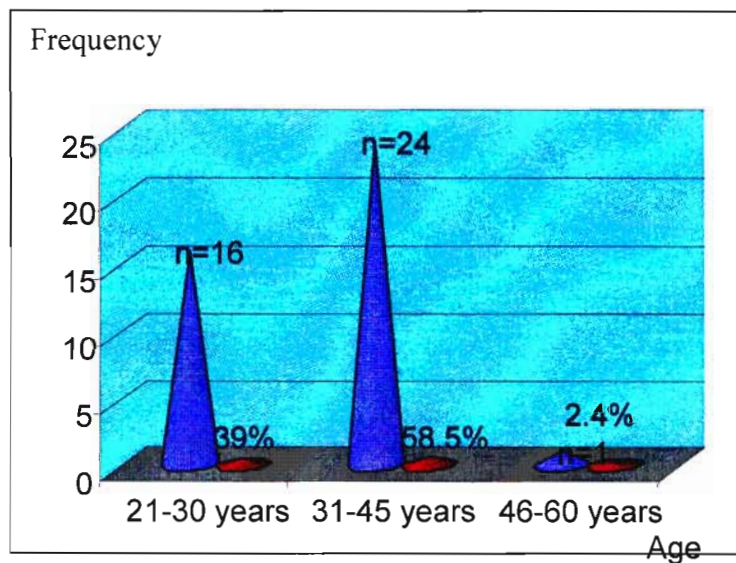
Out of 100% (n=41) ICU staff, 61% (n=25) were female and 39% (n=16) male. (See table 4.1)

**Table: 4.1 Repartition of the participants according to gender (N=41)**

Gender	Frequencies	Percent
Female	25	61%
Male	16	39 %
<b>Total</b>	41	100 %

**Age of participants (N=41)**

The findings revealed that majority of participants [58.5% (n=24)] were aged between 31-45 years old, 39% (n=16) were aged between 21-30 years old with only 2.4% (n=1) aged between 46-60 years old (See Fig.4.1).



**Fig: 4.1 Age of participants (N=41)**

**Professional categories that participated in this study (N=41)**

The breakdown of professional categories that participated in this study reflected that 9.8% (n=4) were medical doctors, 65.9% (n=27) were nurses, 12.2% (n= 5) were medical students and 12.2% (n=5) were student nurses (See Table 4.2).

**Table 4.2 Profession's categories that participated in this study**

<b>Profession's category</b>	<b>Frequency</b>	<b>Percent</b>
Medical Doctor	4	9.8%
Nurse	27	65.9%
Medical Student	5	12.2%
Student Nurse	5	12.2%
<b>Total</b>	<b>41</b>	<b>100%</b>

**The work experience of the participants (N=41).**

Out of 100% (N=41) participants, 29.3% (n=12) had less than 1 year experience in the ICU, 22 % (n=9) had between 1 to 3 years experience, 17% (n=7) had 4 to 7 years experience and 31.7% (n=13) more than 7 years experience (See Table 4.3).

**Table 4.3 The ranges of work experience of participants.**

<b>Experience</b>	<b>Frequency</b>	<b>Percent</b>
Less than 1 year	12	29.3%
1 to 3 years	9	22%
4 to 7 years	7	17%
More than 7 years	13	31.7%
Total	41	100%

### **4.3.2 Presentation of data about ICU: design, staffing requirements, equipment, and operational requirements.**

#### **4.3.2.1 ICU design requirements**

The design of the ICU looked at the accessibility of ICU to the Operating Theatre, the X-ray Department, the Emergency Department and pharmacy.

It assessed the office space available for doctors, medical students, nurses and student nurses.

It also assessed the availability of working space, bed space, a room for the telephones and other means of communication and rooms for training and research.



### Access of ICU to the Operating Theatre (N=41)

The majority of participants, [73.2% (n=30)], agreed that the ICU had access to the Operating Theatre 24 hours a day while 19.5% (n=8) participants disagreed. 7.3% (n=3) were neutral (See Fig 4.2).

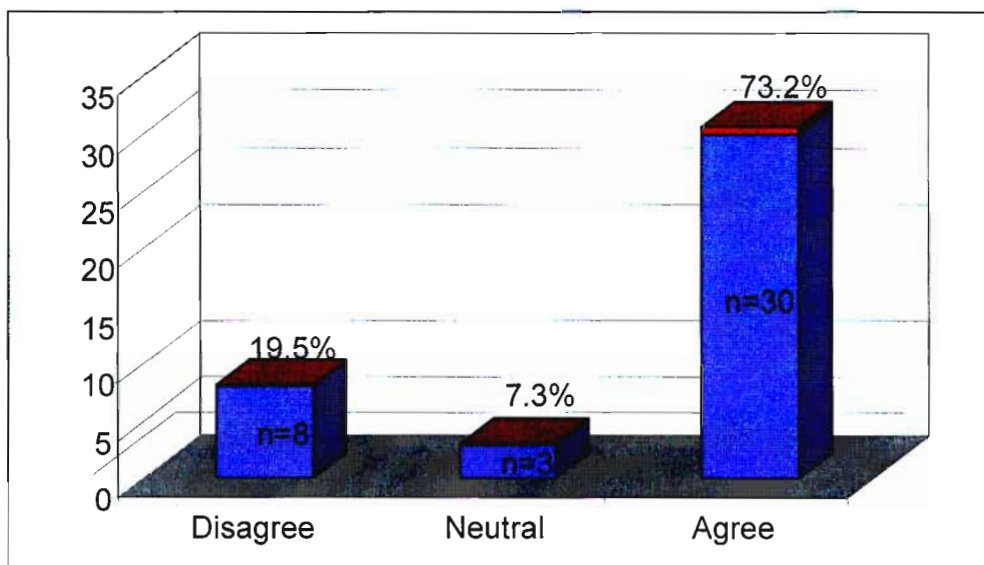


Fig 4.2 Access of ICU to the Operating Theatre 24 hours a day (N=41)

### Access of ICU to the X-ray Department (N=41)

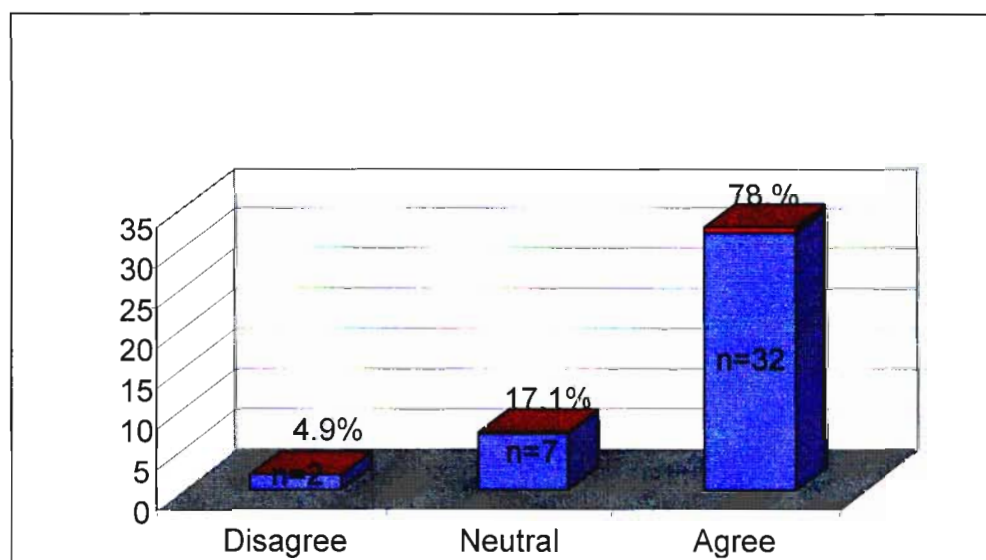
The question as to whether the ICU had access to the X-ray department 24 hours a day was agreed with by 97.6% (n=40) of the participants. Only 2.4% (n=1) were neutral (See Table 4.4).

**Table 4. 4 Access of ICU to the X-ray Department 24 hours a day.**

ICU has accessibility to the X-ray Departmentt 24hours a day	Frequency	Percent
Neutral	1	2.4%
Agree	40	97.6%
Total	41	100%

**Access of ICU to the Emergency Department**

Regarding the access of ICU to the Emergency Department 24hours a day, Fig 4.3 shows that 78% (n=32) agreed that ICU had access to the Emergency Department 24 hours a day and only 4.9% (n=2) disagreed. About 17.1% (n=7) were neutral.



**Fig 4.3 Accessibility of ICU to the Emergency department 24 hours a day (N=41)**

**Twenty four hours access to the unit pharmacy (N=41)**

The results showed that according to 87.8% (n=36) of the participants, ICU did have access to the unit pharmacy 24 hours a day. 4.9% (n=2) disagreed with the statement, while 7.3% (n=3) were neutral (See Table 4.5).

**Table 4.5 24 hours access to the unit pharmacy (N=41)**

<b>ICU has access to the unit pharmacy 24/24h?</b>	Frequency	Percent
Disagree	2	4.9%
Neutral	3	7.3%
Agree	36	87.8%
<b>Total</b>	41	100%

**Twenty four hours access to the main pharmacy (N=41)**

According to 58.5% (n=24) of the participants, ICU had access 24 hours a day to the main pharmacy. 36.6% (n=15) disagreed and 4.9% (n=2) were neutral (see Table 4.6).

**Table 4.6 24 hour access to the main pharmacy**

<b>ICU has accessibility to the main pharmacy 24 hours a day</b>	Frequency	Percent
Disagree	15	36.6%
Neutral	2	4.9%
Agree	24	58.5%
<b>Total</b>	<b>41</b>	<b>100%</b>

**Availability of office space to accommodate nurses and student-nurses (N=41)**

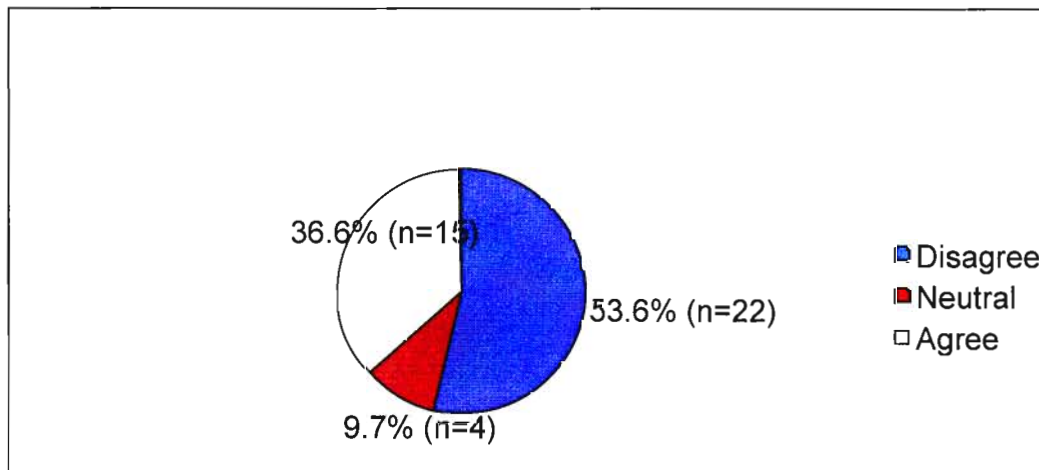
The majority of participants [65.9% (n=27)] disagreed that ICU had enough office space to accommodate nurses and student-nurses with only 26.8% (n=11) agreeing. 7.3% (n=3) remained neutral. (See Table 4.7).

**Table 4.7 Availability of office space to accommodate nurses and student-nurses**

Enough office space to accommodate nurses and student-nurses	Frequency	Percent
Disagree	27	65.9%
Neutral	3	7.3%
Agree	11	26.8%
<b>Total</b>	<b>41</b>	<b>100%</b>

**Office space to accommodate doctors and medical-students (N=41)**

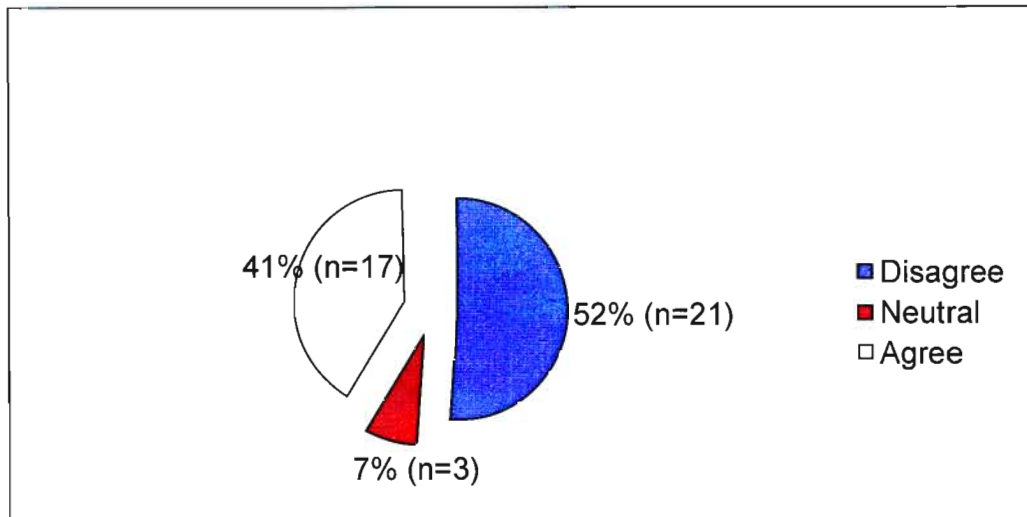
On the question concerning the availability of office space to accommodate both doctors and medical students, Fig.4.4 shows that 53.6% (n=22) of the participants disagreed that the ICU had enough office space to accommodate both doctors and medical students. 36.6% (n=15) agreed and 9.7% (n=4) were neutral. (See Fig 4.4)



**Fig 4.4 Adequate office space to accommodate doctors and medical-students (N=41)**

**Working space for resuscitation material (N=41)**

On whether there was enough working space to accommodate ICU resuscitation material, Fig 4.5 shows that 52% (n=21) participants disagreed and 41% (n=17) agreed. Only 7% (n=3) were neutral.



**Fig 4.5 Working space for resuscitation material (N=41)**

**Beds space for optimal working condition (N=41)**

On whether the space between the beds in was enough for optimal working conditions, 53.7% (n=22) of the participants disagreed and 43.9% (n=18) agreed. Only 2.4% (n=1) of the respondents were neutral (See Table 4.8).

**Table 4.8 Adequate bed space for optimal working conditions**

<b>Enough space between the beds for optimal working conditions?</b>	<b>Frequency</b>	<b>Percent</b>
Disagree	22	53.7%
Neutral	1	2.4%
Agree	18	43.9%
<b>Total</b>	<b>41</b>	<b>100%</b>

### Enough room for phones and other communication materials (N=41)

The findings in Fig. 4.6 reveal that 46.3% (n=19) of the participants disagreed that there was adequate room for phones and other means of communication. 44% (n=18) agreed while 9.7% (n=4) were neutral.

The responses between agreement and disagreement had a difference of only 1 respondent for the 100% (N=41) participants.

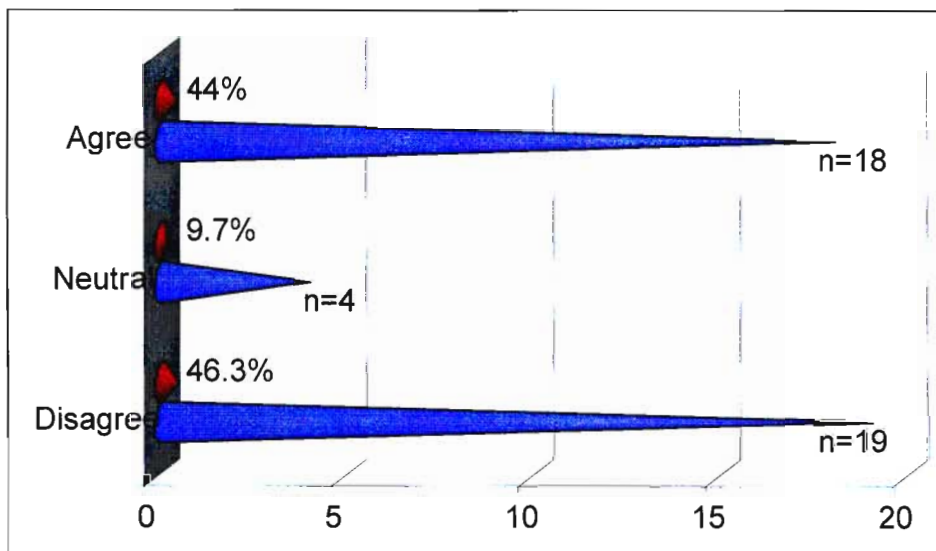


Fig 4.6 Adequate room for phones and other communication materials (N=41)

### **A room for education and research in the ICU (N=41)**

Of the 41 participants, 73.2% (n=30) disagreed with the statement that there is a room available for education and research in the ICU and 19.5% (n=8) agreed that there is such a room. Only 7.3% (n=3) were neutral (See Table 4.9).

**Table 4.9 A room for education and research in the ICU**

<b>Available room for education and research</b>	<b>Frequency</b>	<b>Percent</b>
Disagree	30	73.2%
Neutral	3	7.3%
Agree	8	19.5%
<b>Total</b>	<b>41</b>	<b>100%</b>

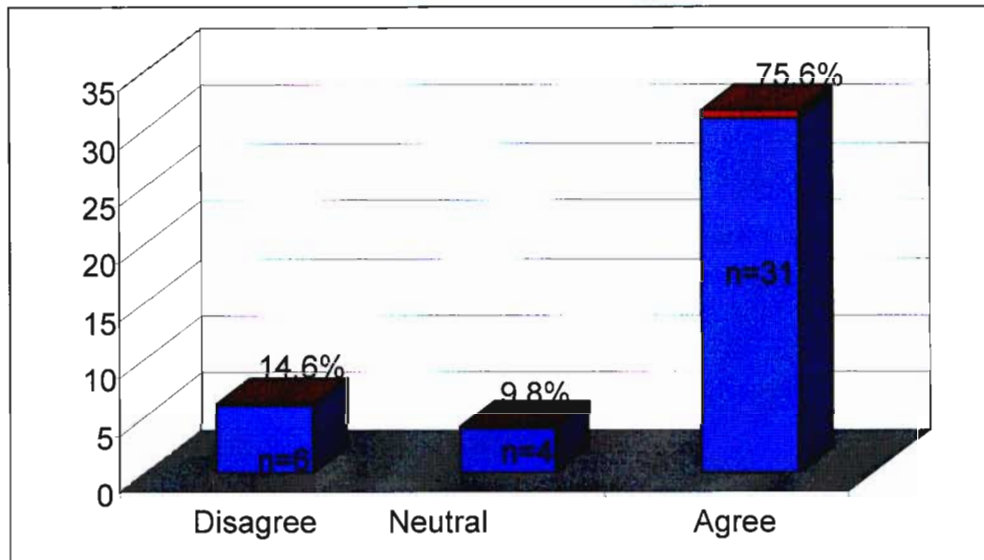
#### **4.3.2.2 ICU staffing requirements**

Staffing was looked at in terms of the availability of a Specialist Consultant in the ICU, the availability of a specialist in Intensive Care Medicine for the trainees, a registered nurse to provide direct patient care, a nurse responsible for the care of patients needing complex support, a nurse responsible for the care of post-operative patients with epidurals, as well as social workers and cleaning staff.



#### Availability of Specialist consultant (N=41)

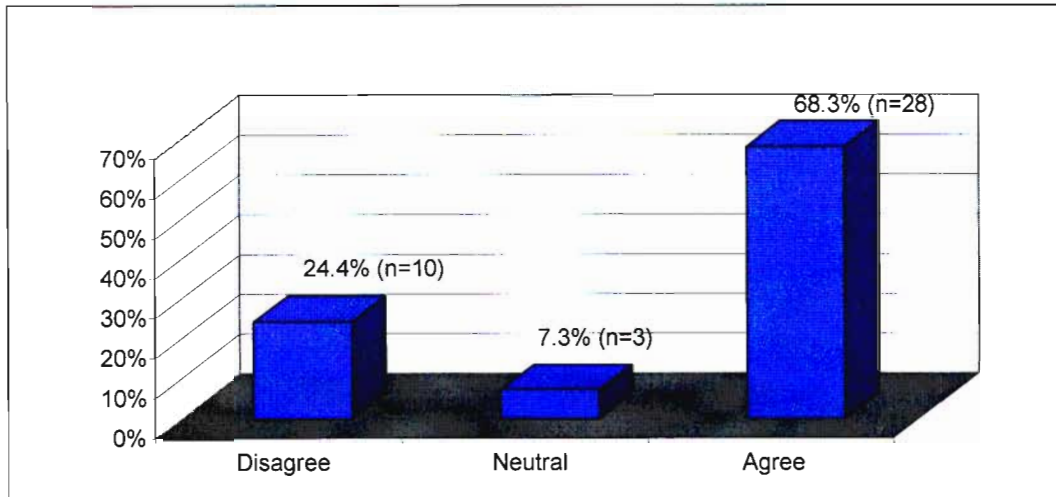
The majority of the participants 75, 6% (n= 31) agreed that a Specialist Consultant was always available in the ICU, 14.6% (n=6) disagreed, while 9.8% (n=4) were neutral (See Fig.4.7).



**Fig 4.7**The availability of Specialist consultant in ICU

#### Availability of specialist doctor to the trainees (N=41)

The majority participants 68.3% (n=28) agreed that the trainees in the ICU were always able to access the specialist doctor. Only 24.4% (n=10) disagreed and 7.3% (n=3) participants were neutral (See Fig.4.8).



**Fig 4.8 Specialist doctor availability to trainees**

**Registered nurse responsibility in direct patient care (N=41)**

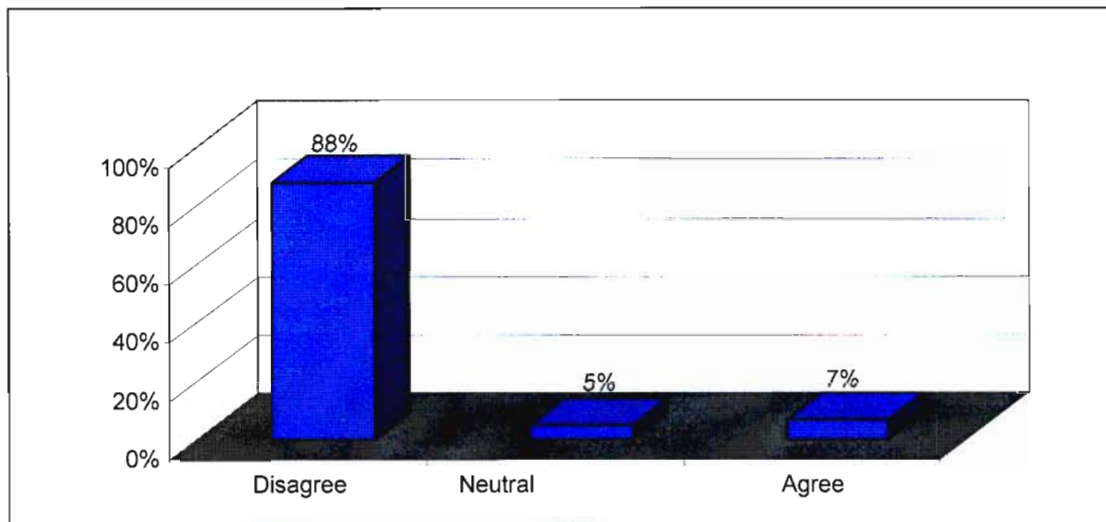
The results reflected that the majority 49 % (n=20) disagreed that direct patient care is the responsibility of a registered nurse, 44% (n=18) agreed, while 7% (n=3) were neutral (See Table 4.10).

**Table 4.10 RN responsibility in direct patient care**

RN responsibility in direct patient care	Frequency	Percent
Disagree	20	49%
Neutral	3	7%
Agree	18	44%
<b>Total</b>	<b>41</b>	<b>100%</b>

**Availability of two nurses for an artificially ventilated patient (N=41)**

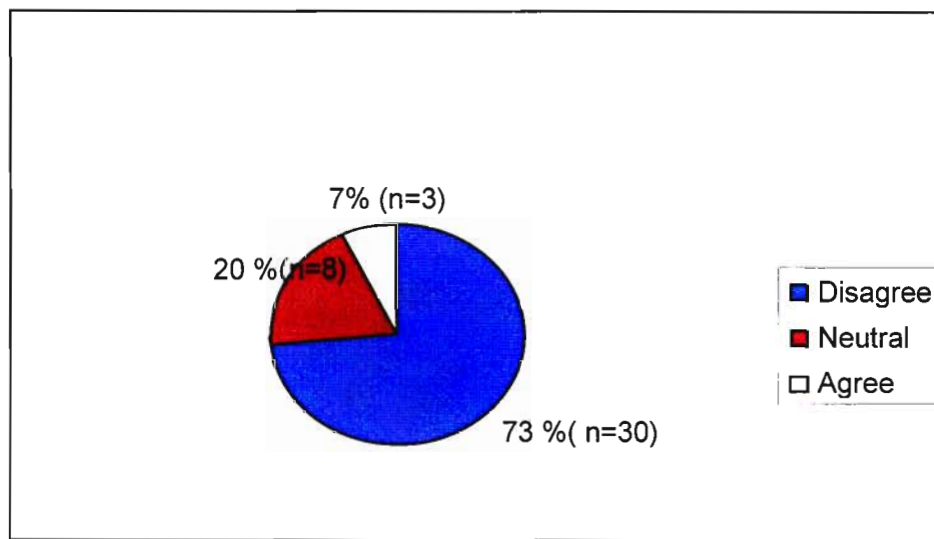
Fig.4.9 demonstrates that 88% (n=36) of the 100% (N=41) participants disagreed that two nurses were always available for an artificially ventilated patient while 7% (n= 3) participants agreed that there are two nurses at all the times. Only 5% (n=2) were neutral.



**Fig 4.9**The availability of two nurses for an artificially ventilated patient

### Post-operative patients with epidural require 1 nurse per 2-3 patients (N=41)

Regarding whether one nurse was looking after 2-3 post-operative patients with a continuous epidural (see Fig.4.10), 73% (n=30) disagreed, while 20% (n=8) were neutral and only 7% (n=3) participants agreed.



**Fig 4.10 Post-operative patients with epidural require 1 nurse per 2-3 patients**

### The work of cleaning staff (N=41)

Regarding whether the cleaning staff perform their work timely (as scheduled), the majority of participants 73.2% (n=30) agreed, 12.2% (n=5) disagreed while 14.6% (n=6) were neutral (See Table 4.11).

**Table 4.11 The work of cleaning staff**

<b>Cleaning staff doing their work?</b>	<b>Frequencies</b>	<b>Percent</b>
Disagree	5	12.2 %
Neutral	6	14.6%
Agree	30	73.2%
<b>Total</b>	<b>41</b>	<b>100%</b>

**The performance of social workers (N=41)**

In response to whether the social workers did their work timely (as scheduled) or not, 58.5% (n=24) of the participants agreed that they did, while 26.8 % (n= 11) disagreed. 14.63% (n= 6) were neutral (See Table 4.12).

**Table 4.12 The performance of social workers.**

<b>Social workers do their work timely?</b>	<b>Frequencies</b>	<b>Percent</b>
Disagree	11	26.8%
Neutral	6	14.63 %
Agree	24	58.5%
<b>Total</b>	<b>41</b>	<b>100%</b>

### 4.3.2.3 ICU equipment requirements

Regarding the ICU equipment, the researcher looked at whether the equipment and its monitoring was appropriate for the workload of the unit, if there was enough equipment in the unit and whether there was a regular system in place for checking the safety of the equipment. He also looked at whether there were enough ventilators, defibrillators, equipment to control patients' temperatures as well as chest drainage equipment and whether there were specialized beds in the ICU.

#### Quantity and monitoring of equipment (N=41)

Fig.4.11 shows that the majority of participants 61% (n=25) disagreed with the statement that the quantity, as well as the monitoring of equipment was appropriate, 31.7% (n=13) agreed, while only 7.3% (n=3) were neutral.

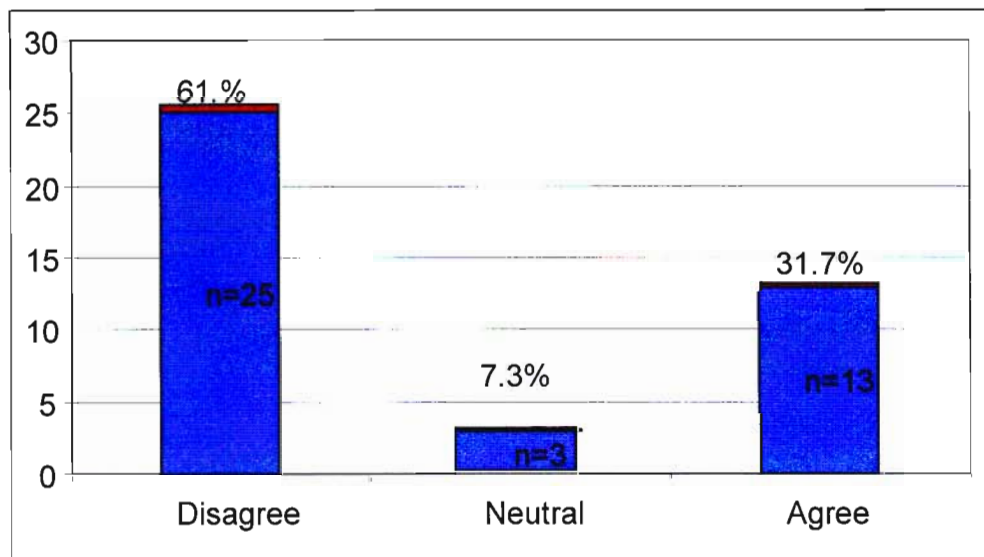


Fig 4.11 Quantity of equipment and it's monitoring

### **Quantity of equipment for the workload of the unit (N=41)**

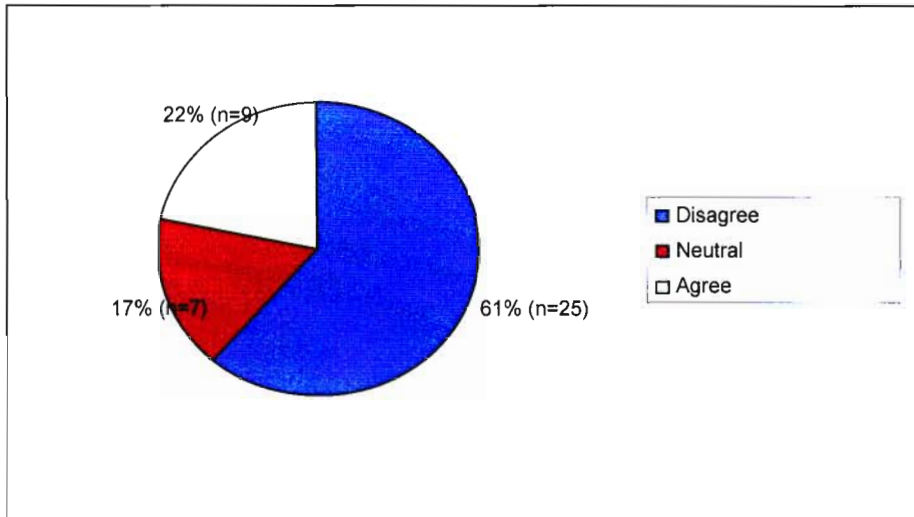
The majority of participants, 80.5% (n=33), disagreed that the quantity of equipment was suitable for the workload of the unit, 17.1% (n=7) agreed and 2.4%(n=1) remained neutral. (See Table 4.13).

**Table 4.13 Quantity of equipment for the workload of the unit**

<b>Quantity of equipment suitable for the workload of the unit?</b>	<b>Frequency</b>	<b>Percent</b>
Disagree	33	80.5%
Neutral	1	2.4%
Agree	7	17.1%
<b>Total</b>	<b>41</b>	<b>100%</b>

### **A regular system for checking the safety of equipment (N=41)**

61% (n=25) disagreed that there was a regular system for checking the safety of equipment, 22% (n=9) agreed while 17% (n=7) were neutral (See Fig. 4.12).



**Fig 4.12 A regular system for checking the safety of equipment**

**Sufficient ventilators in the unit (N=41)**

The majority of participants, [83% (n=34)], disagreed that there were enough ventilators in the unit, only 14.63% (n=6) agreed and 2.4% (n=1) were neutral. (See Table 4.14).

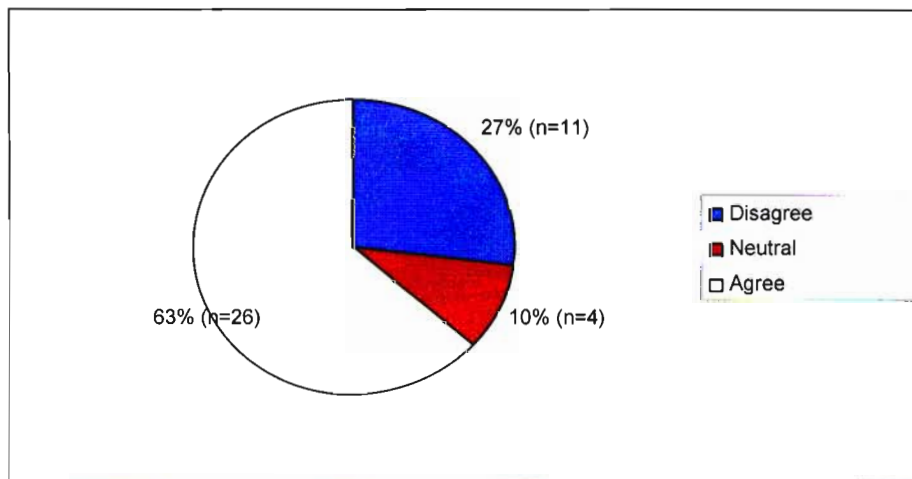


**Table 4.14 Sufficient ventilators in the unit**

Enough ventilators in the unit?	Frequency	Percent
Disagree	34	83%
Neutral	1	2.4%
Agree	6	14.6%
<b>Total</b>	<b>41</b>	<b>100%</b>

**Availability of defibrillators in the unit (N+41)**

Fig.4.13 reveals that out of all the participants, 27% (n=11) disagreed that there are defibrillators in the unit, 63 % (n=26) agreed, while 10% (n=4) were neutral.



**Fig 4.13 Availability of defibrillators in the Unit (N=41)**

### **Equipment for the control of patients' temperatures (N=41)**

A number of participants, 51% (n=21) disagreed that there was equipment for control of patient's temperature, 44% (n=18) agreed while 5 % ( n=2) were neutral (See Table 4.15).

**Table 4.15 Equipment for the control of patients' temperatures**

Is equipment available for the control of patients' temperatures	Frequency	Percent
Disagree	21	51%
Neutral	2	5%
Agree	18	44%
Total	41	100%

### Chest drainage equipment (N=41)

In Fig.4.14, it is indicated whether participants believed there was chest drainage equipment in the ICU. 46.3% (n=19) of the participants disagreed while 41.5% (n=17) agreed. A further 12.2% (n=5) were neutral.

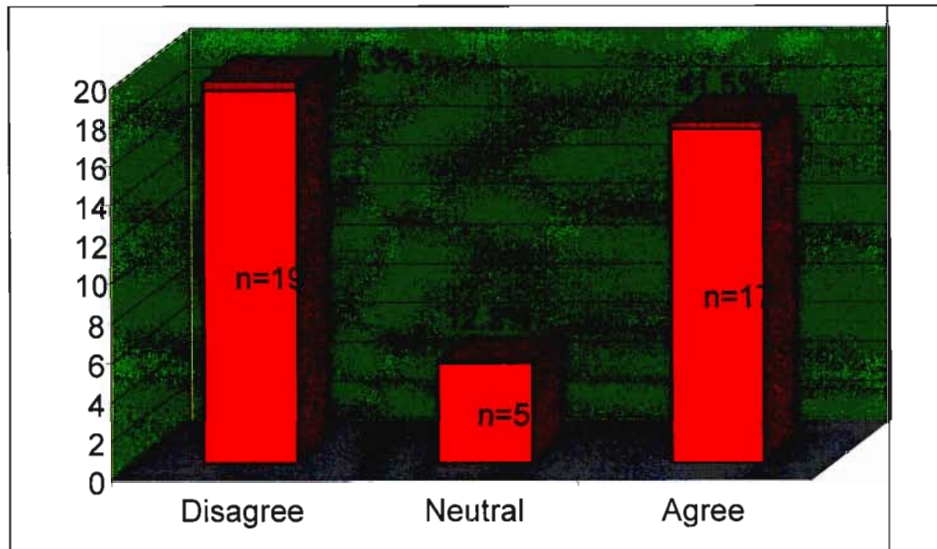


Fig 4.14 Chest drainage equipment (N=41)

### Availability of specialized beds in the unit (N=41)

The findings from the Table 4.16, as to whether there were specialized beds in the ICU, reveal that the majority of participants, 70.7% (n=29), agreed, 9.8% (n=4) disagreed, and 19.5% (n=8) were neutral.

**Table 4.16 Availability of specialized beds in the unit**

<b>Are there specialized beds in the unit?</b>	<b>Frequency</b>	<b>Percent</b>
Disagree	4	9.8%
Neutral	8	19.5%
Agree	29	70.7%
Total	41	100%

#### **4.3.2.4 Operational requirements**

The operational requirements that were considered included the admission of patients, policies, records, a written orientation programme, in service training for doctors and nurses, programmes for research, nurses' presentation of research findings, an infection control programme and access to the unit pharmacy as well as to the main pharmacy.

#### **Documentation of admissions (N=41)**

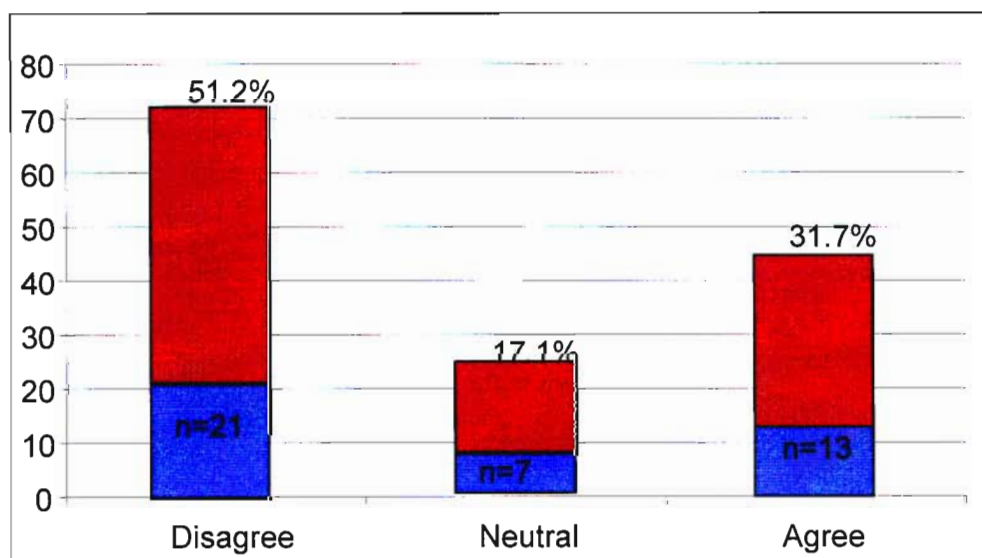
In response to whether every ICU patient admitted was documented, the majority of participants 97.6% (n=40) agreed while only 2.4% (n=1) disagreed (See Table 4.17).

**Table 4.17 Documentation of patient admissions**

<b>Patient admitted was fully documented</b>	Frequency	Percent
Disagree	1	2.4%
Agree	40	97.6%
<b>Total</b>	<b>41</b>	<b>100%</b>

**An orientation programme in the unit (N=41)**

Regarding the existence of an orientation programme in the ICU, Fig. 4.15 shows that more than half of participants, 51.2% (n=21) disagreed that there was, 31.7% (n=13) agreed, while 17.1% (n=7) were neutral (See Fig 4.15).



**Fig 4.15 Orientation programme in the unit**

**In-service training for both medical and nursing staff (N=41)**

Data in Table 4.18 reflects that according to 75.6% (n=31) of the participants, the ICU did not provide in-service training for medical and nursing staff, 9.8 % (n=4) agreed that it did while 14.6% (n=6) were neutral. (See table 4.18)

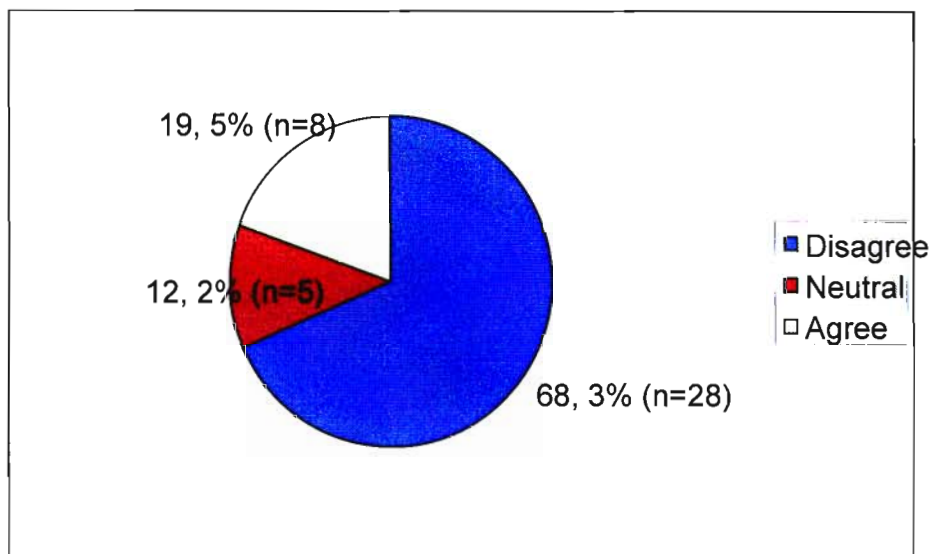
**Table 4.18 In-service training for both medical and nursing staff**

Existence of in-service training for both medical and nursing staff	Frequency	Percent
Disagree	31	75.6%
Neutral	6	14.6%
Agree	4	9.8%
Total	41	100%

### The existence of a programme of research (N=41)

As to whether an active research programme existed in the ICU, 68,3% (n=28) of the participants disagreed, while 19,5% (n=8) agreed and 12,2% (n=5) were neutral.

(See Fig.4.16),



**Fig 4.16 The existence of a programme of research**

### Presentation of nurses' research findings (N=41)

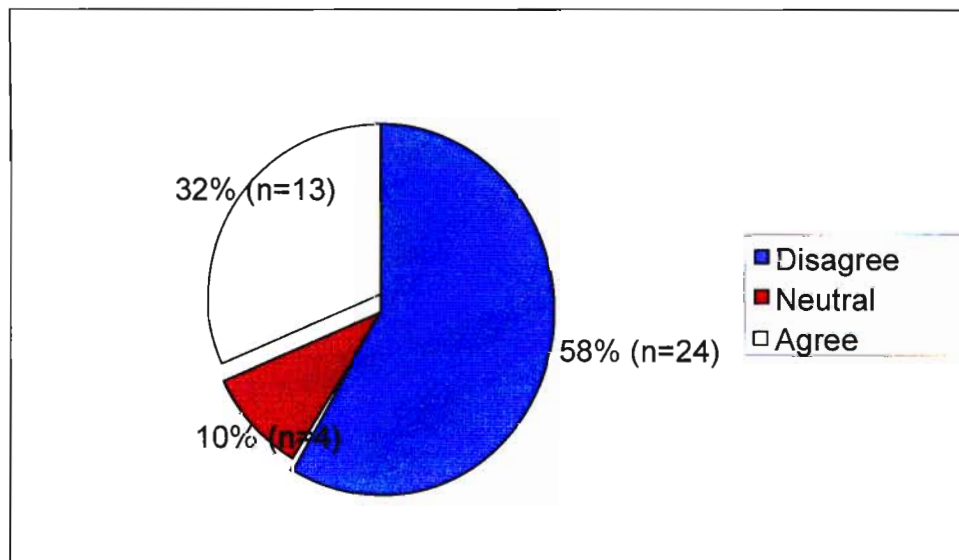
Regarding as to whether nurses' research findings were presented, 75,6% (n=31) of the participants disagreed with this statement, 12,2% (n=5) agreed, while 12,2% (n=5) were neutral (See Table 4.19).

**Table 4.19 Presentation of nurses' research findings**

Presentation of findings by nurses	Frequency	Percent
Disagree	31	75.6%
Neutral	5	12.2%
Agree	5	12.2%
<b>Total</b>	<b>41</b>	<b>100%</b>

**Infection control programmes in the unit (N=41)**

As to whether infection control programmes existed in the unit (See Fig.4.17), 58% (n=24) of the participants disagreed that they did, 32% (n=13) agreed, while 10% (n=4) were neutral.



**Fig 4.17 Infection control programmes in the unit (N=41)**



### **4.3.3 Findings from the checklist: Observation and document analysis**

This data was collected by the researcher using observation and document analysis. The data included the same structure indicators as indicated in the questionnaire, but also added process indicators.

#### **4.3.3.1 Structure standards**

##### **Design:**

The researcher's observations revealed that the ICU is in a self-contained area and is close to the departments of Physiotherapy and X-ray, but not to the Operating Theatre, the Internal Medicine Surgery Department or the Emergency Department.

The ICU does not have access to many tertiary imaging services, only Echography, Endoscopy and X-ray.

With regard to the integration with other health systems, there were no written policies available which could be consulted by the health workers regarding the referral system of patients.

There was no nursing reporting guideline in the unit.

The lighting for clinical observation was inadequate.

Office space for both doctors and the nurse in charge was small and inadequate.

Storage space for equipment such as monitors, ventilators, infusions pump and syringes were there, but disorganized making it difficult to find anything.

The distance between beds in the ICU was between 8-10m<sup>2</sup>.

The hand basins were blocked and people washed their hands in the nurses' bathroom.

**Staffing:**

Only three Specialist Anaesthetists worked in the ICU and the one consultant trained in Intensive Care Medicine worked in both the ICU and Operating Theatre.

A Specialist Consultant was always available to the medical staff during the morning meeting.

The services of a surgeon, gynecologist, and radiologist were not easily available to the unit.

For the 9 bedded ICU, the nurse in charge had an Honours degree in Nursing Education (A0), but did not have a qualification in Intensive Care.

Of the rest of the nurses, 10 had Advanced Diplomas (A1); 11 were RNs, and 16 were EN's (A2). None of the nurses employed in the unit were trained in intensive care.

There were other support staff including a physiotherapist and dietician.

Social workers and cleaners and were also available in the unit and covered all shifts.

The nurse-patient ratio was 1:1 for all ventilated patients during shift one, but changed to 1: 2or3 during shifts two and three because the number of nurses was reduced in those shifts.

Only 4 to 5 nurses worked during shifts two and three for the 9 beds within ICU.

The ICU makes use of a general technician and electrician to repair material and ICU equipment.

No trained biomedical engineer was available.

Sometimes the dietician or nutritionist was also used for social work in the unit, taking over those duties when the social worker was unavailable.

There was no specific clerical and secretarial support available to the unit.

### **Equipment:**

Observation done by the researcher revealed that there was no dialysis equipment in the unit; there were not enough disposable materials used for the monitoring of patients and the trolleys were old and insufficient for the workload of the unit.

There were enough drips for infusions and cardiac monitoring was available to every patient.

Two ventilators were available to the 9 bedded unit.

Aspirators were used in all the three blocks within the ICU.

Most of electric syringes were not working.

Defibrillators were there in the unit but not used.

There was no oxygen analyzer in the unit.

### **Operational requirements:**

The Nursing care plan and nursing duties were written in the handbooks.

There was a small isolation room in the unit which contains two beds.

There was a written circular in the isolation room, but there were no protocols to guide workers.

There was no orientation programme available for the new staff.

Guidelines and protocols for nursing interventions were not available to the nurses in the unit.

No guidelines or protocols were available for the admission or discharge of patients.

There were no specific policies regarding the transfer of patients to, or from, the ICU.

Only the protocol regarding the ventilator monitoring was in the unit.

#### **4.3.3.2 Process standards**

##### **Monitoring**

Patients' files were used to monitor patients.

The equipment was usually checked by the electrician of the hospital to be in good working order.

##### **Interventions**

Most of the time, the nurses were working without using masks and gloves for protection.

The nurses did sterilize the used materials, as scheduled in nursing plan by the nurse in charge.

Prescribed examinations and the administration of medicines were done as planned or depending on emergencies. Patients with tracheostomies were monitored using their files.

**Infection control**

No specific infection control process existed in the unit.

Masks for protection were sometimes used in the unit. A simple disinfection of the bed, after the discharge of a patient, was called infection control.

The whole unit was disinfected using chemical products by any nurse volunteer.

**Documentation:**

Doctors used a patient's book record file (different to what nurses use) to prescribe medicine and advise nurses.

Every time the doctor checked a patient and prescribed something, he/she would record it in the file for the patient.

Most of nursing reports were unclear and useless to the unit after the discharge of the patient.

Patients' files, which should contain most of information on their status, were not timely filled in.

Nursing book notes were also used for reporting patients' monitoring for future shifts by some of the nurses working with the patients.

The feeding patients was monitored by the dietician, using the same patient's file.

**Communication:**

The ICU phone was not always working during the time of observation and there were no other communication materials in the unit.

The patients' discharge reports were often missing some information.

Nurses did use the patients' files (Appendix 12) to report monitoring to other staff members.

All 20 patients' files checked and used by the researcher for observations were available in the unit.

The nursing report book notes were available in the unit, but were mainly not completed.

Communication between departments was done by phone or by physically going from one department to another when requiring information about a patient who might have died during the weekend, or a patient needing to be transferred from another health centre.

#### **4.3.4 Summary of research findings**

##### **4.3.4.1 Structure standards**

###### **ICU design**

The researcher's observations revealed that the ICU is in a self-contained area which was close to the Physiotherapy department and X-ray but not to the Operating Theatre, Internal Medicine, Surgery or the Emergency Department.

No written policies were available for integration with other health system and departments using referral policies.

Communication between departments was done by phone or the person going there for some issues.

Nursing reports were not completed.

There was inadequate and inappropriate lighting for clinical observation and office space for both doctors and the nurse in charge was small and inadequate.

Storage space for equipment such as monitors, ventilators, infusions pump and syringes was available, but disorganized making it difficult to find things.

The distance between beds in the ICU was between 8-10m<sup>2</sup>.

The hand basins were not working so everyone washed their hands in the nurses' bathroom.

The ICU did not have easy access to the all tertiary imaging services.

The data from the participants revealed that 73.2% (n=30) of participants agreed that the ICU had access to the Operating Theatre twenty four hours a day, 97.6% (n=40) agreed that the ICU had access to the X-ray Department twenty four hours a day and 78% (n=32) agreed that the ICU had access to the Emergency Department 24 hours a day.

The majority of participants, 87.8% (n=36), agreed that the ICU had access to the unit pharmacy and 58.5% (n=24) agreed that the ICU had access to the main pharmacy twenty four hours a day.

Most of the participants, 65.9% (n=27), disagreed that ICU has enough office space to accommodate staff nurses and student nurses and only 26.8% (n=11) agreed

53, 6% (n=22) disagreed that the ICU has enough office space to accommodate both doctors and medical students and 36.6% (n=15) agreed.

Also 52% (n=21) disagreed that the ICU had enough working space to accommodate the ICU's resuscitation material and 41% (n=17) agreed.

On the question as to whether the ICU's beds had enough space between them for efficient working conditions, 53.7% (n=22) of the participants disagreed and 43.9% (n=18) agreed.

The majority of the participants, 73.2% (n=30), disagreed that there is a room set aside for education and research in the ICU.

### **ICU staffing requirements**

Results from researcher's observations revealed that the ICU at CHUK has only three Specialist Anaesthetists working in the ICU and one consultant trained in Intensive Care Medicine, who works in both the ICU and the Operating Theatre

The specialist consultant was always available to the medical staff during the morning meeting, but the surgeon, gynecologist and radiologist were not easily available.

The nurse in charge has an Honours degree in Nursing Education, but does not have a qualification in the Intensive Care.

Regarding the nurses, 10 have Advanced Diplomas A1, 11 are RN's and 16 are EN's (A2). The nurse to patient ration is 1:1 for all ventilated patients during shift one but changes to 1:2 or 3 in the shifts two and three.

A physiotherapist and dietician were always available and the cleaners were satisfactory in performing their duties.

The ICU used a general technician and electrician to repair material and equipment.

The participants confirmed these results as the tables showed that 75.6% (n=31) of participants agreed that a specialist consultant was always available, 68.3% (n=28)



participants agreed that the trainees in the ICU were always exposed to the specialist, 58.5% (n=24) agreed that social workers did their job timely and 73.2% (n=30) agreed that the cleaning staff did their job timely as scheduled. There was no specific clerical or secretarial support.

### **ICU equipment**

Observation done by the researcher revealed that there was no dialysis equipment and not enough disposables and trolleys.

There were enough drips for infusions and every patient had access to cardiac monitoring.

There were only two ventilators in the unit and aspirators were used in the whole three blocks.

Most of electric syringes were not working and, although the defibrillators were available, they were seldom used

There was no piped gas and no oxygen analyzer in the unit.

Of the participants, 61% (n=25) disagreed with the statement that the equipment and its' monitoring was appropriate; 80.5% (n=33) participants disagreed that quantity of equipment is suitable for the workload of the unit, and 83% (n=34) disagreed that there were enough ventilators in the unit.

Interestingly, 63% (n=26) of the participants agreed that there were defibrillators in the unit while 27% (n=11) disagreed.

According to participants opinions, 51% (n=21) disagreed that there was equipment for

the control of patient's temperature while 44 % (n=18) participants agreed; 46.3% (n=19) disagreed that there was chest drainage equipment in the unit while 41.5% (n=17) agreed. 70.7% (n=29), the majority of participants, agreed that there were specialized beds in the unit to cater for trauma patients.

### **ICU operational requirements**

The Nursing Care Plan and nursing duties were written in the handbooks, but there was no written definition of the nurse in charge's role or written job descriptions for any of the nurses.

There was a small isolation room in the unit with two beds, but apart from a written circular there were no protocols to guide workers.

None of the nurses were trained in intensive care.

There was no biomedical engineer to repair material in the unit.

There was no orientation programme available for the new staff.

Guidelines and protocols for nursing interventions in the unit were not available for nurses.

No protocols for the admission and discharge of the patients in the ICU were available.

There were no specific policies for the transfer of the patients in the ICU.

The ICU does not have access to tertiary imaging services.

According to results from tables and figures presented, 51, 2% (n=21) of the participants disagreed that the unit had a written orientation programme, while 17.1% (n=7) were neutral and 31.7% (n=13) agreed.

75.6% (n=31) disagreed that in-service training was available for both medical staff and nurses in the unit.

68.3% (n=28) of participants disagreed that there was an active programme of research in the unit and 75.6% of the participants disagreed that nurses were able to present their research findings.

#### **4.3.4.2 Process standards**

##### **Monitoring**

Patient's files were used to monitor patients.

Pulse, ECG, the patient's oxygenations and arterial blood pressure are monitored and the respiratory function is assessed at frequent intervals, as scheduled, in the patient's file (Appendix 12) or as prescribed by doctor.

The urinary catheters were monitored 24 hours, reporting the quantity of urine on the patient's file.

Only the protocol for the ventilator was available in the unit.

The equipment was usually checked by the electrician of the hospital

Alarms of breathing system disconnection or of ventilator failure existed, but only on the cardiac monitor and on the ventilator.

Electrocardiograph-equipment used to monitor patients continuously displayed the electrocardiographs (every patient has the machine type “Propac” for monitoring vital signs.)

With reference to Fig 4.11, the majority of participants, 61% (n=25), disagreed with the statement that equipment and its monitoring was appropriate. (see in Fig 4.11).

According to respondent’s responses 49 % ( n=20) disagreed with the assumption that the registered nurse was directly responsible for patient care (Table 4.8),, 88% (n=36) disagreed that there were two nurses at all times for an artificially ventilated patient (Fig. 4.9), and 73% (n=30) disagreed that 2-3 post-operative patients with epidurals require 1 nurse ( Fig. 4.10).

### **Interventions**

Nurses were working, most of the time, without using masks and gloves for protection. There were no written protocols or written procedures available to guide workers. The nurses did sterilize the used materials as scheduled in the nursing plan by the nurse in charge of the day.

Prescribed examinations and the administration of medicines were done as planned or depending on emergencies.

Patients with tracheotomies were monitored using patients’ files.

Feeding patients was also monitored as scheduled in the patients’ files.

In the ICU at CHUK there was no gas analysis examinations done in the unit.

## **Infection control**

The protection of masks, gowns and gloves was only partially used in the unit and there were no protocols available to guide infection control.

58% (n=24) of the participants disagreed that there was an infection control programme in the unit while 32% (n=13) agreed (see in Fig. 4.17).

## **Documentation**

Doctors used patients' record files to prescribe medicine and advise nurses.

Most of nursing report was unclear.

Nurses used patients' files, (Appendix 12), which contained most of information on the patient status.

Notes in the nursing book were also used for nursing reports.

Patients' discharge reports had information missing..

In spite of these observations, however, the majority of participants 97.56% (n=40) said that patient admission was fully documented (see in Table 4.17).

## **Communication**

The ICU phone was not always working and no other communication material existed in the unit.

According to Table 4.6., 46.3% of the participants disagreed and 43.9% agreed that ICU has a room for phone and other communication materials (see in Fig 4.6).

All 20 patients' files checked by the researcher in his observations were available at the time of data collection.

#### **4.4 Conclusion**

This chapter interpreted and analyzed the results from the study following the necessary steps. The first step detailed the questionnaire in response to the first objective of the study. It included the demographic data, ICU design, the staffing requirements, operational requirements and the ICU equipment.

It also included the researcher's observations on the checklist relating to the structure standards and process standards. The discussion, recommendations and conclusion will be dealt with in Chapter Five which follows.

## **CHAPTER V: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS**

### **5.1. Introduction**

In this chapter, a discussion of the findings, recommendations and conclusions will be presented.

The discussion will be centred on the objectives and framework of the study, which were based on the structure and process standards of quality patient care according Donabedian's (1988) framework. The Joint Faculty of Intensive Care Medicine (JFICM) (2003) minimum standards for an ICU, were also used to draw the instruments for data collection in this study. The JFICM (2003) document provides a description of the minimum standards for ICUs relating the design, staffing and operational requirements, equipment and monitoring in Level III Intensive Care Units.

### **5.2 Discussion**

The discussion covers the following main points:

- **ICU demographics data;**
- **Current structures of quality patient care in the ICU at CHUK which includes** structure standards such as the ICU design, staff requirements, equipment and operational requirements; and

- **Current process standards of quality patient care in ICU at CHUK:** Process standards: monitoring, interventions, infection control, documentation, and communication.

### **5.2.1 ICU demographics**

The study findings showed that the majority of the participants in this study were female (61%) as compared to the 39% males reflected in table 4.1.

In the same ICU at CHUK, the Monthly Report Documents (2008) reported 74% (n= 20) of nurses employed were female and 26% (n= 7) were male. However, this report excluded the students, which did not belong to their staff establishment.

These findings compare with findings by Pudney and Shields (2000) which revealed that the British nursing profession is a female dominated profession, with over 90% of qualified nurses being women. This is also supported by the research from WHO (2004) which confirms that the health system is a gendered system in which doctors, traditionally a predominantly male profession in both the industrial and developing world, are more valued and have more control over resources available within the system, than do nurses who are usually female. Pamela (2001) describes the gendered nature of the health system as an aspect that is little understood and hence neglected in the training of health workers and the planning and provision of services.

For example, Kirkevold and Gjengedal (2005) suggested that it is reasonable to think that gender issues may have important implications in the rehabilitation of patient.



This may include quality of care.

According to personal categories, the results revealed that the majority, 58.5% (n=24), were aged between 31-45 years old, 39% (n=16) of the participants were aged between 21-30 years old and only 2.4% (n=1) were aged between 46-60 years old (see Fig 4.1). This shows that most of employees of the ICU are young and still have potential for professional growth.

According to Min-Chi, Wang, Chih-Wei, Shung-Me, Kumashiro, Ilmarinen, (2007), work done on evaluating work ability and quality of life for clinical nurses in Taiwan, concluded that the work ability of nurses increased with age until after the age of 45.

For young nurses, the job's mental demand is a major influence to their work ability.

The results on the ICU work experience of the participants reveals that only 29.3% (n=12) had less than 1 year experience in the ICU and the other 69.7% (n=29) of the participants had more than one year experience in the ICU (Table 4.3).

According to JFICM (2003), specialist staff, with sufficient experience in ICU, provide essential opportunities for administration, teaching, research and reasonable working hours. These authors further maintain that experienced health workers could help in improving the quality of patient care. They advise in their minimum standards, that at least one specialist is exclusively allocated to the unit at all times together with junior medical staff with the appropriate level of experience.

The current study revealed that none of the nurses in the ICU at CHUK had a specialization in Intensive Care Nursing.

Ingram (1999) argues that education and experience, in general, develop the skills of the nurse towards being more productive and are associated with nurses' positive attitudes towards their job. According to Hasin, et al. (2005) the intensive care nurse (ordinary nurse to work in ICU) should have further training once in at least 5 years in the general intensive care unit. It is also advisable that further training courses be reciprocal so that the nurses working in the general intensive care unit are able to work in the cardiac intensive care unit as well. This could indeed help in promoting the provision of quality patient care.

## **5.2.2 Current structures of quality patient care in the ICU at CHUK**

### **5.2.2.1 ICU Design requirements**

The JFICM (2003) recommendations suggest that the design of an ICU provides access to the Emergency Department, Operating Theatre and imaging.

The findings from this study reveals that the majority of participants [73.2% (n=30)] agreed that the ICU had access to the Operating Theatre 24 hours a day. (Fig. 4.2.) According to the Recommendations by Metropolitan Trauma Services and Consultative Committee on Road Traffic Fatalities (2009), an emergency Operating Theatre must be available on a 24 hour basis. The ICU also had access to the X-ray department 24 hours a

day according to most of participants [97.6% (n=40)] (see Table 4.4) as well as the Emergency Department (78% n=32) (see Fig .4.3).

With regard to the integration of the ICU at CHUK with the other departments, the findings from the researcher's observations demonstrated that the ICU is close to the Physiotherapy Department and X-ray, but was not so with the Operating Theatre, Internal Medicine, Surgery Department and Emergency Department.

The ICU staff finds access to the Operating Theatre difficult because the Physiotherapy Department is between them. The Emergency Department staff have to travel a long distance to access the ICU when transferring a patient. The Radiography Department is easily accessed because it is close to ICU helping the proper coordination of patient care as the radiologists can easily walk into the ICU for patient examination purpose.

In support of this, Moise and Alkins (2004) said that the radiologist assigned to cover the ICU examinations, most likely working from a different building, will read the ICU examinations only at certain times, depending on the limitations for remote image availability.

The unit pharmacy and the main pharmacy are both accessible all the time.

87.8% of the participants agreed that the unit pharmacy was accessible to the ICU (Table 4.5) and 58.5% of the participants agreed that there was easy access to the main pharmacy (Table 4.6).

According to researcher's observation the unit pharmacy and the main pharmacy were accessible to the ICU, and helped in the provision of medicines available twenty four hours. Lucas (2004) argues that, to ensure that it adequately covers clinical problems that may occur in neonatal intensive care unit (NICU) patients, pharmacy provides most of the decentralized services to the NICU. Pharmacists typically work an eight-hour day shift Monday through Friday and when the primary pharmacists are not available, other pharmacy staff provides unit coverage. Lucas (2004) adds also that, information technology enabled to implement a unit-specific neonatal formulary and minimize the possibility of choosing an inappropriate drug product or concentration during order entry.

There were also no written policies available for the integration with other health system departments. Communication between departments was done by phone or the person would go there if there some issues in the unit that needed to be resolved.

In addition, in the ICU at CHUK, there was no adequate and appropriate lighting for clinical observation available and the office space for both doctors and the nurse in charge were small and inadequate. Storage space for equipment such as monitors, ventilators, infusions pump and syringes was there but equipment disorganized making it difficult to find anything. The ICU working environment had no air conditioning yet it is a very small unit hence did not allow for control of temperature, humidity and air exchange as described in the JFICM (2003).

Participants in the current study revealed that ICU did not have enough office space to accommodate nurses and student-nurses. According to the majority of 65.9% (n=27).

The standards in the JFICM (2003) indicates that an ICU should have an appropriate design, providing a suitable environment with adequate space for patient care delivery, storage, staff accommodation (including office space), education and research.

Florida (2007) argues that rooms for the accommodation of staff should be sized and located to provide privacy and to satisfy their intended function.

The researcher's observations confirmed the above perceptions by the participants about design. For example, the unit contained 9 beds for ICU patients.

There were three offices- one for doctors, one for nurses and the third for the nurse in charge.

The latter is also utilised as the unit pharmacy.

There is a small isolation room in the unit with two beds.

The normal bed space in the JFICM (2003) minimum standards was prescribed at least 20m<sup>2</sup> floor areas, but the size between beds in the ICU at CHUK was between 8-10m<sup>2</sup>.

Although the findings indicated that the ICU's bed space was not enough for optimal working conditions, 43.9% of the respondents, which is a substantial percentage, believed that the space was optimal. The hand basin was blocked and everyone had to wash their hands in the nurses' bathroom. Alamedine, Dainty, Deber and Sibbald (2008) argue that physical environment can provide risks to the physical and mental well-being of ICU professionals and then with consequences on patient care.

Concerning the space to accommodate ICU resuscitation material, the participants had mixed opinions because there was a difference of 4 between the agreeing and disagreeing responses.

The ICU level III as defined by the JFICM (2003) is a tertiary referral unit for intensive care patients and should be capable of providing comprehensive critical care including complex multi-system life support for an indefinite period.

This unit must also have adequate space, which allows for the monitoring of patients, the accommodation of resuscitation equipment and medical storage areas (JFICM, 2003).

Stark (2004) states that ICU patients need environments that have a more natural feel and look.

Consequently, this author recommends improved décor, more privacy, reduced environmental stressors such as overcrowding, natural surroundings, and greater patient control over tasks and information.

According to the *Interventional Suite as an Extension of the ICU* (2009), ICU needs for storage space and data management are often not considered during planning. There should be enough space to store plenty of device stock.

According to Reiling (2006), the design of a facility, including its technology and equipment, creates a physical environment in which caregivers provide services.

In Fig.4.6 there were 46.3% (n=19) responses of disagreement and 43.9% (n=18) of responses of agreement that the ICU had adequate room for the phone and other communication material.

The importance of research and education in the ICU has been suggested by Rivers, McIntyre, Morro and Rivers (2005).

The results of the current study showed, however, that 73.2% (n=30) participants disagreed with the existence of a room for education and research in ICU and 19.5% (n=8) agreed.

#### **5.2.2.2 ICU Staffing requirements**

Results from researcher's observations revealed that ICU at CHUK has only three Specialist Anaesthetists working in the ICU and one consultant trained in Intensive Care Medicine working in both the ICU and the Operating Theatre.

The findings from participants confirm this by showing that in the ICU at CHUK a specialist consultant was always available in the ICU (see Fig. 4.7) and could be consulted by trainees (see Fig. 4.8).

JFICM (2003) purported that an ICU should always have a specialist consultant support available to the medical staff in the unit or at least two specialists should have a minimum of 50% involvement in the unit.

In this study, the availability of a specialist consultant could be considered as one of the positive aspects of patient care in ICU at CHUK because it strengthens the multidisciplinary team approach to daily care of patients.

The specialist consultant was in the unit for medical rounds every morning after which he came only by call. Dimick, Pronovost, Heitmiller and Lipsett (2001), argued that having daily rounds by an ICU physician is associated with shorter lengths of stay, lower hospital cost, and decreased frequency of postoperative complications. For the ICU at CHUK the daily rounds of the specialist consultant contributed to improved quality care on the one hand and training of medical student on the other. According to JFICM (2003), during normal working hours, this specialist must be predominantly present in the unit, and available at all times to assist in solving problems in the unit.

Other specialists, for example, the surgeon and the obstetrician were available on call.

The nurse in charge had Honours degree in Nursing Education. 11 of the nurses were RN's (A0); 10 with an Advanced diploma (A1) and 16 were EN's(A2).

The Researcher's observation revealed that it was scheduled in ICU that nurse to patient ratio was 1:1 for all ventilated patients during shift one because during the day (shift one) there were more nurses than in other shifts, and the nurse to patient ratio was 1:2or3 in shifts two and three because the shifts in ICU at CHUK were planned that 4 to 5 nurses worked at shift 2 or shift 3 and during the day 8 to 9 nurses were working in the unit ( because nurses on maternity leave worked a day shift).

These findings showed that, because of the 9 beds in the ICU , the number of nurses was not according to the JFCIM (2003) minimum standards.

The ICU at CHUK, therefore, does not comply with the nurse to patient ratio of 1:1 for the critically ill.



A physiotherapist and dietician were always available in the unit.

The dietetician or nutritionist sometimes doubled up as social workers.

The ICU used a general technician and electrician to repair materials and equipment.

Hasin et al, (2005), stated that the ICU should be staffed by at least one physician for every three to four patients, including the unit director. The Director of the Unit should be a board certified cardiologist, specially trained and accredited as an acute cardiac care specialist, as cardiologists are the physicians better trained to assist patients with ACS and life-threatening cardiac diseases.

Nurses are as important as physicians, and at least 75% of them should have completed formal intensive care training (which includes formal cardiology training).

American Diabetes Association (2008), suggested for people with diabetes should receive medical care from a physician-coordinated team. Such teams may include physicians, nurse practitioners, physician's assistants, nurses, dietitians, pharmacists, and mental health professionals with expertise and a special interest in diabetes.

This is supported by Forshaw, Gossage, and Stephens, et al. (2006) who found that the advantages of specialist care for breast and ovarian cancer are that patients in specialist units are more likely to be investigated and treated comprehensively.

Eight eight percent (88%) of the participants declined the presence of two nurses to the artificially ventilated patients (Fig. 4.9). In the ICU at the CHUK there were only a small number of registered nurses as indicated in the reports-11 registered nurses to 16 enrolled

nurses in the unit (ICU Monthly Reports, 2008). The fact that there were enrolled nurses working in the ICU at CHUK could be a quality assurance problem in itself.

According to Hasin et al. (2005) the ICU should employ only registered nurses and at least 75% of them should have completed formal intensive care training (which includes formal cardiology training). The nursing staff (RNs) should consist of at least 2.8 nurses (RN or trained nurse in ICU) per bed, to cover three shifts per day, so that the minimal number of nurses at any given time is at least one nurse per two beds during day time and one per three beds during night shift.

It is clearly shown by the study findings that this is not the case at CHUK's ICU and, as such, this could be one of the factors leading to poor quality patient care.

In the ICU at the CHUK, nurses were working in three shifts of four to five nurses with a nurse/ patient ratio of 0.4 to 0.6 nurses per bed (ICU Nursing Care Plans Documents, 2008).

With reference to the responsibility of the registered nurse to patient care, 49 % (n=20) of participants disagreed that direct patient care was the responsibility of registered nurses. The findings show that the RNs are somehow not always responsible for direct patient care in the unit.

This, then, could lead to poor quality care when patient care is not offered by RNs but offered by the enrolled nurses without the supervision of RNs.

Foley (2000) argues that patients fare better when American Nurses Association (RNs) play a significant role in their care. RN care makes the difference in reducing complications and allowing patients to be discharged from the hospital on time and on the path to recovery. This is supported by Williams, Donaldson and Watts (1997) who stated that a comprehensive competency-based orientation program for assistive personnel can help the ICU technician be successful.

The findings reflected in Table 4.11 showing 73.2% of the participants agreeing that cleaners did their job as scheduled and this means that the majority of the staff felt that the ICU environment was effectively cleaned at all times. A clean environment helps staff nurses and doctors to work in a safe work environment.

Table 4.12 stating that social workers did their job as scheduled was agreed to by 58.5 % of participants.

In the American Diabetes Association (2008) it is suggested that it is essential to work in the collaborative and integrated team approach. The team should be practiced also in the intensive care unit where they treat critically ill patients, although may need collaborative teams from the trainees in the ICU to the specialist consultant in the unit. The ICU is interdisciplinary team work as indicated in Curtis et al. (2006), where nurses, doctors, clinicians, surgeons, physiotherapist, nutritionist, cleaners, social workers, all work as a complementary team. Clean utility/holding area(s) for storage of supplies is frequently used (Florida, 2007).

According to Occupational Outlook Handbook (2008), medical and public health social workers provide psychosocial support to people, families, or vulnerable populations. They work in interdisciplinary teams that evaluate certain kinds of patients. They also advise family caregivers, counsel patients, and help plan for patients' needs after discharge from hospitals.

In the ICU at CHUK, there is confusion of roles between the social worker and nutritionist.

For instance, the social worker helps poor patients to get food and distributes it to their family, which could be also the role of a nutritionist. But the presence of the Social worker in the unit remained very important as an interdisciplinary ICU team member.

According to Carpenter, Scheneider, Brandon and Wooff (2003) social work makes an important contribution to a multidisciplinary team. Work should be provided in the course of establishing community mental health teams and integrated health and social care services. There was no specific clerical or secretarial support available to the unit.

### **5.2.2.3 ICU equipment**

From researcher's observations the results reveal that there was no availability of dialysis equipment in the unit or enough disposables and trolleys.

The findings at the ICU at CHUK revealed that nurses' observations and blood gas analysis examinations on ICU patients were not done at clinically appropriate intervals. The ICU does not have piped gas supply failure alarms and oxygen supply failure alarms are not automatically activated to monitor oxygen supply pressure.

There is no oxygen analyzer or humidifier of temperature.

There were two old ventilators in the unit which were used on all critically ill patients needing ventilation.

There were aspirators available to all three blocks.

Most of electric syringes were not working.

There were enough drips for infusions and although defibrillators were available, they were seldom used. The importance of fluids infusions is very critical when a patient is admitted in the ICU. According to Rello, (2008), when a patient is admitted to the ward or ICU other important decisions include issues of fluid resuscitation. This include high volume options include the crystalloids (saline and Ringer's solution), whereas lower volume options include hydroxyethyl starch solutions, gelatin, and albumin.

Each patient had access to cardiac monitoring.

This study revealed that the equipment and the monitoring thereof was not appropriate.

The majority of participants 61% (n=25) disagreed with the statement that the equipment and its' monitoring were appropriate, 31.7% (n=13) agreed, while only 7.3% (n=3) were neutral. (See Fig. 4.11.)

According to Hasin et al. (2005), the standard “monitoring equipment”, including “invasive and non-invasive cardiac”, “haemodynamic, and respiratory assessment”, will continue to be the basis of the ICU. The same authors stated that monitoring for the evaluation of autonomous function and electrical instability (heart rate variability, baroreceptor sensitivity, signal average electrocardiogram, and built-in continuous ECG Holter monitoring) is likely to be added to standard equipment (Hasin et al. 2005).

This supported by the JFCIM (2003), which states that equipment and its monitoring should be of an appropriate type and quantity suitable for the function of the unit and appropriate as judged by contemporary standards.

The results reflected in Table 4.13 reveal that the majority of participants 80.5% (n=33) disagreed that the quantity of equipment is suitable for the workload of the unit while 17.1% (n=7) participants agreed. Only one respondent (2.4%) was neutral. Perhaps the reason why 17.1% of the participants agreed that that there is enough equipment is that a permanent generator, which powers electricity to the whole of CHUK, and a mobile X-ray for ICU patients have recently become available and have significantly improved the quality of care, thus helping nursing and medical procedures to be successful and satisfying the rights of patients (Rwanda Ministry of Health Report, 2005).

With regard to the having of a regular system in place for checking the safety of the equipment, (61% (n=25) of the participants disagreed that there was such a system, 22% (n=9) participants agreed while 17% (n=7) were neutral (see Fig. 4.12).

According to Lennon (2008), an ICU is always focused on patient care, the complexity and the amount of technology involved is central to the role it plays in patient care needs. Observations by nurses and blood gas analysis examinations were not done at clinically appropriate intervals in the unit because the necessary machine was not available.

The ICU does not have piped gas supply failure alarms and oxygen supply failure alarms are not automatically activated to monitor oxygen supply pressure.

There is no oxygen analyzer and no humidifier of temperature resulting in a poor working environment. According to Thijs (1997), adequate availability of quality equipment and an optimal personnel allocation are, in addition, important quality issues.

Defibrillators and ventilators are two major resuscitation materials which are important in an ICU, but are very expensive and need a good monitoring. The majority of the participants, about 82.9% (n=34), disagreed that there are enough ventilators in the unit with only six (14.63%) of them agreeing that there are enough. (See Table 4.14)

27% (n=11) disagreed that there are defibrillators in the unit, 63.41 % (n=26) participants agreed that there are defibrillators in the unit, while 10% (n=4) were neutral in Fig. 4.13.

According to the investigations of Hick, Rubinson, O'Laughlin and Christopher (2007), medical equipment and supplies are maintained in quantities sufficient only for daily operations. These authors add that usual medical material distribution chains are vulnerable to disruption during disasters, so additional supplies and equipment may not be readily obtainable (Hick, Rubinson, O'Laughlin and Christopher, 2007).

According to JFCIM (2003), the ICU environment should have appropriate air conditioning which allows the control of temperature, humidity and air change

The results from the Table 4.15 reveal that 51.22% (n=21) of participants disagreed that there is equipment for controlling the temperature in the ICU such as air-conditioners, heaters, thermometers, while 43.9% (n=18) participants agreed.

Chest drainage is frequently necessary for thoracic, cardiovascular, trauma and critical care (Chest drainage equipment, 2009).

On whether there is chest drainage equipment available, 46.34% (n=19) disagreed that there was while 41.46% (n=17) agreed. A further 12.2% (n=5) were neutral. (See Fig. 4.14.)

After researcher's observations, the shortage of materials in the ICU at CHUK was noted. The majority of participants, 70.7% (n=29) agreed that there are specialised beds in the unit, 9.8% (n=4) disagreed and 19.5% (n=8) were neutral. (See Table 4.16).

This confirms in the Interventional Suite as an Extension of the ICU, (2009) in that ICU, patient table should be capable of four-way motion, permitting wide excursion and pivot rotation. The table should also be able to be angled up to 30° from horizontal to facilitate myelographic procedures and Trendelenburg position in cardiovascular emergencies.

#### **5.2.2.4 Operational requirements**

Guidelines and protocols help in improving quality in practices.

The researcher's observations established that, in the ICU at CHUK, there were no guidelines and protocols available to the workers to help them to implement nursing care. There were also no written and defined job descriptions for any of the workers, including the nurse in charge.



At the door of the isolation room was a written circular preventing entry without the protection of a mask, but no protocols to guide workers within that specialized working environment.

New staffs in the ICU were not guided by an orientation programme and guidelines and protocols for nursing interventions in the unit were not available to the nurses.

Only the protocol for the ventilator was in the unit.

The researcher believed that the nurses appeared to be working in an informal manner which contributed to poor quality care.

Observations revealed that there were no protocols for admission and discharge of patient available in the ICU.

There were no specific policies for the transfer of patients in the ICU.

The ICU does not have access to the tertiary imaging services.

Williams, Chaboyer, Alberto, et al. (2007), suggested that the early expectations of the World Federation of Critical Care Nurses (WFCCN) was to develop practical guidelines to assist member associations to set up standards of practice in their respective countries.

As to whether there is a written orientation programme in the unit only 31.7% (n=13) agree that there is with more than 50% disagreeing and the others remaining neutral. (See Fig. 4.15).

Table 4.18 demonstrates that 75.61% (n=31) participants disagreed with the statement that there is in-service training for both medical staff and nurses in the unit, 14.63% (n=6) were neutral, while a mere 9.76% (n=4) agreed.

Hasin et al. (2005), in the study on in service training of personnel, found that the change in patient population and treating policies necessitate appropriate staff training. An increase in the number of complex and/or elderly patients (who may need respiratory treatment, intra-aortic balloon counter pulsation, haemodynamic complex monitoring, or dialysis) and participation in multicentre research projects require suitable training of the physicians and the nursing staff. It is reasonable that for specific specialization, there will be suitable training and accreditation both for physicians and for nurses, especially for the research nurses who will be an integral part of the ICU's nursing staff.

The in service trainings helps in improving the skills of the staff which results in them providing the required quality patient care.

According to JFICM (2003), an ICU should also have a demonstrated commitment to academic education and research.

The research findings for this study done in the ICU reveal that there is no active programme of research in the unit. This was confirmed by the majority of the participants, 68, 3% (n=28) (see Fig. 4.16)

Table 4.19 highlights the fact that nurses did not present their research findings as 75.6% (n=31) agreed with this statement.

Observations by the researcher found that there was no research done by nurses in CHUK. No nurse was observed participating or being involved in the research forum for presentations during the data collection period (20 June to 20 July 2008). Only doctors and medical students were presenting.

According to the introduction and accreditation in Staff training and research Prince of Wales Hospital Intensive Care Unit (2009), for the medical staff, the ICU offers a comprehensive medical training programme. JFICM (2003), indicates that there should also be educational programmes of research for medical staff, a formal nursing education programme and an active research programme for nurses.

The lack of ongoing research in the unit could be an obstacle for evidence-based practice. This can be supported by saying that clinical expertise practice risks becoming tyrannized by evidence. Without current best evidence, practice risks becoming rapidly out of date, to the detriment of patients. In the absence of evidence based practice, one would wonder how patient could access quality care (Sackett, et al., 1996). Williams, Schmollgruber and Alberto (2006), argue that the education programme provides training for junior and senior nurses in the intensive care unit, making the unit a vibrant, multicultural environment.

Sections of presentations on research topics are made by both nurses and doctors in the unit. A Specialist Anaesthetist provides a consultation service to all departments and manages all parenteral nutrition in the hospital.

About the question whether the infection control programmes exist in the unit, 58% (n=24) of the participants disagreed that they exist, 10% (n=4) were neutral, while 32% (n=13) agreed that infection control programmes do, in fact, exist in the unit. (See Fig. 4.17). The fact that the majority of participants (58%) denied the existence of infection control programme speaks volumes as to why there is poor patient quality care in the unit.

In the study conducted by Moro (1996), the presence of an infection control nurse was significantly associated with a lower frequency of substandard care. A great variability was observed by the country in the adoption of 29 patient-care practices, mostly for practices for which clear-cut guidelines are lacking.

The JFICM (2003) recommends, as well, suitable infection control and isolation procedures in the ICU.

### **5.2.3 Process of implementation of quality patient care in ICU at CHUK**

#### **5.2.3.1 Monitoring**

According to the minimum standards of JFICM (2003), the ICUs at university teaching hospitals and referral hospitals were considered at the ICU Level III, where all patients admitted to the unit must be referred for management to the attending intensive care specialist.

Being a university teaching hospital as well as a referral hospital in Rwanda, the ICU at CHUK was classified at Level III, and should now refer patients, who need management, to the attending intensive care specialist. However, in practice, the minimum standards described in the JFICM (2003) were not followed in this hospital because working conditions are not favourable in developing countries such as Rwanda, and many discrepancies were observed because of the realities of the situation.

Many of the requirements needed to improve quality patient care are in shortage and in some cases, do not even exist in the ICU at CHUK.

Patients' files were used to monitor patients. Pulse, ECG, and arterial blood pressure are monitored and the respiratory function is assessed at frequent intervals. The patients' oxygenations are assessed at frequent and clinically appropriate intervals by nurses' observation and the urinary catheters are monitored 24 hours. JFICM (2003) states that the monitoring of patients must be the responsibility of a registered nurse.

The results of Table 4.8, however, revealed that 49 % (n=20) disagreed with the statement that direct patient care was the registered nurse's responsibility.

Furthermore, 88% (n=36) disagreed that there were two nurses all the times for an artificially ventilated patient (see in Fig. 4.9), and 73% (n=30) disagreed that 2-3 post-operative patients with epidural require one nurse (see in Fig. 4.10).

Admission of patients into the ICU at CHUK was done by the doctors of the unit.

The admission was done by the order of the specialist intensivist in charge of ICU, after being called by the doctor from the department where the patient was.

According to Woodhead, Welch, Harrison, Bellingan and Ayres (2006); Houck, Bratzler, Nsa, Ma and Bartlett (2004), efficacy in ICU admission is an important feature of management.

Patients who are admitted to the ICU after being on a medical ward for 1 or 2 days, typically have worse outcomes than those who are admitted directly from the emergency department.

With regard to the monitoring of equipment, the equipment was usually checked by the electricians of the hospital.

The responses to the statement that equipment and its monitoring was appropriate show that majority of participants, 61% (n=25), disagreed (see Fig 4.11). This showed that the ICU personnel were aware of the necessity to improve quality care. The importance of a biomedical engineer was not known to the participants because of the gaps observed between the findings from researcher's observation and findings from participants.

Alarms of malfunction existed on the cardiac monitor and on the ventilator.

Every patient in the unit has a "Propac electrocardiograph machine continuously displaying their for vital signs).

The need for early ICU admission and prompt intervention for high risk patients has been confirmed by recent data in Gibson Area Hospital/Services and (GAHHS') (2009) showed that the specialized nursing care required for our patients helps to create the autonomy, professionalism and collaboration that exist within our multidisciplinary team.

According to JFICM (2003), circulation must be monitored at frequent and clinically appropriate intervals. This monitoring must include the detection of the arterial pulse, ECG display and measurement of the arterial blood pressure. Respiration must be supported by capnography and blood gas analysis. Oxygenation should be assessed at frequent and clinically appropriate intervals by observation, pulse oximetry and blood gas analysis as appropriate. Piped gas supply failure alarms and an oxygen supply failure alarms, which are automatically activated devices to monitor oxygen supply pressure and to warn of low pressure, must be fitted to ventilators. An oxygen analyser must be available to measure oxygen concentration delivered by the ventilators or breathing systems. Alarms for breathing system disconnection or ventilator failure, ventilator volumes and pressures, humidifier temperature, electrocardiograph, pulse oximeter, air embolism must all be attached. MacGregor, Royster (1999), add that effective monitoring technologies should, at a minimum, measure an etiological variable that can be acted upon to improve patient outcome.

The monitoring equipment observation findings were that there was an alarm only for breathing system disconnection or ventilator failure functioning.

In the ICU at CHUK, the specialist doctors prescribe medicines and determine the quantity of oxygen to be administered to the ICU patients every morning and by nurses' call after a new patient admission.

Confirming the importance of oxygen administration and monitoring, Blot, et al. (2007) confirmed that a delay in oxygenation assessment of more than 1 hour was associated

with an increase in time to first antibiotic dose of 6.13 hours (95% CI = 3.42 to 8.83 hours;  $P < 0.001$ ). In addition, a delay in oxygenation assessment of more than 3 hours was associated with an increased risk for death (relative risk = 2.24, 95% CI = 1.17 to 4.30). Multivariable analysis, adjusting for potential confounders, revealed that delayed oxygenation assessment (>3 hours) was an independent risk factor of death (hazard ratio = 2.06, 95% CI = 1.22 to 3.50). This shows the importance of the assessment of ICU patient by health workers. According to Van de Werf, Betriu, Blomstrom-Lundqvist, et al. (2008), monitoring the oxygen for the ICU patient helps in deciding the need for oxygen administration or, in severe cases, ventilatory support. The patients' oxygenations were assessed at frequent and clinically appropriate intervals by means of nurses' observation in the ICU at CHUK (nursing file Appendix 12).

The pulse, ECG, and arterial blood pressure were monitored and the respiratory function was assessed at frequent intervals.

### **5.2.3.2 Interventions or measures taken during patient care**

Airways and respiratory circuit pressure were monitored continuously and electrocardiograph-equipment continuously displayed the electrocardiographs. Every patient in the ICU has an electrocardiograph monitoring machine which display electrocardiographs.

Urinary catheters were also monitored twenty-four hours a day (see Appendix 12). According to Blot, Rodriguez, Solé-Violán, Blanquer, Almirall and Rello (2007), their clinical experience indicates that oxygen assessment and antibiotic administration should



be done promptly, because postponing oxygenation assessment is associated with a significant delay in initiating antibiotics (Blot, et al., 2007).

### **5.2.3.3 Infection control**

Researcher's observation showed that there were no guidelines for the use of masks and other protection material in the ICU at CHUK.

To confirm the importance of gloves, masks and other protection material, Grundmann, Aires-de-Sousa, and Boyce (2006) suggested that guidelines recommend health-care workers wear gloves and gowns when caring for Meticillin-resistant *Staphylococcus aureus* (MRSA) colonised or infected patients. However, there is no consensus on the indications for wearing a mask (Working party on Infection Prevention (WIP), 2007).

Gibson Area Hospital/Services (GAHHS') (2009) suggest that an infection control nurse monitors the hospital departments and employees closely to ensure a safe environment for those at the hospital.

This can be linked to the role of the social worker in the public health, showing how the social worker can help in infection control to improve quality patient care.

Guidelines from the Netherlands and the Society for Healthcare Epidemiology of America (Muto, Jernigan, Ostrowsky, Richet, Jarvis, Boyce, 2003) recommend always wearing a mask when entering the room of patients with MRSA. On the contrary, other guidelines recommend the use of masks only if the health-care workers are to be exposed to droplets or aerosolized secretions of patients with MRSA in lower respiratory

secretions (Coia, Duckworth, Edwards, Farrington, Fry, Humphreys, 2006; New Zealand Ministry of Health (NZMoH), 2002). Cooper, Stone, Kibbler, et al. (2003) indicate that the role of a mask as an effective measure in preventing the transmission of meticillin resistant staphylococcus aureus (MRSA) by health-care workers is questionable and warrants a systematic review.

JFCIM (2003) suggested that an isolation area must be capable of isolation procedures.

With regard to the ICU at CHUK, the nurses collaborate with patients' families in the protection from ICU microbes in order to prevent contamination of the family members of patients in the ICU. Isolated patients are not allowed visitors and only doctors and nurses, working in that room are allowed to enter.

#### **5.2.3.4 Documentation**

Documentation is very important in the improvement of quality patient care because it help to the clinician to know all the facts pertaining to the patient.

Nursing reports at CHUK are often incomplete with the nursing care plans and nursing duties written in the handbooks. According to the researcher's observation, nursing reports were written in the booknotes and in the patients files (the place in shown on Appendix 12).

From the current study, a large majority, 97.6 %, of the participants responded that admissions were properly documented in the register (Table 4.17).

Documenting the care of hospitalized patients and their families is important for several reasons.

It is mandated for legal reasons, for assessing and evaluating care, for quality improvement and for research purposes. Studies have indicated the importance of documentation for quality improvement in evaluating the quality of care (Kirchhoff, Anumandla, Foth, Lues and Gilbertson-White, 2004). Care providers may provide good care but document it poorly.

#### **5.2.3.5 Communication**

Findings from the researcher's observation with the checklist revealed that the ICU does not have guidelines to monitor nurses' practices or written protocols outlining the role of the nurse in charge's role. These can help in nursing practice because the nurses updates their knowledge in using the written guideline and protocols in practices. Reader, Mearns, and Cuthbertson (2007) stated that patient safety research has shown poor communication among intensive care unit (ICU) nurses and doctors to be a common causal factor underlying critical incidents in intensive care.

In the ICU at CHUK, written nursing reports are very poor because of the lack of written instructions to guide them, thus contributing to poor communication between nurses and doctors. This, in turn can result in poor quality patient care.

Walter, Melissa, and Elizabeth (2008), stated that errors in medicine are most frequently due to an interaction of human factors like poor teamwork and poor communication rather than individual mistakes.

The isolation room, also, does not have a policies or procedures guideline and there are not protocols or guideline for the admission and discharge of ICU patients. Nursing reports and doctor's prescriptions were the major communication tools in the ICU for patients needs. The ICU phone, when it is in working order, helps in the communication between services.

### **5.3 Conclusion**

It will not be possible in the ICU at CHUK, to produce errors in the implementation of quality of patient care if they use indicators of quality, acceptability, sensitivity to change, feasibility, reliability and validity. This will optimize their effectiveness in quality improvement strategies in the design,, staffing requirement issues, equipment, operational requirements issues and for the monitoring of ICU patients and equipment.

The majority of participants perceived that the ICU is well integrated into the other departments in CHUK, such as the Emergency Department, Operating Theatre, main pharmacy and unit pharmacy. But the ICU was found lacking in adequate and appropriate lighting for clinical observation, office space both for nurses and doctors and

storage space for ICU material and equipment in order to meet the requirements of quality care at Level III according to JFICM (2003).

While registered nurses seem to be adequate, none of them was qualified in Intensive Care nursing, including the nurse in charge.

The medical specialist support present was only the anaesthetist specialist who was not specialized in intensive care medicine and served both the Operating Theatre and ICU.

There was not enough equipment was the number of patients and it was not well maintained because of the lack of trained technicians.

There were no written policies, guidelines or procedures guiding the care of patients in the ICU at CHUK so the quality of care is not guaranteed.

There were no job descriptions available to any of the health workers.

## **5.4 Recommendations**

### **5.4.1 Recommendations to Ministry of Health in Rwanda**

The Ministry of Health must oversee the implementation of policies and protocols of quality patient care.

The Ministry must also supervise the action plan for quality patient care in the health settings.

#### **5.4.2 Recommendation to CHUK Rwanda**

The ICU is in need of equipment like ventilators, aspirators and equipment for dialysis which needs to be budgeted for by CHUK as quality cannot be improved without equipment.

#### **5.4.3 Recommendation for nursing practice**

- CHUK management must create the policies and written protocols guiding workers and ensure that the documentation of nursing, medical care and nursing procedures at the unit level are fully implemented.
- Nursing practice must be planned and supervised by an experienced nurse who is trained in nursing administration.
- Hospital and nursing administration must create the policies and procedures of patients monitoring and equipment monitoring for good quality patient care.
- Infection control protocols must be implemented in the ICU unit and, in fact, the whole hospital. Create a post for a unity supervisor.
- Protocols or guidelines for the documentation of medical and nursing care must be implemented and then supervised by trained managers.
- The policy for ICU patients' admission and discharge must be clear and revised according to the requirements and conditions within the ICU at CHUK are working.
- More qualified staff is needed in the quality improvement programme.

#### **5.4.4 Recommendation for further Research**

The exploration of the effectiveness work shift in the ICU at CHUK is needed.

Impact of nurse to patient ratio on the quality patient in ICU

The same study to be done throughout the country is needed, as this study was done in only one hospital

#### **5.4 Limitations**

The study was limited in the sense that the researcher found it difficult because:

The research only covered a limited period of time, as only one month was used to collect data.

The research applied only to CHUK and, therefore cannot be generalised in other hospitals in Rwanda.

The small sample constitutes another limitation in terms of generalisation.

The research covered only two of the three aspects within the chosen conceptual framework, namely structure and process, leaving outcome to further research.

The study only intended to establish a baseline from which the improvement in quality of care, as well as further research, could be directed.

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## **APPENDICES**

## Appendix 1: Instrument

**Questionnaire administered to: Doctors, nurses, medical-students and nurse-students all working in the ICU.**

### Instructions

*Dear respondent, this is the questionnaire which will allow us to get information about this study. Please complete by ticking the appropriate box.*

### **I. Demographics**

#### **1. Gender**

Female	<input type="checkbox"/>
Male	<input type="checkbox"/>

#### **2. Age in years**

21-30	<input type="checkbox"/>
31-45	<input type="checkbox"/>
46-60	<input type="checkbox"/>
60+	<input type="checkbox"/>

#### **3. Professional categories**

1. Doctor (General doctor or Specialist)
2. Nurse's category (RN or EN)
3. Medical student
4. Student nurse

#### **4. Please specify the number of years working in ICU**

Less than 1	<input type="checkbox"/>
1 to 3	<input type="checkbox"/>
3 to 7	<input type="checkbox"/>
7+	<input type="checkbox"/>

University of KwaZulu-Natal  
Faculty of Humanities, Development and Social Sciences  
School of Language, Literature and Linguistics

Programme: FRENCH

Signature: Harche

Date: 26/03/09

registered nurses?			
13. Does an artificially ventilated patient with more complex support always have at least two nurses responsible for him?			
14. Do you agree that post-operative patients admitted for overnight monitoring and treatment with a continuous epidural require 1 nurse per 2-3 patients?			
15. Does the cleaning staff do their job as scheduled?			
16. Do the social workers do their job as scheduled?			

#### IV. ICU equipment

*Please tick the appropriate box*

Items	Yes	No	Don't know
17. Is the equipment and its monitoring appropriate for the workload of the unit?			
18. Is there enough equipment for the workload of the unit?			
19. Is there a regular system in place for checking the safety of the equipment in the ICU			
20. Are there enough ventilators for critically ill patients?			
21. Are there defibrillators in the unit?			
22. Is there equipment to control the patients' temperature?			
23. Is there chest drainage equipment in the ICU?			
24. Are there are specialized beds in the unit?			



## V. Operational Issues

*Please tick the appropriate box*

<b>Items</b>	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
25. Has every patient admitted been documented?			
26. Does the unit have a written orientation program for new staff?			
27. Does the unit have an in-service training program for both the medical and nursing staff?			
28. Is there an active research program for the unit?			
29. Do nurses participate in presenting the findings of some pieces of research?			
30. Is there an infection control program in the unit?			
31. Does the ICU have 24 hour access to the pharmacy of the unit?			
32. Does the ICU have 24 hours access to the main pharmacy of the hospital?			

## Appendix 2: CHECKIST

### Checklist of researcher's observations

#### Instructions:

*The questionnaire will be answered by Yes or No.*

Observations	YES	NO
<b>Structure standards</b>		
<b>Design</b>		
1. An isolation room in the unit		
2. 24 hours access to the tertiary imaging services		
3. Equipment storage area exist		
4. Adequate and appropriate lighting		
5. Office space for nurse in charge adequate		
6. ICU design appropriate to receive critical ill patients		
7. Humidifier of temperature available for ventilation		
<b>Staffing</b>		
8. Medical director trained in Intensive Care Medicine		
9. Medical intensivist and anaesthetist available		
10. Post registration qualification in intensive care of nurse in charge		
11. At least one nurse educator		
12. Physiotherapist available		
13. Dietician available		
14. Biomedical engineer available		
15. Specialists consultants always available to the medical staff		
16. Specialists are most or easily available		
17. Nurse-patient ratio 1:1		
18. Appropriate clerical and secretarial support		
<b>Equipment</b>		
19. Are there piped gas supply failure alarms		

20. Is oxygen supply failure alarms automatically activated		
21. Is oxygen analyser available		
22. Alarms for breathing system disconnection		
<b>Operational requirement</b>		
23. Nurse in charge's role defined		
24. Report after discharged patient's		
25. Specific policies for admissions and transfer		
26. Patients' admission and discharge protocols		
27. Written isolation procedures protocols exist		
<b>Process standards</b>		
<b>Monitoring</b>		
28. As ECG detection monitor		
29. Pulse detection monitor		
30. Blood gas analysis exams for ICU patients always done		
31. Patient's oxygenation assessed at frequent and clinically appropriate intervals		
32. Airways and respiratory circuit pressure monitored		
33. Cardiac monitor equipment to monitor patients continually displays the electrocardiograph		
34. Monitoring of patient with tracheotomy		
35. Monitoring of BP to the patient, always done		
36. Monitoring of Oxygen to the patient, always done		
37. Monitoring of equipment		
<b>Infection control</b>		
38. Use of mask for all patient when dressing wounds		
39. Use of mask for the isolation room		
40. Arterial blood pressure monitor		
41. Respiratory function assessed at frequent and clinically appropriate intervals		

<b>Documentation</b>		
42. Nursing duties reports documented		
43. Nursing care plans documented		
<b>Communication</b>		
44. Availability of phone in the unit		
45. Nursing duties reports used as communication instrument between health workers?		
46. If nurses used the doctor's report to know well their patients		

### Appendice 3: Questionnaires en Français

#### Questionnaire réservé au personnel œuvrant aux Soins Intensifs

(Médecins, Résidents, Infirmiers, Infirmiers stagiaires)

#### I. Données démographiques

*Veillez cocher la bonne case*

##### 1. Genre

Masculin	<input type="checkbox"/>
Féminin	<input type="checkbox"/>

##### 2. Age

21-30 ans	<input type="checkbox"/>
31-45 ans	<input type="checkbox"/>
46-60 ans	<input type="checkbox"/>
> 60ans	<input type="checkbox"/>

##### 3. Catégorie professionnelle

1. Médecin (Généraliste ou Spécialiste)
2. Infirmière (RN ou EN)
3. Etudiant en médecine
4. Infirmier stagiaire

##### 4 Expériences aux soins intensifs (en année)

< 1an	<input type="checkbox"/>
1 à 3 ans	<input type="checkbox"/>
3 à7 ans	<input type="checkbox"/>
> 7 ans	<input type="checkbox"/>

## II. Conception de Soins Intensif

Questions	Oui	Non	Ne sais pas
1. Est-ce que le soin intensif peut accéder à la salle d'opération 24 heures sur 24 ?			
2. Est-ce que le soin intensif peut accéder au service de radiologie 24 heures ?			
3. Est-ce que le soin intensif peut accéder au service des Urgences 24 heures ?			
4. Existe-t-il un bureau adéquat pour infirmiers et infirmiers stagiaires travailler dans un même espace ?			
5. Existe-t-il un bureau adéquat pour médecins et médecins stagiaires travailler dans un même espace ?			
6. Y a-t-il un espace adéquat pour travailler avec l'équipement de réanimation ?			
7. Y a-t-il un espace adéquat entre les lits pour permettre de circuler pendant le travail?			
8. Est-ce que le téléphone et autre matériel de communication est accessible ?			
9. Existe-t-il un bureau destiné à la formation et à la recherche dans l'unité?			

## III. Questionnaires en rapport avec le personnel

Questions	Oui	Non	Ne sais pas
10. Y a-t-il toujours un Médecin consultant disponible pour l'encadrement du personnel ?			
11. Y a-t-il toujours un Médecin consultant disponible pour l'encadrement des stagiaires ?			
12. Est-ce que le personnel responsable des malades est diplômé ?			
13. Est-ce que les malades sous ventilation mécanique sont toujours surveillés par 2 infirmiers(ères) ?			
14. Est-ce que le rapport infirmier / patient en cas de surveillance d'une péridural en postopératoire est toujours de 1 sur 2-3 ?			
15. Est-ce que le personnel chargé du nettoyage des locaux répond aux besoins ?			
16. Est-ce que les assistants sociaux répondent aux besoins en service social?			

#### IV. Equipements de soins intensifs

Questions	Oui	Non	Ne sais pas
17. Est-ce que l'équipement disponible et son maintien sont appropriés pour le bon fonctionnement du service?			
18. Y a-t-il suffisamment d'équipement pour le bon fonctionnement du service?			
19. Existe-t-il un système régulier pour le contrôle de l'équipement dans le service?			
20. Y a-t-il une quantité suffisante de respirateurs ?			
21. Y a-t-il des défibrillateurs dans le service?			
22. Y a-t-il l'équipement pour contrôler et régler la température dans le service?			
23. Y a-t-il l'équipement pour effectuer des drains thoracique dans le service?			
24. Y a-t-il des lits spécialisés pour les malades dans le service?			

#### V. Cadre opérationnel du service

Questions	Oui	Non	Ne sais pas
25. Est-ce que chaque malade admis est documenté ?			
26. Est-ce que le service a-t-il un programme écrit pour l'orientation de nouveaux employés ?			
27. Est-ce que le service a un programme de formation continue pour les infirmiers et pour les médecins ?			
28. Est-ce qu'il ya un programme actif de recherche dans le service ?			
29. Est-ce que les infirmier(e)s présentent des rapports de recherche ?			
30. Est-ce qu'il existe un programme de contrôle d'infection dans le service ?			
31. Est-ce que le soin intensif a accès à la pharmacie du service 24 heures sur 24 ?			
32. Est-ce que le soin intensif a accès à la pharmacie centrale 24 heures sur 24 ?			

#### **Appendix 4: Information document**

Dear colleague,

**Re:** Participation in a study on “A descriptive study of the structure and process standards in the Intensive Care Unit (ICU) at the University Central Hospital of Kigali (CHUK) in Rwanda”.

I, Timothée Shahidi am a masters student in nursing management at the University of KwaZulu-Natal, South Africa. As part of the qualification for my program, I am required to do a research project on an area of interest. My study is titled “**A descriptive study of the structure and process standards in the Intensive Care Unit (ICU) at the University Central Hospital of Kigali (CHUK) in Rwanda**”.

This information document aims to inviting you to participate in this study. Although the study will not benefit you directly, but it will help us to know the factors that contribute to the quality patient care in ICU, CHUK. The study will be done by completing the questionnaire that will take about 10 minutes. You are free to ask any question about the study and the researcher will be available to answer and explain as necessary.

Your participation in this study is voluntary; and you are under no obligation to participate. You have right to withdraw any time if you feel uncomfortable to continue.

The study data will be coded and will not be linked your name any way, and the questionnaire is anonymous. The anonymity will be maintained by not writing anywhere on the questionnaire and buy using a coding system on the questionnaire, in such way that it will not be possible to connect a participant’s responses to a name or a person.

Bellow is the researcher’s and supervisor’s address that you may contact if there is a need to do so.

Thank you

Signature: .....

Shahid Twahirwa Timothee  
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**Appendix 5: Consent form**

DECLARATION

I,.....(Full names of participant),  
In signing this document I am giving my consent to take part in the study titled “A descriptive study of the structure and process standards in the Intensive Care Unit (ICU) at the University Central Hospital of Kigali (CHUK) in Rwanda”.

I have read the information document, and I understood its contents, the nature of the research project was explained clearly to me. The permission is granted to me and I was made aware that participation is voluntary.

I also understood that I can withdraw at any time of the project if I do not feel comfortable, and my personnel identification will not be linked to the study data, so that the anonymity be maintained.

Signature of participant: .....

Date: .....

## Appendix 6: Document d'information

Cher Collègue,

**Objet:** Invitation a la participation a l'étude intitulée "A descriptive study of the structure and process standards in the Intensive Care Unit (ICU) at the University Central Hospital of Kigali (CHUK) in Rwanda".

Moi, Timothée Shahidi étudiant a l'Université de KwaZulu-Natal, South Africa ; School of Nursing . Faisant parti du programme de mes études, je suis entrain de conduire l'étude intitulée "A descriptive study of the structure and process standards in the Intensive Care Unit (ICU) at the University Central Hospital of Kigali (CHUK) in Rwanda".

Par la présente, nous voudrions vous fournir des informations nécessaires a ladite recherche et vous inviter a y participer.

Cependant vous ne bénéficiez pas directement de cette étude, mais ses résultats nous aiderons a connaître les facteurs contribuant a la qualité de soins aux maladies hospitalisées aux Soins Intensifs du CHUK.

Le répondant remplira un questionnaire qui lui prendra approximativement 10 minutes. Vous pouvez poser n'importe quel question pour éclaircissement, l'auteur de cette recherche sera disponible d'y répondre. Vous êtes libre de participer ou de se retirer de l'étude, sans aucune conséquence. Votre participation est volontaire.

Le questionnaire est anonyme, le nom du répondant n'apparaîtra nul part sur le questionnaire parce que le système de codage sera utilisé.

L'adresse de l'auteur et du superviseur de l'étude sont mentionnées ci-dessous, vous pouvez nous contacter si besoin.

Merci

Signature: .....

Mr. Shahidi Twahirwa Timothee

UKZN, Howard College

P.O. BOX. 4041 Durban, South Africa

E-mail: [timoshatw@yahoo.fr](mailto:timoshatw@yahoo.fr)

Superviseur:

Zerish Zethu Nkosi

UKZN, Howard College

5<sup>th</sup> Floor, School of Nursing

[Nkosizz@ukzn.ac.za](mailto:Nkosizz@ukzn.ac.za)

## Appendix 7: Document de consentement

### DECLARATION

Je soussigné ..... (Nom et prénom du répondant),

Acceptant de signer ce document, je donne mon consentement de parti de l'étude intitulée " A descriptive study of the structure and process standards in the Intensive Care Unit (ICU) at the University Central Hospital of Kigali (CHUK) in Rwanda ”.

J'ai lu et bien compris le contenu du "Document d'information", la nature du projet de cette recherche m'a été clairement explicite. Je donne mon accord après avoir compris que la participation est volontaire.

J'ai aussi compris que je peux me retirer de participer à cette recherche aussitôt que je me sens inconfortable de continuer, mon nom n'apparaîtra nul part sur le questionnaire parce que le système de codage sera utilisé, ainsi l'anonymite sera maintenue.

Signature du participant: .....

Date: .....

**Appendix 8: Letter to the Director of CHUK**

To: The Director  
University Central Hospital of Kigali  
P.O. Box, 655 Kigali- Rwanda

Mr. Shahidi Twahirwa Timothee  
UKZN, Howard College  
Email : timoshawt@yahoo.fr  
Tel: 0731410235

Dear Sir,

**RE: APPLICATION FOR A PERMISSION TO CONDUCT A RESEARCH PROJECT AT THE UNIVERSITY CENTRAL HOSPITAL OF KIGALI (CHUK)**

I am a student at UKZN Durban, South Africa taking Masters Course in Nursing Management for academic year 2008. I am conducting a research project entitled “A descriptive study of the structure and process standards in the Intensive Care Unit (ICU) at the University Central Hospital of Kigali (CHUK) in Rwanda”.

The purpose of this study was to describe the structure and process standards in order to establish the baseline in the ICU at CHUK and to highlight gaps in the current quality patient care for further improvement. The information obtained is hoped may be of relevance to the nursing department and the institution as whole.

I therefore request your permission to allow me collect the data from the hospital, for this study. I attached to this document the copy of my research proposal.

I hope you will consider my application with favour. Thanks in advance

Yours faithfully,

Signature \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Date: \_\_\_\_\_

Shahidi Twahirwa Timothee

Supervisor: Ms Nkosi Zethu

## Appendix 9: Acceptance to collect data



### CENTRE HOSPITALIER UNIVERSITAIRE UNIVERSITY TEACHING HOSPITAL

CENTRE HOSPITALIER UNIVERSITAIRE DE KIGALI (CHUK)

Kigali, 10/07/2008

#### PROTOCOL AUTHORIZATION

Research title:

ANALYSIS OF FACTORS CONTRIBUTING TO QUALITY PATIENT CARE IN THE  
INTENSIVE CARE UNIT (ICU) AT UNIVERSITY CENTRAL HOSPITAL OF KIGALI  
(CHUK) IN RWANDA.

#### PRINCIPAL INVESTIGATOR ADDRESS

Name: Shahidi Twahirwa Timothee  
University of KwaZulu-Natal  
Tel: + 27731410235  
Email: [timoshatw@yahoo.fr](mailto:timoshatw@yahoo.fr)

#### Acceptance of Responsibility and Ethics considerations

If this application is accepted, I (we) declare that I (we) shall be actively engaged in, and shall be in day-to-day control of the project and I grant to supply in the CHUK a copy of my work after publication of my research.

Signature of principal investigator

Date... *Shahidi Twahirwa Timothee*  
*10/07/2008*

#### AUTHORIZATION

*We have the pleasure to announce to you that the research unit and the Director of CHUK analyzed and considered relevant your entitled project and authorize you to conduct your study in the CHUK.*

Signature of chair person of CHUK research unit  
Dr MUGANGA Narcisse

Date... *10/07/2008*

Signature of Director of CHUK  
Dr HATEGEKIMANA Theobald

Date... *11/07/2008*



**Appendix 10: Letter to the Director of King Faisal Hospital**

To: The Director  
King Faisal Hospital  
P.O. Box, 2534 Kigali- Rwanda

Mr. Shahidi Twahirwa Timothee  
UKZN, Howard College  
Email : timoshatw@yahoo.fr  
Tel: 0731410235

Dear Madam

**RE: APPLICATION FOR A PERMISSION TO CONDUCT A RESEARCH  
PILOT STUDY**

I am a student at UKZN Durban, South Africa taking Masters Course in Nursing Management for academic year 2008. I am conducting a research project entitled "A descriptive study of the structure and process standards in the Intensive Care Unit (ICU) at the University Central Hospital of Kigali (CHUK) in Rwanda".

The purpose of this study was to describe the structure and process standards in order to establish the baseline in the ICU at CHUK and to highlight gaps in the current quality patient care for further improvement. The information obtained is hoped may be of relevance to the nursing department and the institution as whole.

I therefore request your permission to allow me conduct a pilot study from your hospital.

I attached to this document the copy of my research ethics and proposal.

I hope you will consider my application with favour. Thanks in advance .

Yours faithfully,

Signature \_\_\_\_\_

Date \_\_\_\_\_

Shahidi Twahirwa Timothee

Signature \_\_\_\_\_

Date: \_\_\_\_\_

Supervisor: Ms Nkosi Zethu

**Appendix 12: ICU patient's file**

CHUK  
FICHE n°  
NOM :  
Prénom :

Feuille de Surveillance : Soins Intensifs

Date d'entrée :

Date : du au

Age :  
Poids :  
Sexe :

Taille

LIT :

DIAGNOSTICS :  
INTERVENTIONS :

JOUR/U.S.I.	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8	TOTAL	
PERFUSIONS :																										
SANG																										
FFP																										
GELO.																										
ALB.																										
MEDICAMENTS I.V.:																										
MEDICAMENTS P.O.:																										
Alimentation N/ régime																										
Boissons																										
Nursing : toilette																										
Soins yeux																										
Soins bouche / soins tube																										
soins canule externe / interne																										
A.E.T + physio																										
Prévention escarres / soins																										
Position Reinstaller																										
Pansements :																										
Drains																										
Diurèse																										
Sudations																										
Vomissements																										
Selles																										
Asp. Gast. SNG																										
Date :	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8		
T°																										
PIs																										
TA syst.																										
TA diast.																										
PVC																										
Resp.:																										
SatO <sub>2</sub>																										
Conscience																										
Glycosurie / Acétonurie																										
Glycémie																										
Insuline																										
Infirmière responsable:																										
cult. / G.E.																										
Hémato / iono																										
RX thorax / E.C.G.																										
E.E.G. / F.O. / SCAN																										
Consignes particul.																										
Sang en réserve																										
Etat compat.																										
Kiné																										

TOTAL entrées

TOTAL Sorties

BILAN



**PROGRAMME DE PERFUSION**

DATE : du \_\_\_\_\_ au \_\_\_\_\_

N°	SOLUTES	ADDITIFS	Reçu

VOIE CENTRALE : Type placée le :	PERIPHERIQUE : placée le: où
----------------------------------	------------------------------

SURVEILLANCE GENERALE - PROBLEMES PARTICULIERS :

SURVEILLANCE RESPIRATOIRE :  
 RESP. SPONTANEE  
 VENTILATION ARTIFICIELLE L 02 / MIN  
 INTUBATION PLACEE LE :  
 MODE : TUBE N° :  
 VOL. : SatO<sub>2</sub>  
 FIO<sub>2</sub> : Sevrage :  
 FREQ. :  
 TRACHEOTOMIE DU :  
 CANULE N° :  
 Fils à ôter :

**A SIGNALER :**

MOBILISATION : PATIENT A RISQUE D'ESCARRE  OUI  
 CHANGEMENT DE POSITION TOUTES LES.....HEURES  
 PREVENTION :  MATELAS SPECIAL  MOUSSE SOUS LA TETE  TALONS SURELEVES  
 A SIGNALER : ESCARE / PLAIE TRAUMATIQUE  
 TRAITEMENT ENTREPRIS :

ALIMENTATION :  
 SONDE VESICALE : n° PLACEE LE:  URINAL / BASSIN DE LIT  
 A SIGNALER :  
 INCONTINENCE :  URINES  SELLES PAS DE SELLES DEPUIS.....

ALIMENTATION :  A JEUN  ASP. GAST.  SONDE PLACEE LE:  
 REGIME  AUTONOME  
 ALIMENTATION PAR SONDE  PAR SONDE DE FEEDING  AIDE / AIDE COMPLETE  
**A SIGNALER**

DRAINS	LOCALISATION	JOUR	A ÔTER le:	A NOTER (Observations)	DESCRIPTION PANSEMENTS PLAIES CHIRURGICALES :
THORACIQUES					
ABDOMINAUX					
REDONS					
FILS					

PRISE EN CHARGE D'UNE CRISE EMOTIONNELLE  
 OUI  
 PATIENT DESORIENTE  
 MESURE DE PROTECTION

EXAMENS PREVUS :	TRAITEMENT SPECIFIQUE : YEUX: BOUCHE: AUTRE :	ISOLEMENT :
		ALLERGIE :

**Appendix 13: Support letter from Biostatistician**



**UNIVERSITY OF  
KWAZULU-NATAL**

**School of Nursing**

Mr Timothee Shahidi  
Student Number: 206519799  
Masters in Nursing Management

10 March 2009

To whom it may concern

I hereby confirm that Mr Timothee Shahidi, the Masters student in Nursing Management at the University of KwaZulu-Natal, School of Nursing, consulted me several times during the second semester of 2008 academic year seeking for guidance and assistance with statistical analysis relating to his Masters project.

Sincerely,

A handwritten signature in black ink, appearing to read 'Mrs. NM Nkwanyana'.

Mrs. NM Nkwanyana

UKZN Biostatistician

## Appendix 14: Ethical approval

20 June 2008

Mr TT Shahidi  
School of Nursing


Dear Mr Shahidi:

**ETHICAL CLEARANCE APPROVAL NUMBER : FECHSC 051/08**

I wish to confirm that ethical clearance has been granted for the following project:

"Analysis of Factors Contributing to Quality Patient Care in the Intensive Care Unit (ICU) at the University Central Hospital of Kigali (CHUK) in Rwanda"

Yours faithfully

  
SUDH REDDY  
PRINCIPAL FACULTY OFFICER  
HEALTH SCIENCES

PS: The following general condition is applicable to all projects that have been granted ethical clearance:

THE RELEVANT AUTHORITIES SHOULD BE CONTACTED IN ORDER TO OBTAIN THE NECESSARY APPROVAL SHOULD THE RESEARCH INVOLVE UTILIZATION OF SPACE AND/OR FACILITIES AT OTHER INSTITUTIONS/ORGANISATIONS. WHERE QUESTIONNAIRES ARE USED IN THE PROJECT, THE RESEARCHER SHOULD ENSURE THAT THE QUESTIONNAIRE INCLUDES A SECTION AT THE END WHICH SHOULD BE COMPLETED BY THE PARTICIPANT (PRIOR TO THE COMPLETION OF THE QUESTIONNAIRE) INDICATING THAT HE/SHE WAS INFORMED OF THE NATURE AND PURPOSE OF THE PROJECT AND THAT THE INFORMATION GIVEN WILL BE KEPT CONFIDENTIAL.

cc: Head of School  
cc: Supervisor

