Internship Training

at

Narayana Health, Bengaluru

To study the Electronic Medical Records (EMR) implementation strategy at Narayana Health, Bangalore, Karnataka, India

by

Anamika Gandhi

PG/19/011

Under the guidance of

Dr Sumant Swain

PGDM (Hospital & Health Management)

2019-21

International Institute of Health Management Research

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New Delhi

The certificate is awarded to

Ms. Anamika Gandhi

in recognition of having successfully completed her

Internship in the department of

Electronic Medical Records, Narayana Health

and has successfully completed her Project on

To study the Electronic Medical Records (EMR) implementation strategy at Narayana Health, Bangalore, Karnataka, India.

Date: 5th June 2021

Organization: Narayana Health, Bengaluru

She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning.

We wish her all the best for future endeavors.

Ms. Sirisha Vadapalli

Training & Development **Zonal Head-Human Resources**

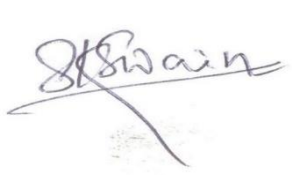
TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. Anamika Gandhi**, student of PGDM (Hospital & Health Management) from International Institute of Health Management Research, New Delhi has undergone internship training at Narayana Health, Bengaluru from 5th March 2021 to 5th June 2021.

The Candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish her all success in all her future endeavors.



Ms. Divya Aggarwal
Associate Dean, Academic and Student Affairs
IIHMR, New Delhi

Dr Sumant Swain
Assistant Professor
IIHMR, New Delhi

CERTIFICATE OF APPROVAL

The following dissertation titled **"To study the Electronic Medical Records (EMR) implementation strategy at Narayana Health, Bangalore, Karnataka, India"** at **"Narayana Health, Bengaluru"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **PGDM (Hospital & Health Management)** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

Name **Signature**

CERTIFICATE FROM DISSERTATION ADVISORY COMMITTEE

This is to certify that **Ms. Anamika Gandhi,** a graduate student of the **PGDM (Hospital & Health Management)** has worked under our guidance and supervision. She is submitting this dissertation titled "**To study the Electronic Medical Records (EMR) implementation strategy at Narayana Health, Bangalore, Karnataka, India"** at **"Narayana Health, Bengaluru**" in partial fulfillment of the requirements for the award of the **PGDM (Hospital & Health Management).**

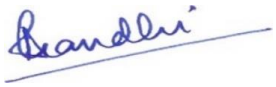
This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Institute Mentor	Organization Mentor
Dr Sumant Swain	**Mr. Kopparthi Hemasai**
Assistant Professor	Manager – EMR
IIHMR Delhi	Narayana Health, Bengaluru

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled "**To study the Electronic Medical Records (EMR) implementation strategy at Narayana Health, Bangalore, Karnataka, India**" and submitted by **Ms. Anamika Gandhi**, Enrollment No.- PG/19/011 under the supervision of **Dr Sumant Swain** for award of PGDM (Hospital & Health Management) of the Institute carried out during the period from 5th March 2021 to 5th June 2021 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.



Anamika Gandhi

Signature

FEEDBACK FORM

Name of the Student: Ms. Anamika Gandhi

Dissertation Organization: Narayana Health, Bengaluru

Area of Dissertation: Electronic Medical Records department

Attendance: 99%

Objectives achieved: To study the Electronic Medical Records (EMR) implementation strategy at Narayana Health, Bangalore, Karnataka, India.

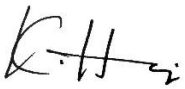
Deliverables: Studying EMR implementation (and integration with hospital operations) and understanding the perspective of various stakeholders of EMR, studying and analysing EMR usage and adoption percentage at the healthcare facility, identifying the challenges and barriers regarding implementation and EMR operations and doing a SWOT analysis for the same.

Strengths: Learning attitude, organized, focused on the agenda provided, good communication and interpersonal skills.

Suggestions for Improvement: Can focus more on understanding processes and inter departmental coordination.

Suggestions for Institute (course curriculum, industry interaction, placement, alumni): More exposure to the industry and industry experts, more hands on and practical experience to the students, industrial and organizational visits should be frequent and broad.

Signature of the Officer-in-Charge/ Organization Mentor (Dissertation)



(Mr. Kopparthi Hemasai)

Date: 5th June 2021

Place: Bangalore, Karnataka

ACKNOWLEDGEMENT

The satisfaction and euphoria that accompany the successful completion of the project would be incomplete without the mention of the people who made it possible.

I convey my sincere gratitude to my corporate guide **Mr. Kopparthi Hemasai (Manager-Electronic Medical Records)** who has kindly guided me for this project. His experience, knowledge and support led me to complete my project timely and successfully.

I also convey my sincere gratitude to my faculty mentor **Dr Sumant Swain**. Without his kind direction and proper guidance, this study would have been a little success. In every phase of the project his suggestion and guidance shaped this report to be completely perfect.

It is with deepest sense of gratitude and reverence that I express my indebtedness to **Mr. Nitin Manjunath (Facility Director, Narayana Health, Health City, Bengaluru)** who granted me to do internship at their esteemed organization.

I owe my wholehearted thanks and appreciation to the entire staff of the **Narayana Health** for their cooperation and assistance during the course of my project.

I am greatly indebted to all of them for providing their valuable guidance at all stages of the study, their advice, constructive suggestions, positive and supportive attitude, and continuous encouragement, without which it would have not been possible to complete the project.

I sincerely acknowledge my institute **IIHMR Delhi** for supporting me to experience the corporate world and work in one of the prominent hospitals.

I hope that I can build upon the experience and knowledge that I have gained and make a valuable contribution towards this industry in coming future.

Anamika Gandhi

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

1. EMR – Electronic Medical Record
2. MSMC – Mazumdar Shaw Medical Centre
3. MSCC – Mazumdar Shaw Cancer Centre
4. NICS – Narayana Institute of Cardiac Sciences
5. NH – Narayana Hrudayala, Narayana Health
6. IT – Information Technology
7. MD – Managing Director
8. CEO – Chief Executive Officer
9. COO – Chief Operating Officer
10. Dr – Doctor
11. CSR – Corporate Social Responsibility
12. NABH – National Accreditation Board for Hospitals and Healthcare Providers
13. JCI – Joint Commission International
14. NABL – National Accreditation Board for Testing and Calibration Laboratories
15. ICU – Intensive Care Unit
16. BMT – Bone Marrow Transplant
17. OT – Operation Theatre
18. PITU – Planned Investigation Treatment Unit
19. CCU – Critical Care Unit
20. ENT – Ear Nose and Throat
21. NICU – Neonatal Intensive Care Unit
22. PICU – Paediatric Intensive Care Unit
23. CABG – Coronary Artery Bypass Grafting
24. HIMS – Hospital Information Management System

25. HIS – Hospital Information System

26. OPD – Out Patient Department

27. MRN – Medical Registration Number

28. URL – Uniform Resource Locator

29. EHR – Electronic Health Record

30. ADT – Admission Discharge Transfer

31. CIMS – Clinical Information Management System

32. SNOMED CT – Systematized Nomenclature of Medicine- Clinical Terms

33. LIS – Laboratory Information System

34. RIS – Radiology Information System

ABSTRACT

Title of the study: To study the Electronic Medical Records (EMR) implementation strategy at Narayana Health, Bangalore, Karnataka, India.

Objectives: To study EMR implementation and understand the perspective of various stakeholders of EMR and to study and analyse EMR usage and adoption percentage at the healthcare facility.

Background and Rationale: EMR stands for Electronic Medical Records, which are the digital equivalent of paper records. Electronic medical records refer to the systematized collection of patient and population electronically stored health information in a digital format. EMR software help the organisations to increase their efficiency and quality of care too. It also ensures safety of patient care by increasing transparency and providing availability of all information at one place quickly. Thus, the patient too, can become more aware and be more involved in one's own healthcare process.

Methodology: The study involves a qualitative one on one interview with the physicians and other EMR users at Narayana Health, Health city, Bangalore regarding their perspective and views on the current usage of EMR software being deployed at the hospital for OPD operations. Data regarding EMR adoption and usage also to be collected for a time frame of 3 months (March-May 2021) and analysed. The study design is a descriptive study which covers a population of physicians, paramedics and other healthcare providers at the **Mazumdar Shaw Medical Centre (MSMC) unit** of Narayana Health, Health city. Convenient sampling method was applied to target 25 consultants from different clinical specialities, 10 nurses, 15 administration, i.e. EMR team members and paramedical staff, i.e., radiology and laboratory professionals, approached and invited for participation in the study. Total sample size taken to be 50.

Result: The responses were a mixture of positives and negatives. Participants found that some aspects of the EMR made them more efficient, once they had learned the system, but this happened only after an initial decrease in the efficiency. After required training and data entry, even the physicians were able to explore their administrative side.

Overall, participants expressed a lot of ambivalence about the EMR. Physicians were aware of but not well prepared for data transfer from paper to EMR charts, leading to a mismatch between expectations and reality. Participants felt that age and IT skills affected their ability to implement the EMR.

Conclusion: EMRs offer tremendous potential to improve quality, productivity, and outcomes in patient care, but they also represent one of the most significant changes healthcare organizations may undertake. A well-planned implementation with leadership support and an organized effort involving employing physician champions, efficient training, and optimization, as well as flexibility on the part of the implementation team, will make the process smoother and can reduce the impact of EMR implementation on productivity. Particular attention in training and support to specific components of the EMR system that are new or require new workflows, such as patient portals and documentation tools, will aid users and contribute to a more efficient learning process. If these elements are clearly articulated early into the process, it would definitely ease the transition that we expect from healthcare system.

INTERNSHIP REPORT

1. Introduction

History

The company was incorporated as Narayana Hrudayalaya Private Limited on July 19, 2000 at Bengaluru, Karnataka as a private limited company under the Companies Act, 1956. Narayana health formally known as Narayana Hrudayalaya is chain of multi-speciality hospital in India, with its headquarters in Bengaluru.

Dr Devi Shetty founded Narayana Hrudayalaya (NH) in the year 2000 with a 280-bed heart hospital in Bangalore.

In 2013, Narayana Hrudayalaya officially changed its identity to Narayana Health. It now operates several hospitals and heart centres across India, making it the second largest hospital network in India (based on operational bed count). Since 2014, the group operates Health City Cayman Islands in Grand Cayman. Dr Emmanuel Rupert was made the MD & Group CEO in the place of Dr Ashutosh Raghuvansha following the latter's resignation in January 2019.

At Narayana Health, 'quality' and 'lowest cost' are not mutually exclusive when it comes to healthcare delivery. In fact, Narayana hospitals are well on way to demonstrate that they are not running institution as just another number-only business, but are attractively placed to create an affordable, globally-benchmarked quality-driven healthcare services model.

Overview

Narayana Health is headquartered in Bengaluru, India, and operates a network of hospitals across the country, with a particularly strong presence in the southern state of Karnataka and eastern India, as well as an emerging presence in northern, western and central India. Their first facility was established in Bengaluru with approximately 225 operational beds and they

have since grown to 21 Hospitals + 1 Cayman Islands and 6 heart centres, 19 primary care facilities across India and an international hospital in the Cayman Islands. The group now features over 5,859 operational beds through a combination of greenfield projects and acquisitions. "Narayana Health" brand is strongly associated with the mission to deliver high-quality, affordable healthcare services to the broader population by leveraging our economies of scale, skilled doctors, and an efficient business model.

In aggregate, their centres provide advanced levels of care in over 30 specialties, including Cardiology and Cardiac Surgery, Cancer Care, Neurology and Neurosurgery, Orthopaedics, Nephrology and Urology, and Gastroenterology.

Narayana Health comprises of a dynamic, vibrant and dedicated team of medical and administrative professionals with diverse skill sets and unique talents. What galvanises them as a team is ‘a call to serve’ and their commitment to deliver high quality care.

They firmly believe in people engagement and ensure growth and fulfilment to their associates through their skill enhancement programs, Vocational and Short-Term Training programs for Doctors, Nurses and Allied healthcare professionals. There is a wealth of clinical knowledge to be gained from the experience of their senior doctors and nursing associates as well. They have a well-planned induction & new hire support program to help new associates adapt to the NH culture. They provide growth opportunities to associates by offering stretch assignments and opportunity to work in cross-functional teams. Individual & team contributions are rewarded & recognised through various awards at Group and Unit levels.

CSR Policy

NH aims to make a positive difference in the lives of the people by engaging in activities that eliminate or alleviates pain and suffering to the underprivileged sections of the society.

CSR Objectives

- Promoting healthcare facilities for the upliftment of people at large and creating a positive impact by addressing issues of accessibility and affordability.
- Promoting educational facilities to help and assist in unfolding the creative potentials and talents of the children and amateurs.
- Strive for socio-economic development thereby reducing inequality between rich and poor.

Mission

The mission of the organization is to deliver high quality, affordable healthcare services to the broader population in India. Their core values are represented by the acronym "iCare", which encompasses innovation and efficiency, Compassionate care, Accountability, Respect for all, and Excellence as a culture. At the same time, they seek to generate a strong financial performance and deliver long-term value to our shareholders through the execution of their business strategy.

Accreditation

Narayana Health adheres to national and international standards for healthcare; 19 hospitals are NABH accredited and 2 are JCI accredited (Narayana Institute of Cardiac Sciences, Bangalore- India and Health City Cayman Islands).

“Narayana Health" brand is widely recognised in India and internationally 20+ Awards and Accreditations received since 2010 Awards from respected institutions such as WHO India, Financial Times, BCG and Frost & Sullivan.

Leadership

Board of Directors

- Dr Devi Prasad Shetty - Chairman & Executive Director
- Dr Emmanuel Rupert - Managing Director and Group CEO
- Mr. Viren Shetty - Executive Director and Group COO
- Ms. Kiran Mazumdar Shaw - Non-Executive Director

Management

- Dr Emmanuel Rupert - Managing Director and Group CEO
- Mr. Viren Shetty - Executive Director and Group COO
- Mr. Kesavan Venugopalan - Group Chief Financial Officer
- Mr. Sumanta Ray - Chief Marketing Officer
- Mr. Sirshendu Mookherjee - Group Head – Human Resources
- Mr. Sridhar S - Group Company Secretary, Legal and Compliance Officer
- Mr. Kumar K V - Group Head- Information Technology
- Mr. Srikanth Raman - Head Internal Audit
- Dr Milind Inamdar - Senior Vice-President - Supply Chain
- Mr. Debangshu Sarkar - Head - Business Development & Investor Relations
- Mr. R. Venkatesh - Regional Director
- Mr. Arunesh Punetha - Regional Director
- Mr. Navneet Bali - Regional Director – North
- Mr. Joseph Pasangha - COO - Health City
- Mr. Sunil Kumar C. N - Lead - Key Transformation projects & Head-ESG
- Dr Vijay Singh - Director - Rest of Karnataka Cluster
- Mr. Hanuman Prasad - Head – Special Projects

- Ms. Rashmi Srivastava - General Manager - Group Quality and New Initiatives

Presence

The hospital chain operates one of the largest telemedicine networks in the world. Narayana Health is a chain of hospitals, heart centres and primary care facilities across India. Narayana Health has its flagship hospital at NH Health City. Narayana Health group is India's leading healthcare provider and one of the largest hospital groups in the country with a network of 21 hospitals, 6 heart centres and 19 primary care facilities. Apart from Bangalore, the group has its presence in Kolkata, Jaipur, Ahmedabad, Kanpur, Jamshedpur, Guwahati, Mumbai, Mysore, Dharwad, Kola, Shimoga, Bellary, Delhi, Durgapur, Gurugram, Jammu, Raipur and Davangere, in addition to an international subsidiary in the Cayman Islands.

2. Organization profile

Narayana Health City in Bommasandra, Bengaluru was established with the vision to make high-end quality healthcare, including tertiary care facilities affordable and accessible to all. The brainchild of Founder & Chairman, Dr Devi Prasad Shetty, Narayana Health is the second largest healthcare provider in the country in terms of operational bed count. Headquartered in Bengaluru, Narayana Health operates a chain of multi-speciality tertiary and primary healthcare facilities across a network of 21 hospitals and 6 heart centres. Narayana Health City is a one-stop healthcare destination that houses several super-speciality and tertiary care facilities.

There are two branches of NH in Bengaluru, the main branch is located at Bommasandra and the other branch is located at HSR layout. To provide affordable cardiac care to the masses, NH followed a hybrid strategy of attracting paying patients by virtue of its reputation for high quality combined with a relentless focus on lowering its costs of operation wherever possible so that a larger number of people could afford to seek treatment. The surplus gained from

paying patients was used to subsidize procedures performed at, or below, cost for patients who could not afford the full fee.

Narayana Institute of Cardiac Sciences (NICS) is a JCI and NABH accredited heart hospital located in the NH Health City, Bangalore. This super speciality flagship cardiac hospital is a part of Narayana Health. It's one of the largest hospitals in the world, equipped with 16 dedicated Cardiac Operation Theatres and 6 Digital Cath Labs of which one is a hybrid that's capable of performing both interventional cardiac procedures as well as complex heart surgeries. Narayana Institute of Cardiac Sciences is well known for performing heart surgeries on adults and children. It's also known to have the largest Paediatric cardiac ICU, comprising of 80 beds. Narayana Institute of Cardiac Sciences specialises in complex cardiac surgeries as well. Narayana Institute of Cardiac Sciences performs heart surgeries both on adults & children. This cardiac centre has dedicated critical care beds for post-operative care and performs Cath Lab procedures routinely.

Narayana Health has been at the forefront in the fight against Cardiovascular epidemic in India. The commitment of cardiologists and cardiothoracic surgeons has led to increasingly better outcomes improving the lives of thousands of patients who visit many of their hospitals every day.

Mazumdar Shaw Medical Centre (MSMC) is also an NABH accredited tertiary care hospital, at NH Health City, Bommasandra Industrial Area, Bangalore, India. The facility is owned in partnership by the Director of Biocon Limited, Kiran Mazumdar Shaw and the Founder and Chairman of the Narayana Health Group, Dr Devi Prasad Shetty.

MSMC is a multispecialty flagship hospital for cancer care, neurology, neurosurgery, nephrology, urology, gastroenterology, paediatrics, Obstetrics & Gynaecology and a host of other clinical services including a stem cell bank and one of India's largest bone marrow

transplant units. It is a preferred centre for a solid organ transplant and specializes in Liver, Kidney, and Lung transplants. A dedicated Cath lab for neuro interventions and the da Vinci Robotic Surgical system are some other prominent features. The unit accredited with NABH and NABL is also a recognized centre for training in robotic surgery.

Mazumdar Shaw Cancer Centre (MSCC) is one of Asia's largest and most advanced cancer centres with highly qualified and experienced doctors. It houses state-of-the-art technology which includes BMT and advanced therapeutics units. MSCC runs a highly successful stem cell transplant program including a high-tech stem cell research centre. It aims towards a holistic approach in combating cancer. Mazumdar Shaw Cancer Centre is one of the largest comprehensive cancer centres in India. An excellence driven centre, it offers multidisciplinary cancer care with a personalized touch to the patients from all corners of India, neighbouring countries and all parts the world. The centre has state-of-the-art equipment and facilities with a well trained and experienced team of oncologists, doctors, nurses and paramedics.

3. Services provided by the hospital

Services

- Consultation: Out-patient & In-patient
- 24/7 Emergency Services
- Pharmacy
- Blood Bank
- Ambulance Services
- NABL accredited Laboratory
- Radiology
- Cardiac Rehabilitation
- Homograft and Valve Banking

- Clinical Research
- Yoga therapy & Counselling

Facilities

- 16 Cardiac OTs
- 6 Digital Cath Labs – one being a Hybrid Cath Lab
- State-of-the-art CCU
- 80 bed PITU – One of the largest in the world
- Dialysis
- Services
- Telemedicine
- Electrophysiology Centre
- Arrhythmia Centre
- Heart Failure Clinic
- Life Style Modification Clinic
- Valve Repair
- Clinic
- Adult Congenital Heart Diseases Clinic
- Foetal Cardiac Echo

Specialities (66)

- Anaesthesia
- Blood Bank
- Bone Marrow Transplant
- Breast Cancer

- Cardiac Surgery - Adult
- Cardiology - Adult
- Clinical Nutrition & Dietetics
- Cranio-Maxillo Facial Surgery
- Critical Care
- Dental Sciences
- Dermatology and Cosmetology
- Diabetology
- E.N.T
- Electrophysiology
- Emergency Medicine
- Endocrinology
- Family Medicine
- Gastroenterology - Medical
- Gastroenterology - Surgical
- Gastrointestinal Oncology
- General Surgery
- Genetics
- Geriatrics
- Gynaecology - Oncology
- Haemato Oncology
- Haematology
- Head & Neck Surgery - Oncology
- Heart Transplant
- Infectious Diseases

- Integrative Oncology
- Internal Medicine
- Interventional Radiology
- Kidney Transplant - Adult
- Lab
- Liver Transplant & HPB Surgery
- Medical Oncology
- Microbiology
- Nephrology
- Neurology
- Neurosurgery
- NICU & PICU
- Nuclear Medicine
- Obstetrics & Gynaecology
- Oncology
- Ophthalmology
- Ortho - Oncology
- Orthopaedics
- Pain & Palliation - Oncology
- Pathology
- Physical Medicine and Rehabilitation
- Physiotherapy & Rehabilitation
- Plastic Surgery
- Psychiatry & Clinical Psychology
- Pulmonology

- Radiation Oncology
- Radiology
- Reproductive Medicine
- Rheumatology
- Robotic Surgery
- Speech and Swallow Rehabilitation
- Spine Surgery
- Surgical Oncology
- Thoracic Surgery
- Uro - Oncology
- Urology
- Vascular Surgery

Paediatric Super Specialities (20)

- Developmental Paediatrics
- Cardiac Surgery - Paediatric
- Cardiology - Paediatric
- Dental Sciences - Paediatric
- E. N. T - Paediatric
- Endocrinology - Paediatric
- Gastroenterology & Hepatology - Paediatric
- Kidney Transplant - Paediatric
- Neonatal Surgery
- Neonatology
- Nephrology - Paediatric

- Neurology - Paediatric
- Neurosurgery - Paediatric
- Liver Transplant - Paediatric
- Oncology - Paediatric
- Surgery - Paediatric
- Paediatrics
- Pulmonology - Paediatric
- Rheumatology - Paediatric
- Thoracic & Vascular Surgery - Paediatric

Procedures (9)

- Ross Procedure
- LVAD
- Dor Procedure
- Cochlear Implant
- RF Ablation
- Valve Repair
- Electrophysiology (EP) Study
- CABG
- Joint Replacement

4. Department worked for

The department worked for during the internship period is **Electronic Medical Records (EMR)** department. Various activities were carried out on a day to day basis such as handling EMR operations, interacting with physicians, coordinating with other paramedical and

administration staff, training and hand holding with respect to EMR software, coordinating with other departments for smooth functioning, EMR implementation, etc.

5. Problems and issues in the department

The wave of digitization had swept up virtually every industry, bringing both disruption and, in most cases, greater efficiency. And perhaps none of these industries was more deserving of digital liberation than medicine, where life-measuring and potentially lifesaving data was locked away in paper crypts — stack upon stack of file folders at doctors' offices across the country.

Some of the challenges and issues observed during the internship were-

- Interference with doctor-patient relationship,
- Difficulty with learning new technology,
- Lack of technical support,
- Lack of control over technology choices,
- Lack of perceived benefits from computerization.

Physicians are waiting for technology to adapt to their methods and processes rather than adapting to what others may determine to be optimum. If the physicians perceive they do not have control over the processes, or the associated costs, they will remain reluctant to adjust to a new system, regardless of the potential benefits to the larger community.

6. Observations/Learnings

Learned and understood about the EMR software being deployed at the healthcare facility, its advantages and disadvantages.

Also, conducted a study on perceptions of various EMR users at the hospital to understand their behaviour towards EMR implementation and challenges faced by them in their day to day operations at the hospital.

Various barriers were identified and a strategy was developed and implemented to overcome the same across various departments of the hospital.

EMRs offer tremendous potential to improve quality, productivity, and outcomes in patient care, but they also represent one of the most significant changes healthcare organizations may undertake. A well-planned implementation with leadership support and an organized effort involving employing physician champions, efficient training, and optimization, as well as flexibility on the part of the implementation team, will make the process smoother and can reduce the impact of EMR implementation on productivity. Particular attention in training and support to specific components of the EMR system that are new or require new workflows, such as patient portals and documentation tools, will aid users and contribute to a more efficient learning process. If these elements are clearly articulated early into the process, it would definitely ease the transition that we expect from healthcare system.

Title: To study the Electronic Medical Records (EMR) implementation strategy at Narayana Health, Bangalore, Karnataka, India.

Introduction: EMR stands for Electronic Medical Records, which are considered as the digital equivalent of paper records. Electronic medical records refer to a systematized collection of patient and population health information which are electronically stored in a digital format. They contain information such as patient details, treatment plan, medical history of the patient, etc.*("What Are Electronic Medical Records?," 2017)*

According to Lord Kelvin, "The quality of care provided to patients matters. If you cannot measure it, you cannot improve it." Computerized data entry, as a part of EMR can prove to be very helpful in overcoming the major challenges of data recording by automating data collection process, improving quality and efficiency. (*Greiver - Implementation of Electronic Medical Records and P.Pdf*, n.d.)

Information Technology has now become pervasive in our society. It has literally barged itself and integrated with most aspects of every field. Seeing the current scenario of the world, it is quite clear that humankind can no longer ignore the involvement of IT into their current operations and systems of working. It has thus become obvious that the healthcare sector too, has accepted the routine involvement of IT, since there is so much of information and communication being managed in this setting. The physicians, the patients, the medical as well as para medical personnel are now keen on integrating IT into their operations for obvious reasons.

The best part about EMR is that they are universal, meaning, that a patient can have one electronic chart instead of having different ones for different healthcare facility. The patients can have quick and easy access to their healthcare records online and thus become more involved in their own health care by exploring patient specific education resources.

EMR software help the organisations to increase their efficiency and quality of care too. Hospital settings can experience a decline in their expenditure by making the use of EMR system instead of paper records, as many published studies suggest. It also ensures safety of patient care by increasing transparency and providing availability of all information at one place quickly. Thus, the patient too, can become more aware and be more involved in one's own healthcare process.

The HIMS, i.e., Healthcare Information and Management Systems mainly focusses on health improvement through information and technology. The analytics branch of HIMS tracks the hospital and clinical practice, which is mostly related to the utilization and adoption of Electronic Medical Records (EMR). Due to the introduction of EMR software, the whole way of entering and processing patient data is being revolutionised. It is surely a huge investment but at the same time full of advantages and opportunities. Healthcare organizations must invest appropriately in technology and other related domains to so that they are able to optimize and enhance workflows. HIMS provides a roadmap and a stepwise guidance for hospitals so that they can measure their level of EMR adoption and accordingly assess its utilization at their respective facilities. These records are developed and compiled which can exist for single healthcare facility. EMRs have multiple benefits like improved way of collecting information, increased staff efficiency, better intercommunication among various departments, access to all information at one platform, reduced medical errors, improved quality of medical care and reduced costs. These systems are responsible for making patient information more accessible and secure by maintaining the privacy. The consultants can have the entire patient information at their fingertips all because of EMR software, at the same time updates can also be made available in real time giving each consultant an up to date and accurate patient file.*("Electronic Health Record," 2021)*

Background: The EMR software at Narayana Health (A Total Hospital Management Application) is a web-based hospital management and information system, designed with the help of professionals with rich experience in the healthcare industry and in-house specialists from diverse fields of medicine to provide a cost-effective solution for all types of hospitals – small, medium, and large multi-speciality hospitals. The application supports a wide range of hospital administration and management functions and provides quick access to vital information. It is scalable and configurable and offers seamless integration with various other applications. Built-in flexibility allows easy customization, and an intuitive user interface increases efficiency, productivity, and satisfaction.

EMR implementation at a healthcare facility which has multiple speciality providers and departments presents many challenges. To name a few, needs of different groups of end users need variability in training, implementation timing and planning, staffing, and logistics implementation, and staffing arrangements present planning and logistical challenges and require flexibility in the way the implementation team approaches the process. At Narayana Health, Bangalore, their inhouse application and software has been used for Hospital Information System, which helps in transforming and succeeding in value-based patient care and improving health outcomes at lower costs. The Hospital Information System (HIS) is an integrated patient management system which is focused on providing hospital information for daily operations at the facility. The system also supports various sections of hospital activities including clinical, administrative, and financial activities to have better and efficient patient care process. *(Rizer et al., 2015)*

The software consists of various modules and widgets designed with flexible functionalities to support OPD operations and patient care. Among different modules one of the essential modules is ‘Electronic Health Records’ (EHR). This module functions as a central source of

information for communication between the administration and healthcare providers, thus improving patient care.

The software URL guides the physician to the doctor's dashboard, wherein demographic details such as patient name, MRN (Unique ID for patient), age and gender of the patient, phone no., any allergies of the patient are mentioned. A provision to view the encounter details, consultation type, status, appointment date, time, patient summary is also provided. The physicians can view their patients under each category separately namely – Inpatients, Outpatients, Day-care and Emergency. The software also provides a section for admissions, referrals, and lab results separately for the ease of access to physicians.

The EHR application enables efficient management of patient data, allowing maintain accurate, complete, and up-to-date information about patients, and quickly retrieve this information, as needed, to make decisions about a patient's care and treatment. The application increases productivity, standardizes documentation, and enables enhanced patient care. There are several modules in the NH EMR software both for clinical and non-clinical purposes. To name a few, EHR, Bay management, Billing, Pharmacy, ADT (Admission, Discharge Transfer), Ambulatory, etc. are there.

EHR module features - The EHR module includes the following features:

- ***Doctor Dashboard:*** Gives an overview of the same day's outpatient appointments. Allows us to access the patients' medical records and update the charts. Provides notifications for patient referrals, admissions, and investigation reports.
- ***Consultation Notes:*** Offers an easy-to-use interface to record consultation notes. Provides multiple ways to record consultation notes. Includes an automated "Favourites" list to store the frequently used entries.

- ***Patient Charts:*** Provides quick access to a patient's clinical records and medical history. Displays the complete chart on a single screen. Allows tracking and comparing the readings over a period of time.
- ***Form Customization:*** Allows customization of a Consultation Form and specify which sections are displayed in the form.
- ***Care Team Definition:*** Allows us to define a common care team for a doctor which can be modified for individual patients, if required.

Upon starting of an encounter, the software guides the physician to patient chart, i.e., the consultation form for that specific patient. It contains the patient name, MRN, age, gender, phone no., allergies. It contains the details of the encounter along-with date, consultant name, status of consultation and consultation type. The various sections on the consultation sheet known as "Widgets" are required to be filled by the consultant depending on the history of the patient. The consultant can also view the patient summary where they can check the whole history of the patient, anything that has been entered by another consultant and investigation and radiology reports as well. The widgets are customizable and can be re-arranged according to the convenience of the consultant.

A consultation form can include the following sections (widgets) –

Admission Request	Family History	Past Medical History
Allergy	Follow-Up	Radiology Results
Attachments	General Examination	Social History
Chief Complaints & HPI	Investigation Orders	Surgical History
Cross-Consultation	Laboratory Results	Systemic Examination
Current Medications	Medication Orders	Vitals
Diagnosis	Notes	
Diagram	Other Results	

The software is also integrated with CIMS (Clinical Information Management System) Drug Interaction, where the following interactions will be alerted in the form of pop up box:

- Drug to Drug Interaction
- Drug to Allergy Interaction
- Drug to Disease Interaction
- Drug Information

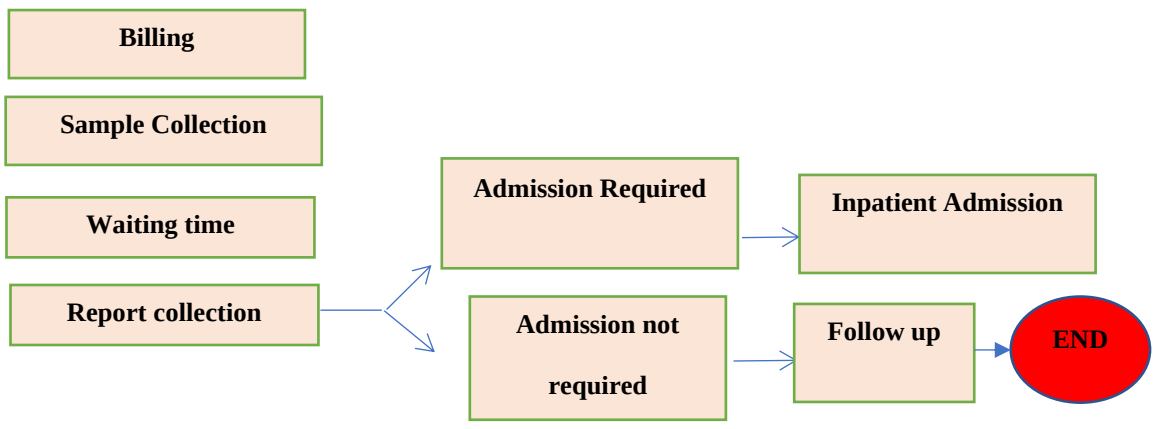
This provides essential clinical decision support to help optimize clinician's time and improve the quality of patient care.

The EHR application offers the following advantages:

- Promotes legible, complete, and up-to-date patient medical records, thereby helping reduce medical errors.
- Allows quick access to patient medical records, enabling improved diagnosis and treatment and a more coordinated and efficient care.
- Displays the complete patient chart on a single screen and allows you to compare the results over a period of time.
- Supports electronic prescriptions and investigation orders, which are automatically routed to respective pharmacies, laboratories, and imaging centres.
- Offers integration with SNOMED-CT codes.
- Provides easy access to test results and imaging reports.
- Provides an automated Favourites list to store frequently used entries.
- Performs automatic drug-to-drug and drug-to allergy interaction checking and alerts you if an unsafe combination or an allergy conflict is identified.

A basic patient flow at the hospital showing integration of EMR into the process -

EMR workflow	EMR status	Patient flow
Patient Arrival	Patient Status → Scheduled	As the patient arrives in the hospital, the first step is registration. Once the registration is done the status appears as scheduled in the EMR. Patient has an option to book online as well with the patient care application.
History recording	Patient Status → Arrived	Once the history of the patient is taken and the patient is physically present in the OPD, the status is updated to 'arrive'.
Doctors' consultation 1)Diagnosis 2)Medications 3)Investigations	Patient Status → In progress	The doctor starts the consultation for the patient and status is 'in progress'. Consultants use the EMR for diagnosis Medication order, Chief complaints and Investigation, other widgets like Advice allergy notes if needed.
Investigations	EMR Software: LIS, RIS	If patient is given any investigations, the consultant orders the same from the system. The ordered investigation is reflected in LIS and RIS as per the patient's condition. Barcode is generated. Patient has an option to pay online (patientcare application for Narayana registered patients), if want to avoid the queue.



Objective: The objectives of the study are mentioned below.

- To study EMR implementation (and integration with hospital operations) and understand the perspective of various stakeholders of EMR.
- To study and analyse EMR usage and adoption percentage at the healthcare facility.
- To identify the challenges and barriers regarding implementation and EMR operations and do a SWOT analysis for the same.

Methodology: The study involves a qualitative one on one interview with the physicians and other EMR users at Narayana Health, Health city, Bangalore regarding their perspective and views on the current usage of EMR software being deployed at the hospital for OPD operations. Data regarding EMR adoption and usage also to be collected for a time frame of 3 months (March-May) and analysed. The study design is a descriptive study which covers a population of physicians, paramedics and other healthcare providers at the **Mazumdar Shaw Medical Centre (MSMC) unit** of Narayana Health, Health city.

Convenient Sampling method was applied to target 25 consultants from different clinical specialities, 10 nurses, 15 administrative staff, i.e., EMR team members and paramedical staff, i.e., radiology and laboratory professionals, approached and invited for participation in the study. Total sample size taken to be 50. Data collection technique used was one to one interview with each participant.

The interview questions were meant to explore various barriers and facilitators in the implementation process. Basic questions presented before the participants were, “What is your general view on the concept of EMR?”, “What challenges have you faced with regard to implementing and using the EMR?” The interviews lasted for about half an hour each and all the interviews were recorded and analysed individually for better understanding of responses.

Ethical considerations: Participants were informed that their participation is voluntary and they can withdraw from the study at any point of time. The participants were not required to answer every question asked to them in the interview, they could pass the question if it seems uncomfortable to them. Also, they were informed that this data may be used for EMR study in the future. No personal or demographic information regarding any person or the organisation was disclosed in the study.

Data analysis: Thematic analysis of the data collected was done using Microsoft Excel. Various responses collected from all the participants were recorded and classified into four main categories as mentioned in the result section (psychological, behavioural, technical, and legal). Qualitative data was quantified using this method and hence, collected data was interpreted.

Result: The responses were a mixture of positives and negatives. Participants felt that once they succeed in learning the system, they were able to enhance their efficiency, but this happened only after an initial decrease in the efficiency. After required training and data entry, even the physicians were able to explore their administrative side.

Another observation made during the study was that there is an eventual benefit that decreases with increasing physician age. The transition was viewed as extremely challenging; younger colleagues have more opportunity for the initial investment in time, money and effort expended during the initial EMR implementation. As well, younger colleagues are more familiar and comfortable with the technology, new physicians, in particular, are faced with much less workload, as they do not have to input large amounts of data from old charts. Most of them even agreed that ten years from now, there will be no paper charts and records, and anyone going into practice who is not starting with EMR now would be a total mess!

Most of the physicians believed that EMR system and applications would improve the coordination and quality of patient care across the medical community. Physicians felt that implementing EMR system improved the quality of their records by digitalising them, improved their organization as well as eased the process of data hunting. Participants commented on the ability to generate reports, which was tied to their expectation that the EMR would help them provide better care.

From the responses received during the interviews, several major and minor barriers could also be identified such as level of computer literacy, amount of training, level of comfort with technology, time, etc.). Those barriers could be classified into several categories namely – psychological, behavioural, technical, legal factors.

1. **Psychological** – It can include factors like resistance to use EMR, attitude towards IT software, self-identity, technology readiness, emotional feeling regarding inability to capture individual work, lack of satisfaction, difficulty in understanding of EMR concepts, uncertainty of system, expectations and interest, level of ease in software usage, and usefulness. It focuses on understanding the factors which impact emotional feelings of EMR users. Among all the other users, shifting to a digital based medical environment straight away from their conventional paper based practice is especially challenging for the physicians. (*Najaftorkaman, Mohammadreza - 2016 - Facilitators and Barriers to User Adoption of Elec.Pdf*, n.d.)
2. **Behavioural–** It includes factors like computer literacy, facilitating conditions, acceptance and rejection of EMR system, that impact have an impact on users' automatic behaviour. The experience of EMR users in adjusting to these changes can affect their attitude toward the new technology. As they call themselves, the creatures of habit, are so much comfortable in using paper that it became difficult for them to step out of their comfort zone and accept the EMR systems into their operational use.

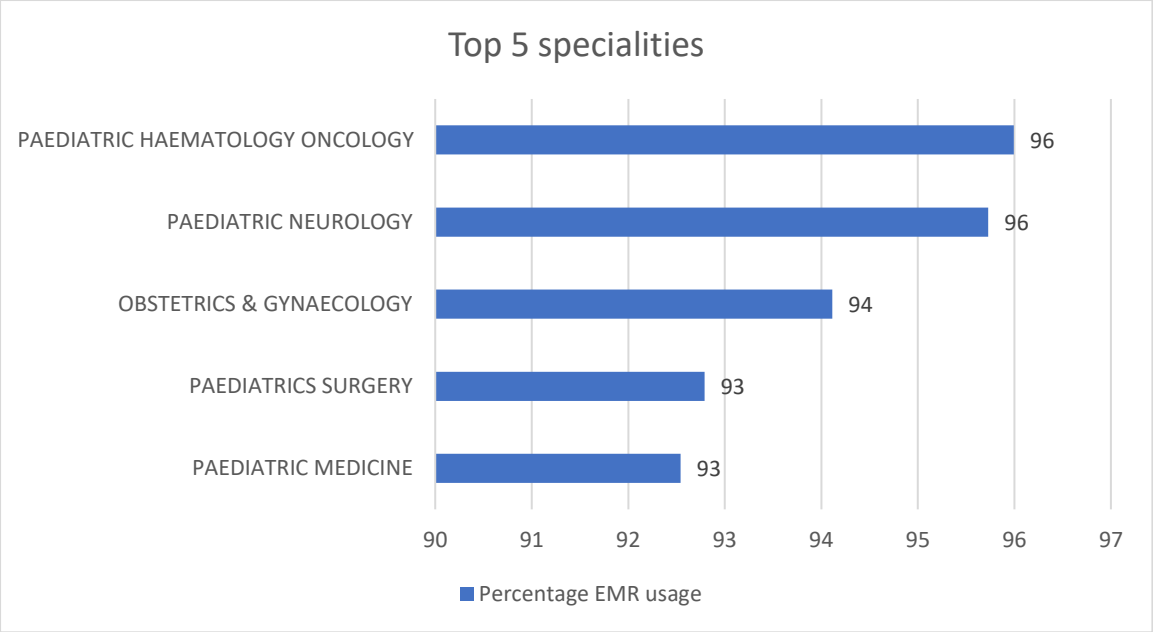
(*Najaftorkaman, Mohammadreza - 2016 - Facilitators and Barriers to User Adoption of Elec.Pdf*, n.d.)

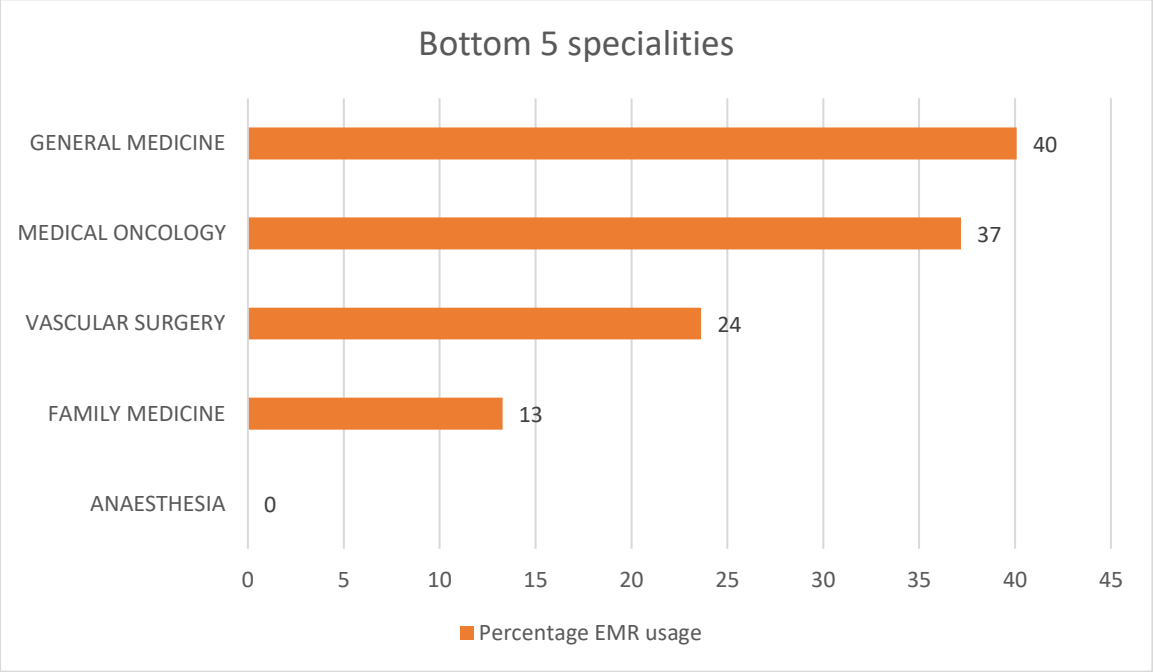
3. **Technical –** EMR systems consist of complex software. Factors like technical training, technical support, compatibility, system reliability, communication tools, system usability, implementation, etc. indicate that if the providers are not able to embrace computer technology in their workplace, the EMR adoption can be at stake and decrease eventually. (*Najaftorkaman, Mohammadreza - 2016 - Facilitators and Barriers to User Adoption of Elec.Pdf*, n.d.)
4. **Legal -** EMR system stores healthcare system's medical information which can be vulnerable in terms of confidentiality, integrity and availability. It involves multiple concerns like security and privacy, legal liability, policies and standards. Standards and regulations which are already defined, play a vital role in establishing and retaining users' trust in healthcare organization. (*Najaftorkaman, Mohammadreza - 2016 - Facilitators and Barriers to User Adoption of Elec.Pdf*, n.d.)

Overall, participants expressed a lot of ambivalence about the EMR. Physicians were aware of but not well prepared for data transfer from paper to EMR charts, leading to a mismatch between expectations and reality. Participants felt that age and IT skills affected their ability to implement the EMR.

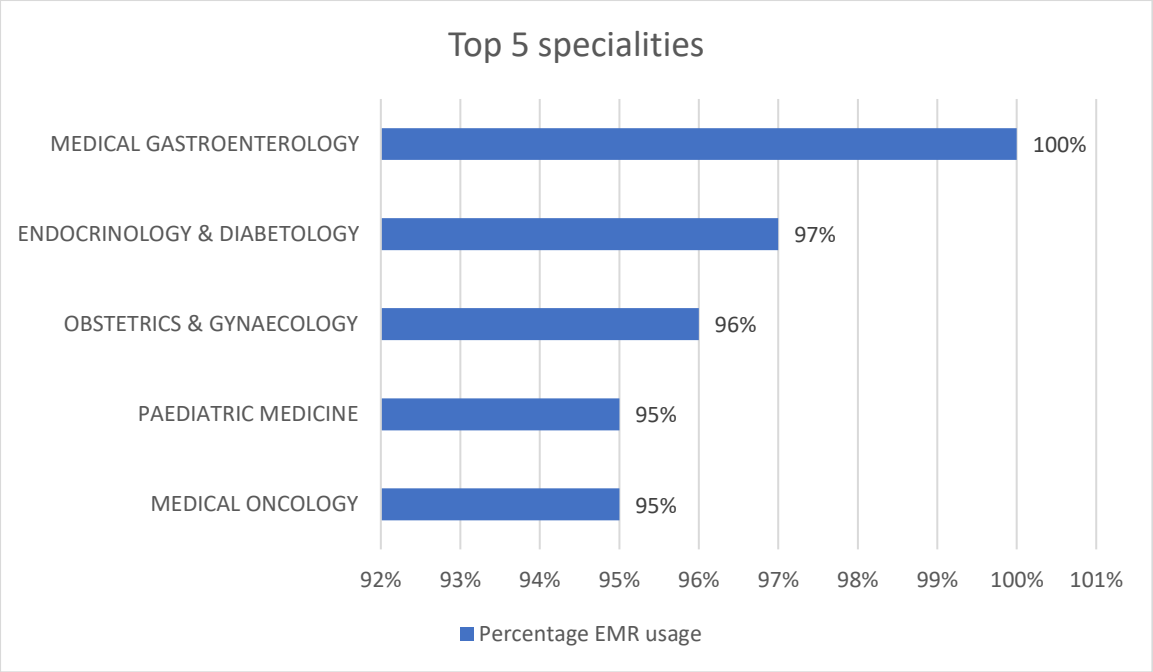
Department wise data was also collected and analysed separately for the month of March, April and May 2021.

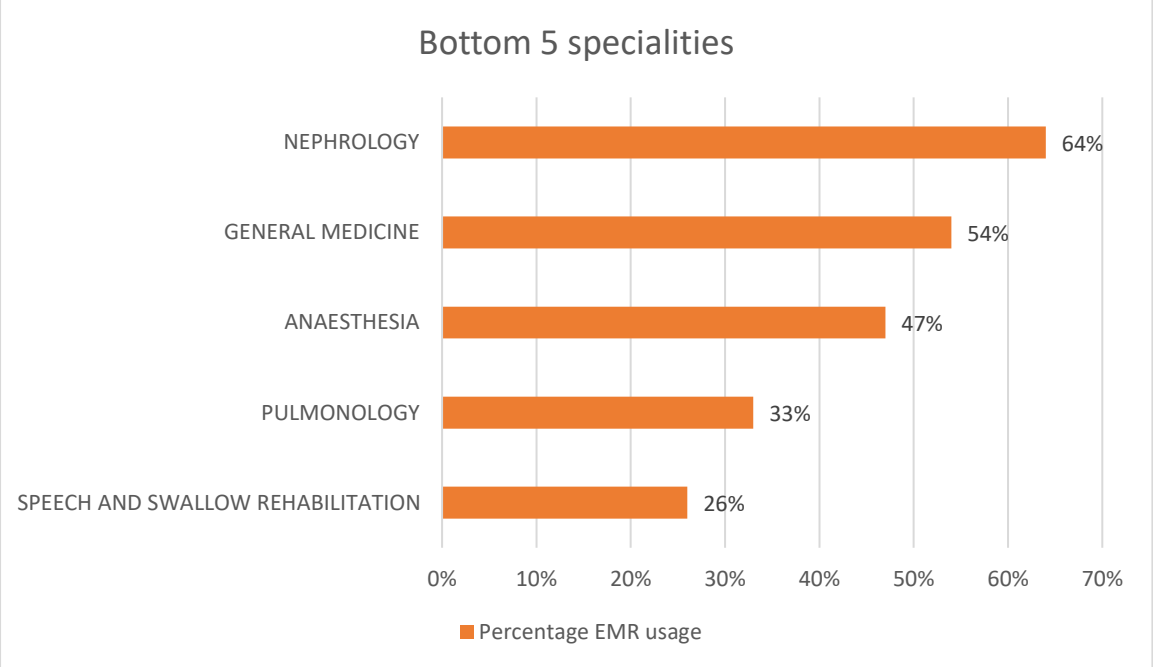
March


Top 5 specialities
PAEDIATRIC HAEMATOLOGY ONCOLOGY
96
PAEDIATRIC NEUROLOGY
96
OBSTETRICS & GYNAECOLOGY
94
PAEDIATRICS SURGERY
93
PAEDIATRIC MEDICINE
93
90
91
92
93
94
95
96
97
Percentage EMR usage

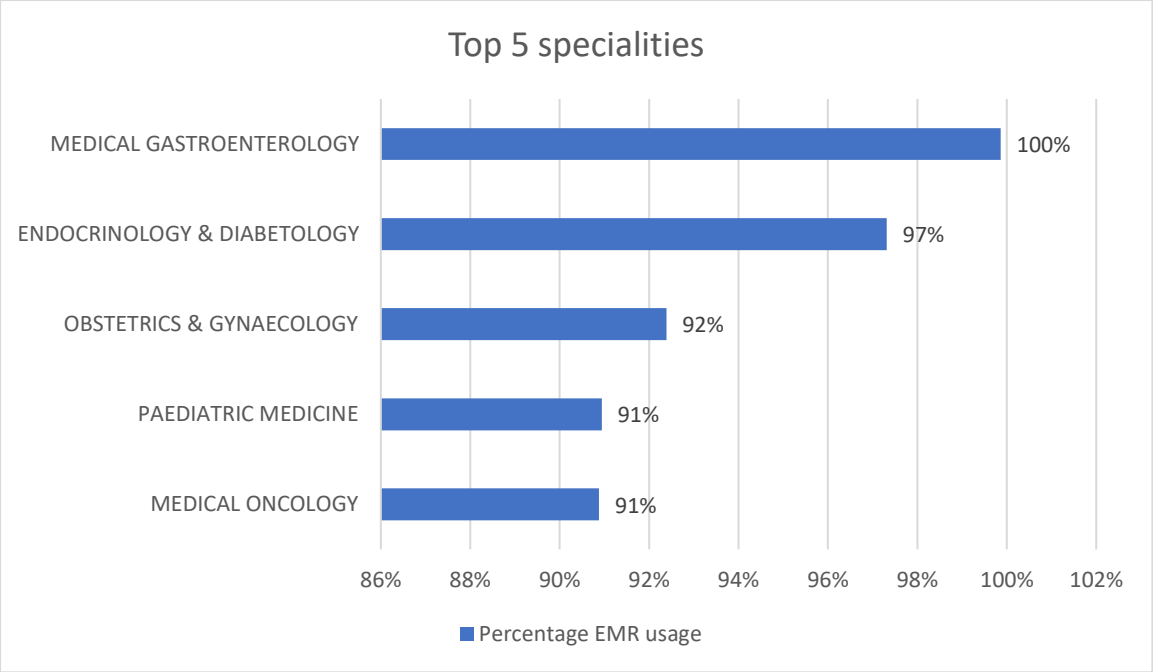

Bottom 5 specialities
GENERAL MEDICINE
40
MEDICAL ONCOLOGY
37
VASCULAR SURGERY
24
FAMILY MEDICINE
13
ANAESTHESIA
0
0
5
10
15
20
25
30
35
40
45
Percentage EMR usage

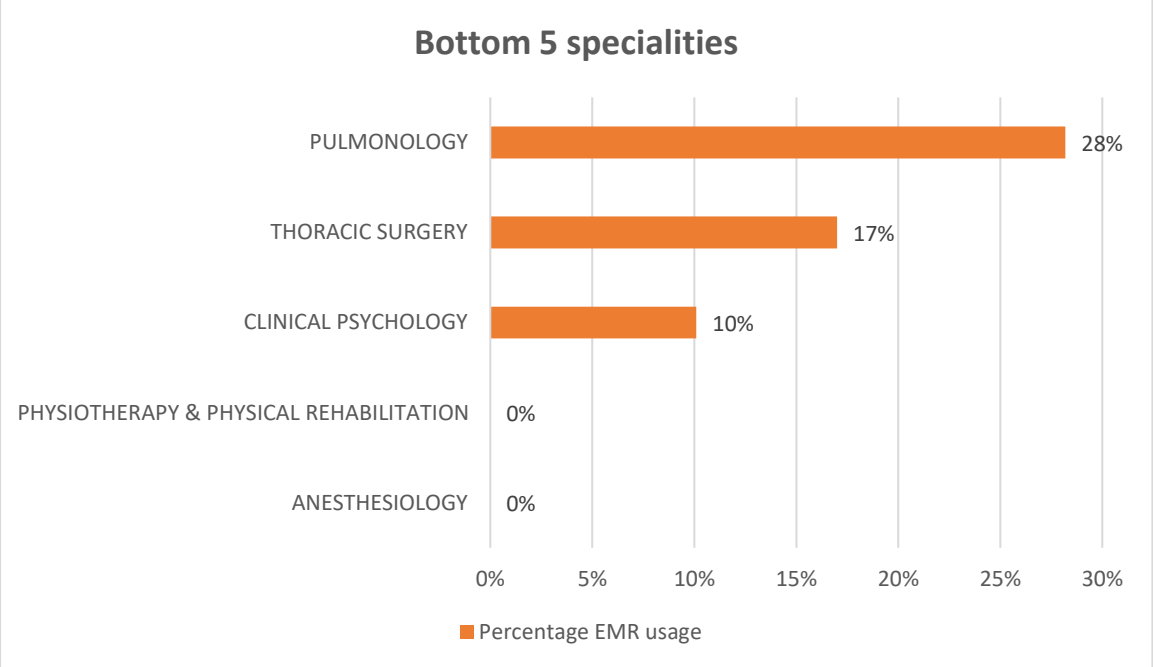
April


Top 5 specialities
MEDICAL GASTROENTEROLOGY
ENDOCRINOLOGY & DIABETOLOGY
OBSTETRICS & GYNAECOLOGY
PAEDIATRIC MEDICINE
MEDICAL ONCOLOGY
100%
97%
96%
95%
95%
92% 93% 94% 95% 96% 97% 98% 99% 100% 101%
Percentage EMR usage


Bottom 5 specialities
NEPHROLOGY
GENERAL MEDICINE
ANAESTHESIA
PULMONOLOGY
SPEECH AND SWALLOW REHABILITATION
64%
54%
47%
33%
26%
0% 10% 20% 30% 40% 50% 60% 70%
Percentage EMR usage

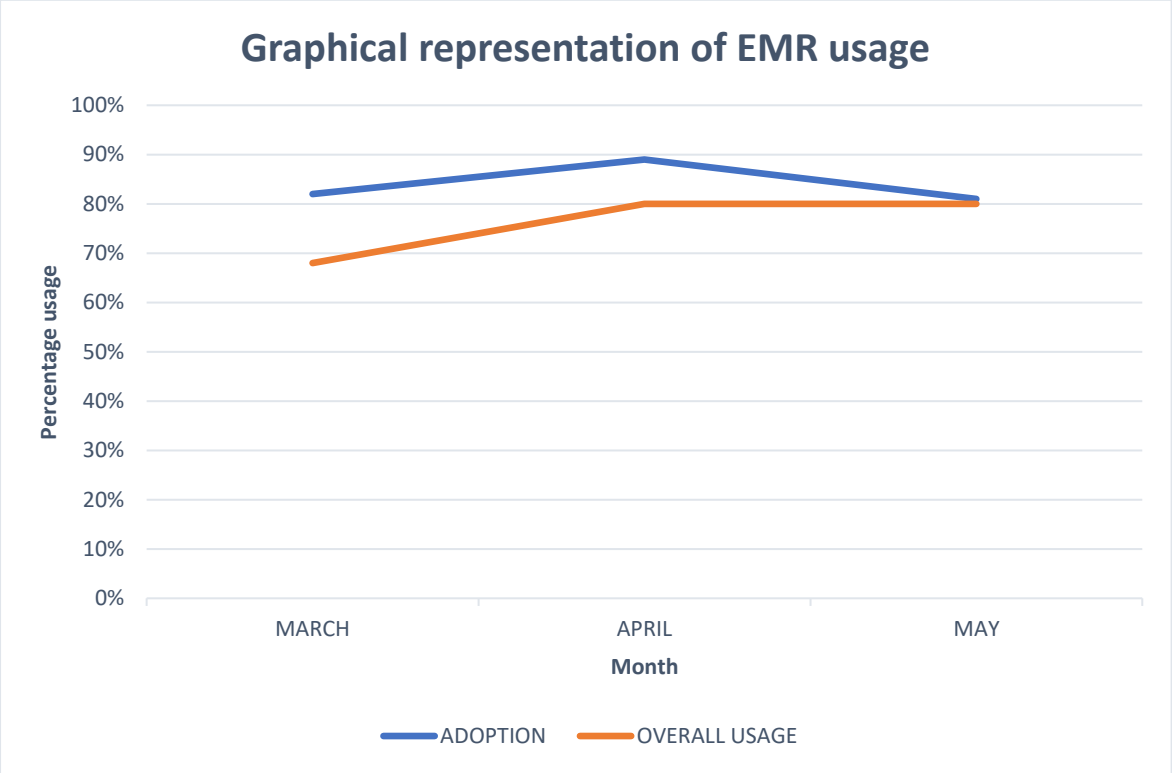
May


Top 5 specialities
MEDICAL GASTROENTEROLOGY
ENDOCRINOLOGY & DIABETOLOGY
OBSTETRICS & GYNAECOLOGY
PAEDIATRIC MEDICINE
MEDICAL ONCOLOGY
100%
97%
92%
91%
91%
86%
88%
90%
92%
94%
96%
98%
100%
102%
Percentage EMR usage


Bottom 5 specialities
PULMONOLOGY
THORACIC SURGERY
CLINICAL PSYCHOLOGY
PHYSIOTHERAPY & PHYSICAL REHABILITATION
ANESTHESIOLOGY
28%
17%
10%
0%
0%
0%
5%
10%
15%
20%
25%
30%
Percentage EMR usage

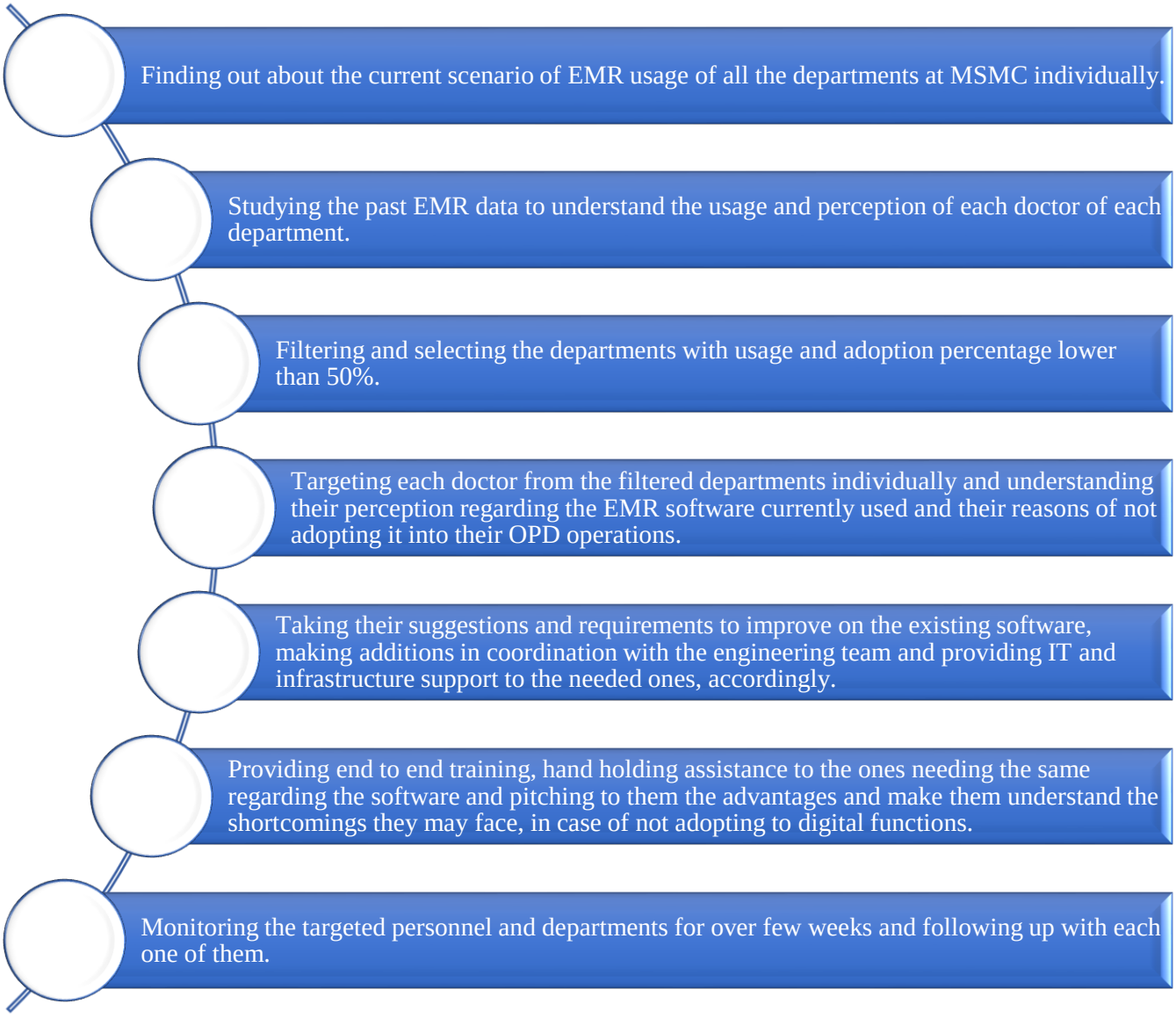
Data related to **EMR usage at Mazumdar Shaw Medical Centre (MSMC) unit**, NH Bangalore was also collected for a time frame of over 3 months, i.e., March, April and May 2021. Usage percentage growth and trend was analysed in the following way-

MONTH	OPD VOLUME	ADOPTION	OVERALL EMR USAGE
MARCH	26988	82%	68%
APRIL	20121	89%	80%
MAY	12836	81%	80%



The graphical representation of the above data clearly shows an increase in overall EMR usage and adoption percentage by the physicians at various departments at MSMC from March to April 2021, and a decrease in the adoption percentage from April to May 2021. The reasons for the same were studied and are listed below.

Activities planned and strategies carried out at individual level responsible for positive growth in EMR usage and adoption percentage –



EMR adoption percentage saw a slight decrease in the month of May 2021, the main reason for which is the pandemic Covid-19 second wave. When analysed more specifically, it was found that the two departments namely Pulmonology and General Medicine were affected the most as the physicians from these departments were engaged actively in clinical management

of Covid-19 patients. The OPD patient volume also saw a significant decline in number, whereas EMR usage percentage could be maintained the same.

Discussion: An overview and analysis of EMR system implementation in the MSMC unit of Narayana Health is presented below using SWOT analysis. *(Terry et al., n.d.) (Greiver, n.d.) (Zaheer & Sayed, 2013)*

Strengths -

- Less paper storage resulting in reduction in record-keeping efforts and thus improvement in operational efficiency.
- Data accuracy is increased as the EMR system helps in avoiding manual inputs, also making it easier to find information needed to make corrections.
- Capacity of information storage, process and retrieval is better, faster and more advanced through EMRs as compared to paper-based methods.
- EMR provides the best solutions for the analysis and review of outcomes for the patient, as it provides a flexible and customizable format in order to meet the needs of the doctors.
- Patient control, transparency, interdepartmental communication is improvised which enables the users to get a complete picture of the condition of the patient so that they can spend more time on planning the right type of care for the patient.

Weaknesses -

- Adoption costs are high initially.
- Extensive staff training programs, from all departments across the hospital, are necessarily required during EMR implementation.
- Systems complexities can pose some challenges in achieving interoperability.

- There is no single standard which can solve all the issues and challenges of interoperability as describing clinical information is a complex process.

Opportunities -

- Decline in illnesses due to a proactive healthcare practice.
- EMR usage leads to fewer loss of patient data and records, thus reducing medical errors.
- Easy and accurate access to medical information in the area of patient care, which can be used multiple times after single point entry.
- EMR can help integrate evidence-based recommendations for preventive services (such as screening exams) and patient data to identify patients in need of specific services.

Threats -

- Fear related to privacy, the consumers' data need to be legally protected any EMR can be adopted.
- Hospitals may have a resistance in adopting EMR system if patients don't feel that their privacy is safeguarded.
- Privacy regulations may also impose costs that can deter EMR adoption.
- Failed attempts in deployment and implementation could result in financial losses and also a negative sentiment toward the efforts and system as a whole.
- Implementation of EMR system can alter the workflow and workload of the healthcare facility, requiring special accommodation.

Challenges: The wave of digitization has swept away almost every industry, which has resulted in the disruption, but, in most cases, higher productivity and efficiency. The healthcare industry appeared to be most worthy for the digital release, where the life measuring data was locked up in paper crypts, stack upon stack of paper records.

Some of the issues indicated by the study data from users' point of view-

- Break in the doctor-patient relationship,
- Issues in the learning new technologies,
- Lack of technical support,
- Lack of control over the choice of technology,
- The lack of tangible benefits from digitization. *(Smith & Newell, n.d.)*

Doctors complain about strange, vague plans and the number of hours spent clicking, typing, and trying to navigate through them - more than the hours they spend with patients. Particularly the physicians have relevance for a sense of control, their medical training focuses on taking control of problematic and challenging situations, but with the actual release of current technological additions into medicine, intrusion of new tools and software, physicians sometimes feel that despite the knowledge and skills, there is so much that they are not able to control. *(Smith & Newell, n.d.) (Rizer et al., 2015)*

Conclusion: Key Benefits of Electronic Medical Record (EMR)

Benefits to Consultants-

- Instant access to patients' records, laboratory and radiology reports, etc.
- Easy cross referrals of patients to specific consultants of concerned departments.
- Eliminates manual way of gathering data, thus reducing workload of the staff and ultimately increases physicians' work efficiency and work satisfaction.
- Facilitates physicians' mobility without compromising data accessibility or security.
- Saves physicians' time by minimizing data entry through inbuilt documentation features.

Benefits to Patients-

- Significant reduction in waiting time for various processes during patient flow.
- Enhances process and services efficiency, ultimately increasing patient satisfaction.
- Significant reduction of iatrogenic incidents as allergies are permanently recorded on the patient record itself.
- No requirement of carrying huge paperwork, clinical files to the doctor each time of the visit.
- Higher patient compliance and participation in one's health care.
- Improved patient care as all the patient data is available on single platform to be viewed by the doctor or the patient himself.

Benefits to Hospitals-

- Presents hospitals as developed and technologically advanced within the health community.
- Saves valuable physical space by eliminating medical records area so that the concerned personnel can be redeployed to other areas of the hospital.
- Improvement of standards of quality to match with international standards.
- Serves a competitive advantage for hospitals in retention of physicians and other clinical staff.
- Increase in revenue and reduction in overall cost.
- Loss of medical records minimized significantly.

Way Forward: Clinical personnel, especially the physicians are in the hope that technology would adapt to their ways and processes rather than adapting to the system. Lack of control over the processes, makes them reluctant to adapt to a new system, regardless of the potential benefit to the health industry as a whole. In this scenario, mutual engagements are necessary.

EMR has a scope to evolve and at the same time the potential users synchronously need to retrain themselves to adapt and evolve together until a sweet spot is reached. To create an EMR that meets the needs of the doctors to use it, we must better understand the workflow and process of physicians, and then build software with a focus on solving real problems rather than developing a problem-solving solution. *(Rizer et al., 2015) (Najaftorkaman, Mohammadreza - 2016 - Facilitators and Barriers to User Adoption of Elec.Pdf, n.d.)*

There is a lot of work in progress to developing solutions that will help putting medicine rather than business, back in the lead of EMRs. The idea is to be in the way of documentation which is more user-friendly, and the creation of an infrastructure that provides the doctors with digital services that will help them with their medical care. Only when the EMRs become an easy-to-use and functional tool for medical doctors, they will embark on their stated goal of helping to transform the health care for the better. Ideally, EMR should combine the soul of medicine, and modern science, with the computers in a harmonious way. *(Hatton et al., 2012)*

Electronic Medical Records have the potential to provide a significant contribution to the improvement of quality, efficacy, and outcomes of patient care, while at the same time, represent one of the most significant changes in healthcare sector. A well-planned execution with the instructions, support, and well-organized forces, including effective training and optimization, as well as the flexibility of the implementation team will make the process smoother. Articulation of these elements will surely ease the transition that we all expect from our healthcare system. *(Rao et al., 2011) (Najaftorkaman, Mohammadreza - 2016 - Facilitators and Barriers to User Adoption of Elec.Pdf, n.d.)*

Bibliography:

- Electronic health record. (2021). In *Wikipedia*. https://en.wikipedia.org/w/index.php?title=Electronic_health_record&oldid=1026704253
- Greiver, M. (n.d.). *Implementation of Electronic Medical Records and Preventive Services: A Mixed Methods Study*. 144.
- *Greiver—Implementation of Electronic Medical Records and P.pdf*. (n.d.).
- Hatton, J. D., Schmidt, T. M., & Jelen, J. (2012). Adoption of Electronic Health Care Records: Physician Heuristics and Hesitancy. *Procedia Technology*, *5*, 706–715. https://doi.org/10.1016/j.protcy.2012.09.078
- *Najaftorkaman, Mohammadreza—2016—Facilitators and Barriers to User Adoption of Elec.pdf*. (n.d.).
- Rao, S. R., DesRoches, C. M., Donelan, K., Campbell, E. G., Miralles, P. D., & Jha, A. K. (2011). Electronic health records in small physician practices: Availability, use, and perceived benefits. *Journal of the American Medical Informatics Association*, *18*(3), 271–275. https://doi.org/10.1136/amiajnl-2010-000010
- Rizer, M. K., Kaufman, B., Sieck, C. J., Hefner, J. L., & McAlearney, A. S. (2015). Top 10 Lessons Learned from Electronic Medical Record Implementation in a Large Academic Medical Center. *Perspectives in Health Information Management*, *12*(Summer), 1g.
- Smith, D., & Newell, L. M. (n.d.). *A Physician's Perspective: Deploying the EMR*. 9.
- Terry, A. L., Giles, G., Brown, J. B., Thind, A., & Stewart, M. (n.d.). Adoption of Electronic Medical Records in Family Practice: The Providers' Perspective. *Family Medicine*, *41*(7), 5.
- What are Electronic Medical Records? (2017, February 16). *USF Health Online*. https://www.usfhealthonline.com/resources/key-concepts/what-are-electronic-medical-records-emr/
- Zaheer, S., & Sayed, S. A. (2013). Evaluation of EMR Implementation in a Private Hospital from User's Perspective. *GSTF International Journal of Nursing and Health Care, Volume 1 Number 1*, *1*(1). https://doi.org/10.5176/2345-718X_1.1.25