

**AN EVALUATION OF THE EFFECTIVE USE OF
COMPUTER-BASED NURSING INFORMATION SYSTEM
IN PATIENT CARE BY PROFESSIONAL NURSES AT
DR GEORGE MUKHARI HOSPITAL**

M.Cur. (Health Services Management)

MMN NTSOELE

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**AN EVALUATION OF THE EFFECTIVE USE OF COMPUTER-BASED
NURSING INFORMATION SYSTEM IN PATIENT CARE BY
PROFESSIONAL NURSES AT DR GEORGE MUKHARI HOSPITAL**

by

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RESEARCH DISSERTATION

Submitted in partial fulfilment of the requirements for the degree of

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(School of Health Care Sciences)

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2011

DECLARATION

I declare that AN EVALUATION OF THE EFFECTIVE USE OF COMPUTER-BASED NURSING INFORMATION SYSTEM IN PATIENT CARE BY PROFESSIONAL NURSES AT DR GEORGE MUKHARI HOSPITAL hereby submitted to the University of Limpopo, for the degree of Master of Curationis in Health Services Management has not previously been submitted by me for a degree at this or any other university; that is my work in design and in execution, and that all material contained herein has been duly acknowledged.

MMN NTSOELE (Ms)

2010 / 11 /23

Date

.....

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To you all, my sincere thanks and love. I wish you all strength in your endeavours. May people be as caring and helpful to you as you have been to me.

DEDICATION

I dedicate this study to Almighty God who opened gates of opportunities for me, as well as to my children Mmereki, Tshegofatso and Keketso, the gifts of my life who believed in me and gave me the motivation to do my best.

ABSTRACT

An evaluation of the effective use of Computer-based Nursing Information System (CNIS) in patient care by Professional nurses at Dr George Mukhari Hospital.

The aim of the study was to evaluate if the CNIS is being used effectively for patient care by professional nurses in different nursing units.

The objectives of the study were to describe the perceptions of professional nurses regarding the role of CNIS, to determine the effective use of CNIS, and to identify barriers to the effective use of CNIS in patient care.

Quantitative descriptive simple survey research design was used. The setting was at Dr George Mukhari Hospital. The population was all professional nurses who are working on day and night shifts in the wards that have computers installed for the purpose of patient care. Non probability, convenience sample of 120 professional nurses was used. Data was collected utilising a self report questionnaire with 41 closed ended and one open ended questions. Raw data was fed into a SPSS with the assistance of a statistician. Data analysis was conducted through the use of descriptive statistics.

The findings are that professional nurses are not using CNIS effectively in patient care. In a unit with a bed occupancy rate of 30-40 patients, and where 30-40 patients are attended to on a daily basis, only 0-2 Nursing Care Plans (NCP) or entries are performed by professional nurses. The majority of professional nurses (56%) never updated NCPs or made an entry before. This is despite the fact that they have indicated positive perceptions with regard to the role of CNIS in patient care. Increased workload, inadequate number of computers, and lack of continuous in-service training were cited by the majority as barriers to the effective use of CNIS in patient care.

A problem of increased workload will remain a challenge for as long as available technology is not used appropriately. Hence, hand held devices such as Personal Digital Assistants (PDAs), Electronic Health Records (EHRs) and bedside terminals, are highly recommended.

Key concepts: Computer, Nursing, Information, System, Evaluation, Effective, Professional Nurses, Patient care.

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ACRONYMS / ABBREVIATIONS

AC	: Assessment Criteria
BBT	: Born Before Technology
BCL	: Basic Computer Literacy
BOR	: Bed Occupancy Rate
CHIS	: Computer-based Hospital Information System
CNIS	: Computer-based Nursing Information System
CNR	: Computerised Nursing Records
CPR	: Computer-based Patient Record
CPU	: Central Processing Unit
DD	: Deputy Director
EHR	: Electronic Health Record
EMR	: Electronic Medical Record
EPRS	: Electronic Patient Record System
HR	: Human Resource
ICT	: Information and Communication Technology
ICU	: Intensive Care Unit
IEUC	: Introduction to End User Computing
IT	: Information Technology
IVT	: Intravenous Therapy
LOV	: List of Values
NANDA	: North American Nursing Diagnosis Association
NASSESS	: Nursing Assessment
NGOAL	: Nursing Goal
NCP	: Nursing Care Plan
NCS	: Nursing Classification System
NDC	: Nursing Diagnosis Classification
NDoH	: National Department of Health
NHS	: National Health Systems
NIC	: Nursing Intervention Classification
NIRM	: Nursing Information Reference Model
NMMDS	: Nursing Management Minimum Data Set

NOC	: Nursing Outcomes Classification
OT	: Operating Theatre
PDA	: Personal Digital Assistant
REPC	: Research Ethics and Publication Committee
SANDoH	: South African National Department of Health
USA	: United States of America

CHAPTER 1

AN OVERVIEW OF THE STUDY

1.1 Introduction

Information is an essential commodity in well managed organisations. It is evident from global industries that the use of information and communication technology seems to be the solution to information management problems in most organisations. Therefore, health care institutions as organisations are no exception to the rule. Nurses are the majority of staff in most of the health care settings, and cannot escape the embrace of this innovation. Electronic management of information by nurses evolved as a result of nursing becoming more sophisticated since the days of early nurse veterans such as Florence Nightingale. According to Kearns (2001:1), nurses have been involved with technology in patient care for decades, from intravenous therapy (IVT) and the advent of the Intensive Care Units (ICU) in the early 1960's, to the current use of compact digital point of care devices.

The use of Computer-based Nursing Information System (CNIS) seeks to increase the productivity of nurses by reducing paperwork, making information more accessible and facilitating communication of information (Sullivan & Decker, 1997:202). The introduction of a computer-based nursing documentation system can improve documentation quality. Positive aspects include completeness of documentation on the nursing process (Mahler, Ammenwerth, Wagner, Tautz, Happek, Hoppe & Eichstadter, 2007: 274). It is evident that nurses need not only understand nursing information systems, but also to use them effectively and apply the knowledge gained in rendering quality patient care. However, there appear to be a sense of despondency amongst professional nurses regarding the effective use of CNIS in general. Therefore, the study is set to evaluate if professional nurses working in different nursing units are using CNIS effectively, to the benefits of quality patient care.

1.2 Background to the study

Nationwide in South Africa, shortage of nurses has become a critical challenge in most of the health care institutions. Ehlers (2003:63) reiterated that worldwide a severe shortage of professional nurses is expected to occur between 2005 and 2020. Few nurses have to deal

with a significant amount of work on a daily basis. Sikwane (2007:1) states that nurses perform a lot of administrative duties which is part and parcel of being a nurse. The problem is that there is too much administrative work and too few nurses. “Nurses in their daily clinical practice gather data during patient’s assessment, collect information from patients themselves, as well as from patients’ relatives and from patients’ records” (Murnane 2005:863). Their workload entails patient care, communication, education, administration and research. In all these aspects, information and documentation becomes crucial in facilitating service delivery.

In most of the South African health care institutions, patient information is still being recorded in paper or manual medical records. Shortliffe and Perreault (1990:120) state that, “this paper medical record, which is shared amongst multidisciplinary teams, has demonstrated a lot of logistical and practical realities, redundancy and inefficiency that greatly limit the intended purpose of the record.” This could substantially lead to the inaccurate health care statistics that would have a negative impact on distribution of resources to health care institutions.

In the “Health Systems Trust” report by Mbananga, Madale and Becker (2002:4), it is reported that, “In 1995, the South African National Department of Health (SANDoH) established a National Committee to develop a National Health Information System Strategy for South Africa (NHIS/SA).” All nine provinces were involved in this project. The main objective of the NHIS/SA was to provide management information for managers and health care workers. Emanating from this strategy, the establishment of Computer-based Hospital Information System (CHIS) was sought by the committee, as reported by Mbananga et.al (2002:4). This was driven by the desire to improve the quality of patient care.

The report further states that Northern Province (now Limpopo Province) started implementing an integrated Computer-based Hospital Information system (CHIS) in 1998 in its 42 hospitals. Since then an evaluation study on CHIS was conducted at these institutions and the report thereof was published in 2002. This highlights the fact that the use of CHIS by professional nurses in South Africa is still at its early stage.

In 1999 the Gauteng Department of Health (GDH) embarked on introducing the on-line integrated CHIS called Medicom, to its health care institutions. A number of health care

institutions were selected to pilot this project. Dr George Mukhari hospital (then Ga-Rankuwa Hospital) in Pretoria was one of the selected sites (Rihanyo Health Informatics: 1999). The researcher having been a staff member at this institution, observed an extensive consultation with stakeholders such as nurses, medical doctors, support groups, allied and community members prior to the implementation of this project. In addition to this consultation, was the training of staff members on the Introduction to End user Computing (IEC). Each unit in the hospital was allocated with one computer which was used by ward clerks for patient admissions and order entries, physicians for medical care entries, and nurses for data capturing on nursing care plans, order entries and reports. The computer module for data capturing on nursing care plans, reports and other nursing data, is the one that constitutes CNIS.

1.3 Problem statement

Since the introduction of Computer-based Hospital Information System (CHIS) at Dr George Mukhari Hospital in 1999, the researcher observed reluctance among professional nurses in implementing the CNIS which is integrated in the CHIS. This was evidenced by frequent absence of nursing care plans in the system in most of the units; professional nurses were complaining of lack of training in Introduction to End user Computing (IEC), loss of passwords and usernames, waste of time on computer and materials as well as recurrent failure of the system to operate properly.

Several meetings were convened by the Information and Communication Technology (ICT) officers in order to identify and solve the problem. Since then there has been no improvement in using the CNIS by professional nurses. This was evidenced by no improvement in data capturing of nursing care plans in the system, order entries were not utilised and submission of hand written instead of computerised or electronic reports. By virtue of their role, professional nurses are more directly involved in patient care than other categories of the personnel. They are the key people in utilising CNIS in order to improve service delivery.

1.4 Purpose of the study

The purpose of this study is to evaluate the effective use of CNIS in patient care by professional nurses in different nursing units.

1.5 Research questions

The following research questions arose from the preceding discussion:

- What are the perceptions of professional nurses regarding the role of CNIS in patient care?
- What are the barriers to the effective use of CNIS among professional nurses in patient care?
- How effective do professional nurses use CNIS in patient care?

1.6 Research objectives

The objectives of the study are to:

- Describe the perceptions of professional nurses regarding the role of CNIS in patient care;
- Identify the barriers to the effective use of CNIS among professional nurses in different nursing units, and
- Determine the effective use of CNIS by professional nurses in patient care.

1.7 Significance of the study

The effective use of CNIS by professional nurses has a significant impact on the delivery of quality nursing care. For nurses to make accurate decisions they need to collect accurate information which can only be collected by use of accurate methods. Undoubtedly, in this case CNIS would be a preferred tool to use. Therefore this study is significant in that the evaluation of the effective use of the CNIS would improve its use by professional nurses. Perceptions and barriers to the effective use of CNIS by professional nurses will also be highlighted. Thus, the results could be brought to the attention of the authorities to support and motivate the use of CNIS in the hospitals.

1.8 Theoretical framework / model

A model is a symbolic representation of concepts or variables, and interrelationships among them (Polit & Beck, 2004: 724). This study will be based on Lewin's change model.

Change, as defined by Muller, Bezuidenhout and Jooste (2006:135), "is an initiative which alters critical organisational processes, which in turn influence individual behaviours, and which subsequently impact on organisational outcomes."

Lewin's change model outlines three phases of change process, namely: Unfreezing, moving and refreezing.

- Unfreezing means that the old ideas and practices need to be cast aside so that new ones can be learned, failure to cast aside old ideas often lead to resistance to change.
- Moving or changing means new ideas are learned. This is done by assisting someone to think reason and perform in a new way.
- Refreezing means that what has been learned is integrated into actual practice. The new practices become emotionally embraced and incorporated into the employee's routine behaviour (Newstrom & Davis, 1997:409).

1.9 Demarcation of the study

The study will be directed at professional nurses working in the wards that have computers installed for the purpose of patient care. The researcher decided to use the professional nurses because they are the ones utilising the CNIS, and majority of them were trained in the use of CNIS.

1.10 Definition of concepts

The following definitions will prevail for the study:

1.10.1 Computer

An electronic machine that performs rapid calculations, compiles, correlates and selects data by means of stored instructions and information (Tomey, 2000:52).

In this study, a computer will be a set of electronic devices comprising a portable monitor, central processing unit (CPU), a keyboard and mouse. This set of device is used by nurses in the hospital units to capture, store and retrieve patient care information such as patient assessment, nursing diagnosis, nursing goals, care plan, implementation and evaluation of nursing care.

1.10.2 Effective use

This means use that enhances achievement, maintenance, and development of the desired competencies of professional nursing practice (Norman, in Peterson & Gerdin-Jelger, 1988:74). The services provided must do what they were intended to do for the specific community. The effectiveness of the service must also be justifiable in terms of total cost (Dennil, King & Swanepoel, 1999:7). In this study, effective use means that all professional nurses who are working in different hospital units where computers are installed for patient care, are competent in capturing, storing and retrieving all patient care information without difficulty, and that this competency increases productivity of professional nurses by reducing paperwork.

1.10.3 Evaluation

The predetermined criteria, standards, norms and objectives which are identified against which the activities and progress can be measured (Hattingh, Dreyer & Roos, 2006: 119).

In this study, evaluation will be the process of determining, measuring and comparing professional nurses' perceptions, knowledge and competency with the number of patients, nursing care plans and frequency of entries captured in the computer against the actual number of patients and nursing care rendered.

1.10.4 Information

Information comprises data that has some type of interpretation or structure and is collected to produce knowledge. Data that has been processed into a format that is understandable by its intended audience (Thede, 2003:11).

In this study, information refers to all patients' personal details, patients' assessment, nursing and medical diagnoses, nursing goals, care plans, implementations, evaluation and discharge plans that are captured, stored and retrieved and used for quality patient care by professional nurses in all nursing units.

1.10.5 Nursing

Nursing is primarily assisting the individual (sick or well) in the performance of those activities contributing to health, or [to] its recovery (or to a peaceful death) that he would perform unaided if he had the necessary strength, will or knowledge. It is likewise the unique contribution of nursing to help the individual to be independent of such assistance as soon as possible (George, 1995: 71). In the context of this study, nursing refers to all computer captured and stored activities pertaining to assisting the individual who is sick or well in the performance of those activities contributing to health, such as patient assessment, care plans, implementation, evaluation and discharge plans.

1.10.6 Patient care

Those services provided to assist an individual who is seeking health care. The services rendered by members of the health profession and non professionals under their supervision for the benefit of the patient (Hood & Dincher, 1984:4) In this study, patient care refers to all activities and services provided by professional nurses in collaboration with other health care professionals to assist an individual (sick or well) in the performance of those activities contributing to health, or [to] its recovery (or to a peaceful death) that he would perform unaided if he had the necessary strength, will or knowledge.

1.10.7 Professional nurse

A person who is qualified and competent to independently practice comprehensive nursing in the manner and to the level prescribed and who is capable of assuming responsibility and accountability for such practice (Nursing Act No.33 of 2005: Section 30). In the context of this study, professional nurse refers to an adult male or female person who is registered with South African Nursing Council to practice as such and is working at the hospital under study, in the units where computers are installed for improving patient care.

1.10.8 System

A group of things, pieces of equipment which are connected or work together. Interdependent group of items, people or processes with a common purpose (Hornby, 2006:150; Kelly-Heidenthal, 2004:391). In the context of this study, system will be desktop computers installed in different units in the hospital, interconnected through local area network (LAN) for the purpose of capturing, communicating, storing and retrieving patient information.

1.11 Organisation of the study according to chapters

The rest of the study is organised as follows:

Chapter 1: Overview of the study

The chapter focuses on the general introduction. The background to the study, the problem statement, as well as the purpose of the study has been outlined. The research questions and objectives were also identified.

Chapter 2: Literature review

This chapter deals with the related literature to the study. The locations of similar or related studies that have already been completed are investigated.

Chapter 3: Research methodology

The chapter describes the methodology undertaken to conduct the study. This includes research design, setting, population, sampling technique, data collection tool, data collection technique, validity of the study and ethical considerations.

Chapter 4: Data analysis

In this chapter the data is analysed using descriptive statistics. Presentation, interpretation and discussion of the results are also conducted.

Chapter 5: Findings, limitations, recommendations and conclusion

Findings of the study are presented in relation to the research questions. Limitations and recommendations of the study are outlined. Key issues are identified and conclusions are drawn.

1.12 Conclusion

In this chapter, the overview and background were discussed with regard to introduction of the Computer-based Nursing Information System (CNIS) in Gauteng province. The purpose of the study, research questions and objectives, significance of the study, theoretical framework and definition of concepts were outlined. The final part of this chapter focused on the organisation of the study as a whole according to different chapters. In chapter 2 the researcher will focus on the related literature reviewed.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

A literature review involves finding, reading, understanding and forming conclusions about the existing literature, published research and theory or model related to the study in context, as well as presenting it in an organised manner (Burns & Grove, 2005:93 ; Brink, 2006 :67). According to Brink (2006: 68), the purpose of the literature review is, “to place the study in the context of the general body of knowledge, which minimises the possibility of unintentional duplication and increases the probability that the new study makes a valuable contribution.” The main objective of the literature review in the context of this study, is to present an organised findings with regard to the effective use of Computer-based Nursing Information System (CNIS) in patient care by professional nurses in different health care settings. The study is based on Lewin’s change management model as a conceptual framework. Therefore, the literature review will be presented under the following headings:

- Lewin’s change model;
- CNIS structure and application;
- The role of CNIS in patient care;
- Professional nurses’ perceptions regarding the role of CNIS in patient care;
- Barriers to the effective use of CNIS among professional nurses in different health care settings.
- The effective use of CNIS by professional nurses in different health care settings.

2.2 Lewin’s change model

Change, as defined by Muller et.al. (2006:135, “is an initiative which alters critical organisational processes, which in turn influence individual behaviours, and which subsequently impact on organisational outcomes.” A model is a symbolic representation of concepts or variables, and interrelationships among them (Polit & Beck, 2004:724). Lewin’s

change model outlines three phases of change process, namely: Unfreezing, moving and refreezing.

- Unfreezing means that the old ideas and practices need to be cast aside so that new ones can be learned, failure to cast aside old ideas often lead to resistance to change.
- Moving or changing means new ideas are learned. This is done by assisting someone to think, reason and perform in a new way.
- Refreezing means that what has been learned is integrated into actual practice. The new practices become emotionally embraced and incorporated into the employees routine behaviour (Newstrom & Davis, 1997: 409)

CNIS structure and application, the role of CNIS in patient care, and the perceptions of professional nurses regarding the role of CNIS in patient care, will be incorporated in the unfreezing phase of change process. The barriers to the effective use of CNIS in patient care constitute the moving or changing phase. Lastly, the effective use of CNIS in patient care by professional nurses will constitute the refreezing phase.

2.3 CNIS structure and application

Bernhard and Walsh (1995:169) describe the goal of the unfreezing phase as, “to clarify what is and make the group aware of the need for change”. CNIS as described by different authors, is combining Computer Science, Information Science and Nursing Science by nurses in execution of their duties (Nagelkerk, Ritola & Vandort, 1998:17; Leeder, in Scott (2001:2). Although formally referred to as Nursing Informatics since 2006, to coincide with current standards of practice and scope (Wimms & Oblak: www.my.clevelandclinic.org), CNIS includes the use of computers by nurses to organise, process, store, communicate and retrieve information that which is regarded as relevant to the profession of nursing. Nurses have always used pen and paper to organise, process, store and communicate information. This practice changed as a result of an individual or a group of people who felt a need for change (Bernhard & Walsh, 1995:176). In the context of this study, the National Committee of the SANDoH sought this process of change by introducing Computer-based Hospital Information System in the selected South African hospitals. This explains the beginning of the freezing phase of the change process in South Africa. This introduction of

CNIS in the nursing profession was sought to bring change in how nurses document their work, communicate, store and retrieve information.

Prior to the inception of CNIS, Computer-based Hospital Information System (CHISs) started as a business, financially oriented systems rather than patient care oriented clinical systems (Hanson, 2006:93). Since the early 1960's the National Health Systems (NHS) has used information systems to link clerical and administrative functions. This highlights the fact that the use of CNIS in nursing was probably still in their embryonic stage. According to Lagina (1971) cited by Mbananga (2002:27), "the first prototypes of decision support systems in nursing was developed at the University of Michigan, and in two decades since these early efforts the science and technology of nursing informatics has grown in complexity and sophistication, particularly in the United States of America (USA)." However, in South Africa the situation is that, CNIS has not yet been fully embraced by the majority of professional nurses.

2.3.1 CNIS structure

In most of the health care institutions, especially in South Africa, CNIS forms part of the main CHIS. The system comprises hardware and software. Hardware is a desktop computer with its Central Processing Unit (CPU) and a monitor, keyboard and a mouse. This desktop computer is usually placed on the nurses' station or ward clerk's office. A printer could be shared between two or more units. However, in developed countries such as Germany, the hospital wards are equipped with bedside personal computers (PCs) (Burkle, Michel, Horch, Schleifenbaum & Dudeck 1998:73). This setup is convenient and allows for easy access to the CNIS, especially nurses. It is during the unfreezing phase of the management of change process that nurses should be involved in the decision to choose a system which is compatible with their workflow. Otherwise resistance to change develop early in this phase. A more convenient CNIS, also used in the developed countries, is a Personal Digital Assistant (PDA). This is a hand held device which can be carried around in the unit by a nurse.

The literature describe other systems such as Electronic Health Record (EHR), Electronic Medical Record (EMR), Computer-based Patient Record (CPR), Computerised Nursing Records (CNR) and many more, which are related to CNIS. The definition of all these systems including CNIS depends on the stakeholder's perspective, as described by Beaver

(2003:257). The author states that, “it is because medical information constitutes electronically maintained information about an individual’s lifetime health status and health care.” Therefore, the CNIS under study in particular, constitutes electronically maintained information about nursing care and the nursing management.

On-line integrated CNIS means that there is a communication network amongst different units within the hospital or within the different district hospitals, as it is the case at the institution under study. As stated by Swanburg and Swanburg (2002:475), CNISs are software packages developed specifically for nursing usage. These programmes may be explicit to a particular area of nursing application, or they may be general to the support of the nursing services division. For example:

- *Nursing care module*

This is the clinical component programme of CNIS that includes patient history and assessment, nursing care plans, nursing progress notes and charting, patient monitoring, order entry and results reporting, patient education and discharge planning (Swanburg & Swanburg, 2002:475).

- *Nursing management module*

This module comprises applications that are relevant for nursing management. In addition to this module, there are those associated with the use of general purpose. Other modules might include a calendar of events, which is commonly known as a year plan. It consists of a nursing management minimum data set (NMMDS), and the nursing Human Resource (HR) information module (Swanburg & Swanburg, 2002:475).

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2.3.2 CNIS application

The application of CNIS in patient care by professional nurses requires that the patient be firstly, registered as an inpatient, and secondly, be admitted in the CHIS. This function is normally performed by an admitting officer or ward clerk. Like any other computer system,

professional nurses are expected to log onto the CNIS by entering the username and password. Patient's file in the CNIS is then accessed by entering an admission number.

The nursing data elements which are captured onto the patient file in the CNIS are the same elements as those in the paper records. This means that, professional nurses must firstly chart on the paper record and secondly, transfer the same data onto the CNIS. Korst, Eusebio-Angeja, Chamorro, Aydin and Gregory (2003:25) describe this as "double charting, which is a vernacular term for the required entry of the same data elements in both computer and paper based systems." This is not the case with the systems such as PDAs and bedside terminals where data is directly entered onto the system. Bernhard and Walsh (1995:171) state that it is important to show the group why the change is necessary and what benefits are expected from it.

It is important to realise that most of the professional nurses in their day to day execution of their duties, are in contact not only with CNISs but other clinical technologies such as electronic blood pressure devices, pulse, fluid, oxygen and other monitoring devices. High care units such as Intensive Care Units (ICU), Operating Theatre (OT), Neonatal and Maternity units use more advanced clinical technologies in their daily functioning. The majority of these professional nurses appear to be comfortable with the effective use of these clinical technologies, as compared to the use of CNIS in patient care. Therefore, the question is, what are the roles of CNIS in patient care? These need to be clearly described during the unfreezing phase, if the process of change is to be successful.

2.4 The role of CNIS in patient care

Alligood and Tomey (2006:310) define the concept "role" from the functioning unit of society's perspective. They describe it as a set of expectations of how a person occupying one position behaves toward a person occupying another position. In the context of this study, the researcher regards CNIS as a functioning unit, and describing a "role" would be a set of expectations of what the CNIS should provide in terms of patient care. It is important to describe the roles of CNIS during the unfreezing phase of the change management process because of the potential threats to staff's feelings of security when giving up their old routine (Tappen 1995:332). Some of the nurses may even perceive that the role of CNIS is to replace

them or take their job. Little or no knowledge about the role of the CNIS in patient care is a potential for resistance to change.

2.4.1 Patient care

The concept “patient care” means care rendered by multidisciplinary team such as physicians, clinical nurses, physiotherapists, occupational therapists, radiographers, pharmacists and other members of health care professions (Hood & Dincher,1984:4). The researcher deemed it prudent to differentiate patient care from nursing care for the sake of clear understanding of the role of CNIS. Nursing care is what is rendered by nurses only; patient care is inclusive of all care rendered by health care professionals including nurses. The role of CNIS in the context of this study would include that of nursing care and nursing management. These two components of nursing pertain to clinical nursing practice only, but exclude the role in formal nursing education and nursing research (which are currently not the focus of this study). Although there is nursing education and nursing research within the clinical nursing component, they will not be discussed in this study.

2.4.2 The nursing care roles of CNIS

The nursing care roles of CNIS pertain to those activities that are related to clinical nursing practice implementations. Such activities include documentation of nursing care, record keeping, communication and retrieval of information. Findings from several studies, including Larrabe, Boldregini, Elder-Sorrels, Turner, Wender, Hart, & Lenzi (2001:56) included the following CNIS clinical nursing care roles:

- Reducing paperwork
- Increase productivity of nurses;
- Improved documentation of nursing care which include nursing care plan components such as *patient assessment, nursing diagnosis, goal setting, planning, implementation and evaluation*;
- Improved documentation of medico legal reports such as *pressure sore statements, accidental falling, accidental burns, incidental reports and many more*;
- Perform accurate record keeping function;

- Making information more accessible such as retrieval of laboratory information reports e.g. *urea and electrolytes, glucose levels, haematology, microbiology, virology reports and many more;*
- Facilitating communication of information through email facilities, and
- Performing order entries such as bulk of patient medications, diet, linen and special equipment and medical stock.

2.4.3 *The nursing management roles of CNIS*

These roles entail activities performed by more senior professional nurses or unit managers who are stationed in the clinical setting, other than formal office hospital nursing management. Such activities include:

- Drawing of the unit year plan;
- Drawing of duty roster and shift planning;
- Fiscal, staff and patient data management at unit level;
- Quality improvement;
- Financial management at unit level;
- Daily, weekly, monthly and annual statistics, and
- Patient acuity and communication (Sullivan & Decker, 1997:2).

Both nursing care and nursing management roles of CNIS as outlined above, appear to be more congruent with what professional nurses and unit managers would expect from the CNIS. However, Darbyshire (2003:17) found that the CNIS did not offer the nurses what they expected. Instead, nurses were predominantly negative and mostly critical of CNIS and perceived inability to capture ‘real nursing’. Therefore, this calls for a need to describe the nurses’ perceptions regarding the role of CNIS in patient care.

2.5 Professional nurses’ perceptions regarding the role of CNIS in patient care

A professional nurse, as described in chapter one, is a person who is qualified and competent to independently practice comprehensive nursing in the manner and to the prescribed level, and who is capable of assuming responsibility and accountability for such practice (Nursing

Act No.33 of 2005 : Section 30). Generally, under different settings, professional nurses' roles in their day to day activities include nursing care, nursing administration or management, nursing education and nursing research. Their acts and omissions are guided by their scope of practice, which entails certain acts or procedures which may be performed by scientifically based physical, chemical, psychological, social, educational and technological means applicable to health care practice (Scope of Practice, 2001:R2598)

2.5.1 *Perceptions*

King, in George (1995 :211) describes perception as the major concept of a personal system among other concepts such as self, growth and development, body image, space, learning and time. The author further describes perception as a process in which data obtained through the senses and from memory are organised, interpreted and transformed. This is the concept that influences all behaviours or to which all other concepts are related. It is through perceptions that nurses may try to ignore or accept the evidence with regard to the role of CNIS.

2.5.2 *Theory of perception*

Little (1999:3) describes perception as having two levels. Level one being the immediate perception which is totally physical. Level two being the interpretive level where our psychology and attention is implicated in the perceptual act. The author's explanation clarifies the point that people can see, smell, hear, feel and taste things which are real and in their real state, and this is what is called level one of perception. However, because of the impulses that have to be registered in the brain before interpretation, there is always a potential that the interpretation can come out being totally different from that which was sensed before. Little (1999:3) calls this, level two of perception. This theory is also applicable to the study as perceptions of the professional nurses regarding the role of CNIS will influence the effective use of CNIS.

2.5.3 *Factors influencing perceptions*

Factors that influence one's perception, especially in organisations, include the framework of the organisational and professional setting, its attitudinal forces, leadership styles and socio-

political forces. Little (1999:6) asks a question, “What must be the state of a perceptual field for perception to be possible?” A perceptual field is that aspect of the environment that will effect the sensory physiology of the selected species (Little, 1999:6). In this instance selected species would be humans or professional nurses per se. The author further states that, “the nature of the perceptual field in and of itself profoundly influences perception, and that a perceptual field must have certain characteristics for perception to be possible.” In the context of this study, the researcher assumes the perceptual field to be the working environment of the professional nurses including CNIS. If CNIS is regarded as a perceptual field, then its nature and meaning does profoundly influence perception. This statement is congruent with what Norman, in Peterson and Gerdin-Jelger (1988:74) alluded to by stating that, “the nature and the meaning of innovation which is articulated and shared between instigators and recipients, determines its successful assimilation.” Thus, the nature and the meaning of CNIS would determine not only its successful assimilation by professional nurses, but influence their perceptions as well.

2.5.4 Positive perceptions regarding the role of CNIS

Nurses communicate their perceptions through different behaviours and attitudes such as speaking out their thoughts. Positive perceptions of professional nurses regarding the role of CNIS in patient care are the reflections of utterances, behaviours and attitudes that demonstrate greater acceptance of using the CNIS. They range from comments such as, ‘the system allows us to check admissions and discharges in each wards’ (Mbananga et al, 2002:54) to, nurses actively participating in the development of the CNIS and fully participating its upgrading. This is a sign that shows that the unfreezing phase of the change management process was effectively implemented. Other positive perceptions are reflected in professional nurses embracing, owning and effectively implementing the CNIS. Lee, Lee, Lin & Chang (2005:171) stated that there are studies that have demonstrated that younger, less experienced nurses have more positive attitudes towards computer use. User benefit has been implicated as one of the factors that influence the nurses’ positive perceptions regarding the role of CNIS.

Findings from Lee (2006:1376) revealed that nurses generally viewed the content of the computer-based nursing care planning system as a reference to aid memory, a learning tool for patient care, and a vehicle for applying judgement to modify care plan content. All these

are the reflections of positive perceptions regarding the role of CNIS in patient care. Although Roussel, Swansburg, and Swansburg (2006:338) remarked that a whole generation of workers view information technology as a normal part of life, Mbananga and Denhill (2003:1) found that nursing informatics is not perceived as a priority by the majority of nurses. It has not yet been embraced by the nursing profession as something necessary for improving quality of care, or as a tool that could improve their practice. This latter statement is supported by the negative perceptions as they are described below.

2.5.5 Negative perceptions regarding the role of CNIS

As early as the inception of CNIS's, nurses have been alleged to having negative attitudes towards technology. Bozak (2003:80) stated that many nurses are sceptical of information technology and may resist learning or using a new system. This type of behaviour is common during the unfreezing phase of the change process. As with positive perceptions, utterances, behaviours and attitudes which reflect negative perceptions include comments such as, "....it's really a flawed system...; "the system doesn't reflect the nurses' practice," and many more, as reported by Darbyshire (2003:17). It is important to note the era when comments such as the one above were made, because Goossen (1997:86) identified some of these negative perceptions more than a decade ago. The author reported that nurses complained of the system de-professionalising, meaning they were being controlled by the computer system; de-individualising, meaning one size fits all, it eliminates creativity; de-autonomising and de-expertising. Some of these negative perceptions still exist in the nursing profession even in this era.

Other negative perceptions which were identified were that, professional nurses complain of the system wasting their time, too demanding, reluctance and lack of interest to use the CNIS. It is interesting to realise that even some of the nursing managers also have these negative perceptions. Mbananga et.al (2002:54) attest to this that, verbalised responses and concerns from the matrons of a particular hospital were that, the system increases nurses' workload and waste too much of nurses' time. These matrons were speaking on behalf of the nurses. Negative perceptions breed resistance to change. Bernhard and Walsh (1995:171) state that, sometimes the way change is presented rather than change itself precipitates resistance. There are also contributory factors such as barriers to the effective use of CNIS which can precipitate resistance. These are outlined below.

2.6 Barriers to the effective use of CNIS by professional nurses

The concept barrier describes something that stands or prevents people from moving forward from one place to another (Hornby, 2006:107). In the context of this study, issues that prevent professional nurses from moving from paper records system to using CNIS effectively are described. The researcher observed that there is a fine line of difference between barriers and factors that influence the effective use of CNIS. For example, the concept of age can be a factor as well as a barrier to the effective use of CNIS.

2.6.1 The individual attributes

According to Scott (2000:4) individual attributes such as age, work experience attitude, anxiety and computer skills affect the development and effective use of nursing informatics. These attributes are congruent with some of the factors affecting the effective use of CNIS mentioned by Lee et.al.(2005:170) such as, demographic variables, of which age is still identified amongst other attributes as a barrier. Age as a barrier, is also in line with a well known adage that people Born Before Technology (BBT) are experiencing an overwhelming pressure to use technology in their workplace, and this can cause them to resist using it.

Bozak (2003:80) stated scepticism and resistance amongst many nurses as barriers to successful implementation of nursing information technology. It has been stated earlier on that scepticism and resistance are all behaviours that reflect one's perception. If professional nurses' perceptions about the role of CNIS in patient care are negative, the behaviours thereof will be scepticism and resistance. The observation that has been made in several nursing settings is that nurses are sceptical about the role that CNIS play in nursing care. They are not sceptical about the role of computers in general. These scepticisms are brought about by what they perceive not to be the role of CNIS in patient care. Such scepticisms may also be as a result of poorly managed unfreezing phase of the change process and resistance to change.

2.6.2 The organisational barriers

These are the barriers related to the organisation. They include organisational culture, organisational processes and policies, such as training requirements and facilities. The organisational culture that does not integrate members so that they know how to relate to one

another and to help them to adapt to the use of CNIS constitutes a barrier. Pessimism and scepticism of some of the managers or administrators are also identified as barriers, according to Barry and Gibbons (1990:40). The authors commented that, “a primary barrier to acceptance of health care information systems is administrators who do not believe this technology can enhance productivity and quality.” Inappropriate placement of the computer in the unit in relation to patient beds is also a barrier if the distance is unacceptable to nurses, for example, a computer that is placed in the unit clerk’s office. Inadequate number of computers in relation to Bed Occupancy Rate (BOR), whereby a clerk, physicians, professional nurses, unit manager as well as other staff members share one computer, constitutes a barrier. Scott (2000:4) stated that factors such as staffing levels, workload, practice setting as well as the quality and quantity of support staff, may affect the acceptance, success or failure of a CNIS.

2.6.3 Covert barriers

Covert barriers is resistance to a computer environment, as mentioned by Scott (2000: 4) and Lee et.al (2005:170). These barriers are difficult to notice, but are mostly evidenced by increased absenteeism, low morale and reluctance to learn new job skills. Increased late coming, increased lunch breaks and poor patient care are also evidence of covert barriers to the effective use of CNIS. In some instances, rebellion and stubbornness can also become barriers to the effective use of CNIS. Passive resistance is covert, yet it slows down implementation of change (Bernhard & Walsh, 1995:170).

2.6.4 Lack of Nursing Classification Systems (NCS)

The main component of CNIS is the nursing process. The nursing process provides a systematic methodology for nursing practice (Ammenwerth et.al, 2003:69). This systematic methodology is being made possible by the use of the Nursing Classification Systems which describes and quantify the work of nurses (Filho, 2001:100). It contains what is called nursing language. It is generally known that language can become a communication barrier between two people and this is applicable to nursing language as well. Filho (2001:100) stated that “in many countries, nurses have not yet defined the minimum data essential to describe their practice, and this complicates the system design.” Therefore, this becomes a barrier to the professional nurses to effectively use CNIS in patient care.

The North American Nursing Diagnosis Association (NANDA) has supported the continued development and evolution of research based nursing classification system (Urden 2006:8). This should not be developed in books only but also incorporated in the CNIS's. The CNIS that is used at the institution under study (South African perspective) still lacks classification systems such as Nursing Diagnosis Classification (NDC) and Nursing Intervention Classification (NIC). The nursing classification system that is incorporated in the CNIS under study, is the Assessment Criteria (AC). This system allows for acuity level classification. It also becomes a barrier as the list of values (LOVs) in the AC is not applicable to most of the units. Some times even if the LOVs are applicable to a particular unit, the system can deny the professional nurses access because that particular patient is not assigned a relevant doctor.

2.6.5 Ethical factors

Harman (2006:1) stated that the protection of private and confidential information is the primary ethical obligation of the health information management professionals. If this is not achieved, it becomes a barrier. Loss of patient's information privacy and confidentiality has been widely debated. Cochrane and Ramokolo (2007:33) alluded to the fact that "implementing a national Electronic Health Record (EHR) is an extremely complex problem that should not be underestimated, especially since heterogeneous information is currently scattered across many record-keeping systems." The system that is easily accessed by unauthorised personnel poses a high risk to patient information leak. Thus, becomes a barrier to the users. Passwords that are written down on a piece of paper constitutes ethical factor, because they can easily land into unauthorised hands. Staff members who leave the system open and do not log off the system after using it, pose a potential for unauthorised personnel to access the system. Also lost passwords that are not immediately reported to be deactivated pose a risk. This explains the degree of sensitivity when it comes to patient confidential information. It is a concern that some of the staff members are also careless with their passwords. Even then, professional nurses need to trust and be confident in the system that deals with their patients' confidential information; otherwise it becomes a barrier in using the system effectively because of fear of potential litigation. This also breeds resistance to change.

2.6.6 Costs

While costs for installation and implementation of the system have been implicated in many areas as a barrier, this has not been alluded to by many professional nurses. This has been mostly the concern of managers and administrators. However, this does not justify professional nurses to be less concerned about the cost incurred in installation and implementation of CNIS. Professional nurses are aware of the costs incurred by the introduction, installation and implementation of the system. Korst et.al.(2003:29) stated that evidence suggests that systems such as Electronic Medical Record (EMR) will never allow any actual decrease in labour costs, but only enable nurses to decrease time spent on documentation. Managers who are more concerned about the cost of purchasing, for example, extra computers where needed, are not aware that they are contributing to the barriers of nurses using the CNIS effectively. One computer in each department becomes a barrier where a clerk, physician, professional nurse, unit manager as well as other staff members are expected to share or use it.

2.6.7 Lack of incentives

Authors such as Vargas (2009:1) support the notion of rewarding the employees for using the innovation. The author states that, “the most common way of motivating employees is giving them an incentive. In a simple analogy incentive motivation is: Do X work and you will get X rewards.” If there is no appreciation such as a simple pad on the back, a thank you note, a motivating comment from the nursing managers, nurses will start to build resistance and negative attitudes which ultimately become barriers to the effective use of CNIS. One would undermine the impact that incentives have on successful implementation of any new innovation. Incentives play a vital role in motivating employees such as professional nurses to use the system effectively. Tappen (1995:335) states that leaders should continue to show interest in staff progress and feelings about the system. However if incentives are rewarded for the sake of coercing the nurses to use the system that does not show any benefits, then the exercise will be futile and resistance to change will prevail. The system should also be analysed for its actual benefit to the nursing care. According to Jooste (2009:231) one of the systems that motivate and reward followers is the way in which nurses interpret their own role. Such nurses given a platform would even transform the way the CNIS is implemented.

Incentives could be in a form of certificates, status or a token for acknowledging professional nurses who consistently maintains care plans, reports and other entries in the system.

The use of Maslow's hierarchy of needs attests to the fact that nurses are motivated by, amongst others the need for status, self actualisation or self fulfilment characterised by integrity and responsibility (Roussel et.al. 2006:316). Nursing managers should also consider offering professional nurses incentives in a form of responsibility, for instance "leader of the nurses' ICT forum," so that professional nurses are motivated to use the CNIS effectively.

Despite the positive and negative perceptions, including barriers identified above, professional nurses still need to continue to use the CNIS effectively in patient care (at least in the organisations where the CNIS exists). Therefore, it is important to delineate what is entailed in the effective use of CNIS in patient care by professional nurses.

2.7 The effective use of CNIS in patient care by professional nurses

The concept "effective use" describes the use that enhances achievement, maintenance, and development of the desired competencies of professional nursing practice (Norman, in Peterson & Gerdin-Jelger, 1988:74). The services provided must do what they were intended to do for the specific community and the effectiveness of the service must also be justifiable in terms of total cost (Dennil, King & Swanepoel, 1999:7). The effective use of CNIS represents the refreezing phase of the change process. The new knowledge, attitude, or behaviour learned is now practiced.

To be able to determine the effective use of CNIS by professional nurses, there should be predetermined competencies, expectations and indicators of what professional nurses and CNIS should achieve and maintain. Reflections of the effective use of CNIS would be an achievement of these predetermined competencies, expectations and indicators. It is therefore the main purpose of this study to evaluate if all these above mentioned aspects are achieved, available, and maintained as expected. Furthermore, to identify factors that affect their achievement and availability.

2.7.1 Predetermined competencies

Competencies refer to the skills and abilities to do a particular job or task well (Hornby, 2006:294). Professional nurses need to achieve certain competencies in order to use the CNIS effectively. Firstly, they should be computer literate. Not only this but also to understand the capabilities and limitations of the CNIS (Scott 2000:3). Secondly, they should participate actively in the development of CNIS (Filho 2001:98). This would be a hallmark that would motivate them to want to achieve the other necessary competencies in using the CNIS effectively. Comments such as “most nurses don’t understand how to integrate information system technology into nursing practice, nurses don’t know what they want, and what they want is not what they need”(Filho, 2001:99), are all indications of a need to empower professional nurses technologically. Although professional nurses at the hospital under study did attend Introduction to End user Computing (IEUC) (which was a two days training), it seems as if it did not empower them sufficiently, because some of them are still struggling to generate Nursing Care Plan (NCP), which is a basic computer module specifically meant for the nurses use.

The other specific competencies as described by Norman, in Peterson and Gerdin-Jelger, (1988:121) are, the ability to interact with the CNIS, to have a balanced and objective approach to the use of CNIS in patient care, ability to access the CNIS and to coordinate information flow. Once professional nurses have achieved these competencies, they will be able to use the CNIS effectively. They will also be able to identify their needs in terms of what CNIS offers.

2.7.2 Expectations

The concept “expectation” means a belief that something will happen because it is likely. (Hornby 2006:512). To determine the effective use of CNIS in patient care, one has certain expectations from the professional nurses and CNIS itself. This means, one has a belief that there are things that are likely to happen to demonstrate that CNIS is used effectively. Therefore, in addition to the competencies required from the professional nurses, they are also expected to demonstrate the following:

- General positive attitudes and satisfaction with the use of CNIS in patient care;

- Understanding the role of CNIS in patient care;
- Enthusiastic and willingness to use the CNIS on a daily basis;
- Doing less manual documentation or not at all;
- Making available generated Nursing Care Plans (NCPs) and progress notes of all the patients captured in the CNIS;
- Evidence of frequent communication, retrieval and stored information in the CNIS with other departments, and
- Submission of electronic instead of paper reports and statistics to management.

To be able to predetermine the expectations from the CNIS itself, i.e. those that will demonstrate its effective use, one has to look back at the roles of CNIS in patient care. It is through successful achievement, fulfilment and maintenance of these roles that one can claim that the CNIS is used effectively. For example, Larrabe et.al. (2001:56) stated that re-education of nurses in the use of CNIS did significantly improve documentation completeness of the elements of NCPs such as, nurse assessments of patient outcomes (NASSESS), achievement of patient outcomes (NGOAL) and others. Therefore, it is expected that CNIS itself should demonstrate such capabilities including the following:

- Time saving and allowing nurses more time for patient care
- Increase productivity of nurses by reducing paperwork
- Easy access, organisation, retrieval and storage of information

2.7.3 Indicators

An indicator is a sign that shows that something is changing, or a presentation of measurement. One of the main objectives of introducing CHIS in South African hospitals was to improve patient care (Mbananga et.al.2002:3). Therefore, the effective use of CNIS should be able to demonstrate improvement in patient care. This means, there must be a sign that shows that patient care is changing to the better, which is an indicator. It is also a sign that the process of change is in a state of equilibrium.

The question is, how is patient care improvement measured, and how is it translated into an indicator? Van Gennip and Bakker (1995:70) answer this question by stating that, “a nursing information system is a typical infrastructure supporting system for which effects and

benefits for patient care are difficult to assess.” However, Dlugacz (2006: xi) emphasised that without measures there can be no real improvements in health care. This means something must be measured. Therefore, the impression is that indicators are statistics and other related data that nurses can use to make informed decisions to improve patient care. CNIS cannot alone improve patient care. Professional nurses create statistics and use the same statistics to make informed decisions. For example, a professional nurse creates statistics by generating NCPs for the patients in the unit. The number of NCPs generated in the CNIS is translated into Bed Occupancy Rate (BOR) which is a statistic and in turn an indicator. Informed decisions can be made out of analysing these NCPs in the CNIS, e.g. a number of NCPs in the CNIS allows the unit manager to plan for staff, to compile reports and even to assess how many staff members are able to generate NCPs.

The professional nurse can also use the patients’ acuity level classification as an indicator. This classification indicates which patients need “level one care, high care and which patients need acute care”. Informed decisions can also be made from this information. Therefore, the daily, weekly, monthly and annual statistics and reports are all indicators of either poor or improved patient care. If all of these indicators are achieved, available and maintained in the CNIS, one can claim that the CNIS is used effectively. If not, the factors influencing the effective use of CNIS should then be explored.

2.7.4 Factors influencing the effective use of CNIS

The literature describes several factors that influence the effective use of CNIS. Lee et.al (2005:170) found that age influence the effective use of CNIS. The authors state that younger nurses spent less time on the computer-based nursing care plan. Something that is unusual, as the general assumption is that younger nurses tend to be more inclined to use technology than the older generation. Such contrasts are due to the difference in what is regarded as useful with regard to the different software applications used by these two groups of nurses. If younger nurses perceive that something is not useful for them, they will obviously resist using it. That is why the development of CNIS that offer real support in documentation would solve some of these negative perceptions.

Ammenwerth, Mansmann, Iller, Eichstadter (2003:69) pointed to four factors influencing the acceptance of a new computer-based documentation system: “ the previous acceptance of the

nursing process, the previous amount of self confidence when using computers, the fit between nursing workflow and the functionality of a nursing documentation system.”

What the authors mean is that, if nurses accepted or did not accept the implementation of the nursing process in the first place, it will either be easy or be difficult for them to capture it in the CNIS. Self confidence in using computers is as a result of being computer literate. Therefore, computer literacy does influence the effective use of CNIS. The fit between nursing workflow implies using CNIS without disrupting the normal nursing activities in the unit. Any disruption will influence the effective use of CNIS. The functionality of a nursing documentation system could mean absence of frequent crashes of the computer system, computer offline, or even the relevancy or irrelevancy of the nursing software applications to different nursing departments. Also, the management of the change process does profoundly influence the effective use of CNIS.

2.8 Conclusion

CNIS is a form of technology used by professional nurses in executing their duties by way of documenting, communicating, storing and retrieving of information. As stated before, it is the use of nursing science, computer science and communication science by nurses to deliver nursing care. Its structure, application and role in patient care were outlined. The effective use of CNIS in patient care was discussed. Barriers to the effective use of CNIS in patient care were also explored. Literature review was based on Lewin’s change model which describes three phases of change management process. In the next chapter the methodology adopted in this study will be outlined.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the design used in this study. The methodology followed in conducting this research is discussed in detail. The main elements being research design, setting, population, sampling technique, data collection, validity of study as well as ethical considerations.

3.2 Research design

Research design refers to the overall plan for obtaining answers to the questions being studied and for handling some of the difficulties encountered during the research process (Polit & Beck, 2004:49). The approach will be quantitative research, utilising descriptive simple survey. According to Burns and Grove (2005: 23) quantitative research is a formal, objective, systematic process in which numerical data are used to obtain information about the world. It is said to have its roots in logical positivism and focuses on measurable aspects of human behaviour (Brink, 2006:12). The descriptive simple survey is used to describe variables, examine relationships among variables, and determine cause and effect interaction between variables (Burns and Grove, 2005:23). The aim is to discover new meaning, describing what exists, determining the frequency with which something occurs, and categorising information (Burns & Grove, 2006:26)

This study focuses on evaluating the effective use of CNIS by professional nurses in patient care. Quantitative descriptive simple survey was chosen because it merely searches for accurate information about the characteristics of particular subjects, in this instance, professional nurses, or about the frequency of a phenomenon's occurrence (Burns & Grove, 2005:232). In the context of this study the variables of interest are demographics, such as age, gender and qualifications, as well as perceptions, roles and barriers to the effective use of CNIS in this particular institution. The purpose of using this type of design is to provide a picture of a situation as it naturally occurs at this institution.

3.2.1 *Setting*

The study was conducted at Dr. George Mukhari hospital, northwest of Pretoria in Gauteng Province. The hospital was previously known as Ga-Rankuwa Hospital. This is a 1655 bedded academic hospital with thirty nine (39) functional wards. Each general ward caters for approximately 40 patients. According to Dr George Mukhari Nursing Staff Establishment document (2009), 479 professional nurses are allocated in the wards on both day and night shifts. This excludes those who are working in any other departments (e.g. outpatients, staff development and clinics) other than those mentioned in this study. Only one ward (ward 21-lodger mothers) is without a professional nurse. Out of 38 wards, 21 wards have a minimum of 2 professional nurses per day shift and one (1) per night shift. The remaining 15 wards, with the exclusion of wards 24 and 29, which has more than 10 professional nurses per shift, has a maximum of 3 professional nurses per day and 2 per night. The two units used for pilot study, renal and spinal units have 6 day and 3 night professional nurses each. Units such as ICU and operating theatre have a maximum of 20 and 30 professional nurses per day and night respectively.

3.2.2 *Population*

A population is the entire aggregation of cases in which a researcher is interested, or persons of interest to the researcher who meets the criteria the researcher is interested in studying (Polit & Beck, 2004: 289). In the context of this study, the population consisted of all professional nurses who are working on day and night shifts and in the wards which have computers installed for the purpose of patient care. This totalled 479 professional nurses. This excluded professional nurses working in outpatients, staff development, nursing administration and all who were on all types of special leave. Professional nurses were chosen as a population of interest for this study because during the initial introduction of the CNIS in the hospital, were the main people involved in the change process consultations. They also played a part in training sessions as well as being the key people in utilising the CNIS.

3.2.3 Sampling technique

Sampling refers to the process of selecting the sample from a population in order to obtain information. This should be done in such a way that represents the population of interest. In this study the sample consisted of a selected group of professional nurses from a defined population. The sample size consisted of 120 professional nurses. Non-probability sampling was used, utilising convenience sampling (Burns & Grove, 2005:350). This approach involved choosing readily available professional nurses from all units where computers are installed for the purpose of patient care. This included day and night staff. The available participants were entered into the study until the desired sample size was reached. Out of 39 wards, only one ward did not participate in the study because there was no professional nurse allocated in that ward. This method was chosen because of the complexity of duty rosters that prevail in the hospital which makes it impossible to use other methods. Different professional nurses work different hours.

3.2.4 Biases and control of biases

The serious bias anticipated by the researcher when using this sampling technique was that certain elements may be overrepresented or under represented. Thus the researcher controlled this by making sure that out of a maximum number of four professional nurses allocated in certain wards, three are entered in the study. Where three are allocated at least two are entered in the study. The researcher also encouraged the unit managers to administer the questionnaires to senior as well as junior members. The other bias was that if all questionnaires were handed to the unit managers to distribute to her staff personally, he/she could give them to only those whom they feel will answer ‘appropriately’. The researcher then decided to distribute some of the questionnaires to staff members directly when the unit managers were not on duty, such as after hours.

3.3 Data collection

3.3.1 Research instrument

A self report instrument in a form of a questionnaire was used for collecting data from the respondents. The questionnaire was developed and structured according to stated objectives.

It comprised of five sections of close-ended questions, and one section of one open-ended question.

- Section 1 is characterised by biographic data of the respondents. Data such as age in years, gender, basic nursing qualifications, unit allocated in, length of stay in that unit and current position held.
- Section 2 covered computer knowledge of the respondents. The respondent had to specify what knowledge does he or she has with regard to different computer applications as well as in-service training received.
- Section 3 dealt with the perceptions of professional nurses regarding the role of CNIS in patient care. The respondent had to indicate within the scale of 'strongly agree to strongly disagree' with regard to specified roles of CNIS in patient care.
- Section 4 covered barriers to the effective use of CNIS in patient care. Items used in this section were placed in positive as well as negative connotation. Respondents were asked to tick 'yes', 'no' or 'not sure' in provided spaces with regard to what they regard as a barrier to the use of CNIS.
- Section 5 of the questionnaire was to determine if CNIS was used effectively in patient care by professional nurses. Included in this section were items such as daily average bed occupancy, daily average number of patients, to which computer module mostly used and number of entries in the computer.
- The last section of the questionnaire was one open-ended question whereby respondents were asked to give their comments on the effective utilisation of CNIS (Medicom) on patient care by professional nurses in their units.

3.3.2 Validity and reliability of the questionnaire

A questionnaire was constructed using self formulated questions based on the objectives of the study. Questions were kept as short as possible to avoid ambiguity. The questionnaires were handed over to the statistician and research expert for correction. A pilot study was conducted to determine the unanticipated effects, such as ambiguity of questions as well as

testing for reliability and validity of the questionnaire. Respondents were strongly encouraged to complete the questionnaires themselves and not to ask any other person to do it. It was through this pilot study that reliability and validity of the instrument was ensured as it yielded consistent measurement of results. It also proved to be valid as it answered the research questions such as perceptions, effective use and barriers to the use of CNIS.

3.3.3 Pre-testing of the questionnaire

The questionnaire was pre-tested as part of the pilot study. Ten (10) professional nurses from the spinal and renal units in the same institution were used for piloting the study. These units did not participate in the actual study. Questionnaires were distributed personally by the researcher to the unit managers to hand to the participants. A period of three weeks was given to complete the questionnaires. Respondents completed the questionnaire without difficulty.

3.3.4 Data collection technique

One hundred and twenty (120) questionnaires were distributed to all thirty eight (38) wards of the hospital by the researcher. Some were handed personally to each unit manager to hand to participants. Where the unit manager was not available, being absent or after hours, questionnaires were handed to the deputy unit manager or professional nurse in charge at that time. The unit manager was asked how many professional nurses she/he has on that shift. If four were on duty, three questionnaires were given to her/him. If three were on duty, two were given. If two on duty one was given. In the wards where one or two professional nurses were absent, their questionnaires were left with the unit manager to hand over to them.

All this was conducted in order to distribute the hundred and twenty questionnaires evenly, to all the selected wards.

3.4 Validity of the study

Burns and Grove (2005:214) describe validity as a measure of the truth or accuracy of a claim. In the context of this study, the truth and accuracy of the study has been ensured by firstly using or choosing the appropriate design in relation to the purpose of the study. The setting where the study was conducted also had an influence in choosing the current design as

well as the complexity of duty rosters prevailing there. According to Burns and Grove (2005:214) four types of validity need to be ensured, namely:

- Statistical conclusion validity. This was ensured by employing a statistician to analyse data.
- Internal validity which refers to the extent to which the effects detected in the study are a true reflection of reality rather than the results of extraneous variables such as history, maturation, testing, instrumentation, mortality and others and others. These extraneous variables could not have influenced this study as in experimental studies. Questionnaires were distributed and collected within three weeks.
- Construct validity examines the fit between the conceptual definitions and operational definitions of variables (Burns & Grove 2005:217). This was ensured by deriving and constructing the operational definitions from the conceptual definitions of the study variables as shown under definitions of concepts.
- External validity refers to the degree to which the results of a study can be generalised to other people and other settings (Polit and Beck 2004:217). Although a non probability sampling was used, questionnaires were distributed evenly to different wards to ensure representation within the hospital. Thus the results can be generalised to other professional nurses within the hospital.

3.5 Ethical considerations

3.5.1 Approval of the protocol

The protocol to conduct the study was approved by the Research, Ethics and Publication Committee (REPC) of the University of Limpopo (Medunsa Campus). Gauteng Province Department of Health, Chief Executive Officer and Deputy Director Nursing of Dr. George Mukhari Hospital all gave permission to conduct the study at the hospital concerned.

3.5.2 Informed consent

Respondents were provided with verbal and written information. Unit managers were also requested to relay verbal information to respondents who were absent during the presentation of questionnaires. The aims and objectives of the study were provided to them. They were

provided with the opportunity to ask questions and given adequate time to rethink the issue. Reassurance was given to them that the study is completely voluntary and that they may withdraw from it without supplying reasons. Consent forms were then issued to them to complete and return.

3.5.3 *Confidentiality and privacy*

Respondents were reassured that the information and their privacy is guaranteed. However, there were those who were willing to participate but did not trust that their written consent will not be linked to their completed questionnaires. These were allowed to submit their consent forms separate from their questionnaires. However, there were questionnaires which were brought back without uncompleted consent forms. The researcher collected these questionnaires personally from all the wards.

3.6 Conclusion

The research design and methodology which was implemented in this study to evaluate the effective use of CNIS by professional nurses in patient care, was outlined. The setting, population, sample and sampling process, data collection, validity and reliability as well as ethical considerations were all discussed. Chapter four will report on the process of data analysis and the statistical assessment conducted to describe the findings.

CHAPTER 4

DATA ANALYSIS

4.1 Introduction

This chapter describes the analysis of data collected from professional nurses at Dr. George Mukhari Hospital. The descriptive statistics was used to analyse data. This allows data to be organised in ways that give meaning and facilitate insight and to examine a phenomenon from a variety of angles (Burns & Grove, 2005:461). Thus presentation, interpretation and discussion of the results will be conducted according to the sections as presented in the questionnaire. The questionnaire was structured according to the objectives of the study. It had five sections comprising 41 items of closed-ended questions, and one open-ended question. All sections represent a descriptive analysis in terms of tables, frequencies, charts and graphs.

4.2 Structure of the descriptive analysis

Statistics employed to summarise this data is frequency count, frequency distribution, charts and graphs. This method is mainly used to check for errors in coding and computer programming (Burns & Grove, 2005: 461). A total of 120 questionnaires were distributed to different departments where professional nurses use computers for recording patient care. Out of 120 questionnaires distributed, 77 were returned. The raw data from these returned questionnaires was verified and checked for accuracy and missing data. Then it was fed into the computer with the assistance of the statistician using the SASS system. The results of the 77 respondents are illustrated in the following paragraphs. A literature control was done to verify the findings.

4.2.1 Section 1 -Biographical data

This section describes the biographical data of the professional nurses involved in the study. Variables of interest were age, gender, basic nursing qualification, unit currently working in, length of stay in the unit, as well as current position held.

4.2.1.1 Age distribution of respondents

Table 4.1 indicates the ages of professional nurses using the CNIS for patient care. This is significant to analyse because age has been suggested as one of the factors that affect the effective use of CNIS.

Table 4.1: Age distribution of respondents (n=77)

Age	Frequency	Percentage
21 - 30	4	5 %
31 - 40	13	17 %
41 - 50	34	44 %
51 and above	26	34 %
TOTAL	77	100%

Table 4.1 illustrates that of the 77 respondents, 5% (n=4) were aged between 21-30, 17% (n=13) were aged between 31-40, 44% (n=34) were between 41-50 and 34% (n=26) were 51 years and above. The impression is that majority of the respondents (44% and 34%) which adds up to 78% were well above 40 years of age, and 22% were below 40 years. The interpretation is that the sample consisted of older respondents than younger ones. These results are supported by the South African Nursing Council (SANC) 2009 statistics (www.sanc.co.za), whereby 72% of registered nurses are above 40 years of age.

4.2.1.2 Gender distribution of respondents

Figure 4.1 indicates the gender of professional nurses using CNIS for patient care. This is important to analyse because it will provide a picture of the distribution of males and females in the sample.

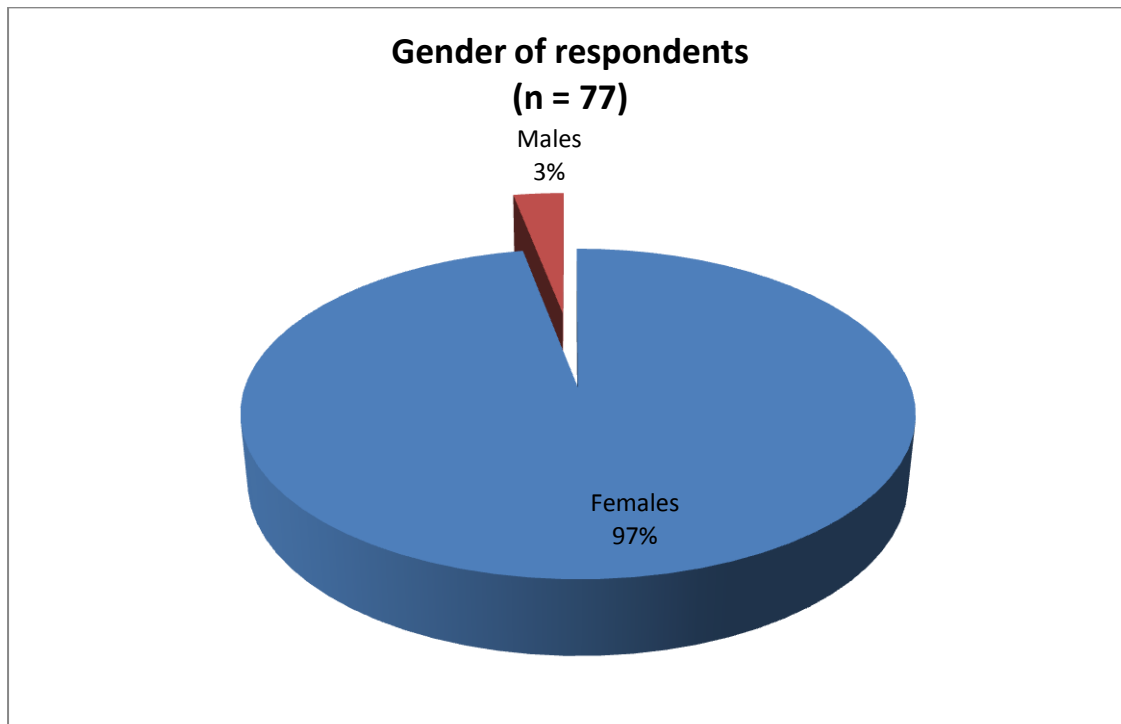


Figure 4.1 : Gender of respondents (n=77)

Figure 4.1 illustrates that of the 77 respondents, 97% (n=75) were females whereas 3% (n=2) were males. This sample consisted of more females than males. This is a common phenomenon in most of the health care settings in South Africa, whereby females outnumber males. These results are also supported by SANC 2009 statistics (www.sanc.co.za) whereby in Gauteng province there are 27624 females as compared to 1398 males registered nurses.

4.2.1.3 Basic nursing qualifications

Figure 4.2 indicates the basic nursing qualifications of professional nurses using CNIS. This is important to analyse because nursing qualification is an indicator of the level of knowledge and education of the professional nurses, particularly with regard to application of the nursing process. This knowledge will in turn affect the use computers in applying the nursing process.

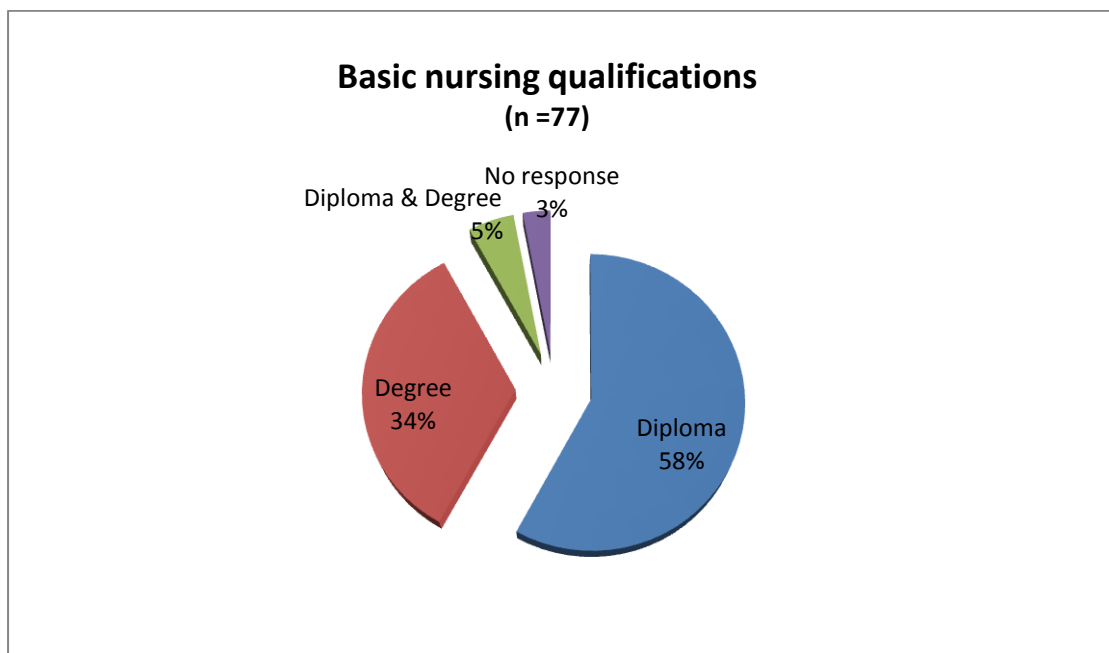


Figure 4.2: Basic nursing qualifications (n = 77)

Figure 4.2 illustrates that of the 77 respondents, 58% (n=45) have a diploma, 34% (n=26) a degree, 5% (n=4) has both diploma and degree and 3% (n=2) did not respond to the question. The interpretation is that the majority of the respondents has diploma as a qualification, followed by those with degree then those with both diploma and degree. The SANC 2009 statistics (www.sanc.co.za) attest to these results whereby in Gauteng province, the output of the four year comprehensive programme completed at nursing college (diploma) and at university (degree) were 469 and 108 respectively.

4.2.1.4 In which unit are you currently working?

Table 4.2 indicates different units in which professional nurses are working. This is important to analyse as it indicates the level of distribution of professional nurses in different units, more especially in units which are regarded as having a higher workload than others, such as ICU, maternity and operating theatre. It also indicates the extent of the distribution of questionnaires in the institution.

Table 4.2: Unit currently working in (n=77)

Unit Currently Working	Professional Nurses	Percentage
General surgery	11	14 %
Specialist	11	14 %
Paediatrics	10	13 %
Obstetric and Gynaecology	8	11 %
Internal medicine	12	16 %
Operating Theatre	11	14 %
Intensive care Unit	12	16 %
Maternity	1	1 %
Other	1	1 %
TOTAL	77	100%

Table 4.2 illustrates that of the 77 respondents, 14% (n=11) work in general surgery 14% (n=11) in speciality, 13% (n=10) in paediatrics, 11% (n=8) in obstetrics & gynaecology 16% (n=12) in internal medicine, 14% (n=11) in operating theatre, 16% (n=12) in ICU, 1% (n=1) in maternity and 1% (n=1) in other departments such as ophthalmology which is basically speciality. This indicates a fair distribution of professional nurses in different units. Although the distribution appears to be even, there is a possibility of differences in workload in all the departments. The other indication is that the distribution of questionnaires was also balanced.

4.2.1.5 Length of stay in that particular unit

Figure 4.3 indicates for how long the respondents have been working in that particular unit. This is significant to analyse as length of stay indicates more experience and possibility of being in contact or familiar with the use of CNIS.

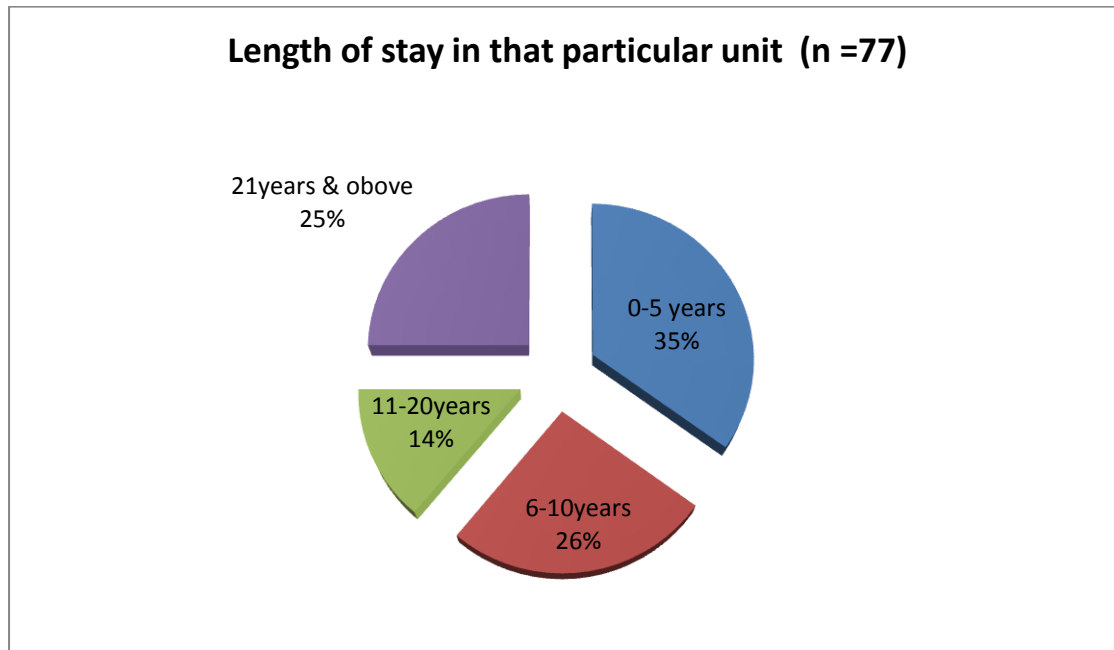


Figure 4.3 Length of stay in that particular unit (n=77)

Figure 4.3 illustrates that of the 77 respondents, 35% (n=27) stayed in that particular unit for 0-5years, 26% (n=20) stayed for 6-10 years, 14% (n=11) stayed for 11-20 years, and 25% (n=19) stayed for 21years and above. Significant percentage (35%), of respondents has been in the same unit for 5 years and less. However, a more significant percentage is all those who are more than 6 and above 21 years, which constitutes 65% of all respondents (26%, 14%, 25%). The interpretation is that the majority of respondents have been working in the same unit for more than five years thus an indication of more experienced respondents. Marasovic et.al. (1997) quoted in Lee et.al. (2005:171) stated that less nursing experience had a statistically significant positive effect on motivation to use computers.

4.2.1.6 Current position occupied at your job

Figure 4.4 indicates the percentage of respondents who occupies certain positions in their different units. This is significant to analyse since it will also reveal the level of maturity, seniority and experience of the respondents. Since the sample consisted of professional nurses only, the three common categories were chosen for them to select from, i.e. chief professional nurses, senior professional nurse and functional nurses.

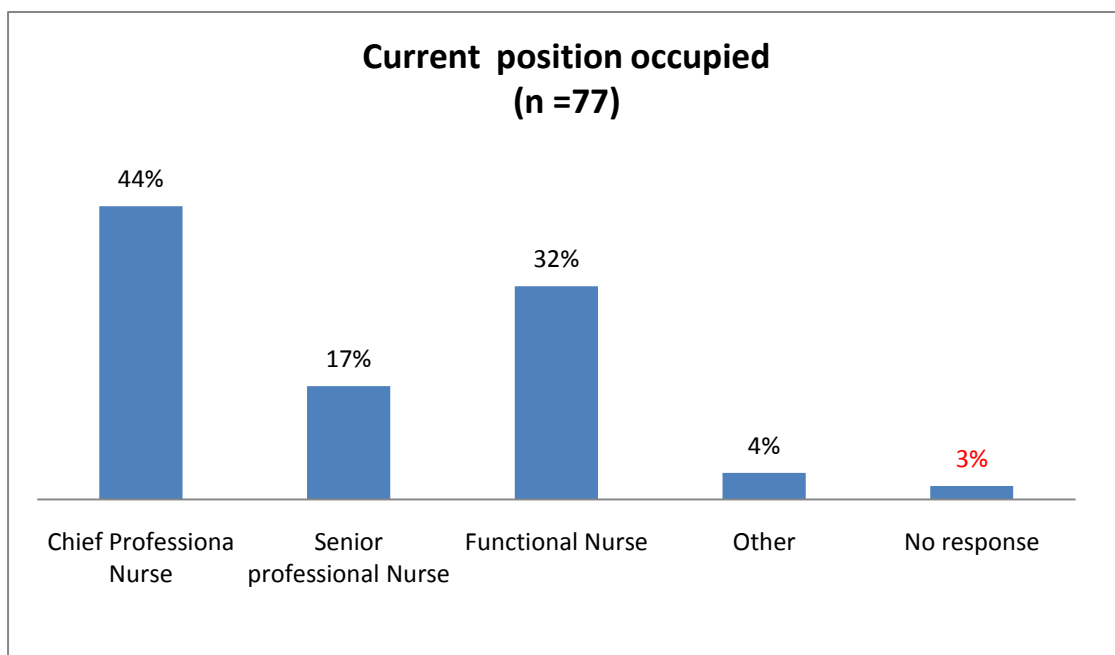


Figure 4.4 Current position occupied (n=77)

Figure 4.4 illustrates that of the 77 respondents, 44 % (n=34) are chief professional nurses, 17% (n=13) are senior professional nurses, 32 % (n=25) are functional nurses, 4 % (n=3) referred to themselves as unit managers which is the same level as chief professional nurses. The remaining 3% (n=2) did not respond to the question. Therefore, the result shows that there is a significant percentage of chief professional nurses, which means senior personnel as compared to functional nurses. This illustrates that the sample comprised of more experienced and matured personnel which is an indication of more years of nursing experience. Sleutel and Guinn (1999) quoted in Lee et.al. (2005:171) reported that years of nursing experience were positively related to attitude towards computer use. These could be negative or positive attitudes.

4.2.2 Section 2 –Computer knowledge

This section describes the computer knowledge of the respondents. The questions asked were: What computer knowledge do you have? Which computer training did you attend? How often do you receive computer in-service training and which Medicom module are you competent in?

4.2.2.1 What computer knowledge do you have?

Figure 4.5 indicates computer knowledge of the respondents. They were asked to choose from the following applications: word processing, email, internet, power-point, excel and no computer knowledge. This is significant to analyse since computer knowledge form the basis for the effective use of CNIS and because of a general assumption that nurses with more computer knowledge are more willing to use CNIS.

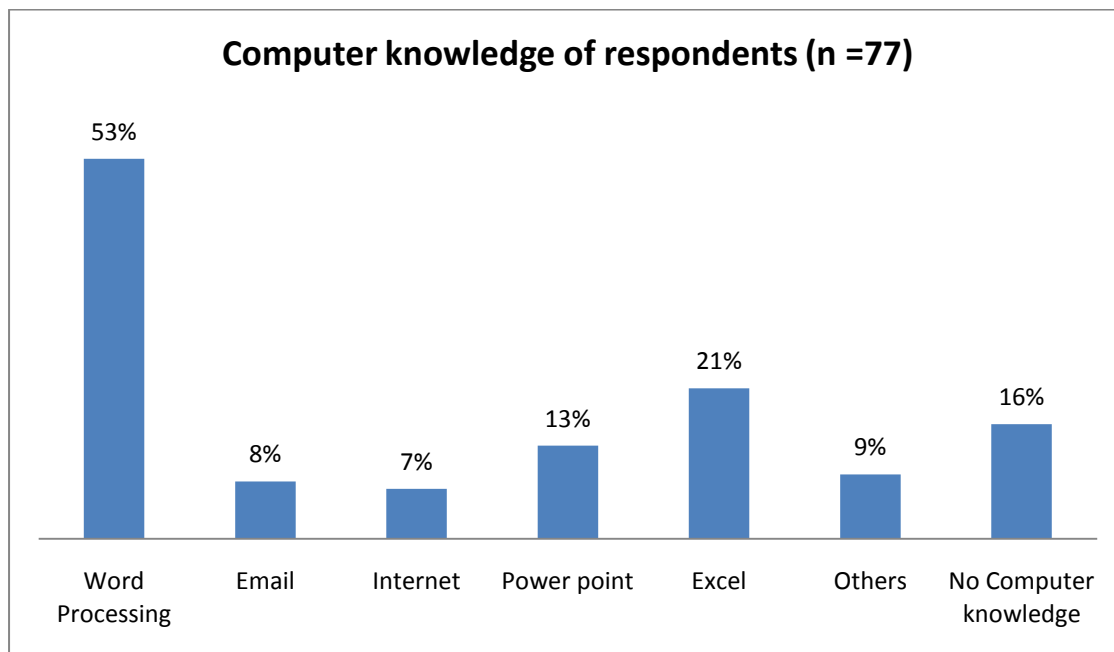


Figure 4.5 Computer knowledge of respondents (n=77)

Figure 4.5 illustrates that of the 77 respondents 53% (n=41) have a knowledge of word processing, 8% (n=6) of email, 7% (n=5) internet, 13% (n=10) power point, 21% (n=16) excel, 9% (n=7) other knowledge such as Medicom, introduction and ‘assist’.16 % (n=12)

have no computer knowledge. The interpretation is that a significant number of respondents have knowledge of word processing which is more of basic computer knowledge. On the extreme there is a significant number of respondents (16%), with no computer knowledge. Respondents with knowledge such as email, internet, power point and excel have indicated amongst others, knowledge of word processing. According to Filho (2001:99), developing IT knowledge among nurses is an urgent need since in both developed and developing countries most nurses don't understand how to integrate information system technology into nursing practice

4.2.2.2 Which computer training did you attend?

Figure 4.6 indicates computer training the respondents attended. This is important as computer training is one of the critical factors that affect the effective use of CNIS. One cannot use the computer if one is not trained to use it. Two basic courses were selected for respondents to select from i.e. Basic Computer Literacy (e.g Microsoft word) and Introduction to End User Computing (Medicom).

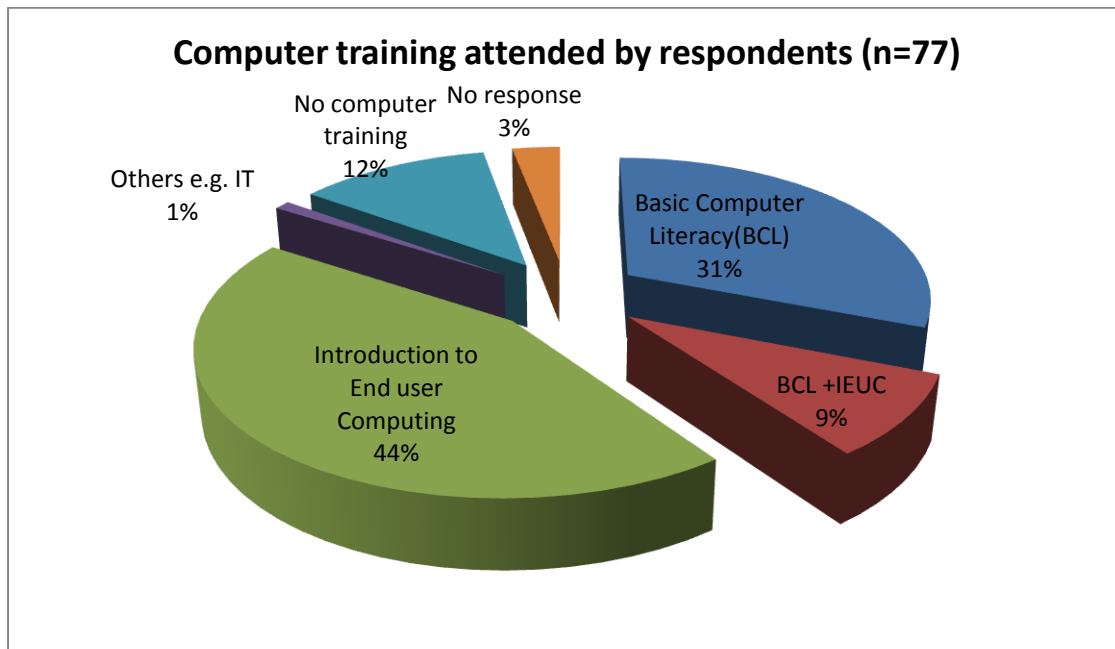


Figure 4.6 : Computer training attended by respondents(n=77)

Figure 4.6 illustrates that of the 77 respondents 31% (n=25) have attended Basic Computer Literacy training –BCL (e.g. Microsoft word), 9% (n=7) attended both BCL and Introduction

to End User Computing IEUC (e.g.Medicom) and 44% (n=34) attended only IEUC. Other training such as IT (Information Technology) was attended by only 1% (n=1) of the respondents. 12% (n=9) had attended no computer training and 3% (n=2) did not respond to the question. A significant percentage of respondents 53% (n=41) attended Medicom, which is a system under discussion

4.2.2.3 How often do you receive computer in-service training?

Figure 4.7 indicates the frequency of computer in-service training undertaken by the respondents. The respondents were to choose between once a week, more than once a week, once a month, more than once a month and no in-service training. This is significant to analyse since in-service training empowers, encourages and enforces the use of CNIS.

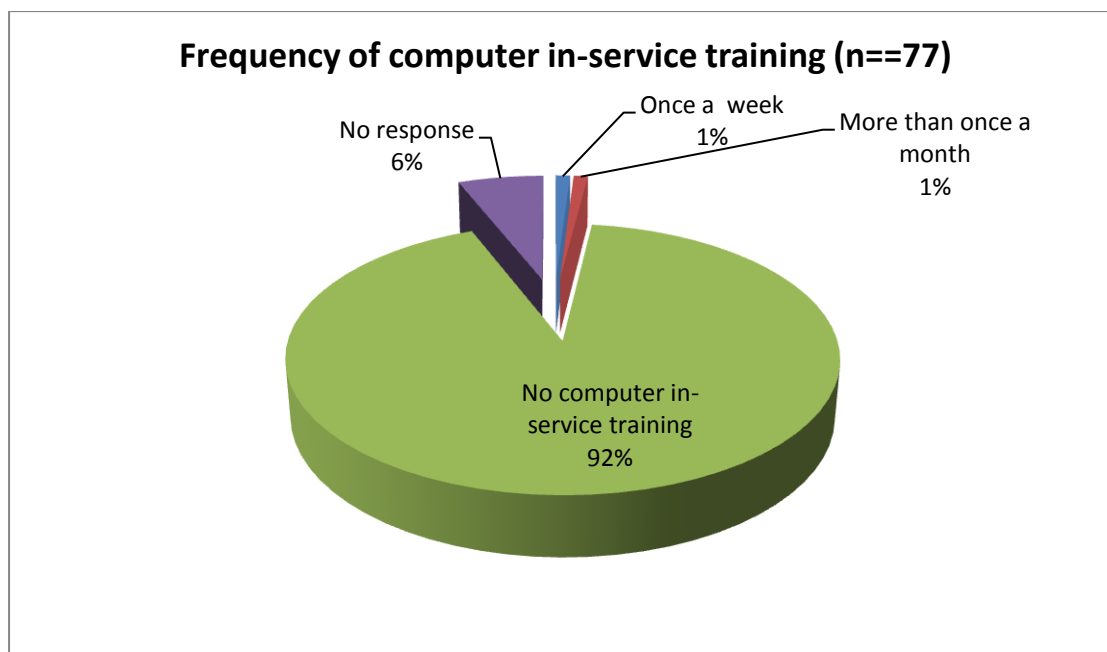


Figure 4.7: Frequency of computer training (n=77)

Figure 4.7 illustrates that of the 77 respondents, only 1% (n=1) received computer in-service training once a week, no respondents i.e. nil percent receive computer in-service more than once a week or even once a month. 1% (n=1) received training more than once a month. A significant percentage 92% (n=71) received no computer in-service training at all. 6% (n=4) did not respond to the question. The interpretation is that the majority of professional nurses

receive no computer in-service training at all. According to Larrabe et.al. (2001:64) re-education of nurses in the use of the CNIS did significantly improve documentation and most importantly its use.

4.2.2.4 Which Medicom modules are you competent in?

Figure 4.8 indicates the different Medicom modules which the respondents are competent in. Selected modules which are specific to nursing are: generating nursing care plan, transfer of patient, patient reports, statistics, birth registration and discharge advice. This is important to analyse since they are the core modules for nurses in using CNIS.

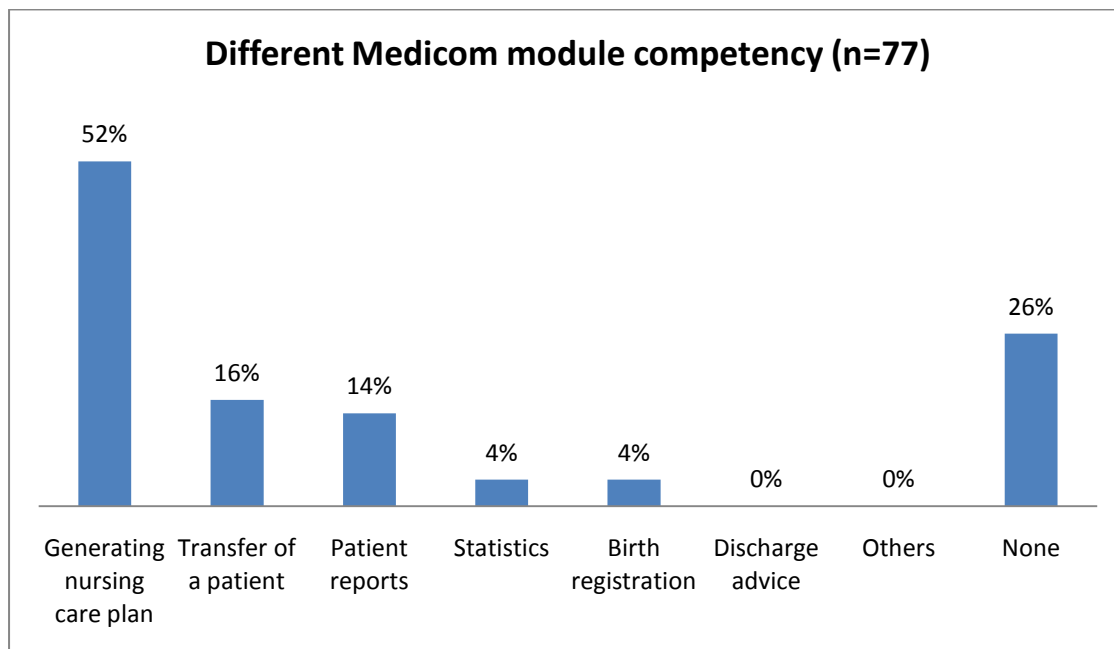


Figure 4.8: Different Medicom module competency (n=77)

Figure 4.8 illustrates that of the 77 respondents, 52% (n=40) are competent in generating nursing care plans, 16% (n=12) competent in transfer of patients, 14% (n=11) in patient reports, 4% (n=3) in statistics, 4% (n=3) in birth registration, nil percent in discharge advice. 26% (n=20) are not competent in any of the modules. The interpretation is that over 50% of respondents are competent in generating nursing care plans, which is the core module for nurses' use.

4.2.3 Section 3 – The perceptions of professional nurses regarding the role of CNIS in patient care.

This section describes the perceptions of professional nurses regarding the role of CNIS in patient care. The statements which the respondents were expected to respond to were rated as (5) strongly agree, (4) agree, (3) uncertain, (2) disagree and (1) strongly disagree. The following statements were used:

4.2.3.1 *Using a computer is time saving, thus allowing more time for patient care*

Figure 4.9 indicates the responses to the statement above. This is important to analyse as it reveals professional nurses' perception regarding the time saving, and time allowed for patient care aspects of CNIS.

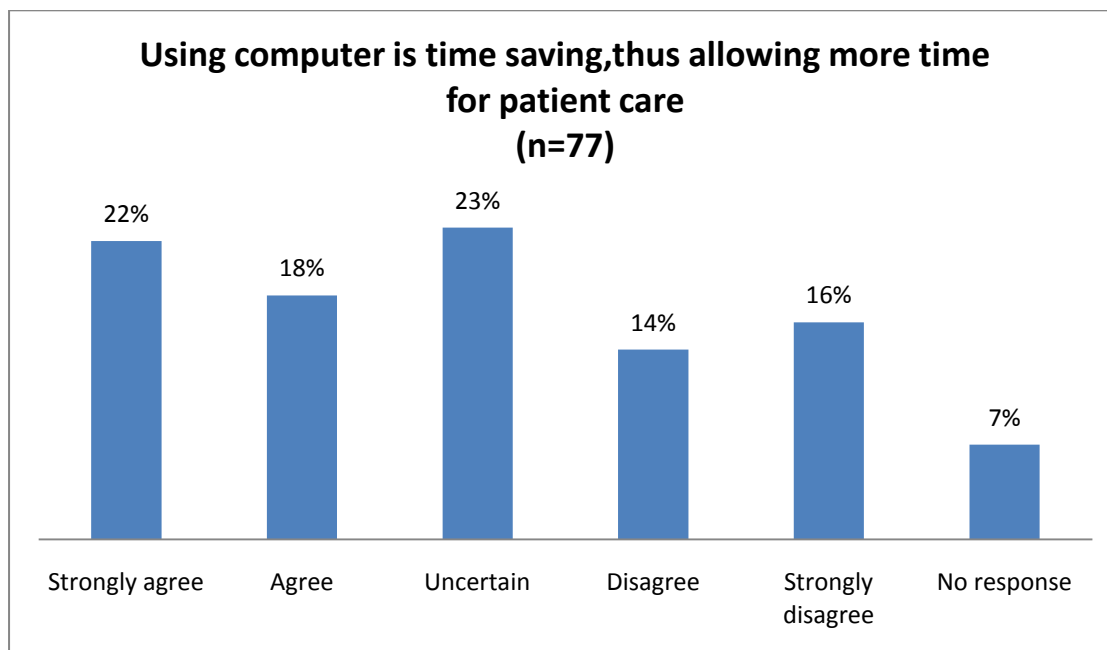


Figure 4.9: *Using computer is time saving, thus allowing more time for patient care (n=77)*

Figure 4.9 illustrates that of the 77 respondents, 22% (n=17) strongly agree that using a computer is time saving thus allowing more time for patient care, whereas 18% (n=14) agree, 23% (n=18) are uncertain, 14% (n=11) disagree and 16% (n=12) strongly disagree with the statement. A total of 40% (n=31) of respondents strongly agree and agree, and a total of 30%

(n=23) strongly disagree and disagree that using a computer is time saving thus allowing more time for patient care. The interpretation is that the majority of respondents perceive that using computer is time saving and thus allow more time for patient care. These results are in line with the findings by Poissant, Pereira, Tamblyn and Kawasumi (2005:505) who stated that “the use of bedside terminals and central station desktops saved nurses, respectively, 24.5% and 23.5% of their overall time spent documenting during a shift.”

4.2.3.2 Computers increase productivity of nurses by reducing paperwork

Figure 4.10 indicates the percentage of respondents regarding the statement above. This is important to analyse since a significant amount of paperwork has been suggested as one of the factors that hinders quality patient care, thus decreasing productivity of nurses.

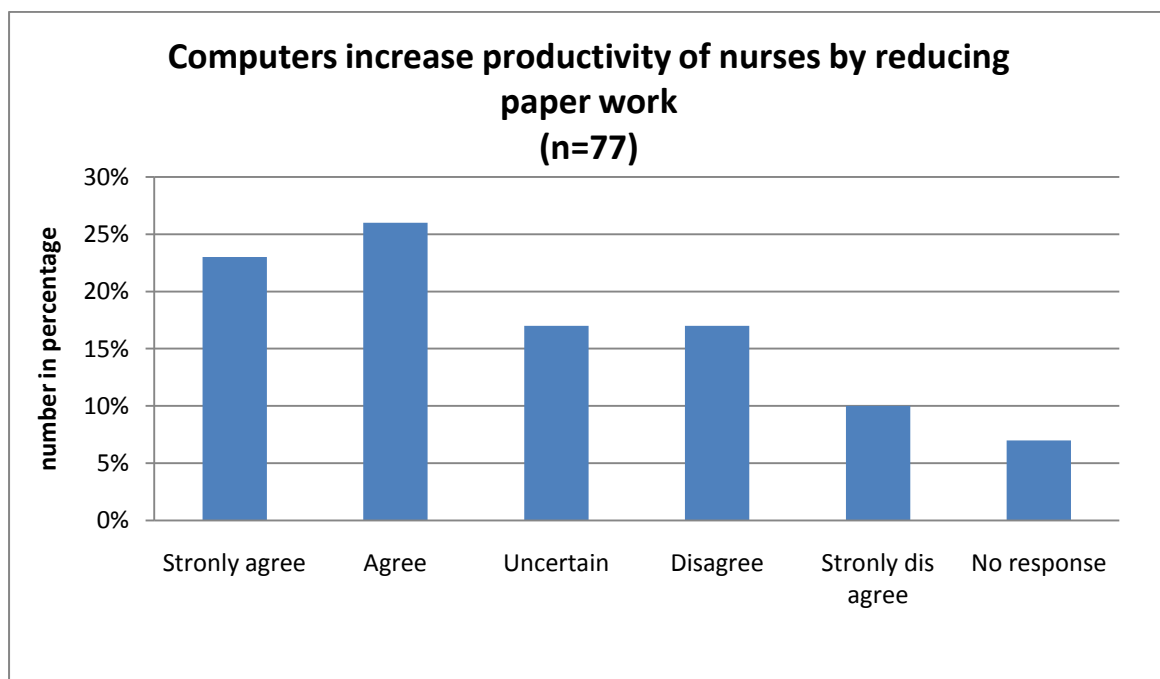


Figure 4.10 : Computers increase productivity of nurses by reducing paperwork (n=77)

Figure 4.10 illustrates that of the 77 respondents, 23% (n=18) strongly agree that computers increase productivity of nurses by reducing paperwork. Whereas 26% (n=20) agree with the statement, 17% (n=13) are uncertain, another 17% (n=13) disagree, 10% (n=8) strongly disagree, 7% (n=5) did not respond to the statement. A total of 49% (n=38) of the respondents agree and strongly agree with the statement. Of the respondents, 27% (n=21)

strongly disagree and disagree. Therefore, the majority of respondents agree that computers increase productivity of nurses by reducing paperwork.

4.2.3.3 Computers make nursing information more accessible

Figure 4.11 indicates the responses with regard to accessibility of nursing information when using computers. This is important to analyse as increased accessibility of information facilitates patient care.

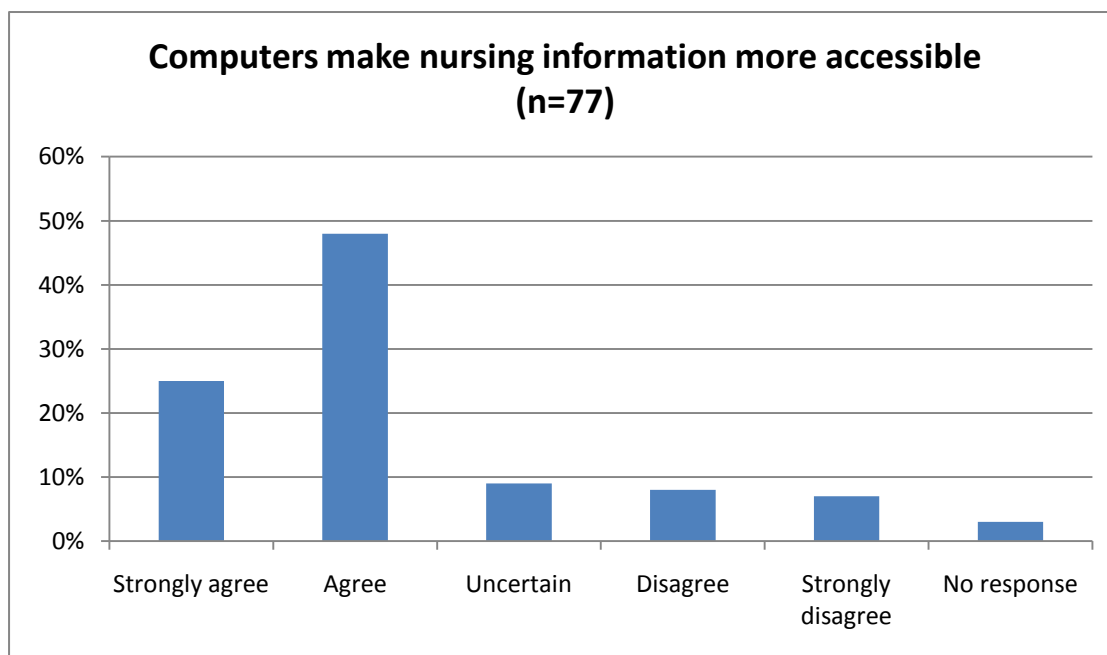


Figure 4.11: Computers make nursing information more accessible (n=77)

Figure 4.11 illustrates that of the 77 respondents, 25% (n=19) strongly agree that computers make nursing information more accessible, 48% (n=38) agree with the statement, 9% (n=7) are uncertain, 8% (n=6) disagree and 7% (n=5) strongly disagree, 3% (n=2) did not respond to the statement. The interpretation is that a significant percentage of respondents 73% (n=56) agree and strongly agree that computers make nursing information more accessible. Scott (2000:1) attests to this result that the use of computers improve access and dissemination of important information.

4.2.3.4 Computers facilitate communication of nursing information from one department to another

Figure 4.12 indicates the responses to the statement above. This is important to analyse as communication is paramount in nursing care delivery.

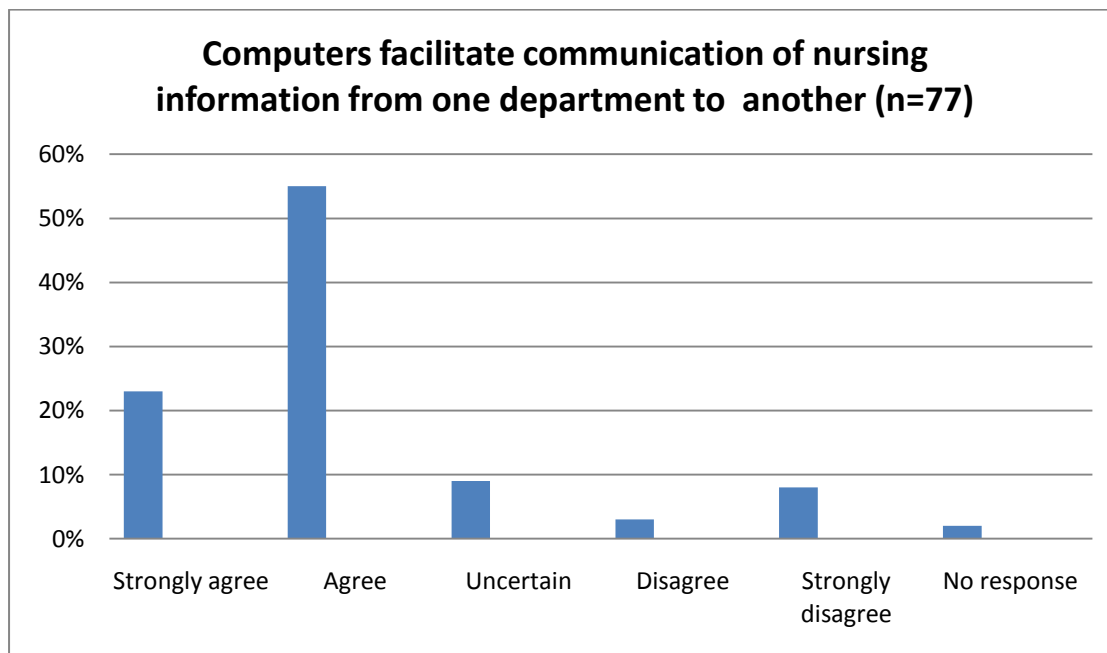


Figure 4.12: Computers facilitate communication of nursing information from one department to another (n=77)

Figure 4.12 illustrates that of the 77 respondents, 23% (n=18) strongly agree that computers facilitate communication of nursing information from one department to another. 55% (n=42) agree, 9% (n=7) are uncertain, 3% (n=2) disagree, whereas 8% (n=6) strongly disagree with the statement, 2% (n=2) did not respond to the statement. Therefore, the majority of the respondents 78% (n=60) agree and strongly agree that computers facilitate communication of nursing information from one department to another. This has been alluded to by Goosen (1997:86) stating that “CNIS facilitates communication of patient data to ensure continuity of care, and to exchange information among other healthcare professionals, within the institution, or between different institutions.”

4.2.3.5 Computers facilitate retrieval of information to be easy

Figure 4.13 indicates the responses to the statement: computers facilitate retrieval of information to be easy. This is important to analyse as easy retrieval of information is one of the factors that motivate nurses to use the CNIS effectively.

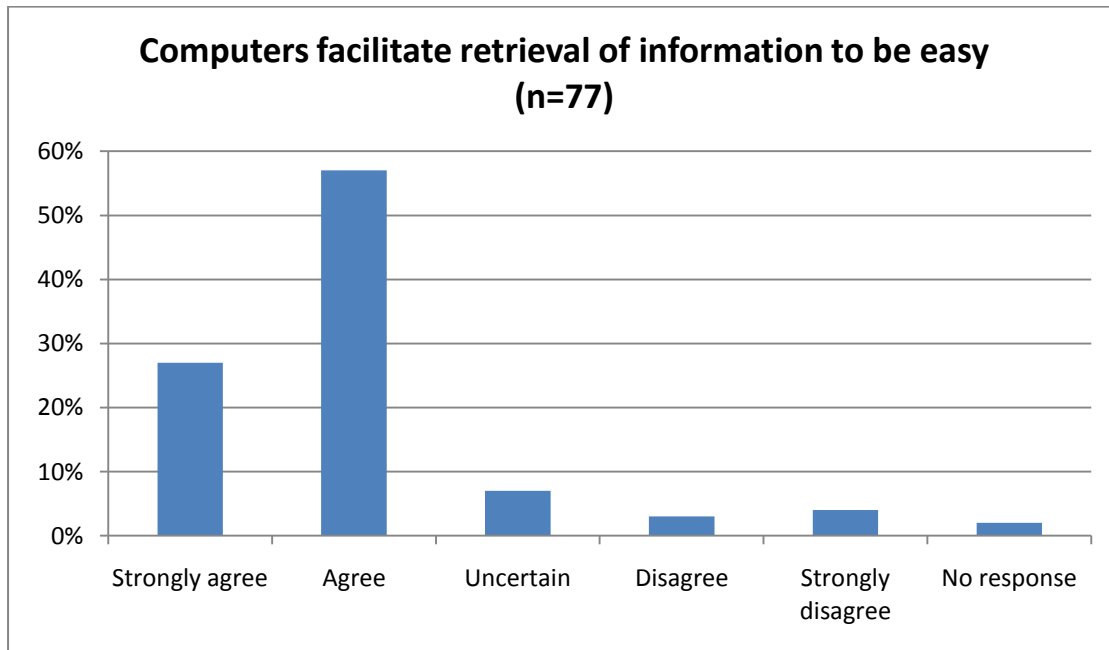


Figure 4.13 Computers facilitate retrieval of information to be easy (n=77)

Figure 4.13 illustrates that of the 77 respondents, 27% (n=21) strongly agree that computers facilitate retrieval of information to be easy. While 57% (n=44) agree, 7% (n=5) are uncertain, 3% (n=2) disagree and 4% (n=3) strongly disagree, 2% (n=2) did not respond to the statement. Thus a significant percentage of respondents 84% (n=65), agree and strongly agree that computers facilitate retrieval of information to be easy.

4.2.3.6 Computers improve completeness of nursing documentation

Figure 4.14 indicates responses to the statement whether computers improve completeness of nursing documentation. This is important to analyse since completeness of nursing documentation is crucial to quality nursing care.

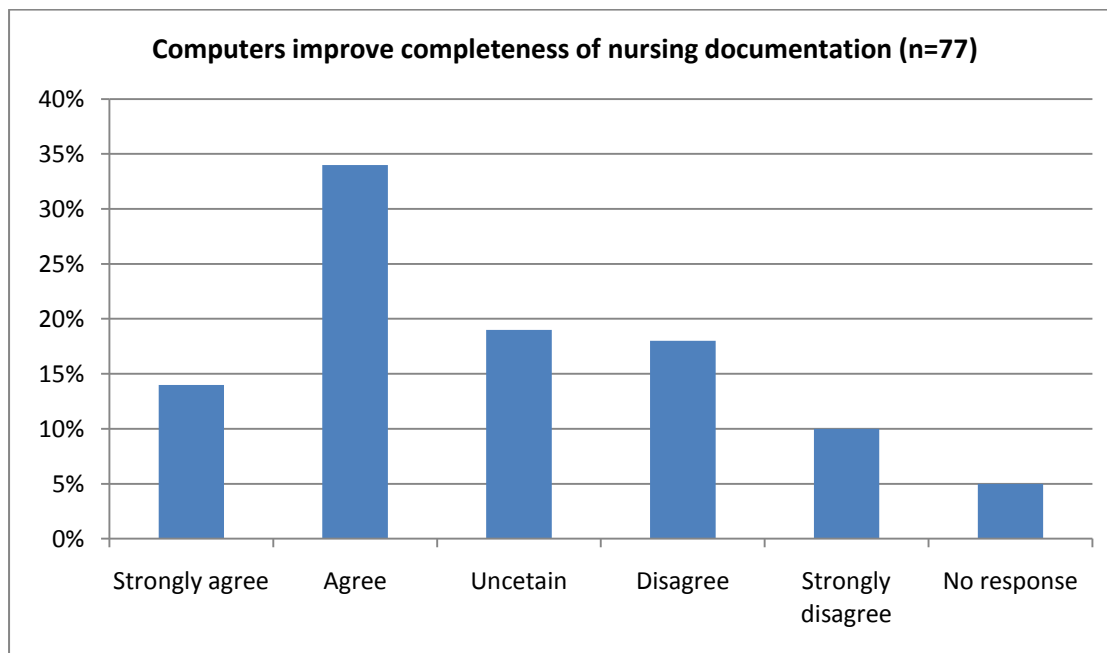


Figure 4.14: Computers improve completeness of nursing documentation(n=77)

Figure 4.14 illustrates that of the 77 respondents, 14% (n=11) strongly agree that computers improve completeness of nursing documentation, while 34% (n=26) agree, 19% (n=15) are uncertain, 18% (n=14) disagree whereas 10% (n=8) strongly disagree, 5% (n=3) did not respond to the question. Most of the respondents 48% (n= 38) strongly agree and agree that computers improve completeness of nursing documentation. Although Larrabe et.al. (2001:64) found that the implementation of a CNIS did not improve documentation within the first 6 months of the study, re-education of nurses in the use of the CNIS did significantly improve documentation.

4.2.3.7 It is easier to complete information in the computer than on a paper record

Figure 4.15 indicates the responses with regard to the statement whether it is easier to complete information in the computer than on a paper record. This is important to analyse since easy completion of information directly affect the nurses' willingness to use the computer.

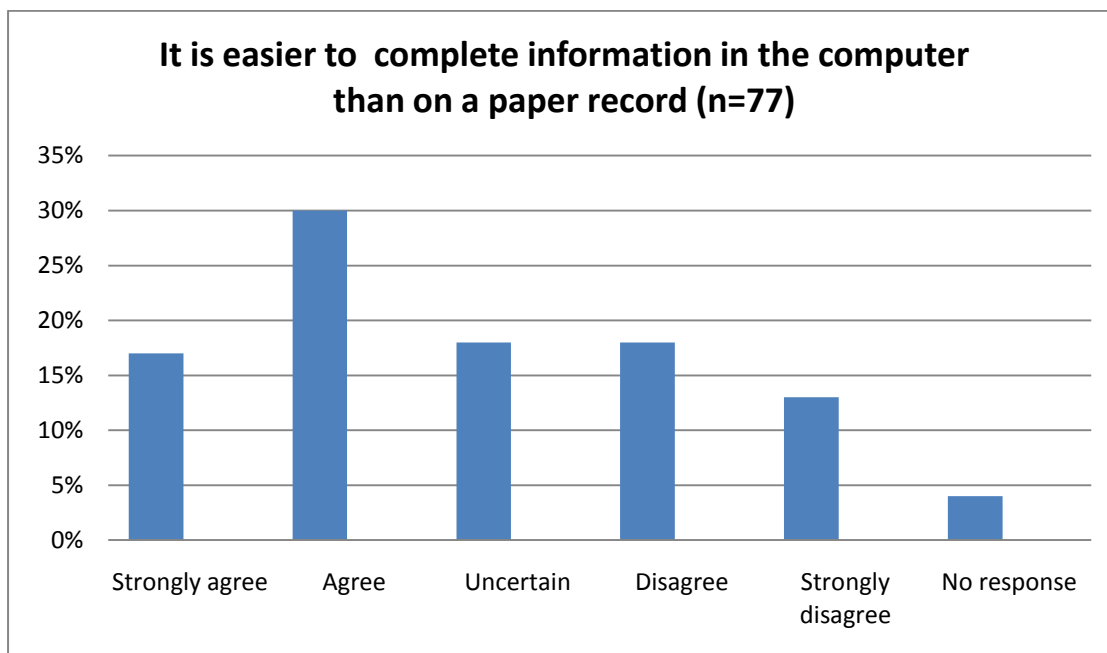


Figure 4.15: It is easier to complete information in the computer than on a paper record (n=77)

Figure 4.15 illustrates that 17% of the respondents (n=13) strongly agree that it is easier to complete information in a computer than on a paper record, while 30% (n=23) agree, 18% (n=14) are uncertain, 18% (n=14) disagreed, 13% (n=10) strongly disagree and 4% (n=3) did not respond to the question. A total of 47% (n=36) of respondents agree and strongly agree, and a total of 31% (n=24) disagree and strongly disagree. Thus the interpretation is that most of the respondents perceive that it is easier to complete information in the computer than on a paper record.

4.2.3.8 Computers facilitate efficient organisation and storage of nursing information

Figure 4.16 indicates the responses with regard to the statement that computers facilitate efficient organisation and storage of nursing information. This is important to analyse as one of the principles of good record keeping is efficient organisation and storage of nursing information.

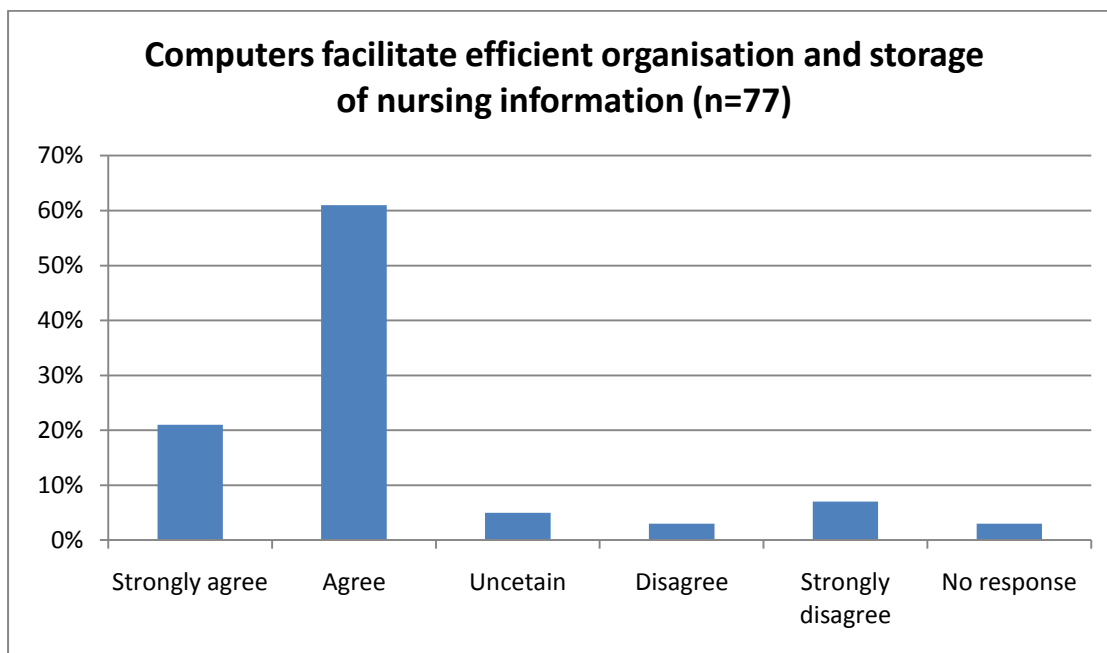


Figure 4.16: Computers facilitate efficient organisation and storage of nursing information (n=77)

Figure 4.16 illustrates that 21% (n=16) of the respondents strongly agree that computers facilitate efficient organisation and storage of nursing information, 61% (n=48) agree, 5% (n=4) are uncertain, 3% (n=2) disagree and 7% (n=5) strongly disagree, 3% (n=2) did not respond to the question. The interpretation is that the majority of respondents, a total of 82% (n=63) of those who strongly agree and agree, perceive that computers facilitate efficient organisation and storage of nursing information.

4.2.3.9 Computers make documentation more accurate

Figure 4.17 indicates the responses with regard to the statement that computers make documentation more accurate. This is significant to analyse as accuracy in documentation promotes accuracy in decision making.

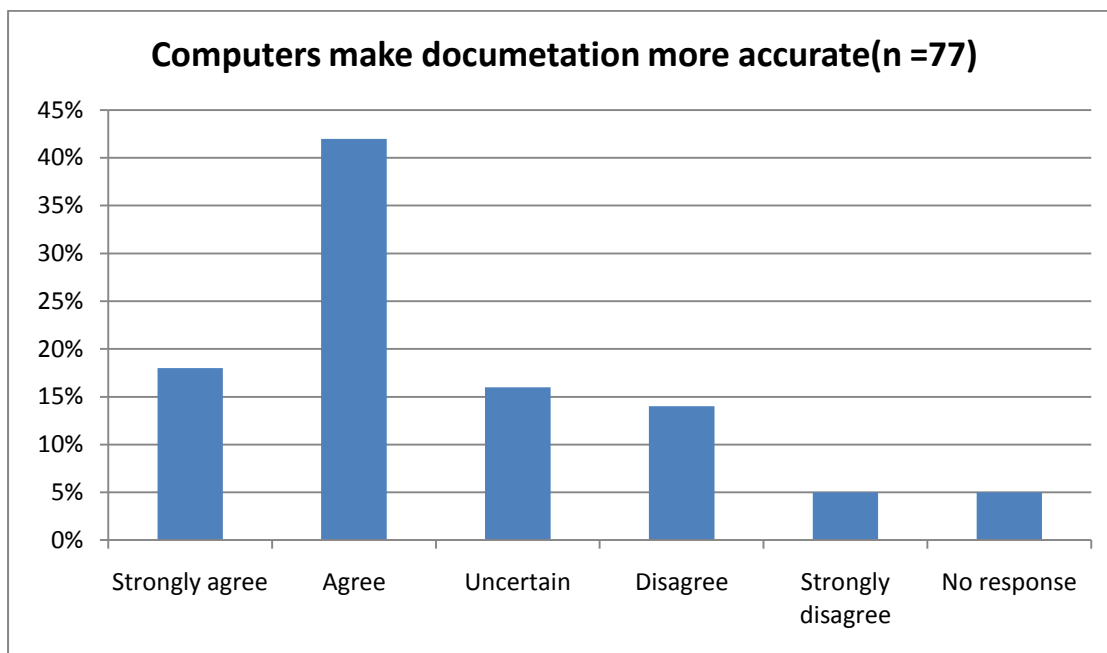


Figure 4.17 Computers make documentation more accurate (n=77)

Figure 4.17 illustrates that 18% (n=14) of the respondents strongly agree that computers make documentation more accurate, 42% (n=32) agree, 16% (n=12) are uncertain, 14% (n=11) disagree and 5% (n=4) strongly disagree, 5% (n=4) did not respond to the statement. The interpretation is that the majority, 60% (n=46) of those who agree and strongly agree perceive that computers make documentation more accurate.

4.2.4 Section 4- Barriers to the effective use of CNIS in patient care by professional nurses

This section describes the barriers to the effective use of CNIS in patient care by professional nurses. Respondents were asked to respond with either 'yes', 'no' or 'not sure' to the written statements. The following statements were used:

4.2.4.1 *I generally have a positive attitude towards computers*

Figure 4.18 indicates the responses to the statement whether respondents generally have positive attitude towards computers. This is important to analyse as attitudes toward computers have been suggested as one of the factors as well as barriers that affect the effective use of CNIS.

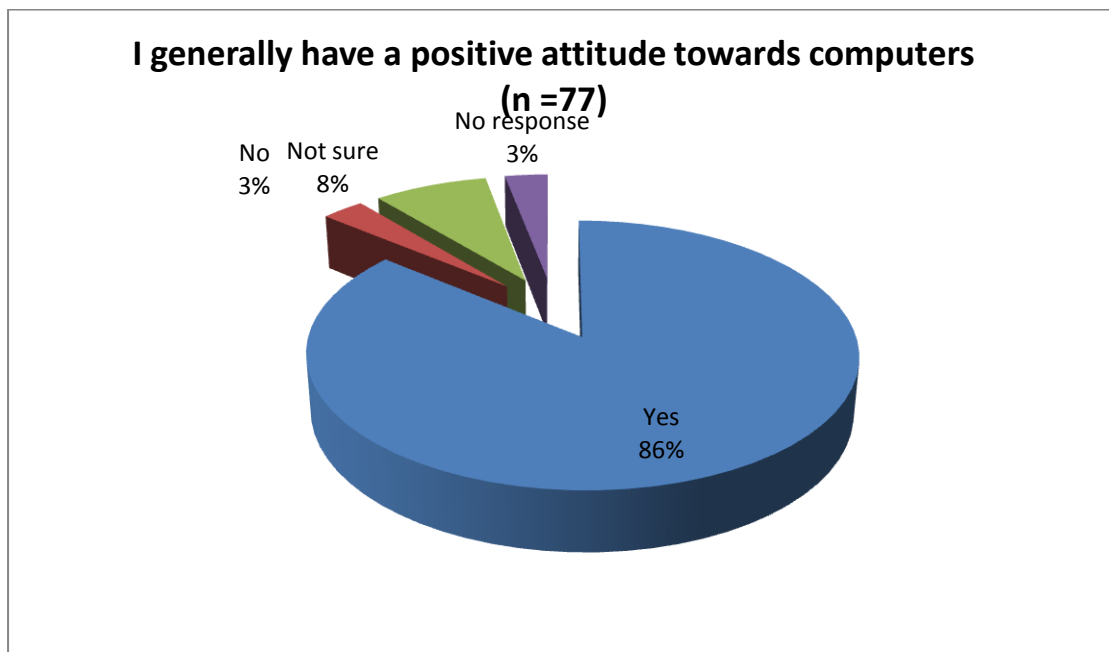


Figure 4.18: *I generally have a positive attitude towards computers*(n=77)

Figure 4.18 illustrates that 86% (n=67) of the respondents answered that they generally have a positive attitude towards computers, 3% (n=2) answered 'no', 8% (n=6) are not sure and 3% (n=2) did not respond to the statement. Therefore the majority of respondents, 86%

(n=67), have a positive attitude towards computers. Thus attitudes are not a barrier for these respondents to use the CNIS effectively. These results are supported by Simpson (1997) quoted in Scotts (2000:4) that nurses' computer related attitudes were found to be generally positive.

4.2.4.2 I have basic computer skills and knowledge

Figure 4.19 indicates the responses to the statement above. This is important to analyse as the results will give an indication of the respondents who do not have the basic computer skills and knowledge, a factor that has been suggested as a barrier to using the CNIS effectively.

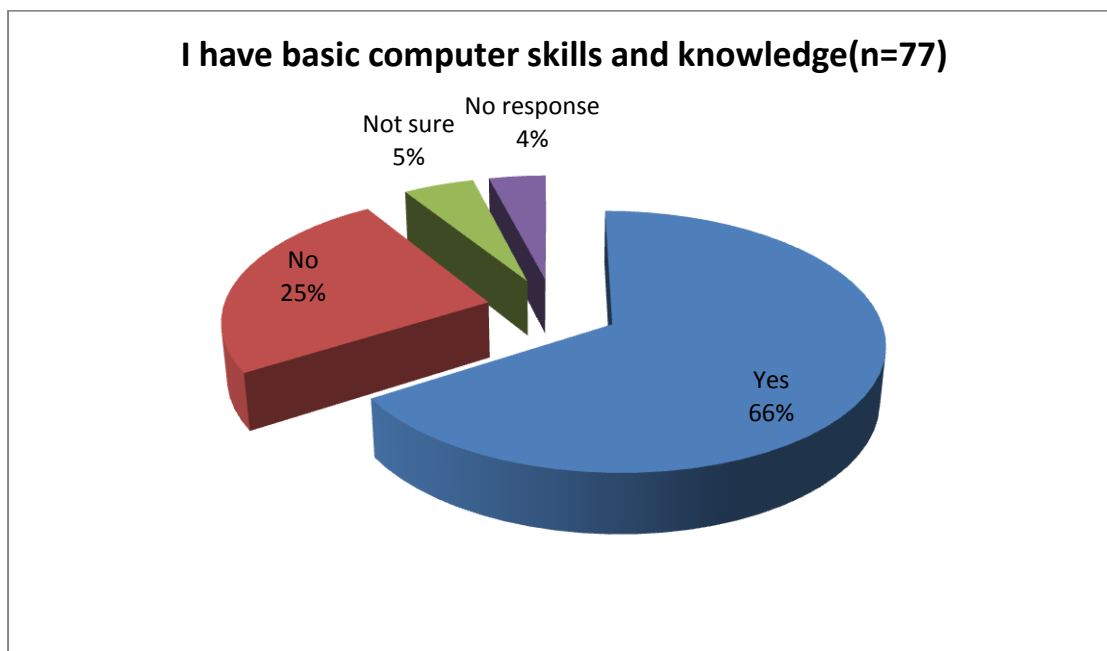


Figure 4.19: I have basic computer skills and knowledge (n=77)

Figure 4.19 illustrates that 66% (n=51) of the respondents answered that they have basic computer skills and knowledge, while 25% (n=19) answered 'no', 5% (n=4) are not sure and 4% (n=3) did not respond to the statement. The interpretation is that the majority of respondents 66% have computer skills and knowledge. Therefore, there are no barriers that are related to lack of computer skills and knowledge.

4.2.4.3 I know how to complete at least one Medicom module relevant to my department

Figure 4.20 indicates the responses to the statement whether they know how to complete at least one Medicom module relevant to their department. This is important to analyse, as the results will reveal if lack of knowledge to complete one Medicom module forms part of the barriers to use the CNIS effectively.

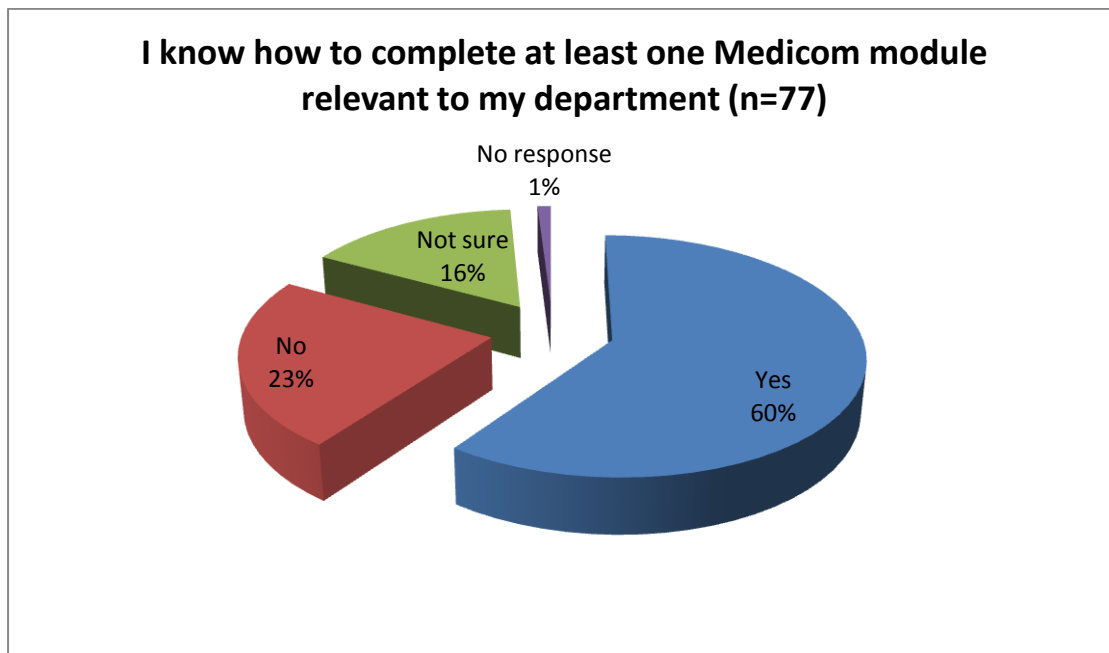


Figure 4.20 I know how to complete at least one Medicom module relevant to my department (n=77)

Figure 4.20 illustrates that 60% (n=46) of the respondents answered that they know how to complete at least one Medicom module relevant to their specific department, while 23% (n=18) answered 'no', 16% (n=12) are not sure and 1% (n=1) did not respond to the statement. The interpretation is that the majority of respondents 60% (n=46) know how to complete at least one Medicom module relevant to their department. Therefore, there is no barrier related to lack of knowledge with regard to completing at least one Medicom module relevant to their department.

4.2.4.4 My workload is so large that I cannot work on a computer

Figure 4.21 indicates the responses to the statement above. This is significant to analyse as the results will guide the researcher to establish one of the major barriers to the effective use of CNIS.

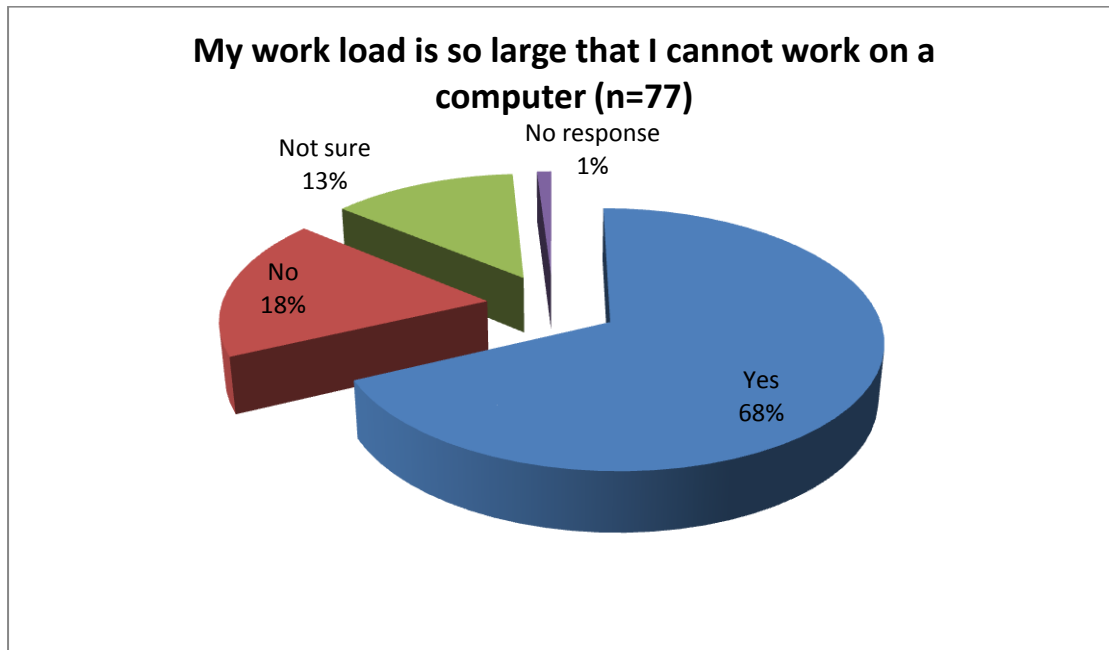


Figure 4.21: My work load is so large that I cannot work on a computer(n=77)

Figure 4.21 illustrates that of the 77 respondents, 68% (n=52) answered that their workload is so large that they cannot work on a computer, while 18% (n=14) answered 'no', 13% (n=10) were not sure and 1% (n=1) did not respond to the statement. The interpretation is that a significant percentage (68% n=52) of respondents have a large workload that forms a barrier for them to work on a computer.

4.2.4.5 I understand the role of computers in nursing

Figure 4.22 indicates the responses to the statement whether respondents understand the role of computers in nursing. This is significant to analyse because lack of understanding regarding the role of computers in nursing constitutes lack of knowledge and skills which form part of the barriers to use the CNIS effectively.

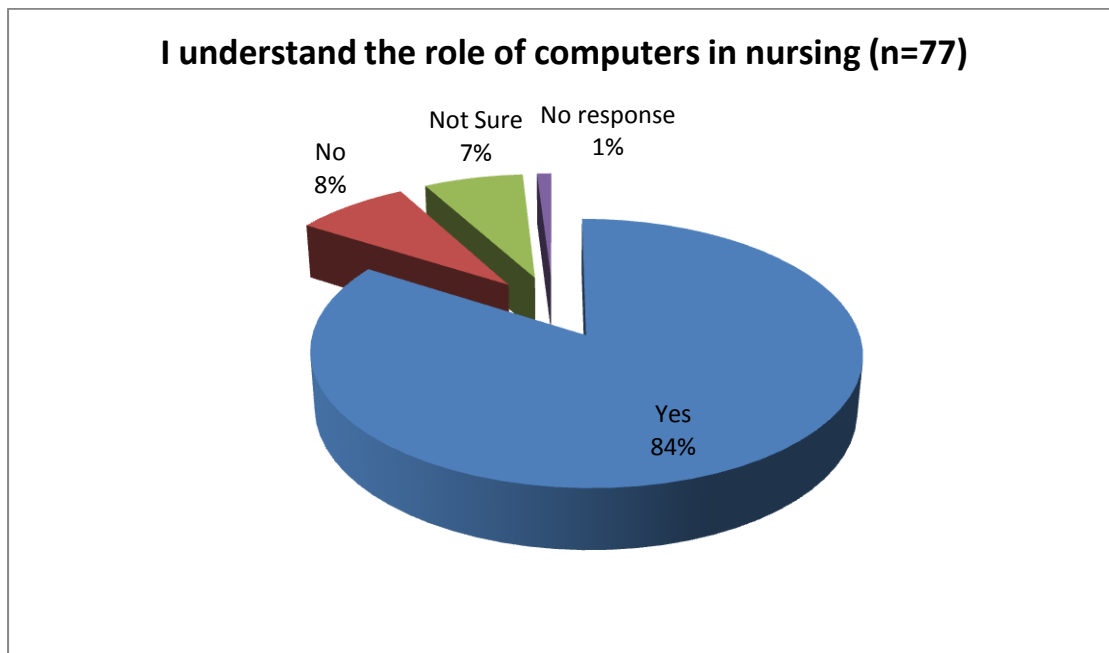


Figure 4.22: I understand the role of computers in nursing (n=77)

Figure 4.22 illustrates that of the 77 respondents, 84% (n=65) answered that they understand the role of computers in nursing, 8% (n=6) answered 'no', 7% (n=5) are not sure and 1% (n=1) did not respond to the statement. Therefore a significant percentage of respondents (84% n=65) understand the role of computers in nursing. Thus there is no barrier that is related to not understanding the role of computers in nursing.

4.2.4.6 When the computer fails to operate, it has a negative impact on my nursing care

Figure 4.23 indicates the responses to the statement above. This is important to analyse because the results will not only indicate the seriousness of the problem (failing computer) but also the consequences thereof (impact on nursing care).

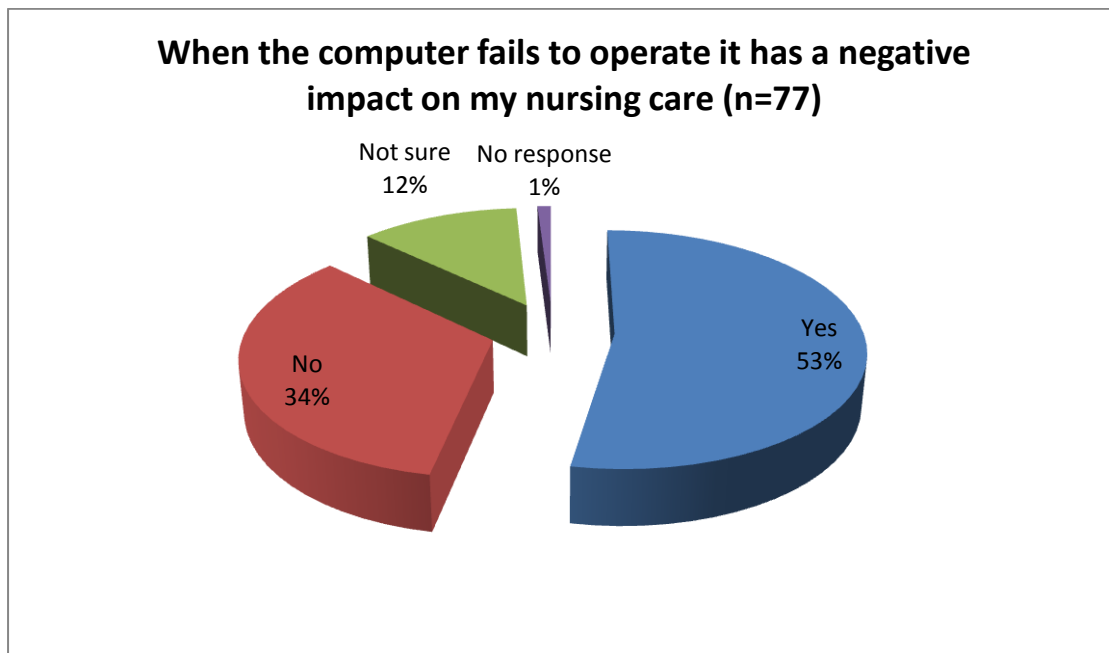


Figure 4.23: When the computer fails to operate it has a negative impact on my nursing care(n=77)

Figure 4.23 illustrates that of the 77 respondents, 53% (n=41) answered that when the computer fails to operate it has a negative impact on their nursing care, 34% (n=26) answered 'no', 12% (n=9) are not sure, and 1% (n=1) did not respond to the statement. The interpretation is that the majority of respondents (53% n=41) regard a failing computer not only as a barrier, but also having a negative impact on their nursing care.

4.2.4.7 The information that I get from the computer is relevant to what I do in my unit

Figure 4.24 indicates the responses to the statement above. This is significant to analyse because irrelevant information demotivate professional nurses and becomes a barrier to use the CNIS effectively.

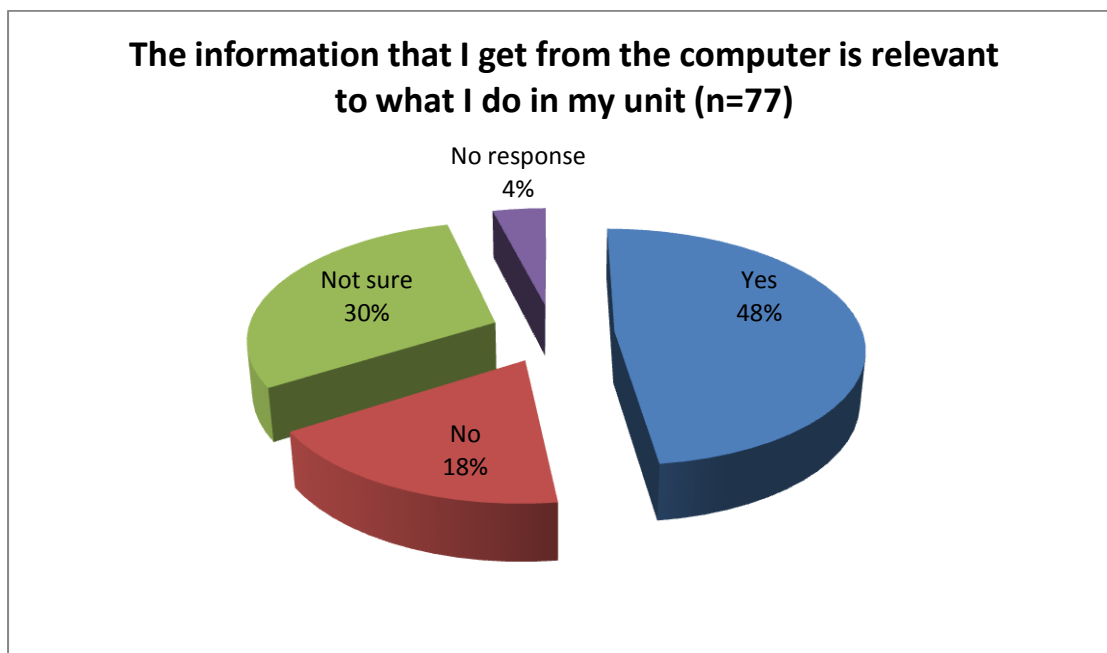


Figure 4.24: The information that I get from the computer is relevant to what I do in my unit (n=77)

Figure 4.24 illustrates that of the 77 respondents, 48% (n=37) answered that the information they get from the computer is relevant to what they do in their units, while 18% (n=14) answered 'no', 30% (n=23) are not sure and 4% (n=3) did not respond to the statement. The impression is that most of the respondents (48% n=37) found the information from the computer relevant to what they do in their units. They do not find irrelevant information in the CNIS that could constitute a barrier to the effective use of CNIS. Thus, when they find the information relevant, it will motivate them to use the CNIS.

4.2.4.8 There is a system in place to deal with Medicom / computer problems in the unit

Figure 4.25 indicates the responses to the statement whether there is a system in place to deal with Medicom/ computer problems in the unit. This is significant to analyse because lack of the system in place is considered one of the major barriers for professional nurses to use the system effectively.

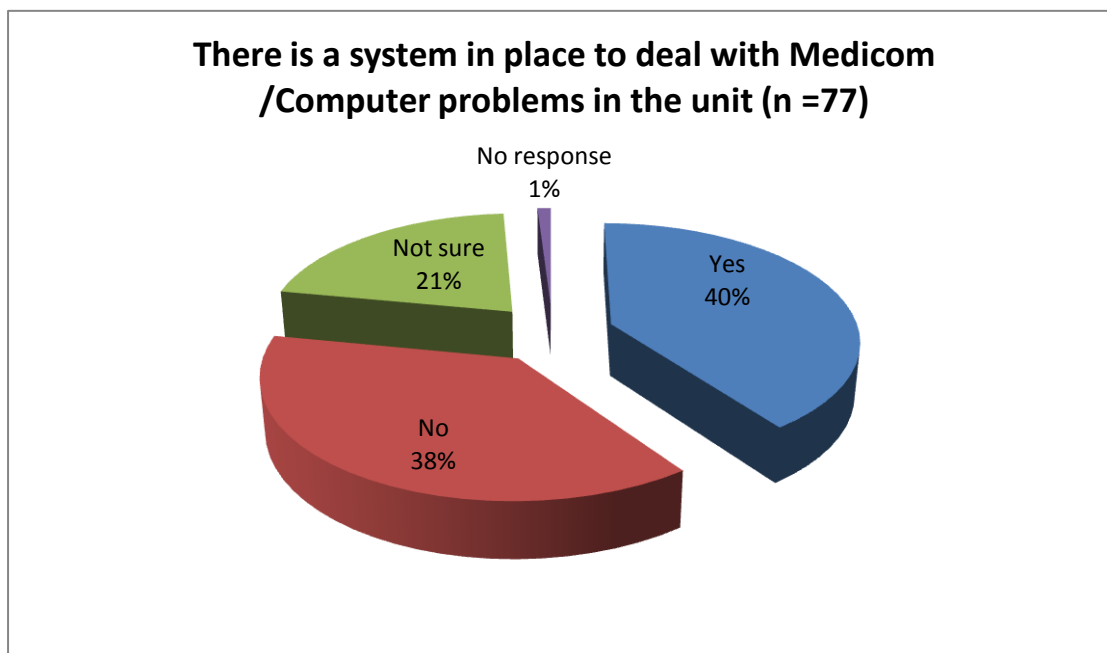


Figure 4.25: There is a system in place to deal with Medicom /Computer problems in the unit (n=77)

Figure 4.25 illustrates that of the 77 respondents, 40% (n=31) answered that there is a system in place to deal with Medicom/computer problems in the unit, while 38% (n=29) answered 'no', 21% (n=16) are not sure, and 1% (n=1) did not respond to the statement. The interpretation is that most of the respondents (40% n=31) indicated that there is a system in place to deal with Medicom /computer problems in the units. Therefore, there is no barrier that is related to the system that deals with Medicom/computer problems in the units.

4.2.4.9 One computer is enough for our unit

Figure 4.26 indicates the responses to the statement whether one computer is enough for their unit. This is significant to analyse because inadequate computers is a hindrance to access by some of the professional nurses, thus becoming a barrier.

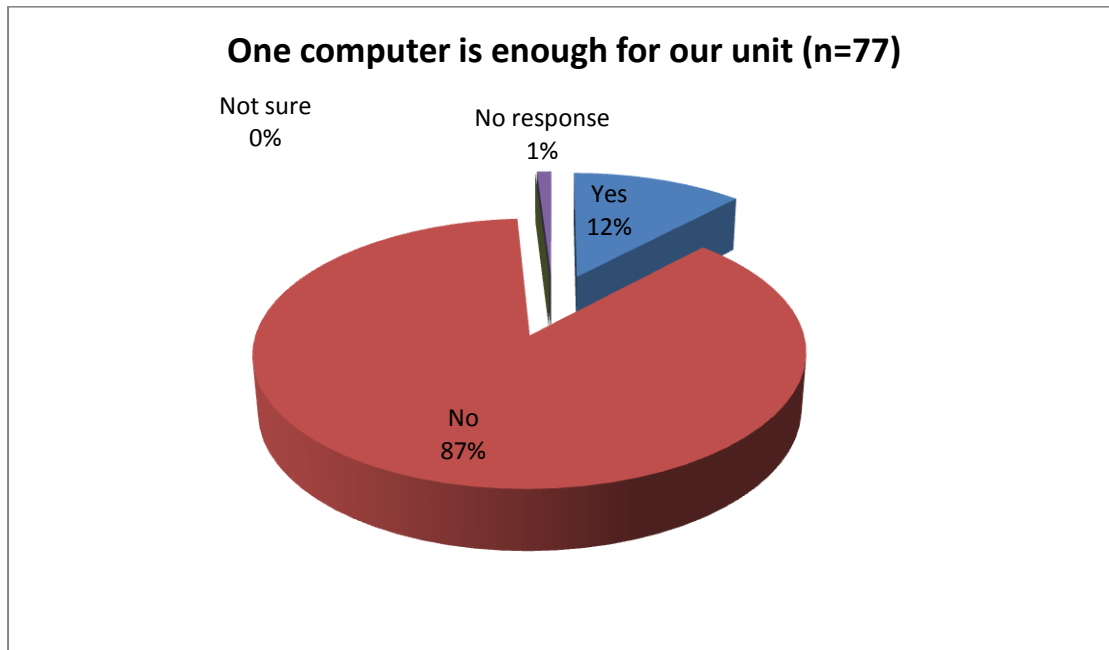


Figure 4.26: One computer is enough for our unit (n=77)

Figure 4.26 illustrates that of the 77 respondents, 12% (n=9) answered that one computer is enough for their unit, while 87% (n=67) answered 'no'. No respondent answered 'not sure' and 1% (n=1) did not respond to the statement. The interpretation is that a significant percentage (87% n=67) of the respondents indicated that one computer is not enough for their units. Therefore, inadequate number of computers in the unit becomes a barrier to the effective use of the CNIS.

4.2.4.10 The placement of the computer in my unit is easy to access

Figure 4.27 indicates the responses to the statement of whether the placement of the computer is easy to access. This is significant to analyse because inaccessibility to the computer hinders its effective use, thus could result in a barrier.

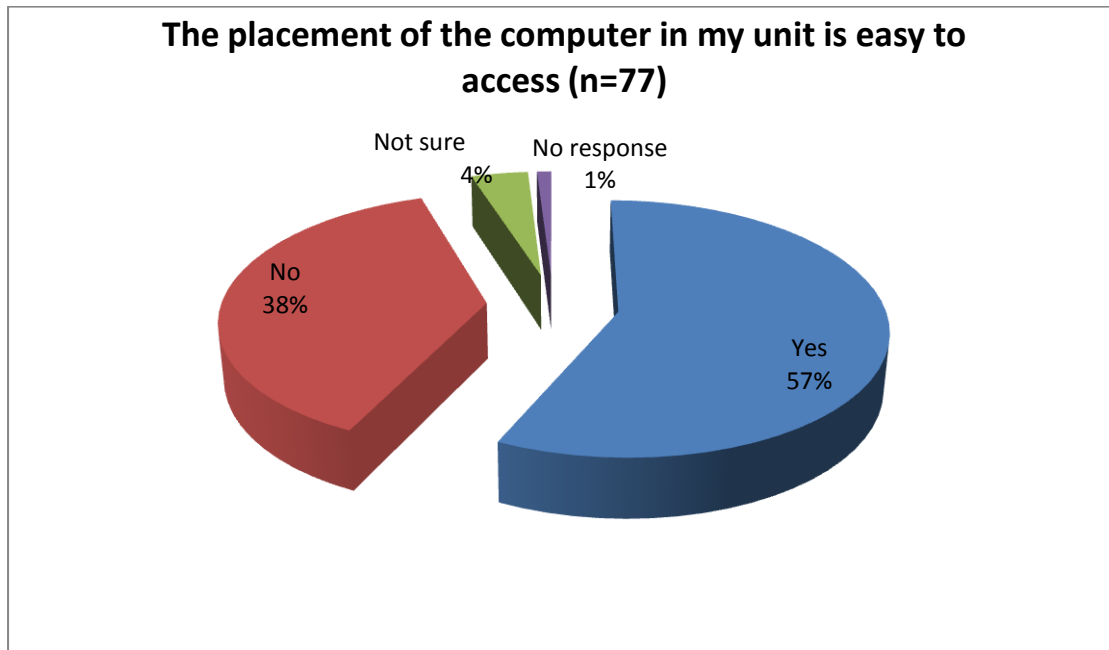


Figure 4.27: The placement of the computer in my unit is easy to access (n=77)

Figure 4.27 illustrates that of the 77 respondents, 57% (n=44) answered that the placement of the computer in their units is easy to access, while 38% (n=29) answered 'no', 4% (n=3) are not sure, and 1% (n=1) did not respond to the statement. The interpretation is that the majority of respondents (57% n=44) have easy access to the computer in their units. Therefore, the placement of the computer in the units does not pose a barrier to the effective use of CNIS. Although the area where computers are placed in the units does not pose a barrier to the effective use of the CNIS, Burke et.al (1998:72) are of the opinion that such systems could demonstrate under optimum conditions with bedside computers.

4.2.4.11 Management support nurses in utilising computers in the units

Figure 4.28 indicates the responses to the above written statement. This is important to analyse as unsupportive management has been suggested as one of the organisational barriers to the effective use of CNIS.

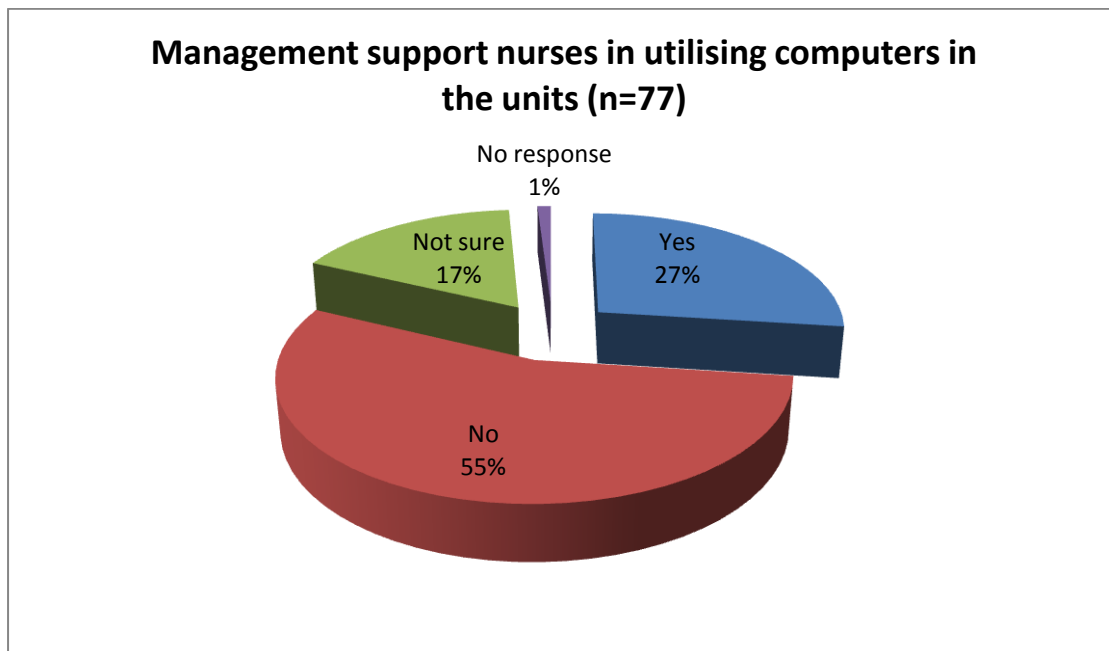


Figure 4.28 Management support nurses in utilising computers in the unit (n=77)

Figure 4.28 illustrates that of the 77 respondents, 27% (n=21) answered that management support nurses in utilising computers in the units, while 55% answered 'no', 17% (n=13) are not sure, and 1% (n=1) did not respond to the statement. The majority of respondents 55% (n=42) indicated that management does not support nurses in utilising the computers. Therefore, this becomes one of the organisational barriers, as supported by Barry and Gibbons (1990:40). These authors found that a primary barrier to acceptance of health care information systems is administrators who do not believe this technology can improve productivity and quality of patient care.

4.2.4.12 The system administrator is readily available to attend to computer problems when called

Figure 4.29 indicates the responses to the statement above. This is important to analyse because if there is a system in place to deal with problems but this system is not readily available, this hinders the effective use of CNIS, and becomes a barrier.

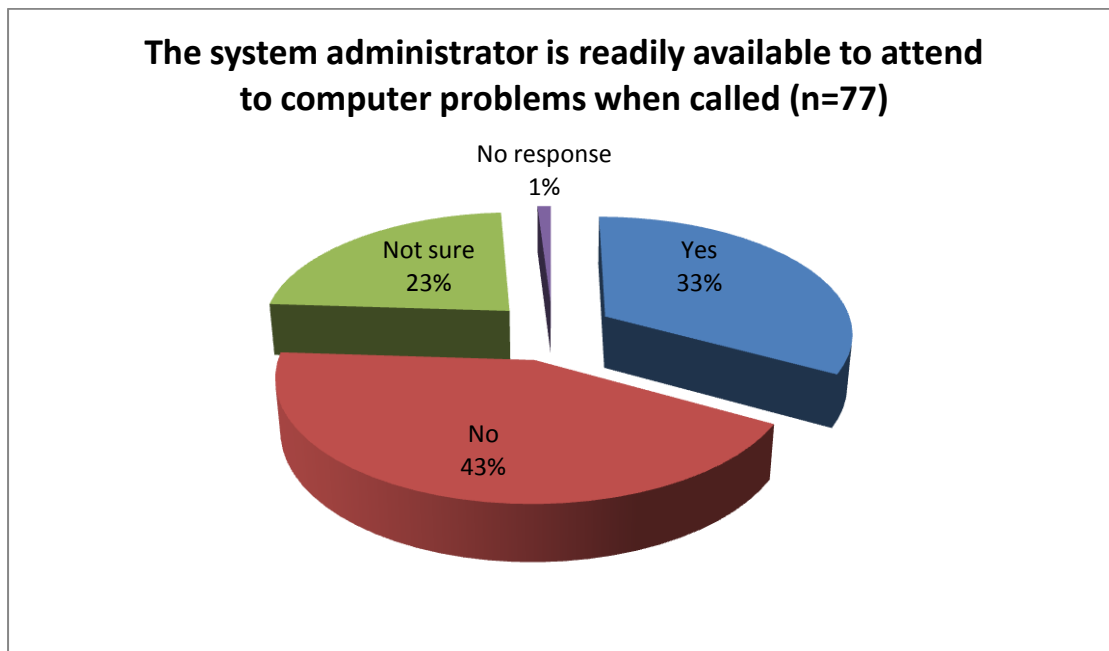


Figure 4.29: The system administrator is readily available to attend to computer problems when called (n=77)

Figure 4.29 illustrates that of the 77 respondents, 33% (n=25) answered that the system administrator is readily available to attend to computer problems when called, while 43% (n=33) answered 'no', 23% (n=18) are not sure and 1% (n=1) did not respond to the statement. The interpretation is that most of the respondents (43% n=33) indicated that the system administrator is not readily available when called for computer problems. Therefore, this becomes a barrier for them to use CNIS effectively.

4.2.4.13 I am satisfied with the continuous in-service training on Medicom/ computer in my department

Figure 4.30 indicates the responses to the statement above. This is important to analyse because lack of continuous in-service training results in nurses becoming despondent, thus creating a barrier to use the CNIS effectively.

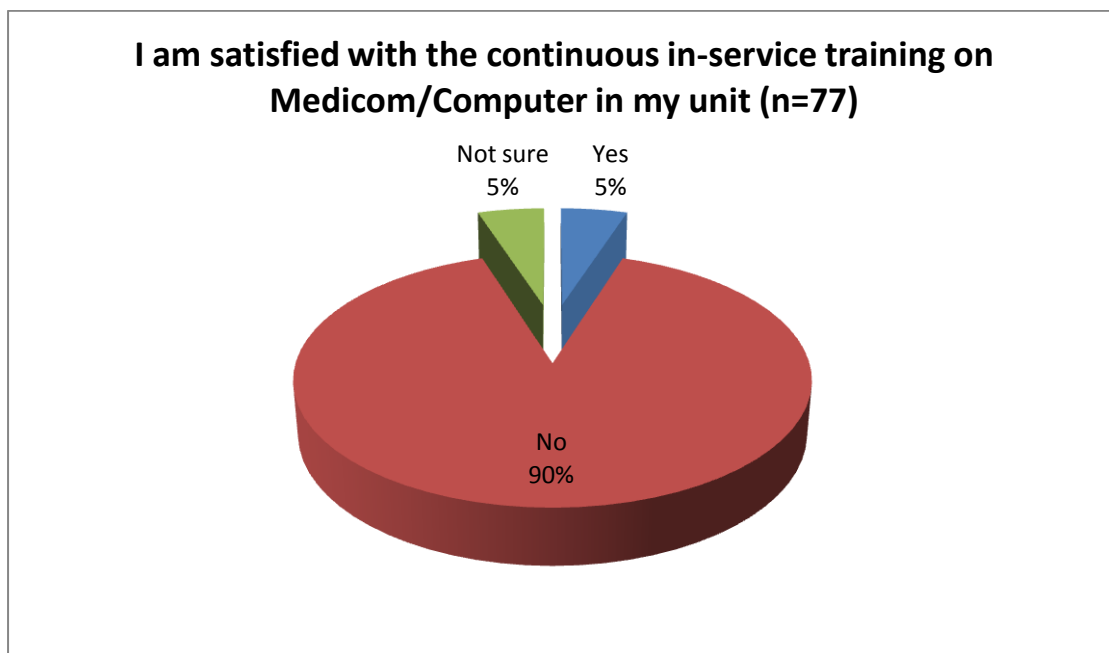


Figure 4.30: I am satisfied with the continuous in-service training on Medicom/ computer in my department (n=77)

Figure 4.30 illustrates that of the 77 respondents, 5% (n=4) answered that they are satisfied with the continuous in-service training on Medicom/ computer in their department, while 90% (n=69) answered 'no' and 5% (n=4) are not sure. A significant percentage of respondents (90% n=69) are not satisfied with the continuous in-service training in their departments. Therefore, this becomes a barrier to the effective use of the CNIS. According to Larrabe et.al. (2001:64), re-education of nurses in the use of CNIS did significantly improve documentation of Nursing Assessment (NASSESS), Nursing Goal (NGOAL) and others.

4.2.5 Section 5- Determine the effective use of CNIS in patient care by professional nurses

This section determines if computers are used effectively by the respondents in their different units. Respondents were requested to choose one answer from the answers given to them. The following questions were asked:

4.2.5.1 What is the daily average bed occupancy of your unit?

Table 4.3 indicates the responses to the statement above. This is important to analyse because the average bed occupancy is a reflection of an average number of patients occupying the beds in a ward or unit. This will in turn provide a baseline for an expected average number of patients admitted and captured in the system on a daily basis.

Table 4.3: Daily average bed occupancy (n=77)

Daily average bed occupancy	Frequency	Percentage
0 - 10	2	3%
11-20	11	14%
21 -30	16	20%
31 -40	29	38%
40 and above	9	12%
Not applicable	9	12%
No response	1	1%
TOTAL	77	100%

Table 4.3 illustrates that of the 77 respondents, 3% (n=2) are working in a unit that has a bed occupancy of (0-10), 14% (n=11) indicated (11-20) , 20% (n=16) indicated (21-30) 38% (n=29) indicated (31-40) 12% (n=9) indicated (40 and above) and 12% (n=9) indicated ‘ not applicable’ meaning that they are working in units that are not keeping beds for patients e.g. operating theatre, while 1% (n=1) did not respond to the statement. The interpretation is that most of the respondents (38% and 12%) work in the units that have an average bed occupancy of 31-40 and above respectively on a daily basis. Therefore it is expected that the

average number of patients admitted and captured in the CNIS should correspond with the average bed occupancy on a daily basis.

4.2.5.2 What is the daily average number of patients attended to in your unit?

Table 4.4 indicates the responses to the statement about the average number of patients attended to. This is important to analyse as the number of patients attended to, will indicate the expected average number of nursing care plans (NCP) or entries in the CNIS on a daily basis.

Table 4.4: Daily average number of patients attended to (n=77)

Daily average number of patients attended to	Frequency	Percentage
0 -10	2	3%
11-20	16	21%
21-30	12	16%
31-40	27	35%
40 and above	17	22%
Not applicable in our unit	2	3%
No response	1	1%
TOTAL	77	100%

Table 4.4 illustrates that of the 77 respondents, 3% (n=2) indicated that they attend to (0-10) patients on a daily basis, while 21% (n=16) attend to (11-20) patients, 16% (n=12) attend to (21-30) patients, 35% (n=27) attend to (31-40) patients, 22% (n=17) attend to 40 and above, 3% (n=2) indicated 'not applicable', while 1% (n=1) did not respond to the statement. The impression is that most of the respondents (35% and 22%) attend to an average of 31- 40 patients and above respectively. Therefore, it is expected that the average number of patients attended to on a daily basis should correspond with the average number of NCPs or entries in the CNIS.

4.2.5.3 Which Medicom module do you mostly use in your unit ?

Table 4.5 indicates the responses to the statement about which Medicom module is mostly used in their units. This is important to analyse as the results will indicate which module is common, mostly used and applicable to most of the units.

Table 4.5: Medicom module mostly used in the units (n=77)

Medicom module mostly used	Frequency	Percentage
Nursing Care plan	44	56%
Transfers	6	8%
Patient reports	13	16%
Birth registration	4	5%
Operated patients	9	11%
Other e.g. stats, stock	3	4%
TOTAL	79	100%

Table 4.5 illustrates that of the 77 respondents, 56% (n=44) indicated that they mostly use NCP module in their units, 8% (n=6) mostly use transfers module, 16% (n=13) mostly use patient reports module, 5% (n=4) mostly use birth registration module, 11% (n=9) mostly use operated patients module whereas 4% (n=3) mostly use other modules such as stock and statistics. The majority of the respondents (56% n=44) mostly use NCP module in their units. Therefore, it is expected that the number of captured NCPs will be more than any other entry or module in the CNIS.

4.2.5.4 How many patient entries do you perform per day?

Table 4.6 indicates the responses to the statement about how many patient entries do you perform per day. This is important to analyse as the results will indicate the frequency of entries performed thus the effective use of the CNIS.

Table 4.6 Number of entries performed per day (n=77)

Number of entries performed per day	Frequency	Percentage
0-2 entries	42	55%
3-5 entries	11	14%
6-10 entries	4	5%
11 and more entries	8	10%
No response	12	16%
TOTAL	77	100%

Table 4.6 illustrates that of the 77 respondents, 55% (n=42) perform 0-2 entries per day, 14% (n=11) perform 3-5 entries, 5% (n=4) perform 6-10 entries, 10% (n=8) perform 11 and more entries per day, while 16% (n=12) did not respond to the statement. The interpretation is that the majority of the respondents 55% (n=42) perform 2 or less entries out of 30-40 and more patients per day. This is another indication that the CNIS is not used effectively.

4.2.5.5 When do you generate a care plan or make entries for a patient?

Table 4.7 indicates the responses to the statement about when the respondents generate a care plan or entries for a patient. This is important to analyse as the time for making entries will reveal the significance and the sense of urgency to complete the entries.

Table 4.7 Time for generating a care plan or making entries for a patient (n=77)

Time for generating a care plan or make entries	Frequency	Percentage
On admission or arrival day	7	9%
The following day after arrival	7	9%
2 days after admission or arrival	6	8%
Any other time (Specify)	21	27%
Never generated a care plan or made entry for a patient	28	36%
No response	8	10%
TOTAL	77%	100%

Table 4.7 illustrates that of the 77 respondents, 9% (n=7) generate a care plan or make entries on admission or arrival of a patient, 9% (n=7) the following day after arrival, 8% (n=6) make entries 2 days after admission, 27% (n=21) any other time, 36% (n=28) never generated a care plan or made entries for a patient, and 10% (n=8) did not respond to the statement. The impression is that most of the respondents 36% (n=28) never generated a care plan or made an entry for a patient. This is an indication of the CNIS not being used effectively because every patient should be entered or generated a care plan on admission to the unit.

4.2.5.6 When do you update generated care plans or entries?

Table 4.8 indicates the responses to the statement to determine when the respondents update generated care plans or entries. This is important to analyse as the results will verify for the researcher the responses in Table 4.7

Table 4.8: Frequency of updating generated care plans or entries (n=77)

Frequency of updating generated care plans or entries	Frequency	Percentage
Once a day	2	3%
Twice a day	0	0%
When I have time to	17	22%
Any other time (Specify)	8	10%
Never updated care plans or made an entry before	43	56%
No response	7	9%
TOTAL	77	100%

Table 4.8 illustrates that of the 77 respondents 3% (n=2) update generated care plans or entry once a day, 0% (n=0) twice a day, 22% (n=17) when they have time to, 10% (n=8) any other time (did not specify as requested), 56% (n=43) never updated or made entries before, and 9% (n=7) did not respond to the statement. The interpretation is that the majority of respondents never updated care plans or made entries before. This is an indication that the CNIS is not used effectively by respondents.

4.2.5.7 In the unit where you are working now, which system do you use more?

Table 4.9 indicates the responses to the statement which system does the respondents use more in the unit. This is important to analyse in order to detect the inclination of using one system over another.

Table 4.9 The system that is used more in the units (n=77)

System used	Frequency	Percentage
Paper records more than computer	49	64%
Computer more than paper records	0	0%
Computer only	1	1%
Paper records only	24	31%
No response	3	4%
TOTAL	77	100%

Table 4.9 illustrates that of the 77 respondents, 64% (n=49) indicated that paper records are used more than computer in their units. No respondent indicated on computer more than paper records, 1% (n=1) indicated computer only, while 31% (n=24) indicated on paper records only, and 4% (n=3) did not respond to the statement. These results suggest that paper records are used more than computer. Although Burke et.al. (1998:72) affirmed these findings that for filing purposes and continued care on the normal ward the essential parts must still be printed, these results still indicate that CNIS is not used effectively by respondents.

4.2.5.8 Average number of care plans or entries which are in the system on a daily basis

Table 4.10 indicates the responses to the statement about the average number of care plans or entries which are in the system on a daily basis. Stating the number of entries per day is also seen as a significant indicator of the effective use of the CNIS.

Table 4.10: Number of care plans or entries in the system on a daily basis (n=77)

Number of care plans or entries in the system on a daily basis	Frequency	Percentage
0-5	47	61%
6-10	1	1%
11-20	3	4%
21-30	3	4%
30 and above	4	5%
No response	19	25%
TOTAL	77	100%

Table 4.10 illustrates that of the 77 respondents, 61% (n=47) indicated that the number of care plans or entries in their systems on a daily basis are between 0-5, 1% (n=1) indicated that they are between 6-10, 4% (n=3) between 11-20, 4% (n=3) between 21- 30, 5% (n=4) indicated 30 and above, while 25% (n=19) did not respond to the statement. The interpretation is that there is less number of care plans or entries in the computers on a daily basis. This is an indication that computers are not used effectively in patient care.

4.2.5.9 Which system or method do you use for patient enquiries?

Table 4.11 indicates the responses to which system or method do respondents use for patient enquiries. This is important to analyse as the results will reveal if the CNIS is used effectively at least for patient enquiries.

Table 4.11: System or method used for making enquiries (n=77)

System or method used for making enquiries	Frequency	Percentage
Paper records(e.g. admission book)	68	88%
Computer	1	1%
Ask other staff members	5	7%
Ask other patients	0	0%
Both computer and paper records	3	4%
No response	1	1%
TOTAL	77	100%

Table 4.11 illustrates that of the 77 respondents, 88% (n=68) use paper records for making patient enquiries, 1% (n=1) make use of computer, 7% (n=5) ask other staff members. No one make use of patients for enquiries, 4% (n=3) use both computer and paper records, while 1% (n=1) did not respond to the statement. These results suggest that a very significant percentage (88% n=68) of respondents make use of paper records to make patient enquiries. This also indicates that the CNIS is not used effectively even for patient enquiries where no entry is expected.

4.2.5.10 In your department which staff members are often making entries in the computer?

Table 4.12 indicates the responses to the question which staff members are often making entries in the computer? This is important to analyse as the results will give a picture of staff members who are using the CNIS often.

Table 4.12 Staff members who are often making entries in the computer (n=77)

Staff members who are making entries often	Frequency	Percentage
Professional nurses	26	34%
Enrolled nurses	14	18%
Student nurses	3	4%
Assistant nurses	12	16%
Others (Specify) Clerk, ASD,	34	44%
None	2	3%
No response	10	13%
TOTAL	101	132%

Table 4.12 illustrates that of the 77 respondents, 34% (n=26) indicated that professional nurses are often making entries in the computer, 18% (n=14) indicated enrolled nurses, 4% (n=3) indicated student nurses, 16% (n=12) indicated assistant nurses, 44% (n=34) indicated others such as clerks and Assistant Director (ASD), 3% (n=2) indicated that no one is making entries in the computer, while 13% (n=10) did not respond to the statement. Other respondents indicated more than one answer. However, the interpretation is that a very substantial percentage (44% n=34) indicated that clerks are the ones that are often making entries in the computer, ironically followed by professional nurses.

4.2.6 Give your comments on the effective utilisation of CNIS (Medicom) in patient care by professional nurses in your unit

This is important to analyse because it allows respondents an opportunity to express what was probably not covered by the closed-ended questions. The comments were identified, coded and categorised under the objective: “Barriers to the effective use of the CNIS.” The following four broad themes were formulated according to the comments: Workload, Training, System functionality, and Support services.

4.2.6.1 Workload

Table 4.13 indicates the comments with regard to the coded theme “Workload” as a barrier to the effective use of CNIS. The comments which were identified and related to this theme are indicated in table 4.13

Table 4.13 Respondents who commented about workload (n=29)

Workload	Frequency	Percentage
Increased workload	8	10%
Shortage of staff	9	12%
Overcrowding of patients / Full wards	6	8%
No time to attend to a computer	6	8%
TOTAL	29	38%

Table 4.13 illustrates that of the 77 respondents, 38% (n=29) commented about workload. Ten percent (n=8) of 77 respondents complained of increased workload as a barrier to the effective use of CNIS, while 12% (n=9) complained of shortage of staff. Eight percent (n=6) complained of overcrowding of patients or full wards, and 8% (n=6) of no time to attend to a computer. These results suggest that 38% (n=29) of the 77 respondents identified workload as a barrier to the effective use of CNIS.

4.2.6.2 Training

Table 4.14 indicates the comments with regard to the coded theme “Training.” Comments which were identified and related to this theme are indicated in table 4.14.

Table 4.14 Respondents who commented about training (n=29)

Training	Frequency	Percentage
No in-service training	24	31%
Lack of practice	3	4%
Not computer literate	2	3%
TOTAL	29	38%

Table 4.14 illustrates that of the 77 respondents 38% (n=29) commented about training. Thirty one percent (n=24) of 77 respondents stated lack of in-service training as a barrier to the effective use of CNIS, while 4 % (n=3) complained of lack of practice, and 3% (n=2) complained of not being computer literate. The interpretation is that 38% (n=29) of 77 respondents identified lack of training as a barrier to the effective use of CNIS.

4.2.6.3 System functionality

Table 4.15 indicates the comments with regard to the coded theme “System functionality”. Comments which were identified and related to this theme are indicated in table 4.15.

Table 4.15: Respondents who commented about the system functionality (n=21)

System functionality	Frequency	Percentage
One computer is not enough	1	1%
No computer in the ward	1	1%
Poor memory of the computer	1	1%
Poor quality	1	1%
Frequent crashes	4	5%
Un-serviced computers	1	1%
Irrelevant care plans	1	1%
Not useful for nursing care	2	3%
Not user friendly	1	1%
Professional nurses never use a computer	5	7%
Time consuming	1	1%
Difficult retrieval of information	2	3%
TOTAL	21	26%

Table 4.15 illustrates that of the 77 respondents, 26% (n=21) commented about the system functionality. One percent (n=1) of 77 complained of having one computer in the unit, 1% (n=1) of not having a computer at all, 1% (n=1) of a computer having poor memory, 1% (n=1) of poor quality, 5% (n=4) of frequent crashes, 1% (n=1) of un-serviced computers, 1% (n=1) of irrelevant care plans, 3% (n=2) of not useful for nursing care, 1% (n=1) of not user friendly, 7% (n=5) never used a computer, 1% (n=1) of time consuming and 3% (n=2) of difficulty in retrieving information. The interpretation is that 26% (n=21) of the 77 respondents identified the problem with the system functionality as a barrier to the effective use of the CNIS.

4.2.6.4 Support services

Table 4.16 indicates the comments with regard to the coded theme “Support services.” Comments which were identified and related to this theme are shown in table 4.16

Table 4.16: Respondents who commented about the support services (n=20)

Support services	Frequency	Percentage
Clerks occupy the computer more	9	12%
Invalid pin codes /passwords	7	9%
Poor response from IT services	1	1%
No prompt backup system	1	1%
No printer	1	1%
No support from unit managers	1	1%
TOTAL	20	25%

Table 4.16 illustrates that of the 77 respondents, 25% (n=20) commented about support services. Twelve percent (n=9) of 77 complained of clerks occupying the computer more, 9% (n=7) complained of invalid pin codes or passwords, 1% (n=1) of poor response from IT services, 1% (n=1) of no prompt backup system, 1% (n=1) of no printer and 1% (n=1) of no support from the unit managers. The interpretation is that 25% (n=20) of 77 respondents identified the problem with support services as a barrier to the effective use of CNIS.

4.3 Conclusion

This chapter presented descriptive analysis of data using frequency count, frequency distribution, charts and graphs. Biographical data of the respondents was analysed. Variables of interest were age, gender, basic nursing qualification, unit currently working in, length of stay in the unit as well as current position occupied. Computer knowledge of the respondents was also analysed as well as their perceptions regarding the role of CNIS in patient care. Barriers to the use of CNIS and the effective use of CNIS were also analysed. Lastly, analysis of the comments on the effective use of CNIS in patient care was conducted. Comments were coded and analysed using various themes. The following chapter will deal with summary of the findings, limitations, recommendations and conclusion.

CHAPTER 5

SUMMARY OF FINDINGS, LIMITATIONS, RECOMMENDATIONS AND CONCLUSIONS

5.1 Introduction

In this chapter the outcomes of the study with regard to the purpose, objectives, methodology, data collection and analysis are summarised. The findings on the evaluation of the effective use of CNIS by professional nurses in patient care are indicated. Limitations of the study are highlighted. Recommendations are made based on the outcome of the study. Conclusion of the study is also based on the achievement of the objectives.

The purpose of the study was to evaluate the effective use of Computer-based Nursing Information System (CNIS) by professional nurses in patient care based on the following research questions :

- What are the perceptions of professional nurses regarding the role of CNIS in patient care?
- What are the barriers to the effective use of CNIS by professional nurses in patient care?
- How effective do professional nurses use CNIS in patient care?

Objectives of the study were to:

- Describe the perceptions of the professional nurses regarding the role of CNIS in patient care;
- Identify barriers to the effective use of CNIS among professional nurses in different nursing units, and
- Determine the effective use of CNIS by professional nurses, in patient care.

The research design used in this study was quantitative descriptive simple survey. The setting was at Dr. George Mukhari hospital, northwest of Pretoria in Gauteng Province. The study population consisted of all professional nurses who work in the units where computers are installed for the purpose of patient care. The sampling technique was a non-probability sampling, utilizing convenience sampling. Data collection was conducted through the use of a

self report questionnaire. A pilot study was conducted prior to the main study. Data analysis was conducted through the use of descriptive statistics.

5.2 Findings of the study

The findings of the study are described according to the five sections based on the structure of the questionnaire.

5.2.1 Section 1-Biographical data

The sample consisted more of older professional nurses than younger ones. Approximately 78% were 41 years and above. This finding is supported by the South African Nursing Council (SANC) 2009 statistics (www.sanc.co.za) that, 72% of registered nurses are above 40 years of age. The sample also had more females (97%) than males (3%). This phenomenon is not uncommon to the nursing profession as it is generally regarded as a female dominated profession. This is also supported by SANC 2009 statistics (www.sanc.co.za) 27 624 females' versus 1 398 males. Although some of the professional nurses have degree in Nursing, the majority (58%) have a diploma in Nursing as a basic qualification. SANC statistics also attest to this (469 Diploma versus 108 Degree). This is in line with the study by Lee (2005:347) which comprised of 72.8% Vocational and 27.2% Baccalaureate respondents. This level of education is adequate to form a basis for understanding and learning basic computer skills as well as CNIS Medicom modules.

Another biographical finding was that within all the selected units, namely: general surgery, speciality surgery, internal medicine, obstetrics and gynaecology, operating theatre as well as intensive care unit, respondents was evenly distributed, at an average of 10 respondents per unit. This is also an indication of evenly distributed questionnaires. A significant number of respondents (65%) worked in their units for more than five years, and 61% occupy senior positions. Therefore, the biographical data revealed that the sample consisted of older female respondents who have Diploma in Nursing and worked in their units for more than five years, as well as occupying senior positions.

5.2.2 Section 2- Computer knowledge

With regard to computer knowledge, almost half of the respondents (53%) have word processing as basic computer knowledge. Respondents with no computer knowledge at all comprised 16%. Other respondents, in addition to word processing have computer knowledge ranging from Medicom, email, internet, power point to excel. A significant number of respondents (85%) attended computer training. However respondents indicated that they do not receive continuous computer in-service training (as indicated by 92%). The findings with regard to which Medicom modules are they competent in, 52% are competent in generating nursing care plan (NCP), which is a basic and core module for nurses to use. Twenty six percent of respondents indicated that they are not competent in any of the available Medicom modules. Therefore, summary of these findings are that the majority of respondents are trained in basic computer literacy and are competent in generating nursing care plans, however they do not receive continuous computer in-service training

5.2.3 Section 3- The perceptions of professional nurses regarding the role of CNIS in patient care

The perceptions of the majority of respondents are that, using computer is time saving thus allow more time for patient care, as indicated by 40% versus 30% of those who disagree.

Lee (2002:63) also found that, although nurses had ambivalent feelings toward CNIS, they indicated amongst others that the system saves paper/time. The respondents also perceive that computers increase productivity of nurses by reducing paperwork, 49% versus 27%. Another positive perception is that the majority (73%) of respondents perceive that computers make nursing information more accessible.

A significant percentage (78%) perceives that computers facilitate communication of nursing information from one department to another. Computers facilitate retrieval of information to be easy as perceived by 84% of respondents. Although the percentages appear low (48% & 47%), they represent the majority of respondents who perceive that computers improve completeness of nursing documentation, as well as easy completion of information than on a paper record respectively. Another significant percentage (82%) perceives that computers facilitate efficient organisation and storage of nursing information. Lastly, 60% perceive that computers make documentation more accurate. Generally, the findings reflect positive perceptions with regard to the role of CNIS in patient care. These findings are in line with

those of Dillon, Blankenship and Crews (2005:139), the authors found that nurses are accepting of new Electronic Patient Record System (EPRS) and are somewhat supportive of technology in general. These findings also demonstrate that the perceptions of respondents are an indication of stronger driving force than retraining force as according to Lewin's change management model. They indicate a potential for successful change.

5.2.4 Section 4 – Barriers to the use of CNIS in patient care

Large workload was found to be a barrier to the use of CNIS by the majority (68%) of respondents. Another barrier as identified by 53% of respondents, was a failure of the computer to operate, thus having a negative impact on nursing care. A significant percentage (87%) indicated that one computer in the unit is not enough, thus constitutes a barrier. Elkind, Finley and Narloch (2008:1) found that, availability of hardware was cited by a large percentage of nurses as being one of the statistically significant factors affecting satisfaction with computer use in the clinical setting. Unsupportive management to the use of computers in the units was also found to be a barrier by 55% of the respondents. Barry and Gibbons (1990:40) alluded to this that, administrators who do not believe that this technology can enhance productivity and quality, are a primary barrier to acceptance of CNIS. Another barrier is the system administrator who is not readily available to attend to computer problems when called (43%). Lastly, 90% of the respondents indicated that they are not satisfied with the lack of continuous in-service training on Medicom/ computer in their departments, thus also constitutes a barrier to the effective use of CNIS. This finding is supported by Lee (2005:344) that, user training/education programmes are critical issues that affect nurses' use of computers in their daily practice.

Although respondents have indicated what constitute barriers for them to use the CNIS effectively, they did not find the following to constitute barriers for them:

- Attitudes towards computers;
- Lack of computer skills and knowledge;
- Lack of knowledge on how to complete at least one Medicom module;
- Not understanding the role of computers in nursing ;
- Irrelevant information from the computers, and
- Lack of the system in place to deal with Medicom problems in the unit.

These findings demonstrate a state of equilibrium that is brought about by the fact that the driving forces which are forces for change e.g. attitudes towards computers, are balanced by the restraining forces e.g. large workload, which are the forces working against change. Therefore this is an indication of a “stagnant state of affairs” in terms of change management process.

5.2.5 Section 5- *Determine the effective use of CNIS in patient care*

The findings on how effective do professional nurses use the CNIS in patient care are described in this section. The majority of respondents (50%), work in the units that has a daily average bed occupancy of 30- 40 and above, and 57% of respondents attend to an average of 31-40 and above, of patients on a daily basis. Fifty seven percent mostly use Nursing Care Plan (NCP) Medicom module in their units. However, 55% perform 0-2 entries per day. With regard to the question of when do they generate NCPs or make entries for patients, 36% (which is the most according to the responses) never generated a NCP or made an entry for a patient. Another significant percentage (56%) is of those who never updated a generated NCP or entry. Sixty four percent of the respondents use paper records more than computer. Another finding is that the average number of NCPs in the CNIS on a daily basis is 0-5 as indicated by 61% of the respondents. Paper records (e.g. admission books) are the system or method that is used by 88% of the respondents for patient enquiries. Although professional nurses often make entries in the computer as indicated by 34% of respondents, ward clerks and Assistant Directors make entries more often than any other staff members (44%). To summarise these findings, the interpretation is that in a unit with average bed occupancy of 31-40, where an average of 31-40 and more patients are attended to on a daily basis, only 0-2 NCPs or entries are performed and there are 0-5 NCPs in the CNIS on a daily basis. This is despite the fact that respondents have indicated that NCP module is mostly used in the units by professional nurses. However, there appear to be some contradiction with regard to most of the respondents who need in-service training despite the fact that they are competent in generating NCP (see figure 4.8), but at the same time they indicated that they never generated or updated NCP before (see table 4.8). Therefore, CNIS is not used effectively by professional nurses in patient care.

These findings demonstrate that the restraining forces were stronger than the driving forces as according to Lewin’s change model.

5.2.6 Comments on the effective use of CNIS in patient care by professional nurses in the unit.

Thirty eight percent of the respondents commented about increased workload which forms a barrier to the effective use of CNIS. For example, some of the respondents gave these comments:

“Professional nurses use computer rarely in the unit due to pressure or increased workload” and *“Shortage of staff makes it impossible to sit in front of a computer and do computer work”*.

Findings from the comments about Training are that respondents are not receiving continuous in-service training on computer or Medicom, as indicated by 31% of them. These are some of their comments: *“Computer in-service in this institution is very poor, few computers thus learning poor”* and *“This is discouraging as we need more practice.”*

Findings from the comments about the System functionality are that, 26% of the respondents expressed their dissatisfactions which include, frequent crashes and poor memory of the computer. This is supported by the following comments: *“Most of the time computers are offline”* and *“Medicom has not demonstrated its usefulness for nursing care, hence apathy in its utilisation...”* and many more.

Findings from some of the comments about the support services are that, ward clerks occupy the computers more than other staff members, and poor response from the IT services when needed. These are some of the comments that support these findings: *“The use of one computer in the unit is not useful, because ward clerk occupies it more, management to supply more computers”* and *“... if the managers can give us the opportunity to use the computer effectively...”* To summarise these findings from the comments, the following were identified as barriers to the effective use of CNIS: large or increased workload, lack of in-service training, problem with the system functionality, and problem with support services. These findings support the conclusion that somehow, the unfreezing, moving and refreezing phases were not successfully implemented during the introduction of CNIS in the hospital concerned.

5.3 Limitation of the study

The study was limited to one health care institution in Gauteng province and findings can only be generalised within the hospital and not be applied to all health care institutions in South Africa where conditions could be different from the institutions under study.

5.4 Recommendations

Based on the findings of the study, the researcher makes the following recommendations for:

- **Nursing Education**

A module on Nursing Informatics in the curriculum for nursing students is highly recommended. All professional nurses should undergo a compulsory basic computer literacy for at least once every week, until they are competent.

- **Nursing management**

It is recommended that staff development should incorporate CNIS training in their monthly in-service programmes. It is also suggested that Management should review the current CNIS used in the hospital and benchmark for a more compatible system from outside countries. Bedside terminals, PDAs or EHRs are recommended. Management should support and involve clinical nurses extensively in decisions regarding CNISs. Nurses know what they need. Lastly, it is recommended that management review all three phases of change process as according to Lewin's change model. All phases are critical when introducing systems such as CNIS in the hospital.

- **Clinical Nursing**

Nurses should participate actively in decision making with the management regarding the review of the current system. Clinical nurses should voice out their concerns regarding the decisions taken by management with regard to the use of CNIS. Voluntary change agents should work closely with management.

- Further research is recommended on the following:

To determine the cost effectiveness and feasibility of having bedside terminals, PDAs or EHRs in an academic hospital such as the one under study. The results could be used to review the current setup in these institutions.

5.5 Conclusion

The objectives of the study were achieved. This study revealed that CNIS is not used effectively in patient care by professional nurses in different nursing departments. This is despite the general positive perceptions with regard to the role of CNIS in patient care, as indicated by the majority of respondents. Of all the barriers identified, respondents felt very strong about increased workload, inadequate number of computers and, most of all lack of continuous in-service training.

In conclusion, the core business of nurses is patient care. When nurses complain about increased workload, they mean increased patient care, which could either mean increased number of patients in a ward or increased acuity level of patients. This increased patient care, including excessive paper documentation, is rendered at patient bedside. Therefore, if CNIS was introduced in the hospital to reduce excessive paper documentation, it would be more reasonable if it could be done at patient bedside. Hence, hand held devices such as PDAs, EHRs and bedside terminals, are highly recommended. Nurses understand the role of computers in nursing, but they do not want to move away from their patients to go and “double chart” information in one computer that is placed somewhere on the nurses station or clerk’s office. Instead, they will continue to suffer the consequences of illegible, inaccurate and incomplete documentation. Not because they rebel against the system, but because they need someone out there, to determine the cost of using one desktop computer for forty patients, as compared to the cost of using bedside terminals. Perhaps, even a new technology e.g. “Patient Bathing Machine” that can assist nurses with the increased “core business.” Technology should be a solution to nurses’ problems and not a problem itself.

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QUESTIONNAIRE

QUESTIONNAIRE TO BE COMPLETED BY PROFESSIONAL NURSES REGARDING : AN EVALUATION OF THE EFFECTIVE USE OF COMPUTER BASED NURSING INFORMATION SYSTEM IN PATIENT CARE BY PROFESSIONAL NURSES

- i) Please answer all questions
- ii) Your honest opinion, whether positive or negative is highly appreciated
- iii) Please do not write your name
- iv) Please write X next to the number that you have chosen for each question's response in the square to the right of the question, except where otherwise indicated. The numbers on the left of these squares are for official use only

Section 1

BIOGRAPHICAL DATA

				X ↓	For office use only
1.	Age in years:				
	21-30	= 1			
	31-40	= 2			
	41-50	= 3			
	51 and above	= 4			
2.	Gender:				
	Male	= 1			
	Female	= 2			
3.	Basic nursing Qualification				
	Diploma	= 1			
	Degree	= 2			
4.	In which unit are you currently working?				
	General Surgery	= 1			
	Specialists	=- 2			
	Paediatrics	= 3			
	Obstetrics and Gynaecology	= 4			
	Internal Medicine	= 5			
	Operating Theatre	= 6			
	Intensive Care Unit	= 7			
	Maternity	= 8			
	Others (Specify)	= 10			

5.	For how long have you been working in this unit?			
	5.1 0 -5 years	= 1		
	6 -10 years	= 2		
	11-20 years	= 3		
	21years and above	= 4		
	5.2 Current position at your job			
	Chief Professional Nurse	= 1		
	Senior Professional Nurse	= 2		
	Functional Professional Nurse	= 3		
	Other (Specify)	= 4		

Section 2

COMPUTER KNOWLEDGE

Mark with an **X** in the appropriate box

N.B MORE THAN ONE ANSWER CAN BE MARKED

6.	What computer knowledge do you have?			For office use only
	Word processing (e.g. Microsoft Word)	= 1		
	E-mail	= 2		
	Internet	= 3		
	Power-point presentation	= 4		
	Excel	= 5		
	Others (Specify)	= 6		
	No computer knowledge	= 7		
7.	Which computer training did you attend?			
	Basic Computer Literacy (e.g. Microsoft Word)	= 1		
	Introduction to End User Computing (Medicom)	= 2		
	Others (Specify)	= 3		
	No computer training	= 4		
8.	How often do you receive computer in-service training?			
	Once a week	= 1		
	More than once a week	= 2		
	Once a month	= 3		
	More than once a month	= 4		
	No in-service training	= 5		
9.	Which Medicom modules are you competent in?			
	Generating nursing care plan	= 1		
	Transfer of a patient	= 2		
	Patient reports	= 3		

	Statistics	= 4		
	Birth registration	= 5		
	Discharge advice	= 6		
	Others (Specify)	= 7		
	None	= 8		

Section 3

THE ROLE OF COMPUTER BASED NURSING INFORMATION SYSTEM

To what extent do you agree with the following statements? Please place an X in the appropriate column according to the following designation							For office use only
	5.Strongly Agree 4.Agree 3.Uncertain 2.Disagree 1.Strongly Disagree	5. Strongly Agree	4. Agree	3. Uncertain	2. Disagree	1. Strongly Disagree	↓
10.	Using a computer is time saving thus allowing more time for patient care						
11.	Computers increase productivity of nurses by reducing paperwork						
12.	Computers make nursing information more accessible						
13.	Computers facilitate communication of nursing information from one department to another						
14.	Computers facilitate retrieval of information to be easy						
15.	Computers improve completeness of nursing documentation						
16.	It is easier to complete information in the computer than on a paper record						
17.	Computers facilitate efficient organisation and storage of nursing information						
18.	Computers make documentation more accurate						

Section 4

BARRIERS TO THE USE OF COMPUTER-BASED NURSING INFORMATION SYSTEM IN PATIENT CARE

Mark with an X in the appropriate box

		YES	NO	NOT SURE	For office use only
19.	I generally have a positive attitude towards computers				
20.	I have basic computer skills and knowledge				
21.	I know how to complete at least one Medicom module relevant to my department(e.g. Care plan)				
22.	My work load is so large that I cannot work on a computer				
23.	I understand the role of computers in nursing				
24.	When the computer fails to operate, it has a negative impact on my nursing care				
25.	The information that I get from the computer is relevant to what I do in my unit				
26.	There is a system in place to deal with Medicom computer problems in the unit				
27.	One computer is enough for our unit				
28.	The placement of the computer in my unit is easy to access				
29.	Management support nurses in utilising computers in the units				
30.	The system administrator is readily available to attend to computer problems when called				
31.	I am satisfied with the continuous in-service training on Medicom / computer in my department				

Section 5

DETERMINE THE EFFECTIVE USE OF COMPUTER- BASED NURSING INFORMATION SYSTEM IN PATIENT CARE BY PROFESSIONAL NURSES

Mark with an X in the appropriate box

				For office use only
32.	What is the daily average bed occupancy of your unit?			
	0- 10 patients	= 1		
	11-20 patients	= 2		
	21- 30 patients	= 3		
	31- 40 patients	= 4		

	41 and above	= 5		
	Not applicable in our unit	= 6		
33.	What is the daily average number of patients attended to in your unit?			
	0 -10 patients	= 1		
	11-20 patients	= 2		
	21- 30 patients	= 3		
	31- 40 patients	= 4		
	41 and above	= 5		
	Not applicable in our unit	= 6		
34.	Which Medicom module do you mostly use in your unit?			
	Nursing care plan	= 1		
	Transfers	= 2		
	Patient reports	= 3		
	Birth registration	= 4		
	Operated patients	= 5		
	Other (Specify)	= 6		
35.	Referring to (34) above, how many patient entries do you perform per day? (e.g. care plans, birth registration etc.)			
	0-2 entries	= 1		
	3-5 entries	= 2		
	6-10 entries	= 3		
	11 and more entries	= 4		
36.	Do you generate a care plan for a patient OR make entries:			
	On admission or arrival day	= 1		
	The following day after arrival	= 2		
	2 days after admission or arrival	= 3		
	Any other time (Specify)	= 4		
	Never generated a care plan OR made an entry before	= 5		
37.	Do you update generated care plans OR entries			
	Once a day	= 1		
	Twice a day	= 2		
	When I have time to	= 3		
	Any other time (Specify)	= 4		
	Never updated care plans OR made an entry before	= 5		
38.	In the unit where you are working now, do you use			
	Paper records more than Computer	= 1		
	Computer more than Paper records	= 2		
	Computer only	= 3		
	Paper records only	= 4		
39	In your unit, the average number of care plans OR entries which			

	are in the system on a daily bases are between			
	0-5	= 1		
	6-10	= 2		
	11-20	= 3		
	21-30	= 4		
	30 and above	= 5		
40.	When making patient enquiries, do you search from			
	Paper records (e.g. admission book, midnight stats etc)	= 1		
	Computer	= 2		
	Ask other staff members	= 3		
	Ask other patients	= 4		
	Both computer and paper record	= 5		
41.	In your department which staff members are often making entries in the computer			
	Professional nurses	= 1		
	Enrolled nurses	= 2		
	Student nurses	= 3		
	Assistant nurses	= 4		
	Others (Specify)	= 5		

Give your comments on effective utilisation of computer based nursing information (Medicom) on patient care by Professional nurses in your unit.

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

* THANK YOU FOR YOUR PARTICIPATION *

LETTERS

Nursing Science Department
P.O. Box 142
Medunsa
0204

The Deputy Director
Department of Health
Gauteng Province
Private Bag X085
Marshalltown
JOHANNESBURG
2107

Dear Sir / Madam

Re: permission to conduct a study on : **AN EVALUATION OF THE EFFECTIVE USE OF COMPUTER-BASED NURSING INFORMATION SYSTEM IN PATIENT CARE BY PROFESSIONAL NURSES**

I am a student at University of Limpopo (Medunsa Campus) doing Masters in Nursing Science. I hereby request permission to conduct a study on the above mentioned topic as a requirement for Masters Program I am enrolled for.

The purpose of the study is to evaluate the effective use of Computer-based Nursing Information System by professional nurses in different nursing units at Dr George Mukhari Hospital. Respondents will be given questionnaires to complete within a period of one month.

The results will be used to improve the use of Computer-based Nursing Information System by professional nurses in different units.

Yours faithfully

NTSOELE MMN (Ms)

.....
Cell: 082 262 9855

Email: mntsoele@ul.ac.za

Nursing Science Department
P.O. Box 142
Medunsa
0204

Chief Executive Officer
Dr George Mukhari Hospital
Private Bag X422
Pretoria
0001

Dear Sir / Madam

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Nursing Science Department
P.O. Box 142
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Mrs. F Kuypers
Deputy Director nursing Services
Dr George Mukhari Hospital
Private Bag X422
Pretoria
0001

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Yours faithfully

NTSOELE MMN(Ms)

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Cell : 082 262 9855

Email : mntsoele@ul.ac.za

CONSENT FORMS

UNIVERSITY OF LIMPOPO (Medunsa Campus) CONSENT FORM

Statement concerning participation in a Research Project

Name of Study

An evaluation of the effective use of Computer-based Nursing Information System in patient care by professional nurses at Dr George Mukhari hospital.....

.....
.....

I have read the information on the aims and objectives of the proposed study and was provided the opportunity to ask questions and was given adequate time to rethink the issue. The aim and objectives of the study are sufficiently clear to me. I have not been pressurized to participate in any way.

I understand that participation in this Study is completely voluntary and that I may withdraw from it at any time and without supplying reasons. This will have no influence on the regular schedule that holds for my duty neither will it influence the care that I give to my patients.

I know that this Study has been approved by the Research, Ethics and Publications Committee of faculty of Medicine, University of Limpopo (Medunsa Campus) & Dr George Mukhari Hospital. I am fully aware that the results of this Study will be used for scientific purposes and may be published. I agree to this, provided my privacy is guaranteed.

I hereby give consent to participate in this Study.

.....
Name of volunteer

.....
Signature of volunteer

.....
Place.

.....
Date

.....
Witness

Statement by the Researcher

I provided verbal and written information regarding this Study
I agree to answer any future questions concerning the Study as best as I am able.
I will adhere to the approved protocol.

MMN NTSOELE.....
Name of Researcher

.....
Signature

.....
Date

.....
Place

INFORMED CONSENT

Title : An evaluation of the effective use of Computer-based Nursing Information System in patient care by professional nurses at Dr George Mukhari hospital

I Monica Ntsoele am conducting a research on the above mentioned topic. The purpose of the study is to determine the effective use of Computer-based Nursing Information System by professional nurses in different nursing units.

You are requested to voluntarily participate in the study and therefore to complete the questionnaire provided. Your name will only appear on the consent form. All information furnished will be treated with strict confidence.

Although there are no financial benefits for you in participating the study results will be used to improve the use of information systems by professional nurses in quality patient care.

Should you have any questions or desire further information, please contact:

Ms. Monica Ntsoele
P.O.Box 142
Medunsa
0204

Tel: (012)521 3039/ 4305
Fax : (012) 521 3820
Email: mntsoele@medunsa.ac.za

Thank you for your cooperation and support

