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PERCEPTIONS OF NURSES WITH REGARD TO THE USE OF COMPUTER INFORMATION TECHNOLOGY AT PRIMARY HEALTH CARE CLINICS IN THE EASTERN PART OF EKURHULENI

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DEDICATION

This dissertation is dedicated to my mother (Mantshonyane Rosina Podile) who laid a good foundation in my life,

And my brother (Seofela Alfred Podile wa Ditsebe) who encouraged me to have a vision and achieve my potential.

Special thanks goes to my husband (Tabane Nathaniel Tabane) for his constant support and encouragement,

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"The man who can drive himself further once the effort gets painful, is the man who will win"
By Roger Bannister.

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ABSTRACT

Information technology is the management of a computer-based information system, particularly software applications and computer hardware, which are used to handle all aspects of information storage, retrieval, transmittal, protection, and processing information securely. The lack of reliable health information is one of the major obstacles to the effective planning of the health services in South Africa.

The existing information systems are fragmented and incompatible; most systems are manually driven with minimal computerisation which results in inadequate analysis, interpretation and the use of data at PHC level. The use of computer information technology in the health facilities will improve service delivery; reduce the cost of providing health care; and enhance the management and control of service. Yet, it seems that nurses are insufficiently using computer information technology at the PHC clinics in the eastern part of Ekurhuleni. It has been observed that nurses do not use Computer Information Technology (CIT) to the benefit of the clients. It was unclear what the perceptions of PHC professional nurses about CIT were.

The purpose of this study was to explore and describe the perceptions of primary health care nurses with regard to the use of Computer Information Technology (CIT) with the purpose of recommending the actions to be taken by the nurse manager about computer information technology.

In this study a quantitative, exploratory and descriptive design was used in order to obtain factual reasoning and information from professional nurses working at five (5) primary health clinics in the eastern part of Ekurhuleni. The total sample of professional nurses was n = 150. The method of data collection was a self-administered and structured survey- questionnaire that took 30 minutes to complete. Descriptive statistics were compiled by using the Statistical Package of the Social Sciences (SPSS) Version 20 software program.

Validity and reliability were ensured by the judgments of the researcher and experts about whether the research instrument had covered the comprehensive set of facets that encompassed the concepts (the use of information technology at primary health care clinics). It also included pre-testing of the instrument to establish the consistency with which

participants understood, interpreted and responded to all the carefully formulated questions in the survey-questionnaire. Ethical principles and standards for nurse researchers were adhere to. The findings indicated that there were aspects that need to be addressed in respect of the use of information technology in primary health care clinics. Limitations of study and the recommendations for nursing practice, management and research were discussed.

This study determined the perceptions of nurses with regard to the use of computer information technology at the PHC clinics that lead to recommendations on the actions to be taken by the nurse managers about the use of computer information technology at PHC clinics.

LIST OF ABBREVIATIONS

AIDS   : Acquired immune deficiency syndrome

ANC   : Ante-natal care

ARV   : Ante retroviral

CCMT   : Comprehensive care management and treatment (of HIV/AIDS illness)

CDO   : Care delivery organization

CIT   : Computer information technology

Com serv   : Community service professional nurse

CPN   : Chief professional nurse

CTOP   : Choice on termination of pregnancy

DHIS   : District health information system

DoH   : Department of health

EBM   : Evidence based medicine

HER   : Electronic health record

EMR   : Electronic medical record

EPI   : Expanded programme on immunization

HIS   : Health information system

HIV   : Human immune deficiency virus

HR   : Human resource

IMCI   : Integrated management of childhood illness

IT   : Information technology

MIS   : Management information system

MMC   : Male medical circumcision

MOU   : Midwife obstetric unit

PHC   : Primary health care

PICT   : Provider initiated counselling and testing

PN   : Professional nurse

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CHAPTER 1:
OVERVIEW OF THE STUDY

1.1   Introduction

The Primary Health Care (PHC) setting is particularly important in health care service delivery, since it is the first contact of clients with a facility where health services are provided. The use of technology in general and specifically in information management are necessary at PHC settings for constructive management of information in the interest of quality decision making with reference to management of the core business of the health care organisation. Therefore, the management of information in health care is a crucial aspect of communication (Muller, Bezuidenhout & Jooste, 2007: 150).

Nucita, Bernava, Bartolo and Giglio (2009: 1191) state that communication amongst various health centres will be impossible without an Internet connection and the computer. Computer information technology potentially provides a promising solution for improving patient safety, reducing inefficiencies, improving the quality of care in our public health structure, and saving money on administrative costs (United States, 2003: 6). Most primary health care professionals are not prepared for the use of computer information technology in the health care environment (Warren & Connors, 2007: 58). The issue is exacerbated by nurses, despite the fact that they have received training in the use of technology, who are not using computers.

Openness and transparency during health services delivery, information about the type of services, the location of the health institution, service charter and redress information can easily be made accessible to all patients by using information technology (South Africa, 2008b: 29). The experiences of managers are reinforcing the observation that implementation of information technology, as a vehicle for the delivery of accountability in the management of health services, demand organisational change within a framework of human resource development and technical support (Williamson, Stoops & Heywood, 2002: 3). PHC nurses need to be competent in using computers for the purpose of processing data and storing / retrieving information in order to improve the all-encompassing quality, safety, and efficiency of the health delivery system.

1.2 Background to the problem

The use of computer information technology during the delivery of PHC services has legal, professional and ethical implications. According to the Promotion of Access to Information Act of the Republic of South Africa (2000: 1), clients have a constitutional right to access of any information while health professionals are obliged to protect such rights in order to foster a culture of transparency and accountability in health care service by giving effect to the right of access to information; and to promote a society in South Africa that enables people to have effective access to information that will empower them to exercise and protect all their rights.

The person in charge of a health establishment, such as a PHC clinic, is in possession of a patient's health records and ought to implement control measures for the prevention of unauthorised access to those records and to the storage facility in which, or a system by which records are kept, e.g. electronic record keeping (South Africa, 2004a: 24). A professional nurse needs to keep clear and accurate record of all the acts which he / she is performing in relation to the patient, to retain such records for at least three years, and to produce the records to the South African Nursing Council when it is required to do so (South Africa, 2005: 1).

Patients have the right to access of information (South Africa, 1996: 15). The nurses at public clinics will be guilty of misconduct if they fail to recognise the citizen's right to access of full and accurate information (South Africa, 2002: 60). Without the proper use of computer information technology, it will be very difficult – if not impossible – to comply. The right of the patient to access a health provider of their choice (South Africa, 2008b: 30) results in patients utilising different clinics, searching for high quality care. Accessing different health facilities leads to: duplication of records; lost patients' information; the unnecessary repetition of laboratory tests; and complicated management of patients.

The national priorities are the development of an integrated national health information system, the improvement of data management and use, implementation of electronic patient record keeping, implementation of HR databases, and improved surveillance (South Africa, 2009a: 24). The professional nurses are required to maintain physical and electronic records by applying the departmental procedures and standards for storage of physical and electronic information and to ensure that all members of the work group enter information into and extract information from records efficiently (South Africa, 2004b: 61). Management and

control of services can be enhanced by the implementation of an electronic patient record keeping and management system. The smart card solution, which has been launched in 2008, will improve care provision at health facilities and in the homes of patients. This new electronic system will (South Africa, 2009a: 25, 31) strengthen the district health system, improve the quality of services, lead to better stock control of medication, and improve the overall experience of patients at facilities by shorting queues and reducing waiting times.

Nurses at the PHC clinics are facing an increased application of information during day-to-day operations with the overall aim of improving the quality of patient care (Willmer, 2007: 207). At PHC clinics, nurses are trained and, therefore, expected to use computers for capturing patients' data as part of their record keeping. Information technology at PHC facilities will undoubtedly improve information access at the point of care; enhance work flow; promote evidence-based practice that facilitate effective decision making; and make remote and traceable access to clinical data possible.

Therefore, a well-prepared workforce that can confidently use information technology while contributing to the growing requirements of a PHC health care service is important and necessary (Honey & North, 2009: 1).

1.3   Problem statement

During inspection at primary health clinics, the researcher observed problems with regard to the use of computer information technology.

The first observed problem was, A. Record keeping and retrieval of information. Patients' information is stored in files which sometimes got lost. Duplication of records, due to patients utilising the services at different health care clinics, existed. Booking of patients was done manually and tracing of the defaulters was impossible due to change of addresses of the patients. Secondly, B. Communication using a computer network between primary health clinics and hospitals was lacking. Information of patients was not effectively shared amongst members of the health team. There was insufficient communication between unit managers and the professional nurses with regard to the use of information technology. Thirdly, C. Decisions about the health care service and management of patients were not based on the use of computer information technology. Guidelines and protocols that were recent and available

electronically were not used. Instead, nurses were using hard copies to make decisions about patient management. Archaic ways of data capturing existed. Most primary health care clinics did not use electronic data capturing. Statistics that were captured manually by professional nurses in hardcopy records were transmitted late and was viewed as inaccurate by head office. The reporting of underutilisation of PHC services existed. As a result, the PHC head-count at the primary health clinics was also inaccurate.

From the issues mentioned, it seemed that computer information technology was not used appropriately. If these practices were to continue, they could have an impact on cost, time, improvement of patient conditions, patient dissatisfaction and inappropriate resource allocation. Subsequently, it was important to study the perceptions of nurses about the use of computer information technology in the PHC setting. Computer information technology is an important tool which can improve overall quality, safety and efficiency of the health delivery system (Chaudhry, Wang, Wu, Maglione, Mojica, Roth, Moton & Shekelle, 2006: 12).

While pondering about the abovementioned issues, the following research questions were expressed:
- How do nurses perceive the use of computer information technology at the primary health care clinics?
- What actions can be taken to promote the use of computer information technology at primary health clinics?

1.4 Purpose of the study

The purpose of the study was to explore and describe the perceptions of nurses in relation to the use of computer information technology at primary health clinics in order to describe recommendations about taking appropriate actions by the nurse manager to optimally integrate computer information technology.

1.5   Objectives of the study

The objectives of this study were to:
- explore and describe the perceptions of nurses about the use of computer information technology at primary health clinics.
- describe recommendations about taking appropriate actions by the nurse manager to optimally integrate computer information technology at PHC clinics.

1.6   Definitions of concepts

A **nurse** refers to a person registered in one of the categories (Section 31(1) of the Nursing Act), with the purpose of caring for and treating a health care user to achieve or maintain health. However, when it is not possible; a health care user ought to be treated in such a way that he or she lives in comfort and with dignity until death (South Africa, 2005: 1).

A professional nurse is 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 (South Africa, 2005: 34). In this study, a nurse refers to all professional nurses working at the primary health care clinics.

Nurse manager is a person who performs leadership functions of governance and decision-making within organisations that employ the nurses. He/she has a legitimate power to control, plan, organise and direct. His/her functions include human resource allocation, directing and controlling. He / she needs to be sensitive to the needs of the staff members whom he / she is managing and should focus on efficiency, making better use of talents and creativity (Jooste, 2007: 5, 12; Wikipedia, 2009: 1). In this study, nurse manager refers to a manager at a primary health care clinic.

Computer is an electronic device capable of processing and storing information according to a set of instructions (Oxford Paperback Dictionary and Thesaurus, 2007: 177).

Information management describes the efficient planning, collecting, organising, using, controlling, disseminating, and communicating information within and external to the organisation in the interest of quality decision making with reference to proper management of the core business of the health care organisation (Muller et al. 2007: 150; Hersh, 2009:

1473-1474; http://willpowerinfo.co.uk/infoman.htm; http://www.businessdictionary.com/definition/informatio-management.html). In this study, information management refers to the process of getting information (information sourcing), capturing and storing information electronically for use in communication and decision making during nursing management.

Information technology refers to hardware, software, data capturing and other information related sources in an organisation that are used for storing, retrieving, protecting, sharing and transmitting data, and making it available in a format that will support organisational decision making and communication (Muller et al. 2007: 150; Oxford Paperback Dictionary, 2007: 473; Hersh, 2009: 1472-1473). In this study, information technology refers to the main focus of using computers at the primary health care clinics for record keeping, communication and decision making.

Record keeping of information refers to the recording, storage and retrieval of information on the computer (Cheevakasemsook, Chapman, Francis, Davies, 2006: 366-367; Van der Walt, 2006: 45-46). **Communication** in this study refers to sharing of information within the clinic and between clinics, hospitals and other facilities, such as educational facilities (Your dictionary, 2012: 1-2). **Decision making** in the health setting refers to the use of information from a computer to make clinical and administrative decisions at different levels of management (Tanck, 2008: 1-4; Brockman & Russell, 2009: 1-3).

Primary health care setting is defined as the essential health care based on a practical, scientifically sound and socially acceptable method. Technology supports this service when it is accessible to individuals and families in the community with their full participation and at a cost that the community and the country can afford in the spirit of self-reliance and self-determination (South Africa, 2006: 38). In this study, a PHC setting refers to all PHC clinics in the eastern part of Ekurhuleni which are three (3) community health care centres and two (2) primary health care clinics. A community health care centre refers to the clinic with the following facilities: PHC, midwife obstetric unit (MOU), comprehensive management care and treatment of HIV / AIDS illness (CCMT), mental health service, rehabilitation service, dental service and radiology department.

Perceptions are the ability to see, hear or become aware of and have a particular understanding of the situation or something (Oxford Paperback Dictionary & Thesaurus,

2007: 667). In this study, perception refers to a nurse's awareness and the understanding of the use of computer information technology (CIT) at a PHC clinic.

1.7   Research design

This study is based on a quantitative, exploratory and descriptive design. *Quantitative research* is a formal, objective, systemic process in which numerical data are used to obtain information about the phenomenon (Burns & Grove, 2005: 356). A survey is conducted and the data are collected by means of a questionnaire to measure the perceptions of professional nurses in terms of the use of information technology in the PHC setting. An *exploratory* investigation is undertaken to generate knowledge in the field of PHC nursing practice (Burns & Grove, 2005: 357). A *descriptive* design is followed to provide an accurate portrayal of the characteristics of a particular situation. In this case, the portrayal is based on perceptions of professional nurses about the use of computer information technology (Burns & Grove, 2005: 357).

1.8   Population and sample

The target population was the entire set of participants who meet the sampling criteria (Burns & Grove, 2005: 342). In this study, it included all professional nurses who were working at the PHC clinics in South Africa. The accessible population was the portion of the target population to which the researcher had reasonable access. The accessible population, in this study, was all professional nurses working at 5 PHC clinics in the eastern part of Ekurhuleni (n = 150). The accessible population served as the total sample of the study and all professional nurses who were working at these 5 PHC clinics on the East Rand were invited to take part in the study.

1.9   Data collection

A survey was conducted using a developed self-administered structured questionnaire which was based on literature, comprising questions structured in two sections. Section 1 sought to collect demographic and biographical data while Section 2 was addressing items about information technology, i.e. record keeping which included: capturing, storing and retrieving information, communicating and information sharing, and decision making that was based on the use of computer information technology. The questionnaire contained items that required

responses on a 7-point scale, ranging from totally disagree to totally agree. Participants were requested to select one response for each item on the scale that was best describing her / his perceptions (Burns & Grove, 2005: 404).

1.10 Data analysis

Collected data were captured, analysed and coded by using the Statistical Packages of the Social Sciences (SPSS), Version 20 software program. A statistician was consulted to assist with the analysis of data. Data were analysed by means of descriptive statistics.

1.11 Validity and reliability

Objectivity was ensured by using structured self-administered survey-questionnaires during data collection, which implied that data were collected and analysed by a statistician in an impartial and unreduced manner. Internal validity was ensured by means of pre-testing the instrument and was conducted to determine the content and face validity of the instrument. An appropriate method of data analysis was followed using SPSS, Version 20. External validity was ensured by selecting the representative sample to include the total accessible population.

1.12 Ethical considerations

Ethical standards and principles for research projects were adhered to during the research. The planning and implementation of the research project complied with all principles and standards described by Jooste (2010: 277-281) which were:

- **Permission to conduct a research project**: The research proposal was submitted to the Academic Ethics Committee at the University of Johannesburg for approval and the allocation of a clearance number (No HDC54/O2-2010). The proposal, accompanied by the letter for permission to undertake the study at the PHC clinics, had been submitted to the Ekurhuleni District Research Committee, which subsequently submitted it to managers of the institutions.
- **Protecting the research participants and honouring trust**: Participants were given the information letter which contained particulars they needed about the study and the duration of answering the questions (items). The questionnaire would take approximately 30 minutes to complete.

- **The right to privacy**, **confidentiality and anonymity**: The privacy of the participants was ensured at all times during the research proceedings. Informed consent had been obtained from participants before conducting the research. The invasion of privacy was prevented by ensuring that no identifying information was required in the formulation of the questionnaire. For control purposes, codes rather than names were indicated on the questionnaire. The gathered data would be kept under lock and key for 2 years after the results had been published after which it would be destroyed.

- **The participant's right to confidentiality and anonymity** was ensured by making it impossible to associate any data with a specific institution or a specific person. Participants were assured of anonymity by neither recording their personal details, nor publishing their personal details. The research report was written in such a way that no individuals or groups would be identified by their responses. Any personal details that might identify individuals were left out of the study and each instrument was given an identifying number for control purposes. The results of the study would be communicated in such a way that no individual's personal identity could be associated with these results. Questionnaires did not reveal the name of an institution or a participant and were completed anonymously. After completion, the participants placed their questionnaires in a sealed envelope before handing it back to the researcher.

- **The right to justice and equality**: A total sampling method was used to ensure fair selection of participants. The total sampling method gave everyone in the population an equal chance to participate in research. Contact details of the researcher were provided for whenever the participants needed support during the study.

- **The right to protection and truthfulness**: Participants were alerted to the fact that no risks were anticipated in this study. Data collection took place at a time that was convenient to the participants, e.g. during lunch time.

- **The right to freedom of choice and withdrawal**: Written informed consent was obtained before the completion of questionnaires. Participants were not pressured in any way to participate in the research and were permitted to withdraw at any time without fear of discrimination, exposure or embarrassment. They were informed that they could withdraw their consent at any stage of the project and no adverse consequences would arise from their withdrawal.

- **Access to information and communication**: Sufficient information was disclosed to the participants by means of a letter which indicated the purpose, procedure used, an

expected period for answering the questionnaire and the goal of the study. Participants were informed that any data gathered would only be shared with the relevant researcher or supervisors involved in the study and other relevant persons who would be aiding with the analysis of data and the compilation of research findings.

- **The rights of the community and the research community**: The researcher maintained the highest standards of research planning, implementation and reporting; was committed to honest, unbiased and neutral research; made the constraints of the study known; did not participate in any unethical manipulation of the research data gathered; made use of acceptable, scientific methods and procedures throughout the research process; did not engage in plagiarism; and acknowledged the contributions from other parties, such as the supervisors.

- **Respect for person**: Informed written consent was obtained from the participants who voluntarily agreed to participate in the study.

- **Beneficence** (benefit to the research participants): The study might benefit the PHC clinics by the gained knowledge, since it describes recommendations for actions to the manager or recommendations for health care practice. There were no inherent risks to participants in the study. Research results would be made available to participants on request.

1.13 Possible outcomes of the study

The study determined the perceptions of nurses with regard to the use of computer information technology at the PHC clinics that had led to recommendations about the actions to be taken by the nurse managers in relation to the use of computer information technology at PHC clinics.

1.14 Conclusion

This chapter serves as an orientation to the study. The lack of reliable health information is one of the major obstacles to the effective planning of the health services in South Africa. The background, purpose, objectives and design of the study are briefly described, and the ethical considerations followed in this study are outlined.

This report will be presented as follows:

Chapter	Description
Chapter 1	Overview of the study
Chapter 2	Literature review
Chapter 3	Research methodology
Chapter 4	Data analysis and interpretation
Chapter 5	Guidelines actions, limitations and recommendations

The literature review about the topic is described in Chapter 2.

CHAPTER 2:
LITERATURE REVIEW

2.1 Introduction

A literature review is an organised written presentation of anything that is published or currently known about the topic of interest (Burns & Grove, 2005: 93). In this study, it refers to everything that is currently known about the use of information technology in nursing and health care service delivery. An empirical literature review has been conducted at the beginning of the research process to direct the implementation of study (Burns & Grove, 2005: 93-95), e.g. to develop the questionnaire of the study with regard to information technology (De Vos, Strydom, Fouche & Delport, 2005: 82).

The literature search was conducted by using a systemic and explicit approach to the identification, retrieval and bibliographical management of independent and published studies of full text articles available in CINAHL, MEDLINE, Health Source (nursing / academic and consumer edition), AMED (alternative medicine) and databases were used. A topic (the use of information technology at primary health care clinics) and the key words (IT, computer, PHC, record keeping, communication, decision making) were used as a strategy for searching citations. Citations were selected on the basis of index and abstracts with subject headings and included the paragraph and full text of citation. Another selection type was applied, i.e. the citation search indices yielded citations that were accessed on the basis of the references at the end of the article (Burns & Grove, 2005: 97).

Full text data bases indices of journal articles were accessed electronically at the University of Johannesburg library and were read online, printed or saved electronically for reading and critiquing purposes.

In this study, information technology refers to the main focus in this study, namely the use of computers at the primary health care clinics for record keeping, communication and decision making.

2.2   Record keeping on a computer

The management of the health care organisation's core business depends on proper information management which includes appropriate record keeping (Cheevakasemsook et al. 2006: 366-367; Muller et al. 2007: 150). Record keeping of information refers to the recording, storage and retrieval of information on a computer. Therefore, record keeping in the health care setting should begin with getting information/ information sourcing (Van der Walt, 2006: 45-46) in order to start the process. The aspects to be considered in the process of record keeping are sources of information, resources needed for record keeping while using a computer, electronic recording of information on the computer and the benefits of the use of a computer for record keeping.

2.2.1   Sources of information

In order to manage information in any setting, the information sources and information flow within the organisation needs to be identified (Van der Walt, 2006: 45-46).   Many authors have identified the sources of information in the health care setting. It includes information that is being obtained from the client when the professional nurse uses her or his diagnostic skills to gather objective and subjective data for the purpose of planning nursing care. The data include information, such as observation, procedures, progress notes and discharge summary. All members of the health team who have contact with clients are consulted with regard to the continuous assessment of clients, the provision of information about clients' interaction with the health care environment, and the evaluation of the recovery progress of the clients from their own perspective. The clients' records are important, since it contains laboratory reports and doctors notes which are enabling the nurse, to notice certain patterns in the clients' health care behaviour, treatment and response to treatment (Tomasi, Facchini & Maia, 2004: 869, Agarwal, Jacobs, Goh, Gao, Corriveau & Manicone, 2008: 3; Jooste, 2010: 149).

The organisation's environment plays a role as the source of information. This includes the infra-structure and its maintenance (Van der Walt, 2006: 46); organisational performance in the form of reports; and checklist that measures patient safety such as patient falls, and rates of health care–associated infections in health care settings (Mc Carthy & Klein, 2011: 2-3, 7).

Information about the administration of the organisation is needed; such as human resource information, e.g. the number of personnel and their categories, training and their qualifications. Databases need to be used. Such databases are containing collections of data elements that are organised and stored in a structured manner on the computer. Examples of data elements are the human resource (HR) database; and surveillance systems, e.g. for measles, acute flaccid paralysis (AFP) and neonatal tetanus (South Africa, 2009a: 24-25).

The Canadian Institute for Health Information provides an overview of the data sources that will be required to report about PHC indicators. These sources include the client, patient, and population; e.g. surveying a sample of PHC clients / patients or surveying the general population for specific elements; like the smoking rate, service providers (gathering information from PHC providers, e.g. work place safety) and organisational data (data that are obtained from PHC organisations in relation to health regions by means of surveys). Organisational data include information that is obtained from surveys conducted about PHC outreach programmes for chronic patients; such as information about chronic support group meetings and health talks that are given to the support groups. Some of the information is obtained during clinical encounters when a patient / client attends a clinic and data about diagnostics, drugs, immunisations and laboratory tests are captured and stored. Administrative data sources include data that are obtained from health human resource or health expenditure databases (Canadian Institute for Health Information, 2006: 1-7).

Data from a source in the environment of the organisation; such as information about the administration of the organisation that can be captured, structured and stored by means of databases. Databases are collections of data elements organised and stored in a structured way on the computer. Examples are administrative, HR and expenditure databases (College and association of registered nurses of Alberta (CARNA), 2005: 7, South Africa, 2009a: 24-25 & Air transport IT services, 2012: 1).

In PHC settings, record keeping of client data about diagnostics, drugs, immunisations and laboratory tests, and administrative data sources (HR and health expenditure) is important for planning, control and management of resources and budget allocation for health service. Health information that is obtained from different sources needs the resources in order to be captured, structured and stored in such a way that it can be retrieved when access to the data is required.

2.2.2 Resources needed for record keeping using a computer

The need for using the computer for record keeping purposes includes both material and human resources. Material resources for capturing, storing and retrieving information using the computer include information technology infrastructure; such as desktop computers, handheld devices, laptops, computers with operating systems, like Microsoft Windows; adequate access to online sources; a system upgrading plan; and a back-up system (Andrews, Pearce, Sydney, Ireson & Love, 2004: 11-18). Human resources that are needed for record keeping using the computer include computer literacy training for members of staff (South Africa, 2007: 5; International Organization for Standardization (ISO), 2008: 1). When both information technology infra-structure and computer literate personnel are available, the capturing of information on the computer, for storage and retrieval purposes, can then take place.

2.2.3 Electronic recording of information on the computer

In the health care setting, information from different sources can be stored in different ways. Information about the patients can be stored in the computer in the format of electronic health records / patient health records or electronic medical records. Many authors explain the electronic health record / patient health record or electronic medical record as a record that is programmed for storing and integrating information from various sources into a single life time records of a client's health (sic) history and care, which will be easily found, selected and retrieved; and will further reduce errors that are caused due to multiple files and date entry points, reduce duplication and improve the flow of information (Tomasi et al. 2004: 867-872; Owen, 2005: 49; Chaudhry et al. 2006: 14; Langley & Beasley, 2007: 19; Healthcare Information Technology Standards Panel, 2009: 10-11; Hellström, Waern, Montelius, Åstrand, Rydberg & Petersson, 2009: 1186-1472; Orchard, Dobrow, Paszat, Jiang & Brown, 2009: 1186; Jooste, 2010: 156).

Electronic medical records are records of clinical services that are supplied during patient engagement. These records can be captured, stored and retrieved by using a record management system that is commercially available from companies, such as enterprise vendors, and can be installed and used by the health institutions (Garets & Davis, 2006: 3). UniChart is one of these electronic medical record management systems. It is being regarded

as an adequate system for clinical record keeping and workflow needs, and can successfully be used in a wide range of medical specialties; including primary health care, neurology, psychiatry, cardiology, pulmonology, urology, physical medicine and rehabilitation and pain management. It can also be used for integrated patient charting; prescription and refill management; documentation management; encounter and consult note generation; patient and resource scheduling; and intra-office messaging. UniChart can easily be used for the electronic management of patient's information. All charts have a patient-based layout; i.e. demographic information, historical data, scanned documents, encounters, treatment plans, medication and financial charges and are all in the patient's electronic file. It expedites the instantaneous provision of an overview about a patient's health in relation to all clinical aspects (Electronic medical record (EMR) software, 2011: 1).

Some authors have differentiated between an electronic medical record (EMR) and an electronic health record (EHR). They describe the EMR as the legal record that is being created in the health care setting to include a clinical data repository, controlled medical vocabulary, computerised provider order entry, clinical documentation, charting, pharmacy management, electronic medication administration record, major ancillary systems (e.g. laboratory tests, diagnostic imaging, cardiology, etc.), a picture archive and a source of data for the EHR. An EHR contains continual input of a patient's health information to encompass all episodes of care and exposure to multiple health care systems (Garets & Davis, 2006: 2; Fox & Sheridan, 2009: 1). Other researchers refer to the EHR as an electronic patient records (EPR). Despite the differences mentioned above, all electronic records are used every day when recording information in the health care setting using the computer to support patient care and will therefore be referred to as electronic medical records.

2.2.4 The everyday use of electronic medical records to support patient care

The everyday use of electronic recording refers to the reading and writing of patient information with the aim of creating a comprehensive, retrievable and holistic representation of a patient's medical and health care history.

2.2.4.1 Reading and writing patient information

An electronic medical record (EMR) is a system which supports and allows multi-professional use. It means that members of a multi-disciplinary team (nurse, doctor, specialist, pharmacists, radiographer, social worker and other members of staff, e.g. managers) can read and / or write in the same record of a patient, while enabling access to one another's portions of the patient record (Smith et al. 2005: 133; Lee, 2006: 1377; Tornvall & Wilhelmsson, 2008: 2117).

Electronic medical records (EMRs) can be used by primary health care physicians to capture clinical notes about the patient – including all medication prescriptions, discharge summaries, laboratory results and referrals – either by entering the data themselves or creating an electronic voice recording for later text entries by office personnel (Protti & Johansen, 2010: 2).

2.2.4.2 Electronic medication prescription

An electronic medical record can be used for the electronic prescription of medication when primary care physicians enter all prescriptions for medication themselves by making use of a computer. After the patient has identified which pharmacy he or she wishes to visit, the physician will be selecting the pharmacy from a dropdown menu to send the prescription electronically to that pharmacy (Andrews et al. 2004: 11-18; Tomasi et al. 2004: 867-872; Honeyboume, Suttont & Ward, 2006: 52, 58; Hellström et al. 2009: 1186-1472). All pharmacies that are linked to information technology (IT) systems will be able to receive electronic prescriptions. An acknowledgment from the pharmacy, with all transmissions encrypted, can automatically be sent back to the physician's office. A complete medication record can be developed which amalgamates all medication prescribed by general practitioners, hospitals, home care, and the clinics (Protti & Johansen, 2010: 2).

2.2.4.3 Monitoring and tracking activities

Some of the applications of electronic medical records are the monitoring of activities, such as monitoring the anti-retroviral (ARV) tolerability; ARV drug switches; and occurrence of opportunistic and HIV related illnesses. An electronic medical record can also be applied as a component of visit tracking activities (missed visits), and can provide information about

follow-up statistics (including deaths and transfers), and ARV drug procurement; i.e. the drugs ordered according to the number of patients who are using those drugs. Patient tracking includes a unique patient identification number for electronically capturing the demographic information in a confidentially maintained electronic database (Tomasi et al. 2004: 867-869). Magnetic tapes or smart cards are examples of electronic memory hardware (South Africa, 2009a: 25, 31) which has been developed to be used by health providers and patients for tracking activities; such as user identification, electronic scheduling systems for appointments, examinations and hospital admissions (Mannan, Murphy & Jones, 2006: 125).

Information technology (computers) can be used for monitoring of patients who participate in specific health programmes, such as immunisation at mother-and-child clinics, antenatal care and diabetes programmes by means of electronically generated messages when patients miss scheduled appointments, and the issuing of pre-appointment reminders. These support tools enable the identification of absentees and defaulters of appointments; integration of prevention and control activities; and the detection of risk factors and complications (Tomasi et al. 2004: 867-872; Protti & Johansen, 2010: 1).

2.2.4.4 Access / retrieval of information

EMRs serve as a method to easily access and print documentation for the purpose of releasing information. Access to an electronic medical record can be controlled by the patient, or the health provider (Garets & Davis, 2006: 2; Fox & Sheridan, 2009: 1), this access can be in the form of electronic patient registry. Electronic patient registries are systems that integrate and promote access (from a single site to multiple locations) to collections of clinical information (Tomasi et al. 2004: 869). These patient's registries and administrative data about the patients are based on a distributed database, such as a drug database and lists of generic drugs (Protti & Johansen, 2010: 5), that serve as a means of support to members of staff. These support systems can be used by the multi-disciplinary stakeholders in the health care system by making around the clock access to patient information possible; e.g. laboratory results, and patient records (Wainwright & Waring, 2004: 242; Honeyboume et al. 2006: 52, 58; Langley & Beasley, 2007: 19).

When utilising systems; such as the Unichart medical record system; electronic medical records can be accessed from both local intranets and the Internet with equal ease. This

system makes backing up databases easy, and one can also backup the entire EMR program on a USB flash drive; plug that drive into another computer or network and start using it immediately. If mobility has been important, installation of the software can be done directly on a high speed USB drive for immediate access by nurse practitioners, certified nurse-midwives or physician assistants who need a certain amount of mobility for providing medical services at rural health clinics (Electronic medical record (EMR) software, 2011: 1).

2.2.4.5 Screening for health conditions

A computer can be used at PHC settings to provide efficient and standardised mental health screening for depression, anxiety, alcohol abuse and problems with gambling. The patient can access the screening information and answer questions alone where ever he is and the information can be retrieved by the health provider for plan of patient care. This screening test can facilitate early interventions and can be effective in collecting sensitive or confidential information. It also facilitates personal assessment at the patient's own pace, and offers rapid screening of mental health status and a better understanding and management of one's own condition (Leung, French, Chui & Arthur, 2007: 441-446).

2.2.4.6 Statistics and the use of the computer for record keeping

Data from the environment of an organisation; such as data about the health institution performance, and personnel and patient profiles (Mc Carthy & Klein, 2011: 2-3, 7); can be captured and stored electronically in the form of statistics by using systems, such as the district health information system (DHIS) software (South Africa, 2008b: 126). The computer can be used to automatically validate the entry figures (detecting numbers which lie outside of a normal range described as the mean and maximum of each data field and validity checks of certain figures to ensure that they were within acceptable limits). The computer is also used for graphing the PHC data (Williamson et al. 2002: 2; South Africa, 2004b: 19-79; Tomasi et al. 2004: 867-872; Agency for healthcare research and quality (AHRQ), 2008: 3; South Africa, 2008b: 126).

2.2.4.7 Human resource management and the use of computer

The quality of services essentially depends on proper and efficient staffing and quality leave management systems. The streamlined staff deployment; allocation, management and control

of leave of absence are considerably intensifying the demands that are made on scheduling managers. The vital decisions such as determination of the types of leave, the employee 's leave entitlement, the circumstances and conditions to be considered for leave authorization, are often made under intense time pressure, and quick responses to schedule changes are required. The use of information technology may relieve the workload of scheduling managers and enhance the efficiency of coordinating personnel deployment (South Africa, 2008a: 7; Air transport IT services, 2012: 1-2). Some office procedures; like the submission of a leave request for authorisation purposes, leave authorisation by the supervisor and monitoring of patterns of absenteeism can be done electronically (http://www.aspiration.co.za; http://www.cbars.co.za/home.htm). The computer can be used for storage of information about the organisation; such as the maintenance of a human resource database (South Africa, 2009a: 24) that comprises the number of employees at the establishment, their employment dates, categories, training, qualifications, allocation, performance and their progress reports (College and association of registered nurses of Alberta (CARNA), 2005: 7; Air transport IT services, 2012: 1).

2.2.4.8 Financial management and the use of computer

A computer is supporting financial management of the organisation; e.g. electronic banking, electronic ordering of stock and direct billing to the government health service (Cenic, Mcphee & Kidd, 2010: 4). An expenditure database can be used to store organisational information about the annual budget allocation; budget spent; and what the budget is used for; such as procuring equipment and assets, infrastructure maintenance, and repairs (College and association of registered nurses of Alberta (CARNA), 2005: 7).

Financial and administrative functions of the computer include billing, coding laboratory tests, tracking, collation of information and external reporting (Andrews et al. 2004: 11-18; Agarwal et al. 2008: 8).

2.2.5   Benefits of the use of a computer for record keeping

Computer-based documentation has the advantage of maintaining nursing documentation more comprehensively than any of the most sophisticated paper-based systems, and can constitute a learning tool with the purpose of increasing the knowledge and changing care

strategies for nurses (Smith et al. 2005:133; Lee, 2006: 1377; Tornvall & Wilhelmsson, 2008: 2117).

The use of electronic medical systems strengthen the district health system, improve the quality of services, lead to better stock control of medication and improve the overall experience of patients at facilities by shortening queues and reducing waiting times (Agarwal et al. 2008: 3, 8). A computerised assessment process refers to a standardised assessment of the patient which includes the collection and capturing of sensitive or confidential information in a time efficient manner, while potentially reducing errors in data recording (Leung et al. 2007: 442).

Patient safety could be enhanced by using systems; such as a national pharmaceutical association database. This system can also help to ensure accurate dispensing of medication to patients (Tomasi et al. 2004: 867-872; Chaudhry et al. 2006: 14; Honeyboume et al. 2006: 52, 58; Mannan et al. 2006: 125; Langley & Beasley, 2007: 19; Jooste, 2010: 156-157; Protti & Johansen, 2010: 6).

A computerised clinical documentation system can be used for educational purposes by collecting isolated and scattered information and capturing it in one common repository. The physician trainee will have easy and immediate access to the notes of other people. It presents a paradigm shift and a new way of learning, i.e. trainee's notes are being corrected and augmented by fellow trainees and other members of the faculty (Agarwal et al. 2008: 9). Accessing health literature, online journals, books and databases online and informational CD-ROMs that support practicing professionals' offline are some of the educational applications of the computer in the health care setting (Mannan et al. et al. 2006: 125).

2.3   Communication and information sharing in relation to computer technology

Communication refers to the sharing of ideas and information. It is the act of expressing and transmitting ideas, especially in speech and writing. It describes the exchange of information; i.e. the sending and receiving of messages; by speech, gestures, and writing or by a system that is using devices and software, such as computers and the Internet (Your dictionary, 2012: 1-2). Effective communication is a process of receiving and understanding a message by a receiver in the manner that the sender intends it to be received and understood. Business

communication is taking place in the context of people and organisations during business transactions. The respective entities that are exchanging information are senders and receivers; e.g. employees, customers, bosses, boards, stockholders, companies, and departments. Business communication is using its own language, e.g. medical terminology is used in the health institution, and the entities (senders and receivers) tend to adopt and maintain their public identities while communicating (People communicating, 2010: 1-2).

Communication in the health care setting of this study refers to the sharing of information at the clinic and between clinics, hospitals and other facilities. The purpose of the communication is to carry out duties and responsibilities in the health care context. Electronic communication refers to the use of the computer and internet to communicate internally (intra) and between (inter) the health facilities and other entities, such as education facilities (Your dictionary, 2012: 2). During the literature review, aspects have been explored in terms of the need for computer communication, electronic health records and communication, sharing of information and the use of the computer and the benefits of electronic communication.

2.3.1   The needs for electronic communication

In order to communicate effectively in the health care setting, information is needed. A national database, comprising of data that are collected and coded using structured language, is needed. The format of displaying information electronically needs to be user-friendly, and communication technology ought to support evidence-based care. Professional nurses need to have the competency and experience to use information communication technology (ICT) (Jooste, 2010: 156-157). Internet connections or satellite beams will make communication between various centres possible (Honeyboume et al. 2006: 52, 58; Nucita et al. 2009: 1191). Communication by means of the computer focuses on the use of electronic medical records, the exchange of information, and the benefit of electronic communication.

2.3.2   Using an electronic medical records for communication

Communication using computer in the health setting is dependent on functional electronic medical records (EMRs) environment. EMRs environments are communication systems that allow health care systems to exchange data with one another; regionally and within the

community. It serves as a way of easy access to information and is the source of data for storing the information about the patient. Therefore, EMRs need to be implemented in the health care setting before the electronic communication can be established (Garets & Davis, 2006: 2; Fox & Sheridan, 2009: 2). The EMRs represent the ability to easily share medical information among stakeholders (patients / consumers, health care providers, employers and / or payers / insurers, and the government). It includes patient information from various care delivery organisations (CDOs) where a patient has sought medical assistance and it also serves as a way of making sure that a patient's information follows him or her on the trail of seeking medical services at various modalities of care by that individual (Garets & Davis, 2006: 2-3; Fox & Sheridan, 2009: 1). In order to communicate in the health setting, (EMRs) need to be integrated across the professional and organisational boundaries; with high quality, security and confidentiality maintained throughout their use (United States, 2003: 2).

Captured patient information in the format of electronic medical records can be used for interaction with other stakeholders who are involved with patient care in a various health care settings by means of Internet communication (Honeyboume et al. 2006: 52, 58; Nucita et al. 2009: 1191). The interaction with others refers to electronic referral of a patient's file / file transfer to a specialist, e.g. a doctor / nurse in a very remote region can receive a quick response and advice from a specialist about the management of an ill patient by transferring a file electronically without costly and time consuming referral of the patient (Hersh, 2009: 1475; Cenic et al. 2010: 4). Electronic medical records can be used for counter-referral activities, i.e. the return of the patient to his or her physician after specialist consultation, between different levels of care, e.g. from specialists or hospitals. In such a case, the patient will have comprehensive information in his /her file, which includes laboratory test results, X-ray results and examinations results (Tomasi et al. 2004: 867-872). Such comprehensive information is crucially needed by the health provider for the purpose of the continuation of care and management of the patient after health intervention at a hospital or specialist (Kantonen, Kaartinen, Mattila, Menezes, Malmila, Castren & Kauppila, 2010: 1472).

 Other interactions can be conducted by making use of the standardised communication system, which includes the sending of an email message, with information about a patient's health intervention at an emergency department, to the clinic where the patient has accessed the health service to enable continuity of care. The email message can contain the results of examinations performed; e.g. electrocardiography, laboratory and radiological test results;

consultation report; diagnosis; medication; and follow-up planning. The email needs to contain a link to a password-secured website where a physician can access a detailed report (Afilalo, Lang & Boivin, 2003: 1-7; Orchard et al. 2009: 1186).

The computer can also be used to communicate with the pharmacist about the electronically prescribed drugs. The nurse / doctor can receive the information about drug doses, side effects and usage by the patient (Chaudhry et al. 2006: 14;   Honeyboume et al. 2006: 52, 58; Mannan et al. 2006: 125; Langley & Beasley, 2007: 19; Jooste, 2010: 156-157; Protti & Johansen, 2010: 4-6)

2.3.3   Sharing of information and the use of the computer

Sharing of information refers to the exchange of information and ideas. The Internet enables the two-way exchange of information and gives people around the world the opportunity of sending information instantly and sharing ideas immediately (Your dictionary, 2012: 1-2). Sharing of information entails the use of the computer to share information for the purpose of patient care and education.

2.3.3.1 The use of the computer to share information for the purpose of patient care

The computer can be used for sharing information with the purpose of patient care by means of Internet connections. Internet communication can be used for discussion with colleagues by making use of particular Internet resources (either Internet support groups or consumer health), e.g. when the doctor or a nurse has a need to interact with specialised personnel of other African or European centres about more complex clinical cases with the purpose of seeking consensus about the standard of management (Honeyboume et al. 2006: 52, 58; Tornvall & Wilhelmsson, 2008: 2118; Nucita et al. 2009: 1191; Orchard et al. 2009: 1186).

Internet communication makes it possible to share patient electronic medical records or documents from any health care entity to another; e.g. from a private physician's office to a clinic, to an acute care in-patient facility or other health facilities / organisations (Afilalo et al. 2003: 1-7), Healthcare Information Technology Standards Panel, 2009: 10-11; Orchard et al. 2009: 1186).

Internet communication can be used to provide health information to patients and their care givers in order to enhance the patients' ability to self-manage chronic conditions, and to enhance their ability to adhere to treatment, medication, and monitoring regimens (Agency for healthcare research and quality (AHRQ), 2008: 1-4). Internet communication can also enhance medical practice, opinions and activities between the patient and practitioner (Andrews et al. 2004: 11-18) by asking questions when no visit is necessary, setting up appointments, and discussing information received by patients via an email message.

2.3.3.2 The use of the computer to share information for the purpose of education

The computer can be used for sharing information that has educational purposes by email, and by Internet and intranet networks. The use of email and computer presentations can improve communication in and between the facilities. It includes the sharing of knowledge among nurses; and providing mentorship and guidance for the professional development of nursing students and other colleagues / health care team members (College and association of registered nurses of Alberta (CARNA), 2005: 18). A computer communication network, that is connecting primary health care practitioners from different areas in the country, can be used to establish an electronic journal club for users to share details from interesting and relevant articles in the wide range of medical journals, and for research purposes. It means that a nurse / practitioner can communicate with the relevant experts at a university to obtain advice about research and medical computing by using a computer communication network that is connecting primary health care practitioners with universities (Cenic et al. 2010: 4).

Internet communication can be used by other departments at a university, such as the Department of Statistics that is responsible for research support, teaching, and statistical consulting. It includes activities, such as collaboration with other disciplines in order to make available a wide range of opportunities to graduate students, to collaborate with individuals in different academic disciplines and to learn about the practical application of statistical principles from direct experience (Department of Statistics, 2009: 1).

2.3.4   The benefits of electronic communication

The use of electronic medical records or documents can prevent the unnecessary duplication of files and patient management while the patient exercises the right to seek health assistance

at different health institutions. The right to continuity and coordinated care (Cheevakasemsook et al. 2006: 366-367), could be ensured by the use of an electronic medical records in all the health care institutions, to care for the patients when they become ill; regardless of where they are being treated, since these institutions are able to access one another's electronic record systems while simultaneously ensuring patients' privacy (Afilalo et al. 2003: 1-7; Owen, 2005: 48). An electronic medical record can provide interactive patient access, and afford patients the opportunity to amend information before providing it to health providers wherever the information is needed; e.g. during a health assessment (Garets & Davis, 2006: 3).

Internet communication can be used to improve the quality of service by enhancing organisational learning, by encouraging members of staff to report safety risks; such as patient falls, rates of health care associated infections on computerised system-wide database. The system is designed for reporting all the identified risks at different health institutions and its use can trigger reviews of risks at other facilities. Subsequently, it may result in an improved reduction, over a period of time, in the rate of cross infection in the health care setting (Mc Carthy & Klein, 2011: 2-7).

2.4   Decision making and information technology

Decision making is a process of generating a complete set of alternatives, gathering the necessary information for understanding the possibilities and probabilities, applying reasoning skills and ultimately making a choice that best suits the values of the organisation. It implies a process: a set of steps and rules that provide an assurance of thoroughness and rigour. It is an assurance that the chosen process of decision making has been of acceptable standard (Tanck, 2008: 1-4; Brockman & Russell, 2009: 1-3). Decision making at public health institutions depends on the thoroughness and the accuracy of the information that is being assessed to arrive at a particular choice.

In this study, decision making in the PHC health care setting refers to the use of computerised information to make clinical and administrative decisions at different levels of management. These decisions include aspects, such as accountability of the decision makers (the nurses, doctors and the managers) to the client, the community and to higher levels of policy making. There are several requirements which needed to be introduced for the effective use of

information technology for decisions making purposes in the health care setting, such as a PHC.

Various aspects need to be considered when information technology is going to be used to support decision making. These aspects are a reliable information technology operating system, decision making and data interpretation, accountability in decision making, clinical decisions, and support systems.

2.4.1 A reliable information technology operating system for use in decision making

Decision making at public health institution depends on the availability of reliable information which is generated, analysed, and disseminated by information systems (Williamson et al. 2002: 4; Tomasi, Facchini, Thume, Maia & Osorio, 2009: 1-2). The needs for such information include a health information system software program (HISP); skilled staff to capture, validate and report data (distribute data vertically and horizontally); standard tools and structures for collecting, capturing, and disseminating of data; a minimum dataset; data collection tools; data validation rules and routine feedback.

It is critical to design information systems that will satisfy the needs of decision makers and that will create a culture that is providing incentives and accountability for evidence–based decision making; such as computerised statistics. An effective health information system – that requires an architecture that is defining the data elements, processes, and procedures for collection, collation, presentation, and use of information comprehensively in the health sector – is required for decision making by all the stakeholders (Jamison, Breman, Measham, Alleyne, Claeson, Evans, Jha, Mills & Musgrove, 2006: 35; Stansfield, Walsh, Prata & Evans, 2006: 1).

2.4.2 Decision making and data interpretation

Statistics are described as the development and application of methods to collect, analyse and interpret data (Department of Statistics, 2009: 1; American statistical association, 2012: 1). The application of computerised statistics in the health care setting, therefore, refers to the application of the computer to collect, analyse and interpret the data in the health care setting with the purpose of making decisions at the health institution and at a higher level. Decisions

that are made at different levels need to be based on the outcomes of interpreting and reporting about the results.

The statistics, such as the primary health care data, can be presented graphically to establish whether progress has been made in a certain area or not. Some statistics, such as immunisation coverage and family planning, are best graphed in cumulative graphs in order to show the progress towards an annual objective (Williamson et al. 2002: 2; South Africa, 2004b: 19-79; Tomasi et al. 2004: 867-872; Agency for healthcare research and quality (AHRQ), 2008: 3; South Africa, 2008b: 126). These computerised statistics, such as the data about the services provided by a health institution, can be used to guide managerial decision making, e.g. the tracking of the services, such as new tuberculosis patients, may indicate communities in particular need of intensive patient finding or control of a spreading disease. Reports about the performance of different health units can be produced by generating an electronic report of the data for any desired period and calculating the whole set of indicators, such as a head-count of patients younger than five years and patients who are five years old and older. The indicators can be used to identify gaps in meeting the set targets (Williamson et al. 2002: 2; Tomasi et al. 2004: 867-872). It is the responsibility and accountability of the health providers to provide appropriate and accurate information to all the stakeholders with the purpose of making decisions based on the sound evidence (Jamison et al. 2006: 35).

2.4.3   Accountability in decision making

Accountability is a concept in ethics and governance that is often used synonymously with concepts such as responsibility, answerability, blameworthiness, liability, and other terms associated with the expectation of account-giving. In leadership roles, accountability is the acknowledgment and assumption of responsibility for actions, products, decisions, and policies; including the administration, governance, and implementation within the scope of the role or employment position and encompassing the obligation to report on objectives and strategies explain and be answerable for resulting consequences or outcomes (Muller et al. 2007: 517).

2.4.3.1 Nursing accountability and professional responsibility in decision making

Nursing accountability refers to nurses who ought to be answerable for their practice:

- while they are acting in a manner consistent with their professional responsibilities and standards of practice; for example nurses are responsible to use the nursing process in the management of patient's needs and conditions. This responsibility depends on the availability of accurate information on the previous or current patient history. The use of an electronic information system to obtain such patient information could provide nurse's accountability for evidenced decision making (Tomasi et al. 2004: 867-872; Agency for healthcare research and quality (AHRQ), 2008: 3);

- In order to respect and practise according to the values and responsibilities stipulated in codes of conduct; and in keeping with the professional standards, laws and regulations that are supporting ethical practice (Jooste, 2007: 90, 345); for example nurses could be held accountable if they failed to follow any established information sharing protocols such as misuse of computer access code as it is a professional misconduct (Nursing and Midwifery Council, 2010: 1-7).

In clinical, administrative, research or educational practice, nurses have professional responsibilities and accountability towards safe-guarding the quality of nursing care that persons are receiving; hence they need to promote health policies and decision-making procedures that are consistent with current knowledge and practice (College and association of registered nurses of Alberta (CARNA), 2005: 18; Cheevakasemsook et al. 2006: 366- 367), and that are based on reliable health information technology systems, including the use of information technology in the health care setting.

2.4.3.2 Nurses' accountability in the use of computer information to make medico-legal decisions

A computer can be used to fully support the nurses' responsibilities and accountability of maintaining complete, accurate and informative records; since it is the moral and legal requirements for proper documentation of patient care (Cheevakasemsook et al. 2006: 366-367; Mosby's Medical Dictionary, 2009: 1). The proper documentation of patients care needs to include subjective and objective data that are being gathered for the purpose of planning nursing care, capturing progress notes (Jooste, 2010: 249), and complementing clinical decisions and support systems during the care of the patient. Accountability of nurses includes keeping accurate records of the patient for providing evidence that will make legal protection possible. It often results in writing patient information several times in different places in an attempt to avoid the complete loss of information due to a single misplaced source. However,

such a cumbersome manual recording system is increasing the volume of documentation and is consuming an unnecessary amount of time. Electronic nursing documentation can provide legal protection without duplicating or loosing documentation, while also saving time. It can also support easy retrieval by the nurse manager for auditing purposes, quality control, and risk management. The results of these audits can be disseminated with the aim of enhancing evidence-based nursing (Owen, 2005: 48-49; Garets & Davis, 2006: 3).

2.4.3.2 Nurse Manager's accountability to the public and political structure

Accountability of local political structures can be strengthened by educating board members about safety and quality improvement strategies (Mc Carthy & Klein, 2011: 5), e.g. a website that focuses on managing patients' complaints. It can also be enhanced by monitoring the business plans by referencing health service indicators that enable the health managers to account for services provided by the health institutions in order to realise the political health mandate. The success of efforts to reduce poverty and health inequity depends on the existence of information systems to detect those problems, to facilitate the design of solutions, and to track progress that aim at eliminating the problems. The use of the computer for detecting and monitoring the nutritional needs of the patients is realising one of the government strategies to combat poverty, e.g. identifying under-weight children, and offering food supplements (food-schemes) to needy children or to children from poor families (Stansfield et al. 2006: 1018; Agency for healthcare research and quality (AHRQ), 2008: 3; South Africa, 2008b: 126).

A computer can be used to provide appropriate and accurate health information to the public. This information is required for use by citizens to demand effective policies and services, and to hold governments accountable for the allocation and use of resources in the health sector (Stansfield et al. 2006: 1017). The information is obtainable from the health programmes that are being provided by the health facilities. Health managers are responsible and accountable to ensure that both the citizens and the government receive the information about the activities, outcomes and challenges in order to make decisions that are based on sound evidence (Jamison et al. 2006: 35).

2.4.3.3 Nurse manager's accountability to inform the decision makers at higher level

The computer can be used for monitoring the health programmes at institutions and at district level. In fulfilment of their obligations, the health managers are required to periodically disclose appropriate information about health programmes in adequate detail and consistent format to all contractually involved parties, such as the decision makers (Mosby's Dental Dictionary, 2008: 1). Such periodic monitoring includes calculating indicators, e.g. immunisation coverage [calculating the number of children who were fully immunised as opposed to the number of first (six weeks) immunisations], and nurse-patient ratios. The information can be used for planning the health services at higher levels, e.g. the motivation of posts where staff shortages are experienced. The calculation of the nurse-patient ratio may indicate the extent of staff shortage at health care clinics, and it can also establish the shortage of nurses countrywide. Therefore, it can meaningfully inform decision making at higher levels about the number of students to be trained by universities and nursing colleges. The information that has been provided to higher management levels can also be used for resource allocation, such as budget allocation to every district, sub-district and institution (Tomasi et al. 2004: 867-868; Agency for healthcare research and quality (AHRQ), 2008: 3).

2.4.4   Clinical decisions and support systems

Making decisions in clinical practice involve a careful analysis of harms and benefits associated with different treatment options. It is, therefore, essential to use the best possible available methods for making appropriate decisions in specific clinical situations, i.e. conducting a decision analysis. A decision analysis is a tool that allows users to apply evidence-based medicine to make informed and objective clinical decisions when they are faced with complex situations. Evidence-based medicine (EBM) refers to the incorporation of critically appraised scientific evidence into clinical practice. It is the support system which allows the clinician to integrate both clinical expertise and the best available evidence in the literature into patient care. It can also be used by the patients, insurers and even government policy-makers. A computerised clinical decision, therefore, refers to the use of established methods of treatment, such as conducting a decision analysis, protocols and policies in the computer to make properly informed decisions about the management of different conditions in patient care (Aleem, Schemitsch & Hanson, 2008: 137-139; http://www.authorstream.com).

2.4.5   Use of the computer information to make clinical decisions

A decision analysis can be used in a specific decision making process, i.e. the clinicians will compare how closely their particular clinical situation resembles the decision analysis. Consequentially, the results will support an informed decision process with regard to the specific clinical circumstances. A decision analysis can be applied to a number of scenarios of health policies; including the management of ventricular septal defects, screening for prostate cancer and the treatment of early osteoarthritis of the wrist (Aleem et al. 2008: 139).

The decisions about the management of patients in a health care setting include the nursing process. It implies that nursing assessment, diagnosis, plan of treatment and care (Cheevakasemsook et al. 2006: 366- 367; Jooste, 2010: 156) can be improved by using the guidelines and protocols in the computer. Guidelines, such as WHO staging of HIV disease progression of infected patients, can be used to assess and stage the disease in order to plan the most appropriate managerial regimen. The standardised therapeutic plans for patient management; such as regimens and decision support systems for hypertension, diabetes mellitus, asthma, cardiac conditions, AIDS-related diseases, chronic obstructive pulmonary disease, and anticoagulant therapy; can be implemented for the management of different conditions during patient care. The implementation of the patient management plan includes electronic management algorithms and drug dosages. The database of the National Pharmaceutical Association refers to a system that is used by pharmacies to ensure accurate dispensing, while offering decision-support capabilities, such as drug-to-drug interaction and warnings concerning pregnant patients (Tomasi et al. 2004: 867-872;   Chaudhry et al. 2006: 14;   Honeyboume et al. 2006: 52, 58; Mannan et al. 2006: 125; Langley & Beasley, 2007: 19; Jooste, 2010: 156-157; Protti & Johansen, 2010: 4-6).

Computer technology can be used as a system that provides timely, accurate, and relevant information to decision makers. It can provide all citizens with the appropriate health information that is required to choose interventions that will be supporting healthy behaviour (Stansfield et al. 2006: 1017). A decision analysis can be usefully applied in clinical decisions when there is uncertainty about an appropriate clinical strategy. Therefore, it can prevent risks and harm related to improper choice of patient treatment (Aleem et al. 2008: 137).

Table 2.1: Concepts in the literature and the items in the questionnaire

Point	Main topic	Sub topic	Items number
2.1	Record keeping	Sources of information	1 – 8
		Resources needed for record keeping using the computer	15, 16
		Electronic recording of information on the computer	1, 2, 3
		The everyday use of electronic medical records to support patient care: reading and writing patients' information	1 – 8
		The everyday use of electronic medical records: Electronic medication prescribing	3, 4
		The use of electronic medical records: Monitoring and tracking activities	4, 5, 6, 19
		The use of electronic medical records: Access / retrieval of information	2, 7, 8, 14 - 16
		The use of electronic medical records: Screening for health conditions	1, 2
		Statistics and the use of computer for record keeping	21, 22
		Human and financial resources management and the use of computer	17, 18, 19, 20
		Benefits of the use of computer for record keeping	3, 4,
2.2	Communication and information sharing by using computer technology	Needs for communication	Section A: 8, 9, 11
		Using an electronic medical records for communication	23, 26, 27, 28
		Sharing of information and the use of the computer	29, 32, 33, 34
		The use of the computer to share information for the purpose of patient care	24, 25
		The use of the computer to share information for the purpose of education	30, 31, 35
		The benefits of electronic communication	27, 35
2.3	Decision making based on the use of computer technology	A reliable information technology operating system for use in decision making	39, 40
		Decision making and data interpretation	38, 39, 40, 41, 42
		Accountability in the computer	44 – 46
		Clinical decisions and support systems	47, 48
		Use of the computer information to make clinical decisions	36, 37, 38, 43, 49, 50, 51

2.5 Conclusion

Literature review on record keeping of information in the computer, communication and information sharing in relation to computer information technology and decision making based on computer information technology was conducted. Table 2.1 illustrates the relation between the literature and the items in the questionnaire.

The literature review indicates that incorporating information technology in healthcare services can pursue greater cost-effectiveness, can clearly deliver good value for money and better patient outcomes in the primary health care environment.

Reforming (primary) health care by means of the systemic implementation of information technology starts with electronic record keeping. Electronic medical records are crucial to the success of local, regional, and national goals to: improve patient safety; improve the quality and efficiency of patient care; and reduce healthcare delivery costs (Garets & Davis, 2006: 4). The medical records are applied to capture information about all the services at health institutions; to communicate and share information inside and between institutions; and to help in decision making at all levels of health service delivery. These levels of service delivery include the patient's home, community, (primary) health facility, and regional and national departments with the aim of achieving the governmental and national objectives of improving health care and public well-being (Locatis, 2009: 1-3).

In Chapter 3 the research methodology is described.

CHAPTER 3:
RESEARCH METHODOLOGY

3.1   Introduction

The methodology of a study should be systematic (Goddard & Melville, 2006: 1) and diligent, which meant that the researcher should develop a plan, organise and persist in an orderly manner according to a predetermined framework. In this study, the researcher endeavoured to minimise the likelihood of results being influenced by errors in the methodology or by her expectations (Burns & Grove, 2005: 2). This research methodology was a process. It implied that there was a purpose namely:

- to explore and describe the perceptions of nurses about the use of computer information technology at primary health clinics with the purpose of describing recommended actions to nurse managers about the application of computer information technology in nursing.

The purpose gave the direction to the process, and it was consistently applied in the methodology (Douglas, 2009: 1-5). A research process was a systemic way of applying a scientific method in an orderly and logical manner (De Vos et al. 2005: 71). Furthermore, it required the research findings and the method used to acquire these findings to be disclosed to members of the research community. This chapter addressed the research design which was quantitative, exploratory and descriptive in nature, and described in detail the research process that was followed in this study in relation to the population and sampling, data collection, data analysis, validity and reliability.

3.2   Research design

A research design is the plan, recipe or blueprint for the investigation. As a result, it provides the guidelines that described how to select a data collection method that are the most appropriate to achieve the goal and to suit the selected design (De Vos et al. 2005: 159). In this study; a quantitative, exploratory and descriptive design was selected since it was the most appropriate to the goal of the research; namely the investigation of the participants' perceptions about the use of information technology at PHC clinics. Quantitative design is a scientific method, which means that it is a formal, objective, systematic process which

requires the use of numerical data to obtain information about the research phenomenon (Burns & Grove, 2005: 23). A researcher maintains a distance by not directly interacting with the participants with the purpose of maintaining objectivity (Neill, 2007: 1; Gray, 2009: 338-339) rather than subjectivity like in a qualitative design. A qualitative design expects the researcher to interact with the participants in order to describe lived experiences that are giving meaning to a research phenomenon. In this study, the research about the phenomenon (the use of information technology at a PHC) was described in a quantitative paradigm, and did not explore the understanding of experiences of the participants in relation to information technology, like it would have been included in a qualitative design. A qualitative design would have focussed on the understanding and interpretation of the meaning of "the use of computers" in the real life situation (Heppner, Wampold & Kivligham, 2008: 258-9).

The knowledge that developed from a quantitative design would be based on the measuring of phenomena (Cresswel, 2009: 5), which was the perceptions of nurses about the use of computer information technology. Quantitative research involves the gathering of data that is absolute, such as statistics. As far as possible, it allows data to be examined in an unbiased manner (Mc Guigan, 2010: 1-4). In this study, both the profiles of the participants – PHC nurses (demographic data) – as well as the perceptions of these participants in respect of the use of information technology at primary health care clinics in the east of Ekurhuleni were collected by using a self-administered, structured questionnaire. For the purpose of statistical analysis, the responses to the questionnaire were supplied in numerical format (Burns & Grove, 2005: 233).

An exploratory design aims at exploring the dimensions of a specific phenomenon, i.e. the manner in which the phenomenon manifests (Research, 2007: 2). In this study, it aimed at exploring the perceptions of nurses about the use of information technology at primary health care clinics. It provided insights into and comprehension of an issue or situation. In this study, it referred to the insights or comprehension in relation to the use of computer information technology in PHC clinics. Exploratory design methods refer to highly structured, statistical analyses of the perceptions of the participants about the use of information technology (Burns & Grove, 2005: 356-357). Exploratory designs were conducted to gather a large body of knowledge or to increase knowledge about the field of the study (Burns & Grove, 2005: 356-357); such as information technology in the field of nursing management in primary health care settings. Information from this study led to describing recommendations in respect of the

use of information technology at primary health care clinics in the east of Ekurhuleni (Burns & Grove, 2005: 357; Zikmund & Babin, 2009: 88).

A descriptive study design is followed for providing more information about characteristics within a particular field of study (Burns & Grove, 2005: 26, 232; Hopkins, 2008: 2). This study was designed to describe the perceptions of nurses about the use of information technology at primary health care clinics. The purpose of a descriptive design was to identify problems with the current practice (Burns & Grove, 2005: 232). In this study, the existing perceptions about the use of computer information technology at primary health care clinics were determined in order to describe the recommendations of the actions to be taken by the nurse manager about computer information technology. The researcher was informed by previous empirical literature and existing theories (Heppner et al. 2008: 372). To this end, the researcher had conducted a literature review at the beginning of study.

3.3   Population and sample

3.3.1   Population

Target population: It refers the entire set of participants who meet the sampling criteria (Burns & Grove, 2005: 342), and whose responses will enable the researcher to extract generalisations (Gray, 2009: 219). In this study, it referred to all professional nurses who were working at the PHC clinics in South Africa. Often, it is impossible to study an entire population (Goddard & Melville, 2006: 34). Therefore, an accessible population (Cresswel, 2007: 148) was used. It refers to the portion of the target population that the researcher can reasonably access and that can be realistically selected (Ouyang, 2010: 3). In this study, it included all professional nurses who were working at district primary health care clinics in the Eastern region of Ekurhuleni (n = 150). The Ekurhuleni district health clinics comprised 5 facilities: 3 community health centres and 2 primary health care clinics. Table 3.1 indicates the type of services provided by community health care centres that could put information technology to good use.

Table 3.1: The type of services rendered in the clinics

Area	Type of services
Child health	• Expanded programme of immunisation (EPI), growth monitoring, integrated management of childhood illnesses (IMCI); and • School health services.
Women's health	• Family planning; • Cervical and breast cancer screening; • Choice about termination of pregnancy (CTOP) and; and • Sterilisation.
Reproductive health	• Antenatal Care (ANC); • Peri-Partum Care (Labour); and • Post Natal Care (PNC).
Curative health care services	• Treatment of minor ailments and communicable and non-communicable diseases, e.g. TB and STIs; and • Management of chronic diseases which included hypertension, diabetes mellitus, asthma and epilepsy.
Comprehensive care, treatment and management of HIV / AIDS related illnesses (CCMT).	• Provider initiated counselling and testing for HIV (PICT); • Prevention of mother-to-child infection of HIV (PMTCT); • HIV wellness clinic and management of opportunistic infections; • Initiation of patients who were taking ARVs (antiretroviral treatment); • Monitoring of toxicity, drug effectiveness and treatment failure; and • Treatment adherence counselling.
Rehabilitation	• Occupational health services; • Speech and audiology services; • Physiotherapy services; and • Social and psychological health services.
Medico legal services	• Management of sexual assaults; • Drinking and driving case management; and • Physical assaults and management.
Radiology	• X ray; and • Sonar.
Dental health services	• Tooth extractions; • Dentures; and • Dental care.
Mental health services	• Management of psychiatric patients.

The other 2 clinics and local municipality clinics were referring patients to the community health care centres for radiology; rehabilitation; and other women health services like CTOP and sterilisation, initiation of antiretroviral treatment and labour. All the clinics; including the community health centres; referred the patients for secondary level of management to two hospitals in the east of Ekurhuleni which, in turn, use two hospital in Gauteng for referral of patients in need of tertiary level of management.

3.3.2 Sample

Sampling describes the list of essential characteristics for membership of or eligibility for the target population (De Vos et al. 2005: 82; Hopkins, 2008: 1-3). The sampling method that was used in this study is called probability sampling. Probability sampling refers to the fact that all the members of the population have an equal probability of being selected, with the intent that the selected sample would adequately represent the population. Probability sampling results in less bias during sample selection and was mostly used during quantitative research (Burns & Grove, 2005: 346). In this study, the researcher selected a sample of participants who were representative of the population, and the accessible population served as the sample (n = 150). A list of names of nurses per clinic (sample frame) (Burns & Grove, 2005: 346, 347; Rubin & Babbie, 2008: 362) - that included unit managers, project managers, chief professional nurses, senior professional nurses, professional nurses and community service professional nurses who were working at 5 district health clinics in the eastern part of Ekurhuleni - was obtained from the human resource department. The list was used to check whether everyone was included in the study. Table 3.2 illustrates the sample size and response rate of participants per clinic.

Table 3.2: Distribution of questionnaires and feedback per clinic

Clinic	Accessible population (n)	Questionnaire distribution (n)	Feedback (n)
A	42	42	37
B	32	32	25
C	29	29	26
D	23	23	19
E	24	24	21
TOTAL	150	150	128

3.4 Data collection

3.4.1 Data collection method

Data collection refers a precise and systemic gathering of information that is relevant to the research design and measurements methods (Burns & Grove, 2005: 430). A survey (data collection method) was used to gather data. A survey is a system for collecting quantitative information in the form of numerical data with the aim of describing or explaining knowledge of the research phenomenon (De Vos et al. 2005: 137). Surveys are mostly conducted by using a questionnaire, which provides the data in the same format for all the participants (Rubin & Babbie, 2008: 383). In this study, data were collected by using the same format of a self-administered questionnaire for all participants. A survey was the best method for collecting data in respect of a population which was too large to observe directly (Gray, 2009: 218). In this study, a significant amount of data (the total number of questions in Section 1 and 2 of the questionnaire was 64) were collected from a sizeable ($n = 128$; total number of responses) population. A survey was used to measure the variables which were believed to be constant and enduring, e.g. the study of perceptions (Haslam & Mc Garty, 2003: 102-104). The collected data, about the detailed description of the existing variables, were analysed and information was gathered (Zikmund & Babin, 2009: 88) to assess and justify the current situation and practices; and to make recommendations for improving practices (Burns & Grove, 2005: 232). In this study, recommendations about the use of computer information technology in primary health care were described.

3.4.2 Data collection instrument

A questionnaire was used as the data collection instrument: a printed self-report format was designed to elicit information by obtaining written responses from the participants (Goddard & Melville, 2006: 42). This questionnaire was developed by the researcher on the basis of and after a literature search had been conducted (De Vos et al. 2005: 82; Heppner et al. 2008: 66). The essential content that needed to be covered by the questionnaire was identified by means of a literature study; that had investigated the main concepts of the study, i.e. the use of computer information technology at the primary health clinics; and the development of the questionnaire was based on the essential concepts, i.e. record keeping, communication and information sharing, and decision making by making use of computer information technology (Burns & Grove, 2005: 399).

The questionnaire had 2 sections. Section 1 required demographic and biographical data that were presented in either a nominal scale (characteristics of an object was categorised by assigning names to it, e.g. male or female) or ordinal scale (objects were classified in a number of categories that could not be measured, e.g. level of education / qualifications (De Vos et al. 2005: 164). The options of each respective scale had blocks next to them and participants were required to indicate the most appropriate block by marking it with an (X). The researcher endeavoured to provide all of the possible responses that were applicable to the study. However, in order to ensure the exhaustive response category, she added category labelled "other (please specify _____)" (Rubin & Babbie, 2008: 216).

Questions of Section 2 of the questionnaire were formulated according to the 3 topics which were the essential concepts in the blueprint. Each topic had sub-headings and each sub-heading represented several items. Items in Section 2 of the questionnaire were presented on a likert scale (seven point scale), which varied between two extreme opposite concepts, namely "strongly disagree" to "strongly agree" (De Vos et al. 2005: 181; Rubin & Babbie, 2008: 215). One number on the scale; that best described the participant's perception; had to be selected by indicating with an X as shown below:

Disagree				Agree		
1	2	X̶3̶	4	5	6	7

Section 2 of the questionnaire contained two types of questions: close-ended questions and open-ended questions (Burns & Grove, 2005: 400; Creswell, 2009: 15). Close-ended questions were used in the first part of the questionnaire and were clearly expressed below headings or sub-headings.

Two open-ended questions were placed at the end of section 2 of the questionnaire that allowed participants to explain; in their own words (Goddard & Melville, 2006: 47); what they were using the computer for in the workplace, and to express their opinion about making the use of the computer easier. The response set of these questions were open and flexible and included enough space for a participant to write down her / his response (Rubin & Babbie, 2008: 216).

Every section and heading had clear instructions about how responses to the questions ought to be indicated (Goddard & Melville, 2006: 48). Instructions and questions were written in plain English and were edited to eliminate ambiguous or vague meaning of language. The questionnaire was scrutinised by the researcher, supervisors and 5 experts in the field of nursing management to assess whether it had contained any leading questions, double questions and questions that could have influenced the responses of the participants.

3.4.3   Pre-testing of the instrument

The questionnaire was viewed on a small scale (n = 5) before the main study in an attempt to bring possible deficiencies in the questionnaire to the fore timeously (Burns & Grove, 2005: 400; De Vos et al. 2005: 82, 171; Rubin & Babbie, 2008: 226; Gray, 2009: 227). The population in the pre-testing phase had similar characteristics than the accessible research population. The questionnaire that was used for the major study was handed out to all (n = 5) participants. The results of the pre-testing of the instrument assisted with identifying those items in the questionnaire which were not providing useful information about the topic and minor editorial corrections were made to some items.

3.4.4   Questionnaire administration

Written permission to conduct the study was obtained from the Ekurhuleni District Research Committee. Subsequently, the committee informed the clinic managers of the intended study (Jooste, 2010: 278). The managers of the clinics were visited by appointment to arrange a suitable time for administering the questionnaire at the clinic. The researcher kept to the appointment with each clinic at the time that had been agreed upon by the manager of the specific clinic without inconveniencing the services at the clinic. Clinics that were providing 24-hour service were visited more than once to reach all participants and to maximise the return rate of questionnaires (Haslam & Mc Garty, 2003: 113; Goddard & Melville, 2006: 48).

A covering letter included the purpose of the study, the name of the researcher, institutions supporting the study, the approximate amount of time required to complete the questionnaire (30 minutes), the assurance of confidentiality and confirmation that participants could withdraw from the study at any time (Burns & Grove, 2005: 400; De Vos et al. 2005: 170**;**

Rubin & Babbie, 2008: 385; Jooste, 2010: 279). The covering letter also contained the instructions that explained the process after the questionnaires had been completed. Participants who agreed to participate in the study were requested to sign a written informed consent form.

A self-administered structured questionnaire for completion (De Vos et al. 2005: 168; Neill, 2007: 1-2; Rubin & Babbie, 2008: 384) were provided to the participants at each clinic. On completion, participants were expected to place the answered or non-answered questionnaires in the provided envelopes after they had sealed the envelopes. The envelopes were then handed to the managers of the clinics who handed the returned envelopes to the researcher during the subsequent visit that arranged by mutual appointment between the managers and the researcher.

The data were gathered during July 2011.

3.5   Data analysis

Collected data were captured and analysed by using the statistical package for the social sciences (SPSS) Version 20 analysis software. The SPSS software package had already been programmed to electronically execute mathematical processes (Burns & Grove, 2005: 461). A statistician of the University of Johannesburg was consulted to assist with the analysis of statistics about the perceptions of nurses in relation to the use of computer information technology at primary health care clinics. Statistics were the most powerful tool for reducing, summarising, organising, manipulating, evaluating, interpreting and communicating quantitative data (Haslam & Mc Garty, 2003: 130; Heppner, 2008: 70). In the absence of statistics, quantitative data would simply be a chaotic mass of numbers. In this study, data were analysed by using descriptive statistics.

3.5.1   Descriptive statistics

Descriptive statistics; i.e. frequency distributions (*f*), percentage distributions (%), calculating central tendencies / means ($\bar{x}$) and standard deviations (SD); were used for describing and summarising data meaningfully. Table 3.3 illustrated an example of the manner in which the descriptive statistics were presented. These statistics converted and condensed a collection of

data in a variety of ways to an organised, visual representation or picture with the purpose of giving meaning and facilitating insight to examine the research phenomenon from different angles. In this study, angles referred to perceptions (Burns & Grove, 2005: 461; Babbie, 2009: 435).

Table 3.3: Presentation of descriptive statistics

Heading	Item No	Items about record keeping using computer	Frequency (f) or the total number of responses (n) and the percentage (%) distribution								$\bar{x}$	SD
			Responses ranged from 1 = strongly disagree to 7 = strongly agree									
			1 n %	2 n %	3 n %	4 n %	5 n %	6 n %	7 n %	Total n %		
Staffing	16	Have a backup system, which allows a nurse to call a computer expert for support when needed.	3 2.4	0 0	1 0.8	6 4.7	9 7.1	16 12.6	92 72.4	127 100.0	6.42	1.218

Frequency distributions (*f*) were used to check for errors in coding and computer programming and had been the first strategy which might be applied for organising data. These distributions represented a method of tallying to indicate how often certain scores occurred. Percentage distribution (%) implied that all variables were listed and counted each time they had occurred. The percentage distribution was used to analyse the data with the purpose of interpreting the findings (Burns & Grove, 2005: 461-462). The measuring of central tendencies (the most concise statement of the location of the data, often referred to as an average); i.e. the means ($\bar{x}$) and standard deviations (SD); were used to describe and to summarise data. The mean ($\bar{x}$) was the sum of the scores divided by the number of scores being added and was the most commonly used measurement of central tendency for an approximately normal distributed population. The standard deviation (SD) was a measurement of dispersion which represented the square root of the variance and provided a measurement of the average deviation of a score from the mean in a particular sample (Burns & Grove, 2005: 463, 465).

3.6   Ethical considerations

In the light of ethical considerations that were increasingly becoming important, some aspects needed to be highlighted. Ethical standards and principles for research projects were adhered to during the research. The planning and implementation of this research project was compiled while taking into account all the principles and standards that had been described by Jooste (2010: 277-281):

- **Permission to conduct a research project:** A research proposal, accompanied by a covering letter had been submitted to the Academic Ethics Committee at the University of Johannesburg for approval and the allocation of clearance number (No HDC54/O2-2010) which would be cited when the research findings were published. Copies of the proposal and the letter for permission to undertake the study at the district health clinics had been submitted to the Ekurhuleni District Research Committee. Both committees granted the permission to conduct the study. The intent of conducting a study had been communicated telephonically to the managers of the institutions where the study were going to be conducted, and a copy of permission to conduct the study was supplied to managers on the delivery date of the questionnaires at the clinic.

- **Informed consent**: Written informed consent was obtained from the participants before data collection had taken place. Participants were requested to sign the consent forms

after they had read and understood the information letters which were informing them about the study, the purpose of the study, duration of answering questionnaire, the benefits and risks of the study and the measures taken to ensure confidentiality. Participants were also informed that participation in the study was voluntary and that there would be no negative consequences if they chose not to complete the questionnaires. Participants were requested to place consent forms; whether signed or not; inside the envelopes which were provided to every clinic. Information letters and consent forms were written in English, since all professional nurses understood English.

- **The right to freedom of choice and withdrawal**: Written informed consent was obtained before questionnaires were completed. Participants were not cajoled in any way to participate in the research and were permitted to withdraw at any time without fear of discrimination, exposure or embarrassment. They were made aware by means of information letters that they could withdraw their consent at any stage of the project and no adverse consequences would arise from their withdrawal.

- **Protecting the research participants and honouring trust**: Participants were given an information letter which informed them about the study and the duration about answering the questionnaire, which should not have exceeded 30 minutes.

- **The right to privacy:** The privacy of the participants was ensured at all times during the research proceedings. Consent forms; whether signed or not; were inserted in a separate envelope from of the one used for the questionnaire to ensure that these two documents could not be associated with each other. Invasion of privacy was prevented by making sure that no identifying information would be required during the formulation of questionnaires. The method of data collection was a self-administered structured questionnaire which was scrutinised by the researcher and research expert from a university to protect the privacy of the participants. Gathered data would be kept under lock and key for 2 years after the results had been published. Thereafter, it would be destroyed.

- **The participants' right to confidentiality and anonymity** was ensured by making it impossible to link specific data to either a particular institution or person. Participants were assured of anonymity by not having their personal details published. The researcher report was written in such a way that neither individuals nor groups would be identified by their responses. Any personal details that might have identified individuals were omitted from the study and each instrument was given an identifying number for

control purposes. The completed questionnaires did not reveal the name of either an institution or participants since it was completed anonymously. After completion it had been inserted in a sealed envelope before it was handed back to the researcher.

- **The right to justice and equality**: Total sampling was used to ensure a fair selection of participants. Total sampling gave everyone in the accessible population an equal chance of participating in the research. Contact details of the researcher were provided in the event that her support during the study was needed.

- **Access to information and communication**: Sufficient information was supplied to the participants in an information letter which indicated the purpose of the study, the study procedure, expected duration of the study and the goal of the study. Participants were alerted to the fact that the gathered data would only be shared with the relevant researchers or supervisors who were consulted during the study and other relevant persons who were assisting with the analysis of data and the compilation of the research findings.

- **The rights of the community and the research community**: The researcher maintained the highest standards of research planning, implementation and reporting; was committed to honest, unbiased and neutral research; made the constraints of the study known; did not participate in any unethical manipulation of the gathered research data; made use of acceptable, scientific methods and procedures during the research process; did not engage in plagiarism; and acknowledged contributions from other researchers.

- **Respect for person**: Informed written consent was obtained from the participants who voluntarily had agreed to participate in the study.

- **Prevention from harm**: The principle of non-maleficence was ensured. The study did not present any anticipated risks. Participants were made aware of the research project in an information letter. Data collection took place at a time that was convenient to the participants, e.g. during lunch time. The duration of answering the questionnaire was estimated at 30 minutes. The research proposal had been submitted to the University of Johannesburg Ethics Committee for evaluation and was approved. The Ekurhuleni Research Committee also had granted permission to the researcher for conducting a study.

- **Beneficence** (benefit to the research participants): The study might not directly benefit the participants but would be of benefit to the district health clinics. The newly gained

knowledge stimulated the description of actions to nurse managers and recommendations for health care practice. The research finding might lead to improved health care delivery.

- **Participants' rights with regard to data and publications**: Research results would be supplied to participants on request once the study had been completed.

3.7   Validity and reliability

Instrument validity and reliability represent the heart of competent and effective study. The applied instrument should actually measure what it purports to measure (Thanasegaran, 2005: 1). In order to ensure the validity and reliability of the study, the researcher was maintaining a distance by not interacting with the participants. At the same time, objectivity was being maintained (Neill, 2007: 1-2). Objectivity was an integral part of research to ensure that the researcher's personal biases and preferences did not influence the interpretation of the findings (Mc Guigan, 2010: 1-4). The questionnaire used in this study was both structured and standardised from one respondent to the next. Therefore, different interpretations and changes in emphasis were eliminated.

3.7.1   Validity

Validity determines whether the research truly measures what it is intending to measure without accidentally including other factors or how truthful the research results are (Bashir, Afzal & Azeem, 2008: 3; Thanasegaran, 2005: 3).

Face validity means that an instrument appears to measure what is intended to be measured as determined by the researcher and the experts who have been consulted (Rubin & Babbie, 2008: 198; Validity in Research Design, 2009: 2). The questionnaire was checked by the researcher, supervisors and five experts in nursing management for face validity. It appeared to measure what it was intending to measure, because it covered the three main aspects of the use of computer information technology, i.e. record keeping, communication and decision making. Every aspect in the questionnaire had several sub-headings, e.g. accessing information from a computer; and items below each sub-heading, e.g. electronic prescription, which were further describing the use of computer information technology in a PHC setting. Other experts (University Higher Degree Research Committee and Ekurhuleni Research

Committee) evaluated whether the questionnaire; that they were supplied with; would be measuring what it intended to measure, approved the proposal and gave permission for conducting the study.

Content validity refers to the degree to which an instrument comprehensively includes the range of meanings inherent to the concept. It is established on the basis of the judgments of the researcher and experts whether the instrument encompasses the universe of facets that make up the research concepts (Rubin & Babbie 2008: 200; Gray, 2009: 157-158). Content validity of the study informs the researcher how survey items represent their content domain, how clear they are, and the extent to which they maintain the theoretical structure (Validity in Research Design, 2009: 2).

The three main aspects covered in the questionnaire were described after a thorough review of empirical literature (Burns & Grove, 2005: 232); i.e. the application of computers at the primary health care clinics with a particular focus on the electronic recording, storage and retrieval (record keeping) of information, communication and information sharing, and the use of information from the computer to make clinical and administrative decisions. A literature review about these three main aspects was conducted. The sub-headings and questions of this study emerged as a result of the review.

To ensure validity of the study, the principles of Botes (1995: 188-196) and those taken from the internet source (Validity in Research Design, 2009: 1-5) were followed:

Internal validity: It relates to the standards of truth value and the neutrality of the research. It refers to the degree of trust that can be introduced by the findings and the methods that are used to generate those findings. These methods include data collection; data analysis and interpretation; choice of population; the method of sampling; and the size of the sample. Objectivity was ensured by using structured self-administered questionnaires during data collection. i.e. data were collected and analysed in an impartial and unreduced manner.

Measures which were taken to ensure internal validity during data collection:
- Pretesting of the instrument was conducted to determine its validity (Gray, 2009: 227). Measures taken during data analysis and interpretation:
- Appropriate method of data analysis was used; this was a statistical package of the

social sciences (SPSS) Version 20 program.

- Ethical standards were adhered to during data collection e.g. allowing the participant to withdraw from the study at any stage.
- Accuracy was maintained during data analysis.
- Interpretation was supported with true and relevant data.

Measures taken during choice of population and sampling:

- Sample representative was ensured by total sampling of the participants.

External validity: It refers to the generalisation of the findings from the sample to the population. Representativeness of the sample is the central measure to external validity.

The measure which was taken to ensure external validity was:

- a total sampling method to validate the generalisation of the findings to the accessible population. The representativeness of the sample determined whether the findings could later be generalised to the target population.

Measurement validity: It refers to a numerical value that is associated with the corresponding data in the measuring instrument.

Reliability: Reliability in research refers to the accuracy or precision of an instrument, which is the process that the researcher is using to familiarise her with the concept to be studied, to arrange the information in the questionnaire in the format of numbers that can be quantified and summarised, to use an acceptable mathematical process for analysing the numeric data and to express the final results in terms of statistical terminology (Bashir et al. 2008: 1-11). Therefore, the reliability of a questionnaire refers to the consistency (Kerfting, 1991: 158; Rubin & Babbie, 2008: 194-197) with which participants understand, interpret and respond to all the questions contained in the questionnaire. In this study, reliability referred to the degree of accuracy with which the instrument was capable of measuring the phenomenon (Cresswel, 2009: 5), i.e. the perceptions in relation to the use of computer information technology at PHC clinics.

3.8   Conclusion

A quantitative design was followed in order to explore and describe the perceptions of nurses about the use of computer information technology in primary health care in the eastern part of Ekurhuleni with the aim of describing the recommendations about the actions to be taken by the nurse manager in connection with the use of computer information technology (CIT). A pre-test of the instrument was conducted in order to determine the feasibility of the questionnaire. The total number of participants served as the sample (n = 150). The self-administered questionnaire was completed by the participants. Descriptive data analysis followed. The principle of validity and reliability were taken into consideration during the research processes, while the researcher was also adhering to ethical principles. The findings of the research were used to attain the second objective of the study.

CHAPTER 4
RESEARCH FINDINGS

4.1   Introduction

In order to answer the research questions, a researcher needs to analyse the data in an orderly and coherent fashion (Polit & Beck, 2010: 76). The research design was quantitative in nature; hence a statistical analysis with the assistance of a statistician of the University of Johannesburg was conducted.

The first research objective was to:

- explore and describe the perceptions of nurses about the use of computer information technology at primary health care clinics.

A self-administered, structured questionnaire was distributed to 150 (100.0%) professional nurses working at PHC clinics in the eastern part of Ekurhuleni and 128 (85.3%) were returned.

For purposes of this study, the research results are discussed according to the sequence of the headings in the questionnaire:

Section A

- Background of the participants

Section B

- Record keeping in computer information technology;
- Communication in computer information technology;
- Decision making based on computer information technology.

The results of the responses to the questionnaire are discussed as follows:

- Descriptive statistics (n = 128): The results are presented in the format of frequencies (f), mean values ($\bar{x}$) and standard deviations (SD) for the purpose of interpreting the responses of the participants (n = 128).

- The responses of the last two open ended question were linked to the responses in items of both section 1 and 2. Only the frequencies (*f*) and the percentage (%) were presented.

4.2 Section 1: Background information of the participants

Information about the participants' age, gender, the PHC clinical department they mostly were working in, their current position at work, clinical experience, highest qualifications, possession of a computer at home, computer literacy training received, computer program(s) used, computer access and the purpose the computer was used for at work, was obtained from the responses to the items in Section A of the questionnaire.

4.2.1 The age of the participants (Item 1)

From the 128 (100.0%) responses, 19 (14.8%) participants were in the age group of 20 – 30 years, 29 (22.7%) were in the age group 31 – 40 years, 45 (35.2%) were in the age group of 41 – 50 years, 30 (23.4%) were in the age group of 51 – 60 years and five (3.9%) were in the age group above 60 years (Figure 4.1).
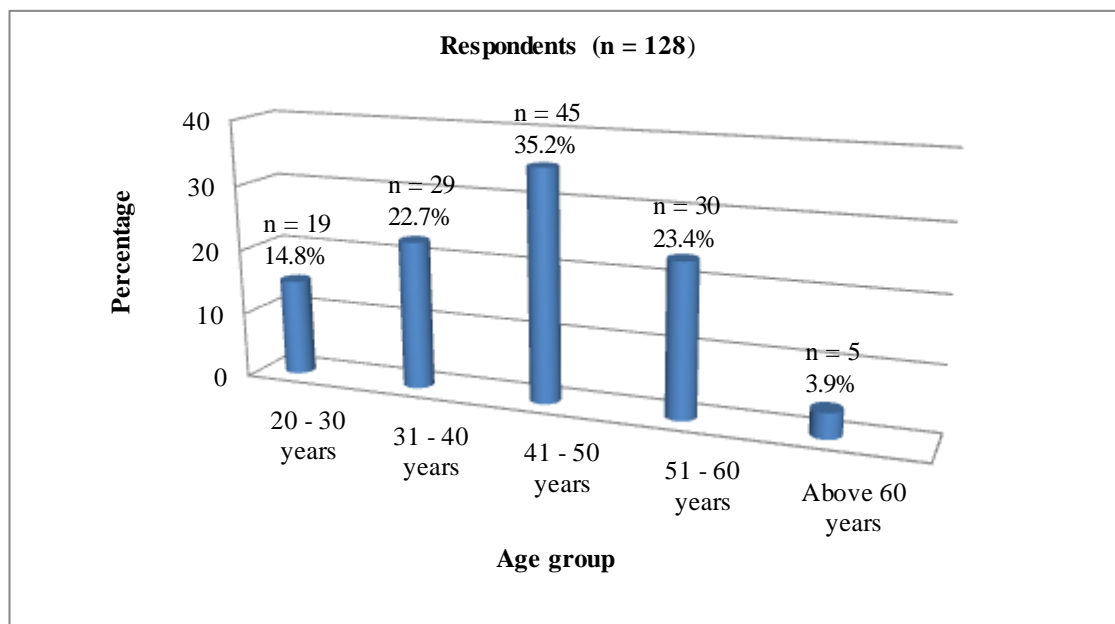
Figure 4.1: Age group of the participants

A small percentage of participants were of the age group between 20 and 30 years (n = 19; 14.8%). Literature mentions that fewer younger people are entering the field of nursing (Marquis & Huston, 2009: 337-338). Literature also mentions an aging population of nurses and that the average age of registered nurses, has already been 41.9 years in 2006 (Mason, Leavitt & Chaffee, 2007: 86). The findings confirm this information which can explain the highest percentage of participants between the ages of 41 and 50 years. It is known that the retirement age in South Africa starts from the age of 55 to 60 years, hence a minority of the participants were in the age group of above 60 years.

4.2.2   Gender of the participants (Item 2)

In Item 2, one (0.8%) of the 128 (100.0%) participants did not indicate her/his gender. Of the 127 (100.0%) responses, five (3.9%) participants were male and 122 (96.1%) were female (Figure 4.2).
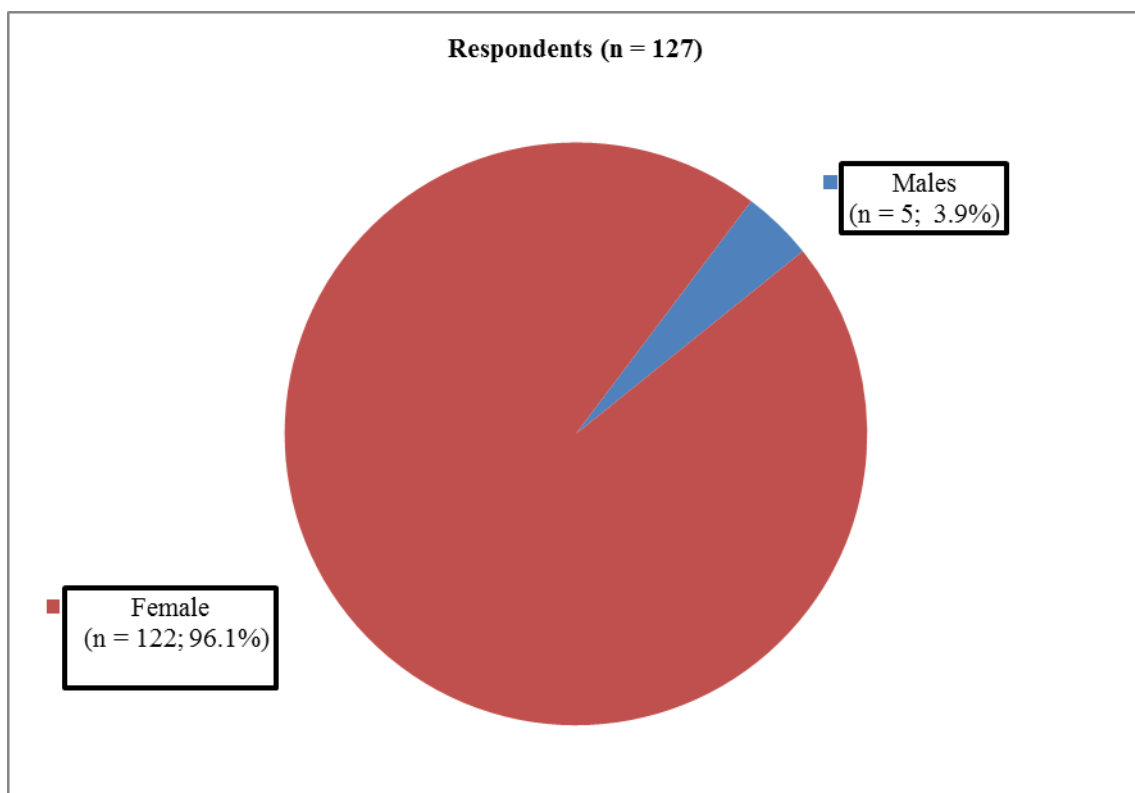
Figure 4.2: Gender of the participants

Male participants represented the minority (n = 5; 3.9%) and female participants represented the majority (n = 122; 96.1%) of the participants. It could be due to nursing profession that was traditionally known to be a predominantly female profession, but currently the number of

minorities (including men) in the nursing profession are gradually increasing (Chung, 2011: 2; South Africa, 2012: 1). With regard to gender and the use of information technology, research has indicated that women are more likely to use technology such as emails to connect with other people and Internet for academic purposes than men (Jackson, Zhao, Kolenic, Fitzgerald, Harold & Von Eye, 2008: 441).

4.2.3   PHC clinical department in which participants worked the most (Item 3)

Of the 128 (100.0%) responses, three (2.3%) participants did not indicate the department in which they work the most. Of the 125 (100.0%) participants, four (3.2%) were mostly working as school health nurses, 65 (52.0%) were working mostly as primary health care nurses (PHC), 30 (24.0%) were mostly working in a midwife obstetric unit (MOU), and 19 (15.2%) were mostly working in comprehensive care and at management of HIV/Aids (CCMT) sites. A minority of the participants (n = 7; 5.6%) indicated that they were mostly working in other departments (Figure 4.3).
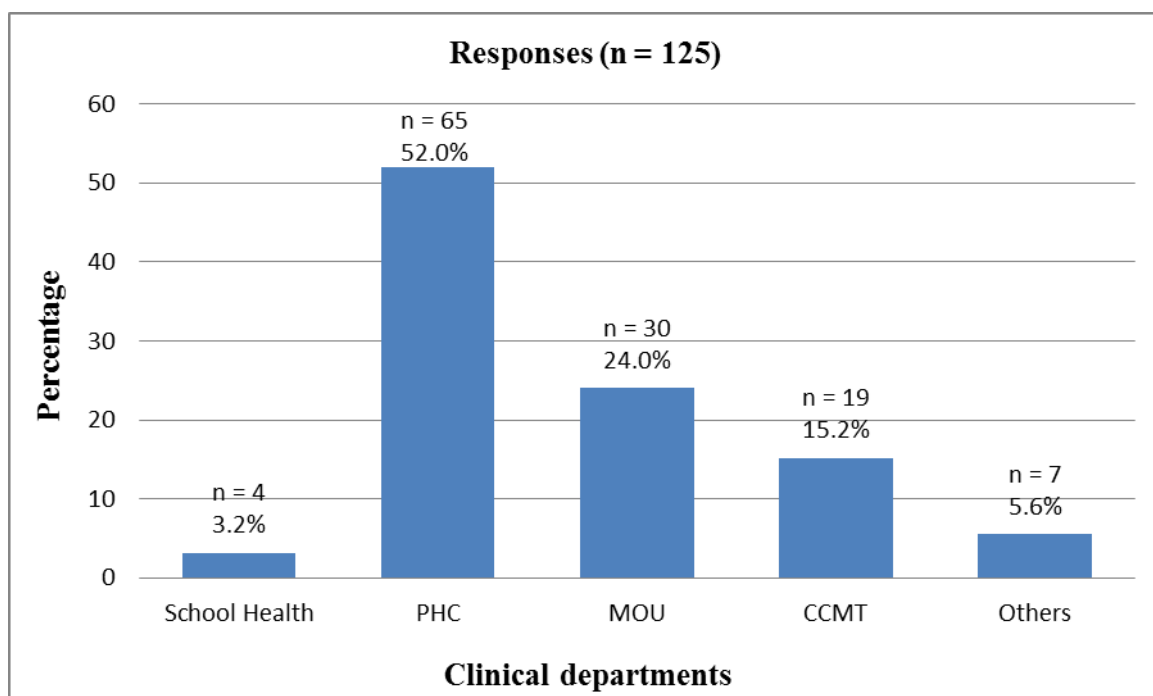
Figure 4.3: Clinical departments in which participants mostly work

In the PHC setting, there are different specialities which include: chronic illnesses, acute illnesses, women's health, child health and mental health (South Africa, 2008b: 3). Due to the comprehensive nature of PHC services, the majority of the participants were working in primary health care departments (n = 65; 52.0%). The midwife obstetric unit (MOU) was

indicated as the second largest department with 30 (24.0%) of professional nurses, which could be due the nature of the nursing care delivered during 4 shifts 24 hours per day (South Africa, 2008b: 36). Very few (n = 4; 3.2%) participants were mostly working as school health nurses. It could be one of the reasons why the Minister of Health (South Africa, 2011) has commented about the need to strengthen the school health services.

Of the seven (100.0%) participants who are working in other departments, only two (28.6%) were working in a male medical circumcision (MMC) department, due to the fact that the MMC service was offered at one clinic from Monday to Friday; and one (14.3%) of the seven (100.0%) participants was running a mobile clinic which could imply that the mobile clinic operates a few days per week only and he/she subsequently spent most of the weekdays in PHC departments. One (14.3%) of the seven (100.0%) participants indicated the oral health department which might be due to the fact that most of the nurses who are working in oral health were nursing auxiliaries and staff nurses. A smaller number of participants (n = 3; 42.9%) of the seven (100.0%) were working in administration departments as nurse managers due to the reasons that operational managers were mostly consulting patients in their departments.

4.2.4   Participants' current position at their clinic (Item 4)

Of the 128 returned questionnaires, one (0.8%) participant did not indicate her/his position. Of the 127 (100.0%) responses, eight (6.3%) participants indicated that they were community service nurses, 57 (44.9%) participants indicated that they were professional nurses (PN), 22 (17.3%) indicated that they were senior professional nurses (SPN), 31 (24.4%) indicated that they were chief professional nurses (CPN), and nine (7.1%) participants indicated that they occupied other positions (Figure 4.4).
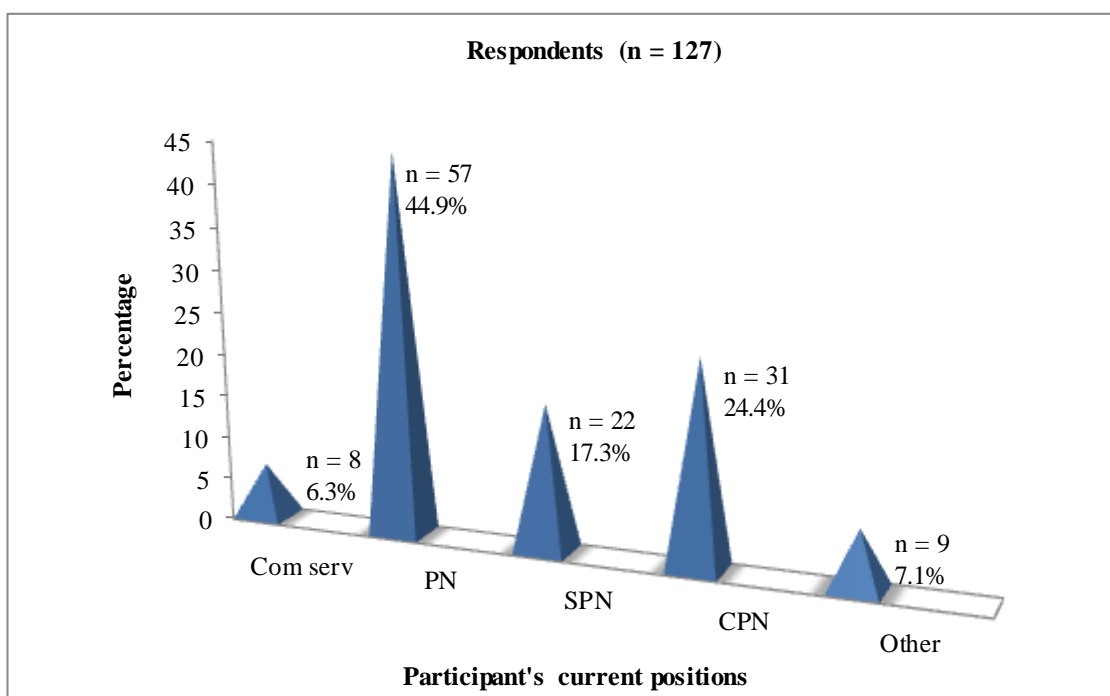
Figure 4.4: Participant's current positions

Of the 127 (100.0%) responses, participants who indicated that they were community service professional nurses were very few (n = 8; 6.3%), and nearly half (n = 57; 44.9%) of the participants were found in the category of professional nurses (PN). In relation to the professional nurses, quite a number of participants, 53 (41.7%) occupied more senior positions namely: senior professional nurses (SPN) and chief professional nurses (CPN). The findings could be interpreted that senior staff were well positioned to play a role in promoting the use of information technology at the PHC clinics.

4.2.5   Clinical experience of the participants (Item 5)

Figure 4.5 illustrates the clinical experience of the participants. Only 20 (15.6%) of the 128 (100.0%) participants had less than one year of experience at the clinic. Just over a quarter (n= 36; 28.1%) of the participants had clinical experience of 1 to 5 years, and less than a quarter (n = 31; 24.2%) had clinical experience of 6 to 10 years. Participants with 11 to 15 years clinical experience (n = 18; 14.1%) were more than the ones with clinical experience of 16 to 20 years (n = 8; 6.3%). On the other hand, 15 (11.7%) participants had clinical experience of more than 20 years working at the clinics.
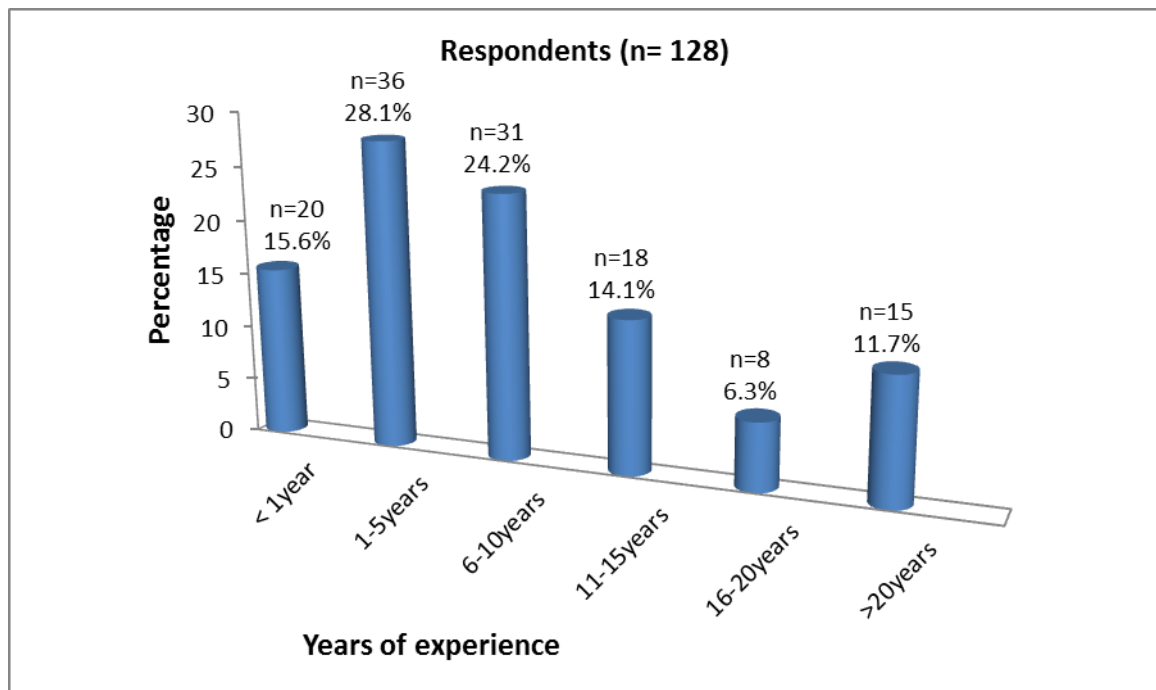
Figure 4.5: Participant's clinical experience

Only 20 (15.6%) of the 128 (100.0%) participants had clinical experience of less than a year. It included the community service professional nurses (n = 8; 6.3%) who are indicated in Figure 4.4 and other participants (n = 12; 9.3%) who might have been new employees from hospitals (private and government sectors). These participants could need direct supervision since they were viewed as inexperienced in nursing practice to prevent errors (Page, 2004: 69). The fact that the majority of participants had 5 or more years of clinical experience, could be related to the more senior positions of nearly a half of the participants who were indicated in Item 4. It could be interpreted that the more years of experience participants had, the more senior positions they were occupying within the PHC clinics.

4.2.6   Highest nursing qualification (Item 6)

Of the 128 (100.0%) responses, 2 (1.6%) participants did not indicate their qualifications. Of the 126 (100.0%) responses, 75 (59.5%) participants had a basic diploma or degree, 39 (31.0%) had a post basic diploma, 11 (8.7%) had an honours degree and one participant indicated the "other" option (Figure 4.6).
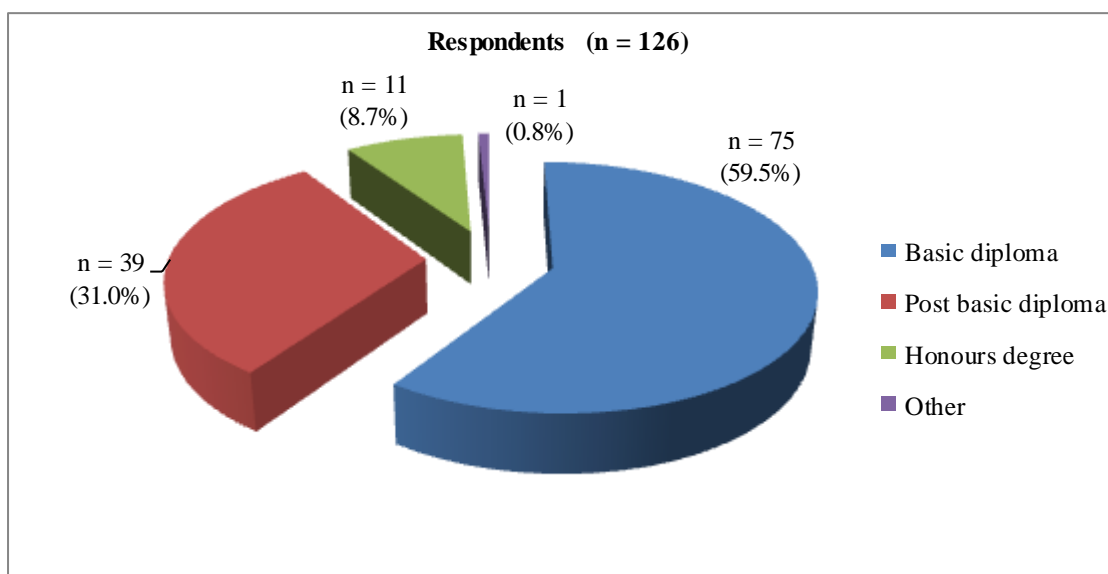
Figure 4.6: Participant's highest nursing qualifications

Less than half of the participants had a qualification in primary health care. On the one hand, slightly more than a third (n = 39; 31.0%) of the 126 (100.0%) participants had a post basic qualification required to work at PHC level. These participants usually work independently without the presence of a doctor or assistant. Nursing care without expertise could be considered potentially harmful for the patient (Elliot, Aitken & Chaboyer, 2007: 21-22; South Africa, 2007: 5). Therefore, it is crucial for nurses working at PHC clinics to have relevant post basic qualifications such as clinical nursing diagnosis treatment and care or advance midwives to work in midwife obstetric units (MOU). On the other hand, 11 (8.7%) of the 126 (100.0%) participants indicated that they had an honours degree. This group of people could be viewed as experts in nursing since they had acquired a qualification which is often necessary for supervising administrative positions, as well as for conducting research, consulting and teaching (Health Guide, 2012: 1-2). Qualified persons are needed for service delivery for advancing a co-ordinated effort to improve health care quality and to reduce errors in health care (South Africa, 2007: 12).

4.2.7 Possession of a computer at home (Item 7)

Of the 128 (100.0%) responses, 84 (65.6%) participants indicated that they had computers at home while more than a third (n = 44; 34.4%) of their counterparts were not in the same position (Figure 4.7).

Responses (n = 128)
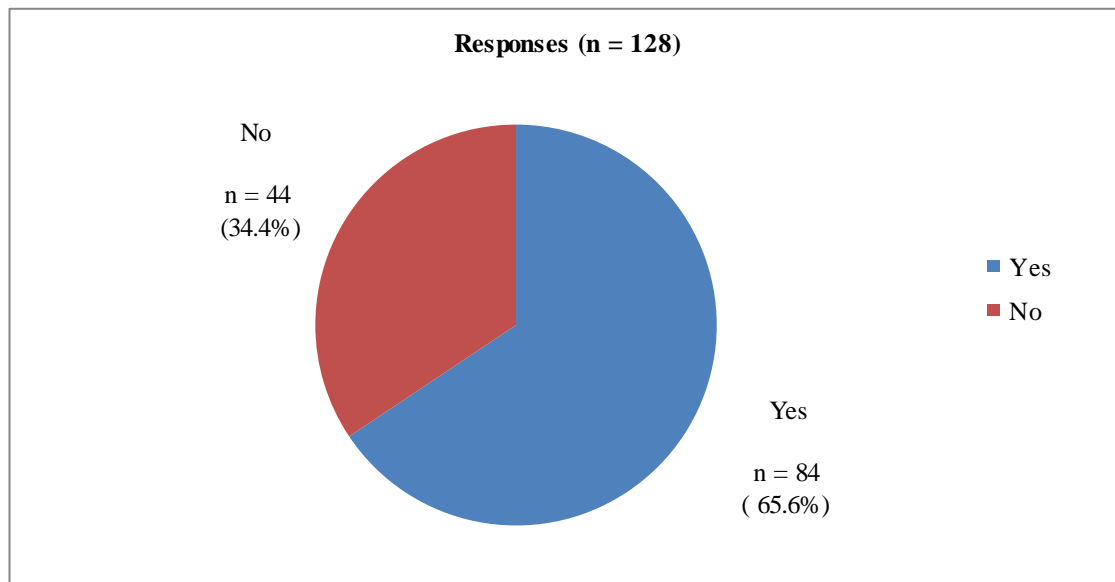
Figure 4.7: Possession of a computer at home

More than 30 per cent of people in the USA do not have computers and Internet access at home. Due to this lack of possession of and access to technology they do not acquire computer skills and are left behind in their work field (Luster, 2010: 1, 8). The same situation was found in the context of this study.

4.2.8 Participants who were trained in computer literacy (Item 8)

Figure 4.8 illustrates the participants who were trained in computer literacy. Of the 128 (100.0%) responses, 92 (71.9%) participants were trained in computer literacy while 36 (28.1%) were not trained.
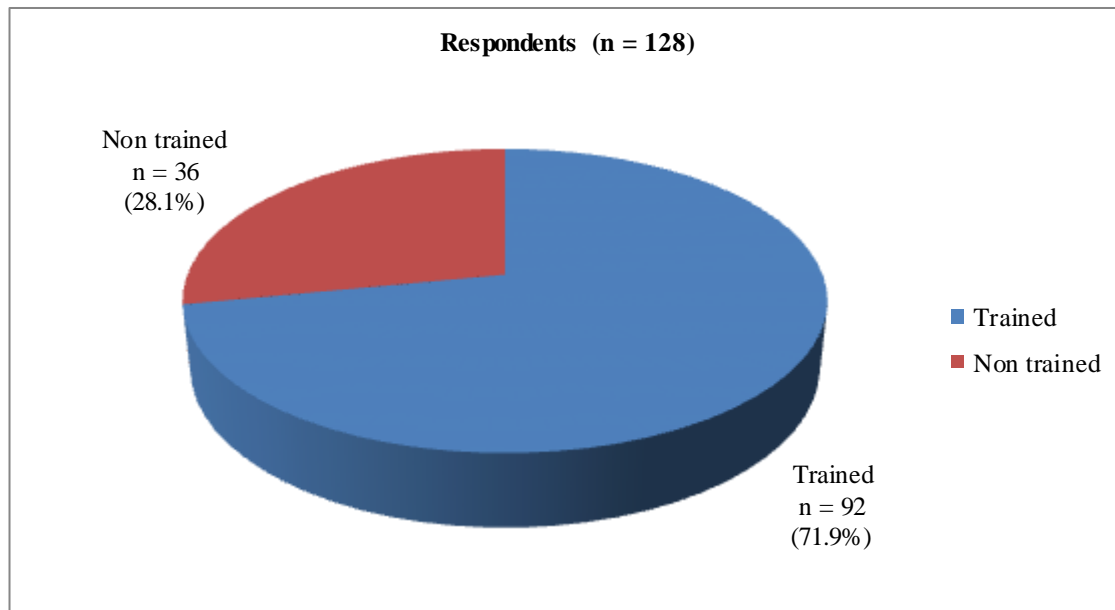
Figure 4.8: Participants who were trained in computer literacy

Although, the findings in Figure 4.7 indicate that 65.6% of participants had computers at home, nearly three quarters of the participants (n = 92; 71.9 %) were trained in computer literacy. It meant that the majority of participants could have the knowledge and skills that were needed to use a computer in the primary health care clinics. Of the 128 (100.0%) responses, 39 (30.5%) participants responded to Item 52 (open ended question) and eight (n = 8; 20.5%) of the 39 (100.0%) participants stated their specific reasons for not using a computer in the work place:

- *"I am not computer literate"* (n = 2);
- *"I have no idea of how a computer works"* (n = 1);
- *"I'm not too sure on how to use"* (n = 1);
- *"Not computer trained"* (n = 2);
- *"Never used computer before only when I was training at college for basic skills"* (n = 1); and
- *"Not using computers"* (n = 1).

Out of the 128 (100.0%) responses, 57 (44.5%) participants responded to Item 53 (open ended question) and 25 (43.9%) of the 57 (100.0%) participants stated their suggestions about the ways in which the use of computer should be implemented at PHC clinics (Table 4.1). These responses related to the need for training, role-players to be trained, providing training courses in computers, training in the use of specific programs, recordkeeping, budgeting, empowerment, time management and system support.

Table 4.1: Suggestions for implementing the use of computers

Suggestions	Responses (n = 25)
Need for training (n = 5)	*"By providing basic computer literacy to staff members in need of it".* *"By training staff members that are computer illiterate".* *"Personnel to obtain efficient computer training and skills".* *"By training all the nursing staff to have access to the computer".* *"By training the nursing staff on the use of computer, i.e. there must be a computer literacy course which will help the staff on how to use the computer for work purposes".*
Role-players (who) to be trained (n = 6)	*"All personnel working at the clinics should be trained in computer literacy".* *"It should not be only one person's duty to know I use the computer".* *"Development of computer literacy to all community health nurses and administration clerks".* *"Every individual must be computer trained".* *"First all nursing staff to be trained on computer".* *"Maybe by training patients".*
Provide training courses in computers (n = 4)	*"At least every nurse should attend a short course on computer literacy so they can have knowledge to use a computer".* *"By providing regular computer training on site (free courses) for the staff members".* *"Workshops must be done for the use of computers, so that everybody must know how to use it".* *"Send nurses to advance computer courses".*
Training in specific programs for specific areas (n = 3)	*"Staff to be trained on computer programs usage".* *"Computer literacy will enable large numbers of personnel to receive training on site. It will make work easier".* *"Training personnel, providing computers for each consulting room and reception area".*
Recordkeeping and access through computers (n = 2)	*"All professional nurses to be familiarised with the use of computers because files get lost on daily basis and important information get lost".* *"Train all nursing staff on employment on computer literacy, both new and old staff".*
Budgeting and the use of computers (n = 1)	*"Staff to be trained in computer literacy senior management to budget for training".*
Empowerment and computers (n = 2)	*"Empowerment of staff".* *"Empower all employees with skills in computer".*
Time management and computers (n = 1)	*"Each one to be trained to use a computer then in order to save time when trying to access patient information".*
Support systems (n = 1)	*"Trained technicians to be available so that there is a breakdown during use, e.g. when computers are down history taking to be in a format system so that nurses may make ticks only".*

The findings indicate that the employer should provide opportunities for nurses to be trained in the use of computers on a regular basis, as another participant stated: *"Offer computer training to all staff members to enable them to use computers or else there is no point in having computers when no-one can use them"*.

Providing people with training in the methods and tools of continual improvement, such as computer literacy, should be a permanent objective for improving the general performance of an organisation (International Organization for Standardization ISO, 2008: 1). Training of professionals will improve patient safety and will reduce hazards in health care (South Africa, 2007: 5).

4.2.9 Departments that were offering computer training to the participants (Item 9)

Figure 4.9 illustrates the departments that were offering computer training to the participants. Of the 128 (100.0%) responses, 54 (42.1%) participants responded that training was provided by the National Department of Health. However, only 12 (22.2%) of the 54 (100.0%) participants indicated that they had received training. The majority of 85 (66.4%) of the 128 (100.0%) participants responded that self-training was assisting to use the computer. The majority of 73 (85.9%) of these 85 (100.0%) participants indicated that they were teaching themselves. More than a third, 47 (36.7%) of the 128 (100.0%) participants responded that computer training was being offered during basic nursing courses. However, only 11 (23.4%) of the 47 (100.0%) participants indicated that they had received training during their basic nursing course.
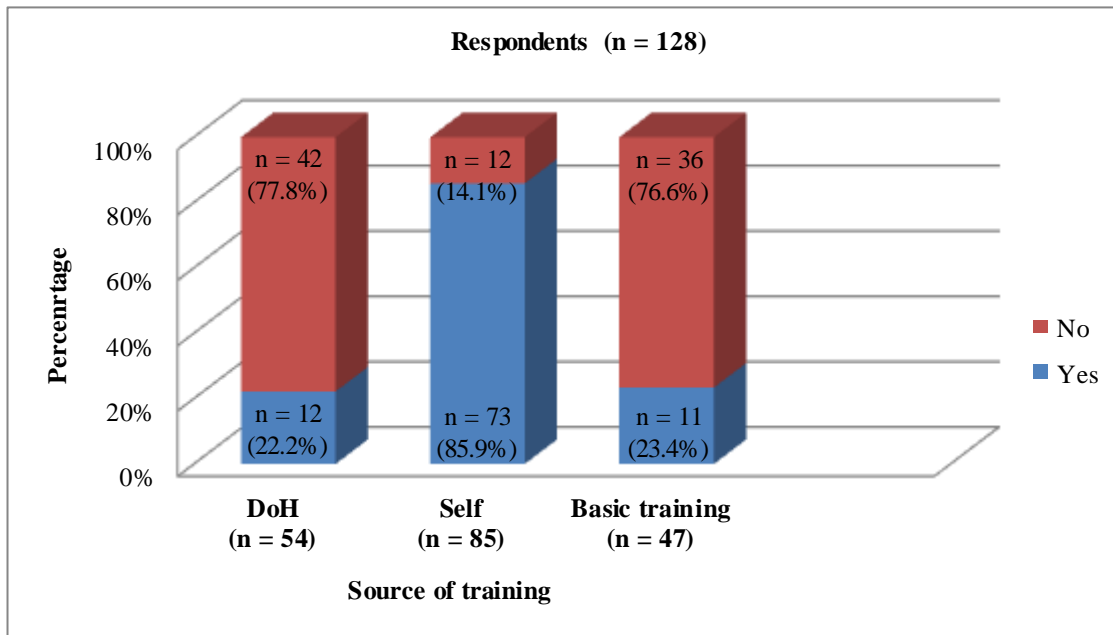
Figure 4.9: The source of training in computer literacy

The results indicate that the majority of participants indicated that inadequate opportunities were available to participants for attending computer training.

4.2.10 Computer programs that were used in the workplace (Item 10)

Figure 4.10 indicates the computer programs which were available for use in the workplace. Of the 128 (100.0%) responses, 84 (65.6%) participants indicated that Microsoft Word was in operation, and 70 (83.3%) of the 84 (100.0%) participants indicated that they were using it. Less than half (n = 62; 48.4%) of the 128 (100.0%) participants responded that Microsoft Excel was used in the workplace. However, only 35 (56.0%) of the 62 (100.0%) participants indicated that they were using it. Similarly, 54 (42.1%) of the 128 (100.0%) participants responded that PowerPoint was used in the workplace. However, 28 (51.9%) of the 54 (100.0%) participants indicated that they were using it. Close to half, 63 (49.2%) of the 128 (100.0%) participants responded that Internet Explorer was used in the workplace and the majority of 41 (65.1%) of the 63 (100.0%) participants indicated that they were using it. The findings, therefore, indicate that participants were using Microsoft Word and Internet Explorer more than Microsoft Excel and PowerPoint.
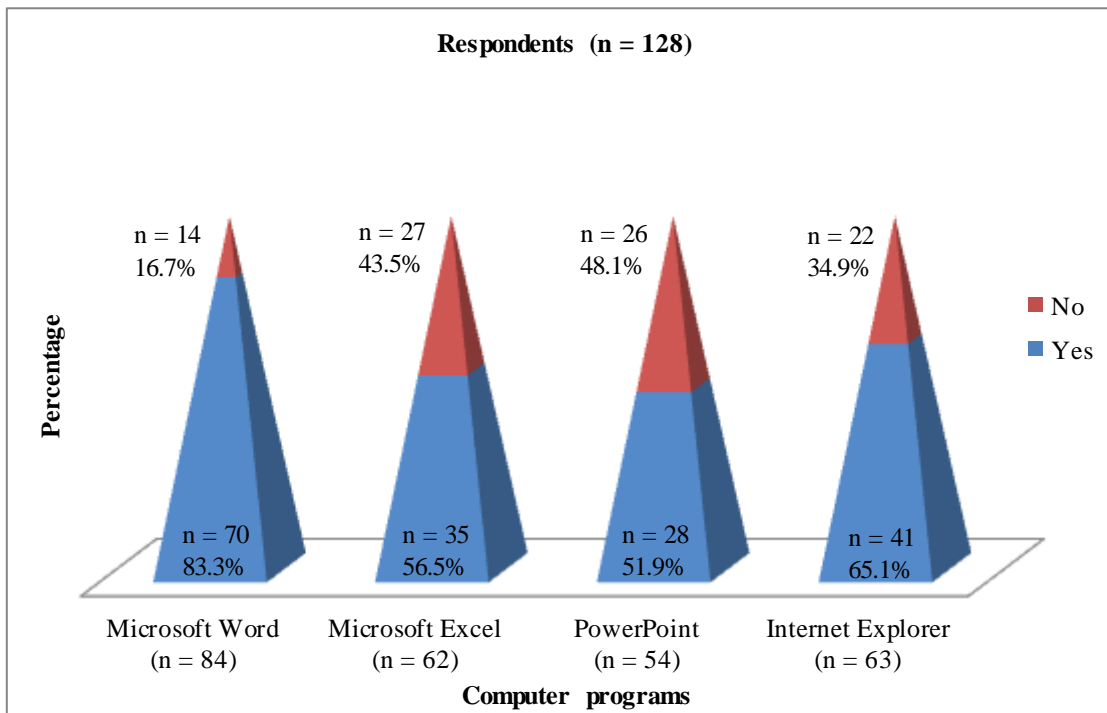
Figure 4.10: Computer programs that are used by the participants

Only three (n=3; 7.7%) out of 39 (100.0%) participants mentioned in an open-ended question (Item 52) that they were using PowerPoint in the PHC setting for:

- *"Presentations",*
- *"Prepare presentations",* and
- *"Teaching aids".*

The findings also indicate that participants tended to use the Internet more often. However, Internet Explorer could be used for different reasons, such as for accessing information, and for teaching and learning. Accessing health literature, online journals, books and databases, and offline informational CD-ROMs that support practising professionals are some of the educational uses of the computer in the health setting (Mannan et al. 2006: 125). Computerised clinical documentation systems can be used for educational opportunities by storing isolated and scattered information in one common depository for access by physician trainees to easily access one another's notes. It could enable a new way of learning with a paradigm shift that facilitates the correction and augmentation of a trainee's notes by the fellows and the faculty (Agarwal et al. 2008: 9).

4.2.11 Access to computers at the work place (Item 11)

Figure 4.11 indicates the access of computers at the work place. Of the 127 (100.0%) participants that responded to this item, more than a third (n = 39; 30.7 %) indicated that they had access to a computer while less than three quarters (n = 88; 69.3%) of the participants did not have access to a computer at work. The findings in Item 10 indicate that computer programs were available at the work place and that participants used them to a larger or lesser extent. The findings in Item 11 indicate that participants did not always have access to use these programs.
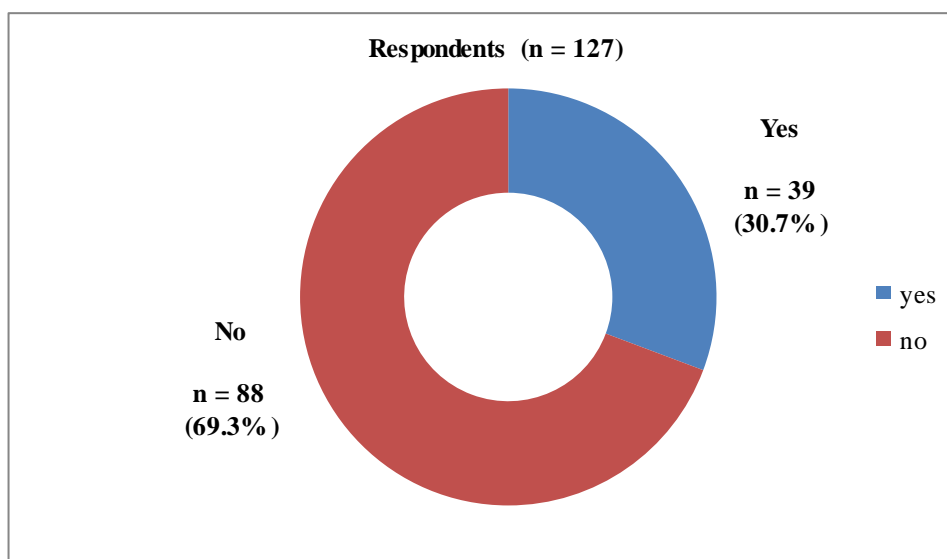
Figure 4.11: Access to computers at the work place

The minority (n= 39; 30.7%) of the 127 (100.0%) participants had access in contrast to the majority (n= 88; 69.3%) of the participants who did not have access to a computer at work. Table 4.2 explains the reasons for these findings. Information technology infrastructure; that includes desk top computers, handheld devices, laptops, and computers; need to be available and accessible for effective use of information technology (Andrews et al. 2004: 11-18).

Just above a quarter (n=10; 25.6%) of the 39 (100.0%) participants described in an open-ended question (Item 52), that accessibility, availability, applicability, usability and equitability were making it difficult to use computers in the PHC setting (Table 4.2).

Table 4.2: The issue of computer access

The issue of computer access	Responses
Accessibility (n = 3)	*"Have no access to computer".* *"Computer is not accessible at our working place as it is normally used by the faculty manager and also the administrative workers for statistics purposes".* *"I do not have access and to be able to use it, as we do not have computers in our consulting rooms".*
Availability (n = 2)	*"Computers are available at my working place but not for use by the functional nursing personnel".* *"I do not have access to computer at work because of lack of facilities".*
Applicability (n = 3)	*"I am not using computer at my work place because I am not doing statistics as I am working in casualty department, I would like to have a computer in my department in order to know how to understand the application of computer information technology by nurses at PHC clinic".* *"I do not use a computer at my work place; the senior clerk is the one who uses it. Data is given to him so that he punches it in".* *"Always request the data capture or clerk to store or retrieve data of the patients because he has one".*
Usability (n = 1)	*"I do not use computer at my work place because we don't have computer in our rooms only in switchboard and in unit manager's office".*
Equitability (n = 1)	*"I don't use the computer; managers are too strict and jealous to allow us nurse's access to computers".*

More than three quarter (n=45; 78.9%) of the 57 (100.0%) participants stated in an open-ended question (Item 53) that the accessibility of computers was related to availability, adequacy and equitability of access, individuality, centralisation, and consultation purposes. Therefore, it should be implemented in order to make the use of computer information technology easier in the PHC setting (Table 4.3).

Table 4.3: Suggestions about computer accessibility in a PHC setting

Computer should be accessible	Responses (n = 45)
Availability (n = 9)	*"Accessibility, make the computers available in the clinics".* *"Computers must be available in all the departments".* *"It must be available for use to all staff".* *"By ensuring availability of computers".* *"Make it available".* *"Availability and maintenance of existing computers".* *"Management to make available computers".* *"Should be available to all staff and during starts checking stock available and stock out".* *"Availability of computers in clinics".*
Adequacy and access (n = 6)	*"All district health care (DHC) facilities to have computers per person if possible".* *"Clinics to have more than one computer for easy access".* *"I would like to have computer in PHC clinics because there is a lot of misfiling and a lot of files missing. It is advisable to have computer especially for the storage of information and also record keeping about the patients".* *"If there can be adequate computers at the clinic where everyone can be able to access the computer because we do not have access because only the unit managers and clerks are able to do so. We nurses we do not have access".* *"Having access to the computer".* *"Supply computers to all clinics".*
Individuality (n = 8)	*"If each sister has own personal computer I like results will computerised must saving time for RNs. If the whole department is computerised it will be easier for department to calculate accurate headcount and the nurse patient ratio".* *"Each department should have at least three computers for it to be easily accessible to everyone".* *"Each department to have its own computer".* *"To have computers to each and every department".* *"We should have enough computers within the unit".* *"Have computers in each room. Have Internet access".* *"It will be possible if every room is installed with a computer".* *"To have computer in every room where a PHC nurse is working".* *"Each room to have its own computer. Staff members to be given laptops for continuity of updating some of the information especially when doing home visits".*

Computer should be accessible	Responses (n = 45)
Centralisation (n = 2)	*"Centralised computers - for data capturing of information from doctors/nurses"*. *"There must be a computer room"*.
Consultation purposes (n = 13)	*"All consulting rooms to have computers"*. *"All consulting rooms and admin areas should be computerised with linkage to email"*. *"Computers to be made available in all consulting rooms to store information about clients and avoid the challenge of missing files"*. *"By allocating computers in consulting rooms (Installing them in consulting rooms)"*. *"By having computers in the consulting rooms, nurses they can make use of them"*. *"Consulting rooms to have computer"*. *"Each consulting room to have its own computer or at least one computer to 3 consulting rooms"*. *"Each consulting need to have a computer to save time when trying to access patient information"*. *"Every consultation room to have computer"*. *'If all the consulting rooms can have computers"*. *"If there could be computers in all the consulting rooms"*. *"The provision of computers for use in consulting rooms for easy access"*. *"Computers are available at every consultation room"*.
Equitability and access (n = 7)	*"All staff members to have access to computers"*. *"Every member of personnel should have access to computer for work purposes"*. *"Everyone should be given equal access to computers"*. *"Make computers accessible to all employees"*. *"Should be placed where everybody has access"*. *"All nurses or managers must have computers in their rooms"*. *"Each ante-natal care clinic everyone should have his own computer"*.

It seems that the vast number of participants was not using computers at the PHC clinics due to a lack of access. It could imply that the participants who were using the Microsoft and Internet Explorer programs (Figure 4.10), might also be using computers at home (Figure 4.7).

4.2.12 The purpose of using computer at the work place (Item 12)

Less than a third (n = 39; 30. 7%) of the 127 (100.0%) participants had access to computers at work (Figure 4.11).

Figure 4.12 illustrates the purpose for using computers at the work place. Of the 39 (100.0%) participants who were accessing a computer at work, less than half (n = 16; 41.0%) of the (100.0%) participants indicated that the computer was being used for presentations, a third (n = 13; 33.3%) were using the computer for decision making, and less than three quarters (n = 27; 69.2%) of participants used computers for communication.

Just less than three quarters (n = 28; 71.8%) of the 39 (100.0%) participants were using the computer for retrieval of information, almost three quarters (n = 29; 74.4%) of the participants indicated that computers were being used for storage of information and more than three quarters (n = 32; 82.1%) of the participants were using the computer for recording information. Nearly half (n = 18; 46.2%) of the 39 (100.0%) participants were using the computer for personal purposes.
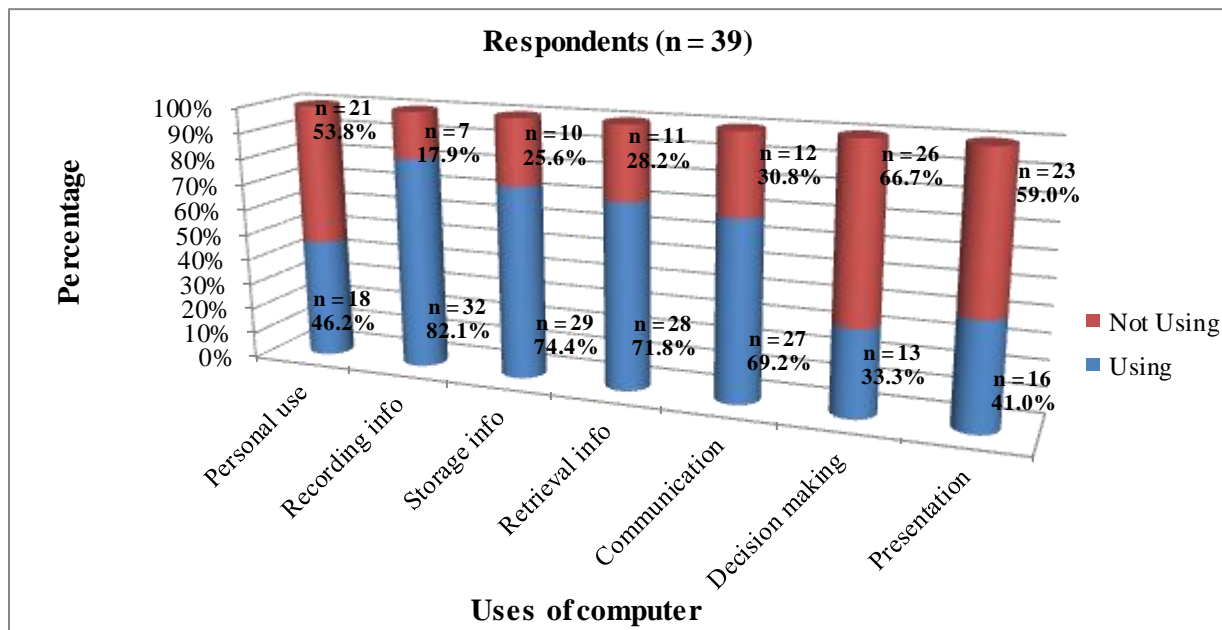
Figure 4.12: The purpose of using computers at the work place

Many authors mention that the use of computers at health institutions for the purpose of recording, storage, and retrieving patient information could reduce errors caused by multiple files and entry points and improve the flow of information (Tomasi et al. 2004: 867-872; Owen, 2005: 49;   Chaudhry et al. 2006: 14; Langley & Beasley, 2007: 19).

Nearly a half (n = 18; 46.2%) of 39 (100.0%) participants indicated that they were using computers for personal purposes. Only five (12.8%) of the 39 (100.0%) participants in Item 52 mentioned some of the personal uses of the computer at the work place:

- *"For playing games"* (n = 1);
- *"For checking advertised posts"* (n = 2);
- *"For Internet"* (n = 1); and
- *"For personal reasons"* (n = 1).

A large number (n = 18; 46.2%) of the 39 (100.0%) participants who were using computers at work for personal reasons, could be attributed to a lack of insight about the importance of using computers for work purposes or focusing on fulfilling their own needs due to not having computers at home.

4.3 Section 2: The use of computer information technology at primary health care clinics

Descriptive statistics were undertaken about the responses of all participants (n = 128). The number of responses differed for the separate items. Floyd and Fowler (2009: 158) are of the opinion that when non-response to an item is less than 5%, the potential for the non-response to distort the estimate is fairly minimal. The descriptive statistics relate to the frequencies (*f*), percentage (%), the mean ($\bar{x}$) and the standard deviation (SD) for all the items in Section 2 of the questionnaire. Responses were distributed on a 7-point scale which ranged from one (strongly disagree) to seven (strongly agree) respectively:

1 = Strongly disagree with an item;
2 = Moderately disagree with an item;
3 = Little disagreement with an item;
4 = Neutral – neither agree nor disagree;
5 = Little agreement with an item;
6 = Moderately agree with an item; and
7 = Strongly agree with an item.

For purposes of the discussion, the findings refer to responses that indicated:
- strongly disagreed to a neutral response (1 - 4 on the scale);
- little to moderately agreed (5 - 6 on the scale); and
- Strongly agreed (7 on the scale).

4.3.1 Record keeping in computer information technology

Table 4.4 indicates the frequencies (*f*) and the percentages (%) of the distribution of responses on a 7-point scale, indicating the mean value ($\bar{x}$) and the standard deviation (SD) of the responses of all items, as perceived by the 128 (100.0%) participants in terms of items about record keeping.

In order to describe the findings, the researcher grouped the items about record keeping (Table 4.4), under the following headings:

- Staffing (Items 16; 17; 18; 19; 20);
- Suppliers and equipment (Items 21; 22);
- Authorisation (Items 9; 10; 11);
- Specific entries on the records (Items 12; 13; 14; 15);
- Client information (Items 1; 2; 6; 7); and
- Tracking and follow up (Items 3; 4; 5; 8).

For discussion purposes, the items in Table 4.4 are presented from the highest to the lowest mean values under each of the above-mentioned headings.

Table 4.4: Descriptive statistics – record keeping

Heading	Item Number	Items about record keeping using computer	Responses 1=strongly disagree and 7= strongly agree								x̄	SD
			1 n %	2 n %	3 n %	4 n %	5 n %	6 n %	7 n %	Total n %		
Staffing aspects	16	Have a backup system, which allows a nurse to call a computer expert for support when needed.	3 2.4	0 0.0	1 0.8	6 4.7	9 7.1	16 12.6	92 72.4	127 100.0	6.42	1.218
	19	Electronic monitoring of patterns of absenteeism.	6 4.7	0 0.0	0 0.0	7 5.5	21 16.5	18 14.2	75 59.1	127 100.0	6.08	1.473
	18	Authorisation of the leave form by the supervisor	5 4.0	0 0.0	1 0.8	11 8.7	28 22.2	19 15.1	62 49,2	126 100.0	5.87	1.459
	20	Monthly allocation of staff members to different clinic departments.	7 5.5	1 0.8	1 0.8	9 7.1	22 17.3	23 18.1	64 50.4	127 100.0	5.86	1.592
	17	Submission of a leave request for authorisation purposes.	8 6.3	2 1.6	2 1.6	14 11.0	18 14.2	16 12.6	67 52.8	126 100.0*	5.74	1.742
Suppliers and equipments	21	Weekly ordering of stock, in line with the stock replacement policy.	5 3.9	1 0.8	0 0.0	3 2.4	17 13.4	22 17.3	79 62.2	127 100.0	6.21	1.389
	22	Ordering of equipment that has been budgeted for.	5 3.9	1 0.8	0 0.0	6 4.7	20 15.7	22 17.3	73 57.5	127 100.0*	6.09	1.428
Authorization	11	The responsible use of access codes.	8 6.3	1 0.8	3 2.4	3 2.4	14 11.1	11 8.7	86 68.3	126 100.0	6.10	1.682
	9	Authorising nurses to update a record on the computer.	8 6.3	2 1.6	4 3.2	6 4.8	20 15.9	23 18.3	63 50.0	126 100.0*	5.77	1.717
	10	Issuing nurses with a computerised access code, to replace the signature, which identifies the individual using the computer system.	9 7.1	4 3.2	4 3.2	11 8.7	15 11.9	18 14.3	65 51.6	126 100.0	5.64	1.861
Specific entries on the record	15	Have a backup (device used to store information for in-case the computer breaks.	4 3.1	0 0.0	0 0.0	5 3.9	8 6.4	12 9.4	98 77.2	127 100.0	6.47	1.252
	14	Indicate the date and time that the entry was made on the record.	3 2.4	1 0.8	0 0.0	5 4.0	13 10.3	14 11.1	90 71.4	126 100.0	6.38	1.251
	13	Identify the individual who made the last entry on the specific client record.	5 3.9	3 2.4	2 1.6	5 3.9	16 12.6	14 11.0	82 64.6	127 100.0	6.10	1.563
	12	Identify the individual who has last entered data on a computer.	5 3.9	5 3.9	2 1.6	4 3.1	17 13.4	14 11.0	80 63.0	127 100.0*	6.03	1.633
Client specific information	6	Following up on client information, e.g. correct physical address.	4 3.2	0 0.0	0 0.0	3 2.4	11 8.7	13 10.3	95 75.4	126 100.0	6.46	1.237
	7	Locating information about the client, e.g. to contact the next of kin.	3 2.4	1 0.8	0 0.0	9 7.1	9 7.1	18 14.2	87 68.5	127 100.0*	6.32	1.290
	2	Accessing patients information, e.g. about the clinic previous visit.	3 2.4	1 0.8	3 2.4	3 2.4	19 15.0	11 8.7	87 68.5	127 100.0*	6.27	1.342
	1	Capturing client information on e.g. history taking.	11 8.9	2 1.6	4 3.2	8 6.5	20 16.1	11 8.9	68 54.8	124 100.0	5.65	1.909
Tracking and follow up	8	Link on patient's record about other departments, e.g. the laboratory department to obtain blood results.	3 2.4	1 0.8	2 1.6	7 5.6	9 7.1	16 12.7	88 69.8	126 100.0	6.32	1.331
	4	Tracking the medicine dispensed to a patient, e.g. Anti-diabetic drugs.	4 3.2	2 1.6	2 1.6	2 1.6	14 11.1	21 16.7	81 64.3	126 100.0*	6.23	1.404
	3	Electronic prescription of e.g. Antibiotics.	6 4.7	1 0.8	9 7.1	6 4.7	20 15.7	21 16.5	64 50.4	127 100.0*	5.77	1.663
	5	Tracking the sequence of nursing actions performed on a client as spelt out in the clinic guidelines.	3 2.4	5 4.0	5 4.0	14 11.1	19 15.1	17 13.5	63 50.0	126 100.0*	5.73	1.622

*Due to the statistical calculations the totals do not always add to 100.0%

Items 16, 17, 18, 19 and 20 (Figure 4.13) addressed the staffing aspects of record keeping. The lowest mean value ($\bar{x}$ = 5.74; SD = 1.742) about staffing aspects in record keeping was found in Item 17 where 26 (20.5%) of the 126 (100.0%) participants indicated *strongly disagreed to a neutral response* while 34 (26.8%) *little to moderately agreed* and 67 (52.8%) *strongly agreed* that the computer should be used for submission of leave requests for authorisation purposes. In Item 18 ($\bar{x}$ = 5.87; SD = 1.459), 17 (13.5%) of the 126 (100.0%) participants indicated *strongly disagreed to neutral*, while 47 (37.3%) indicated that they *little to moderately agreed* and less than a half, namely 62 (49.2%) *strongly agreed* that the authorisation of leave forms by the supervisor should be done on the computer.

Of 127 (100.0%) responses in Item 19 ($\bar{x}$ = 6.08; SD = 1.473), 13 (10.2%) participants indicated that they *strongly disagreed to neutral* while 39 (30.7%) *little to moderately agreed* and 75 (59.1%) of participants *strongly agreed* that the computer should be used for electronic monitoring of patterns of absenteeism. These three items (Items 17, 18 and 19) addressed leave and absenteeism aspects about which the participants had a wider distribution of responses around the mean value of using the computer for submission of leave forms (Item 17; SD = 1.742) than for authorisation of leave forms (Item 18; SD = 1.459) and electronic monitoring of absenteeism (Item 19; SD = 1.473). The use of an electronic system makes the management of leave applications easier, by monitoring a leave plan, detecting trends in leave patterns, providing the reports when needed, saving time of managers and ultimately improving the quality of service (My Vacation Tracker scheduled software, 2012: 1-2). Computers can be used for office procedures like submission of a leave request for authorisation purposes, authorisation of the leave form by the supervisor, electronic monitoring of patterns of absenteeism (http://www.aspiration.co.za; http://www.cbars.co.za/home.html), and allocation of staff, off duties and staff performance evaluation.

Of the 127 (100.0%) responses in Item 20 ($\bar{x}$ = 5.86, SD = 1.592), 18 (14.2%) participants indicated *strongly disagree to a neutral response,* that the computer should be used for monthly allocation of staff members to different clinic departments, while 45 (35.4%) indicated *little to moderate agreement,* while half of the participants (n = 64; 50.4%) *strongly agreed* about the monthly allocation**.** The quality of services is essentially dependent upon efficient and streamlined staff deployment and allocation, which is considerably intensifying the demands that were made on scheduling managers. Often, vital decisions must be made under intense time pressure, and quick responses to schedule changes are required. The use of

information technology may relieve the workload of scheduling managers and enhance the efficiency of coordinating personnel deployment and allocation (Air-Transport IT Services, 2012:1-2).

The highest mean value ($\bar{x}$ = 6.42; SD = 1.218) about staffing aspects of record keeping was found in Item 16 where 10 (7.9%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response* that a backup system, which allows a nurse to call a computer expert for support when needed should be in place, while 25 (19.7%) indicated *little to moderate agreement* and the majority of 92 (72.4%) participants *strongly agreed* on the backup system.

The findings in Item 16 could be attributed to a need for information technology (IT) support systems like computer experts. Few (n=4; 7.0%) of the 57 (100.0%) participants stated in an open-ended question (Item 53) that the following support should be available in the PHC setting):

- *"Sub-district IT support";*
- *"Computer technician should always be available for network and Internet";*
- *"Technicians must also be available in cases of breakdown so that functioning will be easy";* and
- *"Trained technicians to be available for when there is a breakdown during use, e.g. when computers are broken down".*

In order to capture and retrieve the information in/from the computer, information technology infra-structure, which includes a system upgrading plan and a back-up system, is needed (Andrews et al. 2004: 11-18).
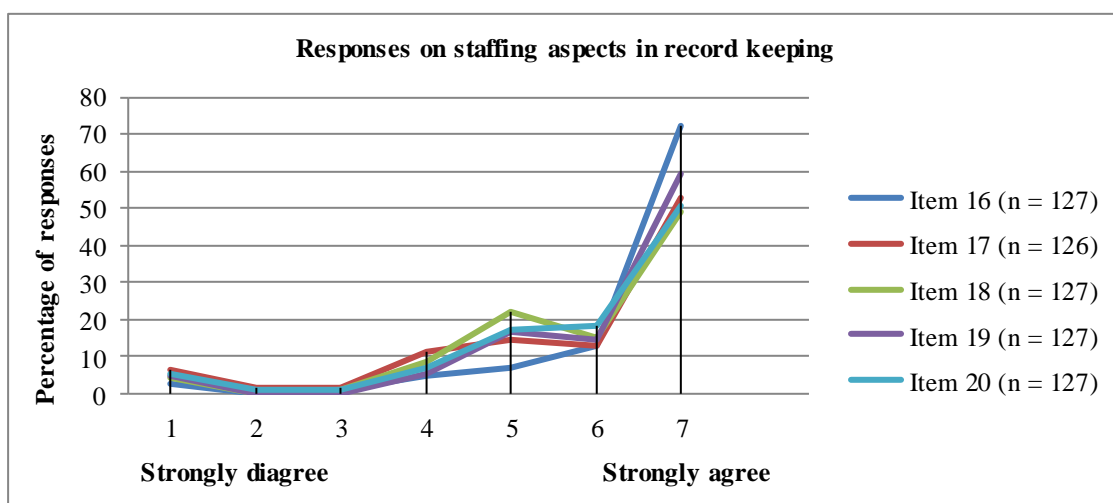
Figure 4.13: Items about the staffing aspects of record keeping

In all items about staffing aspects of record keeping, the majority of participants indicated negatively skewed responses about the use of a computer to record staffing information (Figure 4.13).

Items 21 and 22 addressed the supplies and equipment aspects of record keeping in information technology. The lowest mean value ($\bar{x}$ = 6.09; SD = 1.428) about the supplies and equipment aspects was found in Item 22 where 12 (9.4%) of the 127 (100.0%) participants indicated *strongly disagreed to neutral responses* while 42 (33.0%) indicated *little to moderately agreed* and 73 (57.5%) *strongly agreed* that the ordering of equipment that has been budgeted for, should be done on the computer. The use of computers in the work setting can be easier if computers are included in the equipment budget. Only two (n=2; 3.5%) of the 57 (100.0%) participants stated in an open-ended question (Item 53) their suggestions about the budget for computer use:

- *"It must be the role of the managers to include computers in the budget for financial year";* and

- *"Senior management to budget for computers".*

Computers could be used for storage of information about the organisation; such as information about the annual budget allocation, budget used, what the budget was used for; e.g. buying equipment like computers, assets and repairs (Canadian Institute for Health Information, 2006: 7; South Africa, 2009a: 24) in order to control and manage the clinic finances.
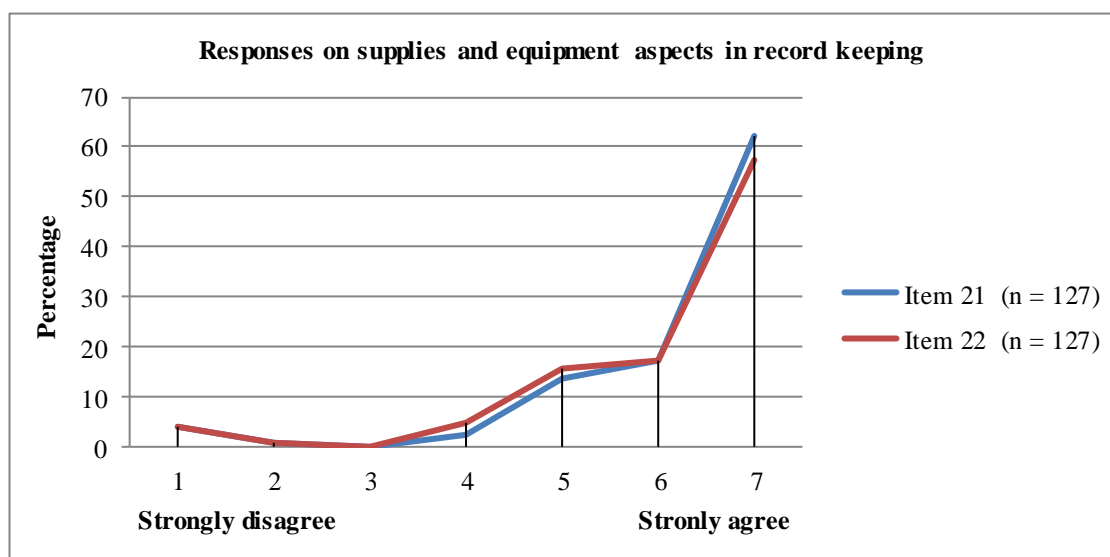
Figure 4.14: Items about suppliers and equipment aspects of record keeping

As Figure 4.14 indicates, the highest mean value ($\bar{x}$ = 6.21; SD = 1.389) about supplies and equipment aspects was found in Item 21 where nine (7.1%) of the 127 (100.0%) participants indicated *strongly disagreed to neutral* and 39 (30.7%) of participants were *little to moderately in agreement* about ordering equipment and stock by computer. The majority, 79 (62.2%) of the participants, *strongly agreed* that a computer can be used for ordering equipment and stock in line with a stock replacement policy. Computers can be used for other commercial uses in general practice, such as electronic ordering of stock and direct billing to the government health service (Cenic et al. 2010: 4). The participants in both Items 21 and 22 indicated negatively skewed responses (Figure 4.14).

Items 9, 10 and 11 addressed the authorisation aspects in record keeping (Figure 4.15). The lowest mean value ($\bar{x}$ = 5.64; SD = 1.861) about authorisation items was found in Item 10 where 28 (22.2%) of the 126 (100.0%) participants indicated *strongly disagreement to neutral* responses and almost similarly, 33 (26.2%) respondents indicated *little to moderately agreement* about using a computerised access code. The majority of participants (n = 65;51.6%) *strongly agreed* that access to computerised patient information should be ensured by issuing the nurses with a computerised access code, to replace the signature, which identifies the individual who was using the computer system. Patients have the right to expect that information given to a nurse or midwife is only used for the purpose for which it was given. It includes situations when information is disclosed directly to the nurse or midwife and also information that the nurse or midwife obtains from other people and records

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(CARNA-College and Association of Registered Nurses of Alberta, 2005: 1). Therefore, authorising the nurses with access codes to replace the signature, which identifies the individual using the computer system could ensure that confidentiality is maintained at primary health clinics.
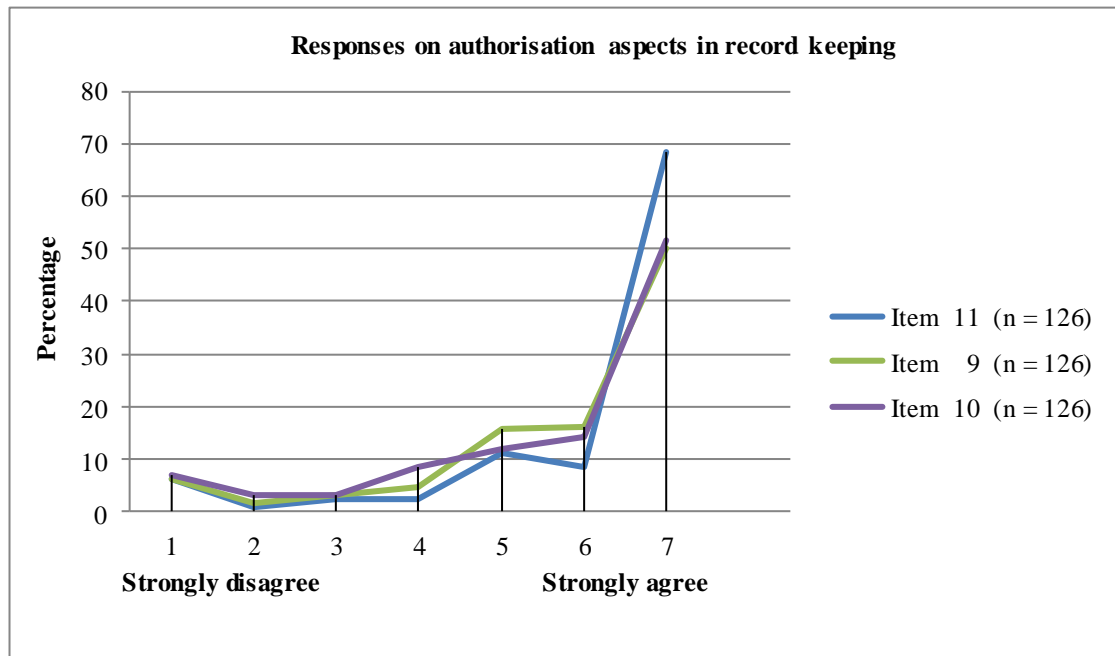
Figure 4.15: Items about authorisation aspects in the record keeping

The highest mean value ($\bar{x}$ = 6.10; SD = 1.682) about authorisation aspects in record keeping was found in Item 11 where only 15 (11.9%) of the 126 (100.0%) participants indicated *strongly disagreement to neutral* responses to the responsible use of access codes while 25 (19.8%) indicated *little to moderately agreement.* More than two thirds (n = 86; 68.3%) of the participants *strongly agreed* that the access to computerised patient information should be insured by the responsible use of access codes. Health providers should protect the confidentiality of all information gained in the context of the professional relationship and practise within relevant laws that are governing privacy and confidentiality of personal health information (South Africa, 2000: 1; CARNA-College and Association of Registered Nurses of Alberta, 2005: 17).

In Item 9 ($\bar{x}$ = 5.77; SD = 1.717), 20 (15.9%) of the 126 (100.0%) participants indicated *strongly disagreement to neutral* responses while 43 (34.2%) indicated *they little to moderately agreed.* Half of the participants (n = 63; 50.0%) *strongly agreed* that nurses should be authorised to update a record on the computer.

A wide distribution of responses (SD) around the mean values was found in all three of the items that were related to authorisation, ranging from 1.682 to 1.861.

The person in charge of a health establishment, such as a PHC clinic, is in possession of a patient's health records and must set up control measures to prevent unauthorised access to those records, e.g. issuing access codes in case of electronic record keeping (South Africa, 2004a: 24). Only five (n=5; 8.8%) of the 57 (100.0%) participants in the open-ended question (Item 53) supplied suggestions about authorisation to use a computer in the PHC setting (Table 4.5).

Table 4.5: Participants' suggestion about authorisation to use a computer

Authorisation aspects	Responses
Provision of access code (n = 3)	*"By providing each member of staff a code number".* *"Each staff to be allocated an access code so as to load information concerning to the patient according to the room where shelve is allocated for easy follow up and referral".* *"One has to log in his/her access code which he does not have".*
Responsible use of the access code (n = 1)	*"Not share the pin number to other colleagues".*
Authorised to use computer (n = 1)	*"Everyone must be authorised to use the computer".*

The use of a computer in the work setting can be easier if nurses were authorised to use computers and were fully responsible for the use of their access codes, in order to maintain confidentiality. Nurses and midwives have a professional duty to take actions for ensuring that people in their care are protected by following any established information sharing protocols. Failure to observe such protocols could amount to professional misconduct (Nursing and midwifery council, 2010: 1-7).

The responses of participants to Items 9, 10, and 11 were negatively skewed for nurses having authorisation to use computers for record keeping (Figure 4.15).

Item 12, 13, 14 and 15 addressed the specific entries on the records (Figure 4.16). The lowest mean value ($\bar{x}$ = 6.03; SD = 1.633) about specific entries on the records was found in Item 12 where 16 (12.5%) of the 127 (100.0%) participants indicated *strongly disagreement* to *neutral* responses and 31 (24.4%) indicated *that they little to moderately agreed* that the individual who last entered data on the computer should be identified. Nearly two thirds (n = 80; 63.0%) of the participants strongly agreed in Item 12.
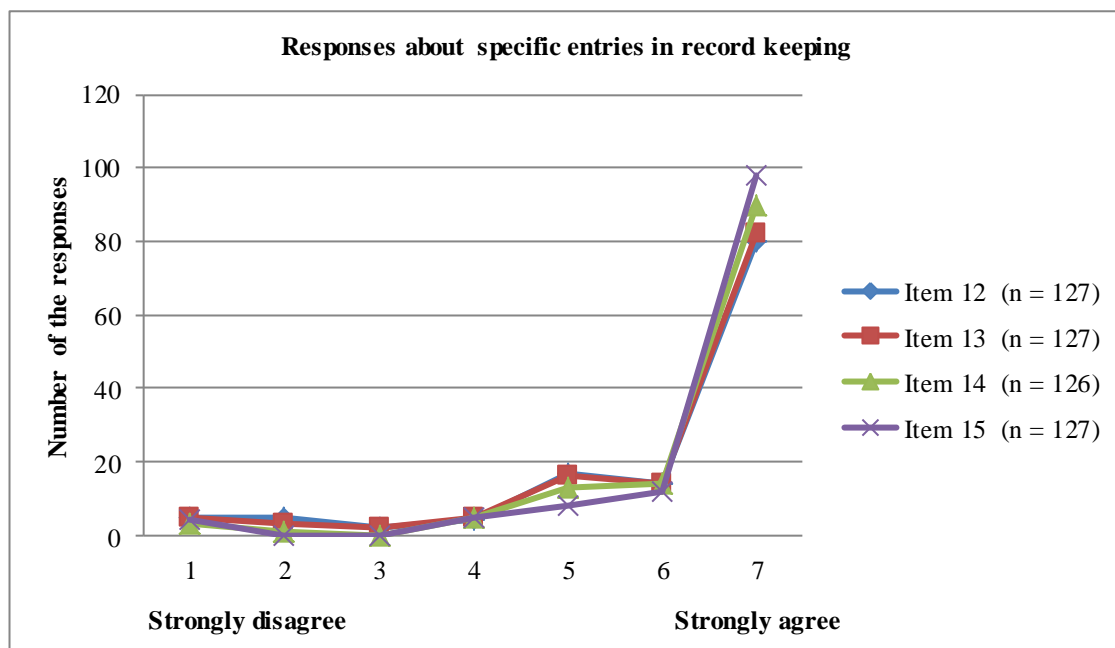
Figure 4.16: Items about specific entries in the record keeping

The highest mean value ($\bar{x}$ = 6.47; SD = 1.252) about specific entries on records was found in Item 15, where only nine (7.0%) of the 127 (100.0%) participants indicated strong disagreement to neutral responses about a backup device, while 20 (15.8%) indicated that *they little to moderately agreed* with the use of a backup device. More than three quarters (n = 98; 77.2%) of the participants *strongly agreed* that the computer information system should have a backup device (device that was used to store information for instances of hardware failure). A back-up system is one the components of an information technology infrastructure that is needed for record keeping. A database backup can easily be made on a USB flash drive to back up the entire electronic medical record (EMR) program (Andrews et al. 2004: 11-18; Electronic Medical Record (EMR) Software, 2011: 1-3).

Of the 126 (100.0%) responses in Item 14 ($\bar{x}$ = 6.38; SD = 1.251), nine (7.2%) participants indicated they strongly *disagree to a neutral response* while 27 (21.4%) indicated that *they little to moderately agreed* about dates and times of last entries made on the record, while 90 (71.4%) participants *strongly agreed* that the date and time of the last entry should be indicated in the computer. In Item 13, 15 (11.8%) of the 127 (100.0%) participants indicated they strongly *disagree to a neutral response* about the manner in which the last entry should be made, while 30 (23.6%) indicated that *they little to moderately agreed* about it. Less than two thirds (n = 82; 64.6%) of the participants *strongly agreed* that the individual who made the last entry on the specific client record should be identified. The patients' registries and administrative data about the patient are being used by the multidisciplinary stake holders in the health care system which necessitates 24-hour access to patient information, e.g. laboratory results and patient records (Wainwright & Waring, 2004: 242; Honeyboume et al. 2006: 52, 58; Langley & Beasley, 2007: 19). Therefore, it is important to identify each and every member of the health team who is making an entry on the patient record, and the date and time of such entry.

The responses of participants in Items 12, 13, 14 and 15 were negatively skewed about recording specific entries on records (Figure 4.16).
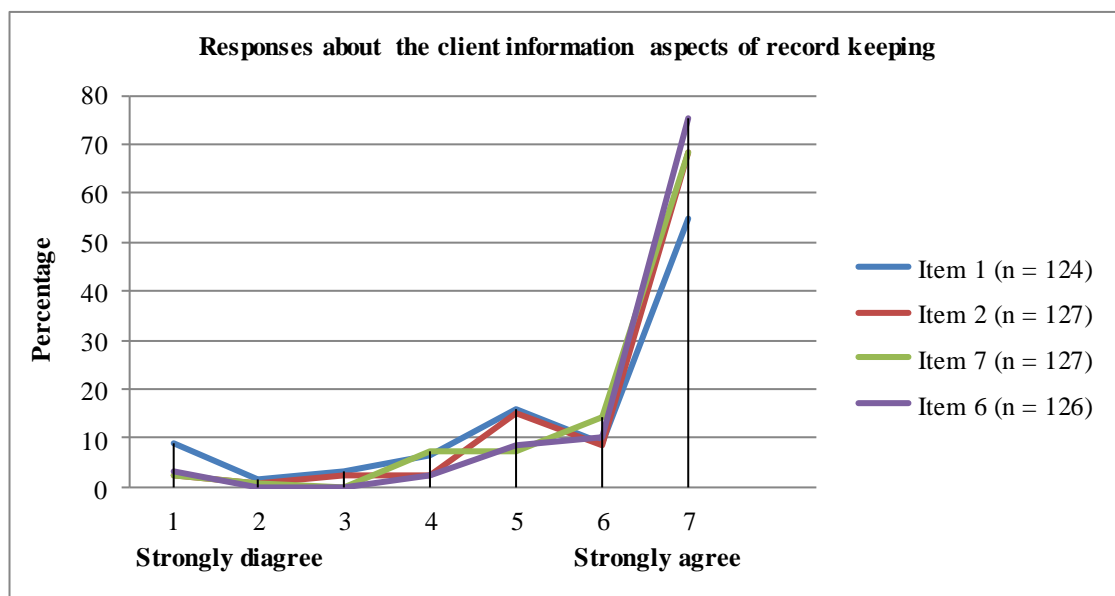
Figure 4.17: Items about the client information aspects of record keeping

Items 1, 2, 6 and 7 addressed the client's information aspects in record keeping (Figure 4.17). The lowest mean value ($\bar{x}$ = 5.65; SD = 1.909) of the client information aspects was found in Item 1 where 25 (20.2%) of the 124 (100.0%) participants indicated that they strongly *disagree to a neutral response* while 31 (25.0%) indicated that *they little to moderately agreed* about capturing client information. Little more than a half (n = 68; 54.8%) of the participants *strongly agreed* that the computer should be used for capturing client information, e.g. history taking. The responses of participants were widely distributed (SD = 1.909) around the mean value of 5.65 in Item 1.

Information that is obtained from the client, which includes objective and subjective data, is needed in order to diagnose and to plan for nursing care (Agarwal et al. 2008: 3; Jooste, 2010: 149). This information should be captured and stored in the computer in the form of an electronic health record/patient health record or electronic client record. Many authors explain an electronic client record as a record that is responsible for storing and integrating patient information from various sources into a single life time record of a client's history and care, which will be easily located, selected and retrieved; and will additionally reduce errors and duplication that are caused by multiple files and date entry points, and improve the flow of information (Tomasi et al. 2004: 867-872; Owen, 2005: 49; Chaudhry et al. 2006: 14; Langley & Beasley, 2007: 19; Healthcare Information Technology Standards Panel, 2009: 10-11; Hellström et al. 2009: 1186-1472; Jooste, 2010: 156).

The highest mean value ($\bar{x}$ = 6.46; SD = 1.237) about the client information aspects in record keeping was found in Item 6 where only seven (5.6%) of the 126 (100.0%) participants indicated that they *strongly disagree to a neutral response* about the follow-up of client information on a computer. Nearly a fifth (n = 24; 19.0%) of the participants indicated that *they little to moderately agree* with, e.g. having the physical address of the client while three quarters (n = 95; 75.4%) of the participants *strongly agreed* that the computer should be used for follow-up of client information (e.g. correct physical address of the client). A client record is a record in which all the patient information, such as residential address, is captured to be retrieved for follow-up purposes (Tomasi et al. 2004: 867-872; Owen, 2005: 49; Chaudhry et al. 2006: 14; Langley & Beasley, 2007: 19; Healthcare Information Technology Standards Panel, 2009: 10-11; Hellström et al. 2009: 1186-1472; Jooste, 2010: 156). Of the 127 (100.0%) responses in Item 7 ($\bar{x}$ = 6.32; SD = 1.290), 13 (10.3%) participants indicated *strongly disagree to a neutral response*, while 27 (21.3%) indicated that *they little to*

moderately agree with locating information about the client on the computer. More than two thirds (n = 87; 68.5%) of the participants *strongly agreed* that the location of information about the client, e.g. contact details of the next of kin, should be done on the computer. In Item 2 ($\bar{x}$ = 6.27; SD = 1.342), 10 (8.0%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response,* while 30 (23.7%) indicated that *they little to moderately agreed* and 87 (68.5%) *strongly agreed* that accessing patient information (e.g. about the previous clinic visit) should be done on the computer. The magnetic tape or smart card is an electronic system (South Africa, 2009a: 25, 31, 32) which is developed to be used by health providers and patients for user identification, electronic scheduling systems of appointments, examinations and hospital admissions (Mannan et al. 2006: 125).

Out of 39 (100.0%), Six (n=6; 15.4%) of the participants stated in an open-ended question (Item 52), the uses of the computer for client information in the work setting (Table 4.6).

Table 4.6: Participants' use of *computer* for client information in the PHC setting

Client information aspects	Responses
Capturing (n = 3)	*"Capturing the number and names of learners which I have seen in different schools".* *"Capturing client's information".* *"For capturing the support group information through the switchboard data capture".*
Storage (n = 1)	*"Store data of oxygen patient seen".*
Record keeping (n = 2)	*"Record keeping e.g. history taking previous and coming visits sequence of nursing collection".* *"Record keeping of patients/clients data".*

Computers can be used for recording, accessing, and identifying patient information. The unique patient identification number can be used for patient tracking and for entering the demographic information in a confidentially maintained electronic database (Tomasi et al. 2004: 867).

The responses of participants in the items about client information that should be recorded and stored in the computer were negatively skewed in Items 1, 2, 3 and 7 (Figure 4.17).

Items 3, 4, 5 and 8 addressed the tracking and follow-up aspects of record keeping (Figure 4.18). The lowest mean value ($\bar{x}$ = 5.73; SD = 1.622) about the tracking and follow-up aspects of record keeping was found in Item 5 where 27 (21.5%) of the 126 (100.0%) participants indicated *strongly disagree to a neutral response* about tracking by means of the computer. More participants, namely 36 (28.6%) indicated that *they little to moderately agreed* that the computer should be used for the tracking of the sequence of nursing actions that were performed on a client as spelt out in the clinic guidelines and half (n = 63; 50.0%) of the participants *strongly agreed* in Item 5.
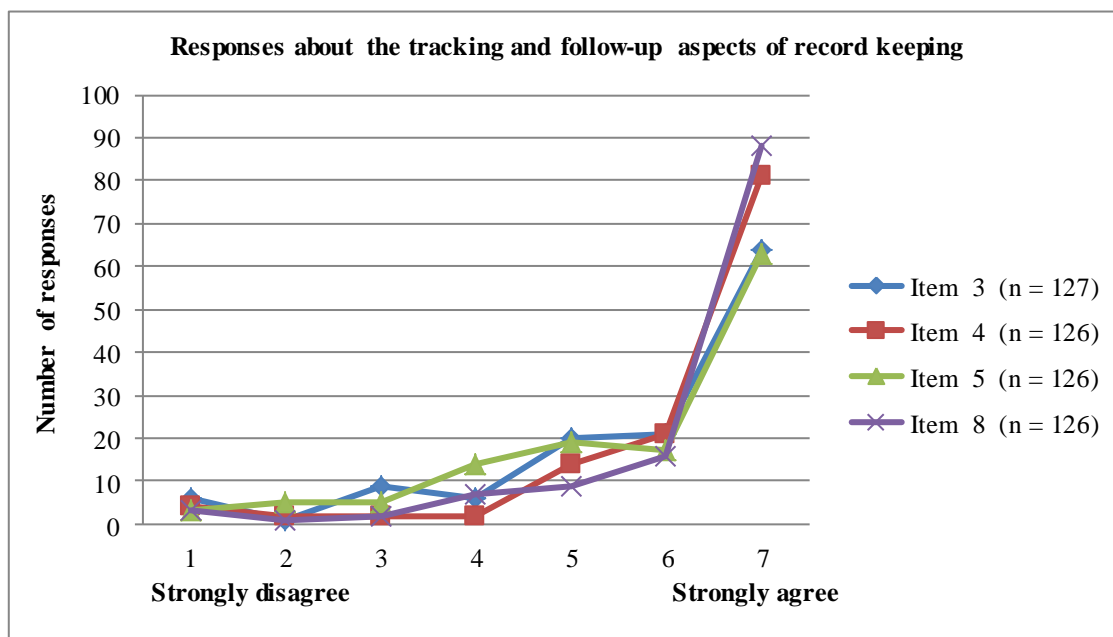
Figure 4.18: Items about the tracking and follow-up aspects of record keeping

The highest mean value ($\bar{x}$ = 6.32; SD = 1.331) about the tracking and follow-up aspects of record keeping was found in Item 8. Only 13 (10.4%) of the 126 (100.0%) participants indicated *strongly disagree to a neutral response* about the availability of patient records to other departments, while 25 (19.8%) indicated that *they little to moderately agreed* about it. A majority of 88 (69.8%) participants *strongly agreed* that there should be a link between patient records and other departments, e.g. the laboratory department to obtain blood results. The multidisciplinary stake holders in the health care system can use different means of support for 24-hour access of patient information, e.g. laboratory results and patient records (Wainwright & Waring, 2004: 242; Langley & Beasley, 2007: 19; Honeyboume et al. 2006: 52, 58).

Of the 126 (100.0%) responses in Item 4 ($\bar{x}$ = 6.23; SD = 1.404), 10 (8.0%) participants indicated *strongly disagree to a neutral response* about tracking medicine dispensing to patients, while 35 (27.8%) indicated that *they little to moderately agree* about it. Nearly two thirds (n = 81; 64.3%) of the participants *strongly agreed* that the computer should be used for tracking the medicine dispensed to a patient, e.g. anti-diabetic drugs. All pharmacies that are linked to information technology (IT) systems can receive electronic prescriptions and complete a record collates prescriptions by General Practitioners, hospitals, home care, and the clinics (Protti & Johansen, 2010: 4-6).

In Item 3 ($\bar{x}$ = 5.77; SD = 1.663), 22 (17.3%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response* about prescribing medication electronically, while 41 (32.2%) indicated that *they little to moderately agreed* about it. Half, namely 64 (50.4%) of the participants *strongly agreed* that medication, e.g. antibiotics, should be prescribed electronically. The primary care physicians should personally enter all prescriptions for medications in the computer before sending the prescription electronically to the pharmacy and an acknowledgment from the pharmacy will automatically be sent back to the physician's office system, with all transmissions encrypted (Andrews et al. 2004: 11-18; Hellström et al. 2009: 1186-1472; Protti & Johansen, 2010: 6).

In order to track and follow up on patient information and care in the computer, information should be displayed in a user friendly manner. The following responses to an open-ended question (Item 53) about the format of displaying information were supplied by only few (n=4; 7.0%) of the 57 (100.0%) participants (Table 4.7):

Table 4.7: Participants' suggestions about the format of displaying data/information

Format of displaying data/information	Responses
User-friendly format (n = 4)	*"The computer to be user friendly".* *"It should be more applicable or user friendly to the clerk".* *"It must be user friendly".* *"History taking to be in a format system so that nurses may make ticks only".*

The user-friendly format of displaying the information electronically is one of the needs for using the computer effectively in the health care setting (Jooste, 2010: 156-157).

The responses of participants in Items 3, 4, 5 and 8 were negatively skewed about the tracking and follow-up aspects in record keeping that should be maintained in the computer as illustrated by the negatively skewed graph (Figure 4.18).

4.3.2   Communication in computer information technology

Table 4.8 indicates the frequency (*f)* and the percentage (%) distribution of responses on a 7-point scale, the mean ($\bar{x}$) and the standard deviation (SD) of all 128 participants in terms of items about using a computer for communication purposes. For the purpose of describing the findings, the researcher grouped the items using a computer for communication according to the following headings:

- Information transfer (Items 23; 26; 27; 28);
- Intra-departmental communication (Items 29; 32);
- Information distribution and sharing (Items 24; 25; 33; 34; 35); and
- Patient information (Items 30; 31).

For discussion purposes, the data in Table 4.8 are presented from the highest to the lowest mean value according to each of the headings.

Table 4.8: Descriptive statistics - Communication in information technology

Heading	Item Number	Items about intra and inter facility communication using computer	Responses 1=strongly disagree and 7= strongly agree								$\bar{x}$	SD
			1 n %	2 n %	3 n %	4 n %	5 n %	6 n %	7 n %	Total n %		
Information transfer	27	Maintaining continuity of patient care when the patient is referred back, by enabling the clinics and hospitals to have access to each other's electronic record system.	6 4.7	1 0.8	0 0.0	5 3.9	17 13.4	21 16.5	77 60.6	127 100.0*	6.13	1.485
	26	Co-ordination between departments to access the client's data when the patient is referred from PHC to maternal health department.	4 3.1	1 0.8	1 0.8	4 3.1	23 18.1	23 18.1	71 55.9	127 100.0*	6.10	1.362
	23	Electronic transfer of the entire patient file.	8 6.3	2 1.6	1 0.8	4 3.1	19 15.0	21 16.5	72 56.7	127 100.0	5.95	1.661
	28	Ensuring the availability of records to enable staff members to have more time to examine clients.	6 4.8	2 1.6	2 1.6	8 6.3	21 16.7	15 11.9	72 57.1	126 100.0	5.93	1.611
Intra-departmental communication	32	Communicate with an employee about e.g. urgent circulars.	5 3.9	2 1.6	0 0.0	5 3.9	21 16.5	15 11.8	79 62.2	127 100.0*	6.12	1.478
	29	Communication with the financial managers for the approval of e.g. requisitions.	6 4.7	1 0.8	5 3.9	9 7.1	23 18.1	20 15.7	63 49.6	127 100.0*	5.72	1.612
Information distribution and sharing	34	Distribute minutes of meetings.	4 3.2	0 0.0	0 0.0	4 3.2	19 15.1	28 22.2	71 56.3	126 100.0	6.19	1.269
	35	Share information amongst colleagues, e.g. clients' attendance rates.	2 1.6	1 0.8	2 1.6	6 4.7	22 17.3	23 18.1	71 55.9	127 100.0	6.13	1.256
	33	Distribute electronic templates nurses should use to complete required information.	3 2.4	1 0.8	1 0.8	5 4.0	22 17.6	24 19.2	69 55.2	126 100.0	6.12	1.299
	25	Sharing detailed relevant reading materials.	5 4.0	1 0.8	3 2.4	7 5.6	23 18.3	26 20.6	61 48.4	126 100.0*	5.89	1.492
	24	Discussing standards of patient care with colleagues.	8 6.3	2 1.6	5 3.9	9 7.1	24 18.9	27 21.3	52 40.9	127 100.0	5.58	1.706
Patient information	30	Educate clients on factors affecting their health during teaching moment	5 3.9	3 2.4	0 0.0	7 5.5	19 15.0	25 19.7	68 53,5	127 100.0	5.98	1.512
	31	Placing information about the clinic on a website.	6 4.7	3 2.4	3 2.4	6 4.7	22 17.3	21 16.5	66 52.0	127 100.0	5.85	1.629

* Due to statistical calculations totals do not always add up to 100.0%

Items 23, 26, 27, and 28 addressed the information transfer aspects of computer communication (Figure 4.19). The lowest mean value ($\bar{x}$ = 5.93; 1.611) about the information transfer aspects was found in Item 28 where 18 (14.3%) of the 126 (100.0%) participants indicated *strongly disagree to a neutral response* about the availability of records on the computer (Table 4.8). More than a quarter, 36 (28.6%) of the participants indicated that *they little to moderately agreed* and 72 (57.1%) *strongly agreed* that the availability of records on a computer should be ensured for enabling staff to have more time to examine clients. Captured patient information in the form of an electronic patient record is used for interaction with other stakeholders who are involved with patient care at various health settings. Internet communication (Honeyboume et al. 2006: 58; *Nucita et al.* 2009: 1191) could ensure the timely availability of patient record.
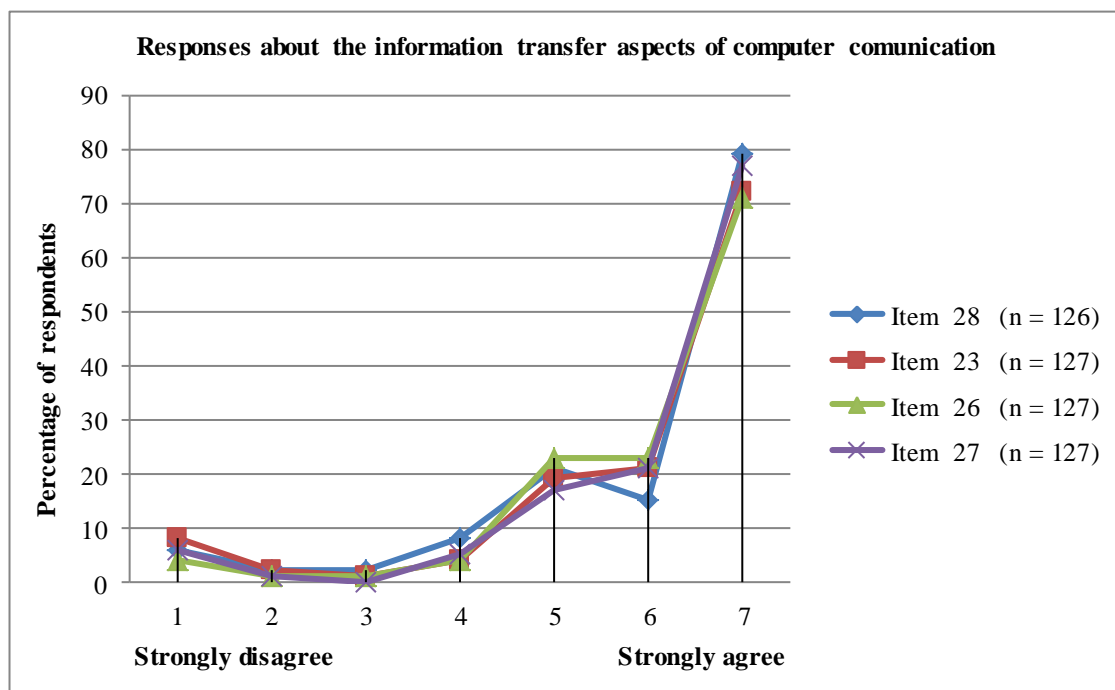
Figure 4.19: Items about the information transfer aspects of computer communication

The highest mean value ($\bar{x}$ = 6.13; SD = 1.485) about the information transfer aspects of communication was found in Item 27 where 12 (9.4%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response* about maintaining continuity of care on a computer. More participants, namely 38 (29.9%) indicated that *they little to moderately agreed* and 77 (60.6%) *strongly agreed* that the maintenance of continuity of patient care when the patient is referred back, should be ensured by enabling the clinics and hospitals to have access to one another's electronic record systems. The health providers need a record of

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the report on activities undertaken on the patient for continuation of the care and management of the patient from the hospital or specialist (Kantonen et al. 2010: 1471-1472).

Of the 127 (100.0%) responses, 10 (7.8%) participants in Item 26 ($\bar{x}$ = 6.10; SD = 1.362) indicated *strongly disagree to a neutral response* about using the computer for coordination of data amongst departments. More than a third (n = 46; 36.2%) of the participants indicated that *they little to moderately agreed* and 71 (55.9%) *strongly agreed* that computer should be used for collaboration amongst departments for accessing the client's data when the patient is referred from PHC to maternal health department.

In Item 23 ($\bar{x}$ = 5.95; SD = 1.661), 15 (11.8%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response* about using the computer for electronic transfer of patient data. Nearly a third (n = 40; 31.5%) of the participants indicated that they *little to moderately agreed* while more than the half (n = 72; 56.7%) participants *strongly agreed* that computers should be used for the electronic transfer of the entire patient file, e.g. when the doctor has a need to interact with a specialist at another institution about a more complex clinical case. An electronic patient's record is used for counter-referral activities (i.e. the return of the patient to his or her physician after specialist consultation with all the information in the file) between different levels of care (Tomasi et al. 2004: 867-872). An electronic patient's file can be transferred to a specialist but not the referral of the patient. The specialist may assess the clinical presentation of the patient's condition on the file and make recommendations regarding the treatment and send the file electronically to the physician or the nurse (Cenic et al. 2010: 4). The responses of participants about using the computer to transfer patient information from one institution to another are illustrated as negatively skewed (Figure 4.19).

Item 29 and 32 addressed the intra-departmental communication aspects of computer communication (Figure 4.20). The lowest mean value ($\bar{x} = 5.72; SD = 1.612$) about the intra-departmental communication was found in Item 29 where 21 (16.5%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response* about communication with financial managers via the computer. On the other hand, 43 (33.8%) participants indicated that *they little to moderately agreed* and 63 (49.6%) *strongly agreed* that the computer should be used for communication with the financial managers for the approval of, e.g. requisitions.

The highest mean value ($\overline{x}$ = 6.12; SD = 1.478) about the intra-departmental communication aspects of computer communication was found in Item 32 where 12 (9.4%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response* about using the computer to distribute, e.g. urgent circulars. More than a quarter (n = 36; 28.3%) indicated that *they little to moderately agreed* with the item while 79 (62.2%) *strongly agreed* that the computer should be used for communication with the employees about, e.g. urgent circulars.
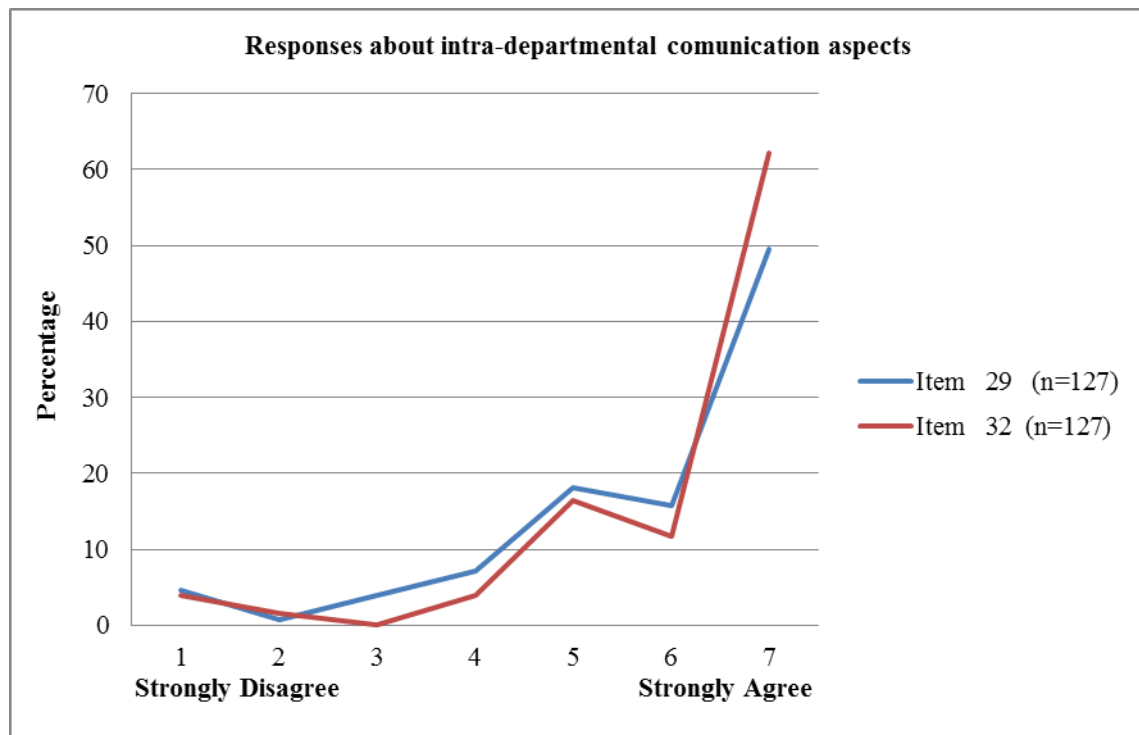
Figure 4.20: Items about intra-departmental communication aspects of computer communication

Seven (17.9%) of the 39 (100.0%) participants stated in an open-ended question (Item 52) that the method used for intra-departmental communication were referring to email and the Internet (Table 4.9).

Table 4.9: The method that is used for intra-departmental communication

Communication method	Responses (n = 7)
Email (n = 6)	*"Receiving email about new developments, e.g. circulars, new politics".* *"Receiving mails and sending them typing information".* *"Communication with other staff members and research".* *"Communication. Use of statistics".* *"Communication. Receive emails. Reply emails".* *"To access email and to email to other department".*
Internet (n = 1)	*"Internet".*

An Internet connection or satellite could make communication between various centres and internally in the facilities possible, which may include communication with colleagues via the email (Honeyboume et al. 2006: 52; Nucita et al. 2009: 1191).

The responses of the participants about intra-departmental communication were negatively skewed (Figure 4.20).

Items 24, 25, 33, 34 and 35 addressed the information distribution and sharing aspects in computer communication (Figure 4.21). The lowest mean value $(\bar{x} = 5.58; SD = 1.706)$ about the information distribution and sharing aspects in computer communication was found in Item 24 where 24 (18.9%) of the 127 (100.0%) participants indicated *strongly* disagree to a neutral response. More than a third (n = 51; 40.2%) indicated that they *little to moderately agreed* and similarly 52 (40.9%) *strongly agreed* that computers should be used for discussion about standards of patient care with colleagues. A wide distribution of responses was found in this item (SD = 1.706). One (1) participant stated in an open-ended question: "*I use the computer for communication with other staff members*". Captured patient information in the form of an electronic patient record, by means of Internet communication, is used for interaction with other stake holders who are involved with patient care at various health settings (Honeyboume et al. 2006: 52, 58; Nucita et al. 2009: 1191). Such communication includes discussion of patients' condition and treatment.
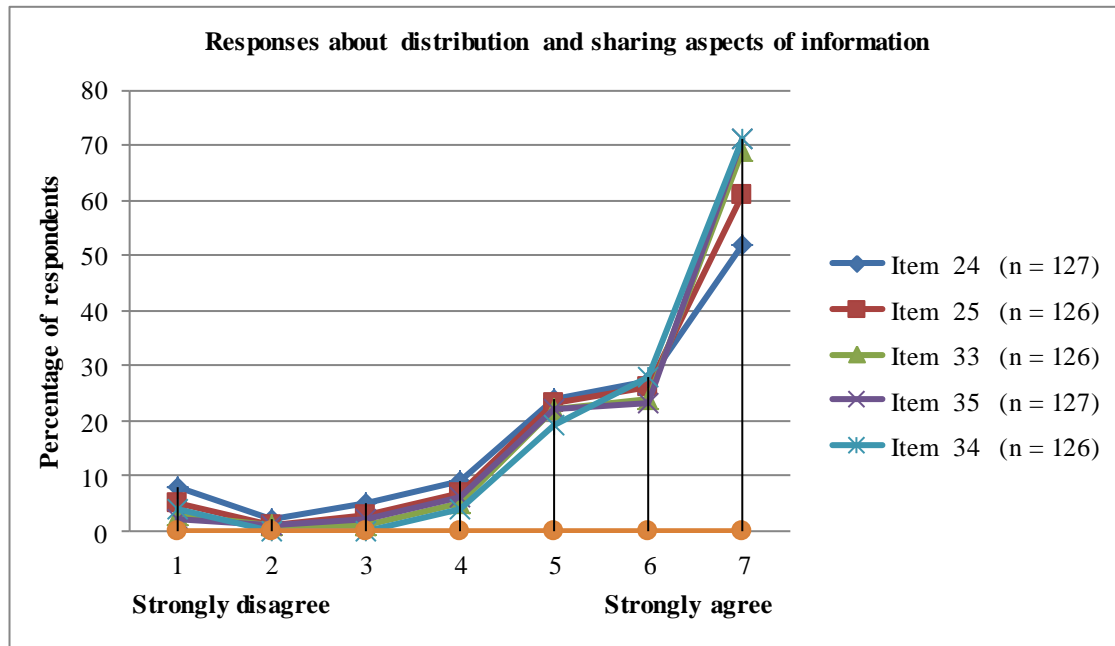
Figure 4.21: Items about the information distribution and sharing aspects of computer communication

The highest mean value $(\bar{x} = 6.19; SD = 1.269)$ about the information distribution and sharing aspects of computer communication was found in Item 34, where only eight (6.4%) of the 126 (100.0%) participants indicated *strongly disagree to a neutral response* to distributing minutes of meetings via the computer. On the other hand, 47 (37.3%) indicated that *they little to moderately agreed* and 71 (56.3%) *strongly agreed* that computer should be used for distribution of the minutes of meetings. Only two (5.1%) of the 39 (100.1%) participants mentioned the other uses of the computer in their responses to an open-ended question (Item 52):

- *"Cabinet memos/motivation letters, notices, memos"*; and
- *"Submissions, minutes"*.

In Item 35 ($\bar{x}$ = 6.13; SD = 1.256), 11 (8.7%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response* to sharing information on the computer. More than a third, namely 45 (35.4%) of the participants indicated that *they little to moderately agreed* and 71 (55.9%) *strongly agreed* that the computer can be used to share information amongst colleagues. One (1) participant stated in an open-ended question: *"Sharing messages on the computer is important"*. Nurses should share their knowledge and provide mentorship and guidance for the professional development of nursing students and other colleagues/health-

care team members (CARNA-College and Association of Registered Nurses of Alberta, 2005: 18).

Patient electronic health records or documents can be shared between any health care entity, ranging from a private physician office to a clinic, to an acute care in patient facility or to other health information systems (Afilalo et al. 2003: 3; Healthcare Information Technology Standards Panel, 2009: 10-11; Orchard et al. 2009: 1186).

Of the 126 (100.0%) responses, only 10 (8.0%) participants in Item 33 ($\bar{x}$ = 6.12; SD = 1.299) indicated *strongly disagree to a neutral response* to using templates on a computer. On the other hand, 46 (36.8%) indicated that *they little to moderate agreed* and 69 (55.2%) *strongly agreed* that the computer should be used for distribution of electronic templates to nurses with the purpose of completing required information. In Item 25 ($\bar{x}$ = 5.89; SD = 1.492), 16 (12.8%) of the 126 (100.0%) participants indicated *strongly disagree to a neutral response* to sharing of reading materials on the computer. More than a third (n = 49; 38.9%) of the participants indicated that *they little to moderately agreed* and 61 (48.4%) *strongly agreed* that the computer should be used for the sharing of detailed relevant reading material. A computer communication network that is linking primary health care practitioners in different geographical areas in the country can be used to establish an electronic journal club for users for sharing details about interesting and relevant articles in the wide range of medical journals, (Cenic et al. 2010: 4).

The majority of responses in all the items that computers can be used to distribute and share information was negatively skewed (Figure 4.21).

Items 30 and 31 addressed the patient information aspects of computer communication (Figure 4.22). The lowest mean value $(\bar{x} = 5.58; SD = 1.629)$ about the patient information aspects was found in Item 31 where 18 (14.2%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response* to placing information on a website. More than a third (n = 43; 33.8%) of the participants indicated that *they little to moderately agreed* and 66 (52.0%) *strongly agreed* that the computer can be used for placing information about the clinic on a website.
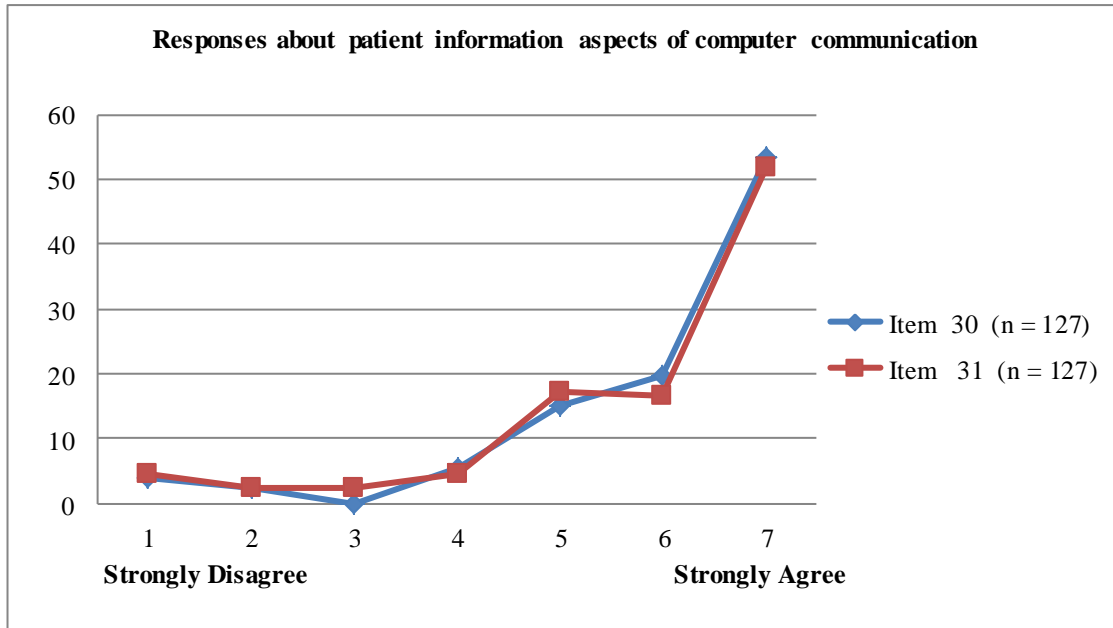
Figure 4.22: Items about the patient information aspects of computer communication

The highest mean value $(\bar{x} = 5.98; SD = 1.512)$ about the information distribution and sharing aspects of computer communication was found in Item 30, where 15 (11.8%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response* to the education of clients by using the computer. On the other hand, 44 (34.7%) of the participants indicated that *they little to moderately agreed* and 68 (53.5%) *strongly agreed* that the computer should be used for the education of the clients about factors that were affecting their health during teaching moments. Internet communication is used to provide health information to patients and their care givers in order to enhance patients' ability to self-manage their chronic conditions (e.g. generating patient information hand-outs about common chronic conditions) and enhance their ability to follow treatment, medication, and monitoring regimens (Agency for healthcare research and quality (AHRQ), 2008: 1-2).

Only four (10.3%) of the 39 (100.0%) participants stated in an open-ended question (Item 52) the uses of the computer for education in the work setting (Table 4.10).

Table 4.10: The uses of the computer for educational purposes

The use of the computer	Responses
Preparation (n = 1)	*"Prepare presentations".*
Presentation (n = 1)	*"Presentations".*
Teaching aid (n = 1)	*"As teaching aids".*
Training program (n = 1)	*"For training programme".*

However, internet explorer could be used for accessing information for self-teaching and self-learning. Accessing health literature, online journals, books and databases, and offline to informational CD-ROMs that support practising professionals are some of the educational uses of the computer in the health setting (Mannan et al. 2006: 125). A computerised clinical documentation system could be used for educational opportunities. It is a system that enables the storing of isolated and scattered information in one common depository and the physician trainee could easily access the notes of other members of the health care team which facilitates a new way of learning and paradigm shift. The trainee's notes could be corrected and augmented by the fellows and the faculty by using the system (Agarwal et al. 2008: 9).

4.3.3 Decision making based on computer information technology

Table 4.11 indicates the frequency (*f*) and the percentage (%) distribution of responses on a 7-point scale, the mean ($\bar{x}$) and the standard deviation (SD) of all 128 (100.0%) participants in terms of items about decision making when using computer information technology.

For the purpose of describing the findings, the researcher grouped the items about decision making (Table 4. 11) according to the following headings:

- Raw data and statistics (Items 38; 39; 40);
- Monitoring and reports (Items 41; 42; 44);
- The needs identification and care description (Items 36; 43; 49; 50);
- Information provision (Items 37; 45; 46; 47; 48); and

- Research (Item 51).

For discussion purposes, the data in Table 4. 11 are presented from the highest to the lowest mean value according to each of the headings.

Table 4.11:   Descriptive statistics –Decision making based on information technology

Heading	Item Number	Items about decision making	1 n %	2 n %	3 n %	4 n %	5 n %	6 n %	7 n %	Tot n %	x̄	SD
Raw data and statistics	38	Review the monthly statistics to set new clinic targets.	3 2.4	1 0.8	1 0.8	5 3.9	22 17.3	25 19.7	70 55.1	127 100.0	6.13	1.291
	39	Analyse client data using computer software - district health information system (DHIS) program.	5 4.0	2 1.6	0 0.0	10 8.0	16 12.8	27 21.6	65 52.0	125 100.0	5.97	1.497
	40	Validate entry figures (detecting numbers which lie outside of a normal range) to ensure that they are within the range of possibility.	6 4.7	2 1.6	3 2.4	11 8.7	24 18.9	22 17.3	59 46.5	127 100.0*	5.73	1.611
Monitoring and reports	42	Graphically present data for monthly reports, e.g. immunisation coverage.	4 3.1	0 0.0	1 0.8	4 3.1	17 13.4	24 18.9	77 60.6	127 100.0*	6.23	1.298
	41	Produce a report of the data for any desired period, to calculate the whole set of indicators, e.g. the number of HIV positive tests per year.	4 3.1	0 0.0	2 1.6	4 3.1	18 14.2	24 18.9	75 59.1	127 100.0*	6.18	1.330
	44	Monitor programmes, e.g. calculating the number of children who are fully immunised against the number of first (six weeks) immunisations.	5 4.0	2 1.6	1 0.8	3 2.4	15 11.9	23 18.3	77 61.1	126 100.0*	6.16	1.461
Needs identification and care description	36	Track the services that were provided to clients	3 2.4	1 0.8	2 1.6	5 3.9	19 15.0	21 16.5	76 59.8	127 100.0	6.17	1.322
	43	Identify clients' needs, e.g. measles case may indicate the need for mass campaign	4 3.1	0 0.0	3 2.4	5 3.9	18 14.2	20 15.7	77 60.6	127 100.0*	6.16	1.377
	50	Identify trends in the care provided e. g. increase of the number of diarrhoea patients per given season.	2 1.6	1 0.8	1 0.8	11 8.7	26 20.5	24 18.9	62 48.8	127 100.0*	5.98	1.282
	49	Describe the care of clients in various settings.	2 1.6	0 0.0	2 1.6	14 11.0	29 22.8	25 19.7	55 43.3	127 100.0	5.86	1.277
Obtaining and providing Information	37	Provide relevant data at clinic level	3 2.4	1 0.8	2 1.6	1 0.8	20 15.7	25 19.7	75 59.1	127 100.0*	6.22	1.266
	48	Obtain information that will assist with making decisions about patient management.	3 2.4	1 0.8	3 2.4	0 0.0	24 19.2	23 18.4	71 56.8	125 100.0	6.15	1.302
	46	Provide information for staff allocation that depends on nurse-patient ratio.	3 2.4	2 1.6	0 0.0	9 7.1	24 19.0	22 17.5	66 52.4	126 100.0	6.01	1.365
	47	Obtain information that complements the examination of a patient.	3 2.4	1 0.8	3 2.4	5 4.0	27 21.4	22 17.5	65 51.6	126 100.0*	6.00	1.356
	45	Provide information to policy makers at higher levels.	5 3.9	1 0.8	0 0.0	10 7.9	23 18.1	18 14.2	70 55.1	127 100.0	5.98	1.475
Research	51	Stimulate nursing research by means of links to existing data.	4 3.1	0 0.0	1 0.8	7 5.5	19 15.0	33 26.0	63 49.6	127 100.0	6.06	1.317

* Due to Statistical calculations totals do not always add to 100.0

Items 38, 39 and 40 addressed the raw data and statistical aspects of decision making while using computer information technology (Figure 4.23). The lowest mean value $(\bar{x} = 5.73; SD = 1.611)$ of the raw data and statistical aspects in relation to using the computer was found in Item 40 where 22 (17.4%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response*. On the other hand, 46 (36.2%) participants indicated that they *little to moderately agreed* and 59 (46.9%) *strongly agreed* that computers should be used to validate the entry figures (detecting numbers which lie outside of a normal range) for ensuring that they are within the range of possibility. Decision making at public health institutions depends on the availability of reliable information which is generated, analysed, and disseminated by information systems, such as computer hardware and software (Williamson et al. 2002: 4; Tomasi et al. 2009: 1-2).

The highest mean value $(\bar{x} = 6.13; SD = 1.291)$ of the raw data and statistical aspects in decision making was found in Item 38, where 10 (7.9%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response* about the review of monthly statistics with the aid of the computer. More than a third (n = 47; 37.0%) of the participants indicated that they *little to moderately agreed* and 70 (55.1%) *strongly agreed* that the computer should be used for the review of monthly statistics with the purpose of setting new clinic targets. The clinic targets could be renewed or aligned with the priorities of the department, such as millennium development targets for continual improvement of quality in service delivery (South Africa, 2004-2009: 32).

In order to use information software to validate the entry figures, analyse the client's data, review the monthly statistics with the purpose of setting the new clinic targets, the computer could be used for capturing the information. Eleven (n=11; 28.2%) out of 39 (100.0%) participants stated in an open-ended question (Item 52) that the application of the computer for statistical purposes mainly included the capturing of data and submitting data elsewhere (Table 4.12).

Table 4.12: The uses of the computer for statistical purposes

Uses of the computer	Responses (n = 11)	
Statistics and data	*"Capture statistics".*	(n = 3)
	"Do statistics records".	(n = 2)
	"Capturing of data".	(n = 2)
	"Entering of daily statistics".	(n = 1)
	"For compiling stats".	(n = 1)
Submission and print out	*"Print stat for different department".*	(n = 1)
	"Submission of stat".	(n = 1)

In Item 39 ($\bar{x}$ = 5.97; SD = 1.497), 17 (13.6%) of the 125 (100.0%) participants indicated *strongly disagree to a neutral response* to data analysis by means of a software program. On the other hand, 43 (34.4%) participants indicated that *they little to moderately agreed* and 65 (52.0%) *strongly agreed* that computers should be used for analysis of client data by using computer software programs, such as the district health information system (DHIS) program. The health information system software program (HISP) is one of the effective health information systems that can be used to provide an incentive and accountability for evidence–based decision making at, e.g. PHC clinics (Jamison et al. 2006: 35; Stansfield et al. 2006: 1).
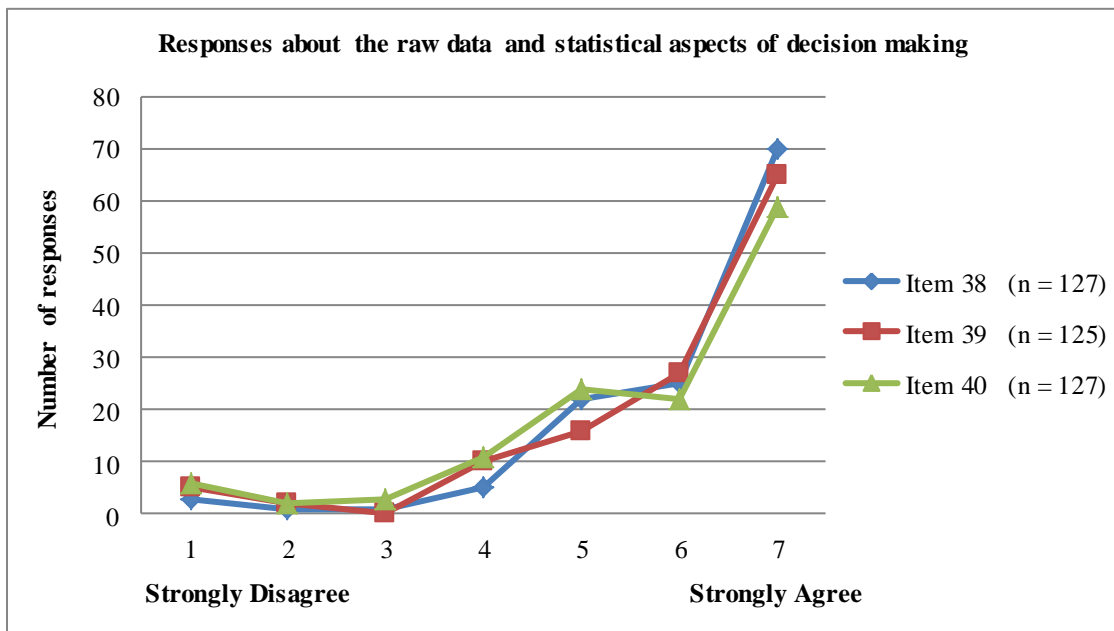
Figure 4.23: Items about the raw data and statistical aspects of decision making based on information technology

The responses of the participants to raw data and statistical aspects of decision making were negatively skewed (Figure 4.23).

Items 41, 42 and 44 addressed the monitoring and reporting aspects of decision making by using the computer information (Figure 4.24). The lowest mean value $(\bar{x} = 6.16; SD = 1.461)$ about the monitoring and reporting aspects was found in Item 44 where only 11 (8.8%) of the 126 (100.0%) participants indicated *strongly disagree to a neutral response* to the item, while 38 (30.2%) participants indicated *little to moderately agreement* to it. The majority (n = 77; 61.1%) of the 126 participants *strongly agreed* that computers should be used for monitoring of the programmes, e.g. calculating the number of children who are fully immunised according to the number of first (six weeks) immunisations.

The highest mean value $(\bar{x} = 6.23; SD = 1.298)$ about the monitoring and reporting aspects of decision making was found in Item 42, where only nine (7.0%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response* to graphical presentation of data for monthly reports. Less than a third (n = 41; 32.3%) of the participants indicated that *they little to moderate agreed* while 77 (60.6%) participants *strongly agreed* that computers should be used for graphical presentation of data for monthly reports, e.g. immunisation coverage

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reports. The report about less coverage of the immunisation programme may result in decision making about a mass immunisation campaign and consequently the report of no infection for a defined period of time may result in the declaration of a disease free country, e.g. declaring South Africa a polio-free country (South Africa, 2004-2009: 4).
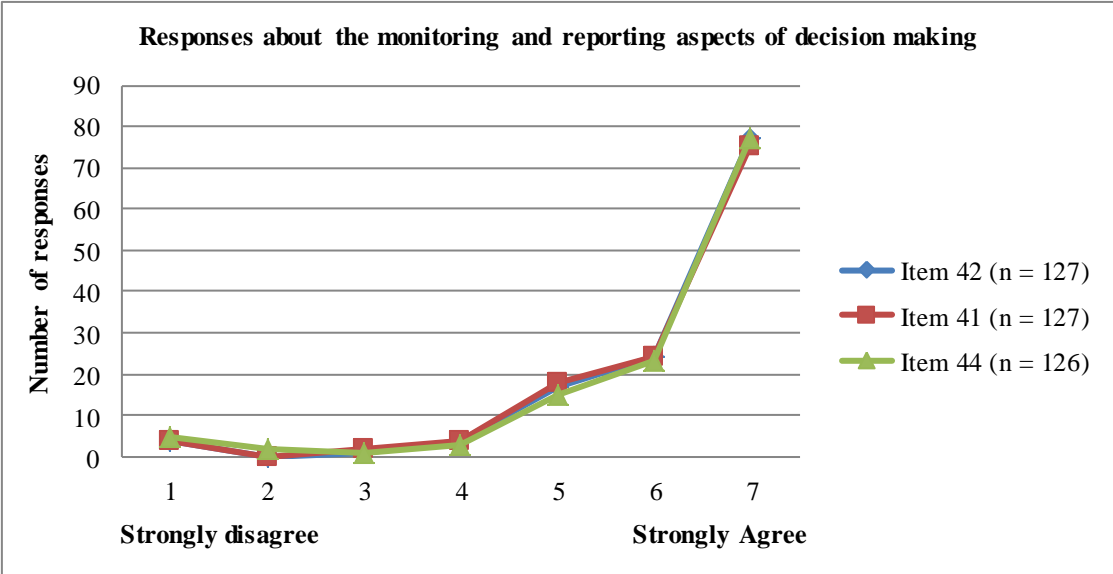
Figure 4.24: Items about the monitoring and reporting aspects of decision making based on information technology

Of the 127 (100.0%) responses, 10 (7.8%) participants in Item 41 ($\bar{x}$ = 6.18; SD = 1.330) indicated *strongly disagree to a neutral response* while 42 (33.1%) indicated that *they little to moderately agreed* that producing a report of data should be compiled by a computer. More than half, 75 (59.1%) of the 127 participants *strongly agreed* that the computer should be used to produce a report of the data for any desired period to calculate the whole set of indicators, e.g. the annual number of HIV positive tests. Reports about the performance of different health units can be presented by compiling a report of the data for any desired period and calculating the whole set of indicators, e.g. head-count of under-five and above-five years, in order to identify gaps in meeting the set targets (Williamson et al. 2002: 2; Tomasi et al. 2004: 867-872).

Six (n=6; 15.4%) of the 39 (100.0%) participants stated in an open-ended question (Item 52), the uses of the computer for producing and submitting such reports (Table 4.13).

Table 4.13: The uses of the computer for producing and submitting reports

Uses of computer	Responses (n = 6)
Reports (n = 3)	*"Statistics. Unit Reports".* *"Capturing of reports".* *"Do statistics records".*
Submission and e-mail (n = 3)	*"Submission of data".* *"Submission of reports".* *"Email report to stats department".*

The responses of the participants to all the items about the use of computers for monitoring, evaluating and reporting clinic performance in order to make decision were negatively skewed (Figure 4.24).

Items 36, 43, 49 and 50 addressed the needs identification and care description aspects of decision making by using computer information technology (Figure 4.25). The lowest mean value $(\bar{x} = 5.86; SD = 1.277)$ about the needs identification and care description aspects was found in Item 49. 18 (14.2%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response* while 54 (42.5%) indicated that they *little to moderately agreed* that the computer should be used for implementing a nursing minimum data set. Less than the half, namely 55 (43.3%) of the 127 participants *strongly agreed* that the computer should be used to implement a nursing minimum data set for a complete collection of clinical settings for the description of clients' care in various settings.
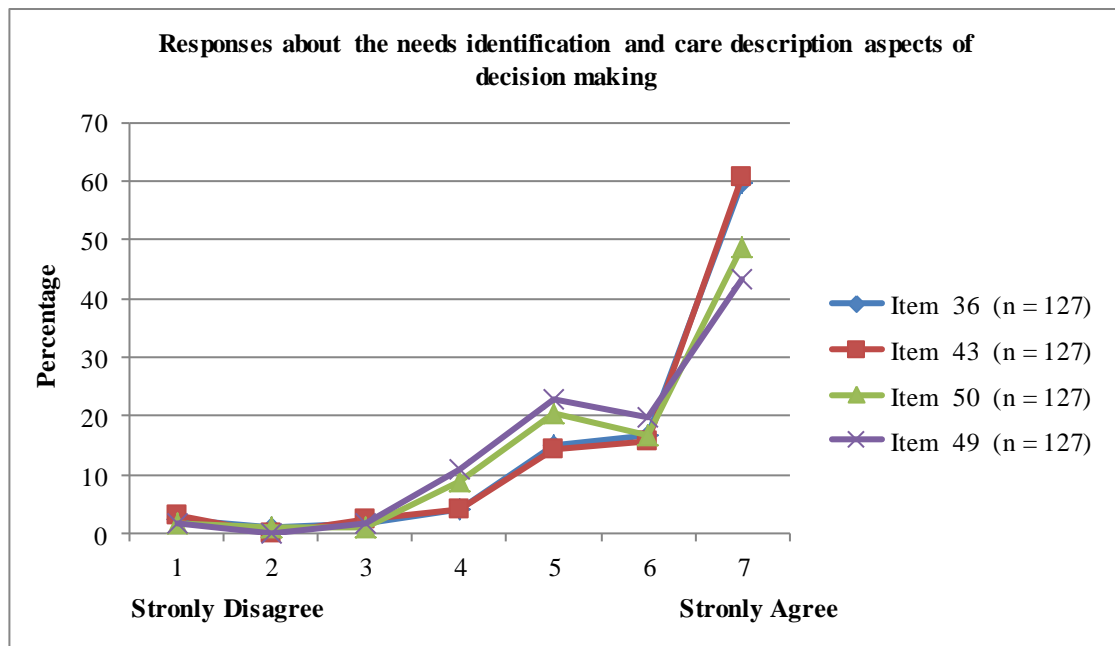
Figure 4.25: Items about the needs identification and care description aspects of decision making

The highest mean value $(\bar{x} = 6.17; SD = 1.322)$ about the needs identification and care description aspects of decision making was found in Item 36 where only 11 (8.7%) of the 127 (100.0%) participants indicated *strong disagree to a neutral response* to tracking of services by using the computer. On the other hand, 40 (31.5%) participants indicated that *they little to moderately agreed* and 76 (59.8%) *strongly agreed* that the computer should be used for the tracking of services that were provided to the patients. Of the 127 responses, 12 (9.4%) participants in Item 43 ($\bar{x}$ = 6.16; SD = 1.377) indicated *strongly disagree to a neutral response* to the identification of patients' needs by means of the computer, while 38 (29.9%) indicated that *they little to moderately agreed* and 77 (60.6%) *strongly agreed* that the computer should be used for the identification of clients' needs, e.g. measles cases may indicate the need for a mass campaign. One (1) participant stated in an open-ended question that he/she used the computer in the work place to: "*Identify problems or learners with barriers*". The use of an information system at all levels of service delivery, which includes school health services, will inform the different sectors about making effective use of existing services, identifying gaps in service delivery and monitoring the progress with regard to the development of health promoting schools (South Africa, 2009a: 5, 61).

In Item 50 ($\bar{x}$ = 5.98; SD = 1.282), 15 (11.9%) of 127 (100.0%) participants indicated *strongly disagree to a neutral response* while 50 (39.4%) indicated that *they little to*

moderately agreed with identifying trends of care. Less than half, namely 62 (48.8*%)* of the 127 (100.0%) participants *strongly agreed* that the computer should be used for the identification of trends in the care provided, e.g. increased number of diarrhoea patients per given season. One (1) participant stated in an open-ended question that he/she used the computer in the work place to: "*Collect information for the patient*".

Computerised statistics can be used to guide managerial decisions in the management of health service and quality improvement by tracking the services provided by the health institution, e.g. new tuberculosis patients may indicate communities in particular need of intensive patient finding or control of spread (Williamson et al. 2002: 2; Tomasi et al. 2004: 867-872).

The responses to all the items in relation to using computer information technology to identify the needs and describe the care needed by the client, were negatively skewed (Figure 4.25).

Items 37, 45, 46, 47 and 48 addressed obtaining and providing information for decision making purposes by using computer information technology (Figure 4.26). The lowest mean value $(\bar{x} = 5.98; SD = 1.475)$ was in Item 45, where 16 (12.6%) of the 127 (100.0%) participants have indicated s*trongly disagree to a neutral response* to providing information to decision makers. Less than a third, 41 (32.3%) of the 127 (100.0% participants indicated that *they little to moderately agreed* to it. Slightly more than half, namely 70 (55.1%) of the 127 (100.0%) participants *strongly agreed* that the computer should be used for providing information to decision makers. Health managers are responsible for monitoring the health programmes at institution and district level due to an obligation to periodically disclose appropriate information in adequate detail and consistent form to all contractually involved parties (Mosby's Dental Dictionary, 2008: 1).

Responses about obtaining and providing of information aspects for decision making
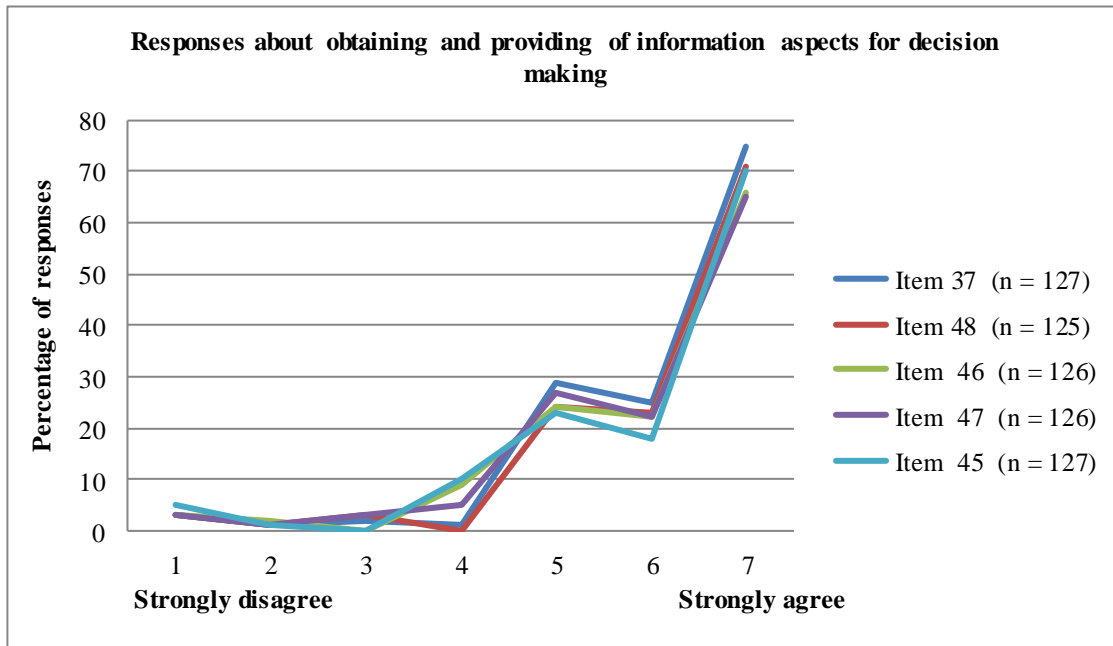
Figure 4.26: Items about obtaining and providing of information aspects for decision making

The highest mean value $(\bar{x} = 6.22; SD = 1.266)$ about obtaining and providing of information aspects for decision making was found in Item 37 where only 7 (5.5%) of the 127 (100.0%) participants indicated *strongly disagree to a neutral response* to obtaining information and providing relevant data at clinic level via the computer. On the other hand, 45 (35.4%) of the 127 (100.0%) participants indicated that *they little to moderately agreed* and 75 (59.1%) *strongly agreed* that the computer can be used for providing relevant data at clinic level. In Item 48 ($\bar{x}$ = 6.15; SD = 1.302), 7 (5.6%) of the 125 (100.0%) participants indicated *strongly disagree to a neutral response* while 47 (37.6%) indicated that they *little to moderately agreed* and 71 (56.8%) *strongly agreed* that the computer should be used for obtaining information that will assist the making decisions about patient management.

Of 126 (100.0%) responses, 14 (11.1%) participants in Item 46 ($\bar{x}$ = 6.01; SD = 1.365) indicated *strongly disagree to a neutral response* to monitoring nurse-patient ratios by means of the computer. On the other hand, 46 (36.5%) of the 126 (100.0%) participants indicated that they *little to moderately agreed* and 66 (52.4%) *strongly agreed* that the computer should be used for providing information for the purposes of staff allocation that depends on the nurse-patient ratio. Computer information technology can be used for planning the health

services at higher levels, e.g. the calculation of nurse-patient ratios may indicate a staff shortage at the clinics. In turn, it can inform the shortage of nurses in the country leading for developing policy at a higher level about the number of students to be trained by each university and nursing college (Tomasi et al. 2009: 1-2; Agency for healthcare research and quality (AHRQ), 2008: 1-2).

In an open-ended question (Item 53), only five (n=5; 8.8%) of the 57 (100.0%) participants expressed their concerns and suggestions about the shortage of staff and the use of the computer at PHC clinics. Comments were supplied with regard to time and the appointment of a clerk (Table 4.14).

Table 4.14: Participants' concerns and suggestions about the use of computers and staff shortage

Concerns and suggestions	Responses
Time (n = 3)	*"I wish there was time to sit on computer (shortage of staff limit us using computer)".* *"Each one to be trained to use a computer then in order to save time when trying to access patient information".* *"It is time consuming".*
Appointment of the clerk (n = 2)	*"If there can be clerks who can capture data of patients".* *"The clerk must be appointed to store patient's information".*

Nurses should value and promote quality practice environments that have the organisational structures and resources necessary to ensure the safety, support and respect of all persons in the work setting. Nurses must promote, to the extent it is possible within the circumstances, sufficient human and material resources for providing safe and competent care. When there is a staff shortage, nurses must set priorities that are reflecting the allocation of resources. Nurse managers/administrators must strive to provide adequate staff for meeting the requirements of nursing care as part of their fundamental responsibility to promote practice environments where fitness to practise and safe care can be maintained (CARNA-College and Association of Registered nurses of Alberta, 2005: 19, 20).

In Item 47 ($\bar{x}$ = 6.00; SD = 1.356), 12 (9.6%) of 126 (100.0%) participants indicated *strongly disagree to a neutral response* to using the computer to compliment examinations of patients. On the other hand, 49 (38.9%) of the participants indicated that they *little to moderately agreed* and 65 (51.6%) *strongly agreed* that the computer should be used for obtaining information that complements the examination of a patient.

The responses to all the items about the computer being used for providing information to expedite solutions and decisions at managerial level were negatively skewed (Figure 4.26).

Item 51 addressed the research aspect of decision making while using computer information technology (Figure 4.27). The mean value $(\bar{x} = 6.06; SD = 1.317)$ was found on this item, where 12 (9.4%) of the 127 participants indicated *strongly disagree to a neutral response* while 52 (41.0%) indicated that they *little to moderately agreed* and 63 (49.6%) *strongly agreed* that the computer could be used for stimulating nursing research by means of links to existing data.
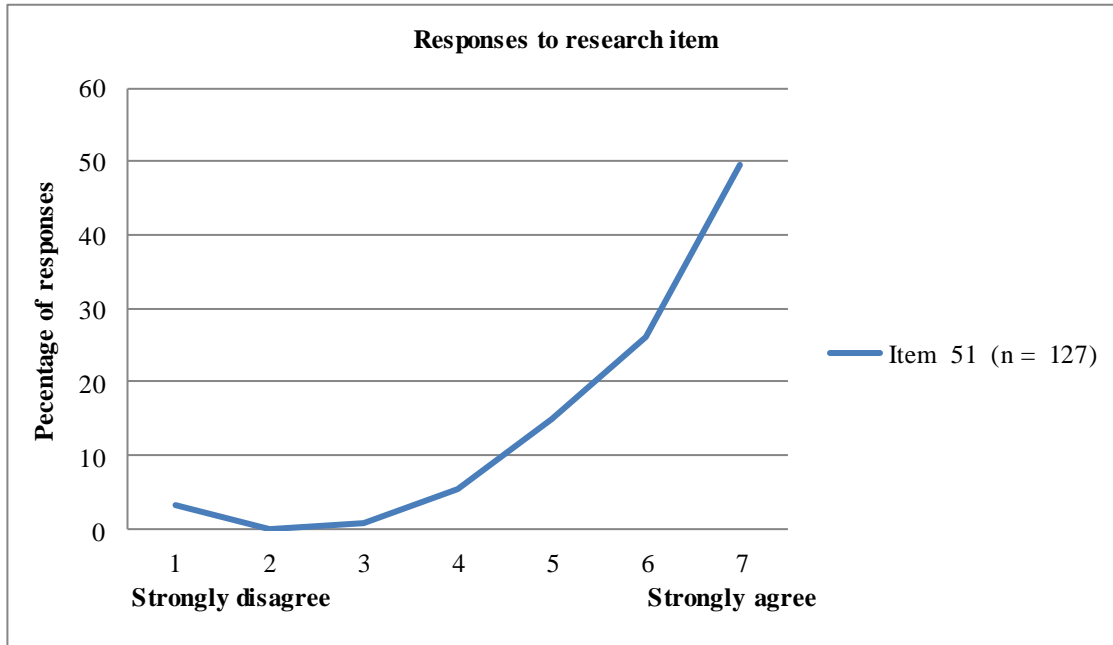
Figure 4.27: Item about the research aspect of decision making

The majority of the participants agreed that the use of computers for implementing a nursing minimum data set amongst all clinical populations / settings could stimulate research studies as illustrated by negatively skewed graph (Figure 4.27). Nurses should promote on-going research that is designed to identify best nursing practices, and to collect and interpret nursing care data at all level of care (CARNA-College and Association of Registered nurses of Alberta, 2005: 14).

Three (n=3; 7.7%) of the 39 (100.0%) participants stated in an open-ended question (Item 52) their uses of the computer for research purposes (Table 4.15).

Table 4.15: Participants' use of the computer for research purposes

The uses of the computer	Responses
Conducting research (n = 1)	*"Conducting research".*
Research data capturing (n = 1)	*"Research and or data capturing purposes".*
Communication and research (n = 1)	*"Communication with other staff members and research".*

A computer communication network that is comprehensively linking primary health care practitioners in different areas of the country can be applied for research purpose, i.e. a nurse/practitioner who is communicating with relevant experts at a university to gain advice about research and medical computing by using a computer communication network, since primary health care practitioners and universities are linked (Cenic et al. 2010: 4).

4.4 Conclusion

In Chapter 4, the findings indicate that certain aspects about computer use should be addressed. For purposes of the conclusion, the researcher established certain criteria for identifying the items that present problems. The first question of the research (How do nurses perceive the use of computer information technology at the primary health care clinics?) had been answered. The findings indicate that the participating nurses perceived the use of computer information technology to a lower extent in relation to certain items. These were items with a mean value of < 6.0; a standard deviation (SD) > 1.500; a disagreement to a neutral response of > 15.0% (Table 4.16).

Table 4.16:   The items with the mean value of < 6.0, SD > 1.500, strongly disagreement to a neutral rating > 15%

Headings in the questionnaire	Topic	Items
Record keeping using computer in primary health care clinics	Staffing	Item 17 (Submission of a leave request for authorisation purposes).
		Item 18 (Authorisation of the leave form by the supervisor)
		Item 20 (Monthly allocation of staff members to different departments in the clinic).
	Authorization in record keeping	Item 9 (Authorising nurses to update a record on the computer).
		Item 10 (Issuing nurses with a computerised access code, to replace the signature, which identifies the individual using the computer system).
		Item 11 (The responsible use of access codes)
	Specific entrance on records	Item 12 (Identify the individual who has last entered data on a computer)
		Item 13 (Identify the individual who made the last entry on the specific client record)
	Client specific information	Item 1 (Capturing client information on e.g. history taking).
	Tracking and follow up	Item 3 (Electronic prescription of e.g. antibiotics)
		Item 5 (Tracking the sequence of nursing actions performed on a client as spelt out in the clinic recommendations.)
Communication using computer internally and outside the clinic	Information transfer	Item 23 (Electronic transfer of the entire patient file)
		Item 28 (Ensuring the availability of records to enable staff members to have more time to examine clients).
	Intra-departmental communication	Item 29 (Communication with the financial managers for the approval of e.g. requisitions).
	Information distribution and sharing	Item 24 (Discussing standards of patient care with colleagues)
		Item 25 (Sharing detailed relevant reading materials)
	Patient information	Item 30 (Educate clients on factors affecting their health during teaching moment)
		Item 31 (Placing information about the clinic on a website).
Decision making using computer information	Raw data and statistics	Item 39 (Analyse client data using computer software - district health information system (DHIS) program)
		Item 40 (Validate entry figures (detecting numbers which lie outside of a normal range) to ensure that they are within the range of possibility)
	Needs identification and care description	Item 49 (Describe the care of clients in various settings).
		Item 50 (Identify trends in the care provided e. g. increase of the number of diarrhoea patients per given season).
	Obtaining and providing Information	Item 45 (Provide information to policy makers at the higher levels)

CHAPTER 5
GUIDELINES, LIMITATIONS AND RECOMMENDATIONS

5.1 Introduction

In this study, a quantitative research design was followed in terms of which the perceptions of professional nurses in respect of the use of information technology in primary health care in the East of Ekurhuleni were explored and described. A survey by means of questionnaires was carried out. It was followed by a data analysis which was conducted with the assistance of STACON at the University of Johannesburg. Descriptive statistics was utilised. The principle of validity and reliability were adhered to and ethical considerations were also taken into account during the study.

The purpose of study was to explore and describe the perceptions of nurses about the use of computer information technology at primary health clinics in order to describe the recommendations for the actions to be taken by the nurse manager about computer information technology.

The second objective of the study was to describe the recommendations for the actions to be taken by the nurse manager about computer information technology. The findings indicated that there were aspects that need to be addressed in relation to the use of information technology at primary health care clinics.

The possible limitations of the study, as well as the recommendations for nursing practice, nursing management and nursing research are also presented in this chapter.

The findings in data analysis, which were the items with a mean value of < 6.0, SD > 1.500, strong disagreement to a neutral rating > 15% as presented in Table 4.16 were used as the point of departure for the description of the recommendations in relation to the actions to be taken by nurse managers about the use of information technology.

5.2 The recommendations about the use of computer information technology in primary health care

The recommendations will address the following headings:

- Record keeping in computer information technology;
- Communication in computer information technology; and
- Decision making based on computer information technology.

The existing information systems are fragmented and incompatible, manually driven with minimal computerisation, providing inadequate analyses, interpretation and use of data at PHC level. These circumstances necessitate the proper use of computer information technology at the health facilities. Recommendations may assist the nurse manager with the use of computer information technology at primary health care clinics in the Eastern Region of Ekurhuleni.

Each recommendation outlines the actions that the nurse manager should execute in relation to the use of computer information technology in a PHC setting.

5.2.1 Record keeping in computer information technology

In order to improve service delivery, reduce the cost of providing health care and enhance the management and control of services, the use of computer information technology at the health facilities is needed (South Africa, 2009a: 31). Capturing and retrieving information by using the computer is the first step in the proper implementation of information technology. Record keeping using the computer at PHC clinics depends on several factors which include the availability and accessibility of the computers, computer literacy, staff shortages and motivation**.**

5.2.1.1 Recommendation 1: The nurse manager should address the staffing aspects of record keeping which include: leave management and staff allocation (Item 17, 18, 20)

Rationale

The quality of services essentially depends on proper and efficient staffing and quality leave management systems. The staff deployment; allocation, management and control of leave of absence are considerably intensifying the demands that are made on scheduling managers. The vital decisions such as determination of the types of leave, the employee 's leave entitlement, the circumstances and conditions to be considered for leave authorization, are often made under intense time pressure, and quick responses to schedule changes are required. The use of information technology may relieve the workload of scheduling managers and enhance the efficiency of coordinating personnel deployment (South Africa, 2008a: 7; Air transport IT services, 2012: 1-2). The use of an electronic system makes the management of leave of absence easier, by monitoring the leave of absence plan, detecting trends in leave patterns, providing the reports when needed, saving time of managers and ultimately improving the quality of service (My Vacation Tracker scheduled software, 2012: 1-2).

The following actions should be included in the management of leave of absence while using computer information technology in the PHC setting:

The nurse manager should:

- use an available electronic system for management of leave of absence, such as the Leave PERSAL System which is used nationwide (Rohde, Shaw, Hedberg, Stoops, Venter, Venter, Matshisi, 2010: 202, 208).
- provide members of staff with development activities (Australia, 2011: 2) which include training of the electronic leave management system.
- manage all types of vacation or leave as defined in the Gauteng Provincial Health Leave Policy and determination on leave of absence in the health service (South Africa, 2004c: 1-10; South Africa, 2008a: 10-25).
- schedule, plan and track each vacation and leave plan.

- ensure the use of an electronic leave application software (the software which will access the employees' leave applications, the type/s of e-leave and the system calendar) and online leave submission which will automatically update e-leave applications (Leave PERSAL system).
- verify and approve/decline the leave request by using an electronic system (the leave software will calculate the number of leave days applied for and leave balances).
- monitor a leave plan, detect trends in leave patterns and patterns of absenteeism using the computer.
- provide reports about leave management when they are needed and save time of managers and ultimately improve the quality of service by using an electronic leave system.

The following actions should be included in staff allocation while using the computer information technology in a PHC setting:

The nurse manager should:

- have a human resource (HR) database (BAS) where all the HR information is stored. BAS is an electronic system that is used nationwide for storing and managing of HR information (Rohde et al. 2010: 202, 208).
- have job descriptions, the requirements of the work unit and the objectives available before he/she is allocating staff at clinics.
- provide an opportunity for discussion of workload in the context of the staff members' duties, the requirements of the work unit, the objectives and time frames agreed between the staff member and the manager.
- consider peak and off-peak work periods when allocating staff members at clinics.
- set realistic priorities and time frames for projects in primary health care.
- ensure that a position description exists and is up-to-date, as part of the Performance Planning and Review Process at district level.
- ensure that workload is taken into consideration when developing the work area operational plan at district level.
- annually review the work area operational plan, including staffing requirements, e.g. the taking of leave/vacation.

- offer training where appropriate to members of staff in prioritising, time management, and building new skills to assist staff in performing their duties efficiently and effectively (while being mindful that time is allocated for training in such a way that participation in training will not increase a staff member's workload.)

- have the information on the website (such as dealing with workload concerns) which members of staff can use for advice about resolving problems associated with unreasonable workload.

- allocate staff accordingly and appropriately by using the computer.

5.2.1.2 Recommendation 2: The nurse manager should address the authorisation aspects in record keeping which include: issuing access codes, responsible use of access codes and the reasons for access codes when using computer information technology (Item 9, 10, 11)

Rationale

The quality of care depends on the accuracy of the information that is obtained from the client and from records. Lack of confidentiality between the client and the care giver will result in mistrust which may lead to inaccurate information that gets obtained from the client and consequently misdiagnosis and mismanagement of the client's condition follow. Health providers should protect the confidentiality of all information that is gained in the context of the professional relationship, and practise within the framework of the relevant laws that are governing privacy and confidentiality of personal health information (South Africa, 2000: 1; College and Association of Registered Nurses of Alberta (CARNA), 2005: 17). Nurses and midwives have a professional duty to take action for ensuring the people in their care are protected by following any established information sharing protocols. Failure to take such action could amount to professional misconduct on their part (Nursing and Midwifery Council, 2010: 1-7).

Unauthorised access to health records may result in litigation that is associated with increased costs. Therefore, it is the responsibility of the person in charge of the health establishment, such as a primary health care clinic to implement control measures for preventing unauthorised access to health records (e.g. issuing of access codes in case of electronic record

keeping), and to the storage facility or a system where records are kept (South Africa, 2004a: 24).

The following actions should be included when authorising the nurses to use computer information technology in a PHC setting:

The nurse manager should:

- avoid computer misuse by securing computer programmes and data against unauthorised access or alteration, thereby ensuring that any person who is updating records on the computer is identifiable.
- implement control measures to prevent unauthorised access to patient records. The control measures that need to be in place include Information Sharing Protocols, i.e. the documented rules and procedures for the disclosure and use of patient information between two or amongst more units, organisations or agencies, in relation to security, confidentiality and data destruction (Nursing and Midwifery Council, 2010: 1-7).
- have in place a program which allows the use of electronic signatures. The signatures should be legible and signatures need to be linked to the rank of each person.
- protect the confidentiality of all information that is gained in the context of the professional relationship, by ensuring the discipline and protection of professional secrecy by the nursing staff.
- make sure that nurses practise within the framework of relevant laws that are governing privacy and confidentiality of personal health information (South Africa, 2000: 1; College and Association of Registered Nurses of Alberta (CARNA), 2005: 17) by making these laws accessible by means of training and availability.
- make sure that nurses are authorised to use computer programmes and data for the delivery of patients care by issuing them with access codes. These codes need to be changed on a regular basis. The nurse manager should make sure that nurses take responsibility for the use of their access codes. When the users go beyond what they are permitted to do, the action should be viewed as misconduct.
- allow the nurses to update the patient information electronically by making computers available at each consultation room. Data collection tools needs to be located at points where routine record keeping of patient care takes place (Rohde et al. 2010: 202).

- have information sharing protocols implemented and ensure that nurses and midwives follow them correctly.

5.2.1.3 Recommendation 3: The nurse manager should address the capturing, tracking and follow up of client information aspects during record keeping (Item 1, 3, 5)

Rationale

It is not possible to use information technology in any setting without beginning with capturing or retrieving information from the computer. Lack of information technology infrastructure and computer literacy in the health setting constitute the major obstacles in the use of information technology (Andrews et al. 2004: 11-18). The use of electronic medical systems strengthens the district health system, improve the quality of services, lead to better stock control of medication and improve the comprehensive experience of patients at facilities by shorting queues and reducing waiting times (Agarwal et al. 2008: 3, 8).

Many authors indicate that capturing and storing patient information in the computer in the form of an electronic health record/patient health record or electronic medical record, reduce errors that are caused by multiple files and date entry points, reduce duplication and improve the flow of information (Tomasi et al. 2004: 867-872; Owen, 2005: 49;   Chaudhry et al. 2006: 14; Langley & Beasley, 2007: 19; Healthcare Information Technology Standards Panel, 2009: 10-11; Hellström et al. 2009: 1186-1472;   Orchard et al. 2009: 1186; Devine, Hollingworth, Hansen, Lawless, Wilson-Norton, Martin, Blough & Sullivan, 2010: 152-167; Jooste, 2010: 156).

Patient safety and accurate dispensing can be enhance by the using systems such as a national pharmaceutical association database (Tomasi et al. 2004: 867-872; Chaudhry et al. 2006: 14; Honeyboume et al. 2006: 52, 58; Mannan et al. 2006: 125; Langley & Beasley, 2007: 19; Jooste, 2010: 156-157; Protti & Johansen, 2010: 6).

The use of an electronic system, such as magnetic media or smart cards (South Africa, 2009a: 25, 31, 32), by health providers and patients for user identification, electronic scheduling systems for appointments, examinations and hospital admissions (Mannan et al. 2006: 125), will assist with the identification of absentees and defaulters of appointments, integration of

prevention and control activities, and detection of risk factors and complications (Tomasi et al. 2004: 867-872).

The following actions should be included when capturing client information by using computer information technology in a PHC setting:

The nurse manager should:

- include computer infrastructure and computer literacy in the budget for every financial year. The infra-structure needs to be part of the equipment procurement system inclusive of ordering, buying, repairing and maintaining the equipment within the budget allocation (South Africa, 2009a: 24; Canadian institute for health information, 2006: 7).

- have information technology infrastructure implemented and maintained and it should include: desk top computers, handheld devices, laptops, computers with operating systems, e.g. Microsoft Windows, adequate access to online resources, a system upgrading plan and a back-up system (Andrews et al. 2004: 11-18).

- train the staff to use computer information technology (formal and informal training). There is a need for on-going training and development of members of staff with the purpose of remaining up-to-date with current trends about the health information system field. Managers at all levels of care need to invest in establishing on-going in-service training in the health information system field for members of staff (Rohde et al. 2010: 207).

- make sure that client information is captured in the computer in the format of an electronic health record/patient health record or an electronic medical record by using a system which will allow multi-professional use, which means that members of a multi-disciplinary team (the nurse, doctor, specialist, pharmacists, radiographer, social worker and other professionals like managers) can read and/or write in the same patient record or easily gain access to one another's particulars of the patient record.

- have an electronic storing system in place, e.g. magnetic media or smart cards to be used by health providers and patients for user identification, electronic scheduling systems for appointments, examinations and hospital admissions.

- ensure that each patient has a unique patient identification number which is used for patient tracking and for entering the demographic information in confidentially maintained electronic databases (Tomasi et al. 2004: 867-870).
- ensure that electronic client's records include laboratory reports and doctors notes which enable the nurse to establish patterns in the client's health care situation, treatment and response to treatment (Agarwal et al. 2008: 3; Jooste, 2010: 149).

The following actions, including electronic prescriptions, should be included during tracking and following-up by using computer information technology in a PHC setting:

- have in place authorization and signatures for licensed prescribers such as nurse clinician working in the PHC clinic (Devine, et al. 2010: 155).
- enhance access to EMR by providing each consulting room with a laptop/computer, and to provide wireless access throughout the clinic (Devine, et al. 2010: 152-167).
- make sure that primary health care nurse enter all prescriptions for medications themselves in the computer.
- ensure that PHC nurses renew the prescriptions electronically (Devine, et al. 2010: 158), e.g. prescription for chronic patients in the fast queue.
- ensure the development of a complete medication record which should gather all medication that is prescribed by General Practitioners, hospitals and nurse clinicians (Protti & Johansen, 2010: 6).
- enhance patient safety and accurate dispensing by using systems such as a national pharmaceutical association database for nurses refer when prescribing (Tomasi et al. 2004: 867-872; Chaudhry et al. 2006: 14; Honeyboume et al. 2006: 52, 58; Mannan et al. 2006: 125; Langley & Beasley, 2007: 19; Jooste, 2010: 156-157; Protti & Johansen, 2010: 6).

The following actions, including tracking the sequence of nursing actions that are performed on a client as spelt out in the clinic guidelines, should be included during tracking and following-up by using computer information technology in a PHC setting:

The nurse manager should:

- make sure that nursing actions performed on a client are recorded in the computer.
- make sure that an electronic medical record is used to monitor and track the nursing actions performed on a client.
- ensure that all patients have unique patient identification numbers for patient tracking purposes.
- ensure that information obtained from the client when the professional nurse is using her or his diagnostic skills to gather objective and subjective data is captured in the computer.
- ensure that the planned nursing care is comprehensively captured in the computer to include observation, procedures, progress notes and discharge summary.
- make sure that all members of the health team who come into contact with clients capture the information in the computer with regard to on-going assessment of the client, the client interaction with the health care environment, and evaluation of the progress of the client from their own perspective (Van der Walt, 2006: 45-46).

5.2.2 Communication by means of information technology in primary health care clinics

Quality of care in the health setting depends on several aspects which include effective communication about the services provided between the health providers and the patients, amongst the different stake holders. In order to ensure effective communication, the use of the computer should include electronic record keeping, Internet connection or satellite linkage, intra- and inter-departmental networks (Honeyboume et al. 2006: 52), the competencies and experience of professional nurses to use (ICT) information communication technology (Jooste, 2010: 156-157).

5.2.2.1 Recommendation 4: The nurse manager should address the information transfer aspect of communication, including the availability of records and electronic transfer of the entire patient file (Item 23, 28), by using computer information technology

Rationale

Researchers indicate that communication between various centres is impossible without an Internet or satellite connection (Honeyboume et al. 2006: 52, 58; Nucita et al. 2009: 1191). Electronic communication can ensure the continuity and coordination of care across the health care institutions when patients fall ill regardless of where they are treated by accessing one another's electronic record systems, while ensuring patient's privacy. The use of electronic health records or documents can prevent duplication of files and patient management if the patient chooses to consult practitioners at different health institutions (Afilalo et al. 2003: 1-7; Owen, 2005: 48). An electronic health record can provide interactive patient access, as well as the ability for the patient to provide appended information to health providers wherever the information is needed, e.g. during assessment (Garets & Davis, 2006: 3).

An electronic referral of a patient's file or file transfer will ensure patient comfort while receiving the best quality care; avoiding cost and saving time (Cenic et al. 2010: 4).

The use of an Internet communication system, such as a system wide database, can improve the quality of service by enhancing organisational learning, by encouraging members of staff

to report safety risks (such as patient falls, and rates of health care–associated infections) on the computer. This system is designed for reporting all the risks that get identified at different health institutions and its use can trigger reviews of risks at other facilities with the purpose of vastly reducing the rate of cross infection in the health settings over a period of time (Mc Carthy & Klein, 2011: 2-7).

The following actions (i.e. ensuring the availability of records and electronic transfer of the entire patient file) should be included during information transfer when using computer information technology in a PHC setting.

The nurse manager should:

- have an Internet or satellite connection that will make communication between various centres possible.
- ensure that an electronic medical record (EMR) process is implemented in the health setting before the EHR connections of communication can take place.
- make sure that there is a link of electronic health records between the facilities.
- ensure that the electronic referral of patient's file / file transfer to a specialist is applied in the PHC setting, e.g. a doctor/nurse in a very isolated region can received a quick response and advice from a paediatrician about the management of a sick child by file transfer without referral of the child.
- make sure that the electronic patient's record is used for counter-referral activities, i.e. the return of the patient to his or her physician after specialist consultation, between different levels of care, e.g. between specialists and hospitals). In such a case, comprehensive information of the patient will be available in the file, which includes laboratory, x-ray and examinations results.
- encourage the use of a standardised communication system. For continuity of care, it is a system that enables the sending of an email message, containing a patient presentation to an emergency department, to another clinic where the patient is accessing the health service. The email message can contain the results of examinations performed, (e.g. electrocardiography, laboratory and radiology), consultation report, diagnosis, medication and follow-up plans. The email needs to contain a link to a password-secured website where a physician can read a detailed report (Afilalo et al. 2003: 1-7; Orchard et al. 2009: 1186).

- ensure communication between the nurse/doctor and the pharmacist about electronically prescribed drugs. The nurse/doctor can electronically receive the information about drug doses, side effects and usage by the patient.

5.2.2.2 Recommendation 5: The nurse manager should address the intra-departmental communication aspects of communication which include communication with the financial managers for the approval of, e.g. requisitions (Item 29)

Rationale

Intra-departmental communication forms the basis of support for delivery of services at health facilities. Without communication with the support services; such as specialised systems like financial, pharmaceutical, and human resource systems; the health facilities will not reach the main objective of providing quality health care. Linking the financial allocation to health service delivery output is one of the Public Finance Management Act (Act 1 of 1999) and the Division of Revenue Act (Act 2 of 2006) orientation (Rohde et al. 2010: 196, 205), therefore communication with the financial manager about the finances and budget of the primary health care clinic is of the utmost important. The lack of an Internet or satellite connection for sending email messages will make communication between finance manager and specialised services that support service delivery impossible (Honeyboume et al. 2006: 52; Nucita et al. 2009: 1191).

The following actions should be included during intra-departmental communication when using computer information technology in a PHC setting:

The nurse manager should:

- have an Internet or satellite connection for sending and receiving email messages. An Internet or satellite connection could make communication between various centres and inside the facilities possible.
- communicate with the financial manager about the budget that is required for achieving the health outputs and objectives.

- provide financial managers with integrated management information systems that include required finances for specialised services, such as human resources and pharmaceutical products, e.g. increase nurse-patient ratios and address drug shortages.

- communicate with colleagues by email about requisitions.

- have access to an implemented electronic system for ordering, sending and receiving requisitions.

- send requisitions electronically to the financial manager for approval.

- receive the approved requisitions electronically.

5.2.2.3 Recommendation 6: The nurse manager should address the information distribution and sharing aspects of communication by using computer information technology which include discussing standards of patient care and sharing detailed and relevant reading material with colleagues (Item 24, 25)

Rationale

Internet communication can be used to improve quality of service by enhancing organisational learning by prescribing particular Internet resources (either Internet support groups or consumer health), e.g. when the doctor or a nurse needs to interact with specialised personnel of other African or European centres about more complex clinical cases for seeking consensus about the standard of management (Honeyboume et al. 2006: 52, 58; Tornvall & Wilhelmsson, 2008: 2118; Nucita et al. 2009: 1191 & Orchard et al. 2009: 1186). A computer communication network that links primary health care practitioners from all the different areas in the country can be used to establish an electronic journal club for users to share details from interesting and relevant articles in the wide range of medical journals and for research purposes, i.e. a nurse/practitioner communicates with relevant experts at universities to get advice about research and medical computing by using a computer communication network that links primary health care practitioners and universities (Cenic et al. 2010: 4). Nurses need to share their knowledge and without provision of mentorship and guidance to nursing students and other colleagues/health-care team members, professional development will be impossible (College and Association of Registered Nurses of Alberta (CARNA), 2005: 18).

The following actions should be included during discussion of the standards of patient care and sharing information by using computer information technology in a PHC setting:

The nurse manager should:

- ensure the availability of an Internet or satellite connection in the PHC setting. Internet communication is used for discussion with colleagues (either internet support groups or consumer health) by applying specifically approved Internet resources, e.g. when a doctor or nurse needs to interact with specialised personnel at other African or European centres about more complex clinical cases with the purpose of seeking consensus about standards of management.

- collaborate and liaise with all the stake holders at all health care entities, ranging from a private physician office, to a clinic, to an acute care patient facility or other health information systems.

- ensure the comprehensive continuity and coordination of care at all health care institutions when patients fall ill regardless of where they are treated by accessing one another's electronic record systems without compromising patients' privacy.

- have access to a computer communication network that links primary health care practitioners in all different areas of the country.

- use Internet communication to improve the quality of service by improving organisational learning, e.g. members of staff are encouraged to report safety risks on a system-wide database. It will assist with monitoring the risks at institutions that triggers reviews of risks at other facilities. As a consequence, the rate of cross infection in the health settings is highly reduced over a period of time.

- lobby for the establishment of an electronic journal club for users to share information from interesting and relevant articles in the wide range of medical journals.

- have access to a computer communication network that links primary health care practitioners and universities for research purposes, i.e. a nurse / practitioner communicates with relevant experts at a university to seek advice about research and medical computing.

- encourage nurses to share their knowledge and provide mentorship and guidance for the professional development of nursing students and other colleagues / health-care team members.

- encourage nurses to use the computer communication network to improve the management of the health needs of the patients, while empowering themselves and other people with knowledge and skills.

- offer support to staff in relation to the use of computer information technology.

5.2.2.4 Recommendation 7: The nurse manager should address the patient information aspect of communication when using computer information technology which includes patient education and a clinic website (Item 30, 31)

Rationale

The public needs knowledge and guidance for making well-informed choices about their health. Provision of desired information and support required will enable people to act on their own behalf in meeting their health and health-care needs to the greatest extent possible. Nurses need to be actively assisting persons to obtain the best current knowledge about their health condition (College and Association of Registered Nurses of Alberta (CARNA), 2005: 10, 15).

Internet communication is used to provide health information to patients and their care givers in order to enhance the patients' ability to self-manage their chronic conditions, e.g. generating information hand-outs for patients about common chronic conditions and enhancing their ability to follow treatment, medication, and to monitor regimens. Provision of preventative and promotional health care rather than curative health care will enhance quality of life and solidarity in the communities (South Africa, 2008b: 14).

The following actions should be included when giving information to patients, e.g. education and a clinic website in a PHC setting:

The nurse manager should:

- have an Internet or satellite connection at the clinic to address the needs of the community.
- provide health information to patients and their care givers via Internet communication in order to enhance the patients' ability to self-manage their chronic conditions, e.g. generating information hand-outs for patients about common chronic conditions and enhancing their ability to follow treatment, medication, and to monitor regimens.
- have a clinic website where information about the clinic and the services can be made available.
- encourage nurses and other health providers to refer clients to the website.
- have printed information, education and communication (IEC) material for clients who do not have access the Internet.
- use the computer as a teaching aid to prepare and to educate clients during teaching moments about factors that are affecting their health.
- practise openness and transparency during health services delivery. Information about the type of services, the location of the health institution, service charter and redress information can be made easily accessible to all patients by using information technology (South Africa, 2008b: 29).

5.2.3 Decision making based on computer information technology in primary health care clinics

Decision making at public health institution depends on the availability of the reliable information which is generated, validated, analysed, and disseminated by information systems (Williamson et al. 2002: 4; Tomasi et al. 2009: 1-2) to all levels of decision making. The needs for such information include: the health information system program (HISP) software, skilled staff to capture, validate and report data (distribute data vertically and horizontally), standards tools and structures for collecting, capturing, and disseminating data, minimum dataset, data collection tools, data validation rules and routine feedback. The health information system software program (HISP) is one of the effective health information

systems that can be used to provide an incentive and accountability for evidence–based decision making at, e.g. primary health care (PHC) clinics. It is, therefore, the responsibility and accountability of the health providers who are working at PHC clinics to provide appropriate and accurate information to all the stake holders in order to make decisions based on the sound evidence (Jamison et al. 2006: 35).

5.2.3.1 Recommendation 8: The nurse manager should address the raw data and statistical aspects of decision making that are based on computer information technology and which include: analysis of data using computer software and validation of entry figures (Item 39, 40)

Rationale

Computers need to be used as a system that can provide the quality of data for use during decision making (Stansfield et al. 2006: 1017). Data analysis and data validation are aspects of data quality improvement, are considered as priority activities for managers and need to begin at the facility level. Data validation will ensure the correction of errors in the collected data and ensure that the data are of good quality. A data validation tool, such as ETR.net (software for capturing cases such as Tuberculosis), is used to identify duplicate case entries whilst DHIS (District Health Information System) software can be used to identify data element values for the facility that are obviously wrong (absolute validation violations like having more children weighed than children examined) or that are inconsistent with long term trends (statistical validation violations, e.g. suddenly having 30% still births as opposed to the general rate of 3%). Data analysis at the facility level is an important aspect of creating a culture of information use. It can be used as the evidence for the request of resources, such as budget requests (Rohde et al. 2010: 204-208). Analysis of the data enables the identification of patterns, while creating information. This information is used to generate recommendations, rules for action, and behaviour change that finally signifies the creation of knowledge that is used to make decisions and change human behaviour (Stansfield et al. 2006: 1018).

The following actions should be included in the analysis of data when using computer software in a PHC setting:

The nurse manager should:

- ensure the availability of information technology infrastructure at the clinic.
- implement and maintain a management information system (a planned system of collecting, processing, analysing, storing and disseminating data in the form of information). Automation of data entry and analysis can ease data capture, validation, analysis, and transmittal of health information (Stansfield et al. 2006: 1022).
- train staff to use the computer and the software to capture and analyse the data.
- ensure the use of computer software to capture and analyse the data at the clinic for identifying patterns, and creating information that can be used for decision making.
- apply the statistical principles in the management of data in the health care setting. It can help to understand the challenges about services delivery and can stimulate future research (Department of Statistics, 2009: 1; http://www.authorstream.com).
- analyse and present the electronically processed data as indicators, for example about mortality rates.
- conduct self-assessment about key indicators, such as HIV counselling and testing (HCT) quarterly and report the progress towards achieving the targets, such as supervisory reports.
- provide evidence for operational planning at the facility level.
- use software to develop graphs that indicate the programme needs/progress and display them for other people's understanding of, e.g. trends in children diseases.
- provide incentives and accountability for evidence–based decision making by using an effective information system, such as a health information system software program (HISP).
- monitor and control the internal operations of an organisation by using a well-integrated system to analyse data, such as the District Health Information System Software or ETR.net.

The following actions should be included in the validation of entry figures when using computer software in a PHC setting:

The nurse manager should:

- implement and maintain a management information system (a planned system of collecting, processing, validated, storing and disseminating data in the form of information).

- train staff to use the computer and the software to capture and validate data and to apply the data with the purpose of accounting for gaps in service delivery.

- ensure the use of computer soft-ware to capture and validate the entry figures (detecting numbers which fall outside a normal range to ensure that they are included the range of possibility).

- ensure the use of an electronic data validation tool to identify duplicate case entries, e.g. case records of the patients with tuberculosis who are visiting the clinic.

- use health information system software that will identify data element values for facility that are obviously wrong or inconsistent with long-term trends, e.g. tuberculosis cure rate which is more than number diagnosed.

- identify the outliers which may be due to abnormal circumstances, for example the average of 2% infant deaths suddenly rising to 10%. In this case, to add a comment explaining why the entry is correct (Rohde et al. 2010: 204).

- encourage data capturing that flags what appears to be unrealistic entries and for printing it for checking by the manager of the clinic.

- ensure the availability of reliable information for decision making, e.g. to budget for resources, such as vaccines for immunisation, or when influenza trends increase.

5.2.3.2 Recommendation 9: The nurse manager should address the needs identification and care description aspects of decision making based on information technology to include: the description of care in various settings and identification of trends in care provided (Item 49, 50):

Rationale

Researchers have indicated that the use of the **c**omputer as a system that can provide timely, accurate, and relevant health information which will assist with identifying trends and describing health care in the various settings with the aim of improving the management of the health services (Stansfield et al. 2006: 1017). A decision analysis can be usefully applied in clinical decisions when there is uncertainty about appropriate clinical strategies. Therefore, it can prevent risks and harm that are related to an improper choice of patient treatment (Aleem et al. 2008: 137). The use of systems, such as a national pharmaceutical association database, can enhance patient safety and accurate dispensing (Tomasi et al. 2004: 867-872; Chaudhry et al. 2006: 14; Honeyboume et al. 2006: 52, 58; Mannan et al. 2006: 125; Langley & Beasley, 2007: 19; Jooste, 2010: 156-157; Protti & Johansen, 2010: 6). Consequently, the lack of computer use in the health setting may result in improper patient management, harm, loss of life, reduction in life expectancy (South Africa, 2009b: 2), and increased litigation and health costs.

Automation of data entry and analysis can assist with the identification of trends and can generate reports easily. Special prompts and "exception reports" can alert managers to unexpected findings that require confirmation or immediate interventions; for example low immunisation coverage, or other management problems. However, the absence of these reports may result in unnoticed problems, such as the outbreak of infectious diseases (Stansfield et al. 2006: 1022).

The following steps should be included in the description of care when using computer information technology in a PHC setting:

The nurse manager should:

- ensure that the management of a patient in a health setting includes the guidelines and protocols in the computer of a nursing process, i.e. nursing assessment, diagnosis, plan of treatment and care (Jooste, 2010: 156).

- ensure patient safety and accurate dispensing by using systems, such as a national pharmaceutical association database. The national pharmaceutical association database is a pharmacy system that ensures accurate dispensing and offers decision-support capabilities, such as drug-to-drug interaction and warnings in relation to pregnant patients.

- make sure that guidelines, such as the WHO staging of HIV disease progression of infected patients are used to assess and stage the disease in order to plan management.

- ensure that the standardised therapeutic plans for patient management, such as regimens and decision support systems for hypertension, diabetes mellitus, asthma, cardiac, AIDS-related diseases, chronic obstructive pulmonary disease, and the patients who need anticoagulant therapy are used for management of different conditions during patient care.

- ensure that the implementation of the patient management plan includes management algorithms in the computer and drug dosages.

- prevent risks and harm related to improper choice of patient treatment by applying a decision analysis in clinical decisions when uncertainty exists about an appropriate clinical strategy. A decision analysis can be used in a specific decision problem when the clinicians look at how closely their particular clinical situation resembles that of the analysis, and then use the results to make an informed decision about the specific clinical scenario. A decision analysis can be applied to a number of scenarios of health policies, including management of ventricular septal defects, screening for prostate cancer and the treatment of early osteoarthritis of the wrist (Aleem et al. 2008: 137, 139).

- ensure that information systems are used at all levels of service delivery, which includes school health services. It informs the different sectors to make effective use of

existing services, to identify the gap in the services and to monitor the progress towards the development of health promoting schools (South Africa, 2009a: 5, 61).

- make auditing of files, quality control and risk management measures easier by using computerised nursing documentation. The results of these audits can be disseminated with the purpose of enhancing evidence-based nursing (Owen, 2005: 48-49; Garets & Davis, 2006: 3).

The following steps should be included in identification of trends in the care provided when using computer information technology in a PHC setting:

The nurse manager should:

- ensure the automation of data entry and analysis. Automation of data entry and analysis expedites data capturing, validation, analysis, and transmittal of health information (Stansfield et al. 2006: 1022).
- graphically present statistics (the primary health care data) in order to identify whether progress is made in identified areas or not. Some statistics, such as immunisation coverage and family planning are best graphically presented in cumulative graphs in order to show the progress towards an annual objective (Williamson et al. 2002: 2; South Africa, 2004b: 19- 79; Tomasi et al. 2004: 867-868; Agency for healthcare research and quality (AHRQ), 2008: 3; South Africa, 2008b: 126).
- produce reports about the performance of different health units, for any desired period and identify gaps in meeting the set targets.
- generate reports with tables and charts and transmit them to central levels, where that knowledge can be applied to improve local management. Special prompts and "exception reports" can alert managers to unexpected findings that require confirmation or immediate interventions, for example outbreaks of infectious diseases, low immunisation coverage, or other management problems (Stansfield et al. 2006: 1022).
- track the services provided by the health institution, e.g. new tuberculosis patients may indicate communities in particular need of intensive patient finding or control of spread. (Williamson et al. 2002: 2; Tomasi et al. 2004: 867-872).

5.2.3.3 Recommendation 10: The nurse manager should address the obtaining and provision of information aspects about decision making based on information technology, including: provision of information to decision makers at a higher level (Item 45)

Rationale

It is critical to design information systems that meet the needs of decision makers and that create a culture that provides incentives and accountability for evidence–based decision making, such as computerised statistics (Jamison et al. 2006: 35; Stansfield et al. 2006: 1018). When relevant information is not provided timely and accurately, it results in wrong decisions about policy making, improper strategic planning and setting of priorities and ultimately poor service delivery. Inadequate health information leads to clinical misdiagnoses and improper management of illnesses or injuries. Inaccurate and a lack of verified analytical statistics results in the inability to detect and control emerging and endemic diseases. A computer should be used for providing appropriate and accurate health information to assure the quality and improvement of health services The local political structures and the public require accurate information which may be placed on the clinic website for use to demand effective policies and services, and to hold the government accountable for the allocation and use of resources for health. Failure to provide this information constitutes a violation of the citizen's rights (Stansfield, et al. 2006: 1018; Mc Carthy & Klein, 2011: 5).

The following actions should be included in the provision of information to decision makers at a higher level when using computer information technology in a PHC setting:

The nurse manager should:

- use the computer to monitor the health programmes at institutions and at district level.
- monitor the service delivery which includes calculating indicators, such as immunisation coverage (calculating the number of children who are fully immunised against the number of immunisations during the first six weeks) and nurse-patient ratio. The information can be used for planning the health services at higher levels, such as motivating additional posts when staff shortages are experienced. The calculation of nurse-patient ratios may indicate staff shortages at clinics, which can determine the

shortage of nurses in the country. The information can be escalated to decisions at higher level about the number of students to be trained by each university and nursing college.

- provide information to higher levels of management that can be used for resource allocation, such as budget allocation for individual districts, sub-districts and institutions (Tomasi et al. 2004: 867-869; Agency for Healthcare Research and Quality (AHRQ), 2008: 3).

- evaluate the business plans by using health service indicators in the computer. The health managers can account for services provided at health institutions in order to fulfil the political health mandate. The success of efforts to reduce poverty and health inequity depends on the existence of information systems to detect those problems, to facilitate the design of solutions, and to track the progress of eliminating the problems. The use of the computer to detect and monitor the nutritional needs of the patients, such as under-weight children and food supplements (food-scheme) offered to the needy or children from poor families (Bana Pele strategy), is fulfilling one of the government strategies to combat poverty (Stansfield et al. 2006: 1018; Agency for Healthcare Research and Quality (AHRQ), 2008**:** 3; South Africa, 2008b: 126).

- generate reports with tables and charts and transmit them to central levels, where that knowledge can be applied to improve local management. Special prompts and "exception reports" can alert managers to unexpected findings that require confirmation or immediate interventions, for example outbreaks of infectious diseases, low immunisation coverage, or other management problems (Stansfield et al. 2006: 1022).

- provide appropriate and accurate health information to the public. Accountability to local governmental structures can be enabled by educating board members about safety and quality improvement strategies (Mc Carthy & Klein, 2011: 5), such as a website that manages patients' complaints.

- ensure that both the citizens and the government receive the information about the activities, outcomes and challenges in order to make decisions that are based on sound evidence.

- periodically disclose appropriate information about health programmes in adequate detail and consistent format to all contractually involved parties, such as the communities, decision makers and the politicians.

5.3   The limitations of the study

This research study was conducted at primary health care clinics at district level, excluding municipal clinics. However, some of the clinics had district, as well as municipal personnel. At these clinics, everybody wanted to participate since they belonged to one clinic. It took the Ekurhuleni research committee a long time to respond to the request for conducting the study. Due to the shortage of staff at the clinics, it was difficult to access staff during the agreed time with the clinic managers. Patients arrive very early before the opening at the clinics and when staff arrive they have already waited for some hours. Few or no members of staff take a lunch break. As a result, some staff members have to take the questionnaires home for answering without any explanation given to them.

5.4   Recommendations

The recommendations about the use of information technology at PHC clinics include:

5.4.1   Recommendations for the Department of Health

The use of information technology should be encouraged by ensuring:

- The availability of budget for implementation of the use of computer information technology.
- Monitoring the implementation of the use of the computer information technology.
- Liaison with other departments about the implementation, e.g. Department of Education in respect of the training of the nurses during basic training.
- All software programs, e.g. statistics and different registers per program are installed on computers.
- A functional intra- and inter-facilities network system, including private and tertiary hospitals.
- Standard formats of displaying health care data on computers in provinces.

5.4.2   Recommendations for nurse managers

The use of information technology should be encouraged by ensuring:

- Availability of computers in each consulting room at the PHC clinics that are network linked.

- Training of all the health professionals in using computer information technology in a health setting.

- Employment of data captures at each clinic to also capture the PHC data.

- A functional backup system at all times to ensure that important patient information is not lost.

- All programs, e.g. statistics and different registers per program are installed on the computers.

- Top level management ensures that each sub-district has an IT support system available on site.

- Each staff member has an email address.

- A proper system of staff establishment to address the issues of staff shortages.

- Each professional nurse needs to receive basic computer training because it is necessary in a world of emerging technologies.

5.4.3   Recommendations for nursing research

There has been limited research about the use of computer information at primary health care clinics in South Africa. The following aspects may be considered for future research:

- What is the current situation in relation to the use of computer information technology in the hospitals?

- What are the perceptions of patients about the use of computer information technology?

- How does the perception of nurses about the use of information technology at PHC clinics differ in the different regions of South Africa?

- What are the lived experiences of professional nurses about the use of information technology at primary health care clinics in South Africa?

5.5 Conclusion

The purpose of this study was to explore and describe the perceptions of professional nurses about the use of information technology at primary health care clinics. It had led to the development of recommendations for action about the use of information technology at the primary health care clinics in the eastern part of the Ekurhuleni Municipality.

The study was based on a quantitative, explorative and descriptive design. Total sampling of all professional nurses who were working at the district health clinics in the East of Ekurhuleni was conducted. The 128 (100.0%) participants were requested to complete a questionnaire during a survey, in order to explore and describe their perceptions of professional nurses in relation to the use of information technology at primary health care clinics.

Descriptive statistics were used to analyse the responses to the questionnaire. The validity and reliability of the study, and ethical considerations were adhered to during the entire research project.

The findings of the research indicated some significant differences in the perceptions of the participants in respect of the use of information technology at PHC clinics in the East of Ekurhuleni. The participants indicated what they are currently doing at PHC clinics with regard to the use of computer IT and what should be done in order to facilitate the use of computers at PHC clinics.

Recommendations were described for the nurse managers with regard to the use of information technology at PHC clinics.

With regard to record keeping, using a computer at primary health care clinics, recommendations were made about staffing, authorisation in record keeping, specific entries on records, client specific information, tracking and follow-up.

With regard to communication, using a computer inside and outside the clinic, aspects that need to be addressed are information transfer, intra-departmental communication, information distribution and sharing patient information.

About decision making based on computer information, statistics need to indicate relevant data, address needs identification and record care description of clients

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ANNEXURE A: CONSENT FORM

P O Box 19053

East Geduld

Springs

1568

Dear participant

INFORMATION AND CONSENT FORM

I am a student at the University of Johannesburg conducting a Masters Degree in Nursing Science. I am conducting a study about perceptions of nurses with regard to the use of computer information technology at PHC clinics. The purpose of the study is to explore and describe the perceptions of nurses about the use of computer information technology at PHC clinics in order to describe actions to be taken by the nurse manager about the application of computer information technology.

In this study all professional nurses working at 5 PHC clinics in the eastern part of Ekurhuleni will be invited to participate. The method of data collection will be a self-administered, structured questionnaire that will take 30 minutes to complete. Your participation in this study is completely voluntary. There will be no negative consequences if you choose not to complete the questionnaire. There will be no direct benefits to you if you participate but the summary. Ethical approval for this study was obtained from the Ethics and Higher Degree committees of the Faculty of Health Sciences at the University of Johannesburg. Permission to conduct the study has been obtained from the Department of Health.

If you have any further questions, or any complaints about the way the study is conducted, you can contact me at 082 881 1014 or Email: manitatabane@yahoo.com.

Researcher:	Manita Tabane	011 737 9716
Supervisor:	Professor K. Jooste	011 559 2857
Co-supervisor:	Mrs NBD. Magobe	011 559 2726

If you agree to participate in the study, please complete the questionnaire, and place the completed questionnaire in the envelope provided and seal it. Completion of the questionnaire will be taken as written informed consent.

Consent from

I have read the Information Sheet. I understand that the researcher will make every effort to ensure confidentiality and that my name will not be used in the study.

I ……………………………………………………. agree to take part in the study titled: "Perceptions of nurses with regard to the use of computer information technology at PHC Clinics.

Signature: ………………………………..

Date: ………………………………..

ANNEXURE B: REQUEST FOR PERMISSION

<div align="right">

University of Johannesburg

Faculty of Health Science

Department of Nursing

Auckland Park

</div>

The Research Ethics Committee

Ekurhuleni Health District

P O Box 4

Alberton

1450

ATTENTION: Ekurhuleni District Research Ethics Committee Coordinator

REQUEST FOR PERMISSION TO CONDUCT A STUDY AT THE EKURHULENI HEALTH DISTRICT (Eastern Service Delivery Region)

Dear Sir/Madam

I am a student at the University of Johannesburg conducting a Masters Degree in Nursing Science. I am conducting a study on perceptions of nurses with regard to the use of computer information technology at primary health care (PHC) clinics.

The purpose of study is to explore and describe the perceptions of nurses about the use of computer information technology at PHC clinics in order to describe actions to be taken by the nurse manager with regard to the use of computer information technology at these clinics.

In this study all professional nurses (n = 150) working at 5 Primary Health Care clinics in the eastern part of Ekurhuleni will be invited to voluntarily participate in the study. The method of data collection will be self-administered, structured questionnaires; distributed to professional nurses in order to determine perceptions by rating the extent of the use of computer information technology at the PHC clinics in the eastern part of Ekurhuleni. The questionnaire will take approximately 30 minutes to complete.

There will be no negative consequences if participants choose not to complete the questionnaires. There will be no direct benefits to them if they participate but the information collected will be helpful in improving the quality of nursing care at PHC clinics.

Information obtained during this study will be kept strictly confidential. Participants' names, facility or address will not be required during the completion of the questionnaire or when the results of study are presented or written up. Ethical approval for this study was obtained from the Ethics and Higher Degree committees of the Faculty of Health Science.

Data gathered will be kept under lock and key for 2 years after the results have been published, after which it will be destroyed.

The result of the study will be made available for the PHC clinics.

I trust that my request for conducting the study will be favourably considered.

Yours Sincerely

……………………….

Researcher: Manita Tabane
Cell number: 082 881 1014
Work Tel: 0117379700
Email: manitatabane@yahoo.com

Supervisor: Professor K Jooste
Tel: 011 559 2857
Fax: 011 559 2257
Email: kjooste@uj.ac.za

Co-supervisor: Mrs N Magobe
Tel: 011 559 2726
Fax: 011559 2257
Email: nmagobe@uj.ac.za

Ekurhuleni
METROPOLITAN MUNICIPALITY

RESEARCH ETHICS
CLEARANCE CERTIFICATE

Research Project Title: <u>PERCEPTIONS OF NURSES REGARDING THE USE OF COMPUTER INFORMATION TECHNOLOGY IN PRIMARY HEALTH CARE CLINICS IN THE EAST OF EKURHULENI.</u>

Research Project Number: 12/01/2011-1

Name of Researcher(s): ManitaTabane

Division/Institution/Company: Master's Degree; University of Johannesburg

<u>DECISION TAKEN BY THE EKURHULENI HEALTH DISTRICT ETHICS PANEL (EHDEP)</u>

- THIS DOCUMENT CERTIFIES THAT THE ABOVE RESEARCH PROJECT HAS BEEN FULLY APPROVED BY THE EHDEP. THE RESEARCHER(S) MAY THEREFORE COMMENCE WITH THE INTENDED RESEARCH PROJECT.

- NOTE THAT THE RESEARCHER WILL BE EXPECTED TO PRESENT THE RESEARCH FINDINGS OF THE PROPOSED RESEARCH PROJECT AT THE ANNUAL EKURHULENI RESEARCH CONFERENCE HELD IN JULY/AUGUST.

- THE ETHICS PANEL WISHES THE RESEARCHER(S) THE BEST OF SUCCESS.

Dr. R. Kelleeman

CHAIRPERSON: GAUTENG DEPARTMENT OF HEALTH (EKURHULENI REGION)
Dated: 14/01/2011

DR .J. SEPUYA

DEPUTY CHAIRPERSON: EKURHULENI METROPOLITAN MUNICIPALITY
Dated: 14/01/2011

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ANNEXURE D: PERMISSION TO CONDUCT RESEARCH

UNIVERSITY
— OF —
JOHANNESBURG

FACULTY OF HEALTH SCIENCES

ACADEMIC ETHICS COMMITTEE

AEC56/01-2010

23 July 2010

TITLE OF RESEARCH PROPOSAL: Perceptions of nurses regarding the use of computer information technology in primary health care clinics in the east of Ekurhuleni

DEPARTMENT OR PROGRAMME: M.CUR : NURSING

RESEARCHER: TABANE, GM   STUDENT NO.   200730786

SUPERVISOR: Prof K Jooste

CO-SUPERVISOR: Ms N Magobe

The Faculty Academic Ethics Committee has scrutinised your research proposal and confirm that it complies with the approved ethical standards of the University of Johannesburg.

The AEC would like to extend their good wishes to you in your endeavour of your research project.

Yours sincerely,

Prof. Karien Jooste
Chair: Faculty of Health Sciences: Academic Ethics Committee

ANNEXURE E: RESEARCH QUESTIONNAIRE

PERCEPTIONS OF NURSES WITH REGARD TO THE USE OF COMPUTER INFORMATION TECHNOLOGY AT PRIMARY HEALTH CARE CLINICS

The purpose of the study is to explore and describe the perceptions of nurses about the use of computer information technology at primary health care (PHC) clinics in order to describe actions to be taken by the nurse manager about the application of computer information technology.

Please complete the questionnaire while keeping the following instructions in mind:

1. This questionnaire should be completed by nurses working at a health care clinic in the Ekurhuleni Area.
2. The term nurse refers to a community service nurse and a professional nurse working at a PHC clinic.
3. There is no right or wrong answers.

SECTION 1: BACKGROUND INFORMATION

This section of the questionnaire refers to background information necessary to understand the application of computer information technology by nurses at PHC clinics.

Please answer questions marking the most appropriate block with an **X**, <u>for example</u>:

Marital status

Single	**X**
Married	
Divorced	
Widowed	

Mark the most appropriate block in questions 1 – 9 with an **X**.

1.   Age group

< 20 years	
20 – 30 years	
31 – 40 years	
41 – 50 years	
51 – 60 years	
> 60 years	

2.   Gender

Male	
Female	

3.   In which clinical department do you work <u>most</u> at the PHC health care clinic?

School health	
Primary health care	
Midwife obstetric unit	
Comprehensive care and management of HIV/Aids and Illnesses	
School health	
Other: Please specify	

4.   What is your current position at your clinic?

Community service nurse	
Professional nurse	
Professional senior nurse	
Professional chief nurse	
Other: Please specify	

5.   How many years of clinical experience have you had as a nurse at the clinic?

< 1 year	
1 – 5 years	
6 – 10 years	

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11 – 20 years	
> 20 years	

6.   What are your highest nursing qualifications?

Basic diploma/degree	
Post basic diploma	
Honours degree	
Masters degree	
Doctorate degree	
Other: …………………………………………………….	

7.   Do you have a computer at home?

Yes	
No	

8.   Which training have you received in computer literacy?

		Yes	No
8.1	Training provided by the Department of Health		
8.2	Learned myself		
8.3	During basic nursing training		
8.4	Other (please specify) ………………………………………………………		

9.   For what purposes do you access a computer at the clinic?

Rank the answers in sequence of priority from 1 to 6, whereas 1 is the most important and 6 the least important.

9.1	Personal use	
9.2	Recording information	
9.3	Storage of information	
9.4	Retrieval of information	
9.5	Communication	
9.6	Decision making	

Instructions:

Please take note that there are no right or wrong responses to any of the following statements. Your honesty is very important and anonymity will be ensured by not making your name known.

Please ensure that you mark an **X** on the scale, ranging from 1 (never) to 7 (always), indicating how much you agree or disagree with the statements.

Example:

Nurses at the clinic should		
		Disagree　　　　　　Agree
1.	create the weekly off-duty schedule on a computer.	1　2　X　4　5　6　7

Listed below are several statements about the use of computer information technology. For each statement fill in your response by placing an **X** over the number that indicates how much you agree or disagree with that statement.

1 = Strongly agree with statement

2 = Moderately agree with the statement

3 = Some agreement

4 = Neutral – neither agree nor disagree

5 = Some disagreement

6 = Moderately disagree with the statement

7 = Strongly disagree with the statement

RECORD KEEPING
Record keeping of information refers to the recording, storage and retrieval of information on the computer. Indicate how much you agree or disagree with the following statements:
Disagree　　　　　Agree

RECORD KEEPING

Record keeping of information refers to the recording, storage and retrieval of information on the computer. Indicate how much you agree or disagree with the following statements:

		Disagree Agree
Nurses should use computers for:		
1.	capturing client information on e.g. history taking.	1 2 3 4 5 6 7
2.	accessing patients information, e.g. about the previous visit to the clinic.	1 2 3 4 5 6 7
3.	electronic prescription of e.g. blood tests.	1 2 3 4 5 6 7
4.	tracking the medicine dispensed to a patient, e.g. anti-diabetic drugs.	1 2 3 4 5 6 7
5.	tracking the sequence of nursing actions performed on a client as spelt out in the clinic guidelines.	1 2 3 4 5 6 7
6.	following up on client information, e.g. correct physical address of client.	1 2 3 4 5 6 7
7.	locating information about the client, e.g. to contact the next of kin.	1 2 3 4 5 6 7
8.	link on patient's record about other departments, e.g. the laboratory department to obtain blood results.	1 2 3 4 5 6 7
Access to computerised patient information should be ensured by:		
9.	authorising nurses to update a record on the computer.	1 2 3 4 5 6 7
10.	issuing nurses with a computerised access code, to replace the signature, which identifies the individual using the computer system.	1 2 3 4 5 6 7
11.	the responsible use of access codes, e.g. do not allow your code to be used by other nurses or people.	1 2 3 4 5 6 7
The computer information system should:		
12.	identify the individual who has last entered data on a computer.	1 2 3 4 5 6 7
13.	Identify the individual who made the last entry on the specific client record.	1 2 3 4 5 6 7
14.	indicate the date and time that the entry was made on the record.	1 2 3 4 5 6 7
15.	have a backup of a record before it was updated.	1 2 3 4 5 6 7
16.	have a backup system, which allows a nurse to call a computer expert for support when needed.	1 2 3 4 5 6 7
The nurse should use the computer for administrative purposes such as:		
17.	submission of a leave request for authorisation purposes.	1 2 3 4 5 6 7

	RECORD KEEPING	
Record keeping of information refers to the recording, storage and retrieval of information on the computer. Indicate how much you agree or disagree with the following statements:		
		Disagree Agree
18.	authorisation by the supervisor of the leave form of a nurse.	1 2 3 4 5 6 7
19.	electronic monitoring of patterns of absenteeism.	1 2 3 4 5 6 7
20.	monthly allocation of staff members to different departments in the clinic.	1 2 3 4 5 6 7
21.	weekly ordering of stock, in line with the stock replacement policy.	1 2 3 4 5 6 7
22.	ordering of equipment that has been budgeted for.	1 2 3 4 5 6 7

	COMMUNICATION	
Communication refers to sharing of information in the clinic.		
		Disagree Agree
Nurses in the clinic should use the computer for:		
23.	electronic transfer of the entire patient file, e.g. when the doctor has a need to interact with a specialist about a more complex clinical case.	1 2 3 4 5 6 7
24.	discussing standards of patient care with colleagues to be included in the computer system.	1 2 3 4 5 6 7
25.	sharing detailed relevant reading materials, e.g. articles on PHC issues.	1 2 3 4 5 6 7
26.	co-ordination between departments to access the client's data when the patient is referred.	1 2 3 4 5 6 7
27.	maintaining continuity of patient care, by enabling the clinics and hospitals to have access to each other's electronic record system.	1 2 3 4 5 6 7
28.	ensuring the availability of records to enable staff members to have more time to examine clients.	1 2 3 4 5 6 7
29.	communication with the financial managers for the approval of e.g. requisitions.	1 2 3 4 5 6 7

COMMUNICATION		
Communication refers to sharing of information in the clinic.		
		Disagree Agree
30.	educating clients during a teaching moment, e.g. on factors affecting their health.	1 2 3 4 5 6 7
31.	placing information about the clinic on a website, e.g. information on termination of pregnancy services.	1 2 3 4 5 6 7
Electronic mail(Email) should be used to:		
32.	communicate with an employee about e.g. urgent circulars.	1 2 3 4 5 6 7
33.	distribute electronic templates nurses should use to complete required information.	1 2 3 4 5 6 7
34.	distribute minutes of meetings.	1 2 3 4 5 6 7
35.	share information amongst colleagues, e.g. clients' attendance rates.	1 2 3 4 5 6 7

DECISION MAKING		
		Agree Disagree
Nurses should use computers to:		
36.	track the services that were provided to clients, e.g. new tuberculosis patients may indicate communities in particular need of intensive patient finding or control of spread.	1 2 3 4 5 6 7
37.	provide relevant data at clinic level, e.g. monthly number of patients per number of nurses allocated in order to establish nurse-patient ratios.	1 2 3 4 5 6 7
38.	review the monthly statistics to set new clinic targets.	1 2 3 4 5 6 7
39.	analyse client data using a computer software district health information system (DHIS) program.	1 2 3 4 5 6 7
40.	validate entry figures (detecting numbers which lie outside of a normal range) to ensure that they are within the range of possibility.	1 2 3 4 5 6 7
41.	produce a report of the data for any desired period, to calculate the whole set of indicators, e.g. the number of HIV positive tests per year.	1 2 3 4 5 6 7

DECISION MAKING									
		Agree						Disagree	
42.	graphically present data for monthly reports, e.g. immunisation coverage.	1	2	3	4	5	6	7	
43.	identify client needs, e.g. new tuberculosis patients may indicate communities in particular need of intensive patient finding or the control of spread.	1	2	3	4	5	6	7	
44.	monitor programmes, e.g. calculating the number of children who are fully immunised against the number of first (six weeks) immunisations.	1	2	3	4	5	6	7	
45.	provide information to policy makers at higher levels.	1	2	3	4	5	6	7	
46.	provide information for staff allocation that depends on nurse-patient ratio.	1	2	3	4	5	6	7	
47.	obtain information that complements the examination of a patient.	1	2	3	4	5	6	7	
48.	obtain information that will assist with making decisions about patient management.	1	2	3	4	5	6	7	
Implement a nursing minimum data set across clinical populations/ settings which could:									
49.	describe the care of clients in various settings.	1	2	3	4	5	6	7	
50.	identify trends in the care provided, e. g. increase of the number of diarrhoea patients per given season.	1	2	3	4	5	6	7	
51.	stimulate nursing research by means of links to existing data.	1	2	3	4	5	6	7	

52. I use the computer for:

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

53. How to make the use of computer easier in the PHC clinics? (Please give your opinion)

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Thank you for your participation.