Original Research Article

Perceived use and barriers in the use of health information technology by nurses of selected hospitals in Kerala

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Abstract

Introduction: The use of information technology becomes a routine activity for many organizations. In fact the term informatics means the use of computerized information system to answer questions, solve problems and make decisions. However, little is known about the uptake and technology acceptance among nurses.

Aims and Objectives: This study aim to find the perceived use and barriers in the use of health information technology by nurses.

Materials and Methods: Descriptive research design was used. A total of 150 staff nurses selected using convenient sampling. Data was collected using demographic data sheet and semi-structured questionnaire.

Results: As per the study, a vast majority of the staff nurses opines that data collection in health care facility needs to be electronic. The major uses of health information technology include improvement in clinical care, provision of up to date information and reduced need for manual record writing. The major barriers in the use of health information technology are prolonged implementation time, the threat to confidentiality caused by the easy access and the lack of proper manuals and guidelines regarding the use of EMR.

Conclusion: The study emphasizes the benefits of use of health information technology in improving clinical care, providing up to date information and reducing manual recording. It also identifies significant barriers such as confidentiality issues, implementation delays, and lack of training resources.

Keywords: Health Information Technology, Staff Nurses, Perceived Uses, Perceived Barriers

1. Introduction

In recent decades, there has been an increasing interest in patients' need and their satisfaction with health systems.[1] Healthcare information technology can contribute to improving healthcare services performances, cost savings, and greater engagement of patients in their own health. Therefore, many health care organizations are planning to increase their overall adoption of information technology in their activities.[2] The impact of information technology on nursing has been a subject of discourse for the latter half of the 20th century and the early part of the 21st century. The computer revolution and information technology (IT) have transformed modern healthcare systems in the areas of communication, teaching, storage and retrieval of medical information. These developments have positively impacted patient management and the training and retraining of healthcare providers.[3]

However, there are certain barriers to the implementation and use of health information technology in healthcare settings which includes: infrastructure-based barriers, lack of financial support, work policy and procedures, inadequacy of hardware-software, technical support, process based barriers, existing work practice and workflow, communication, low system speed, accessibility, stability, deficient computer literacy, as well as poor system usefulness and user interface design, outcome based barriers, lack of measurement and monitoring of system effectiveness.[4-5]

A quantitative descriptive study conducted on the use of health information technologies: international health system in Greece, among 1,216 healthcare workers revealed that

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92.11% of the hospitals has installed health information system. Of the respondents, 86.18% believed that adoption of health information system is extremely important, and 88.8% reported a high or very high frequency of usage in their workplace. However, in 22.3% of the cases, health professionals highlighted the need for integrated information systems.[2]

Majority of the registered nurses regarded on nursing informatics as a useful tool to improve the nurses` knowledge and skill on healthcare technology and to increase the confidence. Healthcare personnel must have access to the necessary information and must have effective and collaborative information communication technology [ICT] support to facilitate their daily work and ensure high quality and safety. Further, there are lack of resources for using health technologies in the hospitals. In healthcare, health information technology has the potential to facilitate the delivery of healthcare services by improving the quality of care, efficiency and patient safety.[6]

Information technology enables nurses to identify medical errors as well as reduces the time it takes to document patient care therefore allowing nursing professionals to spend more time focusing on care they provide.[7] The primary responsibility of a nurse is to provide comprehensive care to the patient. By the proper usage of health information technology nurses can use their time effectively for patients. This requires the use of health information technology to carry out inter-departmental, intra-departmental and inter-personal communication regarding patient care and also to document procedure. However, there are certain barriers which hinder the use of perceived health information technology in nursing profession. The present study is aimed to identify, observe and describe the use and barriers in perceived health information technology by staff nurses of selected hospitals in Kerala.

2. Materials and Methods

Quantitative research approach with descriptive research design was used in the present study. The sample consisted of 150 staff nurses from selected hospital in Ernakulam district. The pilot study was conducted on 31/10/2023 among 20 staff nurses at Welcare Hospital, Ernakulam and it was found to be feasible. Data collection was done on 04/11/2023 among 150 staff nurses at Lisie hospital, Ernakulam.

2.1 Tools for data collection

The tool of the study consisted of demographic data sheet and semi-structured questionnaire to assess the perceived use and barriers in the use of health information technology by nurses.

Tool 1:

Demographic characteristics

Demographic questionnaire which includes age, gender, educational qualification, years of experience, practice area, and designation.

Tool 2:

1. **Section A:** A semi-structured questionnaire for reporting the perceived use of health information technology.
2. **Section B:** A semi-structured questionnaire for reporting the perceived barriers in the use of health information technology.

For the present study stability was established by test retest method. The researchers administered tool to 8 subjects who met the inclusion criteria and same tool was administered to the same subjects after 48 hours and reliability of the tool was established. The stability of Tool 1 is 100%. The stability of Tool 2 was assessed by comparing the semi structured questionnaire by test retest method, by calculating the percentage of items that got the same answer in both test and retest. The mean total reliability of Tool 2 Section A in percentage was calculated as 97.5% and that of Tool 2 Section B was calculated as 95%.(**Figure 1**)

Self reporting was the technique used in this study.

2.2 Ethical considerations

The study was conducted after getting approval from the selected hospital authorities. The purpose of the study was explained to the subjects and assurance was given regarding confidentiality. An informed consent from the respondents was also taken and confidentiality of the data was maintained.

2.3 Data collection process

Data collection was done on 04/11/2023.

3. Results

Socio demographic data

As depicted in **Table 1**, 78% of staff nurses were in the age group of 21 to 30 years. Ninety eight percent of the staff nurses were females. Of these staff nurses, 58% are B.Sc Nursing graduates.

As depicted in **Table 2**, on the basis of working experience, 50% had work experience between 6 months and 2 years and only 12% had a work experience more than 3.5 years to 5 years. Based on the practice area, 68% were working in the medical units and 32% were working in the surgical units. Among the 150 subjects 56% were staff nurses, 36% were trainee nurses, 6% were senior staff nurses and 2% of them were ward in-charges.

As **Table 3** depicts, 84% stated that the mode of data collection in health care facility needs to be electronic, however the remaining 16% opposed the idea. Reportedly 50% of the participants opined that a good information

technology provides up to date information about new protocols. Fifty eight percent of subjects considered improving clinical care as the most important features of health information technology.

As depicted by **Table 4**, 42% of subjects identified benefits to the inter disciplinary team as improved communication through health information system, 38% of subjects as improved continuity of care through the use of EMR. Forty eight percent reported that they had access to internet while managing health records, while 30% had no access and the remaining had occasional access.

As depicted by **Table 6**, 48% opined that reducing the need for manual writings as their perception on the perceived ease of use of EMR, 34% recognized as it is easy to learn the usage of EMR, only 10% identified it as user friendly. Thirty eight percent of subjects stated that IT departmental support is crucial as their perception about the hospital management`s and IT department`s support of EMR. Thirty four percent opined that they receive adequate training from the IT department while using the EMR.

As per the **Table 7**, 34% of subjects identified lack of motivation as the major professional barriers in the use of heath information technology whereas for 32% of it was lack of time for learning. The table also demonstrates that, 36% of the subjects chose lack of adequate manuals and guidelines as the major technical barrier and just 8% identified difficulty in data entry and retrieval.

As per **Table 8**, for 44% of the subjects long implementation time was the major organizational barrier. It can also be seen that for 36% of subjects, lack of awareness of importance and benefits of using EMR and lack of experience in using EMR was the Human barrier.

As depicted by **Table 5**, 34% of subjects stated that the perceived usefulness of EMR is to improve the job performance, 24% opined that it saves time. Thirty eight percent of the subjects recognized that the system quality of EMR allows them to accomplish more work. EMR enhances job effectiveness on the job for 26% subjects.

Table 1: Frequency and percentage distribution of subjects based on their age, gender and educational qualification. (N-150)

Variables	Frequency	Percentage
Age in years		
21-30	117	78
31-40	27	18
41-50	06	04
Gender		
Male	03	02
Female	147	98
Educational Qualification		
General Nursing and Midwifery	63	42
Post Basic BSc Nursing	00	00
BSc Nursing	87	58
MSc Nursing	00	00

Table 2: Frequency and percentage distribution of subjects according to their experience in years, practice area and designation. (N-150)

Variables	Frequency	Percentage
Experience in years		
6 Months – 2 Years	75	50
>2 Years – 3.5 Years	27	18
>3.5 Years – 5 Years	18	12
>5 Years	30	20
Practice area		
Medical unit	102	68
Surgical unit	48	32
Designation		
Trainee Nurse	54	36
Staff Nurse	84	56
Senior Staff Nurse	09	06
Ward In-charge	03	02

Table 3: Frequency and percentage distribution of subjects according to need of electronic data collection, good health information technology and its important features.

Variables	Frequency	Percentage
Does the data collection in health care facility need to be electronic (N-150)		
Yes	126	84
No	24	16
A good health information technology (N-150)		
Can collect information about health care activities.	51	34
Can collect, analyze and communicate information	63	42
Provides up to date information about new protocols	75	50
Designed to track orders to ensure high security	15	10
Important features of data use in a good health information system (N-150)		
Improves clinical care	87	58
Aids in continuity of care	48	32
Available in chronological order	24	16
Ensures accessibility in concerned areas only	12	08

Table 4: Frequency and percentage distribution of subjects according to benefits to the inter disciplinary team and access to internet.

Variables	Frequency	Percentage
Benefits to the inter disciplinary team		(N-150)
Improved communication	63	42
Decreased communication through e-mails	18	12
Improved continuity of care	57	38
Efficient communication and interventions	30	20
Access to internet(N-150)		
Present	72	48
Absent	45	30
Sometimes	33	22

Table 5: Frequency and percentage distribution of subjects according to perceived usefulness and system quality of EMR.

Variables	Frequency	Percentage
Perceived usefulness of EMR (N-150)		
Job is challenging without EMR	27	18
Gives greater control over my work	27	18
Improves job performance	51	34
Addresses job related need	33	22
Saves time	36	24
Accomplish tasks quickly	15	10
System quality of EMR (N-150)		
Allows to accomplish more work	57	38
Reduces the time spent on unproductive activities	24	16
Enhances the effectiveness on job	54	26
Increases productivity	21	14
Enhances data accuracy	33	22

Table 6: Frequency and percentage distribution of subjects according to perceptions about perceived usefulness and hospital management`s and IT departments support of EMR.

Variables	Frequency	Percentage
Perceptions of perceived usefulness of EMR (N-150)		
No need of manual writings	72	48
Easy to learn the usage	51	34
User-friendly	15	10
Supports the critical aspects of my job	36	24
Perceptions about hospital management's and IT department's support of EMR (N-150)		
Institutional support is important	39	26
IT department's support is important	57	38
IT department gave adequate formal training	48	32
IT staff provide adequate support to use EMR	33	22

Table 7: Frequency and percentage distribution of subjects according to Professional barriers and Technical barriers

Variables	Frequency	Percentage
Professional barrier (N-150)		
Lack of health professional's support to EMR	39	26
Lack of motivation to train and use EMR	51	34
Lack of time allowed for learning and training on using EMR	48	32
EMRs add more professional responsibilities	27	18
EMRs decrease productivity	15	10
Technical barriers (N-150)		
No manuals or guidelines	54	36
Maintenance problems	39	26
Old and slow network	42	28
Not satisfying users needs	27	18
Difficulty in data entry and retrieval	12	08

Table 8: Frequency and percentage distribution of subjects according to Organizational barriers and Human barriers.

Variables			Frequency	Percentage
Organizational barriers		(N-150)		
Redesigning of workflow to match with EMR			54	36
More implementation time			66	44
Lack of experience of hospital management to choose, implement and evaluate best EMR			27	18
No demonstration of live models of EMR			21	14
Lack of effective monitoring or protection			12	08
No strategic planning	for	adoption and	39	26
implementation of EMR				
Lack of necessary training for staff			18	12
Human Barriers		(N-150)		
Lack of awareness of importance and benefits of using EMR			54	36
Lack of knowledge of using EMR			27	18
Lack of experience in using EMR			54	36
Lack of experience in using computers			24	16
Low number of health informatics specialists			12	08
Negative beliefs and impression about EMR			24	16
Negative beliefs about own ability to useEMR			06	04

Table 9: Frequency and percentage distribution of subjects according to Financial barriers and Legal and regulatory barriers.

Variables	Frequency	Percentage
Financial Barriers(N-150)		
High initial cost of implementation	42	28
Lack of capital resources	57	38
High operational maintenance cost	21	14
Lack of feasibility	45	30
Uncertainty about return of investment	06	04
Huge amount consumption	15	10
Legal and Regulatory Barriers (N-150)		
Lack of policies, procedures, laws or legislations that govern EMR	27	18
Easy access to EMR	66	44
Threatened confidentiality of health information	42	28
Uses of EMRs are monitored and may be subjected to liability to accountability.	33	22
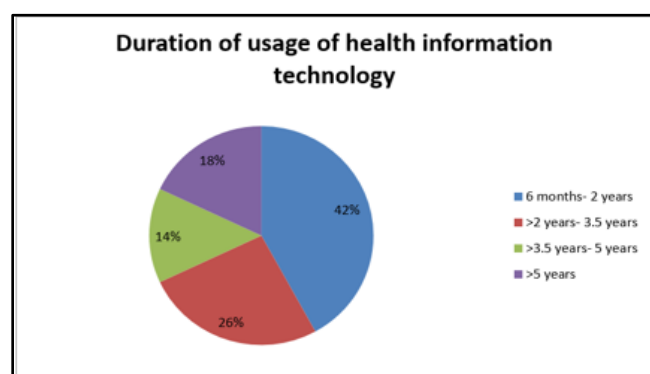
Figure 1: Frequency and percentage distribution of subjects according to their duration usage of health information technolog (N-150).

Analyzing the given **Table 9**, Among the 150 subjects, 38% agrees that lack of capital resources to invest in EMR is a financial barrier. Easy access to EMR was identified as the legal and regulatory barrier by 44% of staff nurses.

4. Discussion

The present study was intended to explore the perceived use and barriers in the use of health information technology by nurses of selected hospitals in Kerala.

In the present study, majority of staff nurses (78%) were in the age group of 21-30 years. Ninety eight percent of the staff nurses were females whereas only 2% of them were males. Of these staff nurses, 58% are B.Sc Nursing graduates and 42% held a diploma in General Nursing and Midwifery. On the basis of work experience, 50% had work experience between 6 months to 2 years and only 12% had a work experience more than 3.5 years to 5 years. Based on the practice area, 68% were working in the medical units and 32% were in the surgical units. Among the 150 subjects 56% were staff nurses, 36% were trainee nurses, 6% were senior staff nurses and 2 % of them were ward in-charges.

These findings were consistent with another study conducted by Bakheet Alosari, Sheema Al-Mansour, Hanan Aldosari and Abdullah Alanazi on assessment of factors influencing nurses acceptance of electronic medical records. Results showed majorities were female nurses (96.7%). The age of the participants was widely distributed which ranged from 20 to 29 years (19.2%) to more than 60 years (0.7%). Most of them belonged to age group of 30–39 years (43.7%). Analysis of the nurses educational level revealed that, 15.2% of nurses had completed diploma in nursing, 80.8% had a bachelor degree and 3.3% had attained a master degree or Ph.D. Work experience in nursing practice ranged from less than five to more than 25 years. The largest proportion of nurses (31.8%) had practiced 6–10 years followed by less than 5 years of experience (19.2%).[8] The present study shows that 84% stated the mode of data collection in health care facility needs to be electronic. The response provided by the subjects regarding characteristics of good health information technology shows that 50% of the participants opines that a good information technology provides up to date information about new protocols, 42% of subjects considered health information technology as a measure to collect, analyze and communicate information. Thirty four percent of subjects identified the information system which collects information about health care activities as the good one Fifty eight percent of subjects considered improving clinical care as the most important features of health information technology.

Similar findings were observed in a study conducted by Robert Eley, Tony Fallon, Jeffrey Soar and Elizabeth Buikstra to assess the nurses experience in using information technology. Of the 4330 respondents 86% used computers at work. Experience in the use of information technology ranged from 90% for a common application such as word processing to 64% for reference tools. Results varied by level of nurse, their age, and length of time in nursing.[9]

This study results revealed, 42% of subjects identified benefits to the inter disciplinary team as improved communication through health information system, 38% of subjects as improved continuity of care through the use of

EMR whereas 20% identified it as efficient communication and interventions and only 15% noted as reduced need for communication through e-mails. Forty eight percent reported that they had access to internet while managing health records, and 30% had no access while the other 22% had occasional access.

These study findings were supported by a study conducted by Todd AM, Harrison J, Morris Docker S, Black R and D Wolstenholme to assess the experience of nurses in accessing internet in acute care area. It incorporated a survey of over 200 staff nurses. The results indicate that the ward based internet facilities were valued and used by nurses. However, time, support and training are required for nurses to realize the full potential of the internet.[10]

The present study showed that 34% of subjects stated that the perceived usefulness of EMR is to improve the job performance, 24% opined that it saves time, 22% felt as it addresses job related needs, 18% subjects identified that it gives greater control over work and it would be challenging to perform without EMR and only 10% stated that it help them to accomplish tasks quickly. Thirty eight percent of the subjects recognized that the system quality of EMR allows them to accomplish more work. EMR enhances job effectiveness on the job for 26% subjects. Twenty two percent stated that the data available is always accurate. Sixteen percent pointed that EMR also decreases the time spent on unproductive activities whereas 14% stated that it increases productivity.

These study findings were supported by the study conducted by Farokhzadian J, Hasman A, Ahmadian L and Reza khajouei to assess the nurses' experience and viewpoints about the benefits of adopting information technology in health care. The findings revealed improving the quality and efficiency of medical services and care, facilitating the communication management in the technological environment, improving information documentation, management, and monitoring, improving resource management, improving management performance and policymaking, and facilitating pathways of organizational and professional growth were the main uses of electronic medical records.[11]

In the present study, 48% opined that reducing the need for manual writings as their perception on the perceived ease of use of EMR, 34% recognized as it's easy to learn the usage of EMR,24% stated that it supports critical aspects of their job and only 10% identified it as user friendly. Thirty eight percent of subjects stated that IT departmental support is crucial as their perception about the hospital management`s and IT department`s support of EMR. Thirty four percent opined that they receive adequate training from the IT department while using the EMR, 26% accepted that institutional support is important to adopt EMR and only 22% recognized that the IT staffs provide them with adequate support to use EMR.

These findings were supported by the study conducted by Bakheet Aldosari, Sheema Al Mansoor, and Abdullah Alanazi to assessment of factors influencing nurses acceptance of electronic medical record in a Saudi Arabia hospital. The study results showed 62.9%of respondents agreed, and 21.9% strongly agreed that top management support is essential to adopt EMR, while 14.6% were neutral. Furthermore, 65.9%of nurses concurred that the related department support is important to adopt EMR, while 31.2% were neutral about it. A greater proportion (53.0%) admitted that they have enough formal training to use EMR; however, 6.0% disagreed, and 0.7% strongly disagreed. 58.9% of respondents agreed that the IT staff provided an adequate support to EMR, while 5.3% disagreed.[8]

The response provided by the subjects to the items on the questionnaire regarding major professional barrier shows that 34% of subjects identified lack of motivation as the major barrier in the use of heath information technology whereas for 32% it was lack of time for learning and 26% pointed lack of professional support. Another 18% identified increased professional responsibility as the professional barrier and 10% thought it decreases the productivity due to the use of EMR.

These study findings have been consistent with the study conducted by Sheraz Khan, Amir Sultan, Kinza Jamal, Zara Bafool and Javaria Hanif to assess the Nurses' perception regarding barriers to use of health information system in the teaching hospital of Abbottabad. Workload due to documentation and inadequate participation in Health information system activities are professional barriers reported by two-third of the study participants. Nurse's documenting every event of a patient increases nurse's workload and decreases patient-nurse interaction. Participation in Health information system related activities needed to get the new and updated skill. Untrained staff faced more difficulties in the use of Health Information System compared to skilled staff.[12]

Majority (36%) of the subjects chose lack of adequate manuals and guidelines as the major technical barrier. Twenty eight percent pointed to old and slow network, whereas 26% recognized maintenance problems, 18% opted poor user satisfaction and 8% identified difficulty in data entry and retrieval as a technical barrier.

These study findings were consistent with the scoping review performed by Bahiru Legesse Jimma and Daniel Berhanie Enyew to assess the barriers to the acceptance of electronic medical records from the perspective of physicians and nurses. The study shows there are several technical issues with EMRs that lead to complaints. Obstructions related to the technical factor include lack of computer skills, system complication and limitation, system customizability and interoperability, system consistency, and technical training and support.[13]

In this study, for 44% of the subjects long implementation time was the major organizational barrier whereas 36% of the subjects it was the need for redesigning the workflow to match with EMR and 26% recognized absence of strategic planning for adoption and implementation of EMR. Another 18% of subjects pointed to lack of experience of hospital management to choose, implement and evaluate best EMR and 14% referred to the lack of demonstration of live models of EMR. Twelve percent of subjects identified lack of proper training for the staff. Only 8% found lack of effective monitoring and protection on EMR as an organizational barrier.

This study findings have been consistent with the study conducted by Fozia Anwar and and Azra Shamim to assess the Barriers in Adoption of Health Information Technology in Developing Societies in Pakistan. The main organizational barriers they found was that First of all there are no documented studies available regarding level and use, benefits, cost, risk analysis and other aspects of health technology in health sector and if they are available they are not well communicated. Secondly, people at higher positions and posts, whose needs of reporting are adequately being catered by the existing system, do not favor HIT as they think that the employment of new technology is wastage of both the money and time.[14]

In our study, it can also be seen that for 36% of subjects, lack of awareness of importance and benefits of using EMR and lack of experience in using EMR was the Human barrier. Eighteen percent pointed to inadequate knowledge in using EMR, 16% of the subjects opined that poor experience in using computers and negative beliefs and impression about EMR. Another 8% subjects referred to insufficient number of health informatics specialists only 4% recognized negative beliefs about own ability to use EMR as a human barrier.

The findings of the present study have been supported by a study conducted by Jacqueline A De Leeuw and Hetty Woltjer for Identification of Factors Influencing the Adoption of Health Information Technology by Nurses Who Are Digitally Lagging. The results shows that for the participants who had had formal digital training (including EHR training; 7/10), almost all of them(6/10) said that the content, form, and pacing of that education had not matched their personal learning needs and learning styles. With digital applications that were used infrequently, feelings of incompetency increased. Also, the daily workload and work stress experienced were reported as impediments to digital learning on-the-job. Hence, new digital functionality was experienced as information overload, and it increased feelings of stress and uncertainty.[15]

The present study reveals, 38% agrees that lack of capital resources to invest in EMR is a financial barrier, 30% identifies lack of feasibility, 28% chose high initial cost of EMR implementation. Fourteen percent of the subjects selected high operational maintenance cost and 10% pointed

to the huge amount consumption by EMR. The remaining 4% subjects recognized uncertainty about the return of investment as financial barrier.

These study findings were consistent with the study conducted by Nir Menachemi and Taleah H Collum to assess the benefits and drawbacks of electronic health record systems. The study shows that financial issues, including adoption and implementation costs, ongoing maintenance costs, loss of revenue associated with temporary loss of productivity, and declines in revenue, present a disincentive for hospitals to adopt and implement an Electronic Health Records (EHRs). EHR adoption and implementation costs include purchasing and installing hardware and software, converting paper charts to electronic ones, and training end-users. The maintenance cost of an EHR can also be costly. Hardware must be replaced and software must be upgraded on a regular basis. In addition, providers must have ongoing training and support for the end-users of an EHR.[16]

In case of perceived legal and regulatory barriers, the table depicts that, out of 150 subjects, 44% reported that electronic health information is easily accessed or disclosed, 28% states that it threatens the confidentiality of health information. Eighteen percent of subjects recognized lack of policies, procedures, laws or legislations that govern EMR as a regulatory barrier.

The findings of the present study have been supported by a study conducted by Haleh Ayatollahi, Nader Mirani and Hamid Haghani to assess the important barriers in electronic health records. The study shows that concerns about the security of computer systems, breaching the confidentiality of health data and a lack of control of unauthorized access were identified as the main barriers. Before an Electronic Health Record system is adopted, issues such as access to health data, legal frameworks, and access permission should be taken into account, and practical solutions should be in place.

4.1. Strength and limitations of the study

The findings of the study have several implications in nursing practice, nursing education, nursing administration and nursing research.

The major benefits of health information technology in nursing practice includes easy access to patient medical records , reduction in medical errors , greater patient care and improved continuity of care. Health information technology plays a pivotal role in the ongoing education of staff nurses. It updates the staff nurses with both theoretical and practical knowledge. Updated versions of policies and protocols are made available to the staff nurses through health information technology.

Nurse administrators can schedule follow up visits or telephonic interviews with the help of health information technology. The study provides basic foundation for future

researchers on the perceived use and barriers in the use of health information technology by nurses. The study was conducted in only one private hospital, so the study need to be generalized with caution as the sample may not be a true representation of the target population.

5. Conclusion

The present study was intended to explore the perceived use and barriers in the use of health information technology by nurses of selected hospitals in Kerala. The sample consisted of 150 staff nurses from selected hospital in Ernakulam. After analysis and interpretation of the data, it is found that 84% out of 150 subjects suggested that data collection needs to be electronic in health care setting and the most commonly identified use of health information technology is the improvement in clinical care. However, the widely prevalent barriers in the use of health information technology, according to the perceptions of nurses are the prolonged implementation time of EMR and the threat to confidentiality caused by the easy access to EMR.

6. Source of Funding

None

7. Conflict of interest

None

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