

PERCEPTION OF FRONTLINE USERS TOWARDS IMPLEMENTATION OF HMIS

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

by

AYUSHI GOEL

Under the Supervision and Guidance of

P. R. SODANI

2022

PERCEPTION OF FRONTLINE USERS TOWARDS IMPLEMENTATION OF HMIS

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

by

AYUSHI GOEL

Under the Supervision and Guidance of

P. R. SODANI

2022

DECLARATION BY STUDENT

I hereby declare that this dissertation titled **PERCEPTION OF FRONTLINE USERS TOWARDS IMPLEMENTATION OF HMIS** is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

AYUSHI GOEL

Name of Student

Date: 01.07.2022

CERTIFICATE



CERTIFICATE

OF COMPLETION

Proudly Presented

Mr/Ms Ayushi Goel has successfully completed 8-weeks
internship program as a Product Healthcare Intern
from 15th March-22 to 15 June-22

A handwritten signature in blue ink that reads "Nidhi Jain".

Nidhi Jain (Director)
KareXpert Technologies Pvt. Ltd

A blue rectangular logo with the text "Think Platform" in white and "Products" in a smaller, italicized font below it.

A handwritten signature in blue ink that reads "KK Singh".

Project Co-ordinator
KareXpert Technologies Pvt. Ltd

CERTIFICATE

This is to certify that dissertation titled **PERCEPTION OF FRONTLINE USERS TOWARDS IMPLEMENTATION OF HMIS** is a record of the research work undertaken by Dr Ayushi Goel in partial fulfillment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

Dr P R Sodani

Faculty Guide
IIHMR University, Jaipur

Date: 01.07.2022

School Dean
IIHMR University, Jaipur

Date: 01.07.2022

ABSTRACT

India's twelfth five-year plan from year 2012-2017 discusses on the improvement of HMIS all over the nation with an investment of \$200 billion for National digital Health Mission. As per the Prime minister of India Narendra Modi, Covid-19 crisis led to creation of platform for unanimous adoption of NDHM. The transformation will be driven aiming the six themes revolving around Information transparency, Standardized claim processing, Prescription digitization, Playground for innovations, from episodic to wellness-oriented care, from service-based to value-based healthcare. However, due to the limitations and certain challenges faced by the frontline users have resulted in slowness of implementation of HMIS in hospitals. The study conducted determined the perception of managerial level at organization towards the implementation of HMIS and understood the challenges faced by the frontline users towards the adoption of HMIS in the hospital. A mix of qualitative and quantitative study was conducted from the month of March to June 2022 in Rising Medicare Hospital, Pune. In- depth interview was conducted among 5 doctors at managerial position of the hospital to explore their perception towards HMIS implementation in the hospital. A close-ended structured questionnaire was distributed among the 101 frontlines worker of the hospital to understand the challenges faced by them while using the software. In case of qualitative study, the major challenges revolved around four perspectives that are Human Resource, Knowledge, and Skill Set, IT infrastructure of Rising Medicare Hospital, Hospital Organizational behavior, Process of the software in the hospital. In case of quantitative study, the most common challenge revolved around human factor with lack of sufficient skills to operate on the computer and lack of knowledge to handle technology without technical support. The analysis of the study suggests that HMIS can be successfully implemented in hospitals if there is more importance given to the technical setup and proper IT infrastructure is built in the hospital. Thus, proper IT infrastructure setup in hospitals, regular trainings to strengthen the healthcare workers competency towards HMIS, greater contribution of organization support towards investment on higher quality information system, and regular feedbacks of users should be taken by the software company to upgrade the system according to the needs of the hospital.

Keywords: HMIS, IT, digital, technology, Infrastructure, healthcare workers, managerial doctors

ACKNOWLEDGEMENTS

Expressing gratitude is a difficult task and words often fall sort of reflecting one's feelings. I express my sincere gratitude towards all those who have contributed their valuable efforts, their guidance and encouragement toward the completion of my project. It is my pleasure to be indebted to various people, who directly or indirectly contributed to the development of this work and who influenced my thinking, behavior, and acts during study.

First, I wish to express my gratefulness to **Mrs. Nidhi Jain**, CEO at KareXpert, Gurugram. I wish to express my gratefulness to **Mrs. Amrita Agarwal and Mr. K.K. Singh**, for their guidance, instruction, direction. Their training and faith in me helped me have a great learning experience at KareXpert, Gurugram.

I am thankful to KareXpert family for providing me with an opportunity to do my internship at KareXpert, Gurugram.

I thank the President of IIHMR University, Jaipur, **Dr. P.R. Sodani** for being my guide and supporting me all throughout my internship period. I am thankful to him for giving me the opportunity to do my research.

I thank my faculty mentor **Dr. P.R. Sodani**, for his immense support and guidance during my research. I remember him with much gratitude for his patience and motivation, but for which I could not have submitted this work.

Lastly, I would like to thank the almighty and my parents for their moral support and my friends with whom I shared my day-to-day experience and received lots of suggestions that improved my quality of work.

Dr Ayushi Goel

Date:

Place: KareXpert Gurugram

<u>TABLE OF CONTENTS</u>	<u>PAGE NO.</u>
Abbreviation/Acronyms	
<u>A. PROJECT REPORT</u>	
SECTION 1: INTRODUCTION	
1.1 Introduction	13
1.2 Purpose Of Health Management Information System	15
1.3 Barriers In Hospital Management Information System	17
1.4 Predicted Solutions in Hospital Management Information System	19
1.4 Research Aim and Objectives	22
1.5.1 Aim	
1.5.2 Objective	
SECTION 2: REVIEW OF LITERATURE	24
SECTION 3: RESEARCH METHODOLOGY	
3.1 Introduction	31
3.2 Research Question	31
3.3 Research Design	31
3.4 Study Population	32
3.5 Sample Size calculation	32
3.6 Sampling Technique	33
3.7 Study Instrument	34
3.8 Operational Definition	36
3.9 Statistical Method	38
3.10 Ethical Consideration	38
SECTION 4: ANALYSIS AND INTERPRETATION	
4.1 General Analysis and Interpretation	40
14.2 Analysis of Qualitative Study	46
4.3 Analysis and Interpretation of Quantitative Study	52
SECTION 5: RECOMMENDATIONS AND CONCLUSION	58
References	
Appendix	

ABBREVIATIONS

S.No	Abbreviation	Full Form
1	HMIS	Hospital Management Information System
2	EMR	Electronic Medical Record
3	EHR	Electronic Health Record
4	OPD	Outpatient Department
5	IPD	Inpatient Department
6	RAP	Rapid Assessment Process
7	HIS	Hospital Information System
8	TPA	Third Party Activity
9	NDHM	National Digital Health Mission
10	IT	Information Technology
11	SC	Sub Centre
12	PHC	Primary Health Centre
13	CHC	Community Health Centre
14	MoHFW	Ministry of Health and Family Welfare
15	ANM	Auxiliary Nurse Midwives
16	RMO	Resident Medical Officer

TABLE OF FIGURES AND TABLES

Table Nos.	TABLE NAME	PAGE NO.
1	Barriers in HIS adoption in developed and developing countries.	44
2	Sample Frequency Distribution	44
3	Dimensions and Based Criterion	45
4	Operational terms and definition	45
5	Demographic details of the respondents	46
6	Mean score of each criterion	47

TABLE OF FIGURES AND TABLES

Fig Nos.	FIGURE NAME	PAGE NO.
1	Current management system in hospitals	10
2	The short journey of patient in a hospital	12
3	Formula for sample size calculation	18
4	Outpatient workflow in Hospital	23
5	Inpatient workflow	24
6	OPD workflow in HMIS implemented in hospital	36
7	OPD workflow if patient comes through call center and patient portal	37
8	IPD workflow captured through the system	40
9	Clinical and pharmacy workflow of IPD patient	41
10	Bill settlement process in HMIS	44
11	Patient appointment portal	46
12	Patient Portal Home screen	46
13	EMR of the patient	48
14	Facility portal	48
15	Perception of frontline users towards HMIS	52
16	Each dimension considered for perception on HMIS	54
17	Barriers in implementation of HMIS	56
18	Architecture design for HMIS	57

CHAPTER I

INTRODUCTION

PROJECT REPORT

1.1 INTRODUCTION

One of the most important parts of any society is healthcare and that is one of the main reasons that the providers of healthcare need to do their job in the most efficient manner. Every day there are millions of patients getting admitted into hospitals creating challenges for the administration to run in most effective manner. The staff working at the hospital must manage with integrating the clinic, finance and operations which expands with the time. Until recent times this process was handled manually causing delay in operations and poor-quality patient care delivery. But now most of the large, bedded hospitals or organized clinics are dependent on HMIS which guides them through organization and maintenance of all the medical records with no hassle.

HMIS is basically an information system that manages all the processing of information within a hospital. This includes patients' information whether on paper or recorded on any other machines. The aim of HMIS an medical information area is to give the utmost possible support to the healthcare providers by processing the patient data electronically. The software is composed of the template which is customizable according to the need of the client. The components are composed of sub-system of medical specialties such as laboratory management information system, pharmacy and inventory, CAD to save, change and procure the information indulged with the administration or clinical perspective to provide hospital services within the hospital premises.

HMIS is a software is compatible with any kind of smart devices like Laptop, Computers, Mobile phones etc. The software enables the hospital to have their own iOS and android application where patient can register themselves to the hospital, book appointment, take Tele-consultations, check their reports etc. The organization doesn't restrict itself it to disruptive technology or the SaaS based commercial model, it also provides holistically managed service model for the hospitals, diagnostic center, clinic etc. which gives the option of both online and offline support to satisfy the client completely. The advanced Hospital Information Management System allows the client to have mobile and web-based interface. The mobile interface allows the user to access the portal through their cell phones.

The advanced HIMS also gives the option of IPD and OPD management. The IPD module allows the smooth patient journey in hospital from admission to discharge. The admission, transfer, discharge (ADT) management allows the patient to easily get admitted to the hospital through the system, occupy bed, maintain patient record, transfer to OT or different ward as per the need and the discharge. The OPD module facilitates patient portal wherein the patient can register to the hospital, take appointment, and consult the doctor. The SMS template configuration allows the software to send alert notifications.

The HMIS helps in managing the billing system efficiently. The financial operations, interim bills provide all the billing details which are auto calculated through the software. The outpatient billing also allows the client to supervise the bills from outsource centers like diagnostic centers. The MIS allows to manage the account receivables and check the bills, settlements and outstanding of the hospital.

Although the HMIS has been advanced version of manual patient data recording incorporating newest innovations. However, if these innovations and upgradations result in confusion to healthcare users then HMIS is of no use. Hence the system should be designed in a user-friendly manner and trainings should be arranged for users on a regular basis. Any systematic and well equipped HMIS could be beneficial to hospital in numerous ways not only limiting to best quality of care provided to patient but also for financial management. The HMIS should have the following qualities. It should be patient centric, hospital staff supportable, valuable, expandable, and affordable. The system should be flexible enough to adapt according to the changes in technology. Any efficient **HMIS** should deliver advantages like:

- Improves the integrity of information
- Errors made through transcription are reduced
- Entries that are duplicated can be reduced
- TAT of reports are better optimized

Recent hospital information systems typically use quick laptop attached to each other through a better network. These computers serve as tools for gathering, processing, and retrieving administrative and patient care data to improve service quality and return on investment. The hospital administration can make better decisions if they have more pertinent information.

1.2 PURPOSE OF HEALTH MANAGEMENT INFORMATION SYSTEM

India's twelfth five-year plan from year 2012-2017 discusses on the improvement of HMIS all over the nation with an investment of \$200 billion for National digital Health Mission. As per the Prime minister of India Narendra Modi, Covid-19 crisis led to creation of platform for unanimous adoption of NDHM. The transformation will be driven aiming the six themes revolving around Information transparency, Standardized claim processing, Prescription digitization, Playground for innovations, from episodic to wellness-oriented care, from service-based to value-based healthcare.

- a) Information transparency:** At present, the repository of medical data tracking real time data is questionable and thus it is difficult to verify any malfunctioning of hospitals. The registries done in NDHM will act as a one source or all the information of a particular individual. The trust in health ecosystem will increase and management burden of hospital in relation to onboarding of doctors will reduce. The Interoperability will allow seamless flow of patient information.
- b) Standardized claim processing:** The third-party claim settlement is considered to be the most tedious tasks for a hospital. These administrative burden on insurers remains high due to the same. Digital health mission will allow faster validation preventing frauds through TPA.
- c) Prescription digitization:** The doctors can provide the prescription digitally which shall be stored within their system along with availability of digital copy in patient's portal. This will end the problem of prescription lost or data lost by the patient stretching the time of doctor appointment in next consultation round.
- d) Playground for innovations:** The Indian government act as a regulator, provider, and payer in healthcare environment. The system will open the grounds of innovation for the Indian government.
- e) From episodic to wellness-oriented care:** The challenges of quality, accessibility and affordability in Indian healthcare system is well known. As the transparency will

increase with the help of NDHM, the accuracy of demand-supply matching shall correspondingly increase.

- f) **From service-based to value-based healthcare:** The incentives provided to healthcare providers doesn't align with the services provided by them. Either payer withhold the money or the management claims lower patient footfall. The NDHM through data analytics will allow to maintain the matching of incentives according to patient centric care.

Much research has reviewed the implementation of HMIS, and progress made in healthcare sector. Based on the studies conducted, the benefits of Health Information System have been noticed in various developing and developed countries. The benefits are in form of better patient care coordination, improved management practices and better delivery of hospital services.

The studies show HIS allows the hospitals to have better access to patient information, the quality of documenting the records have improved, the medical errors in filing the patient records including medication and clinical records have reduced, thus improving the patient care quality. This all has led to improved integration of information and hospital cost reduction. The large patient database can easily be managed over cloud software and burden of storing the files in large rooms for management has reduced.

The need of HMIS has seen an upsurge since pre- pandemic period. The attribute to this need includes the complexity of healthcare sector, limited resource availability in hospitals, day by day increment in the information produced through hospitals, examination of cost effectiveness, quality of information produced, and stored needs improvement, medical studies and sciences related to medical background.

Seeing all the benefits of HMIS, there should be widespread usage and installation of HMIS in hospitals, still there is reluctancy seen in the implementation of the system. The users are unable to use the software at the pace it should be used. The barriers noted through earlier studies included time shortage of the users while the clinical sessions are on run, very limited number of human resources with technical capabilities available in hospital. The hospital infrastructure not supporting the technical grounds due to lack of internet connections, a smaller number of computer screens available for each department.

1.3 BARRIERS IN HOSPITAL MANAGEMENT INFORMATION SYSTEM

Table 1: Barriers in HIS adoption in developed and developing countries.

Barriers	Brazil [49]	Sub-Sahara Africa [50]	Tanzania [9]	India [11]	Malaysia [12]	United States [44]
1. Access to internet	✓	✓				✓
2. Computer availability	✓					
3. Availability of IT team/unit	✓					
4. Electricity supply		✓	✓			
5. Infrequent IT use	✓					
6. User's computer skills		✓		✓		
7. Workload			✓		✓	
8. Employee turnover					✓	
9. Lack of training in IT			✓		✓	✓
10. Resistance of change						✓
11. Budget constraints		✓				✓
12. Security						✓
13. Lack of planning, project management				✓	✓	✓
14. Lack of financial incentives		✓				✓
15. Lack of technology support					✓	✓
16. Loss of Productivity						✓
17. Lack of functions, not meet the practice needs						✓
18. Lack of System maintenance						✓

As reviewed through the research conducted earlier, the barriers identified are mainly due to infrastructure, lack of technical skills in hospital resources, untrained staff keeping minimal knowledge of software usage and reluctancy in changing attitudes of people towards electric record entry.

While the implementation of HMIS is done, it is possible that variety of barriers in organization occur at the various process of implementation. According to the IT frameworks structured by Avgar et al. there are various intra-organizations level during which these barriers may arise, the barrier could be at strategic level or at operational level. The barriers could even be at frontlines level. Barriers at strategic level cause discrepancies between the goals and objective of organization resulting in disturbance of information technology use. Whereas the barrier at operational level is on managerial decisions in regard to the use of HMIS. The frontlines barrier includes challenges in relation to the work structure.

The research question been investigated here is:

- How is HMIS implemented in a 50 bedded private hospital of Pune?
- What is the workflow that needs to be understood by the frontline users to overcome technical issues faced during HMIS implementation?
- Why are the challenges faced by frontline users during implementation of HMIS?
- What is the perception of frontline users after implementation of HMIS in the hospital?

In the recent time, the role of nurse, doctor or the paramedic staff is no more dormant when it comes to HMIS user role. All the working staff from management level to operational level to frontline users, the role is considered independent and determinant. As the responsibilities of hospital staff has enhanced, it is simply implied that the knowledge and technical skills of the users are high so that they are able to work independently.

The patient care is the prime and most extensive task for each hospital staff working. The long exhaustive working hours of nurses and doctor leads to fatigue and physical inactivity. These fatigues can be considered as one major concern while recording the patient data manually. Any error in recording of patient data can be a serious issue leading to threat of patient safety.

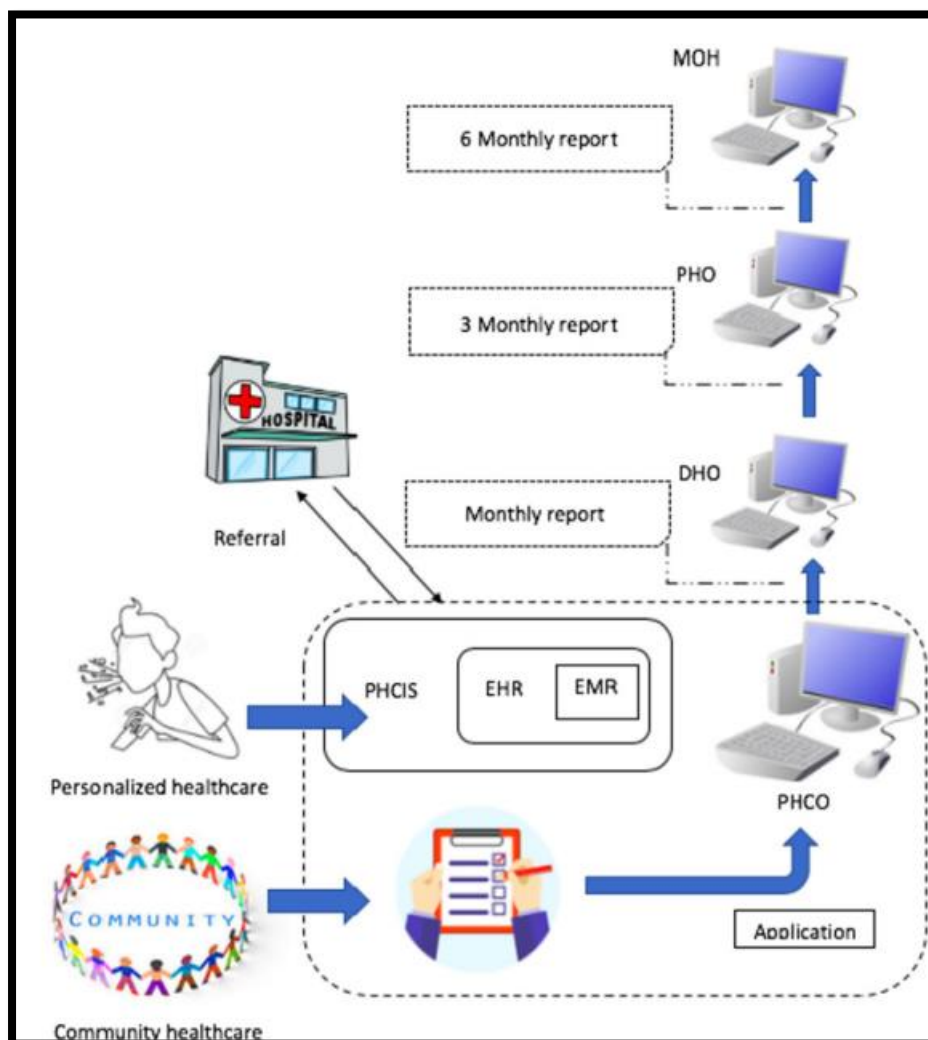


Figure 1: Current management system in hospitals

1.5 PREDICTED SOLUTIONS IN HOSPITAL MANGEMENT INFORMATION SYSTEM

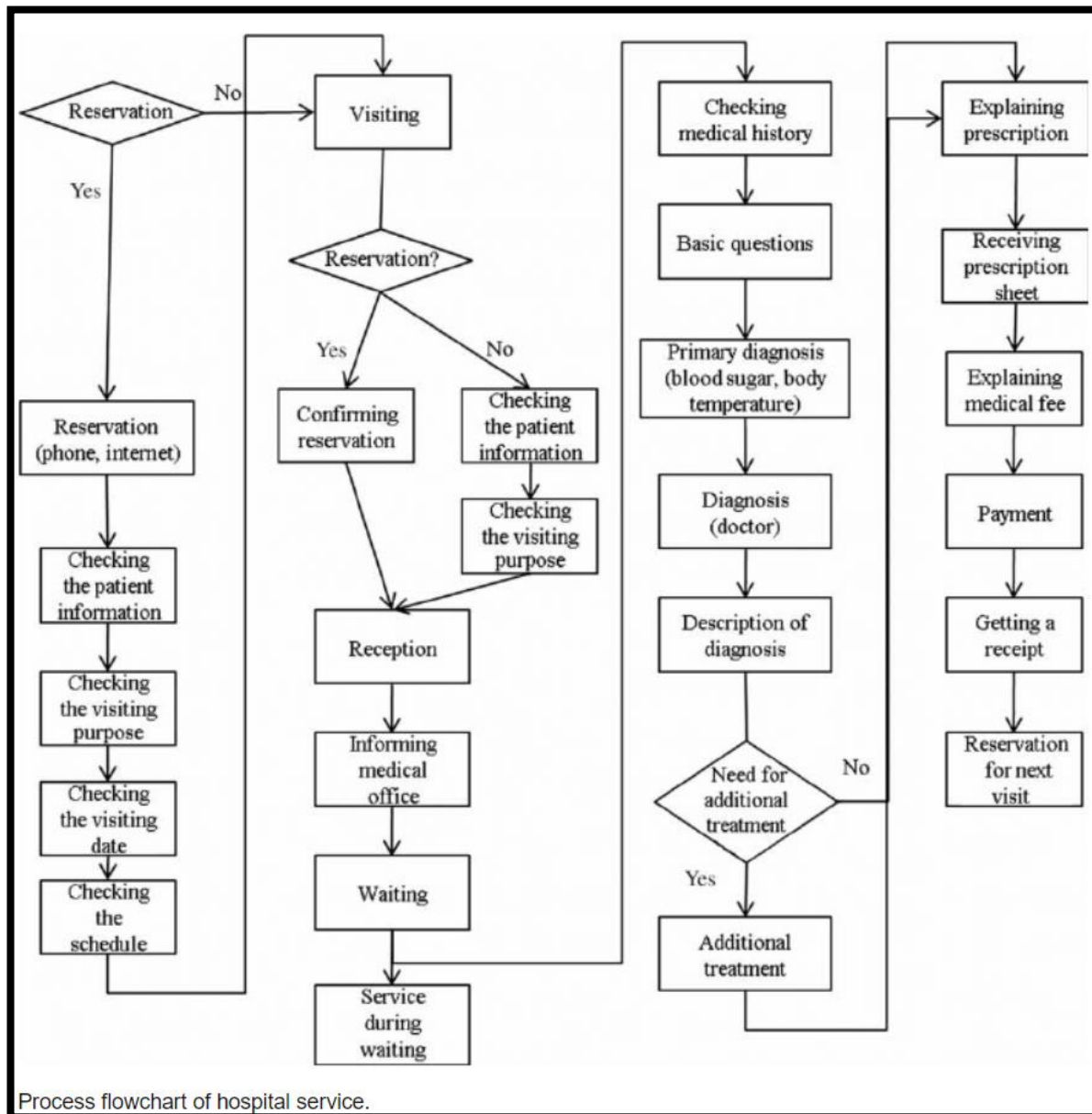


Figure 2: The short journey of patient in a hospital

As seen through the above patient journey, the most preferred solution is creating modules for each process under HMIS. The modules could be categorized as registration, appointment, EMR for OP, IP, daycare, emergency patient, Billing for each patient type, Pharmacy, diagnostics, Operation theater, Inventory, doctor payout etc.

Each module should be defined according to specific user role. The doctors mainly work on the prescription of the patient. The chief complaint, history of illness, physical examination,

diagnosis, investigations, medications, and follow-up are the necessary components for the doctor while treating a patient. Thus, for doctors only the option of EMR module should be available in HMIS, so that they are not confused with the complications in software and easily use the system. Coming to the nurse's specific role the subsystem of HMIS should have the modules necessary for the nurses. The nurses play a major role in IP patients' journey, from admitting the patient to a particular bed, administering the drugs prescribed by the doctor, recording the vitals to discharging the patient. Thus, the subsystem of HMIS for nurses should allow them to regulate all these requirements.

Nursing Information Systems (NIS) – The goal of these computer-based information systems is to assist nurses in providing improved patient care. A good NIS can help with a variety of things, including better staff schedules, precise patient recording, and clinical data integration. Schedule apps, which allow managers to handle absences and overtime, can help the nursing department manage its workforce better. The system can also be used to keep track of staffing levels and optimize staffing costs. Patient charting software allows users to record information about a patient's vital signs. Nurses also use it to keep track of admissions, care plans, and other pertinent nursing notes. All critical information is safely saved and retrievable when needed. Clinical data integration is also very important since it allows nurses to collect, access, and analyze clinical data before integrating it to create a patient's care plan. All of NIS's characteristics contribute to shorter planning times and more accurate assessments and evaluations. Because there is always a reference for electronically prescribed pharmaceuticals, the danger of prescribing the erroneous medication is also reduced.

Physician Information Systems (PIS) - PIS systems, as their synonym implies, aims on enhancing physician practice, and are also encouraged for deployment by the government. Physicians can take advantage of the federal government's stimulus programmed, which aims to improve medical treatment. Various packages are available to fit various budgets and can be applied to improve efficiency, reduce expenses, and provide high-quality patient care.

Physician information systems are given via laptop, connections, and networks, and they make use of immensely used and popular programmed like electronic medical records (EMRs), electronic health records (EHRs), and others. The majority of these systems offer round-the-clock remote help, allowing medical employees to troubleshoot issues that arise during system use.

Radiology Information System (RIS) - These systems are also well-liked since they can handle radiological billing, appointment scheduling, reporting, and patient database storage. With advancements in technology, radiology operations have become more sophisticated, and more institutions are turning to RIS to manage the commercial aspect of their practices.

Pharmacy Information Systems- PIS, which was created to meet the needs of a pharmacy department, aids pharmacists in monitoring how medication is utilized in hospitals. PIS allows users to keep track of drug allergies and other medication-related issues. The technology enables users to detect drug interactions and assists in the administration of appropriate medications based on the patient's physiologic variables.

At the end, the HMIS is implemented in any hospital for patient convenience and record safety. The improvement of patient's life expectancy is main aim of any hospital. The early reporting of a patient to hospital is the major solution to allow this improvement. HMIS can play a very crucial role if patient portal is provided.

Patient Portal Information System: Designed to address the timely reporting of illness by the patient. The patient should be provided the application of hospital wherein they can self-register to the hospital patient record. They should have the accessibility to book their appointment with doctor according to their illness and see all their reports in the mobile application. This will allow them to keep a check on their health and vitals, hence improve their lifestyle and well-being.

1.6 RESEARCH AIM AND OBJECTIVES

1.5.1 AIM

The system should be menu-driven and have an intuitive graphical user interface with a list of all the actions that need to be accomplished when a patient arrives for treatment and is admitted to a hospital. When a medical supply business gives out pharmaceuticals to patients, the stock level should be decreased and all tasks that still need to be done should be listed. It should be able to handle patient test results from the hospital's pathology lab, immediately update inventory once a transaction is finished, and sound an alarm if the stock level of a specific drug drops below a predetermined threshold. The new system should incorporate the hospital's accounts so that this duty can be delegated. External doctors' data and fee information should be kept separate from internal doctors' records.

1.5.2 RESEARCH OBJECTIVES

- i. To understand the workflow of the HMIS in a selected private hospital of Pune named Rising Medicare
- ii. Determine the managerial decision's perception of hospital information management systems in that hospital
- iii. Determine the issues that frontline users in the selected hospitals encounter while using hospital information management systems.
- iv. Investigate options for improving the utilisation of the hospital information management system in both facilities.

CHAPTER II

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Research Paper 1:

Title: - Bridging the gaps in the Health Management Information System in the context of a changing health sector

Author- Angelo S Nyamtema

Source: - International Journal of Management (IJM) Volume 12, Issue 3, March 2021, pp.277-283, Article ID: JM_12_03_025

Methodology: - A cross sectional descriptive study

Findings: -

81 percent had never been taught on HMIS, 65 percent had misunderstood the system, 54 percent had no idea who was expected to use the data produced, and 42 percent had not used the data for planning, budgeting, or evaluating service provision. Although 91 percent of the facilities had a good attitude toward the system, the examined HMIS booklets were never completed in 25 percent to 55 percent of the institutions.

Research Paper 2:

Title: - Challenges of using Hospital Information Systems by nurses: comparing academic and non-academic hospitals

Author-

- Leila Ahmadian,¹
- Nafise Dorosti,²
- Reza Khajouei,³
- Sadrieh Hajesmaeel Gohari⁴

Source: - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5557144/>

Methodology: Cross-sectional study

Study Design:

- Study location: Udham Singh Nagar, Uttarakhand
- Sample Size: SC, PHC, CHC, District Hospitals and Sub district Hospitals.
- Sampling Technique: Cross Sectional descriptive study

Findings: -

Human environment variables, particularly "negative attitude of society about employing HIS," were the most common and significant problems in academic hospitals. Human factors were the most common and significant obstacles at non-academic hospitals, with "little incentive to use system" being the most significant reason.

Salient Features: -

- Objectives of the study were to analyze the capturing of HMIS data being reported, the causes of error in HMIS data and understand the challenges in improving the quality of HMIS for future.
- The failure was in the training system as the trainers who had to train the state level officials lacked knowledge of HMIS and training skills.
- The TOT model used by MoHFW led to uniform training irrespective of the roles to be performed by the officials.
- The quality of HMIS data collected was poor due to improper feedback mechanism. The gap between BPMs and ANMs resulted in no accountability
- Reporting in private sectors is one major reason of non-accurate HMIS data being collected

Research Paper 3:

Title: - Barriers and challenges to Primary Health Care Information System (PHCIS) adoption from health management perspective

Author:

- Sandra Hakiem Afrizala,
- Putu Wuri Handayanib

- Achmad Nizar Hidayantob
- Tris Eryandoa
- Meiwita Budiharsanaa
- Evi Marthaa

Source: [Barriers and challenges to Primary Health Care Information System \(PHCIS\) adoption from health management perspective: A qualitative study - ScienceDirect](#)

Methodology: A qualitative study

Study Design:

- Study location: South Tangerang District, Indonesia
- Sample Size: 6 individuals belonging to Data Centre of the Ministry of Health, Health data resource of District Health Office, Health data resource of the Province Health Office and Two public healthcare organizations have used PHCIS in the district
- Sampling Technique: Qualitative Study involving in-depth interview

Salient Features:

- Objective of the study was to understand the challenges faced by the health management after 5 years of HMIS implementation.
- The lack of commitment towards technology change was the major barrier in implementation of HMIS. The users considered electronic recording to be load.
- The poor technology infrastructures, be it computers or electricity to be provided for running the computers, network capacity was the other challenge in implementation of HMIS
- Lack of IT personnel with proper knowledge and skills resulted in no training of hospital staff to record data electronically. As the hospital staff are not confident with technology, they prefer saving the medical data manually.
- The emergency patients or inpatients data and community health services were not recorded for HMIS.

Research Paper 4:

Title: Experiences of implementing hospital management information system (HMIS) at a tertiary care hospital, India

Author:

- Lakshya Arora

Source:

Methodology: A pilot study

Study Design:

- Study location: Film City Hospital, Mumbai
- Sample Size:
- Sampling Technique: A pilot study

Salient Features:

- The Objective for the research was to understand the challenges faced by the health management after 5 years of HMIS implementation.
- The lack of commitment towards technology change was the major barrier in implementation of HMIS. The users considered electronic recording to be load.
- The poor technology infrastructures, be it computers or electricity to be provided for running the computers, network capacity was the other challenge in implementation of HMIS
- Lack of IT personnel with proper knowledge and skills resulted in no training of hospital staff to record data electronically. As the hospital staff are not confident with technology, they prefer saving the medical data manually.
- The emergency patients or inpatients data and community health services were not recorded for HMIS.

Research Paper 5:

Title: Perception of Nurses about the Computerized Nursing Records in Selected Primary Health Centres in Jos Metropolis

Author:

- Oluwatoyin A Ogunyewo
- Emmanuel Adetunji Oyedele
- Eunice Ari
- G Onyejekwe
- Patience Kumzhi
- Naomi Yakubu

Source: <https://www.heraldopenaccess.us/openaccess/perception-of-nurses-about-the-computerized-nursing-records-in-selected-primary-health-centres-in-jos-metropolis>

Methodology: Cross Sectional, descriptive study

Study Design:

- Study location: Jos Metropolis, Plateau State
- Sample Size: 228
- Sampling Technique: Questionnaire

Salient Features:

- The objective of the study is to determine nurses' perception and perceived factors that influences the nurses towards HMIS in the selected hospital.
- The study showed that majority of the respondents had a positive attitude towards recording the data on computer
- The study exposed the use of standard EMR results in better quality of patient care delivery
- Overall, the perception of HMIS is on a positive side for nurses according to the study

2.1 RESEARCH GAP

The review of a literature is mostly done to amend that gap that occurs between the present and the future i.e., the gap between what has already been done in a system and what further can be done for the betterment of the system. It helps in understanding the research work that has been done in the past related to a specific topic and what can be done in future.

The research gap noted through literature review is that the perception at user level is not focused earlier. The hospital administration has always been the contact point while researching whereas the doctors, nurses and paramedic staff's attitude and perception is neglected. The challenges noted through previous studies in implementation of HMIS includes:

1. The motivation to digitalize public health in India was the growing population, which resulted in a wide disparity between the number of health-care providers and patients, rising health-care costs, and investing in technology to facilitate health-care delivery.
2. One of the great challenges in implementing digital health across India is that health is a state matter, where the states are responsible for on-the-ground implementation while policy directions are centrally directed, and therefore, the individual states are legally entitled to vary from central health directives
3. Lack of trained workforce for handling health information and health information systems, digital platforms working in silos due to limited interoperability, noncompliance to standards, and lack of data governance frameworks
4. There are a limited number of educational institutes that are currently training students in HIM and health informatics as a specialization and only one of them is a government sponsored university.
5. There is a paucity in literature on concrete efforts towards integrating digital health tools and this requires the collaborative efforts of UI/UX designers, administrators, human-computer interaction scientists, and the end users, with these platforms being developed through a participatory co-design approach

CHAPTER III

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The term "research methodology" refers to a set of highly intellectual human actions utilized in the study of nature and matter, and it especially refers to the manner in which data is acquired, evaluated, and interpreted. It explains how the researchers came to their conclusions. It also contains the statistical tools that were utilized to arrive at a solution to the problem.

3.2 RESEARCH QUESTION

What is the perception of frontline users towards harnessing the power of digital technology in a selected private hospital of Pune and understanding the associated challenges or barriers towards implementation of hospital management information system at user level?

3.3 RESEARH DESIGN

- Study type- A qualitative and quantitative research study
- Type of Data- Primary research and Secondary research
- Sampling method- Random stratified sampling method for quantitative and Purposive sampling for qualitative data
- Mode of data collection- Google form for quantitative and in-depth interview for qualitative data
- Duration of Study- It is a cross-sectional study of three months where the observation and analysis are collected at a particular time across a sample population.
- Study Location – Rising Medicare Hospital, Pune, Maharashtra

The study was concerned with the evaluation of implemented HMIS in a private 50-bedded hospital of Pune, Maharashtra. The study provides a cross sectional information of private institution. The study target population was **135 healthcare** workers determined from different department of the hospital. The various departments drawn are the real focal points for making the decisions in the hospital and include OPD, IPD, operation theatre, radiology department, pharmacy department, pathology, clinical and consultation, stores, and administration. The target population included the workers of healthcare who routinely worked on the HMIS. The sample size determined was based on the usage of HMIS by the healthcare workers. Close ended structured questionnaire was prepared for quantitative purpose whereas semi-structed

questionnaire was prepared for in-depth interview of doctors was self-administered to obtain the research data.

3.4 STUDY POPULATION

TABLE 2: Sample Frequency Distribution

S.NO	DEPARTMENT	POPULATION SIZE
1	Nursing	44
2	Doctor	12
3	Radiology	7
4	Pathology	12
5	RMO	11
6	Pharmacy	10
7	IT Department	6
8	Registration	10
9	Billing Desk	7
10	Finance	9
11	Human Resource	7
TOTAL		135

From a total hospital population of 135 healthcare workers employed in Rising Medicare that used HMIS, 101 sample size was chosen as respondents for the study.

3.5 SAMPLE SIZE CALCULATION

To determine the sample size, the function for calculating the least sample size to determine the proportion was brought into the picture. According to this formula, **101** healthcare workers were chosen for the study.

Population size = 135

Confidence interval = 95% (0.95)

Sample proportion = 50% (0.5)

Z-Score = 1.64

The calculated sample size for the study is = 101 healthcare workers

$$n = \frac{N \frac{z^2 p(1-p)}{e^2}}{\frac{z^2 p(1-p)}{e^2} + N - 1}$$

where:

- n is the sample size,
- N is the population size,
- z is the confidence level (in percent, such as $90\% = 0.9$),
- p is the sample proportion (in percent, such as $50\% = 0.5$),
- e is the margin of error (in percent, such as $5\% = 0.05$).

Figure 3: Formula for sample size calculation

The confidence interval and margin of error was taken as 95% and 5% because of the overall small population size. To lower down the margin of error or confidence level would require larger sample size. But due to unavailability of large population size, the reduction in confidence intervals or margin of error was not possible.

3.6 SAMPLING TECHNIQUE

Random stratified sampling technique was adopted to describe the characteristics of subgroups chosen for the study. The healthcare workers were stratified into different departments according to their operations. The random stratified sampling technique was done to obtain the quantitative data of the study

Purposive sampling technique was adopted to describe the characteristics of managerial doctors chosen for the study. The sample chosen for the qualitative study was not based on statistical calculations to accommodate information from large variety of population.

3.7 STUDY INSTRUMENTS

3.7.1 For QUANTITATIVE STUDY

A short questionnaire was prepared to collect the primary data. For the research purpose, the distribution of the pre-designed questionnaires containing **30 close ended question** was done among the healthcare workers chosen for the interest of the study belonging to different wards of the private hospital. The healthcare workers rotated in three different shifts of eight hours per day. The questionnaire prepared as a data collector tool was basically designed keeping previous similar studies done on HMIS implementation for validity of this tool, the experts' opinions including college faculty members and four healthcare workers of different departments was used. This questionnaire has three parts. The first half of the questionnaire involves socio-demographic information of healthcare workers including their age, gender, educational qualification, job profile, work experience with HIS. The second part talks about the perception of frontline users to the use of computerized patient records and the third part of the questionnaire involves questions related to challenges faced while using and implementation of HMIS in the hospital. The questions revolve around four dimensions which are human factors, human environment, organizational environment, hardware factors and system characteristics. Each dimension has a criterion based on which the questionnaire is prepared. The criteria are as mentioned in the table below.

TABLE 3: Dimensions and Based Criterion

DIMENSIONS	CRTIERIA
Human factor	• Time consuming work with HIS • Poor interest to work on computer • Not many skills to work on the technology such as HMIS • Lack of comprehensive understanding about the HMIS • Resistance to transitioning from manual to automated processes • Uncertainty about the system's utility

Human environment	• Reduced interaction with patients • Reduced communication with colleagues • Colleagues' negative attitude about HIS • Society's negative attitude regarding using HIS
Organizational factors	• Clinical work pressure resulting in less time to HMIS • Inadequate training about HIS • Failure to entirely repair the system • Lack of space in workplace • Lack of frontline user contribution in the designing of HMIS • Not in coordination with the organizational culture • Lack of technical staff when necessary
Hardware factors and System characteristics	• Network failure • Lack of computers in hospitals • Low speed of computer • Legal problem issues can be raised while working on HMIS • Loss of confidentiality of information

The questionnaire had to be answered based on the 5-point Likert scale from strongly agree to strongly disagree. Each answer was scored from 1 (strongly disagree) to 5 (strongly agree). The analysis of the data was done using excel formulae and display was also done through Microsoft excel.

3.7.2 For QUALITATIVE STUDY

Qualitative study was conducted along with the questionnaire distribution for quantification purpose. The qualitative study was done to understand the opinion and experience of the **5 doctors at managerial position** with help of Rapid Assessment Process that is previously

adopted for similar type of studies. The results generated from this study was compared to the results of previous studies on which the literature review was conducted to check the accuracy and relevancy of data obtained.

The questionnaire prepared for in-depth interview was based on the Human, Organization, Technology fit Model (HOT-fit) and Individual technology and task framework (ITT). The HOT-fit Model was used to determine the management decisions taken to implement the Hospital Management Information System in the hospital whereas the ITT framework was adopted to understand the socio-organizational factors that influence the doctors in adoption of HMIS. The questionnaire prepared as a data collector tool was basically designed keeping previous similar studies done on HMIS implementation for validity of this tool, the expert opinions of college faculty member.

The questionnaire framed for in-depth interview was semi structured and consisted of **five questions**. It was divided into two halves with the first half acquiring the demographic details of the respondent such as age, gender, educational qualification, job profile, work experience with HIS. The second half depicts the perception of doctors in managerial board to the challenges faced while using and implementation of HMIS in the hospital. Each interview conducted was winded up within 30 minutes as the doctors were available only for short duration of time. Interview was conducted on Google meet in English and Hindi medium mixed.

3.7 OPERATIONAL DEFINITION

TABLE 4: Operational terms and definition

S. No	Term	Operational Definition
1.	Rapid Assessment Process	RAP is a process of collecting, verifying, and discussing data, so that reaction can be taken as rapidly as possible.
2.	Likert Scale	Researchers utilize a Likert scale, which is a one-dimensional scale, to collect respondents' attitudes and opinions. This psychometric scale is frequently used by researchers to learn about people's attitudes and perceptions of a brand, a product, or a target market.

3.	IT Infrastructure	The composite hardware, software, network resources, and services required for the existence, operation, and management of a corporate IT environment are referred to as IT infrastructure. IT infrastructure, which is usually internal to a company and installed within owned buildings, allows an organization to deliver IT solutions and services to its employees, partners, and/or consumers.
4.	Barriers	Anything that makes it more difficult for some people to access, use, or benefit from health care is referred to as a barrier to health care.
5.	EMR	EMRs (electronic medical records) are digitized versions of paper charts used in clinics, hospitals, and clinician offices. EMRs are electronic medical records that contain notes and information collected by and for physicians in a particular office, clinic, or hospital, and are primarily utilized by providers for diagnosis and treatment.

3.8 STATISTICAL METHOD

Mean, median, Coding text

3.9 ETHICAL CONSIDERATIONS

Before than the filling of the questionnaire, the aim and objectives of the research were exemplified, and the security and confidentiality of the information were assured. No patient or public apart from healthcare workers in the hospital were involved. The study was approved by Chief Executive Officer of the company and Medical Superintendent of the hospital. Formal approval from managers of hospitals was taken to record the response of HMIS users. Frontline users were oriented about the purpose and procedure of the study.

CHAPTER IV
DATA ANALYSIS
AND
INTERPRETATION

RESULTS

1. Workflow of HMIS in Hospital

The first objective of the research study was to understand the workflow of the HMIS in the hospital. The research objective was set to understand if the workflow of the software matches to the real case scenario. The patient's journey in a hospital undergoes various step and successful journey is considered when the turnaround time (TAT) at each step is least.

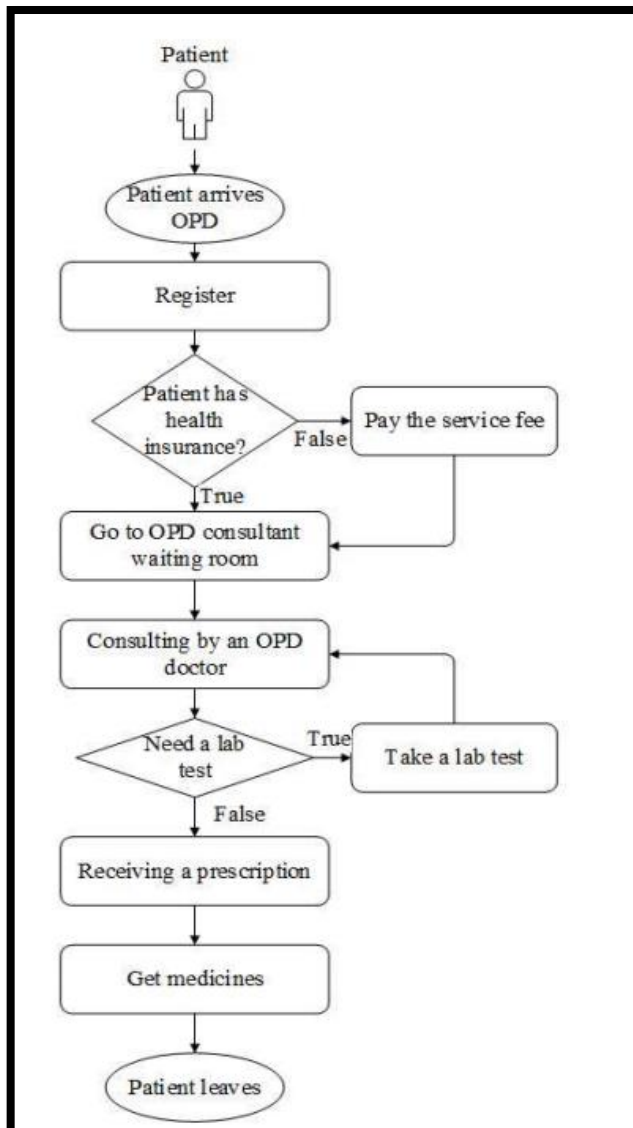


Figure 4: Outpatient workflow in Hospital

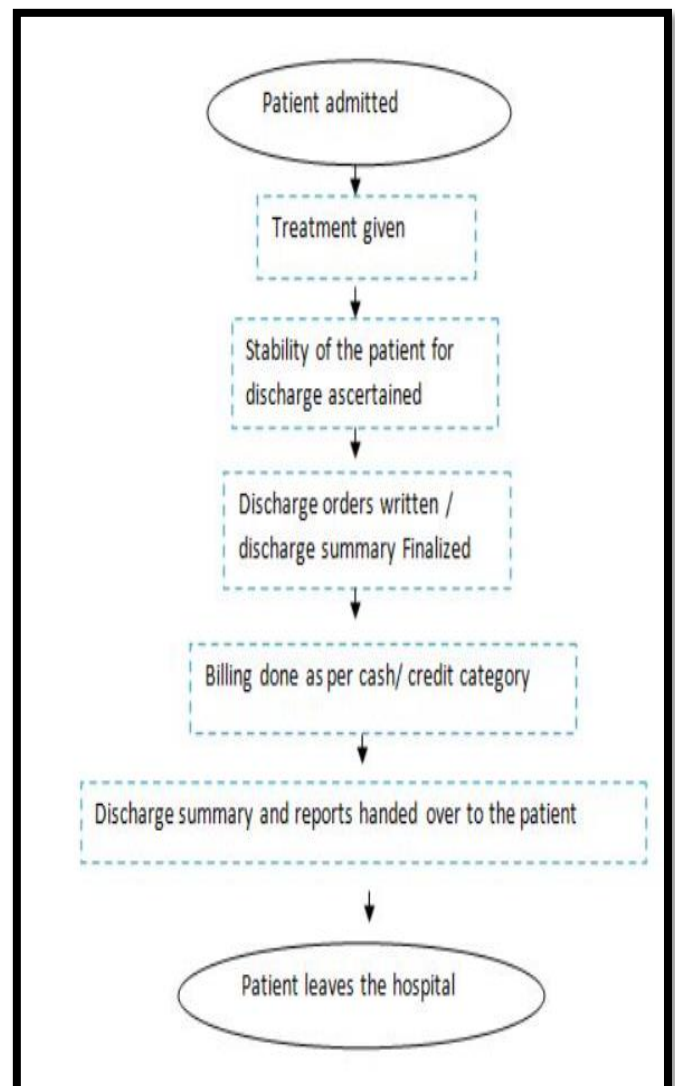


Figure 5: Inpatient workflow

The above workflow depicts a simple journey of patient that was manually done in the hospital before the implementation of HMIS in the hospital. As this was a green field hospital using the

HMIS for the first time, the requirements provided by the Rising Medicare Hospital, Pune were incorporated into the system and a template of 250 bedded corporate hospital was prepared for the hospital. The workflows prepared in the software for OPD, IPD and Emergency patients are described below.

1.1 OPD PATIENTS

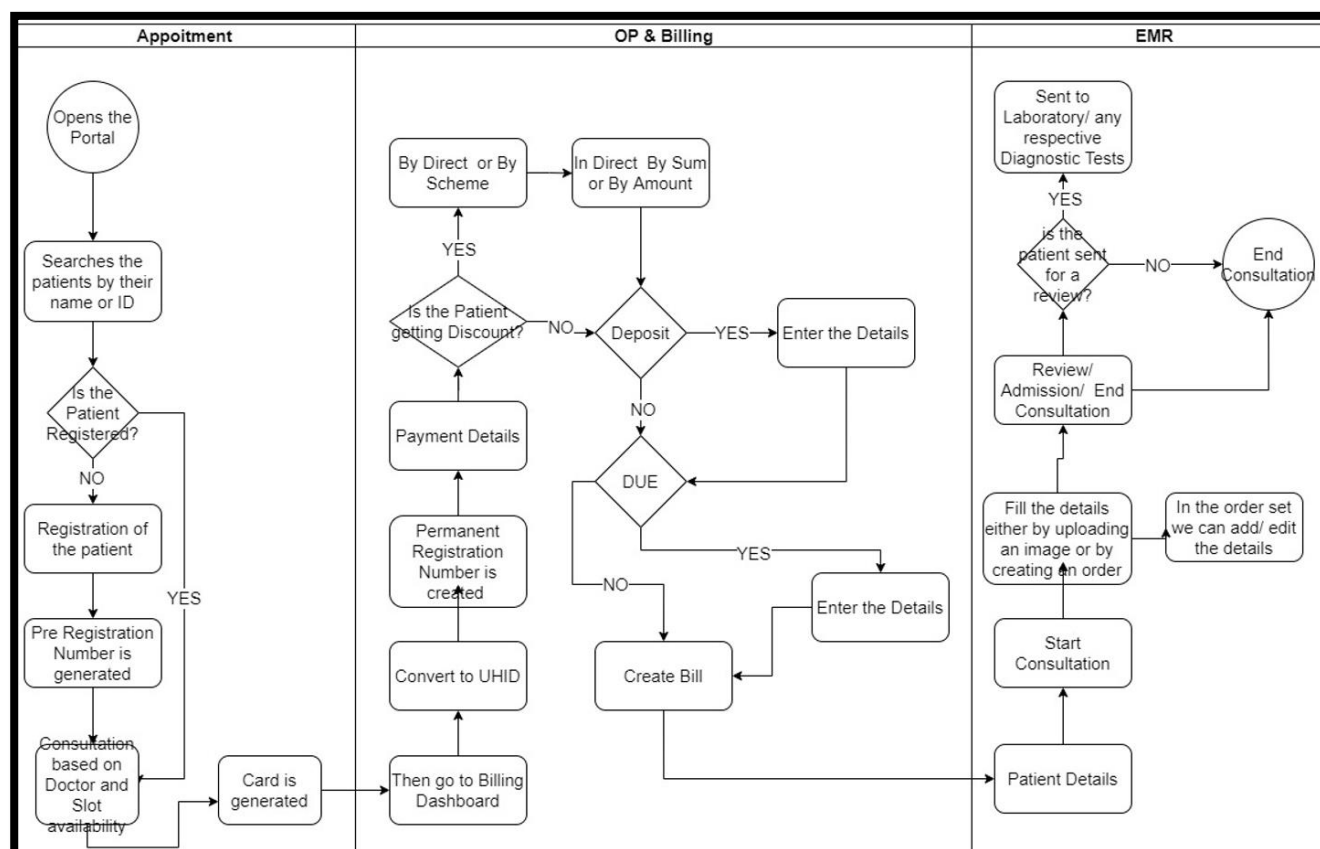


Figure 6: OPD workflow in HMIS implemented in hospital

The HMIS was customized according to the need of the hospital. Three scenarios were available in the OPD according to the hospital requirements. The software was designed in a manner wherein the patient can come to the hospital directly and book the appointment, they can book the appointment through call center or through patient portal available on the hospital application in Play store.

Once the patient books the appointment with the hospital, they get registered on the system forever and can be searched with UHID, mobile number or their name. Once they make the payment for consultation, they can visit the doctor in given time slot. The doctor fills in the EMR and e-prescription is sent to patient via mail and available on their portal. Additional pathology, radiology or pharmacy service if ordered by the doctor can be processed through

the system if the patient wishes to get them done from the hospital itself. They must make the payment at the billing counter and get the ordered test done. Once the appointment is completed, the doctor schedules a follow-up if required, the reminder of which is sent to patient a day prior to the follow-up date. And the whole journey of OPD is covered.

The system has incorporated all the functionalities that were run manually in the Hospital OPD and the staff were trained with the provision of recordings to be watched later in case of any queries. A feedback portal was also made available in the system to note the patient's point of view towards the implementation of HMIS in the hospital. The patients could rate the services provided in the hospital out of five stars.

1.1.1 Other Scenarios: If the patient books appointment through call center or if the patient books appointment through online portal

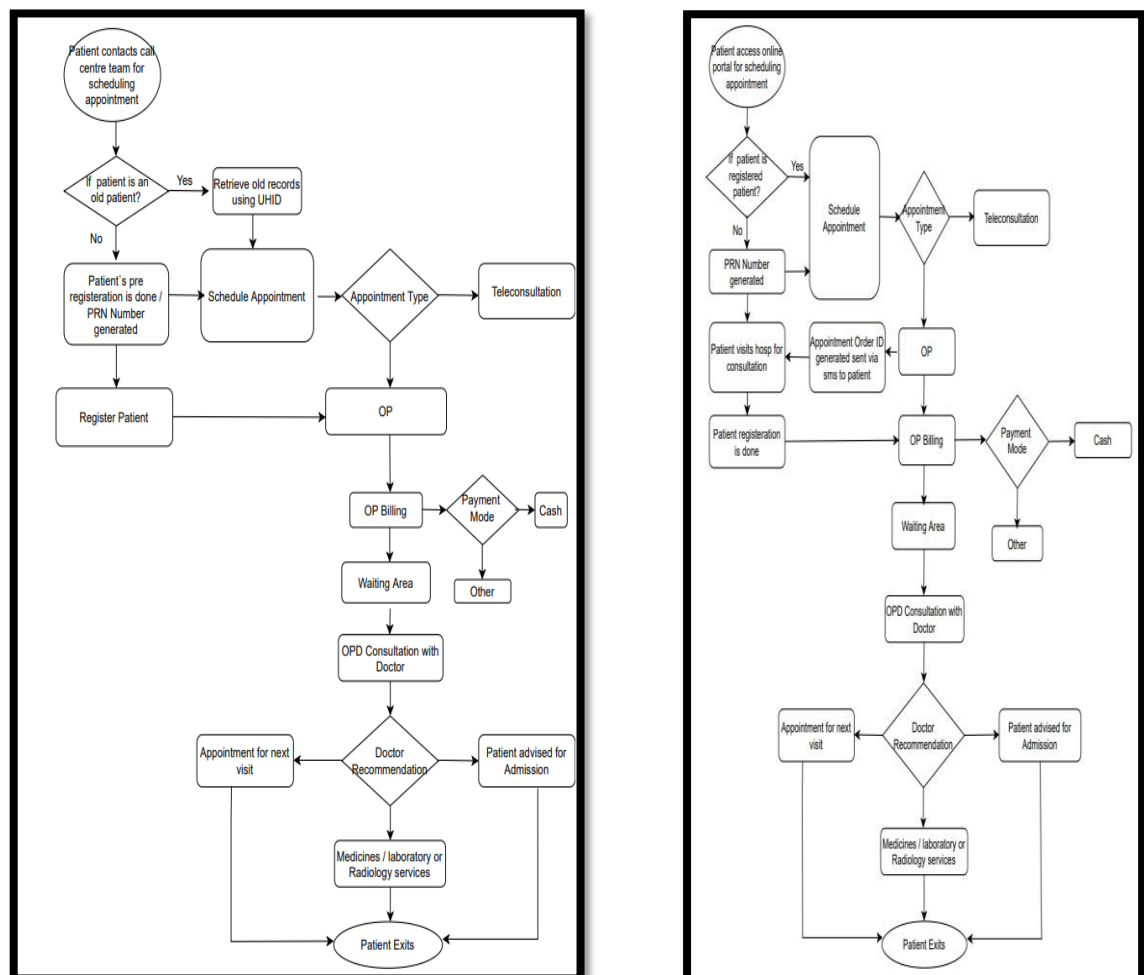


Figure 7: OPD workflow if patient comes through call center and patient portal.

1.2 IPD PATIENTS

An IPD patient journey is captured like that of OPD in initial stages when it comes to registration. The patient gets registered on the system and an OPD patient can be converted to IPD patient through the system. Once the patient gets registered to the system, the patient is admitted to ward according to the billing category and allotted a room.

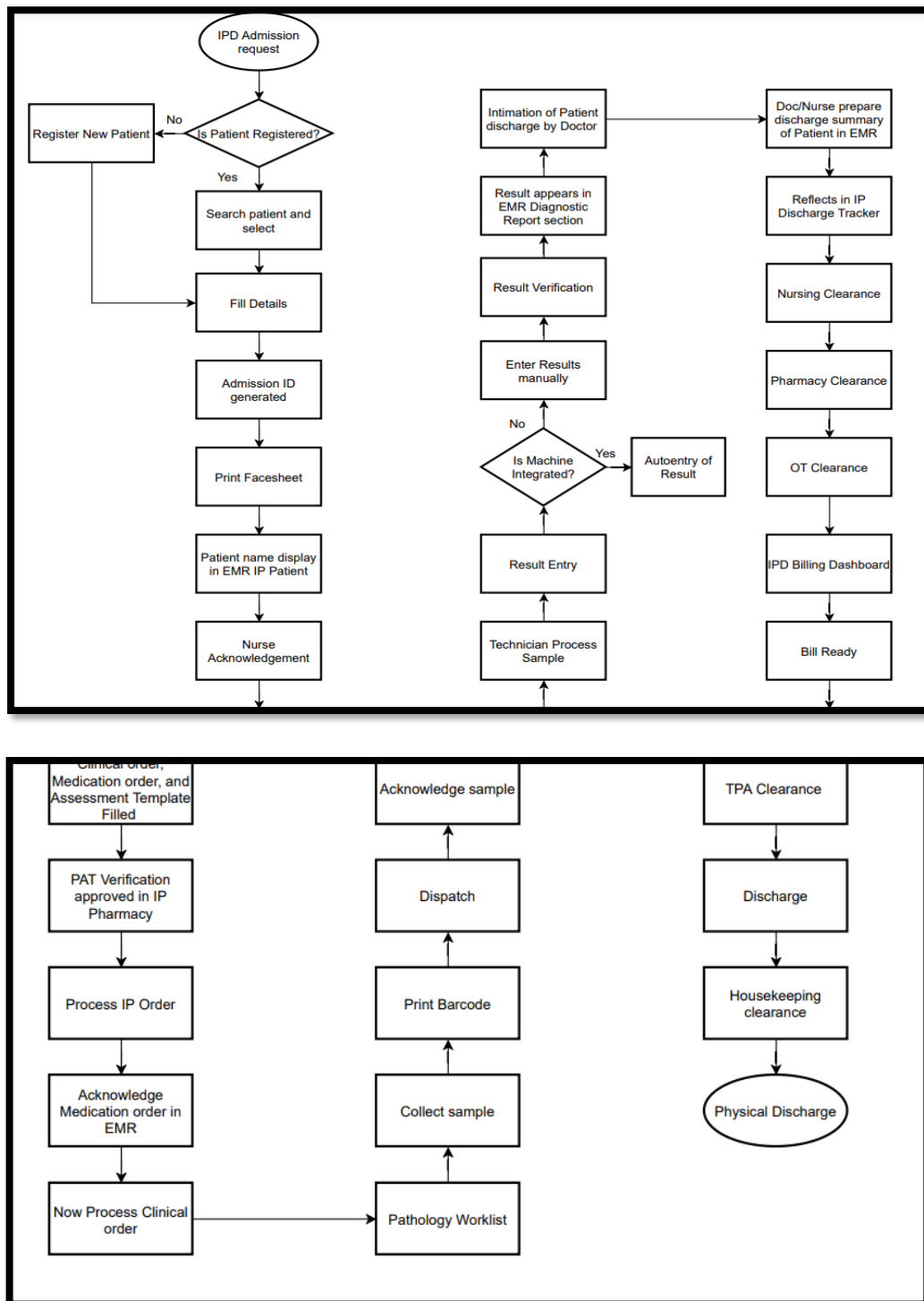


Figure 8: IPD workflow captured through the system

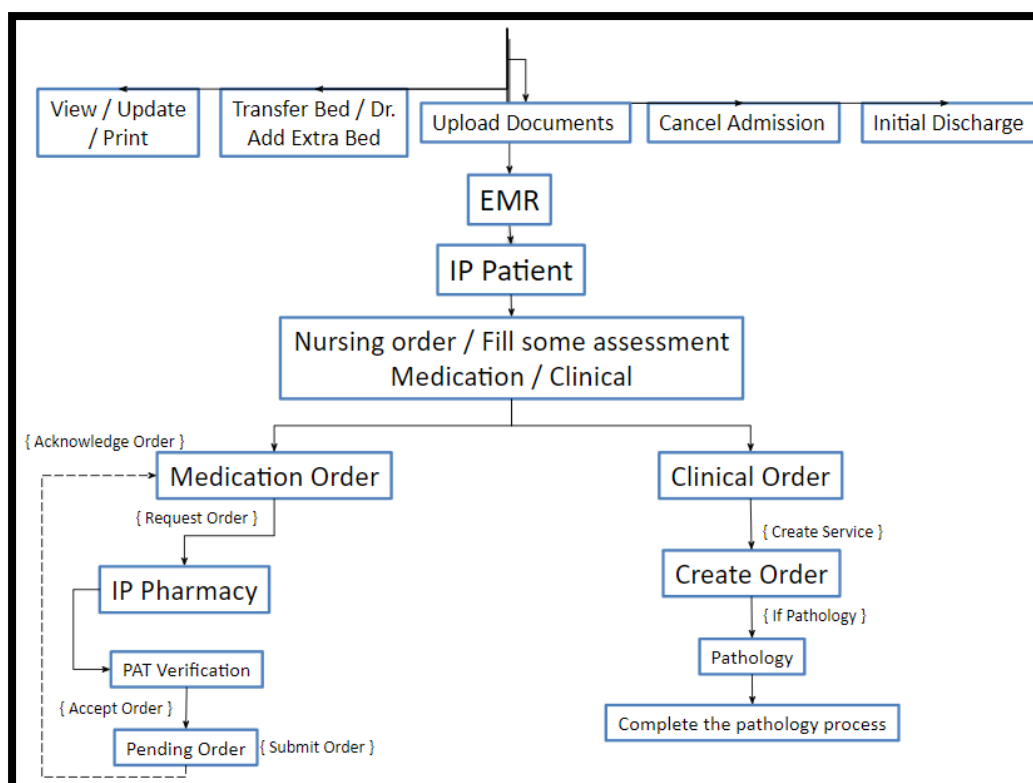
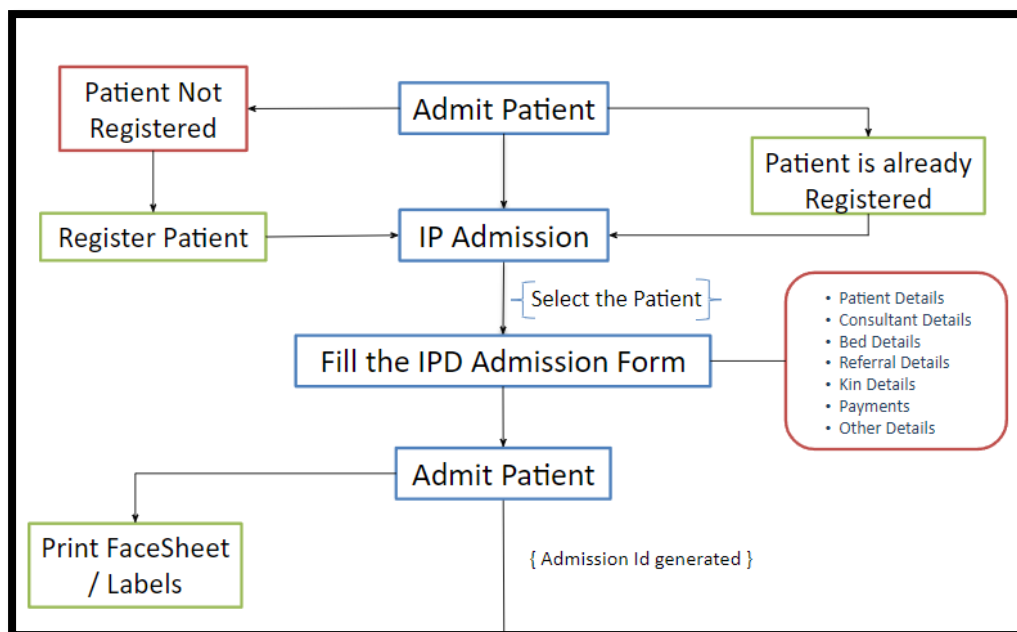


Figure 9 & 10: Clinical and pharmacy workflow of IPD patient

Once the patient gets admitted, the admission slip, patient label, face sheet, visitor pass can be printed through EMR. The doctor's round is recorded in EMR wherein they can book orders for pathology, radiology, Operation Theater and prescribe medication orders. They can maintain the progress sheet through EMR. Nurses' acknowledgement is done, and they can maintain in the vitals of the patient.

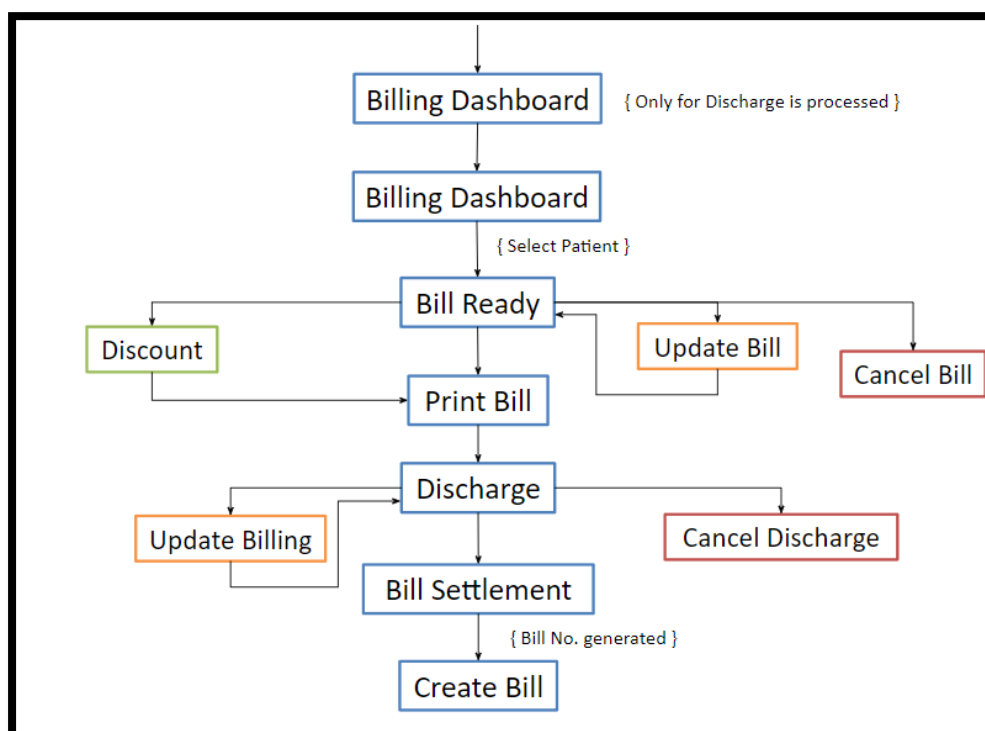
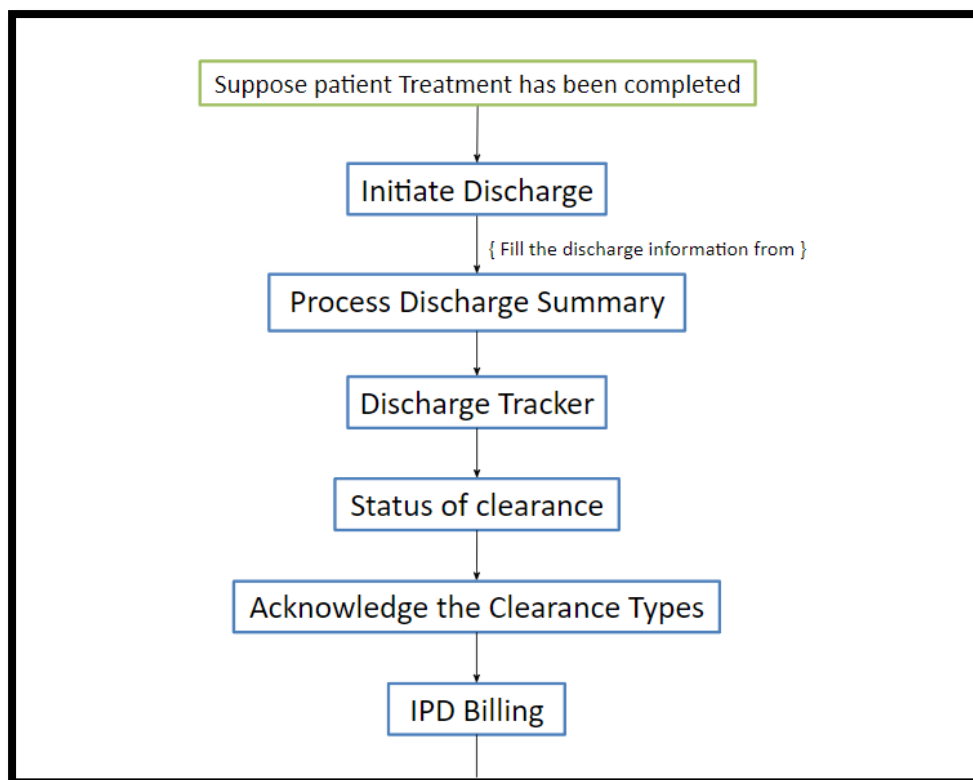


Figure 11 & 12: Bill settlement process in HMIS

Once the whole treatment is completed, initiate the discharge process from the system. The bill is created, once the bill settlement is done the patient is discharged.

2. Perception of Managerial Doctors towards HMIS implementation

The second objective of the research study was to understand the perception of managerial level doctors towards the implementation of HMIS in the hospital. The managerial level doctors were 5 in number which were interviewed for around 30 minutes each through the Google meet forum. The interviews were not recorded as the permissions from the doctors was denied. The result of the interview suggested four main areas to be focused on. The areas included:

- Human Resource, Knowledge, and Skill Set
- IT infrastructure of Rising Medicare Hospital
- Hospital Organizational behavior
- Process of the software in the hospital

2.1 Human Resource, Knowledge, and Skill set:

The most important role in the healthcare management industry is of the staff working in the hospital. They are considered as the driving force of the organization's development. Each interviewee accepted that the knowledge, attitude, and skill set possessed by the healthcare workers determines the performance of the Hospital. The interviewee believed that while reviewing the skill set of healthcare professionals towards HMIS, they noticed that the healthcare workers were not able to comprehend well with system even after multiple trainings. One of the interviewees mentioned

“The staff lacks commitment and diligence to understand the system. They are rigid about shifting to adoption of electronic medium for recording patient data and wish to continue with traditional manual recording system”

The SPOC person from Rising Medicare hospital while interview mentioned that the negative attitude of the staff towards HMIS is due to least previous knowledge of computer and technology. As there are not many IT supporting staff yet in the hospital, so the healthcare workers find it difficult to record the data on computer. They always have to wait for technical support causing delay in their patient management process. This leads to reluctance of adopting HMIS by the staff of the hospital. One of the doctors mentioned about the work pressure over these hospital staff resulting in minimal time availability to update

all patient records on the system. The respondent believed that the nurses were more engrossed in taking care of the patient rather than filling up the orders and medication indents on MAR of the system. The training provided by the software company to the users had no gap, but due to the user's negligence and behavior of being adamant with the manual system, HMIS implemented in the hospital wasn't giving the expected results.

2.2 IT infrastructure of Rising Medicare Hospital

All the doctors agreed that the HMIS implementation is necessary in the hospital to streamline the registration activities, revenue report generation and various others. However, to support HMIS in the hospital, the IT infrastructure of hospital is yet not compatible. Doctors at managerial level believe that to record daily activities within the HMIS require continuous internet connectivity and electricity availability. The number of computer screens available in the hospital are less compared to the number of operational users limiting the intensity with which the HMIS is handled.

The doctor interviewed mentioned:

“The camps arranged outside the hospital, are difficult to record on computer. There are around 200 OPDs dealt in the camps and to register those patients in HMIS is impossible for healthcare staff. As there are certain related clinics outside the hospital with no IT infrastructure, it is difficult to manage this data”

The doctors described the internet connection as a major limitation for the IT infrastructure of the hospital resulting in poor success of HMIS implementation. The LAN network available in the hospital doesn't reach the third floor causing the users to come to first floor and upload the data resulting in chaos. There's a particular range of internet speed needed for the HMIS software to work, but many a times due to bad weather condition or unavailability of internet in remote areas result in slowness of the HMIS.

The other concerned raised by the doctors for infrastructure setup was lack of space in the hospital. The believed for smooth flow of HMIS a proper setup of technical team with appropriate number of computer screens and laptop is mandatory. But they believed that the major hinderance for this setup was lack of space in the hospital. The managerial board considered it to be difficult to plan out a separate space for the IT infrastructure in the hospital. As the technical team will have complete access to all the information of the

patient, administration, billing and revenue of the hospital, the confidentiality of the hospital data will become questionable.

2.3 Hospital Organizational behavior

The implementation process of HMIS in the hospital highly depends on the organization's management board. The IT infrastructure, dedicated IT team and healthcare staff taking responsibility of updating the data on software accurately is dependent on the management decisions. The organizational culture should encourage and support the staff to this shift from traditional to modern management of computerized records. The doctors interviewed admitted the fact that due to lack of IT unit, there is not much support to the frontline users of HMIS. They are aware about the need of IT infrastructure but lack space to build one.

Secondly, there are no incentives and added benefits given to the employee for updating the data on the computer. Instead, the staff is pressurized to timely update the data and manage the patient at same time with no compromise in quality of care being provided. Most of the respondents believed that it was the duty of healthcare staff to gain the knowledge of the system and should help the organization in accelerating the process of HMIS implementation.

The Promoter of the hospital in the interview mentioned

“We are hiring personnel's skilled in IT industry and planning on setting up a separate unit of IT team. We are also planning on keeping weekly trainings and examination to test the comprehensive level and knowledge gained by each user of HMIS. The hospital shall completely shift to HMIS within a year or so”

According to the managerial level doctor's, there is no obligation of compulsorily having IT staff in a healthcare unit and thus the staff didn't plan in that direction. But during the implementation of the software, the hospital is facing shortcomings due to lack of competent and high technology knowledge IT personnel. Doctors believed since it is not yet mandated by the Indian government for HIS adoption, so the staff may continue recording and documenting the patient data manually. However, the policy should be regulated on earliest basis so that every organization is pressurized by higher authorities to shift to computerized recording of patient data. The doctors believed that the satisfaction level of the employees with HMIS should be regulated on weekly basis and a feedback form shall be circulated for the same. This will help the hospital in closing the gaps between user and the software. In addition to this step, the doctors also believed that regular training and support from the software company should

be provided that shall be highly beneficial for the hospital until IT unit is hired. Thus, the software provider should be compliant with the queries raised by the workers at any given time.

2.4 Process of the software in the hospital

According to the respondents the main motto behind implementation of HMIS in hospital was to shift the processes handled manually in the hospital and maintain them through computerized health records. The hospital was preparing to become a paperless industry with ability to do interoperability according AYUSH Bharat initiative.

The head of department from Pediatric ward stated that the software implemented currently in the hospital comprises of most of the basic workflows needed in the hospital and shall stand out to be a great success for the hospital if implemented properly. However, there are certain enhancements like ANC registration, doctor payout calculation that needs to be looked upon, but they will gradually be inculcated in the system as and when the usage is started.

One of the doctors mentioned:

“The best part of the software is patient portal wherein the patients can themselves book appointment with the doctor in need, make payment and take the advantage of tele consultation sitting at home. The software is convenient for us as we do not have to ask for the prescription for patient anymore. As soon as we open the EMR tab and enter the patient’s UHID or first name, the patient is visible in the system, and we get all the patient history directly”

The respondent discussed about the complex activities of LMIS, RIS and pharmacy in the hospital which were well designed and incorporated in the software. They also introduced to different use cases that needs to be dealt with in the hospital at daily basis. The OT management was one of the biggest challenges for the doctors as while recording the surgery request manually and checking if the OT was free for the patient at scheduled time of surgery was tedious task. But, with the help of OT dashboard present in the software, it is easy for the doctors to raise the surgery request and manage their appointment schedule accordingly.

Although earlier the doctors had the notion that the software used as HMIS doesn’t fulfill the basic process of the emergency patient, referral patients or daycare patients. But after seeing the demo of the current software their notion changed and committed that with help of current HMIS system there are no such limitations. Thus, the weak HIS functionality which had less chance of success in the industry is no more into picture.

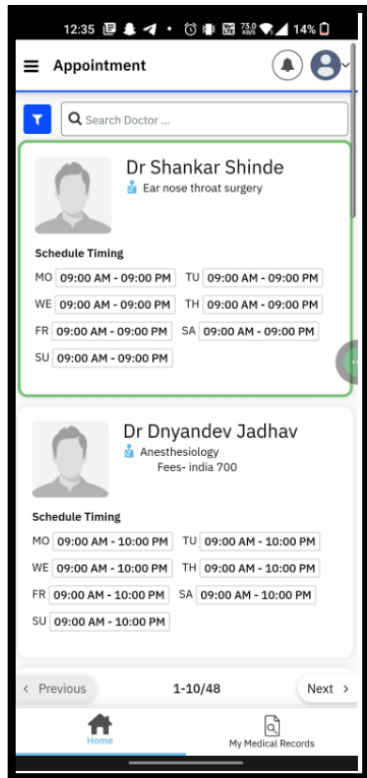


Figure 13: Patient appointment portal

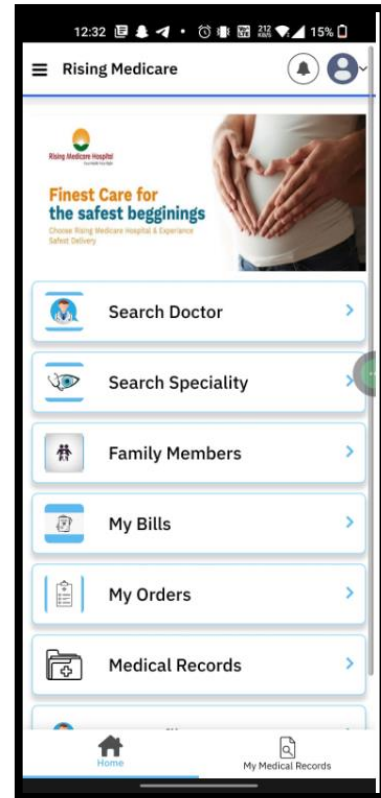


Figure 14: Patient Portal Home screen

KareXpert Rising Medicare Select Location QMS

Mrs Ragini Singh 45 Y,7 M,4 D | Female RMH22-23/60

Date of Birth 14/09/1976 Payer Self Payer Group Cash Payer Sub Group Self

Episode History CoverSheet

Search

Print Download Refresh Table < 1-2 / 2 >

Visit Type	Visit Id	Treating Doctor/Team	Speciality/Unit	Visit Date Time	Tag
IP	SIIP-72	Dr Vinoad Bharrati	Obstetrics And Gynecology	18/04/2022, 11:35 am GMT+5:30	!
OP	OPRefr.149	Dr.Pratima Singh	Internal Medicine	18/04/2022, 10:36 am GMT+5:30	!

Cover Sheet/Episode
E-Prescription
Order-Set
CDSS
Glass History
E-Prescription History
Patient History
Self Note
Diagnostic Report
Patient Documents
Surgery/Package Request
Template/ Assessments
Vitals

Figure 15: EMR of the patient

The screenshot displays the KareXpert Facility portal interface. On the left is a dark sidebar with a search menu and a list of navigation items: Registration, Appointment, OP Billing, Queue Management, Diagnostic, Pharmacy, EMR, Counselling, IPD, IPD Billing, Ambulance, and Emergency. The main content area is titled 'Registration' and includes tabs for Pre-Registration, Merge Registration, Deactivate Registration, Self Registration, and Temp Registration. A search bar at the top of the main area allows filtering by Patient Name or Search By. Below this is a table of patient registrations with columns for UHID, Name, Mobile Number, Age, Gender, Marital Status, City, Lead Source, VIP, and Identity F. The table contains 10 rows of patient data. At the bottom right of the table, there are icons for Logs, Print, Download, Refresh, and Table, along with a pagination indicator showing '1-10 / 20039'.

UHID	Name	Mobile Number	Age	Gender	Marital Status	City	Lead Source	VIP	Identity F
RMH22-23/52	Mr Anil Dussal	8805845143	55 Y	Male	Single	Pune	Camp	No	No
RMH22-23/51	Mr Jitendra Pardeshi	9372270178	52 Y,7 M,29 D	Male	Single	Pune	Camp	No	No
RMH22-23/50	Mrs Sarubai Biradar	7385783946	72 Y	Female	Married	Pune	Camp	No	No
RMH22-23/49	Mrs Madhuri Hemaji Dussal	8485886088	77 Y,1 D	Female	Married	Pune	Camp	No	No
RMH22-23/48	Mrs Priyamvada Pandey	7767905896	30 Y,11 M,22 D	Female	Married	Pune	Camp	No	No
RMH22-23/47	Mr Yogesh Thorat	9822576800	37 Y,11 M,7 D	Male	Single	Pune	Camp	No	No
RMH22-23/46	Babyof Varsha Suryawanshi	9921783082	4 D	Female	Single	Pune	Camp	No	No
RMH22-23/45	Mrs Varsha Suryawanshi	9921783082	25 Y,8 M,26 D	Female	Married	Pune	Camp	No	No
RMH22-23/44	Ms Ruhi Khan	8700522196	16 D	Female	Single	Ghaziabad	Camp	No	No
RMH22-23/43	Ms Qwe Goel Test	9999999991	26 Y,3 D	Female	Single	Pune	Camp	No	No

Figure 16: Facility portal

With help of AI healthcare, a large data pool can be generated and stored at one place. With help data digital health platform, permutations and combinations are driven enabling faster decision making. Valuable insights and knowledge can be driven from single data lake. The AI-App store allows leveraging multiple AI vendors that are best suitable to the industry. The AI- Engine has the feature of execution model that allows the user to make different executions based on the situation. The outputs generated through execution model allows the user to make informed decision. The integration of best AI- vendors is possible through AI engine. The automated responses along with overridden AI recommendations from the user's end can be procured through AI engine.

3. Challenges faced by frontline users in the use of HMIS in the hospital

The third objective of the research was to understand the challenges faced by the frontline users such as nurses, RMO, doctors, billing desk, Lab resources etc. towards the usage of HMIS in the hospital. The results are pull out based on the criteria mentioned in the methodology.

Out of the total population of 135 healthcare workers, 101 respondents were chosen as sample size. The structured questionnaire was distributed among the sample size selected. However, 95 responses were submitted. The 6 participants selected as the sample size didn't fill the informed consent and withdrew their interest from the study. Out of 95 healthcare workers 28 were the nurses, 4 Doctors, 5 Radiology users, 11 Pathology users, 11 RMO, 7 Pharmacy workers, 4 IT department, 3 billing desk, 7 Administration department, 4 Finance users, 7 Human resources. In 95 respondents, 54 were women and 38 were men. The demographic details of the respondents are mentioned in the table below.

TABLE 5: Demographic details of the respondents

Characteristics	Value	Gender	
		Male	Female
Age group (years)			
	19 and below	0	4
	20-24	9	7
	25-29	14	29
	30-34	9	5
	35- 39	4	7
	40-44	1	2
	45 and above	1	
Educational degree			
	Associate	3	1
	Bachelors	20	33
	Master	15	20
Job profile in the hospital			
	Nursing	8	20
	Doctor	3	1
	Radiology	3	2
	Pathology	4	7
	RMO	7	4
	Pharmacy	2	5
	IT Department	3	1
	Registration	2	5
	Billing Desk	2	1

	Finance	2	2
	Human Resource	1	6
	Others	1	0
Work experience in healthcare industry (in years)			
	Less than 1 year	5	9
	1-2 years	12	13
	2-4 years	11	26
	5-10 years	8	5
	Over 11 years	2	1
Experience in using HMIS			
	Less than 1 year	18	36
	1-2 years	13	13
	2-4 years	4	3
	5 years and above	3	2

Through the demographics of the respondent, it was analyzed that majority were female nurses who took part in the study. Most of the staff working at the hospital ranged between 25-29 years of age having bachelor's degree with an average of 2-4 years of experience in healthcare. The results analysis showed that majority of workers had less than 1 year of experience with HMIS and only 5 out of 95 respondents had more than 5 years of experience in HMIS. On investigation it was found that these 5 were doctors who had previously worked on HMIS in their past organizations.

The challenges faced by these frontline users were captured through the 30 close-ended questionnaire shared with them. During the analysis done, it was found that out of all the dimensions based on which the study was prepared, the most challenging dimension was human factor with a mean score of 21.99. Within this dimension of human factor, the most challenging criteria was "Lack of sufficient skill for working with computer" 4.10, whereas in the human environment, reduced communication with the patient kept the highest mean score of 3.21. In the dimension of organizational factor, lack of technical staff had been the most challenging factor with the highest mean score of 3.79. Coming to the dimension of hardware factors and system dimensions the most challenging criteria was lack of sufficient number of laptops in the hospital with a mean score of 3.81. However, if analyzed overall the lowest challenging dimension among all with least mean score was human environment with mean score of 11.53.

TABLE 6: Mean score of each criterion

Dimensions	Criteria	Mean Score	
		Male	Female
Human factor	Time consuming work with HIS	3.17	3.08
	Poor interest to work on computer	3.91	3.97
	Not many skills to work on the technology such as HMIS	4.22	3.97
	Lack of comprehensive understanding about the HMIS	4.17	3.97
	Resistance to transitioning from manual to automated processes	2.94	3.24
	Uncertainty about the system's utility	3.59	3.74
Human environment	Reduced interaction with patients	2.94	3.47
	Reduced communication with colleagues	2.26	2.32
	Colleagues' negative attitude about HIS	2.78	2.97
	Society's negative attitude regarding using HIS	2.84	3.47
Organizational factors	Clinical work pressure resulting in less time to HMIS	2.93	3.05
	Inadequate training about HIS	2.69	2.76
	Failure to entirely repair the system	3.13	3.21
	Lack of space in workplace	3.69	3.77
	Lack of frontline user contribution in the designing of HMIS	2.87	2.46
	Not in coordination with the organizational culture	2.83	2.24
	Lack of technical staff when necessary	3.87	3.71
Hardware factors and System characteristics	Network failure	3.52	3.79
	Lack of computers in hospitals	3.89	3.74
	Low speed of computer	3.69	3.67
	Legal problem issues can be raised while working on HMIS	2.80	3.03
	Loss of confidentiality of information	2.80	3.03

Thus, with the help of study it was established that the main challenges faced by the frontline users were like that pointed out by the managerial doctors during the in-depth interview. The users agreed to the fact that they lacked the sufficient skills and knowledge to run the computer. They also believed that other major challenge encountered by them was lack of sufficient computers to work on causing a delay in updating the patient data on HMIS. The hospital majorly required a technical team and setup to support the working staff as well as the hospital with HMIS.

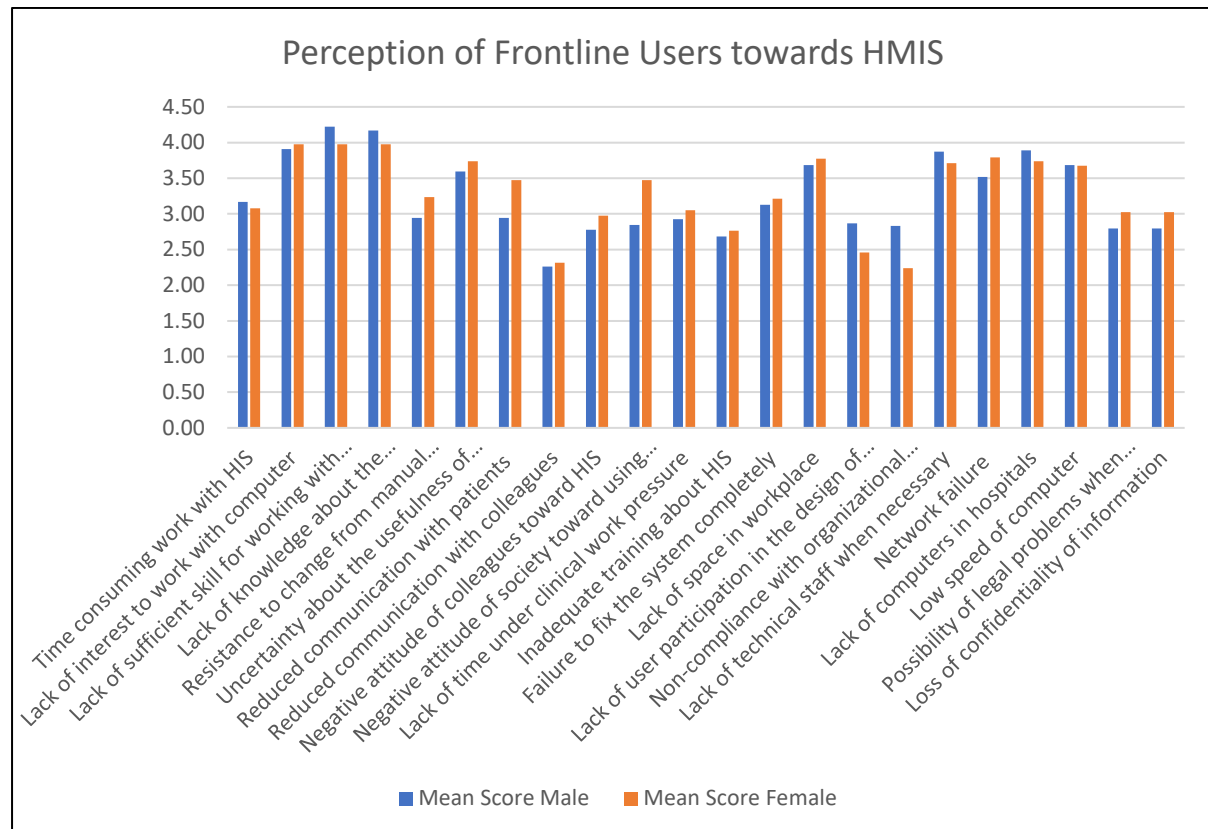


Figure 17: Perception of frontline users towards HMIS

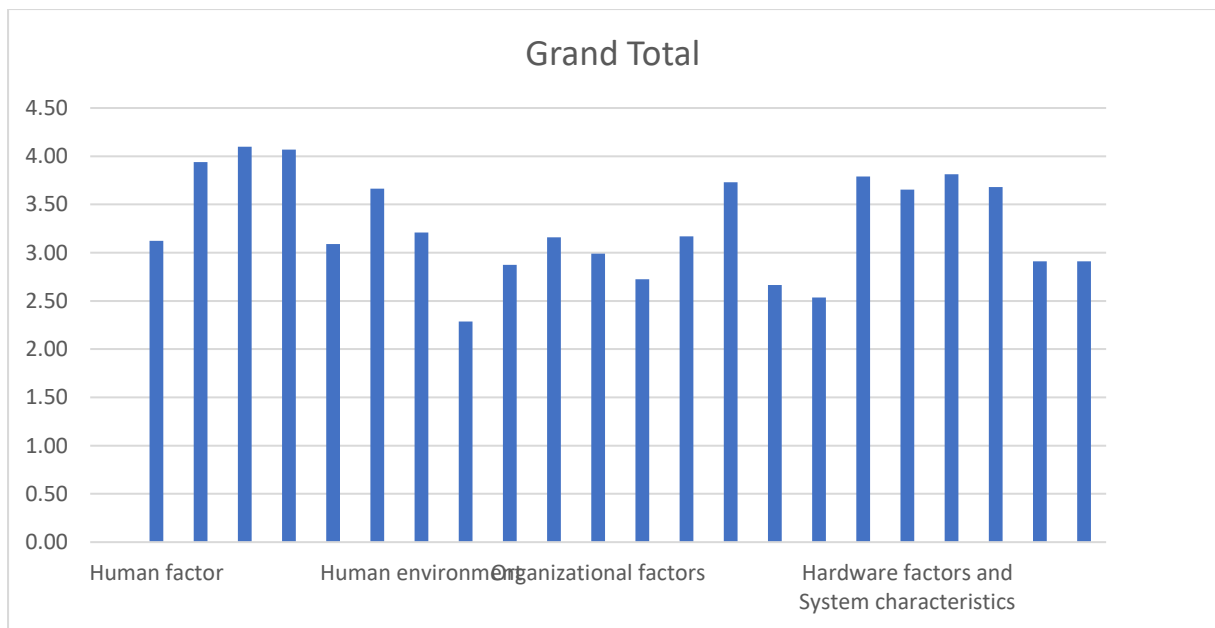


Figure 18: Each dimension considered for perception on HMIS

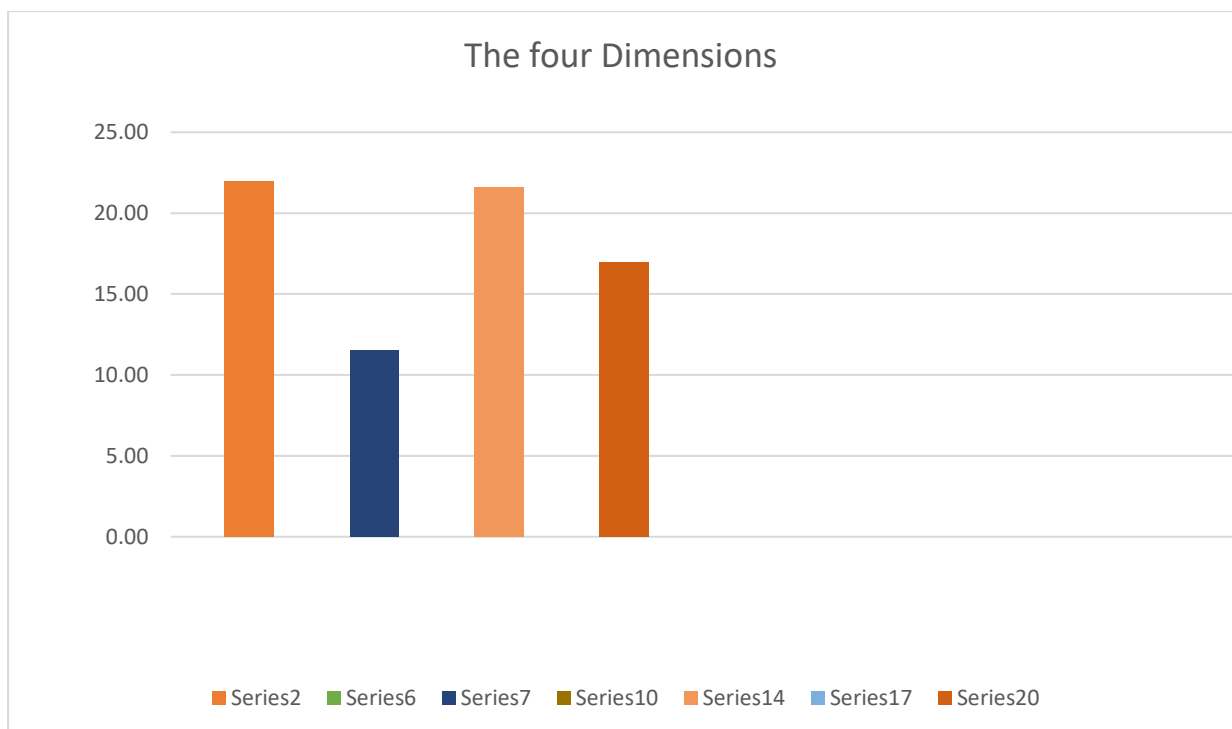


Figure 19: The highest bar of human factor and lowest of human environment

CHAPTER V

DISCUSSION

5.1 INTERPRETATION OF THE STUDY

The research has requisite the need of HMIS in the hospitals. Being a 50 bedded hospital, almost every practitioner believed that there is a need for transition from traditional manual recording of patient data to computerized data recording. As the urban areas will establish this tradition, it will become easier to implement the system in sub-urban areas, rural PHCs, CHCs and SHCs. However, the use of HMIS is still not up to the expectation due to various challenges pointed out in the research such as technical resources, hospital infrastructure, operational factors, and organizational factors.

Earlier research conducted in the urban and sub-urban areas of developed nations have brought out the challenges of accessibility of health data, quality of data collected, and incomplete data recorded in HMIS. The literature review done of recent studies exposed the challenges in implementation of HMIS due to system failure, supply, operations, and human resources. It is known that limited technical capacity is the major challenging factor in implementation of HMIS.

This study helps us determine that apart from technical infrastructure in hospital, it is necessary to have technical support and IT team in the hospital. The healthcare staff lacks the knowledge and skills to run computers and hence there is lack of commitment seen towards the implementation of HMIS. Although the earlier studies have demonstrated that the major role is played by the organization's managerial positions on the success of system however, according to the Expectancy theory, a system in any organization is successful only if the employees are motivated or they are encouraged for their performance.

There is individual level barrier in adoption of HMIS or the organizational level barrier in adoption of HMIS. The interventions required for adoption of HMIS depends on the planning policies at the organizational level and designing of the application on the individual level. High success rate of any computer aided system depends on:

- 1) The need of the technology
- 2) Whether the technology being implemented matches to the need of the user
- 3) The support of top management towards the implementation of the system.

Through this study it was noted that there is need of technology in the hospital and the HMIS implemented in the hospital matches to the need of the user. However, the support of top management towards implementation of the software lacked due to poor technical setup in the

hospital. The limited technical support, improper technical infrastructure, poor internet connectivity and coverage area of LAN network resulted in failure of HMIS.

Insufficient number of computers to record the data, no mandatory regulation from the Indian government to have HMIS in the hospitals are other major concerns pointed out with the help of the study. The study reported that trainings were being provided by the software company according to RBAC but there was no way to monitor the success rate of those trainings.

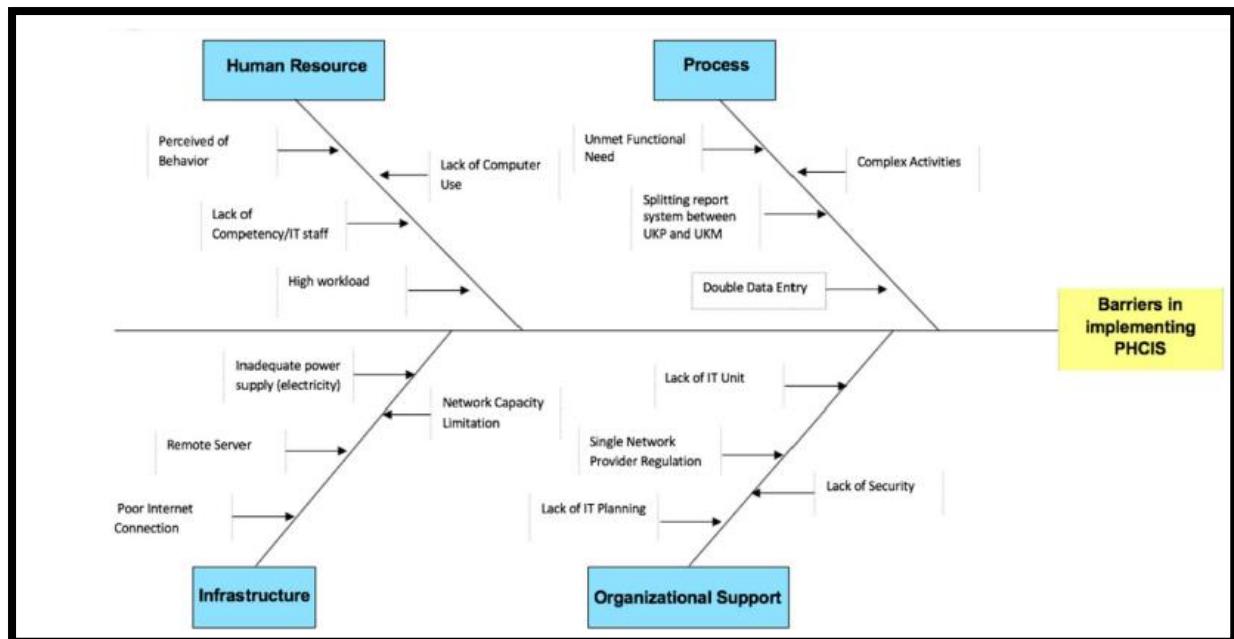


Figure 19: Barriers in implementation of HMIS

The figure mentioned above depicts similar type of barriers reported within Primary Healthcare centers in implementation of HMIS. The previous studies have shown that apart from human resources, organizational support and Infrastructure, the major concerned barrier is process which includes data entry errors, complex activities, and system not able to meet the functional needs of PHC.

However, with the help of qualitative part of this study, it was noted that the Process barrier has been successfully overcome by the Software company KareXpert. The software doesn't allow duplicate entries, each module is made to be simplistic and have training videos attached to them.

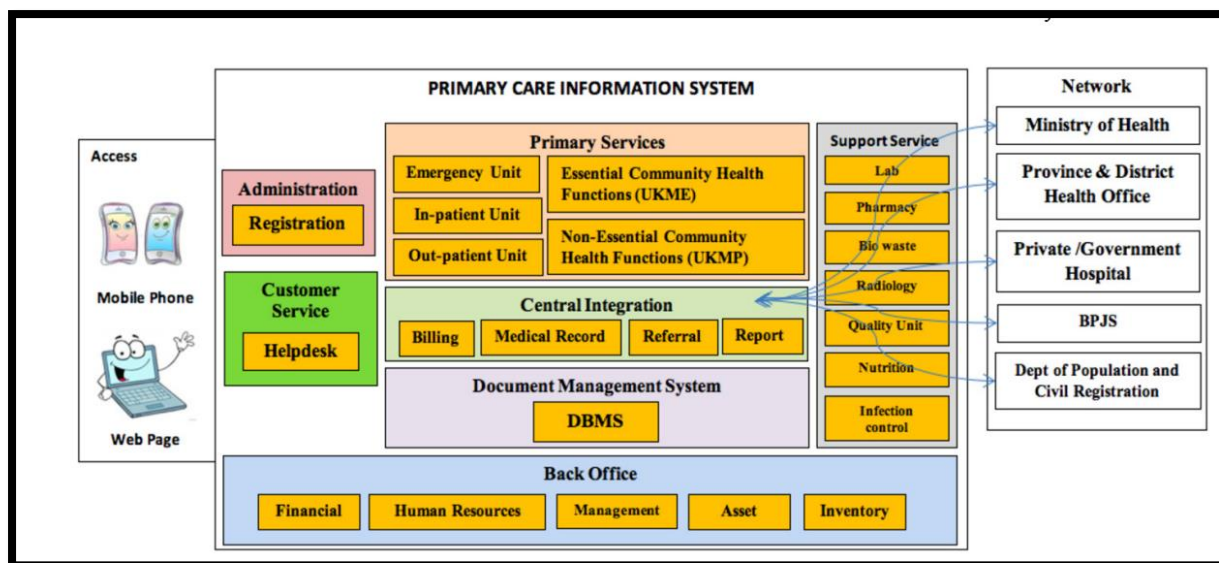


Figure 20: Architecture design for HMIS

The last objective of the study was to Investigate options for improving the utilization of the hospital information management system in both facilities.

The above figure accurately depicts the architectural design of HMIS in Primary Healthcare centers. Since our study exposed lack of IT infrastructure and incompatibility of users towards HMIS due to lack of skills and knowledge as the main hinderance, the approach for urban area private sector should be differentiated.

5.2 LIMITATIONS OF THE STUDY

- The study is covered over online platform which may result in sampling error and limitations.
- The survey is conducted on small scale and hence it is difficult to generalize the interpretations to the whole population.
- Research survey was conducted for a short period of time of about 2 months due to shorter duration of internship, a pilot test was not possible.
- There might be some bias during the administration of the questions. The respondent's reaction is probable to change with time and their need.

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

The results back up the claim that replacing the paper-based medical record benefits medical secretaries more than nurses and doctors, notwithstanding the limited scope of the basis of reference. The various outcomes among the various workforce groups highlight the necessity of a multidisciplinary approach while assessing a HIS.

A well-integrated hospital information management system can efficiently manage all the information and data requirements of any hospital, allowing it to offer patients high-quality care. With this type of technology, financial requirements are effectively controlled, and financial misconduct is significantly reduced. When it comes to patient information, disease notifications, or epidemiological data, hospital information management systems can readily offer timely, accurate, and relevant data. With the aid of the hospital information management system, patient information security can be efficiently handled.

In case of qualitative study, the major challenges revolved around four perspectives that are Human Resource, Knowledge, and Skill Set, IT infrastructure of Rising Medicare Hospital, Hospital Organizational behavior, Process of the software in the hospital. In case of quantitative study, the most common challenge revolved around human factor with lack of sufficient skills to operate on the computer and lack of knowledge to handle technology without technical support. The analysis of the study suggests that HMIS can be successfully implemented in hospitals if there is more importance given to the technical setup and proper IT infrastructure is built in the hospital. Thus, proper IT infrastructure setup in hospitals, regular trainings to strengthen the healthcare workers competency towards HMIS, greater contribution of organization support towards investment on higher quality information system, and regular feedbacks of users should be taken by the software company to upgrade the system according to the needs of the hospital. Healthcare professionals must be trained from the moment the system is implemented in order to use it effectively; otherwise, the system won't serve its intended purpose.

CHAPTER VII

REFERENCES

- [1] Mahendradhata Y, Trisnantoro L, Listyadewi S, et al. The republic of Indonesia health system review. <http://apps.who.int/iris/bitstream/10665/254716/1/9789290225164-eng.pdf>; 2017.
- [2] Menteri Kesehatan RI. Peraturan menteri kesehatan republik Indonesia nomor 46 tahun 2015 tentang akreditasi puskesmas, klinik pratama, tempat praktik mandiri dokter, dan praktek mandiri dokter gigi. Kemenkes 2015;33:3–8. <https://doi.org/10.1073/pnas.0703993104>.
- [3] Menteri Kesehatan RI. Petunjuk teknis sistem informasi kesehatan.
- [4] Yazdi-Feyzabadi V, Emami M, Mehrolhassani MH. Health information system in primary health care: the challenges and barriers from local providers' perspective of an area in Iran. *Int J Prev Med* 2015;6:57. <https://doi.org/10.4103/2008-7802>.
- [5] McGinn CA, Grenier S, Duplantie J, et al. Comparison of user groups' perspectives of barriers and facilitators to implementing electronic health records: a systematic review. *BMC Med* 2011;9:46. <https://doi.org/10.1186/1741-7015-9-46>.
- [6] J Johnson III R. A comprehensive review of an electronic health record system soon to assume market ascendancy: EPIC®. *J Health Commun* 2016;01(04). <https://doi.org/10.4172/2472-1654.100036>.
- [7] Poon EG, Jha AK, Christino M, et al. Assessing the level of healthcare information technology adoption in the United States: a snapshot. *BMC Med Inf Decis Mak* 2006;6:1. <https://doi.org/10.1186/1472-6947-6-1>.
- [8] Pusdatin. Workshop integrasi SIKDA Generik versi 1.4 dan P-care Ministry of Health <http://www.pusdatin.kemkes.go.id/article/view/17073100001/workshop-integrasi-sikda-generik-versi-1-4—p-care.html> Published 2017. Accessed February 13, 2019.
- [9] Sukums F, Mensah N, Mpembeni R, et al. Promising adoption of an electronic clinical decision support system for antenatal and intrapartum care in rural primary healthcare facilities in sub-Saharan Africa: the QUALMAT experience. *Int J Med Inform* 2015;84(9):647–57. <https://doi.org/10.1016/j.ijmedinf.2015.05.002>.

- [10] Maia JX, de Sousa LAP, Marcolino MS, et al. The impact of a clinical decision support system in diabetes primary care patients in a developing country. *Diabetes Technol Ther* 2016;18(4):258–63. <https://doi.org/10.1089/dia.2015.0253>.
- [11] Chattopadhyay S. A Framework for Studying Perceptions of Rural Healthcare Staff and Basic ICT Support for e-Health Use: an Indian Experience. *Telemed e-Health* 2010;16(1):80–8. <https://doi.org/10.1089/tmj.2009.0081>.
- [12] Yusof MM. A case study evaluation of a Critical Care Information System adoption using the socio-technical and fit approach. *Int J Med Inform* 2015;84(7):486–99. <https://doi.org/10.1016/J.IJMEDINF.2015.03.001>.
- [13] Avgar AC, Litwin AS, Pronovost PJ. Drivers and barriers in health IT adoption: a proposed framework. *Appl Clin Inf* 2012;3 (4):488–500. <https://doi.org/10.4338/ACI-2012-07-R-0029>.
- [14] WHO. Declaration of alma-ata. International conference on primary health care. Alma-Ata; 1978. p. 6–12 http://www.who.int/publications/almaata_declaration_en. Pdf Accessed May 10, 2018.
- [15] Menteri Kesehatan RI. Peraturan menteri kesehatan republik Indonesia nomor 75 tahun 2014 tentang pusat kesehatan Masyarakat. 2014. p. 1–24. <https://doi.org/10.1017/CBO9781107415324.004>. 2014.
- [16] Stevenson Rowan M, Hogg W, Huston P. Integrating public health and primary care. *Healthc Policy* 2007;3(1):e160–81 <http://www.ncbi.nlm.nih.gov/pubmed/19305749> Accessed March 21, 2018.
- [17] Claramita M, Syah NA, Ekawati FM, Hilman O, Kusnanto H. Comprehensive case study from Indonesia primary health care system (PRIMASYS). <http://apps.who.int/bookorders>; 2017 Accessed February 15, 2019.
- [18] Menteri Kesehatan RI. Peraturan menteri kesehatan republik Indonesia nomor 44 tahun 2016 tentang pedoman manajemen puskesmas. [http://kesga.kemkes.go.id/images/pedoman/PMK_No._44_ttg_Pedoman_Manajemen_Puskesmas_\(1\).pdf](http://kesga.kemkes.go.id/images/pedoman/PMK_No._44_ttg_Pedoman_Manajemen_Puskesmas_(1).pdf); 2016 Accessed February 9, 2018.

- [19] Presiden RI. Peraturan pemerintah republik Indonesia nomor 46 tahun 2014 tentang sistem informasi kesehatan. https://www.kemerkopmk.go.id/sites/default/files/produkhukum/PP_Nomor_46_Tahun-2014.pdf; 2014 Accessed February 9, 2018.
- [20] Tomasi E, Facchini L a, Maia MF. Health information technology in primary health care in developing countries: a literature review. *Bull World Health Organ* 2004;82(03):867–74. doi:/S0042-96862004001100012.
- [21] Leon N, Schneider H, Daviaud E. Applying a framework for assessing the health system challenges to scaling up mHealth in South Africa. *BMC Med Inf Decis Mak* 2012;12(1):123. <https://doi.org/10.1186/1472-6947-12-123>.
- [22] Handayani PW, Hidayanto AN, Ayuningtyas D, Budi I. Hospital information system institutionalization processes in Indonesian public, government-owned and privately owned hospitals. *Int J Med Inform* 2016;95:17–34. <https://doi.org/10.1016/J.IJMEDINF.2016.08.005>.
- [23] Dinkes Banten. Rencana strategis dinas kesehatan provinsi banten 2012-2017. https://dinkes.bantenprov.go.id/upload/article_doc/BAB_IV_B_TABEL.pdf; 2012 Accessed July 21, 2018.
- [24] Kepala Dinas Kesehatan Provinsi Banten. Rencana program dan kegiatan dinas kesehatan provinsi banten T.A. <https://slideplayer.info/slide/11937221/>; 2018 Published 2018. Accessed October 24, 2018.
- [25] Kemenkes RI. Laporan akhir riset fasilitas kesehatan 2011-puskesmas. http://kesga.kemkes.go.id/images/pedoman/RIFASKES_NASIONAL_PKM_2011.pdf; 2012 Accessed September 10, 2018.
- [26] Ash JS, Sittig DF, McMullen CK, Guappone K, Dykstra R, Carpenter J. A rapid assessment process for clinical informatics interventions. *AMIA . Annu Symp proceedings AMIA Symp*. 2008:26–30
<http://www.ncbi.nlm.nih.gov/pubmed/18999075%0A>
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC2656056>
- [27] Sargeant J. Qualitative research Part II: participants, analysis, and quality assurance. *J Grad Med Educ* 2013;4(1):1–3. <https://doi.org/10.4300/jgme-d-11-00307.1>.

28. Ducharme J. World Health Organization declares COVID-19 a “pandemic.” here is what that means. Time [Internet]. 2020 Mar 11 [cited 2021 Jun 21]; Available from: <https://time.com/5791661/who-coronavirus-pandemic-declaration/>
29. Who.int. [cited 2021 Jun 21]. Available from: <https://www.who.int/pmnch/media/news/2020/SRMNCAH.pdf>
30. Preparing your intensive care unit for the COVID-19 pandemic: practical considerations and strategies [cited 11 May 2020]; Available from <https://ccforum.biomedcentral.com/articles/10.1186/s13054-020-02916-4>
31. Grasselli G, Pesenti A, Cecconi M. Critical care utilization for the COVID-19 outbreak in Lombardy, Italy: early experience and forecast during an emergency response. JAMA. 2020. <https://doi.org/10.1001/jama.2020.4031>

APPENDIX

QUESTIONNAIRE

Q1. Name of the participant

Answer

Q2. Gender of the participant

- a) Male
- b) Female
- c) Do not wish to disclose

Q3. Age group (years)

- a) 19 and below
- b) 20-24
- c) 25-29
- d) 30-34
- e) 35- 39
- f) 40-44
- g) 45 and above

Q4. Educational degree

- a) Associate
- b) Bachelors
- c) Master

Q5. Job profile in the hospital

- a) Nursing
- b) Doctor
- c) Radiology
- d) Pathology
- e) RMO
- f) Pharmacy
- g) IT Department
- h) Registration
- i) Billing Desk
- j) Finance
- k) Human Resource

l) Others

Q6. Work experience in healthcare industry (in years)

- a) Less than 1 year
- b) 1-2 years
- c) 2-4 years
- d) 5-10 years
- e) Over 11 years

Q7. Experience in using Hospital Management Information System

- a) Less than 1 year
- b) 1-2 years
- c) 2-4 years
- d) 5 years and above

Q8. Recording and maintaining patient data on computer is time consuming

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q9. Recording computerized data is boring and should be replaced back to paper-based recording

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q10. Recording computerized patient data requires technical skills and knowledge

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q11. Training is required of each workflow before maintaining the patient data on computer

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q12. Paper based data maintenance should be used along with hospital management information system

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q13. Recording data on computer reduces interaction time with patient

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q14. Maintaining computerized data helps in easy communication with other duty healthcare workers

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q15. Handling patient data on computer overcomes the problem of illegible handwriting used by co-workers

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree

- e) Strongly agree

Q16. Computerized patient data maintenance will help the patients in easy access to their health records

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q17. Maintaining data on computer will improve the quality of care provided to patients

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q18. Recording and maintaining the data on computer is creating extra work over clinical work

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q19. Regular trainings are required to stay updated with the hospital management information system

- f) Strongly disagree
- g) Disagree
- h) Nor disagree nor agree
- i) Agree
- j) Strongly agree

Q20. Poor internet connection causes unnecessary delay in recording the computerized patient data

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree

- d) Agree
- e) Strongly agree

Q21. Limited number of computers in the hospital can be a gap to switch completely to computer-based recording data

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q22. The software lacks many features causing hinderance in switching to HMIS completely

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q22. All time electricity supply is mandatory to run the computers and work on hospital management information system

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q23. Lack of all-time IT team causes hinderance in smooth flow of software-based hospital system

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q24. There is huge dependency on IT team to run the software, due to lack of sufficient technical knowledge among users

- a) Strongly disagree

- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q25. Privacy and confidentiality of patient's information can be easily leaked with computerized patient data

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q26. Faulty human errors while recording the data are difficult to alter in computerized system

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q27. The workflows processed on the software are different from the workflows run manually

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q28. The short forms used in the software are difficult to remember by all the users

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q29. Slowness of the computer speed causes delay in recording the patient data digitally

- a) Strongly disagree

- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

Q30. Recording data on computers allows easy display of hospital statistics, thus making monthly analysis easier

- a) Strongly disagree
- b) Disagree
- c) Nor disagree nor agree
- d) Agree
- e) Strongly agree

INFROMED CONSENT

Namaste. My Name is Ayushi Goel

Contact – ayushigoel.iihmr@gmail.com, 9945059763.

Organization – IIHMR University

I am currently a student at IIHMR UNIVESITY. I am conducting a study on the perception of frontline users towards harnessing the power of digital technology. The information related to the research work will be provided to you in detail once you agree to participate in the study to bring to your notice, the participation in the study is completely voluntary and at some point, of the study if you do not wish to continue you free to withdraw from the study.

The purpose for conducting this research is to find out the challenges faced in the use of the hospital information management systems in the selected hospitals This research work will help the software companies and developers to understand the gaps and find out possible solutions to improve the use of the hospital information management system in both hospitals. There will not be any direct benefit for you, but your responses will be truly valuable for this study.

As we are focusing on the healthcare workers, the responses for the study will be interviewed to the directly. It will be a questionnaire submission which usually will take 10-15 minutes for submission

All the answers that you give will be confidential and will not be shared with anyone other than members of our survey team. During the interview if you have any doubts or need clarification of anything feel free to ask us. If you feel you are not comfortable to ask your doubts openly, you can contact the any of the team members using the contact details mentioned above and get your doubts clarified.

नमस्ते। मेरा नाम वि __Ayushi Goel

संपर्क - ayushigoel.iihmr@gmail.com, 9945059763

संगठन - आईआईएचएमआर विश्वविद्यालय

मैं वर्तमान में IIHMR UNIVESITY का छात्र हूं। मैं डिजिटल प्रौद्योगिकी की शक्ति का उपयोग करने के लिए फ्रंटलाइन उपयोगकर्ताओं की धारणा पर एक अध्ययन कर रहा हूं। एक बार जब आप अध्ययन में

भाग लेने के लिए सहमत हो जाते हैं, तो आपके ध्यान में लाने के लिए शोध कार्य से संबंधित जानकारी आपको विस्तार से प्रदान की जाएगी, अध्ययन में भाग लेना पूरी तरह से स्वैच्छिक है और किसी बिंदु पर, यदि आप नहीं चाहते हैं तो अध्ययन में भाग लेना आपको अध्ययन से हटने के लिए स्वतंत्र रूप से जारी रखें।

इस शोध को आयोजित करने का उद्देश्य चयनित अस्पतालों में अस्पताल सूचना प्रबंधन प्रणाली के उपयोग में आने वाली चुनौतियों का पता लगाना है। दोनों अस्पतालों में अस्पताल सूचना प्रबंधन प्रणाली। आपके लिए कोई प्रत्यक्ष लाभ नहीं होगा, लेकिन इस अध्ययन के लिए आपकी प्रतिक्रिया वास्तव में मूल्यवान होगी।

जैसा कि हम स्वास्थ्य कर्मियों पर ध्यान केंद्रित कर रहे हैं, अध्ययन के लिए प्रतिक्रियाओं का सीधे साक्षात्कार किया जाएगा। यह एक प्रश्नावली सबमिशन होगा जिसे जमा करने में आमतौर पर 10-15 मिनट का समय लगेगा

आपके द्वारा दिए गए सभी उत्तर गोपनीय होंगे और हमारी सर्वेक्षण टीम के सदस्यों के अलावा किसी और के साथ साझा नहीं किए जाएंगे। साक्षात्कार के दौरान यदि आपको कोई संदेह है या किसी बात के स्पष्टीकरण की आवश्यकता है तो बेझिझक हमसे पूछें। यदि आपको लगता है कि आप अपने संदेहों को खुलकर पूछने में सहज नहीं हैं, तो आप ऊपर बताए गए संपर्क विवरण का उपयोग करके टीम के किसी भी सदस्य से संपर्क कर सकते हैं और अपनी शंकाओं को दूर कर सकते हैं।?

Signature of interviewer: _____

Date: _____

साक्षात्कारकर्ता के हस्ताक्षर: _____

दिनांक: _____

Respondent Agrees to Be Interviewed 1

Respondent Does

Not Agree To Be Interviewed 2 - End



प्रतिवादी साक्षात्कार के लिए सहमत है 1

प्रतिवादी साक्षात्कार

के लिए सहमत नहीं है 2 अंत

Instructions for filling the survey

- Questionnaire Form to be filled by the parents/guardian of the child in the presence of the child.
- Kindly circle the given code for each question.
- For descriptive answers, mention the response in the space given in front of the question.