UiT
THE ARCTIC UNIVERSITY OF NORWAY

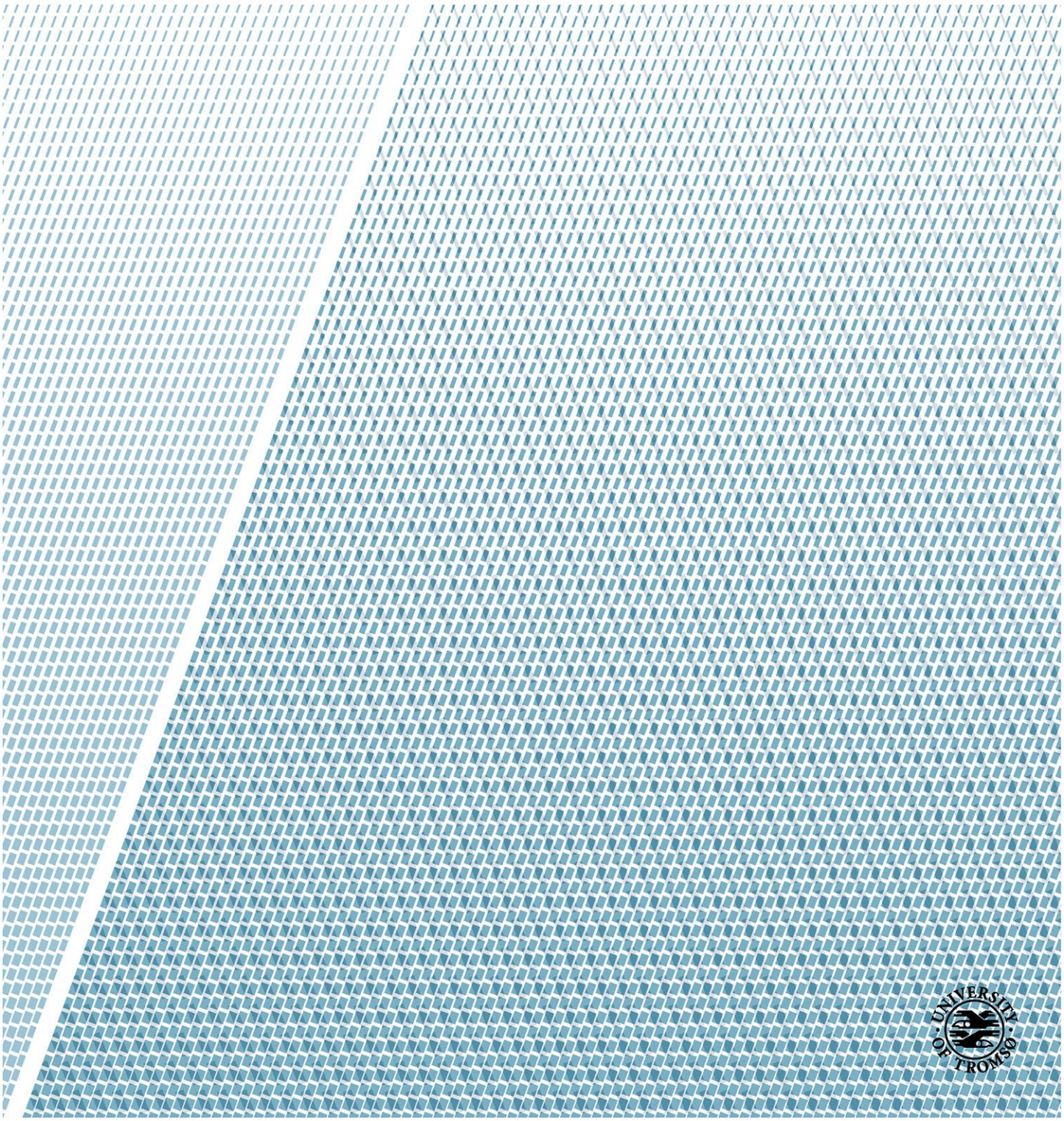
Department of Clinical Medicine
The Faculty of Health Sciences

"Challenges and Impact of Transforming Paper-Based Nursing Documentation into Electronic Form: A Study in Nepal"

Priyanka Shrestha

Master's Thesis in Telemedicine and E-health (TLM-3902)

May 2016



DEDICATIONS

I dedicate this thesis to my father Mr. Kumar Prashad Shrestha, who has always been my inspiration and to my mother Mrs. Renuka Shrestha, who always motivated me to become who I am.

Love you both.

ACKNOWLEDGEMENT

Successful completion of this dissertation is collective effort of many direct and indirect helping hands, to whom I am highly indebted. I would like to take an opportunity to extend my sincere acknowledgement to all those who helped me accomplish this achievement.

My sincere thanks to my family for their incredible love, understanding, encouragement, and blessings throughout my life.

I would like to express my sincere gratitude to Associate Professor Gunnar Ellingsen for his continuous supervision and guidance. With his ever-binding encouragement and suggestions, I was able to accomplish my goals of completing this thesis work.

I would also like to thank program coordinator Judy Au, for her timely help when needed. My profound thankfulness also goes to department of clinical medicine for providing me financial assistance to collect data in Nepal.

I am deeply indebted to B.P. Koirala Institute of Health Sciences for providing me opportunity for data collection. I would like to thank Dr. Birkram Shrestha, Rector of BPKIHS who provided me permission for data collection. I would also like to thank Dr. Anup Ghimire, Assistant Dean for providing me with necessary information and helping with ethical clearance procedure. I am grateful to all the staffs of BPKIHS who supported me during data collection. I am also indebted to the key informants of this study for sharing their opinion and providing invaluable information.

I would like to convey my special thanks to Mr. Mishal Kasaju, who has always been encouraging and supporting me for completion of this thesis.

Priyanka Shrestha

ABSTRACT

The healthcare sector is a very delicate sector which faces issues surrounding quality, safety, efficiency, cost, and access to health care services. The nurses have a huge responsibility to maintain quality documentation and they are struggling in doing so especially when they are still using paper-based nursing documentation. The transformation of paper-based nursing documentation into electronic form tends to increase the quality of information and thus enhances decision making and communication. This further leads to safe, ethical, and effective nursing care with optimal satisfaction of the patients and nurses.

This study was carried out at B.P. Koirala Institute of Health Sciences with the aim of identifying the challenges and impact of transforming paper based nursing documentation into electronic form. A qualitative method with interpretive approach was used in this study using interview, observations, and informal discussion as data collection tool. The empirical findings were analyzed using Information Infrastructure theory and Actor-Network theory.

From the empirical findings, procurement, lack of skilled manpower, electricity and connectivity problems, cost of transformation, feasibility and sustainability, high staff turnover rate, issues related to user friendliness, and issues related to change process were the major challenges identified while transforming paper based nursing documentation into electronic form. The positive impacts of the transformation outweighed the negative one. Finally, it is concluded that while using any Information Communication Technology, a proper strategic plan should be made especially in a developing country like Nepal where several challenges exists.

Key words: *Nursing documentation, Electronic nursing documentation, Transformation, Challenges, Impact*

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LIST OF ABBREVIATIONS

ANT	Actor Network Theory
BPKIHS	B.P. Koirala Institute of Health Sciences
CBS	Central Bureau of Statistics
CCU	Critical Care Unit
CIA	Central Intelligence Agency
CNE	Continued Nursing Education
CRNBC	College of Registered Nurses of British Colombia
DOTS	Directly Observed Treatment Short-Course
EPR	Electronic Patient Record
GDP	Gross Domestic Product
HDI	Human Development Index
HPI	Human Poverty Index
HSRSP	Human Resource from Health Strategic Plan
ICT	Information Communication Technology
II	Information Infrastructure
IS	Information System
ICU	Intensive Care Unit
MOH	Ministry of Health
MOHP	Ministry of Health and Population
MICU	Maternal Intensive Care Unit
NHRC	Nepal Health Research Council
NICU	Neonatal Intensive Care Uni

NII	National Information Infrastructure
PICU	Pediatric Intensive Care Unit
PAHO	Pan American Health Organization
RN	Registered Nurse
UNDP	United Nations Development Project
VDC	Village Development Committee

CHAPTER I

INTRODUCTION

1 INTRODUCTION

The healthcare sector is a very delicate sector which faces issues surrounding quality, safety, efficiency, cost and access to health care services. Information and communication technology (ICT) have the ability to face these challenges (Munyisia & Yu, 2011). The integration of the modern ICT into the health care system has improved the quality of health care services provided to the people by enhancing the patient care and also by providing the opportunity to the health workers for continuing professional development.

Documentation while caring the patient is a fundamental process and is critical as well. Nursing documentation is the record of the care that is planned or provided to the patient, reflecting the quality of care provided to the patient (Irving et al., 2006). Nursing documentation is also said to reflect professionalism through the nurse's application of nursing knowledge, skills and professional standards in the clinical setting (Cheevakasemsook, Chapman, Francis, & Davies, 2006). Quality nursing documentation has the potential to improve patient outcomes through the recording of the patient's condition and the patient's responses to nursing interventions (Jefferies, Johnson, & Griffiths, 2010).

The quality of care provided to the patient directly depends upon the nurse's ability to access accurate and comprehensive health information. The transition from paper to electronic documentation can improve the quality of nursing documentation. Evidently, the implementation of electronic nursing documentation is essential to enhance the provision of safe, ethical and effective nursing care (Pyane, 2013).

As the health care environment is continuously changing and evolving, nurses are facing great problems adapting to these changes. They have to face both change in medical knowledge as

well as advancement in information communication technologies. The nurses are struggling with these changes and also with the complex health care demand. The transition from paper-based nursing documentation into electronic form is one of the significant changes for the nursing profession as well as for the health sector. The transformation of paper-based nursing documentation into electronic form will help the nurses to address the problems that they have been facing especially issues related to accuracy and standardization of nursing documentation. The transformation will thus provide nurses with the opportunity to provide more standard nursing documentation thus improving the communication between health care workers and finally providing high quality patient care (Pyane, 2013).

1.1 Statement of Problem

Nursing documentation is important as it defines the nature of nursing itself by documenting the outcome of patient care. Not only is nursing documentation a repository of knowledge about the patient, it is verifiable evidence showing how decisions are made, and also records the result of those decisions (Jefferies et al., 2010). Through the nursing documentation quality of patient care can be evaluated. The increase in awareness of the patients toward their health information also shows the need for proper nursing documentation. In a country like Nepal, the use of these technologies such as electronic nursing documentation is a big challenge due to many barriers to accept the new technologies, but on the other hand, the benefits of these technologies bring a higher level of patient care. Thus, the transformation of paper based nursing documentation to electronic form will not only improve the quality of care provided but also provides a systematic and organized nursing documentation available to all health care workers as well as the patients.

1.2 Research Objective and Research Questions

The overall objective of this thesis is to identify the challenges and impact of transforming paper-based nursing documentation into electronic form. It will also focus on various influential factors that effects the development of such infrastructure and the sustainability of those infrastructure. With the above mentioned objective this thesis is based on following research questions:

i. What are the present nursing documentation process in Nepal?
ii. What are the challenges of transforming paper-based nursing documentation into electronic form?
iii. What are the impacts of these transformation?

1.3 Motivation for the Research

My background as a health professional (Nurse) is what motivated me the most to conduct this thesis in Nepal. As a nurse who has already worked in Nepal for some years, I had always realized that the nursing documentation in hospital of Nepal are not systematic. I always used to think about the better option to upgrade the nursing documentation. The course Telemedicine and e-Health has influenced me more to pursue my thesis in my home country as I got more informed about telemedicine and electronic nursing documentation. Moreover, the use of ICT in healthcare especially in developing countries has always proved to uplift the health status of the people. So, Nepal being a developing country also encouraged me for this study.

1.4 Study Area and its Justification

This study was carried out in B.P. Koirala Institute of Health Sciences (BPKIHS) which is one of the tertiary level hospitals in eastern part of Nepal. Conducting this research in one of the tertiary level hospitals in Nepal with paper-based nursing documentation would provide insight about the current level of nursing documentation in Nepal. It would also help hospital administration to get detailed information about the strengths and limitations of nursing documentation currently used and the solution to improve it to provide quality patient care. Being a tertiary level hospital it can provide a positive impact on other hospital if electronic nursing documentation is implemented.

1.5 Research Methodology

This study mainly focuses on identifying the challenges and impacts of paper-based nursing documentation into electronic form. To understand the case scenario, qualitative study design was used. This study method helped the researcher to get deep insight to understand the phenomena under study. Therefore, this study makes use of qualitative research design and undertakes interpretive research approach. Multiple data collection tools such as semi structured interview, informal discussion, and observation were used to collect data. A total of 12 respondents were interviewed who were selected by snowball sampling. In addition to that, supporting photographs were also taken to support the study information.

(More detailed information can be found in chapter 3 of this thesis)

1.6 Organization of Thesis

This thesis is structured into 8 different chapters. The chapters and its description are as follows:

Chapter 1: This chapter sheds light on the introduction of the subject matter. It includes statement of the problem and the research objective along with research questions on which this thesis is based upon. This chapter also explains the motivation for this study and also includes information about the study area and its justification. It then provides information about the research methodology used in this thesis. Furthermore, it briefly outlines the content of the further chapters which is included in this thesis.

Chapter 2: It includes the theory section. Theoretical framework is presented in this chapter which includes issues related to nursing documentation especially in developing countries. It further contains information on Information Infrastructure (II). This chapter also includes the notion of Actor-Network Theory (ANT) and how it relates to the concept of nursing documentation.

Chapter 3: This chapter describes the research setting. It contains information about Nepal followed by detailed information about the study site i.e. BPKIHS.

Chapter 4: This chapter includes the research methodology. It reflects on the purpose of the study, research design and the research approach followed throughout the study. It will also provide information regarding the data collection methods and tools used. It describes the qualitative versus quantitative research method. This chapter also focuses on ethical consideration and limitation of the study.

Chapter 5: This chapter presents the empirical findings of this study. The interpreted form of qualitative data collected is presented in this section including detailed information of methods of nursing documentation used, different episodes of work at BPKIHS, challenges to transform paper-based nursing documentation to electronic nursing documentation, its impacts, and future plans of the hospital to upgrade the nursing documentation.

Chapter 6: This chapter presents the discussion which relates the research findings with the literature review to answer the research questions.

Chapter 7: This is the concluding section which includes conclusion to all the issues which is discussed in earlier chapters.

Chapter 8: Includes reference lists used for writing this thesis paper and also provides list of appendices.

CHAPTER 2

LITERATURE REVIEW

2 LITERATURE REVIEW

This chapter gives a brief overview on nursing documentation which is followed by nursing documentation in developing countries including some major issues which are of high significance in these countries while maintaining nursing documentation. This is followed by concepts and definitions of electronic nursing documentation. Further, this chapter includes description about II, and its relation to nursing documentation. Finally, a notion of ANT is presented with some theoretical aspects that illuminate the relationship between various actors and their interplay in this case.

2.2 Nursing Documentation

Documentation of patient care is one of the critical skills used by the nurses that is used to communicate the current health status of a patient, his/her needs, and response to the medical care that is provided to him/her (Kelly, Barandon, & Docherty, 2011). Nursing documentation is one of the important components of clinical documentation. The documentation maintained by the nurses are the precondition for effective care to the patient and for efficient communication as well as co-operation among the members of the health care team (Saranto & Kinnunen, 2009). So, the important responsibilities of the nurses are not only limited to quality patient care but also to exchange quality information about patient's condition and future plans while providing care to the patient (Ammenwerth, Mansmann, Iller, & Eichstadter, 2003). The quality of nursing care depends upon access to high quality patient information (Saranto & Kinnunen, 2009). So, the role of the nurses to record quality patient information is very important.

Nursing documentation is simply defined as *"recording relevant patient data in a clinical record"* (Schrefer, Como, & Myers, 2002). Another simple definition is provided by Irving et al. stating

that *"nursing documentation is the record of care planned and or care provided to patients, which reflects the quality of care provided"* (Irving et al., 2006). The College of Registered Nurses of British Colombia (CRNBC) describes that nursing documentation is the source of information through which nurses communicate their observations, decisions, actions, and outcomes of these actions while providing care to the patient. It is the nursing documentation which allows nurses and other health care professionals to communicate about the care needed to the patient which further supports the nurses to meet their professional and legal standards (CRNBC, 2007). Various studies show that the time and effort spent by the nurses in documentation ranges from 15-20% (Moody & Snyder, 1995) to 25-50% (Gugerty et al., 2007).

The main source of information to provide quality nursing care includes nursing record system, nursing notes, and nursing care plans (Saranto & Kinnunen, 2009). The nurses provide nursing care to the patient through a process called nursing process. The nursing process provides ground for nursing care and gives a structure for the collection of information and nursing documentation (Smaradottir, 2009). This nursing process has the origin in United States and was used in the 1960's. This nursing process then acted as the foundation for the nursing documentation which consisted of different steps (Smaradottir, 2009). The nursing process provides a systematic methodology for nursing practice. The nursing process is comprised of 6 different steps which includes assessment, diagnosis, goals, planning, implementation, and evaluation (Ammenwerth et al., 2003). By utilizing the clinical expertise, theoretical knowledge, and the ability to think critically, the nurse provides care to the patient following the nursing process (Kelly et al., 2011).

Nursing documentation is information tool which supports the nurses to think critically and continuously about caring the patients. It helps the nurses to develop an individual care plan to every patient which will optimize the health outcome of the patients (Kelly et al., 2011). Nursing

documentation simply assists and assures the continuity of the patient care in the best way possible (Saranto & Kinnunen, 2009).

The main purpose of nursing documentation is to provide a patient with the best possible quality of treatment and care through the use of existing resources. The care provided to the patients through use of these resources should be professional and should be able to be evaluated. This is only possible when a high quality of nursing documentation is maintained. Thus, the nursing documentation is the reflection of nurse's care and professionalism and also shows the natural part of caring patient (Smaradottir, 2009).

Several studies have been done which focus on the benefits of nursing documentation. A study done by Bjorvell et al. suggests that the nurses perceive nursing documentation as an important element in their practice and also to ensure the safety of the patient (Bjorvell, 2002). Bjorvell further argues that the main benefit of nursing documentation is improvement of the structured communication between health care professionals to ensure the continuity of individually planned patient care (Bjorvell, 2002).

Another study done by Jefferies et al. states that nursing documentation serves as a reference to the nurses and also provides a wide range of knowledge to the nurses with different options through which they are able to make choices during decision making process while providing quality nursing care to the patient (Jefferies et al., 2010). Nursing care plan helps the patient to participate actively in the decision making process of their own care (Jairath, 1994). Meleis shades the importance of nursing documentation by focusing on the point that the documentation made by expert nursing staffs acts as a source of knowledge to the novice Registered Nurse (RN) and acts as a potential motivating force to further develop nursing theories (Meleis, 1997). Further, Ellingsen and Munkvold in their paper have also supported with the other researchers regarding

the benefits of nursing documentation. They described that nursing plans help to promote improved planning of the patient care which is of high quality and with better cost containment (Ellingsen & Munkvold, 2007).

With the various known benefits of nursing documentation, on the other hand different studies have questioned on the quality of nursing documentation. Bakken in his study mentioned that nursing documentation is the weakest component of the nursing process which is mainly due to the insufficient nurse patient ratio, lack of time for documentation, and lack of standardization (PAHO, 2001). Griffiths and Hutchings also argues that poor recording is even reflected in nursing outcomes (Griffiths & Hutchings, 1999). So, there is a need of evaluation of these nursing documentation to ensure its quality and to promote better patient care. The evaluation of nursing documentation should be focused on the effectiveness, quality, and cost of the nursing care and resource allocation (Moloney & Maggs, 1999). Karkkaninen and Eriksson in their study pointed out that the quality of nursing documentation is evaluated by comparing it with the approved standards (Karkkainen & Eriksson, 2003). Kaplan and Shaw argued that evaluation of nursing documentation and change management are closely related to each other as evaluation can inform change and generate management recommendations which then leads to improved nursing care and documentation (Kaplan & Shaw, 2004).

During the past decade nursing documentation has shifted from manual form of recording to electronic form (Moen, 2003). The use of electronic form of nursing documentation is quite new in nursing practice and it is expected that the use of new technology will reshape information management, create new communication patterns, and enable development of new models in nursing practice (Meum & Ellingsen, 2011).

2.3 Nursing Documentation in Developing Countries

The profession as nurse in developing countries are facing lots of challenges. The challenges vary from quality of education they get, low salaries, low nurse-patient ratio, less exposure to new technologies, low job satisfaction and many more. These all have directly affected the health care delivery in almost all developing countries. Among the few researches which are done in the field of nursing documentation in developing countries, the insufficiencies of nurses and resources as well as workplace inadequacies have been identified as the issues related to documentation in developing countries (Nakate, Dal, Petrucka, Drake, & Dunlap, 2015). Under qualified nursing staff with only basic training is the reason why nursing records are insufficient in developing countries (PAHO, 2001). Others have pointed out that lack of standards for nursing documentation, lack of recognition of relevance of documentation, and lack of an enabling legal environment are more common in developing countries which have affected the quality of nursing documentation (PAHO, 1999). The lack of technology based documentation can be one of the problem in developing countries (Nakate et al., 2015).

Nursing documentation in Nepal as one of the developing countries can be discussed. The documentation in Nepal is paper-based. The major challenge to improve the quality of nursing documentation is the economic condition of Nepal which has a direct impact on the implementation of new technologies. The socio-cultural factors, transportation, and communication systems also play a major issues related to proper nursing documentation (Pradhan, 2002). In Uganda, the nursing documentation is exclusively paper based with only few standards for documentation and less evidence of consistency in documentation. The study in Uganda concluded that the nurses have positive attitude towards documentation of patient care, but they had constraints limiting them to document and also issues concerning the perceived

pressure from the administration which affected the quality of nursing documentation (Nakate et al., 2015). A study regarding nursing documentation in Ghana suggests that the documentation is paper-based and due to problems such as shortage of nurses leading to excessive workload, the documentation and patient care are not done effectively (Johnson, 2011).

Some other problems related to nursing documentation in developing countries are high demand for nursing care, insufficient number of nurses, lack of uniformity related to documentation among different hospitals and health institutions, lack of standardization, lack of recognition of nursing documentation as important communication tool, and lack of knowledge related to new information technology (Manferdi, 1993; PAHO, 1999).

To overcome the ongoing problems related to nursing documentation in developing countries it has been necessary to move forward from only using paper-based nursing documentation into use of information technology into nursing documentation. As information is central element in decision making and essential component for effective provision and management of health care, it is very important to maintain quality nursing documentation. The information obtained from the nursing documentation is also important for planning of health program, supervision, and evaluation of clinical and managerial interventions, and also important in the conveyance of health promotion activities (Hector, 2010).

It has been a necessity for the developing countries to move forward from its present state i.e. paper-based nursing documentation to more organized form i.e. electronic nursing documentation. Through the use of ICT, the health care system in developing countries will be able to work optimally providing satisfaction to both nurses and patient.

In recent years, the hospitals in developing counties are experiencing rapid proliferation, adaptation, and implementation of ICT. Some of the developing countries have started using ICT

such as Electronic Patient Records (EPR). Despite of this growing interest of ICT in health care sector in developing countries, the major problem is sustainability. Initiatives made on using ICT in health care are still in embryonic stage in the developing countries (Lewis, Synowiec, Lagomarsino, & Schweitzer, 2012). Most of the projects related to ICT in health care in developing countries either do not get commenced or are abrogated in the initial phase and only few of these projects have gone beyond its pilot phase which also possesses problems related to coordination (Lewis et al., 2012; Oladosu, Ajala, & Propoola, 2009).

In nursing practice, the nursing documentation is not only related to patient care but also it has an essential relationship with coordination of treatment, communication, accountability, responsibility, and decision making during providing nursing care. Thus, it has been necessary for the developing countries to improve the quality of nursing documentation through integration of information infrastructure (PAHO, 2001).

2.4 Electronic Nursing Documentation

Although methods of recording in the field of nursing have changed overtime with the changing needs of the health care, an important change came with the introduction of computers in health care in the late 20th century (Chand & Sarin, 2014). The first use of computerized medical record was made in 1972 by Department of Family Medicine at University of South Carolina. Since then the health care industry has been planning continuously to integrate computerized system in the medical records (Chand & Sarin, 2014). Nowadays, mostly in the developed countries, EHR is increasingly being used within the heath care organizations to improve the safety and quality of care provided to the patient (Poissant, Pereira, Tamblyn, & LKawasumi, 2005). The computerization of health care has become an inevitable trend. The EMR will constitute the core of a computerized health care system in near future (Walter, 1998).

The need of organized record system containing data that can be compared across the health care delivery system was identified by the nurses very long ago. Florence Nightingale, who is the founder of nursing has expressed her desire for standardized, organized and legible medical record many decades ago. She stated that *"In attempting to arrive at the truth, I have applied everywhere for information, but in scarcely an instance have I been able to obtain hospital records fit for any comparison"* (Laing, 2001).

Similar to paper-based nursing documentation, electronic documentation contains flow sheets through with information can be gathered about the individual patient needs and his/her care plan. However, electronic nursing documentation contains features such as copy and paste option, electronic interface, and drop down menus which are not found in paper-based nursing documentation (Kelly et al., 2011). These features of electronic nursing documentation acts as a time shaving tool for the nurses (Robles, 2009). The drop down menus provide a standardized language that facilitates tracking adherence to clinical standards (Kelly et al., 2011). There are multiple nursing terminologies used in day to day nursing practice and the use of these nursing terminologies in electronic nursing documentation makes it easier for evaluation of documentation as the necessary data can be pulled out directly from the electronic database (Saranto, Ensio, & Jokinen, 2006).

The computerized nursing documentation also reduces redundancies. It has other advantages such as protecting the privacy of the patient, helps in nursing audit, it facilitates data mining for quality assurance and research purpose, and also enables epidemiological monitoring and disease surveillance (Helleso & Rauland, 2001; Malakar, 2006).

Despite of the several advantages that electronic nursing document offer, there are yet different challenges related to it. Transition from paper-based to electronic nursing documentation bring

about confusion, stress, and uncertainty (Chand & Sarin, 2014). The change from paper-based to electronic nursing documentation needs both structural and behavioral change and since change is very rigid process this remains one of the main challenges for the transformation. Acceptance issues are another major challenge. User acceptance is often seen as the crucial factor which determines whether any project runs successfully or not (Ammenwerth et al., 2003; Chand & Sarin, 2014). Despite, there are various challenges while implementing electronic nursing documentation, to come up with ideas to overcome these challenges is the ideal way to improve the documentation in the health care system, meet the new challenges, and meet the changing needs of the health care.

2.5 Information Infrastructure

The use of information and communication technology has changed the life of people in many ways. Nowadays, information and communication technology are used in almost every sector including banking, business, science, and also in the field of health. The people are making more and more use of these new technologies to ensure better outcome which lead to the establishment of term “Information Infrastructure”. This term II has been used to refer to the integrated solutions based on the ongoing integration between information and communication technologies (Hanseth & Monterio, 1998).

The Information System (IS) is developed as a single component which lies within the organizational boundaries with a closed system and having central control due to which there remains limitation of IS while using it in a boarder perspective. As IS are suitable for closed system they are less common to be applied in large and heterogeneous organizations where several component interplay with each other. Due to this limitation of IS, the concept of II has emerged. II is large integrated system with boarder purpose hence, is advanced in comparison to IS which

has single component and a clear purpose (Hanseth & Monterio, 1998). The II involves different communication network and software associated with it which helps to support interaction between the people and the organizations. By doing so, it brings together information processing applications, communication networks and services, physical and software elements in network, and all these elements are integrated together through standardized interfaces (Hanseth & Monterio, 1998).

Hanseth and Monteiro defines II as *"a shared, evolving, open, standardized, and heterogeneous installed base"* (Hanseth & Monterio, 1998). They further described that II covers all kinds of technologies, involves political, social, organizational and human aspects, and issues which interact and are interdependent and intertwined. Borgma describes II as a collective term for the technical, social, and political framework including people, technology, tolls, and services (Borgma, 2007).

The traditional approaches related to IS are based on assumptions where information system are closed with top to down approach but II in contrast with IS is somewhat tricky thing to analyze as it is open, complex, and follows bottom up approach (Hanseth & Monterio, 1998). The conceptualization of II can potentially yield several key insights. Basically, II are described as networks as a broad range of humans and non-human component mutually influence their development in a variety of way (Nielsen, 2006).

Bowker and Star mentioned that II are never transparent to everyone and as they scalp up their work ability becomes more complex, this is the reason why II are very tricky to analyze. One of the advantages of IIs are that they are easy to use but they are very hard to see and as they grow bigger it becomes hard to visualize them. A deeper attention to the architecture is needed to have deeper understanding about II (Bowker & Star, 1999).

The acts which conceptualize II are not independent, but constitute and produce socio-technical actor networks. This is the reason why II are not developed due to planned and controlled actions of some developers, but rather involves a process involving surprises, blockages, diversions, side effects, and vicious circles, as well as inherent tensions between the need for universal standards and locally situated practices (Hanseth & Monterio, 1998).

Hanseth and Monteiro further discuss that II needs to be seen in a more holistic perspective as it has different component and goes beyond pure technology. II would not work without people supporting it or if it is not used properly (Hanseth & Monterio, 1998).

The basis of IIs are the interest of connection between different systems. Thus, II are the fusion between information system and communication technology and are more open compared to the traditional way of looking at the information system (Hanseth & Monterio, 1998).

The National Information Infrastructure (NII) of the United States recognizes four major elements of II which are information, applications and software, network standards and transmission codes, and the people (vendors, users, operators or service providers). This shows that II has a broader meaning like technologies to transmit, store, access and display voice, data and image rather than just wire and machines (Hanseth & Monterio, 1998).

2.5.1 Characteristics of Information Infrastructure

Since II is more than an individual component, it requires a holistic perspective to understand it. New approaches are required to understand these II especially when they are invisible. Harmonizing the various concepts of II and differentiating it form other IS can be done because of the unique characteristics of II which are enabling, shared, open, socio-technical network, heterogeneous, and installed base (Hanseth & Monterio, 1998).

- *Enabling:* II has enabling or supporting functions as it is designed to fulfill a wide range of activities. It not only improves the existing one but also creates new area for different activities. The enabling feature of II provides a stable basis for an increasing, complex, and dynamic world.
- *Shared:* An infrastructure is shared in the sense that it is equally used by the members of the community as a resource or foundation and yet it is irreducible. Irreducible in this statement means that all the users use the same infrastructure yet it cannot be split into separate parts. All the members of the community uses it independently. Although it is stated that it is irreducible on the other hand, it may be decomposed into several small units especially for the design and analysis purpose. But even if it is decomposed into several units, each unit is interdependent with each other and the change in one brings change in the whole system. This is the reason why II are called shared standards.
- *Open:* Another characteristics of IIs is openness. As IIs do not have any beginning or termination point and it lacks borders which specifies the character as open. In II there do not exist any limit for determining the number of actors involved in the system which shows that IIs are always open. There are no limits for the number of users, stakeholders, vendors, and nodes in the network, application areas or network operators in II. II are open as it has no beginning or ending during its development (Hanseth, 2002).
- *Socio-technical network:* IIs involves more than an individual component like technological as well as social components. The infrastructures are socio-technical as the two component are interdependent. This is the reason why the development of II should not be viewed as pure technological rather it should be viewed as ongoing socio-technical negotiation.

- *Heterogeneous:* As IIs have a very broad socio-technical network it is heterogeneous. IIs has many dimensions ranging from technological to non-technological components, standards and functionality. All these components are interrelated and develop ecologies of networks which are layered and each layer is composed of different component.
- *Installed base:* IIs are never developed from scratch, it is evolved from an already existing and continuously evolving infrastructure called installed base. The infrastructure are formed involving innovations over time. The IIs develop as new ones are integrated to the existing ones and improving existing ones, but the new feature must be compatible with the existing one and hence, this existing infrastructure controls how new ones are created (Hanseth, 2002).

Star and Ruhleder in their paper have mentioned that there are three orders of issue caused by II and if these issues are not addressed properly the system fails. The three order of issue are first order issue, second order issue and third order issue. The first order of issue are those that are related to informants. This issues involves money, space, information, training etc. By providing information and training to all the users and stakeholders before starting any new design these, issues can be addressed. The second order issue occurs due to collision of two or more first order issue or due to result of unforeseen contextual effects. The second order issue can be addressed by provision of proper funding, training, and cooperation among the users. The third order issue involves political issues or permanent disputes and can be addressed by initiation of evaluation and reward, creating new sub-specialties, and new criteria for conduct (Star & Ruhleder, 1996).

2.6 Actor Network Theory

ANT was first developed by Michel Callon and Bruno Latou in Paris and was initially applied to the sociological science (Walsham, 1997). Monterio describes ANT as an act in which the

influencing factors such as technological and non-technological elements are linked together in a network which makes ANT heterogeneous (Monterio, 2000). The key feature of this theory is that the actors involved are both human and non-human which are called 'hybrid collectif' as they are treated in same way (Aanestad & Hanseth, 2000; Callon & Law, 1995).

ANT is the interplay between technological determinism and social reductionism. By technological determinism it means that the technology determines the use and the development of this technology is logical. And the social reductionism suggests that the society and actors have influence on the development of these technology (Hanseth & Monterio, 1998). Walsham describes that *"ANT exams the motivations and actions of group of actors who form elements linked and associations of heterogeneous network of aligned interest"* (Walsham, 1997). Monteiro has the similar view and explains that *"ANT is the network of heterogeneous material that make up a context and the notion of ANT instructs us to map out the set of elements which influence, shape or determine action"* (Monterio, 2000).

The ANT provides the theoretical concept of how the element is viewed in the real world and also sheds the importance of these elements in empirical work. Thus, ANT can be used both as a theory as well as methodology. The ANT in any given situation helps to trace and also explains the process that a stable network of interest are created and maintained or if not done properly it even fails (Walsham, 1997).

ANT is mainly focused on how science actually is done. It is the strategy to unpack the complexity of the environment around us (Monterio, 2000). ANT sees social structure as a verb, not as a noun. It defines a set of questions which helps in exploring the complex mechanism involved in an organization. While exploring the character of an organization, the effect of interaction between

materials and strategies of organization is explored by ANT. If there was no heterogeneity of the network, the society would not have existed (Law, 1992).

Law in his paper argues that ANT defines science as a process of heterogeneous engineering where different elements from the social and technical field are connected and then translated into a heterogeneous scientific result. ANT treats elements as interactive effects and is process oriented sociology. Law further describes that the analysis of ordering struggle is central to ANT. Thus ANT is a theory of agency, knowledge, and machines (Law, 1992).

The two important and relevant concepts of ANT are inscription and translation (Monterio, 2000).

Inscription refers to the way in which technical artifacts embody the patterns of use (Akrich, 1992). It includes program of action that defines the actor role and also describes the vision of development of new technologies. The actor in any network behave in a certain way but also has presumptions about other actors and this is called inscription. The inscriptions could be in the form of either scripts, program of actions or any scenario (Latour, 1991).

Translation is another important concept of ANT which is a social process of aligning interests, mapping out the needs of the actors or users. The process of translation can also be seen as a problem solving model (Callon, 1986). It outlines how the interest of actors are translated into specific needs. Callon, one of the central actor network author, explained 4 moments of translation which are problematization, interressement, enrolment, and mobilization. All these moments can overlap in real life situation.

- Problematization is a phase in which the researcher becomes indispensable to other actors involved in the drama and this is done by defining the focal actor and identifying other

actors that have similar goals and interest, and are established itself as an obligatory passage point (Callon, 1986).

- Interessement involves a series of processes through which the researcher locks the other actors involved into the roles that was proposed for them in that program. It involves the act of convincing other actors.
- Enrolment refers to the set of strategies in which the other actors accept the interest of the focal actor.
- Mobilization is a set of methods used by the researcher to ensure that the spokesmen were properly able to represent a particular network and its intention.

The two concepts of ANT i.e. transcription and inscription depend on various factors such as identification of needs of different actors, negotiation of these needs and its inscription into technology, the actor responsible for inscription, and the strengths of these inscriptions (Monterio, 2000). Thus, the success of any new technology developed not only depends upon the new technology used but also depends upon the users and organizational body involved during its implementation.

CHAPTER 3

THE RESEARCH SETTING

3 RESEARCH SETTING

This chapter provides information about the research setting where this study was conducted. It begins with the short introduction on Nepal's country profile including information about geography, population, economic condition, educational status, and health care system. This chapter also contains description about the research setting.

3.1 Country Profile- Nepal

3.1.1 Geographical Information and Administrative Division

Nepal is a landlocked, multiethnic, multilingual, and multi-religious country bordering China in the north and India on the east, west, and south. It occupies the area from 26°22' to 30°27' north latitude to 80°4' to 88°12' east longitude. The elevations ranges from 90 meters to 8,848 meters (MOHP [Nepal], New ERA, & ICF International Inc, 2012). The total area of Nepal is 1, 47,181 square kilometers and occupies 0.03% and 0.3% of total land area of the world and Asia respectively. Geographically Nepal is divided into 3 regions: the mountain region (35% of total land area), hilly region (42%), and terai region (23%) (MOH, 2009). Administratively, the country is divided into 14 zones, 75 districts, 58 municipalities, and 3,915 village development committees (VDC). Each VDCs are further divided into 9 wards while each municipality consists of 9-35 wards.

Figure 1: Map of Nepal showing Administrative divisions 1

3.1.2 Population and Demographic Information

The population of Nepal was 26.6 million according to 2011 census with an increase of 3.5 million in last 10 years. In the last 40 years, the population has doubled with the growth rate of 1.4%. The population density was 181 per square kilometers. The percentage of population in urban areas comprised of 19% of the total population (Central Intelligence Agency, 2014). The male to female ratio is 0.96 in the total population (Central Intelligence Agency, 2014).

[1] Available from: http://ncthakur.itgo.com/map04.htm

3.1.3 Economic Status

54.2% of the population of Nepal is economically active (Central Bureau of Statistics, 2014). Nepal is one of the least developed and poorest countries in the world with the per capita income of around $750 (Central Bureau of Statistics, 2014). In 2013, the human development index (HDI) for Nepal was 0.49 and human poverty index (HPI) was 31.1 (Central Bureau of Statistics, 2014). Gross domestic product (GDP) was $1,300 million during 2011 (United Nations Development Project (UNDP), 2011). Agriculture is the main occupation and contributes to one-third of GDP (Central Intelligence Agency, 2014).

3.1.4 Education Status

The total literacy rate of Nepal in 2011 was 65.9%. Male literacy rate was 75.1% compared to female which was 57.4%. Education expenses includes 4.7% of the total GDP (2010) (Central Intelligence Agency (CIA), 2016). The urban literacy rate and rural literacy rate was 77.2% and 51.5% respectively. This showed that there is difference in education among poor and the rich people and also male and female population. Total education budget in the year 2015 was 12.04% (Ministry of Education, 2015).

3.1.5 Health Indicators and Health Force

Department of health services is responsible for delivering preventive, primitive, diagnostic and curative health services throughout Nepal.

Table 1: Health Indicators [2]

Health Indicators	Value (2010)
Life expectancy at birth	67
Birth rate (per 1000 population)	22.43 (estimated)
Death rate (per 1000 population)	6.89 (estimated)
Infant mortality rate (per 1000 live births)	41
Under 5 mortality rate (per 1000 live births)	50
Maternal mortality rate (per 100,000 live births)	229
HIV prevalence rate (women aged 15-24 yrs.)	0.49
Prevalence of Tuberculosis (per 100,000)	244

[2] Source: MOHP 2010(MOHP, 2012) (MOHP, 2012)

Table 2: Health Workers in Public and Private Sector [3]

Health occupation category	Public	Private	Heath worker per 1000 population
General medical practitioner	1,123	1,327	0.09
Specialist medical practitioner	636	1,315	0.07
Nursing professional	3,371	3,683	0.27
Nursing associate professionals	4,876	1,393	0.24
Paramedics	8,679	1,160	0.37
Dentist	57	173	0.01
Pharmacist	86	349	0.02
Environmental and public health worker	314	20	0.01

[3] Source: HRH, Mohp 2013 (HRH Technical Working Group, 2013)

Table 3: Public and Private Health Facilities and Institutions[4]

S.N	Sector	Number	Bed coverage
1.	Public		
	Public hospitals (central, regional, sub-regional, zonal and district)	96	6,944
	Health center	5	NA
	Primary health center	201	NA
	Health post	699	NA
	Sub-health post	3,104	NA
	Ayurvedic health institutions	293	NA
2.	Private		
	Private hospitals	147	4,810
	Medical college	15	7500
	Subtotal private	162	12,310
3.	Non-governmental organizations	20,000	NA
4.	International non-governmental organizations	81	NA

[4] Source: HSRSP Report, 2010(MOHP, 2012) NA- Not Available

3.2 The Research Site

This research was conducted in B.P. Koirala Institute of Health Sciences, Dharan, Nepal.

3.2.1 BPKIHS

With the mission of improving the health status of people of Nepal by providing holistic health care through training of compassionate, caring, communicative, and socially accountable health workforce, BPKIHS was established on Jan 18, 1993 and upgraded to an autonomous health sciences university on Oct, 28, 1998. It is a 700 bedded central teaching hospital. The hospital services includes inpatient, outpatient, emergency, radiology and laboratory, Operation theater services extending to public health and social services, telemedicine services, and Directly Observed Treatment Short-Course (DOTS) clinic.

BPKIHS has also been envisioned by the Nepali parliament as a center of national importance in the production of skilled health workforce. BPKIHS has postgraduate, undergraduate, university certificate programs, and Doctor of Philosophy (PhD) program. Medical, dental, nursing, and public health are the 4 colleges run by BPKIHS to produce skilled health workforce to meet the country's need.

With over 40,000 admissions per year and a bed occupancy rate of nearly 70%, BPKIHS provides inpatient services to its patients (B.P. Koirala Institute of Health Sciences (BPKIHS)).

Figure 2: View of BPKIHS

3.2.2 Information Infrastructure at BPKIHS

Information infrastructure at BPKIHS is not sophisticated, but compared to other hospital in Nepal it makes greater use of information communication technology. The computers are used all over the hospital for its day to day activities in addition to pen and paper work. Most of the administrative work are done using computers. Other departments of the hospital such as laboratory, billing, and different hospital wards uses computers for different works. Internet facility at BPKIHS is not the best one but is satisfactory. In the wards one printer is provided to each along with the computers. The staffs in the wards use the computers for admission and discharge of the patients and also to get the lab investigation reports of the admitted patients. Other administrative staffs also uses computer for their day to day work.

Figure 3: Information Infrastructure at BPKIHS - Computer with printer

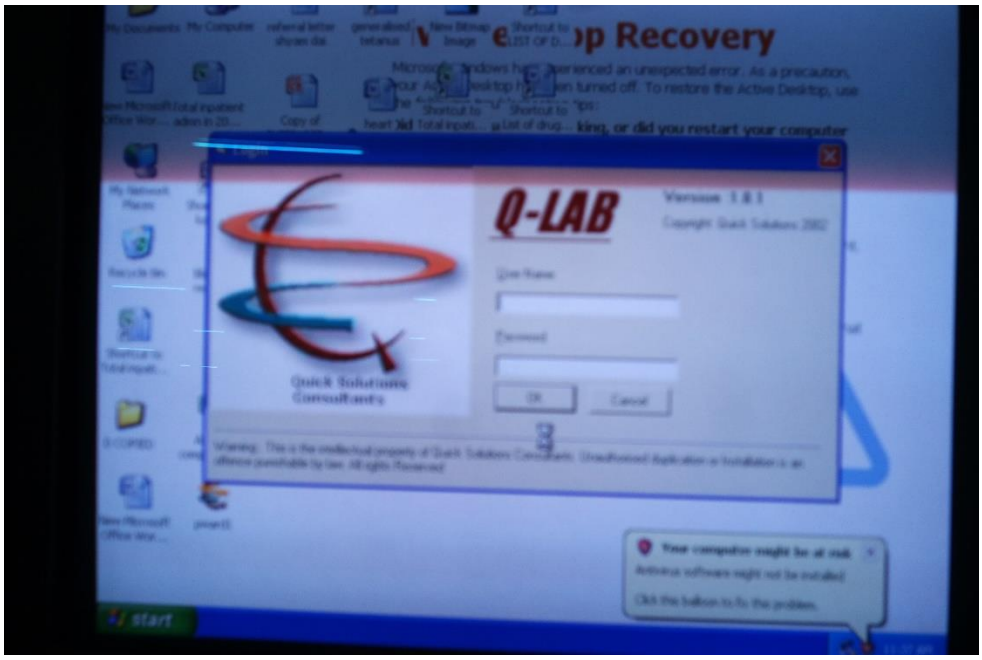


Figure 4: Information Infrastructure at BPKIHS - Software used in BPKIHS to Record Information Electronically (Q-LAB)

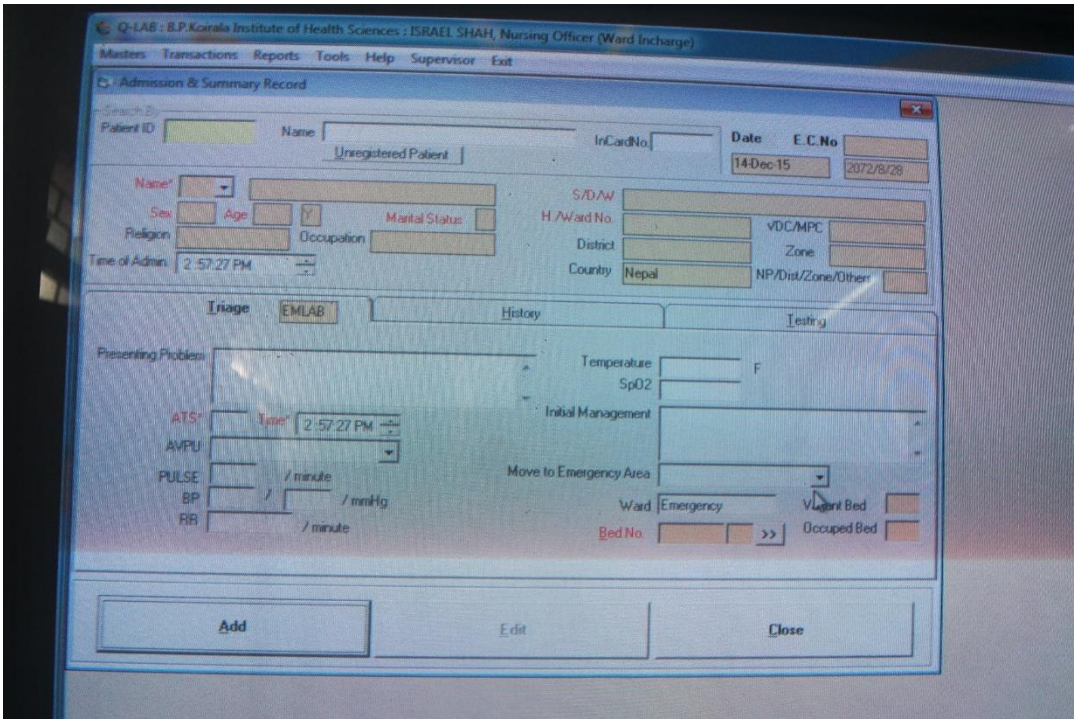


Figure 5: Information Infrastructure at BPKIHS - Electronic Admission Form in Q-LAB

Hospital uses different software for various hospital works. Among those software the one used in the wards of the hospital is called 'Q-LAB'. This software was developed around 13 years ago and was started in a small level only through billing section and was later used in other department of the hospital. The Q-LAB software is used in the laboratory, emergency and other general wards of the hospital. The information stored through this software can be studied by the staffs based on the authority provided to them by the software. Only super user (from the IT department) can get access to all the information.

Apart from Q-LAB which is used for hospital purpose there are other software used such as Q-HFS for administrative purpose, Q-PAY for human resource department and Q-STORE for hospital store. Though this software is of great help, BPKIHS wants to move forward to improve its information infrastructure as it has targeted to be a digitalized hospital (paperless) in next 2 years.

The major limitation of this present software used is that it does not store anything regarding academic section, does not store information about nursing documentation, and has network problems. These limitation could be overcome by the new software which is in the development phase. The new software will be university integrated and will help BPKIHS to become fully digitalized.

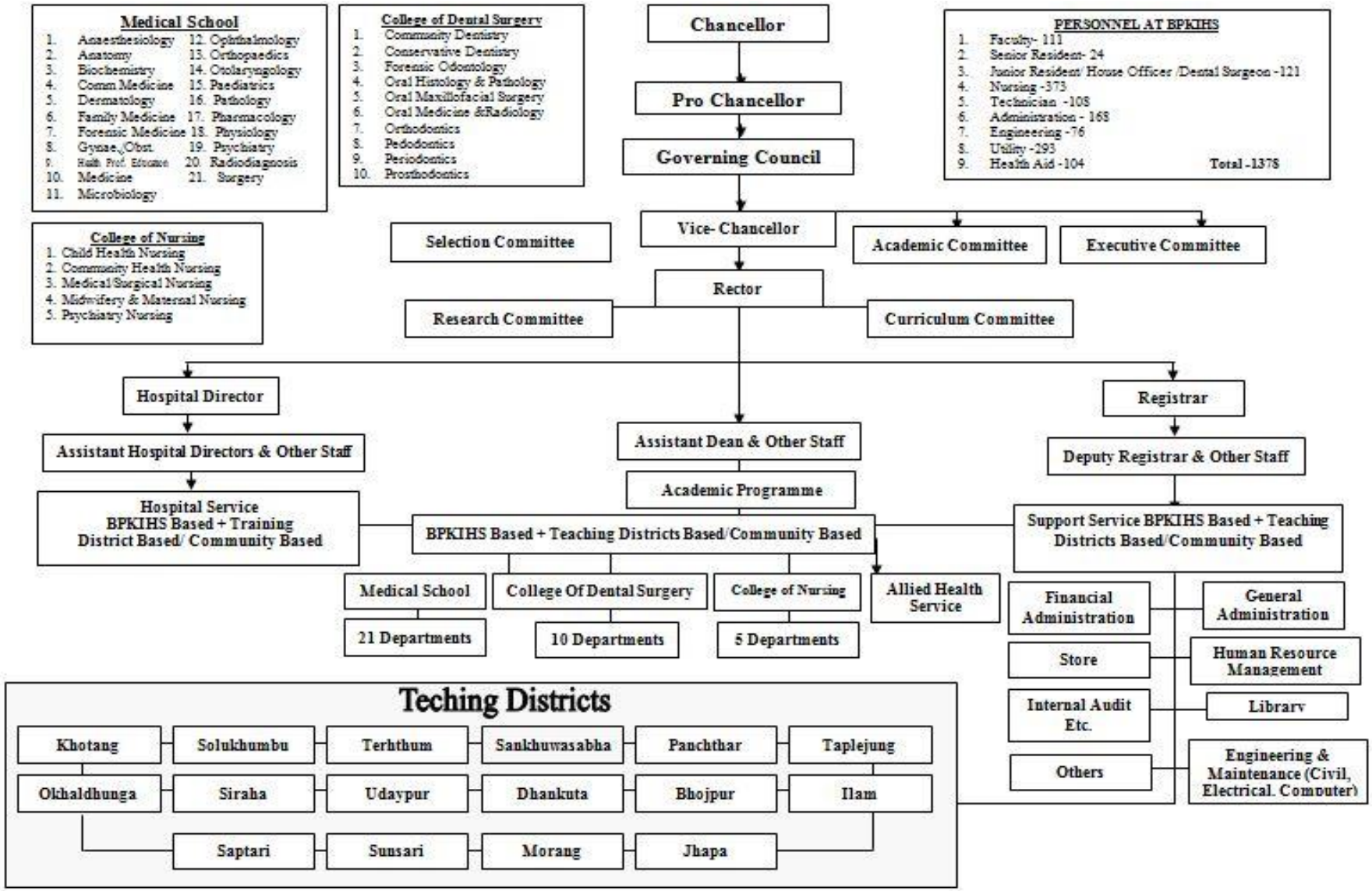


Figure 6: Organogram of BPKIHS

CHAPTER 4

METHODS

4 METHODS

This chapter covers the methodological approach used in this study. This section gives an insight on the difference between qualitative and quantitative research designs and will focus on explaining interpretative approach. This chapter will also cover how I got access to the site, data collection tools, and my experiences in the field work.

4.1 Research Objectives

The main objective of this research was to identify the challenges and impact of transforming paper based nursing documentation into electronic form. To achieve the set objective, the study aimed to answer the following research questions:

- What is the present nursing documentation process in Nepal?
- How is nursing documentation done in BPKIHS?
- What are the challenges of transforming paper based nursing documentation into electronic form?
- What are the impacts of this transformation?

4.2 Research Design

Research design are the strategies of inquiry that provides guidance about the facts related to the study, ranging from assessment of philosophical ideas backing the study to the detailed data collection and analysis process (Cresswell, 2002).

4.2.1 Quantitative versus Qualitative

IS research can be broadly classified into two types: Qualitative and Quantitative research design (Robson, 2002). Further description of these research designs are discussed below.

"Quantitative" refers to quantity or number, this research method is mostly suitable for determining the size, extent or duration of certain phenomena or to find out the pre- specified effect of an intervention or specific cause (Stoop & Berg, 2003). For conducting a quantitative research, a well-developed conceptual framework or theory is required in advance. Quantitative researchers are concerned with answering the questions "what?", "how much?", and Why?" (Stoop & Berg, 2003).

Bryman defines quantitative research as *"A research which is routinely depicted as an approach to conduct social research, which applies a natural science, and in particular a positivist approach to social phenomena"* (Bryman, 1984).

Quantitative research is pre- structured and often starts with a well-defined hypothesis, i.e. the phenomena of interest are typically quantified and that such designs are theory driven (Robson, 2002). Due to these reasons, quantitative method are called as fixed design approach which rely on quantitative data and statistical generalization. One of the advantages of fixed design is that, the result of the study is generalizable from the sample to the whole population. The purpose of quantitative research methods is to explain, predict, or control phenomena through focused collection of numerical data, therefore it is deductive, value-free, focused, and outcome oriented (Howard & Borland, 1999). This is the reason why quantitative research method are most suitable for establishing size, extent or duration of certain phenomena or to establish that a specific cause or intervention results in a pre-specified effect (Stoop & Berg, 2003). However, there are some

weakness of this design. Quantitative research design fails to capture the subtleties and complexities of human behavior, and limited number of factors can only be studied under close conditions (Randall, Harper, & Rouncefield, 2008). There are four approaches of quantitative methods: descriptive, correlation, cause- comparative, and experimental (Ouyang).

In contrast to this, qualitative research design focuses on "why?" and "how?" of situations (Stoop & Berg, 2003). It views reality as socially constructed phenomena and provide detailed insight into the concepts, what people think and do and their underlying principles, and what they are often unaware of (Forsyte, 1999; Robson, 2002). Qualitative research is a process which includes activities like collecting and analyzing data, developing and modifying theory, elaborating or refocusing the research question, and identifying and addressing validity threats which occurs each influencing the others (Maxwell, 2013). The data in qualitative research are in the form of words which can also be presented in the quantitative form.

Cresswell defines qualitative research as *"an approach, useful for exploring and understanding a social phenomenon such as a social or human problem, based on building complex, holistic pictures, formed with words, views of informants and conducted in natural settings"* (Cresswell, 2002). Qualitative research methods are optimally suited to understand a phenomenon '*from the points of view of the participants and its particular social and institutional context'* (Stoop & Berg, 2003). The methods used in collection of data in qualitative research includes interviews, participant observations, and document analysis in the form of case studies, ethnographic studies, and grounded theory (Stoop & Berg, 2003). The four approaches to qualitative research includes phenomenology, case study, ethnography, and grounded theory (Patton, 2002). The data collection procedure in qualitative has less pre-specification and the design evolves, develops, and unfolds as the research proceeds so, it is said to be flexible research design (Robson, 2002). In this research

design the independent and dependent variable are not pre-defined, rather it focuses on the complexity of human senses making as the situation emerges through social construction such as documents, tools, language, consciousness, shared meaning, and other artifacts (Klein & Myers, 1999). The major limitation of qualitative design is that it is limited in terms of inferential power (generalizability) i.e. the conclusion draw from the study may not be generalized to other study (Borland, 2001).

Apart from qualitative and quantitative research design there exists a mixed design which includes both quantitative and qualitative methods and both method complement each other, this process is called triangulation (Robson, 2002). The mixed method is also called "*consequence-oriented, problem-centered, and pluralistic design"* (Howard & Borland, 1999). Stoop and Berg argues that when mixed method is used it yields the greatest result especially when results from one method are used as input for the other (Stoop & Berg, 2003).

The fundamental difference between qualitative and quantitative research method is that qualitative method is text based whereas quantitative is number based. The former one is more subjective- describes a problem or condition form the point of view of those experiencing it whereas, the latter one is more objective- providing observed effects interpreted by researcher. In quantitative design, the study can be controlled whereas in qualitative design, researcher has no control over the study environment (Howard & Borland, 1999). Quantitative study is performed in closed, artificially created environment, whereas qualitative study is carried out in an open, natural or real environment (Robson, 2002). Another simple difference between these two designs is that statistical tests is not required in case of qualitative design, whereas statistical test is required in case of quantitative design. In case of qualitative study methods of data collection includes focus groups, in-depth interviews, observation, and document analysis whereas, in quantitative research,

surveys structured questionnaire are used for data collection. Another difference between the two research designs is the sampling technique used. Qualitative design make use of non-probability sampling, whereas quantitative makes use of probability sapling (Robson, 2002). In qualitative research, there is purposeful sampling due to which generalization is not possible whereas quantitative research makes use of random sampling, so the sample selected represents the whole population and hence in this design generalization is possible (Robson, 2002).

4.2.2 The Interpretive Research Approach

Depending upon the philosophical approach of the researcher qualitative research can be done using interpretive, positivist or critical approach (Klein & Myers, 1999). There is no fundamental difference between qualitative and interpretive approach. According to positivist approach, the social reality is objective, independent of theoretical explanation, and can be tested while the researcher should be detached value free observer for the object of the study (Meyers, 2008). The critical research approach on the other hand is based on assumptions that the ability of people to work and be able to change their social and economic situations is restricted by political, social, and cultural dominations coupled with limitations of resources (Klein & Myers, 1999).

Interpretive research in IS assumes that our knowledge of reality is gained only through social constructions like languages, consciousness, shared meaning, documents, tools, and other artifacts (Klein & Myers, 1999). There is no profound dependent or independent variable in an interpretive research, but it focuses on the complexity of human senses making as the situation emerges (Kaplan & Maxwell, 1994).

"Interpretive approach attempts to understand the intersubjective meanings embedded in social life to explain why people act the way they do". (Gibbons, 1987)

"Interpretive approach is aimed at producing an understanding of the context of the information system and the process whereby the information system influences and is influenced by context" (Walsham, 1993).

To understand issues or particular situations by investigating the behavior and perspectives of the people in these circumstances, and the perspective within which they act and hence presenting the reality as a social phenomenon of multiple facets is the main aim of an interpretive research (Stoop & Berg, 2003). This is the reason why interpretive research can produce deep insight into information systems.

Researcher acts as key instrument in an interpretive research, who is calibrated first through training in theory and methodology followed by experience (Forsyte, 1999). Therefore, the result of interpretive research depends upon the ability of the researcher to collect data and the ability to interpret and represent the collected data.

Due to the lack of focus on validation, the interpretive research has been criticized (Klein & Myers, 1999; Walsham, 1993). The issue of validation led to series of debates, consequently leading to the development of various guidelines for assessing the validity of any interpretive research. Among those various guidelines found in different literature Klein and Myers's *"set of principles for conducting and evaluating interpretive field studies in information system"* will be discussed as most of the principles are relevant to my field of study.

The seven principles for interpretive field research proposed by Klein and Myers (Klein & Myers, 1999) are:

1. *The fundamental principle of hermeneutic circle:* This principle suggests that all human understanding is achieved by iterating between considering the interdependent

meaning of parts and the whole that they form. This principle of human understanding is fundamental to all the other principles.

2. *The principle of contextualization:* Interpretive research requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged.
3. *Principle of interaction between the researchers and the subjects:* Requires critical reflection on how the research materials (or "data") were socially constructed through the interaction process between the researcher and participants.
4. *The principle of abstraction and generalization:* requires that, theoretical abstractions and general concepts need to be reflected in the interpretation of results and to show how the researcher came to the theoretical insights in describing human understanding and social action.
5. *The principle of diagonal reasoning:* It states that the research requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings with subsequent cycles of revision.
6. *The principle of multiple interpretations:* It states that interpretive research requires sensitivity to possible differences in interpretations among the participants, whose interpretation or narration for same setting or event varies.
7. *The principle of suspicion:* The research requires sensitivity to possible "biases" and systematic "distortions" in the narratives collected from the participants.

Golden-Biddle and Locke presented three dimensions of convincing the reader about the validity of the research results which are: authenticity, plausibility, and criticality (Golden-Biddle & Locke, 1993).

1. *Authenticity:* It means being genuine to the field experience as a result of been there. It concerns with the ability of the text in the research paper to convey validity of the everyday life of the researcher in the research setting.
2. *Plausibility:* It is the ability to the text in the study paper to connect two worlds that are put in play in the reading of the written account. Plausibility is concerned with the community of readers and their relationship to the subject matter of the text. It is often addressed by the questions such as "does the story make sense to me as a reader". It emphasizes the importance of the ability of a text to convey the reader's sense of familiarity and relevance as well as the sense of distinction and innovation.
3. *Criticality:* It focuses on the ability of the text to actively probe readers to reconsider their taken-for-granted ideas and beliefs. A text achieves criticality not only through the substance of its message, but through its form and rhetorical style.

4.2.3 Site Selection

During the time when I attended my lectures on topic electronic patient records in Norway, I always thought of the process of patient documentation in Nepal. I wanted to do a research on the topic of nursing documentation in my home country. I made some rough plans where to apply for my data collection in Nepal. Then, this idea of collecting data in one of the tertiary level hospital of eastern Nepal came into my mind as I had already worked in BPKIHS for some years. Thinking about the difficulties regarding paper based nursing documentation what I faced during my working period encouraged me more to collect data from BPKIHS so that the findings made from it would help the hospital to improve the method of nursing documentation practiced.

4.2.4 Gaining Access to the Site

Soon after I was clear about where I was going to conduct my data collection, I discussed with my supervisor about my topic and the research site. As soon as I got permission from my supervisor, I made an email connection with one of my friends so that I could get some suggestions from her about the permission related issues. She gave me a bad news that since BPKIHS is a university hospital they give opportunities to their own students for research and there was minimal chances for the outsiders to get permission.

Despite of what my friend said me, I made an email conversation with the Rector of the hospital. I also made a telephone conversation with him for the permission. After few days I got an email mentioning that I was granted a permission for data collection at BPKIHS. The email also mentioned that for further information I need to contact the assistant dean of the hospital. I made an email communication with assistant dean about my thesis topic, proposal and when I was coming for my data collection.

In every research accessibility is always an important issue.

Access may refer to gaining entry to the field, gaining acceptability, being able to „hang around", and more,"…"the process of gaining access also involves strong elements of chance, luck and serendipity," (Randall et al., 2008).

I left to Nepal on 4th of November for the data collection. I was afraid because of the recent earthquake as well as economic blockade and political instability in my country. What if these causes problem while collecting data? The next day after I reached Nepal I went to Nepal Health Research Council (NHRC) to get ethical clearance for my thesis. I headed to BPKIHS after completion of all the work in Kathmandu.

I went to BPKIHS and was totally confused where I should start from as it is a very big hospital. I was supposed to meet the assistance dean for further procedure before starting my data collection. Getting access to the research site is a troublesome and time consuming process. Good social skills are always important to get access to the research site.

Interpretive researchers need to gain and maintain good access to appropriate organizations for their fieldwork. In order to get access, they need good social skills."(Robson, 2002)

Since I had worked in the hospital section, I had no idea where the academic building was located. I asked one of my friends to help me with this. Finally, I was able to spot academic building and was lucky to meet assistant dean on my first visit. I submitted my research proposal to him and applied for permission letter. It took few days to get all the permission letters as it had to be done by various level of personnel in the administration. I had to get permission from academic building, hospital Rector, hospital director, and then hospital matron before I started with data collection. Hospital Matron invited me to a nursing meeting so that he could introduce me to the nursing in-charges of all wards in the hospital that further helped me to gain access to the wards and informants. After getting all the permissions, I was finally able to start collecting the data at BPKIHS.

Getting access was a long process. I had to go through different gatekeepers such as clerk, security guard, academic staffs, hospital administration, and nursing staffs – run from here and there and when finally I got permission, I felt a sense of success though it was a long way to go.

4.2.5 Selection of Participants

The study group in my thesis was nurses of different position and different ward. The sample size for my thesis was 12 nurses but the total number of nurses working in BPKIHS was very high so,

random selection of the nurses was done so that nurses of different ward and different position was included in the study. The nurses from the main wards were covered including the nurses in the administrative department. The list of participants are listed below in table 4.

Table 4: Information about the Informants

S.N	Designation	Ward	Education	Coding
1	Senior staff nurse	NICU/PICU/MICU/Nursery	Bachelor's in Nursing	A
2	Staff nurse	Gynecology and obstetrics	Bachelor's in Nursing	B
3	Senior staff nurse	Pediatric unit one	Bachelor's in Nursing	C
4	Nursing officer	Emergency	Bachelor's in Nursing	D
5	Staff nurse	Intensive care unit/Critical care unit	PCL nursing	E
6	Staff nurse	Ortho	Bachelors of science in nursing	F
7	Matron	Nursing administration	Masters in nursing	G
8	Nursing officer	Surgery two	Bachelor's in nursing	H
9	Staff nurse	Surgery one	PCL nursing	I
10	Senior Nursing officer	Nursing administration	Bachelor's in nursing	J
11	Staff nurse	Maternal and child health- unit 1	PCL nursing	K
12	Staff nurse	Medicine unit 1	PCL nursing	L

4.3 Data Collection

Before beginning the data collection it was very important for me as a researcher to have knowledge and idea about the topic I am studying and the strategy to get the answers to the research questions.

"After deciding on the focus of the research, the research question to which the researcher seeks answer, and the overall strategy and methodology appropriate for getting those answers must be given a thought by the researcher" (Robson, 2011).

"It is essential that we choose the right people at the right time, and to ask the right question or observe the right people at appropriate settings" (Robson, 2011).

The data was collected in the month of November and December 2015 at BPKIHS, Dharan, Nepal.

4.3.1 Methods used for Data Collection

The data collection method used in this study was interview and observation

a. **Interview:** Interviews can be highly structured, semi-structured or unstructured. I used semi-structured interview schedule to get answers to the research questions. The main reason to choose semi-structured questionnaire was because it helps the researcher to ask open ended questions and also allows the discovery or elaboration of information which might be important to the participants but was not thought important by the researcher (Robson, 2011). It also allows the researcher to help the participant with clues if the participant get confused about the questions asked. Semi-structured interview also helps the researcher to get detailed information from the participants by elaborating on the original response.

   The interview guide consisted of 14 questions and based on that questions the interview was carried out. Further elaboration was made based upon the answers provided by the participants. Each interview schedule was 30-45 minutes long. Participant Information Sheet consisting of brief information about the research topic and about the researcher was provided to each participant before the interview was started and the informed written

consent was also signed by each interviewee. A total of 382 minutes of interviews were taken which was then transcribed and analyzed. Several attempts were made in the process of transcription to get the factual information.

In addition to interviewing the nurses I also interviewed the head of the IT department to get information about the different software used in the hospital and about the new software related to electronic nursing documentation which was on planning phase.

b. Observations:

Another method of data collection used was observation method. Observation helps to understand the organization. Observation helps to get the insight of how they actually work, and what tools they use for nursing documentation. Through observation we can watch what they do, how they record, what we saw, and analyze and interpret what we have observed.

Participant observation and non-participant observation are the two different approaches involved in observational method. I was a non-participant observer in this research who acts as an outsider and does not interfere with the process of how the nurses document or what they are doing.

During observation important notes was taken which would helped me in the thesis writing process. Photographs were also taken of important events and places which would act as a visual proof in the thesis writing phase.

c. Document and literature review:

Different documents and literature were also reviewed as they provide written evidence about the subject under study. Various documents and literatures were searched in the

internet as well as library that was relevant with the study. They gave basis to the researcher to know more about the subject matter, to view the same phenomenon in different opinions.

4.3.2 Tools used for Data Collection

Since there was long hours of interview and observation consisting of lots of information, it was important to take a note as soon as it was completed. If not done so it was difficult for the researcher to memorize everything and researcher might lose lots of information. Hence, to prevent this following instruments were used for data collection:

- A diary for taking note of the important points during observation and interview, keeping details of the appointment schedule, and saving contact information of the participants.
- A tape recorder (SONY) for interviewing. Samsung mobile was also used to record the voice if in case something happens to the recorder.
- A laptop was also used for writing down my daily activities.
- A Sony camera to take pictures of the important events or places.

4.4 Role of the Researcher

The role of a researcher in any research is very important. The simple role of a researcher is to present oneself to be reasonable and courteous human being who is only interested in what people do and then to just shut up and listen and watch (Randall et al., 2008). The researcher must have simple abilities such as listening, showing interest, and being tolerable.

The importance of researcher to have quality of listening is mentioned by Barley in his saying *"When you marry, marry a lady anthropologist. She will have been trained for years never to interrupt you and to say only just enough to keep you talking."* (Barley 1989)

The role of a researcher both in qualitative and quantitative research is of equal importance. In quantitative research, the role of a researcher is theoretically non-existent i.e. participants act independently of the researcher as the quantitative research is based on pre-formulated research instrument and other data collection tools (Simon). Whereas, in qualitative research the researcher is considered as the instrument of data collection i.e. data are gathered through this human instrument rather than tools such as questionnaire or machines (Denzin & Lincoln, 2003). Thus, the role of a qualitative researcher includes understanding relevant aspects of oneself including biases and assumptions, experience, and qualification to conduct the research (Greenbank, 2003). A qualitative researcher must have the ability to ask probing questions, listen carefully to the answer given, think critically, and then ask more questions to get deeper information about the subject under study. Since, the researcher is the primary instrument in qualitative or interpretive research, researcher plays important role in research design, collection of data, management of data, analysis and interpretation, and the process of reporting to make the results of the study trustworthy (Borland, 2001).

4.5 Being an Outsider

It is very important for any social researcher to be clear about their researcher's role especially in case of qualitative research, in order to make research credible. In qualitative study researcher take on a variety of member role. The role may be either as being a complete member of the subject under study i.e. emic- insider or being a complete stranger i.e. etic- outsider (Unluer, 2012).

The insider researcher are those who are involved as participant observer or action researcher and are involved in the study as a member of the organization either temporary or for a short period of time. Among the various definition of insider researcher, generally they are those who chose to study a group to which they belong (Breen, 2007). The three key advantages of being an insider

as identified by Bonner and Tolhurst are : having a great understanding of the culture being studied, not altering the flow of social interaction unnaturally, and establishment of intimacy which promotes telling and judging of the truth (Bonner & Tolhurst, 2002). Further, another advantage of being an insider is that they generally know the politics of the institution which helps them to understand how to best approach people (Symyth & Holian, 2008). In addition to this, taking time and cost under consideration, being insider is more advantageous as insider researcher require less time to understand the setting and get access to the field (Randall et al., 2008). Although there are various advantage of being an insider, there are also problems associated with it. Being insider has disadvantage of unconsciously making wrong assumptions about the research process based on researcher's prior knowledge which leads to bias (Forsyte, 1999). Insider researchers may also confront with role duality where they struggle to balance their insider role and the researcher role (Cresswell, 2002).

During my study period, I justify myself as being an outsider. The 'outsider' researchers remain more physically and emotionally distant from the subjects under study and thus gives advantage as the subjects feel free to express themselves, subjects feels the sense of trusting relationship, and there is also less chance of 'going native' (Randall et al., 2008). Keeping distance and being less emotionally attached is important for an outsider researcher. During my data collection, I tried to put myself in an unbiased position. I never interfered with their work rather just observed their working environment and listened to what they said. I tried to make distance with them and not get emotionally attached to them. Though, there are advantages of being an outsider it has disadvantages too. The disadvantage of being an outsider is that they are not present on each and every occasion and at each site of study, due to which they will be unable to grasp all the information and understand what really is going on inside there.

The choice of role for the researcher should depend upon the advantages and disadvantages for specific role in the study, but the best researcher is one who is an outsider with considerable inside experience (Forsyte, 1999). This is important because the difficult job of an interpretive researcher is interpreting the descriptions given by the participants and being an outsider researcher with inside experience of the organization helps to interpret the data through systematic comparison between inside and outside views of particular events (Forsyte, 1999). Further, Randal et al. on the other hand argues that it does not matter whether the ethnographer is an insider or outsider what matters is the researcher must respect his or her views (Randall et al., 2008).

4.6 Reflections on Validation of this Study

Based on some of the concepts of validity discussed in the earlier section of this paper, the validity of the result of this study is discussed below:

Golden-Biddle and Locke, pointed out 3 dimension for convincing the readers about the validity of the text in the study paper. These dimensions are taken into consideration by me in this research paper. Authenticity is maintained as the researcher has understood the research setting and its members. I spent much of my time in the field during my data collection and tried by best to gather much information as possible. The recorded interview schedule, my diary with all important information and the permission letter provided by BPKIHS reflects the authenticity of the collected data. With regards to authenticity, detail description of the study area, reason for the selection of site, and information about participants is also presented in earlier section. Plausibility of the text requires the construction of a sensible story form the empirical findings. To maintain plausibility the recorded interview was listened and transcribed repeatedly to point out important information and was quoted word by word (presented in detail in chapter 5 of this study) as said by the informants. In regards to criticality, the study provides information to the readers so that they can

compare what is perceived about electronic nursing documentation and the new findings of this study.

Among the seven principle of validation by Kelin and Myers some were used in my study and are reflected below:

Principle of Contextualization states that the researcher should have critical reflection of the social and historical background of the research setting. As I had previously worked at BPKIHS for some years I already had some insight about its social and historical background, plus I also tried to gather recent information regarding social and historical background before I went to the research field.

The principle of diagonal reasoning states that the researcher must require sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings. Having worked in the field of nursing and handling nursing documentation, I had some preconceptions about its use.

The principle of multiple interpretation states that the researcher should be aware of possible differences in interpretation among participants. With regards to this, the participants involved in this study comprised of all level of nurses from different department and with different educational qualification. These participants have different interest which influenced their view about electronic nursing documentation and hence I was able to exclude any personal interest.

The principle of suspicion states that the researcher pay attention to possible biases and distortions in the narratives collected from the participants. As stated earlier, the participants in this study included nurses of different level and different ward with different educational qualifications who may have different interest thus, excluding possible biases.

4.7 Ethical Considerations

Ethical approval was taken before starting the data collection procedure form the following:

- Department of Telemedicine (University of Tromso, Norway)
- Nepal Health Research Council (NHRC)

Permission for data collection was taken from BPKIHS before starting data collection. Participants were given general information about the thesis before commencing the interview schedule. They were also informed about the recording of the interview. An informed consent was signed by all the participants before the interview. The willingness of the participants were highly treasured and their anonymity was respected.

4.8 Limitations and Strengths of the Study

As the study was a part of an academic curriculum, thus cannot be reflected as a standard research. Though attempts have been made to maintain the standard, due to lack of time, research could not be carried out extensively. Since, the study was carried out in only one institution, it could not be generalized. Also, very few research has been done in similar topic previously in Nepal so, was difficult to find literatures and other related documents concerning nursing documentation in Nepal.

Some of the identified strengths of the study were that this was the first kind study of its kind conducted in BPKIHS, so its result could help the hospital administration for future plans to improve its documentation system and hence improve patient care. This study not only generates data to meet the aims and objectives of this study, but also would potentially highlight the need for further research on this topic.

CHAPTER 5

RESULTS

5 RESULTS

This chapter includes the results from the data collected through interview and observation. The results are presented as different episodes in the wards of BPKIHS. Further, the pros and cons of paper-based nursing documentation, challenges of transforming paper-based nursing documentation into electronic form, and the impacts of the transformation is presented as the empirical findings from the collected data.

5.1 Different Episodes of Work in Wards of BPKIHS

In each shift, nurses completes different episodes of work and in each episode recording and reporting is done as a part of nursing documentation. These episodes may vary from admitting a patient, taking rounds, maintaining shift reports, giving handover, discharging the patient, to conducting pre and post conference. How the nurses maintain the nursing documents in each of these episodes will be mentioned in the next section.

5.1.1 Admitting the Patients

Patients are admitted to the wards by the doctors either from the emergency ward, observation ward, and emergency operation theatre or from outpatient department. As soon as the patient comes to the ward nurses assists the patients to the assigned bed, then starts her documentation duty. She collects all the demographic data of the patient, assess the condition of the patient, takes vital signs, carries out the order given by the doctors, and provide treatment as per the doctor's order. During this process nurses have to record a lot of information which will be the source of patient information to all the medical team taking care of the patient.

Informant ‘C’ during the interview schedule mentioned about the admission procedure of the patient.

“As soon as we receive the patient to the ward our documentation starts with this. We assess the patient and then document, we follow up doctor’s order and then document, we provide necessary treatment and care to the patient and then record again. The nursing documentation of a patient is very important from the start i.e. admitting the patient as through this documentation we can communicate between our team members” (Informant C).

Few years ago, like other nursing documentation admission procedure was also done only in paper form. But since last 3 years admission procedure is done electronically. As soon as the patient is admitted nurses gather necessary information and records it electronically in the computer situated in each ward. Along with recording electronically, the document is also printed into paper form and documented in a file. Informant F provided me information about the major problem caused by this.

“Previously when we had to admit the patient we used to send them to the billing section and the patient was admitted by the billing section, then we used to enter that data in our admission book, but now we have to admit patient electronically, write same information in the admission book and also in the board maintained in the ward which causes replication of the same information and thus is time consuming.” (Informant C)

There were different challenges faced when admission procedure was started doing electronically. During the interview with different participant they talked about the challenges faced when they started recording admission electronically.

"During admitting a patient some staff presses different button. Like, to admit a patient we have to write the Inpatient number and press tab button. But, some staffs gets confused and presses the arrow button instead of tab button which caused to open old admission form of the patient who is admitted previously, this changes the information of the patient and the patient looks like he is admitted last year with different diagnosis." (Informant H).

"In the night shift the computer in our ward broke down. We informed the IT department for maintenance. But, it took time and at the same time we had to admit the patient. So, our work was pending. We went to another ward nearby and used their computer to admit the patient." (Informant F).

According to Informant 'F' the main challenge of documenting electronically was technical problems. Similar thought regarding user friendliness as a challenge was pointed out by Informant 'L'.

"It was easy for the new generation nursing staffs to use the computers to record electronically but it took lots of time to teach the old nurses who even did not knew how to use computer properly. They still get confused while admitting the patients." (Informant L)

On the other hand some informants were on favor of documenting admission of patient electronically. Informant D was happy with electronic documentation and said that

"Though it was difficult to record electronically at first, we became used to it as time passed on. I am personally satisfied as I got chance to learn new thing and now there is chance for my professional growth. If every nursing document will be recorded electronically, we will be similar to nurses who are working abroad." (Informant D).

There are several sources of nursing documentation at BPKIHS which are similar to most of the hospitals in Nepal. Maintaining these nursing documentation is the most important responsibility of every nurse working at BPKIHS. The information recorded by the nurses in the nursing documentation is helpful for the doctors, nurses, and also to the hospital administration. Nursing documentation at BPKIHS is the proof of how care is provided to the patient and provides information about the communication process among the health professional acting as a medical team to treat the patient. The goal of maintained nursing documentation at BPKIHS is to act as a communication tool, to promote quality nursing care, and to meet professional and legal standards.

The sources of nursing documentation used depends upon in which episodes the nurses are working. In the process of admission, nurses use the admission form as the source of documentation. The electronic nursing admission form is the source of nursing documentation. Along with the electronic admission of the patient the admission is also recorded in the admission book which is maintained in each ward.

The source of nursing documentation during admission also depends upon the ward in which the nurses are working. Like in emergency ward, the admission procedure also includes filling up the triage form electronically and emergency assessment form which act as the source of nursing documentation. In Intensive Care Unit (ICU) and Critical Care Unit (CCU) different assessment form is used as a part of admission procedure. Different consent form is filled up for different medical treatment in different ward which follows the admission procedure.

5.1.2 Nursing Shift Reports

Nursing shift reports are the reflection of the total work done by the nurses in his/her shift. It contains information about patient's assessment, general condition, specific complains etc.

Maintaining proper shift report is very important as the report is not only referred by the nurses of another shift but also by the physicians. However, maintained proper shift report is also difficult especially in the country like Nepal where nurses and patient ratio is very low. In most of the general wards of BPKIHS, there are 3 nurses in each shift caring around 34 patients. The low nurse patient ratio is a great challenge for the nurses to take compete care of the patient and also maintain proper recording.

It is compulsory to maintain shift report by all the on duty nurses in each shift. Nursing shift reports not only include nursing care records but also maintaining nursing care cardex, intake output chart, and nurses monitoring sheet. There is regular auditing done by senior nurses about maintenance of proper nursing care documentation. So, almost all the staffs in BPKIHS are conscious about maintaining nursing documentation properly in each shift.

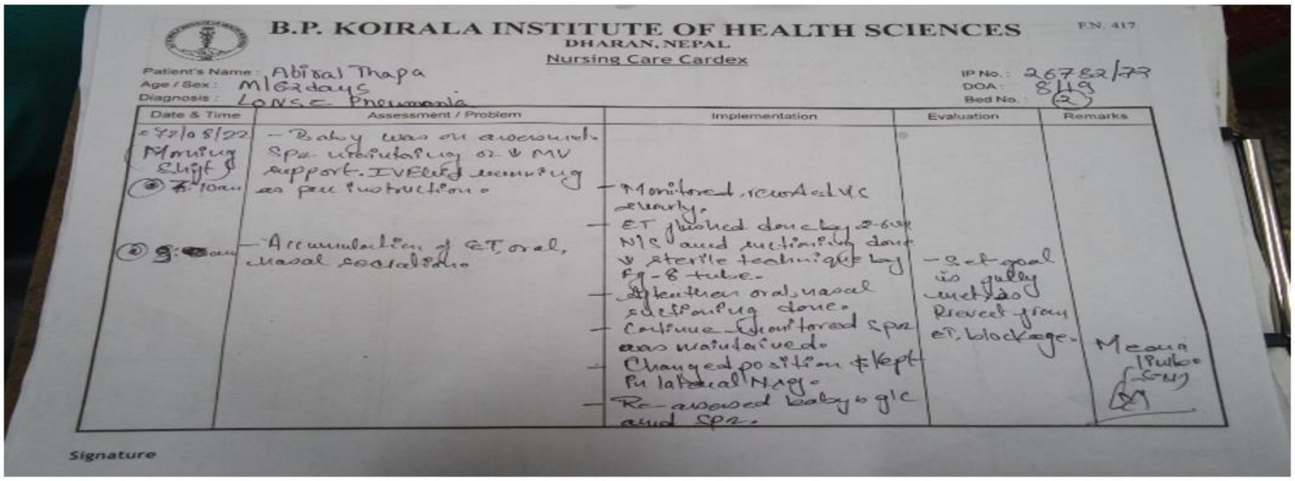
But this becomes difficult when there is replication of information, lots of work with less number of nursing staffs. Some of the informants showed there view against paper-based nursing documentation as they felt that it is time consuming to provide complete patient care as well as maintain all the nursing documentation.

"*Our ward is very busy. There are lots of sick patients and staffs are less. Though our work is for 7 hours, most of the time we have to stay extra hours to complete the documentation. Like last week, I had cared for a patient and I did not get enough time to record during my shift so, I stayed 1 extra hour to complete all the nursing documentation as it is very strictly followed in our hospital. The documentation is also time consuming as there is lots of replication of work."* (Informant I)

The sources of information in this episodes are nursing care cardex, nursing care record, nurses monitoring chart, patient's drug cardex and intake output chart which are used in almost every wards of the hospital. Apart from these general sources of information maintained during nursing

shift reports there are some specific documentation which are maintained in certain wards. Such as in Obstetrics and Gynecology department partograph is used as the source of information.

Figure 7: Source of Nursing Documentation


B.P. KOIRALA INSTITUTE OF HEALTH SCIENCES
DHARAN, NEPAL
Nursing Care Cardex

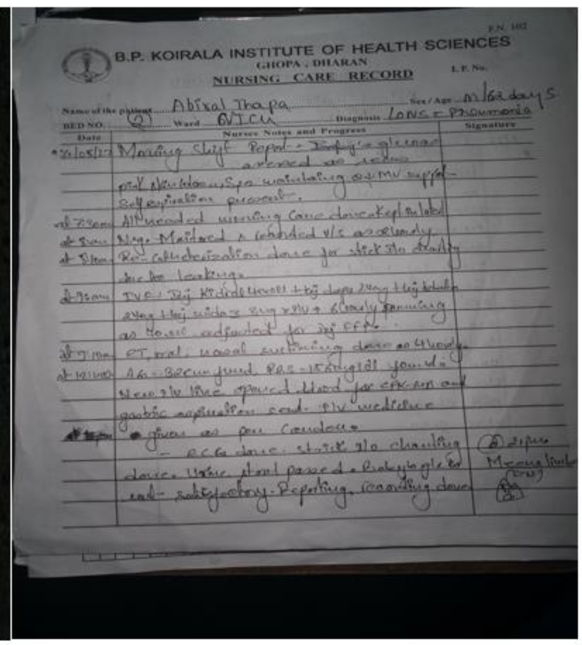
Patient's Name: Abiral Thapa
Age / Sex: M/62days
Diagnosis: LONS - Pneumonia
IP No.: 26782/79
DOA: 8/19
Bed No.: 2

Date & Time	Assessment / Problem	Implementation	Evaluation	Remarks

Signature

(a)


B. P. Koirala Institute of Health Sciences, Dharan, Nepal
Neonatal intensive Care Unit
Nurses Monitoring chart


B.P. KOIRALA INSTITUTE OF HEALTH SCIENCES
GHOPA, DHARAN
NURSING CARE RECORD

Name of the patient: Abiral Thapa
Sex / Age: M/62 days
Ward: NICU
Diagnosis: LONS - Pneumonia

Date	Nurses Notes and Progress	Signature

(b)

(c)

Figure 8: Different forms of Nursing Information

(a):Nursing care cardex, (b): Nurse's monitoring Sheet (c): Nurse's shift report

Nursing care cardex provides information about nursing diagnosis, planning, implementation and evaluation of the plan done to care the patient in each shift. This nursing care cardex contains information about nursing care plan as a whole. Nursing care record includes information about the condition of the patient assessed by the nurses in each shift with information about any special complains of the patient, any specific procedure done on patient, and the general condition of the patient. Nurses monitoring sheet includes information about patients vital signs every 4 hourly to every 1 hourly depending upon the ward in which patient is admitted. Drug cardex includes the name, doses, route, and frequency of medication to be administered to the patient. Intake output chart includes information about the amount of fluid intake and output which is calculated in total in each nursing shift and daily as a whole.

The other sources of information in this episode includes different registers maintained by the nurses to record the information. This includes census book, nurses round book (maintained by nurses during doctors round and information about any changes in treatment modality, any specific instructions by the doctors), specific procedure book (to record information about any specific procedure done to the patient), incident book (to record information about certain incident such as critical condition of patient or patient's death), investigation book (to record which type of samples of which patient are sent to the laboratory), inventory book (to record the medical supplies in the ward), and many other consent forms which are maintained in different wards of the hospital.

A daily census is also maintained at the end of the day which is done by the night shift nurses including information like total number of admission, discharge, transferred-in patients, transferred-out patients, and number of deaths.

5.1.3 Handovers

After observation made during my field work at BPKIHS, I found that nursing documentation plays an important role during handovers from one shift to another. The information recorded as nursing documentation from one shift is handed over to another shift. Nursing handover is usually done in patient's bed side in most of the wards of BPKIHS. The nurses from the morning shift reads the important notes and special instructions to the staffs of the evening shift. To read out this important notes nurses use the information recorded in the nursing documentation which they had maintained in the previous shift. So, this shows the importance of nursing documentation as a communication tool and to make this communication tool work perfectly, the nursing documentation must be accurately maintained.

One of the participants, Informant A focused on the importance of accurate nursing documentation while giving handover.

"*All the nurses follow the same nursing documentation maintained in each shift. If any of the nurses write wrong information or misleading information in the nursing documentation it causes the nurse of another shift to follow the same wrong information due to which patient gets wrong treatment or either miss particular treatment if not recorded properly.*" (Informant A).

Along with the nursing handover doctor's round is also done daily or even several times in a day. The doctor's round includes physician along with the nurses where physician check each patient and talk about the progress, disease condition of the patient, and the change in the treatment or starting new treatment. Nurses maintain a daily doctor's round book containing information about the patient treatment plan. These information from the doctor's book is then carried out into different nursing document, such as information about new drugs or change in dose of old drug is

carried out in drug cardex by the nurses, information about intake and output as intravenous drip or any restricted foods is carried out in intake output form. So, the job of nurses to carry out these information into nursing documentation are important.

The sources of information in this episode is different documentation maintained by the nurses in their shift which are used for giving handover to the fellow shift nurses. The source of documentation used during handover depends upon the shift of the duty as well. Like while giving handover by the night shift nurses to the morning shift they also use the census report. During all other shift handover process includes mostly all the documentation which are maintained by the nurses in their shift.

5.1.4 Discharging the Patients

Although discharge summary is made by the physician, it is nurse's responsibility to conduct the discharge procedure. As the doctor orders patient discharge, nurses have to make all the documents ready to send it to the billing section for clearance. The nurses provide discharge teaching to the patient about the medication, health education, and follow-up. In some wards of the hospital, discharge is done electronically by the doctors but in most of the wards discharge is done in paper form. Referring to the discharge note made by the doctors, nurses record it in the discharge book and file one copy of the discharge slip in the discharge register in the ward.

The nurses also face problems due to these discharge procedure which is done in paper-based form.

"During discharge of the patient we have to send the patient discharge form to the billing section for clearance. Some patients are not educated and they carry the discharge form and all other nursing documents which are on bedside to their home thinking that they are allowed to take that. This causes problem as the documents will be gone missing". (Informant C).

"Once we had to transfer the patient to another ward but the patient file was missing. We searched it for long time but we could not find it. After hours we found it in another ward. It was one of the doctor who took the file to that ward and forgot it. So, the problem with paper-based documentation is that it is misplaced easily." (Informant E)

One of the informants working in the ward where discharge is done electronically shared her view about how electronic nursing documentation will save lots of time.

"Doctors used paper for discharging the patient previously. They had to make 3 copies each and they used carbon paper for that. The first discharge paper used to be clear but the second one is not seen clearly and the third one was bad, and on top of that most of the doctor's handwriting is not clear. But nowadays they make discharge summary electronically. Not only they can make as many copy as they want, they are all clear as well and they save lots of time too. So, if nurses also get chance to record all nursing documentation electronically we can also save lots of time." (Informant F).

The source of information in the discharge episode is the discharge form. The discharge paper is usually maintained by the doctors in each ward except some wards. Then main responsibility of nurses is to record the discharge summary in the discharge book and send the discharge form to the billing section for clearance. Further, one copy of discharge form is filed up in a register by the on duty nurses for future reference.

5.1.5 Pre- conference and Post-conference

Pre and post conference are done in every wards of BPKIHS. In morning shift and evening shift, pre and post conference are done where some patient's file are chosen randomly and discussed. In these conference the ward in charge points out any mistakes made in the nursing documentation

and takes action immediately which helps maintain the quality of nursing documentation. One of the nurses responded during the interview that pre and post-conference was very important to maintain the quality of nursing documentation at BPKIHS and quoted that

"I am satisfied with the quality of nursing documentation at our hospital. Even most of the documents are in paper form, we have maintained the quality as what we have learnt theoretically we have brought it into practice in this hospital. This is possible because we conduct pre and post-conference in regular basis where we discuss about the documentation that we maintain."(Informant D).

In contrast to this, one of the respondents had different view about the quality of nursing documentation at BPKIHS. He quoted that

> *"We are not so satisfied with the quality. We have done Continued Nursing Education (CNE) related to nursing documentation but our manpower does not have stability. There is a huge turnover rate in our hospital due to which we are not able to maintain quality of nursing documentation. But I think compared to other hospital our quality is good even if it is in paper form. But we still can improve a lot and we are planning on that."* (Informant G)

Apart from the pre and post-conference done to maintain the quality of nursing documentation and to improve the nursing care provided to the patient, a regular nursing audit is also done at BPKIHS. The nursing audit is carried out by a group of senior nursing staffs whose main responsibility is to check the quality of nursing care and nursing documentation maintained at BPKIHS and provide necessary suggestion to improve it.

5.1.6 In-service Education

In-service education refers to the continued nursing education provided by the hospital to its staff for their professional growth. At BPKIHS, in-service education are provided in a regular basis. It could be at the ward level or at the hospital level. In ward level the ward in-charge organizes an in-service education which may occur once in a week or more. The staffs of the ward are given certain topics and they have to make a presentation on that topic and present it to the fellow nurses.

"We discuss on some important disease condition or some important procedure within the members of the ward so that we share knowledge with each other and this keeps us updated on that topic." (Informant A)

These in-service education could be either on a ward basis or integration between two wards or more. In-service education on some important topics related to nursing documentation, patient care, use of computers are also provided to all the nursing staffs of the hospital.

5.2 Pros and Cons of Nursing Documentation used at BPKIHS (Paper-based)

After the data collection through observation and interview with the participants of this study, I got information about various pros and cons of the paper-based nursing documentation that is being used at BPKIHS. Each participants had their own view about the pros and cons of the paper based nursing documentation used at BPKIHS. Though the hospital was trying its best to maintain the quality of nursing documentation and the nursing staffs were also working at their best, still they were not totally satisfied with the nursing documentation. The pros and cons of paper based nursing documentation that were identified by the participants will be discussed below.

5.2.1 Pros of Paper-based Nursing Documentation

- **Cost:** Paper-based nursing documentation is cheaper compared to computerized documentation. It does not need sophisticated machine such as computers, printers, internet or even different software. The papers can be printed at cheaper price.
- **Accessibility:** The paper-based nursing documentation is easily accessible. Staffs do not have to open computers to look for patient's information.

  "I don't have to open computer if I need information about a patient. When it is paper-based I can instantly access the information as the patient file is in front of me". (Informant D).
- **Flexibility:** Paper-based nursing documentation is flexible compared to electronic. In electronic documentation you have certain fields where you can enter certain information but in paper-based you can modify these fields as you want and enter detailed information as well. If you are busy while treating the patient the information can be recorded later in paper-based nursing documentation.

  "In ICU, sometimes 2 patients are sick at the same time, they need immediate treatment, and in that case we cannot record everything in the patient's file. Paper-based nursing documentation is flexible in this case as we can record the time and information of the patient later after the critical patients are stabilized". (Informant E)
- **User friendly:** Many staffs do not know how to use computers and even if they know they are not so good at it. This causes problem to the staffs to record the information. Paper-based nursing documentation is easier way to record information as everyone is used to pen and paper.

"In our hospital there are nurses of every age group. The old generation of nurses are not good at computers. So, it's very difficult for them to use computers to record information. Paper-based nursing documentation is easier and user friendly to them." (Informant J)

Informant K also agrees that paper-based nursing documentation is user friendly compared to electronic

"When we first started admitting patient electronically, it caused a lot of problem especially to senior staffs as they were not used to with using computers. They were angry and frustrated with the new electronic admission of patient."

- **Medical-Legal Case (MLC):** In MLC cases, paper-based documentation is very important as it acts as a proof in front of the court. In administrative side and MLC cases it is important to keep hard copy so, paper-based nursing documentation has advantage in this case.

5.2.2 Cons of Paper-based Nursing Documentation

- **Time consuming:** It takes a lot of time to record all the information about the care provided to the patient into nursing documents.

  Informant C emphasized that paper-based nursing documentation is time consuming

  "Especially when ward is very busy, there are lots of sick patient with limited number of staffs, it becomes difficult to maintain all the documentation which is in elaborate form in our hospital. We have to maintain different nursing care forms which is time consuming and it becomes worse when there is scarcity of staffs in the ward".

- **Missing Information:** Missing information is one of the major issues related to paper based nursing documentation. In BPKIHS, missing information was a major disadvantage according to informant F.

  "*Sometimes discharge slip is taken by the patient along with them due to some misunderstanding which causes loss of documentation."*

  Informant H also agrees with missing information as the disadvantage of paper-based nursing documentation and said that

  "Documents are clipped and kept on the bedside. Sometimes the cleaning staffs throws it away if it is dropped in the floor, which causes missing information. Sometimes patient party takes the documents knowingly or unknowingly which also causes missing information".

  Informant K also has the same view about paper-based nursing documentation and stated that

  "Every patient has their own file. During rush hours sometimes one patient's document is misplaced into another patient's file and it is not noticed. But later when the document is needed we could not find it and leads to missing information."

- **Repetition of work:** Another major disadvantage of paper-based nursing documentation identified from the interview was repetition of work.

  "We have to record one information in different files and record books which causes repetition of work and more time consuming". (Informant F)

  Informant A has also the same feeling about paper-based nursing documentation and repetition of work and agrees with informant F

"We use multiple forms to record same information like we have to record in patient file, registers, shift report, and white board leading to repetition of same work and causes loss of time as well."

- **Language and clarity:** This was another disadvantage identified through the interview with the participants. As stated by informant I

  "Some staffs records information in nursing documents but due to less fluency in English language some tends to record it in the way which gives different meaning. So, now the information depends upon how other interpret that."

  Some staffs also have poor handwriting due to which it is hard for other staffs to understand what they have recorded.

5.3 Transforming Paper-based into Electronic Nursing Documentation

When asked about their opinion about transformation of paper-based nursing documentation into electronic form all of the participants showed positive attitude towards this. Though they had different reasons to be positive towards this transformation all of them seemed to be open to this change (if it occurs). Most of the participants would like the nursing documentation to be done electronically and was in favor of digitalization. Even though they were aware that this transformation has different challenges and the change in process would be difficult at the first phase, they were ready to accept this change process and were open to that. Some responses of the participants towards the transformation is listed below:

"I am very positive towards the transformation, there will certainly be some difficulties but if proper training is given it could be overcomed" (Informant B)

"Nowadays, technology is advanced and world is changing according to the technological development, so if we also move according to the changing world we will feel advanced." (Informant G)

"The transformation into electronic form would be good. We have to work according to the technological advancement. This will increase our knowledge and efficiency. Even though it will be hard at the beginning it will bring various advantages." (Informant K).

Most of the informants were in favor of the transformation but some also stated that the hospital should be prepared in advance if they are planning any transformation to electronic form. Informant H focused more on this point as she stated

"I am positive towards the transformation but hospital should plan it properly before initiating it. Proper training should be given to all the staffs and the change process should be brought slowly."

5.3.1 Challenges in Transforming Paper-based to Electronic Nursing Documentation

If you want to do anything challenge is always there. In this study, through the interview with the participant key challenges in transforming paper-based nursing documentation into electronic form has been identified.

- **Procurement:** Procurement is one of the challenges in a country like Nepal. Nepal depends upon other country for its development especially in the field of technology. To initiate electronic nursing documentation, Nepal has to be dependent upon other country, especially for the software related to electronic nursing documentation.
- **Lack of skilled manpower:** As electronic nursing documentation is a very new in Nepal, there is lack of skilled manpower to train the staffs of BPKIHS related to electronic nursing documentation.

"Lack of skilled trainers has always been a great problem at BPKIHS. There are only few trained IT staffs which will not be sufficient to handle all the training programs as well as maintenance of the technologies involved in electronic nursing documentation." (Informant G).

- **Electricity and connectivity:** Electricity is the major problem in Nepal. There is power cut off for almost 12 hours a day in some seasons. This causes a great problem while planning a digitalized hospital. Lack of electricity directly affects connectivity. On top of the problems with electricity there is lack of broadband which leads to slow connectivity. Internet facility is slow, expensive, and limited. With all these problems related to electricity and connectivity this brings a great challenge when transforming paper-based to electronic form.

  "We are using software for admission and discharge only and when server is down it causes great problem. Our work remains pending." (Informant F)

  "We have lab reports in electronic form. In emergency situation we want to see the patients report but due to low connectivity we have to wait till the printed form is available. This delays patient treatment. If every patient document is electronic and the same problem of connectivity persists, we would not be able to see patient information, under which medication he/she is which would risk patient's life." (Informant J).

  "Though electricity is not a major problem in BPKIHS at present it could be a problem in near future as the consumption increases." (Informant L)

- **Cost of transformation:** Cost of transforming paper-based nursing documentation into electronic form is a major challenge. If changed electronically, the cost will increase in terms of setting technology used for electronic documentation, cost to run these

technology (electricity and internet), cost for its maintenance, cost to train the staffs to use the technology, and cost related to sustainability.

Almost all the participants thought finance as a major challenge but Informant G had different feeling towards it

"Finance will not be a big problem because all the infrastructure is already established. We only need software to be installed."

He further adds

"Every wards at BPKIHS already have computers and internet to start this transformation. We just need some investment for software and to train staffs."

- **Feasibility and sustainability:** Another major challenge towards this transformation is feasibility. How effectively will it run once used. Will the hospital be able to overcome the other challenges to make this transformation feasible? These are the major questions related to feasibility.

  "The major challenge may be sustainability. Once we start digitalization we are afraid if it will be sustainable or not as we may lack resources later. But we are making strong plans to overcome this challenge." (Informant G)

- **High staff turn-over rate:** BPKIHS is suffering from high turn-over rate of its staffs especially nurses from many years. Due to the high turn-over rate it has always been difficult to train all the new staffs timely. The major turn-over rates is because the staffs wants to peruse their higher education.

  "There is a huge turn-over rate of the staffs due to which we are not able to maintain quality of nursing documentation now. If this turn-over rate remains the same in near

future it will be a big challenge for us to train all the new staffs as we move forward toward digitalization." (Informant J)

- **User friendliness:** In a country like Nepal where people are not much exposed to new technology, electronic nursing documentation would be a major challenge as it is not as user friendlier as compared to pen and paper method of documentation. As mentioned in above section related to advantage of paper-based nursing documentation, staffs especially seniors ones find it difficult to use computers for recording information as they are not trained in using computers.

  "*For the new generation it would not be a major problem but it will be a great challenge for senior staffs to use computers for all nursing related recording and reporting."* (Informant C).

- **Change process is rigid:** Acceptance is hard for any change process. To bring change into something new is difficult and takes a long time. Not everyone is open to change.

  "When we changed the admission and discharge process from paper-based to electronic, some staffs were not happy with that. They were rigid and did not accepted the change. Later, as time passed they were used to it." (Informant D).

5.3.2 Impacts of Transforming Paper-based Nursing Documentation into Electronic Form

If anything new is done its impact is seen. From the interview conducted on different participants of this study various positive and negative impacts of the transformation has been identified.

5.3.2.1 Positive Impacts of the Transformation

- **Less time consuming:** As multiple recording and replication of work is avoided through electronic nursing documentation, time can be saved and used for patient care.

- **Personal and professional development:** Using electronic nursing documentation will increase the knowledge of the nurses regarding computers and new technology which leads to personal as well as professional development.

  "If electronic nursing documentation will be used we will be able to learn new thing and will be advanced according to the changing world". (Informant B).

  "When the patient we cared is discharged from the hospital the patient's file is send to the record section and if we had off duty on that day we are not able to know about patient's condition during discharge. But if it is electronic we can access the patient's records from the ward which helps in brain storming. Brain storming is always good to increase knowledge about particular thing. (Informant D)

- **Job satisfaction:** Electronic nursing documentation will bring job satisfaction to the staffs as they grow personally and professionally.

  "When the staffs get chance to learn something new, they feel satisfied towards their work. I can tell my friends and family members that I am using new advanced technology at my work which will bring about sense of satisfaction to me." (Informant A)

  Informant I agrees with this and quotes that

  "Job satisfaction is obvious as our skill is build up by using new and advanced technologies.

- **Increased quality of documentation:**

  "When documentation is done electronically, it can be cross checked by senior staffs at any time. So, the ward staffs become more alert and responsible to document properly." (Informant A)

"Frauds will be less as there is less chance that the information is changed intentionally in case of electronic nursing documentation." Informant (E)

"Sincerity and honesty towards the job increases and proper documentation is done with the fear of higher authority as it is accessible to them." (Informant G)

"Once electronic nursing documentation is maintained patient can be assigned electronically to each staffs. The supervisors will be able to see which staff is caring which patient. So, staffs will be more responsible to produce quality nursing documentation." (Informant G)

From the above quotes it is clear that increase in the quality of nursing documentation is the positive impact of electronic nursing documentation.

- **Systematic recording:** When electronic nursing documentation is done there is a common format throughout the hospital due to which the data recorded are all systematic. If recorded electronically there will be no longer use of multiple formats and brings about uniformity which will further reduce confusion and misunderstanding and improve quality of nursing documentation.
- **Confidentiality:** Confidentiality will be maintained at higher level if data are recorded electronically.

  "Nowadays patient files are kept on bedside due to which confidentiality is not maintained. All the patient's visitor as well as others can see the information recorded in the patient's file. But if it is electronic no one can get access to the patient information expect who are actively participating in the care of that particular patient." (Informant B)

- **Less Manpower and space:** One of the positive impacts of electronic nursing documentation identified after the interview was remarkable decrease in the number of manpower used than in present situation.

  Informant B quoted that

  "We use many manpower to do one job at present. Use of electronic nursing documentation will lead to less manpower for a single job which will further decrease the cost of the job."

  Informant G also quoted something which was similar to informant B

  "To find a patient file from the record section we use many staffs. The ward attendant carry the request form from wards to the hospital administration and then to the record section. The staff from the record section uses his valuable time to search for the file for hours. Many staffs are involved for one work. If the documentation was done electronic all these unnecessary manpower would not have been used."

  "We have patient's file from last 20 years in the record section. You can imagine how many files we have. This has occupied a huge amount of space in our hospital. And to maintain this records we spend lots of manpower. This problem can be solved if our hospital is digitalized." (Informant G)

5.3.2.2 Negative Impacts of the Transformation

There were less number of negative impacts of the transformation of paper-based nursing documentation into electronic form identified after the interview in comparison to its positive impacts.

"I think negative impacts are very less compared to the positive impacts. There are always some negative impacts but we have to bring up some ideas to overcome it." (Informant G)

Informant I agreed with informant G and stated that

"The negative impact will be very minimal. As its advantage outweighs its disadvantage I think it is a better idea to choose electronic nursing documentation over the paper-based documentation."

Some of the identified negative impacts were technical problems, electricity problems, lack of skilled manpower, and connectivity problems which were similar to the points discussed in the challenge section.

CHAPTER 6

DISCUSSION

6 DISCUSSION

In this chapter, the findings of this study is related to the literature review. At first, nursing documentation is discussed as an information infrastructure and the concept of ANT is discussed to identify actors involved while transforming paper-based nursing documentation into electronic form. Further, nursing documentation as in developing countries is discussed and compared with developed countries. The challenges involved in transforming paper-based nursing documentation into electronic form is discussed with ideas to address those challenges. Further, nursing documentation is discussed as an information infrastructure and the concept of ANT is discussed to identify actors involved while transforming paper-based nursing documentation into electronic form.

6.1 Nursing Documentation as Information Infrastructure Tool

The term "infrastructure" refers to the set of equipment which are used by the human beings to do their work such as building bridges, houses, or any communication network. Beyond building the term infrastructure also includes more abstract things such as protocols, standards, and memory (Bowker, Baker, Millerand, & Ribes, 2010). When the term infrastructure is added to the term "information", infrastructure refers to digital facilities and services associated with internet (Bowker et al., 2010). II simply refers to the term used when the information and communication technologies are integrated together (Hanseth & Monterio, 1998).

II has unique characteristics which differentiate it from other information systems. These characteristics include enabling, shareable, openness, socio-technical, heterogeneous, and installed base (Hanseth & Monterio, 1998). Nursing documentation shares the common features with

information infrastructure, so nursing documentation can be said as information infrastructural tool.

Nursing documentation as II possesses the characteristics of ***enabling***. As the paper-based form of nursing documentation can be further developed into computerized form, there remains an enabling feature of nursing documentation which increases its features into more complex and standardized form.

Nursing documentation as II has various users with different purpose. It is used by nurses, doctors, patients, and all those who are involved in patient care. Nursing documentation is also used in various different purposes such as a record, as communication tool, as decision making tool, tool to derive health statistics, and many more. This is the reason why nursing documentation as II possesses the characteristics as ***sharable***, where all the users have common goal of providing efficient patient care.

Taking nursing documentation as II, it is ***open*** to many users which are involved in patient care such as nurses, doctors, hospital administration, physiotherapist, nutritionist, and anesthesiologist. It is also open to those who draw heath statistics.

Nursing documentation especially electronic form is ***heterogeneous*** as it involves socio-technical network comprising both human, technology, institution, and organization which are in one or other way interrelated to each other as actors forming ecologies of network. These actors have different interest but yet connected to each other to provide quality patient care through effective communication.

Nursing documentation as II possesses the character of ***installed base*** as it has been developed overtime bringing change to the existing one. Previously, nursing documentation used to be

simpler paper-based, then it developed to more standardized form of paper-based documentation, and now improving to electronic nursing documentation. The nursing documentation as installed base also enables opportunities for range of new activities, like transformation of paper-based nursing documentation into electronic form has enabled to remarkably increase the quality of nursing documentation.

6.2 Actors Involved in Nursing Documentation and their Role

Actor Network theory explains the interplay between use and development of technology, the influence of society, and role of actors on the development of these technology. ANT forms heterogeneous network of human and non-human components interrelated to one another. ANT helps us to identify the actors in the information network who have common interest of achieving a common goal. As heterogeneity is common there is need of socio-technical approach to control all the actors involved.

The actors involved in any project are heterogeneous, they are different compared to each other in terms of their interest, their goals, and their roles and responsibilities. But, even being heterogeneous, the interplay between these different actors are important for successful implementation of any project. The work of one actor effects the work of another actor involved. Though the actors have difference between them, their common goal is to work together for successful implementation of any project. This is the reason why the concept of ANT is important.

There are several actors who are involved while transforming paper-based nursing documentation into electronic form. From the empirical findings of this study the actors involved in transforming paper-based nursing documentation into electronic form could be government, donors, hospital, nursing staffs, and existing technologies and infrastructures. These actors though have different

interest but are interconnected and influence each other. The government as actors are responsible for any kind of developmental work as they formulate policies, make strategies, and implement them. The policies, plans, and strategies help to maintain sustainability of any new ICT projects, which helps to bridge the gap between developed and developing countries. Thus, government plays an important role, not as a prime user of nursing documentation but as a regulator, promoter, and diffuser (Pradhan, 2002). Another actor involved are donors related to funding of electronic nursing documentation. Nepal is mostly dependent upon donor agencies for its infrastructural development. The donor as an actor has the responsibility not only to provide donation but also help the receiving organization with the issues related to sustainability and scalability. The donor agencies should provide strategy to cope with the changes brought into the system while transformation into use of new technologies.

Nursing staffs as a health resource act as an actor, as the ultimate use and maintenance of nursing documentation is dependent upon the nurses. Nurse as an actor has the responsibility to be open with the change process and support the transformation into electronic nursing documentation. Existing technologies and infrastructure act as actors as the development of any new II depends upon the existing infrastructure.

The concept of ANT is important here as these several actors though have different interest but the interplay between them is important for success of this transformation. Thus, in the research setting, before transformation of paper-based nursing documentation into electronic form, the identification of these actors and understanding the importance of interplay between these actors are important for successful implementation of the transformation of nursing documentation.

6.3 Nursing Documentation in Developing Countries

Many literature has shed light to the importance of nursing documentation in health care system. The information provided by the nursing documentation is important as it helps the health care professionals to communicate about the current health status of the patient and the future plans of care. The purpose of nursing documentation is to provide best possible quality care to the patient with the existing resources. To provide high quality patient care there remains need to maintain quality nursing documentation. With the advancement in the medical field, there always remained a need to improve nursing documentation. It is not a new concept in developed countries, where nursing documentation are maintained in electronic form to ensure safety and high quality patient care. The transition from paper-based to electronic form was not an easy task, but the ability of developed countries to tackle with the challenges was what made electronic nursing documentation possible.

On the other hand, in developing countries, electronic nursing documentation is still in its initial phase. Despite the known benefits of electronic nursing documentation not much is done in this field in developing countries. The issues related to inadequate number of nurses, inadequate resources, work place inadequacies, underqualified nurses, lack of technological development, and lack of standards of nursing documentation are reasons behind insufficient and incomplete nursing documentation in developing countries (Nakate et al., 2015; PAHO, 1999, 2001). The empirical findings of this study also suggest that inadequate number of nurses, inadequate resources, and lack of technological development are problems related with quality nursing documentation at BPKIHS. Unlike in developed countries where nurse patient ratio is 1:5 (Medical/Surgical ward USA) or 1:4 to 1:6 (Medical/Surgical ward in Australia) (International Council of Nurses, 2015), in developing countries such as Nepal nurse patient ratio is 1:20 and sometimes more than that

(Dewan, 2014). Nepal being a developing country there exists problems related to electricity, connectivity and internet which effects the introduction of electronic nursing documentation. It is not that health care personnel are not aware about the advantages of electronic nursing documentation over paper-based nursing documentation. They are fully aware that electronic nursing documentation will facilitate to provide single, shareable, accurate, up to date, and rapidly retrievable patient data (Walter, 1998). The nurses are aware about the advantages of electronic nursing documentation and also about the disadvantages of paper-based nursing documentation.

The findings from this study shows the same, the staffs interviewed at BPKIHS identified that paper-based nursing documentation are time consuming, they lead to missing information, repetition of work, and there also exists issues related to language and clarity. The paper-based nursing documentation is also related to low standard of nursing documentation. The nurses interviewed stated that due to lack of time, sometimes they are not able to put their best in documentation. The nurses sometimes record just to finish their work and what actually they have done is not recorded. As the nursing documentation is the proof of what nurses have done in their duty, due to lack of documentation it will look like they have not done their job. One informant stated that

"Sometimes the ward is so busy and we do not have to record immediately what we do, so we record it after all of our work is finished."(Informant E)

This may lead to inaccurate recording of data and the quality of such data cannot be guaranteed as Jefferies et.al stated that *"Nursing documentation should be written as events occur"* as one of the essentials of quality nursing documentation (Jefferies et al., 2010). According to the participants, there was need to move forward from using paper-based nursing documentation into computerized nursing documentation in order to ensure higher quality of nursing documentation and optimal

satisfaction of both nurses as well as the patient. The participants advocated for electronic nursing documentation as they perceived that it will save their documentation time, will provide more accurate and easily accessible data, and also improve the standard of nursing profession. The participants of this study also stated that there will be several challenges in doing so but they all are ready to tackle with these challenges and move towards standard nursing documentation.

Several research has shown that the nursing documentation in the developed countries should be referred as an example to improve the quality of nursing documentation in developing countries. Pradhan, has the similar argument and states that, it is clear that copying what developed countries have done to improve the quality of nursing documentation in past several years will help the developing countries to improve its nursing documentation and patient care (Pradhan, 2002). However, as my findings from this study suggests that there are several challenges that the developing countries faces in comparison to the developed one, my argument is in contrast with what Pradhan has argued in his paper. Therefore, it is necessary for the developing countries to make proper strategy and conduct feasibility and sustainability studies before implementation of electronic nursing documentation, rather than just copying what the developed countries have done, as there exist lots of challenges in developing countries unlike in the developed countries.

6.4 Transformation into Electronic Nursing Documentation: Addressing the Challenges

Transformation of paper-based nursing documentation into electronic form is necessary for the developing countries as it improves productivity, assures quality, integrate organization, facilitate research, and better manage the health care processes (Walter, 1998). The electronic system are investments which is paid back in terms of time, cost, resources, and quality of care (Laing, 2001). Another benefit of electronic nursing documentation over paper-based is that it increases efficiency of documentation as it increases work flow, access to patient record, and elimination of

physical storage of patient data (Laing, 2001). The computer based nursing documentation reduces human error and solves the problems related to duplication of work and also provides facility such as data mining for the purpose of research, quality assurance, and report generation (Helleso & Rauland, 2001). The benefits of electronic nursing documentation discussed by Laing and Rauland are similar to the findings of this study. The informants in this study also pointed out that saving time, increasing quality of nursing documentation, less space for storage, and easily accessible patient data are the benefits of electronic nursing documentation over paper-based form.

Though there are several known benefits that electronic nursing documentation can bring, there exists challenges while implementing it especially in case of developing countries as mentioned in the previous section. A well thought plan is necessary prior to implementation of electronic nursing documentation. Successful transformation of paper-based nursing documentation into electronic form thus requires following issues to be addressed in a coherent manner.

6.4.1 Cost and Dependability Related

Nepal is one of the least developed countries ranking at 157th position among total 187 countries surveyed (United Nations Development Program, 2013). With poor economy it is difficult for Nepal to buy expensive technologies. Nepal relies on foreign donors for the development in the field of technology. Most technologies in Nepal comes as a package from the donors which is limited to a definite time frame (Pradhan, 2002). With a low economic condition, Nepal lacks the ability to buy technologies related to electronic nursing documentation especially the software related to it. So, procurement has been a major challenge in a county like Nepal. Even if Nepal gets technological donation, there remains a major challenges related to sustainability and feasibility. There are issues related to mobilization of these donated technologies and also issues

related to renewals and extensions of projects due to financial problems, lack of internal resources, and lack of institutional capacity (Pradhan, 2002; World Bank, 2000). There is very little or no provision of scaling up existing projects, which leads to collapse of the project.

To tackle with this challenge Nepal will have to use its existing resources to its full extent to grow its economic condition. To deal with the sustainability problems regarding introduction of any new technology such as electronic nursing documentation, proper plan of strategy should be maintained before its commencement. A feasibility study is necessary before starting use of electronic nursing documentation to ensure its success rate. Further, hospitals in Nepal must be made capable of using technologies related to electronic nursing documentation with proper staff training and availability of other technologies related to electronic nursing documentation. Same plans should be made by BPKIHS before moving towards digitalization.

6.4.2 Infrastructure Related

Electricity and connectivity are the major challenge related to infrastructure in Nepal, as Nepal has a complex geographical structure which causes difficulties in development process. Similar is the scenario in BPKIHS. The findings of this study shows that most of the informants pointed out electricity and connectivity as some of the major challenges at BPKIHS. Still there are many remote villages in Nepal where electricity has not reached. Internet connectivity in these areas are just a dream in present condition. Electricity has always been a major problem in Nepal. The 'load shedding' schedule that is published by Nepal Electricity Authority has become a must have document to every Nepalese household. During several dry months, Nepal faces an electricity cutoff sometimes more than 16 hours per day (Shrestha, 2010). The load shedding hours is in increasing trend in past few years. It was 16 hours per week in 2008, which has increased to

maximum 16 hours per day at present in dry seasons (during my data collection time). This data shows there is a great challenge of using electronic nursing documentation with existing electricity problem in Nepal and not every hospitals has enough financial budget to use generators in times of long load shedding hours.

Similarly, connectivity is another major problem related to infrastructure in Nepal. Many of the literatures show that the cost of internet and connectivity is decreasing but in case of Nepal it's a different picture. In Nepal, a broadband internet connection will cost more than $50 (3500 Nepali rupee) per month which is even higher compared to our neighbor country India where it cost less than $7.50 (250 Indian rupee) per month (Internet Society, 2014). Even if the expensive internet connectivity is used, it is slow and limited. With this slow internet connectivity it is hard to use electronic documentation in the hospitals of Nepal.

As Nepal is the second richest country in water resources, there is possible way to make maximum utilization of these resources to generate electricity. An alternative to electricity would be solar energy. As use of solar energy is in increasing trend in Nepal, this can be used in the hospitals as an alternative to electricity. Further to deal with the problems of connectivity, there is need to develop infrastructures in Nepal and work towards increasing the internet broadband in Nepal. To achieve this, there is need of heavy funding and support from both donors, local community, and government.

The empirical findings of this research suggest connectivity as a major problem. According to the informant, electricity is not a problem at present, but could be in near future as the consumption increases. Similar strategies as discussed above can be used in this research setting to deal with the problems of connectivity and electricity.

6.4.3 Human Resource Related

The challenges related to human resources include lack of skilled manpower to train and maintain the infrastructure, lack of training and education, and lack of skilled human resources to use these infrastructure. There has always been shortage health manpower in Nepal as well as in BPKIHS (as the findings suggest) and there also exists shortage of IT expertise. This shortage of IT expertise leads to lack of training to the other hospital staffs. Illiteracy, lack of training, and lack of skilled manpower are the major factors which hinders any kind of infrastructure development. Due to the lack of skilled IT expertise, even if the donor agencies provide technologies for electronic nursing documentation, there remains challenge to maintain and repair these new technologies.

Electronic nursing documentation has not been started yet in Nepal, so the student nurses has never practiced how electronic nursing documentation is done. Training and education to the nursing staffs about the new technologies is must to overcome the challenges related to transformation of paper-based nursing documentation into electronic form. Provision of education, training, and motivation to these staffs are necessary to help the human resources capable of adopting to these new technology and opportunity.

Another problem related to human resource is high turn-over rate of the staffs. To pursue higher education or for better opportunities nurses migrate to western countries or to urbanized areas of the country. This is also termed as ‘brain drain’. Due to this brain drain, it has been difficult for the hospitals in Nepal to train all the new staffs both in terms of resources and finance. The solution to this brain drain as a challenge is to provide better opportunities, incentives and motivation to the staffs. Providing opportunities to learn some new things and new technologies, providing incentives such as increase in salary and recognition of work, and by motivating them to work

harder will help retain these staffs. The empirical findings of this study also suggest brain drain as a major problem at BPKIHS.

6.4.4 User Acceptance

Not every change process is easy and not everyone is open to change. Change from paper-based nursing documentation into electronic form brings about distortions in daily workflow. People tend to be rigid or even resist the change as they have to deal with the consequences than comes along with the change process. Information infrastructure cannot work without the support or acceptance of the end users (Hanseth & Monterio, 1998). The functionality and usability of the documentation system, training and support, and previous paper-based documentation processes influences the user acceptance (Ammenwerth et al., 2003). And as user acceptance is often seen as the crucial factor in determining the success or failure of a new project, it is important to make detailed analysis of the factors affecting user acceptance before introduction of any new projects and same applies in case of transforming paper-based nursing documentation into electronic form.

Nurses often seem to be reluctant to use computers in areas where patient are closely connected. The reasons behind this could be fear of being alienated form the patient (Harries, 1990). As low acceptance of computers may lead to difficulties in introduction of electronic nursing documentation, motivation to the nurses about the advantages of electronic nursing documentation is necessary. User acceptance is one of the issues in BPKIHS as well. According to the findings of this study, many of the staffs are not familiar with computers and not exposed to new technologies, and this makes the change process rigid.

There are various literature which explains about the models related to adaptation of computers in an organization. Such as Lewin's field theory, which suggest 3 main phases of change process

including unfreezing of old patterns, moving and experimenting with new behavior, and refreezing when new behavior becomes part of every-day work (Bozak, 2003; Kaminski, 2011; Pyane, 2013). Another model described by Davis is Technology Acceptance Model (TAM) which explains that user acceptance is strongly influenced by the perceived usefulness of a system (Davis, 1993). The above mentioned models can be used while transforming paper-based nursing documentation into electronic form which will lead to user acceptance and change process will be easy.

Thus, the successful transformation of paper-based nursing documentation into electronic form depends upon how these challenges are addressed and to what extent these challenges are faced successfully.

CHAPTER 7

CONCLUSION

7 CONCLUSION

With the growing use of technology, it has changed our lives in several ways. Development of various information technology and medical knowledge over the past few years is remarkable. The development of technology in the form of information infrastructure, computer technologies and information communication technologies and its integration in the health sector has changed the standard of health care provided to the patient. The increased use of information infrastructure in the field of health has proved to increase the quality of patient care in several ways. As providing quality patient care is one of the most important roles of any health care facility, this sheds the importance of information infrastructure in the health sector.

Nurses play a major role in the achievement of providing quality patient care as quality of care depends upon access to high quality of patient information recorded by the nurses in the nursing documentation. The nurses spend considerable amount of time each day maintaining nursing documentation which is very crucial as it provides information about the patient and also acts as a communication tool between health care workers involved in patient care. Various studies have been carried out regarding nursing documentation and all have common results that it is important in providing quality patient care. However, with the growing field of medical knowledge and information technology, various research shows that paper based nursing documentation are not able to deliver sufficiently safe, high quality and cost effective patient care, and that electronic documentation has a promising benefit over paper-based documentation.

This study conducted at BPKIHS focused on the type of nursing documentation maintained at that hospital. Though it was paper-based nursing documentation maintained at BPKIHS, quality has been maintained to some extent yet the hospital administration is not satisfied and are planning to

improve the quality of nursing documentation by transforming it into electronic documentation. In doing so there exists many challenges and the nurses has the opportunity to accept these challenges to improve the quality of patient care. The major challenges identified was similar to the challenges faced by almost all developing countries which includes procurement of electronic documentation, lack of skilled manpower, electricity and connectivity problems, cost of transformation, feasibility and sustainability, high staff turnover rate, issues related to user friendliness, and issues related to change process. BPKIHS is prepared to face these challenges and are on planning phase towards digitalization of the documentation. They believe that the digitalization of documents will bring about more positive impacts than the negative one and as positive benefits outweighs negative ones hospital are planning to overcome these negative impacts and maintain quality nursing documentation by using electronic form of nursing documentation.

It is also concluded that a very few research is done in the field of nursing documentation in Nepal, so more studies related to nursing documentation should be carried out to get a greater and clear picture of nursing documentation in Nepal. Further, feasibility studies must be carried out including issues related to sustainability before implementation of electronic nursing documentation or any new ICT projects in Nepal as it would be the first of its kind. Copying others may not always yield positive results, so a proper strategic plan should be made especially in a developing country like Nepal where there exists several challenges.

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APPENDICES

APPENDIX I: INTERVIEW GUIDE

Interview Guide

1. How is the nursing documentation done?
2. What is the nature of nursing documentation?
3. What do you think about the quality of nursing documentation in your hospital?
4. Are you satisfied with the method of nursing documentation you have been using?
5. What are the pros and cons of the type of nursing documentation you are using?
6. How can nursing documentation be improved in your hospital to increase efficacy of information?
7. What is your opinion about electronic nursing documentation?
8. Was there any initiative in your hospital related to electronic nursing documentation?
9. What do you think about transforming paper based nursing documentation into electronic form?
10. What would be the challenges in doing so?
11. What will be the positive and negative impacts of this transformation?
12. Do you think, transforming paper based nursing documentation into electronic form would improve patient care? How?
13. In your opinion, what are the major difficulties you have been facing related to paper based nursing documentation?
14. Do you have any future plans to improve the quality of nursing documentation in your hospital?

Informed Consent

Hello, my name is Priyanka Shrestha and I am a Master's student in Telemedicine and e-Health at the University of Tromso (UiT), Norway. I am conducting a thesis on topic: "**Challenges and Impact of Transforming Paper-Based Nursing Documentation into Electronic Form: A Study in Nepal"** and therefore I would like to have your opinion on this matter. I would like to assure that your anonymity will be highly respected. I also like to assure you that your views on this topic will be used only for the thesis purpose. Your opinion and suggestion are very valuable for my thesis work. Are you willing to take part in this survey?

Age (in years):

Gender:

Level of Education:

Occupation:

Department:

APPENDIX II: PARTICIPANT INFORMATION SHEET

Participant Information Sheet

Research Title: "Challenges and Impact of Transforming Paper-based Nursing Documentation into Electronic Form: A study in Nepal"

Introduction of Researcher:

Name: Priyanka Shrestha

Designation: Student, University of Tromso, Norway

Education: Master's in Telemedicine and e-Health

Contact Information:

Phone no: 9842353284

Email: priyanka.dharan@yahoo.com

Purpose of this Research:

To identify the challenges and impact of transforming paper based nursing documentation into electronic form.

- Participation of the participants would be voluntary
- Confidentiality will be maintained

- Interview schedule of nearly 1 hour will be conducted with each participant and the interview will be recorded for further reference.
- Freedom of individual to participate and to withdraw from research at any time without Penalty or loss of benefits to which the subject would otherwise be entitled

APPENDIX III: LETTER FROM TELEMEDICINE DEPARTMENT

UiT
NORGES
ARKTISKE
UNIVERSITET

Department of Clinical
Medicine
Our ref.: 2015/3792-2
Date: 17.08.2015

Priyanka Shrestha
Email: psh004@post.uit.no

Approval of Contract of Supervision for Master's Thesis in Telemedicine and E-health (Health) - Priyanka Shrestha

According to the regulations of the University, the board of the department offering the Master Program must approve the credits and other conditions governing the thesis.

The Case IKM F9-15 is handled by authority at the Department of Clinical Medicine with the following result:

"Institutt for klinisk medisin godkjenner den fremlagte veiledningskontrakten for TLM-3902 Closing Master's Thesis for Priyanka Shrestha under forutsetning at det ikke er behov for innkjøp av utstyr utover det som er tilgjengelig. Det henvises for øvrig til de utfyllende bestemmelsene for mastergradsutdanningen for telemedisin og e-helse ved fakultetet.

Hovedveileder:	*Prof. Gunnar Ellingsen, Institutt for klinisk medisin, UiT*
Studieprogram:	*Master of Science in Telemedicine and e-health*
Studieretning:	*Health field of study*
Foreløpig tittel:	*Challenges and Impact of transforming paper-based nursing documentation into electronic form: A study in Nepal*
Antall studiepoeng:	*60*
Arbeidssted:	*Forskningsparken*
Eksamensform:	*Sensur av skriftlig innlevering*
Evalueringsform:	*Bokstavkarakter A-F*
Utleveringsdato:	*1.9.2015*
Innleveringsdato:	*15.5.2016"*

Your Master's Thesis has the preliminary title, "Challenges and Impact of transforming paper-based nursing documentation into electronic form: A study in Nepal", and is supervised by Professor Gunnar Ellingsen. The number of credits for this thesis is 60 ECTs/studiepoeng and the deadline for delivery is the 15th May, 2016. It will be graded from A-F by an appointed examination board that composes of internal and external examiners. The grading of Master's Theses in Mathematics, Science and Technology (MNT) subjects will also be applied.

The Master's Thesis must be submitted electronically in MUNIN (www.ub.uit.no/munin/).

APPENDIX IV: ETHICAL APPROVAL LETTER FROM NHRC

Government of Nepal

Nepal Health Research Council (NHRC)

Ref. No.: 1986

07 January 2016

Ms. Priyanka Shrestha
Principal Investigator
University of Tromsø
Faculty of Health Sciences
Department of Clinical Medicine
Norway

Ref: **Approval of Research Proposal entitled Challenges and Impact of transforming Paper-based Nursing Documentation into Electronic Form: A study in Nepal**

Dear Ms. Shrestha,

It is my pleasure to inform you that the above-mentioned proposal submitted on 09 November 2015 [**Reg.no. 294/2015** please use this Reg. No. during further correspondence] has been approved by NHRC Ethical Review Board on 6 January 2016.

As per NHRC rules and regulations, the investigator has to strictly follow the protocol stipulated in the proposal. Any change in objective(s), problem statement, research question or hypothesis, methodology, implementation procedure, data management and budget that may be necessary in course of the implementation of the research proposal can only be made so and implemented after prior approval from this council. Thus, it is compulsory to submit the detail of such changes intended or desired with justification prior to actual change in the protocol.

If the researcher requires transfer of the bio samples to other countries, the investigator should apply to the NHRC for the permission.

Further, the researchers are directed to strictly abide by the National Ethical Guidelines published by NHRC during the implementation of their research proposal and submit progress report and full or summary report upon completion.

As per your research proposal, the total research amount is NRs 90,000.00 and accordingly the processing fee amount to NRs- 10,350.00. It is acknowledged that the above mentioned processing fee has been received at NHRC.

If you have any questions, please contact the Ethical Review M & E section of NHRC.

Thank you,

Dr. Khem Bahadur Karki
Member-Secretary

APPENDIX V: PERMISSION LETTER FROM BPKIHS

F.N. 006

वी.पी. कोइराला स्वास्थ्य विज्ञान प्रतिष्ठान
धरान, नेपाल
B. P. Koirala Institute of Health Sciences
Dharan, Nepal

Ref. No. Acd.4741072/073

Date: 10th December 2015

Ms. Priyanka Shrestha
University of Tromso
Norway

Subject: Permission for Data Collection at BPKIHS.

Dear Ms. Shrestha,

As directed, I am pleased to inform you that you have been allowed for Data Collection at BPKIHS for completion of your Master's degree thesis on "**Challenges and Impact of Transforming Paper-based Nursing Documentation into Electronic Form**" from University of Tromsø, Norway on you request. Such an academic activity should be reported to Nepal Health Research Council to get ethical clearance as well as IRB, BPKIHS.

Sincerely yours,

Dr. Anup Ghimire
Assistant Dean, Academics

Copy to:
1. The Rector, BPKIHS
2. The Hospital Director, BPKIHS
3. Nepal Health Research Council

Head Office, Dharan : 977-25-525555, 977-25-521017 • Fax: 977-25-520251 • E-mail: bpkihs@bpkihs.edu