#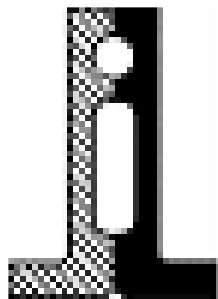 A study on estimating potential benefit of newly implemented EMR system on Healthcare delivery at a Tertiary care Hospital.

Dissertation
In
Moolchand Medcity Hospital
New Delhi

(6th February-6th May 2017)

By
DR. VIPIN PAL TOMAR

Post Graduate Diploma in Hospital and Health Management

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Delhi

2017

The certificate is awarded to

Dr. Vipin Pal Tomar

In recognition of having successfully completed his

Internship in the department of

Hospital Operations

and has successfully completed his Project on

A Study on Estimating Potential Benefit of Newly Implemented EMR System on the Healthcare Delivery at a Tertiary Care Hospital

6th February - 6th May 2017

Moolchand Medcity Hospital

New Delhi

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

We wish him all the best for future endeavours.

Training & Development   **Head-Human Resources**

Abstract

Evaluation is a challenging but necessary part of the development cycle of clinical information systems like the electronic medical records (EMR) systems in hospitals. EMR systems handle the storage, distribution and processing of information needed for health care delivery of each patient. Such systems have been described as "complex systems used in complex organizations", and their evaluation seems to follow that logic.

This study was designed to estimate the potential benefit of newly implemented EMR System on the healthcare delivery at a super speciality Tertiary care Hospital by evaluating the clinician's perspective of EMR system by utilizing task-oriented questionnaire modified for use in Moolchand Medcity Hospital and thereby providing any remedial suggestions to improve health care quality and safety. The study had an observational, cross-sectional design and was conducted over a period of 3 months in a tertiary care hospital in New Delhi. The study instrument used is reliable and validated paper based, self-administered task oriented questionnaire. [4] The task oriented questionnaire included 24 general clinical tasks essential to physicians' work. The interviews included structured questions about task relevancy, frequency and time consumption. The instrument included 3 questions pertaining to each task measuring task relevancy, frequency and time consumption for each task which were measured on a Likert scale of 1-5. The results showed that individual task 18 and 19 were the major tasks disagreed by the clinicians and hence, never performed. This study concluded that most doctors agree that most of the 24 tasks present in the questionnaire were an important part of their work as a physician/clinician and they usually performed these tasks regularly and average time taken by each doctor is in between 1-10 minutes.

Acknowledgement

At the completion of my dissertation I would like to show my sincere gratitude to the Moolchand Medcity Hospital and its staff members for providing me such an opportunity. Without their constant support and guidance it would never be a success.

I am glad to acknowledge my guide Mr. Vinay Tripathi, Assistant Professor, IIHMR Delhi, for incorporating right attitude in me towards learning and for helping and supporting whenever required. I am grateful to IIHMR Delhi for giving me an opportunity to learn administrative tricks and styles.

I wish to express my deep sense of gratitude to my mentors Mr. Anuj Khanna and Ms Prerna Negi for their constant help and cooperation, able guidance, valuable suggestions and inspiration. They were kind enough to give their valuable time from their extremely busy schedule.

I genuinely thank my parents, family and friends for their blessings and support.

Dr. Vipin Pal Tomar

(IIHMR/2015-2017)

Table of Contents

List of Figures

ABBREVIATIONS

EMR	Electronic Medical Record
PGDHM	Post Graduate Diploma in Healthcare Management
JCI	Joint Commission International
NABH	National Accreditation Board of Hospitals
NABL	National Accreditation Board for Testing and Calibration Laboratories
OPD	Outpatient Department
IPD	Inpatient Department
GDP	Gross Domestic Product
IMR	Infant Mortality Rate
NITI	National Institution for Transforming India
MMR	Maternal Mortality Rate
U-5MR	Under-5 Mortality Rate
IT	Information Technology
CDS	Clinical Decision Support
CPOE	Computerized Physician Order Entry
HIE	Health Information Exchange
MoH&FW	Ministry of Health & Family Welfare
ICT	Information and Communication Technology
EHR	Electronic Health Record

PART A

1. INTERNSHIP AT MOOLCHAND MEDCITY HOSPITAL

1.1 INTRODUCTION:

As an integral part of the curriculum, a student of PGDHM is required to undergo 3 months of practical exposure in a reputed organization by way of internship.

1.2 OBJECTIVES OF INTERNSHIP:

The student is expected to carry out the following major activities during this period:

1. To assist the Administrator/ Manager in day to day operations and during this process gain practical knowledge and skills to handle various managerial issues related to major departments in the organization. He/ she may be allocated some specific project or responsibilities by the manager.

2. The student is also required to identify a specific problem area or department for dissertation. The topic for this study will be decided in consultation with the administrator and according to the need of the organization. This activity is envisaged as a problem solving exercise by which the student is expected to:

a) Diagnose critical problems within an operational area.

b) Provide the management with a set of alternative solutions

c) If possible, design the implementation plan to carry out the most feasible solution.

With the similar objectives in mind, I joined the Operations Department, Moolchand Medcity Hospital, New Delhi.

1.3 SUMMARY OF THE JOB:

As part of internship training, I was required to work in different areas of hospital operations areas: Clinic/OPD, Floor management, Hygiene control to learn the nuances of jobs.

The following are the specific duties and responsibilities assigned to me by the organization:

- To work alongside other front line staff to ensure smooth working of processes and patient handling in floors /OPD/Emergency.
- To handle patient queries and address the same.

- Handle patient queue in OPD/Emergency and analyse ways on improving service levels and implement the same.
- Increase conversions from OPD for investigations, pharmacy.
- Ensure adherence to company processes and audit of same.

1.3.1 TASKS PERFORMED:

- Assistance in EMR implementation.
- Co-ordination with EMR implementation team to identify problem areas in EMR implementation, if any and suggest corrective actions.
- Work on EMR conversions from OPD to investigations.
- Co-ordinate with front line staff to handle all issues related to EMR.
- Co-ordinate with front line and other relevant hospital staff to handle and solve patient queries and resolve them.

The duties required me to involve in the managerial activities of the hospital and work in collaboration with the following hospital staff:
- Clinicians in all OPD
- Nursing Incharge and Nursing Assistants
- Front Office Staff
- Guest Relation Executives
- Coordinators working in association with physicians
- Laboratory Incharge and Laboratory Assistants

1.3.2 ORGANIZATIONAL PROFILE

About the hospital: Moolchand Medcity Hospital

As one of India's foremost names in healthcare, Moolchand has been setting standards for the past half century. For over five decades they have been providing healthcare services to three generations of Delhites with care and dedication.

The vision at Moolchand is to create a truly unique institution that delivers world-class healthcare with a conscience of trust. As a result Moolchand has built an outstanding legacy of touching people's lives. Millions of people owe a debt of gratitude to and share a special bond.

Many firsts in Indian healthcare have emerged out of Moolchand (e.g. first Minimal Access Surgery in India). Their commitment to redefining healthcare has resulted in Moolchand winning innumerable awards and accolades for quality and excellence over the years. As a result, patients can count on consistent and extraordinary quality. While a lot has changed, a few things haven't - compassionate care, integrity, affordable prices and trustworthy service to all.

Moolchand's legacy of philanthropic endeavors has spanned more than 80 years. Moolchand Trust was created in 1928 at Lahore, present day Pakistan and was started with an initial endowment of Rs. 4 million. The enormity of this bequest can be better understood when one considers the fact that the profits of India's largest industrial group (Tata's) was Rs. 5 million in 1947, almost 20 years after this bequest.

The values of Moolchand Trust reflected the ideals of Lala Moolchand and his son Lala Khairati Ram. Their rich spiritual legacy continues.

The burden of this enormous responsibility fell on the young (16 years old) Sardari Lal Talwar who upheld the values and aspirations of the Trust over the next 70 years. In the 1990s Suresh Talwar, Sardari Lal's son helped restructure Moolchand so that it could compete in a world of corporate healthcare.

Historically Moolchand Trust has been funded from the profits of the Moolchand Group in keeping with their philosophy of helping to create a better world. Moolchand's values and focus of helping others is a testimony to the extraordinary courage and care of its past leaders.

Vision

To be an integrated, global healthcare service provider, recognized for integrity, quality of care, service and innovation.

Mission

To consistently deliver excellent and compassionate medical care to our customers throughout their lives.

Guiding Values

- Uncompromisable ethics
- A passion for excellence
- Unmatched quality
- Dedicated to innovation
- Leverage teamwork and partnerships

- Strive for leadership and growth

- Reward merit

- Customers and partners first

- Be responsible stewards

- Treat people well

Pursuit of Excellence

Moolchand has been setting standards for excellence in healthcare for over 50 years. Moolchand is India's First Hospital to Receive JCI and Comprehensive NABH (Hospital and Blood Bank) Accreditation.

- Joint Commission International (JCI) Accreditation

Moolchand is proud to be in the league of the world's leading JCI accredited healthcare providers. JCI is the highest benchmark for quality healthcare worldwide.

- National Accreditation Board for Hospital and Healthcare Providers (NABH) Accreditation

Moolchand is the first multispecialty hospital in North India to receive this accreditation. Primarily focusing on patient care, safety, continuous quality improvement and innovation, NABH (accredited by ISQua, International Society for Quality in Health Care) has been set up to bring the world's best healthcare quality standards to India.

- NABH (Blood Bank) Accreditation

Moolchand is the first hospital in India (along with 3 others) to receive NABH for its Blood Bank. This accreditation is testimony to the fact that Moolchand Blood Bank can be counted for providing highest quality and safety to our customers.

- National Accreditation Board for Testing and Calibration Laboratories (NABL) Accreditation

Moolchand Diagnostics is accredited by NABL, India's leading accreditation body for pathology services. This reiterates Moolchand Diagnostics' position as a premier provider of pathology services in India. With a team of highly experienced and efficient staff, we provide services strictly adhering to international quality standards. Our well-organized sample management practices and state-of-the-art automated equipments ensure that our patients receive quick and accurate results.

PART B

2. DISSERTATION

A study on estimating potential benefit of newly implemented EMR system on Healthcare delivery at a Tertiary care Hospital.

2.1. INTRODUCTION

The current status of the healthcare sector in India is associated with low public spending (1% of GDP), high out-of-pocket payments (71%), a high level of anaemia among young women (56%), high infant mortality (47/1,000 live births), and high maternal mortality (212/100,000 live births), etc. The country lags behind other countries, such as Bangladesh and Sri Lanka, when it comes to the health of its people. The situation is worse for the poor as they cannot afford health-care at high rates from private sector providers, which currently serve 78% of outpatients and 60% of inpatients.[1]

According to the working paper (series 1) of the Health Division of the National Institution for Transforming India (NITI) Aayog, the infant mortality rate (IMR) and under 5 mortality rate (U-5MR) have declined during the last two decades, but the rate of decline is lower than those of neighbouring countries, such as Bangladesh, Nepal, Cambodia, among others. Similarly, the maternal mortality rate (MMR) has declined, but it is lower than those in Nepal, Vietnam, and other countries. The Human Development Index in the country has grown by 1 unit only since 2008, whereas it has grown by 4 in Nepal and 2 in Bangladesh since that time. This highlights the need for major reforms in the healthcare sector. [1]

Increasing life expectancy, improved survival in people with acute and long-term conditions and a greater array of available treatment options are combining to place an increasing burden on healthcare organisations internationally. [2]

There have been substantial developments in information technology (IT), hardware and software capabilities over recent decades and there is now considerable potential to apply these technological developments in relation to aspects of healthcare provision. [2]

Of all the health information technology (IT) in current use, the electronic medical record (EMR) has the most wide-ranging capabilities and thus the greatest potential for improving quality. Research has demonstrated that EMR offer numerous advantages over traditional paper-based systems. Through rapid information retrieval and efficient data management, EMR systems have the potential to improve the quality of patient care and to control costs. This can be achieved

through fewer adverse drug events, lower mortality and morbidity rates, seamless continuity of patient care, greater efficiencies, and lower costs. [3]

This study titled "Estimation of the potential benefit of newly implemented EMR System on the healthcare delivery by evaluating the clinician's perspective of EMR system was designed to study the potential impact of the EMR system on health care delivery by utilizing task-oriented questionnaire modified for use in Moolchand Medcity Hospital and there by providing any remedial suggestions to improve health care quality and safety.

2.2 AIMS AND OBJECTIVES

2.2.1 Aims

To estimate the potential benefit of newly implemented EMR system by evaluating the clinician's perspective of EMR system in a hospital and provide further remedial actions and suggestions to improve health care quality by using task-oriented questionnaire.

2.2.2 Objectives

- To study the benefit of EMR implementation in Moolchand Hospital.
- To study and understand the extent of compliance in EMR implementation.
- To provide suggestions and remedial actions for EMR implementation in accordance with clinician's perspective of EMR system.
- To maximize utilization of EMR system by clinicians and thereby improving health care quality and delivery.

2.3 REVIEW OF LITERATURE

Health information technology benefits both patients and providers with respect to healthcare quality. Health information technology is defined as "the application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of health care information, data, and knowledge for communication and decision making." Adapting to technological innovations represents a key process for improving and restructuring healthcare. Electronic health records (EHRs) have been touted as an essential component in the transformation of the healthcare industry. [11]

Electronic health record (EHR) systems have the potential to transform the health care system from a mostly paper-based industry to one that utilizes clinical and other pieces of information to assist providers in delivering higher quality of care to their patients. [13]

2.3.1 Electronic Medical Record: Definition and Content

Electronic health record: a longitudinal collection of patient-centric, healthcare information, available across providers, care settings, and time. It is a central component of an integrated health information system. [Source: US Institute of Standards & Technology. http://www.itl.nist.gov/div897/docs/EHR.html] [2]

Electronic health record: the concept of a longitudinal record of a patient's health and healthcare to combine information from primary healthcare with periodic care from other institutions [Source: UK Department of Health. http://www.dh.gov.uk/Home/fs/en] [2]

EHRs are defined as "a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting. Included in this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data, and radiology reports." [13]

EHR systems can include many potential capabilities, but three particular functionalities hold great promise in improving the quality of care and reducing costs at the health care system level: clinical decision support (CDS) tools, computerized physician order entry (CPOE) systems, and health information exchange (HIE). [13]

A CDS system is one that assists the provider in making decisions with regard to patient care. Some functionalities of a CDS system include providing the latest information about a drug, cross-referencing a patient allergy to a medication, and alerts for drug interactions and other

potential patient issues that are flagged by the computer. With the continuous growth of medical knowledge, each of these functionalities provides a means for care to be delivered in a much safer and more efficient manner. As more and more CDS systems are used, one can expect certain medical errors to be averted and that, overall, the patient will receive more efficient and safe care. [13]

CPOE systems allow providers to enter orders (eg, for drugs, laboratory tests, radiology, physical therapy) into a computer rather than doing so on paper. Computerization of this process eliminates potentially dangerous medical errors caused by poor penmanship of physicians. It also makes the ordering process more efficient because nursing and pharmacy staffs do not need to seek clarification or to solicit missing information from illegible or incomplete orders. Using a CPOE system, especially when it is linked to a CDS, can result in improved efficiency and effectiveness of care. [13]

Once health data are available electronically to providers, EHRs facilitate the sharing of patient information through HIE. HIE is the process of sharing patient-level electronic health information between different organizations and can create many efficiencies in the delivery of health care. By allowing for the secure and potentially real-time sharing of patient information, HIE can reduce costly redundant tests that are ordered because one provider does not have access to the clinical information stored at another provider's location. Patients typically have data stored in a variety of locations where they receive care. This can include their primary care physician's office, as well as other physician specialists, one or more pharmacies, and other locations, such as hospitals and emergency departments. Over a lifetime, much data accumulates at a variety of different places, all of which are stored in silos. Historically, providers rely on faxing or mailing each other pertinent information, which makes it difficult to access in "real time" when and where it is needed. HIE facilitates the exchange of this information via EHRs, which can result in much more cost-effective and higher-quality care. [13]

In September 2013 the Ministry of Health & Family Welfare (MoH&FW) notified the Electronic Health Record (EHR) Standards for India. The set of standards given therein were chosen from the best available and used standards applicable to Electronic Health Records from around the world keeping in view their suitability and applicability in India. [15]

2.3.2 Need for Electronic Health Record

For a health record of an individual to be clinically meaningful it needs to be from conception or birth, at the very least. As one progresses through one's life, every record of every clinical encounter represents a health-related event in one's life. Each of these records may be

insignificant or significant depending on the current problems that the person is suffering from. Thus, it becomes imperative that these records be available, arranged, and be clinically relevant to provide a summary of the various clinical events in the life of a person.

Without standards, a lifelong medical record is simply not possible, as different records from different sources spread across ~80+ years potentially needs to be brought meaningfully together. To achieve this, a set of pre-defined standards for information capture, storage, retrieval, exchange, and analytics that includes images, clinical codes and data is imperative.

The goals of standards in electronic health record systems are:

- Promote interoperability and where necessary be specific about certain content exchange and vocabulary standards to establish a path forward toward semantic interoperability.
- Support the evolution and timely maintenance of adopted standards
- Promote technical innovation using adopted standards
- Encourage participation and adoption by all vendors and stakeholders
- Keep implementation costs as low as reasonably possible
- Consider best practices, experiences, policies and frameworks
- To the extent possible, adopt standards that are modular and not interdependent.

2.3.3 Previous Studies

Sunil Kumar Srivastava (2016)[1] conducted a study whose objective was to develop a roadmap for India for the adoption of Electronic Health Record (EHR) systems based an analysis of the strategies of other countries and national scenarios of ICT use in India. The strategies for adoption of EHR in other countries were analysed to find the crucial steps taken. Apart from reports collected from stake-holders in the country, the study relied on the experience of the author in handling several e-health projects. This study concluded that there are four major areas where the countries considered have made substantial efforts: ICT infrastructure, Policy & regulations, Standards & interoperability, and Research, development & education. A set of crucial activities were identified in each area. Based on the analysis, a roadmap is suggested which includes the creation of a secure health network; health information exchange; and the use of open-source software, a national health policy, privacy laws, an agency for health IT standards, R&D, human resource development.

Josip Car et. al. (March 2008)[2] produced a systematic overview of the literature examining the effectiveness of IT (eHealth) applications to improve the quality and safety of healthcare. Their

work made four main methodological contributions to field, namely development of a very comprehensive search strategy for identifying high quality primary and secondary literature investigating the impact of eHealth on the quality and safety of healthcare ; development of integrated conceptual maps of eHealth, quality and safety, which have, as demonstrated in this project, the ability to draw attention to the major potential benefits associated with use of different eHealth application; development of a tool for critically appraising systematic of eHealth applications based on internationally agreed approaches and development of a framework with which to consider the planned implementation of eHealth innovations into complex health service organisations.

Moustafa M M Nour El Din (2007)[3] conducted a study which aimed at investigating the usefulness of an electronic medical record (EMR) system implemented at a large teaching hospital in the Eastern province of Saudi Arabia. Demographic data, data about physician computer background and experience, level of use of core EMR system functions and physician satisfaction with EMR functions were collected from physicians employed at the target hospital for more than one year (n=142). Results revealed that high percentage of physicians were dissatisfied with EMR system ability to add content, to send messages, to access reference materials and to get timely IT support. Over 75% of physicians indicated positive impact of EMR on work and quality of care. It was concluded that the benefits of the EMR are not fully achieved at the study hospital as many core functions are either unknown or never used by physicians. Improvement of the current EMR training and improvement of key identified aspects of the EMR system are likely to improve physicians' use of the system.

Hallvard Lærum and Arild Faxvaag (2004)[4] developed a task-oriented questionnaire for evaluating EMR systems from the clinician's perspective. The key feature of the questionnaire is a list of 24 general clinical tasks. It is applicable to physicians of most specialties and covers essential parts of their information-oriented work. The task list appears in two separate sections, about EMR use and task performance using the EMR, respectively. By combining these sections, the evaluator may estimate the potential impact of the EMR system on health care delivery. The results may also be compared across time, site or vendor. This paper described the development, performance and validation of the questionnaire. It concluded that this questionnaire is relevant for clinical work and EMR systems, provides reliable and interpretable results, and may be used as part of any evaluation effort involving the clinician's perspective of an EMR system.

Albert Boonstra et. al (2014)[5] systematically reviewed Electronic Health Records (EHR) implementation in hospitals and identified generally applicable findings and lessons for implementers. A systematic literature review of empirical research on EHR implementation was

conducted. Databases used included Web of Knowledge, EBSCO, and Cochrane Library. Relevant references in the selected articles were also analysed. Search terms included Electronic Health Record (and synonyms), implementation, and hospital (and synonyms). Articles had to meet the following requirements: (1) written in English, (2) full text available online, (3) based on primary empirical data, (4) focused on hospital-wide EHR implementation, and (5) satisfying established quality criteria. Of the 364 initially identified articles, this study analysed the 21 articles that met the requirements. From these articles, 19 interventions were identified that are generally applicable and these were placed in a framework consisting of the following three interacting dimensions: (1) EHR context, (2) EHR content, and (3) EHR implementation process. Although EHR systems are anticipated as having positive effects on the performance of hospitals, their implementation is a complex undertaking. This systematic review reveals reasons for this complexity and presents a framework of 19 interventions that can help overcome typical problems in EHR implementation. This framework can function as a reference for implementers in developing effective EHR implementation strategies for hospitals.

Hana Alharthi et. al (2014)[6] measured physician satisfaction with a recently introduced electronic medical record (EMR) system and determined which of the individual attributes of EMR were related to physician satisfaction. One year after introduction of an EMR system, physicians in an inpatient department were asked to answer a self-administered survey. Pearson's correlation coefficient was used to determine which attributes were significantly related to overall satisfaction with the system. Linear regression analysis was then performed to examine the as-association between the three main domains of the questionnaire and overall satisfaction with the system, with adjustment for physician demographic characteristics. A total of 115 physicians answered the survey. Only 40% were satisfied with the system overall. The best predictors of overall satisfaction were performance in the form of speed, integration with workflow, and patient information, such as accuracy, completeness and timeliness. Physicians were generally not satisfied with the system. Continued evaluation of such systems and feedback from users should guide future selection and implementation.

Hallvard Lærum et. al (2001)[7] conducted a cross sectional questionnaire based survey to compare the use of three electronic medical records systems by doctors in Norwegian hospitals for general clinical tasks. Semistructured telephone interviews with key staff in information technology in each hospital for details of local implementation of the systems were performed. 32 hospital units in 19 Norwegian hospitals with electronic medical records systems were studied. 227 (72%) of 314 hospital doctors responded, equally distributed between the three electronic medical records systems. Proportion of respondents who used the electronic system, calculated for each of 23

tasks; difference in proportions of users of different systems when functionality of systems was similar. Most tasks listed in the questionnaire (15/23) were generally covered with implemented functions in the electronic medical records systems. However, the systems were used for only 2-7 of the tasks, mainly associated with reading patient data. Respondents showed significant differences in frequency of use of the different systems for four tasks for which the systems offered equivalent functionality. The respondents scored highly in computer literacy (72.2/100), and computer use showed no correlation with respondents' age, sex, or work position. User satisfaction scores were generally positive (67.2/100), with some difference between the systems. It was concluded that doctors used electronic medical records systems for far fewer tasks than the systems supported.

Ann Robertson et. al (2010)[8] described and evaluated the implementation and adoption of detailed electronic health records in secondary care in England and thereby provided early feedback for the ongoing local and national rollout of the NHS Care Records Service. A mixed method, longitudinal, multisite, socio-technical case study was conducted in five NHS acute hospital and mental health trusts that have been the focus of early implementation efforts and at which interim data collection and analysis are complete. Dataset for the evaluation consists of semi-structured interviews, documents and field notes, observations, and quantitative data. Qualitative data were analysed thematically with a socio-technical coding matrix, combined with additional themes that emerged from the data. It concluded that experiences from the early implementation sites, which have received considerable attention, financial investment and support, indicate that delivering improved healthcare through nationwide electronic health records will be a long, complex, and iterative process requiring flexibility and local adaptability both with respect to the systems and the implementation strategy. The more tailored, responsive approach that is emerging is becoming better aligned with NHS organisations' perceived needs and is, if pursued, likely to deliver clinically useful electronic health record systems.

Aziz Sheikh et. al (2011)[9] evaluated the implementation and adoption of the NHS detailed care records service in "early adopter" hospitals in England by theoretically informed, longitudinal qualitative evaluation based on case studies in 12 "early adopter" NHS acute hospitals and specialist care settings studied over two and a half years. Data were collected through in depth interviews, observations, and relevant documents relating directly to case study sites and to wider national developments that were perceived to impact on the implementation strategy. Data were thematically analysed, initially within and then across cases. The dataset consisted of 431 semistructured interviews with key stakeholders, including hospital staff, developers, and governmental stakeholders; 590 hours of observations of strategic meetings and use of the

software in context; 334 sets of notes from observations, researchers' field notes, and notes from national conferences; 809 NHS documents; and 58 regional and national documents. It concluded that implementation of the NHS Care Records Service in "early adopter" sites proved time consuming and challenging, with as yet limited discernible benefits for clinicians and no clear advantages for patients. Although their results might not be directly transferable to later adopting sites because the functionalities they evaluated were new and untried in the English context, they shed light on the processes involved in implementing major new systems. The move to increased local decision making that is advocated based on their interim analysis has been pursued and welcomed by the NHS, but it is important that policymakers do not lose sight of the overall goal of an integrated interoperable solution.

Ashish K. Jha et. al (2009)[10] studied Use of Electronic Health Records in U.S. Hospitals by surveying all acute care hospitals that were members of the American Hospital Association for the presence of specific electronic-record functionalities. Using a definition of electronic health records based on expert consensus, they determined the proportion of hospitals that had such systems in their clinical areas. They also examined the relationship of adoption of electronic health records to specific hospital characteristics and factors that were reported to be barriers to or facilitators of adoption. On the basis of responses from 63.1% of hospitals surveyed, only 1.5% of U.S. hospitals have a comprehensive electronic-records system (i.e., present in all clinical units), and an additional 7.6% have a basic system (i.e., present in at least one clinical unit). Computerized provider-order entry for medications has been implemented in only 17% of hospitals. Larger hospitals, those located in urban areas, and teaching hospitals were more likely to have electronic-records systems. Respondents cited capital requirements and high maintenance costs as the primary barriers to implementation, although hospitals with electronic-records systems were less likely to cite these barriers than hospitals without such systems. The very low levels of adoption of electronic health records in U.S. hospitals suggest that policymakers face substantial obstacles to the achievement of health care performance goals that depend on health information technology. A policy strategy focused on financial support, interoperability, and training of technical support staff may be necessary to spur adoption of electronic-records systems in U.S. hospitals.

Azza El.Mahalli (2015)[11] assessed the adoption and barriers to the use of an EHR system by nurses at three governmental hospitals implementing the same EHR software and functionalities in Eastern Province, Saudi Arabia. The study was a cross-sectional, paper-based questionnaire study. SPSS version 20 was used for data entry and analysis, and descriptive statistics were calculated. The study found underutilization of almost all functionalities among all hospitals and

no utilization of any communication tools with patients. In addition, there were no instances of "allowing patients to use the Internet to access parts of their health records." The most frequently cited barrier among all hospitals was "loss of access to medical records transiently if computer crashes or power fails" (88.6 percent). This was followed by "lack of continuous training/ support from information technology staff in hospital" (85.9 percent), "additional time required for data entry" (84.9 percent), and "system hanging up problem" (83.8 percent). Complexity of technology (81.6 percent) and lack of system customizability (81.1 percent) were also frequently reported problems. The formation of an EHR committee to discuss problems with the system in Saudi hospitals was recommended.

Kristiina Hayrinen et. al (2008)[12] systematically reviewed literature for literature on electronic health record (EHR) systems. The aim was to find out (1) how electronic health records are defined, (2) how the structure of these records is described, (3) in what contexts EHRs are used, (4) who has access to EHRs, (5) which data components of the EHRs are used and studied, (6) what is the purpose of research in this field, (7) what methods of data collection have been used in the studies reviewed and (8) what are the results of these studies. A literature search was conducted on four electronic databases: PubMed/Medline, Cinalh, Eval and Cochrane. The concept of EHR comprised a wide range of information systems, from files compiled in single departments to longitudinal collections of patient data. Only very few papers offered descriptions of the structure of EHRs or the terminologies used. EHRs were used in primary, secondary and tertiary care. Data were recorded in EHRs by different groups of health care professionals. Secretarial staff also recorded data from dictation or nurses or physicians manual notes. Some information was also recorded by patients themselves; this information is validated by physicians. It was important that the needs and requirements of different users were taken into account in the future development of information systems. Several data components were documented in EHRs: daily charting, medication administration, physical assessment, admission nursing note, nursing care plan, referral, present complaint (e.g. symptoms), past medical history, life style, physical examination, diagnoses, tests, procedures, treatment, medication, discharge, history, diaries, problems, findings and immunization. In the future it will be necessary to incorporate different kinds of standardized instruments, electronic interviews and nursing documentation systems in EHR systems. The aspects of information quality most often explored in the studies reviewed were the completeness and accuracy of different data components. It has been shown in several studies that the use of an information system was conducive to more complete and accurate documentation by health care professionals. The quality of information was particularly important in patient care, but EHRs also provided important information for secondary purposes, such as

health policy planning. Studies focusing on the content of EHRs are needed, especially studies of nursing documentation or patient self-documentation. It concluded that one future research area is to compare the documentation of different health care professionals with the core information about EHRs which has been determined in national health projects. The challenge for ongoing national health record projects around the world will be to take into account all the different types of EHRs and the needs and requirements of different health care professionals and consumers in the development of EHRs. A further challenge is the use of international terminologies in order to achieve semantic interoperability.

Nir Menachemi et. al (2011)[13] reviewed and summarized the literature on the benefits and drawbacks of EHR systems. Much of the literature has focused on key EHR functionalities, including clinical decision support systems, computerized order entry systems, and health information exchange. This paper described the potential benefits of EHRs that include clinical outcomes (eg, improved quality, reduced medical errors), organizational outcomes (eg, financial and operational benefits), and societal outcomes (eg, improved ability to conduct research, improved population health, reduced costs). Despite these benefits, studies in the literature highlighted drawbacks associated with EHRs, which included the high upfront acquisition costs, ongoing maintenance costs, and disruptions to workflows that contributed to temporary losses in productivity that were the result of learning a new system. Moreover, EHRs were associated with potential perceived privacy concerns among patients, which are further addressed legislatively in the HITECH Act. Overall, it concluded that experts and policymakers believed that significant benefits to patients and society can be realized when EHRs are widely adopted and used in a "meaningful" way.

2.4 MATERIALS AND METHODS

Study Design: Descriptive Study, Convenient Sampling

Period of Study: February 6, 2017 to May 6, 2017.

Study Population: Clinicians from all departments.

Total Interviews: 30

Inclusion Criteria:

- Clinicians working for more than 1 year in the organization.

Exclusion Criteria:

- Other staff working on EMR except Physicians /Clinicians.

Study Tool:

- Self-administered reliable and validated paper based EMR questionnaire, including 24 clinical tasks [4].

Methodology

The study had an observational, Descriptive study design and was conducted over a period of 3 months in a tertiary care hospital in New Delhi.

The study instrument used for the study to estimate the potential impact of newly implemented EMR system on the healthcare delivery was reliable and validated paper based, self-administered task oriented questionnaire.[4] The study instrument, task oriented questionnaire included 24 general clinical tasks essential to physicians' work. The interviews included structured questions about task relevancy, frequency and time consumption. The instrument included 3 questions pertaining to each task measuring task relevancy, frequency and time consumption for each task. Task relevancy, task frequency and time consumption for each task were measured on a Likert scale of 1-5(appendix). All the collected data was systematically entered into Microsoft Excel and suitably formulated for statistical analysis using percentage, pie-charting and bar graphs.

2.5 STATISTICAL ANALYSIS:

Salient findings are summarized below in relevant figures.
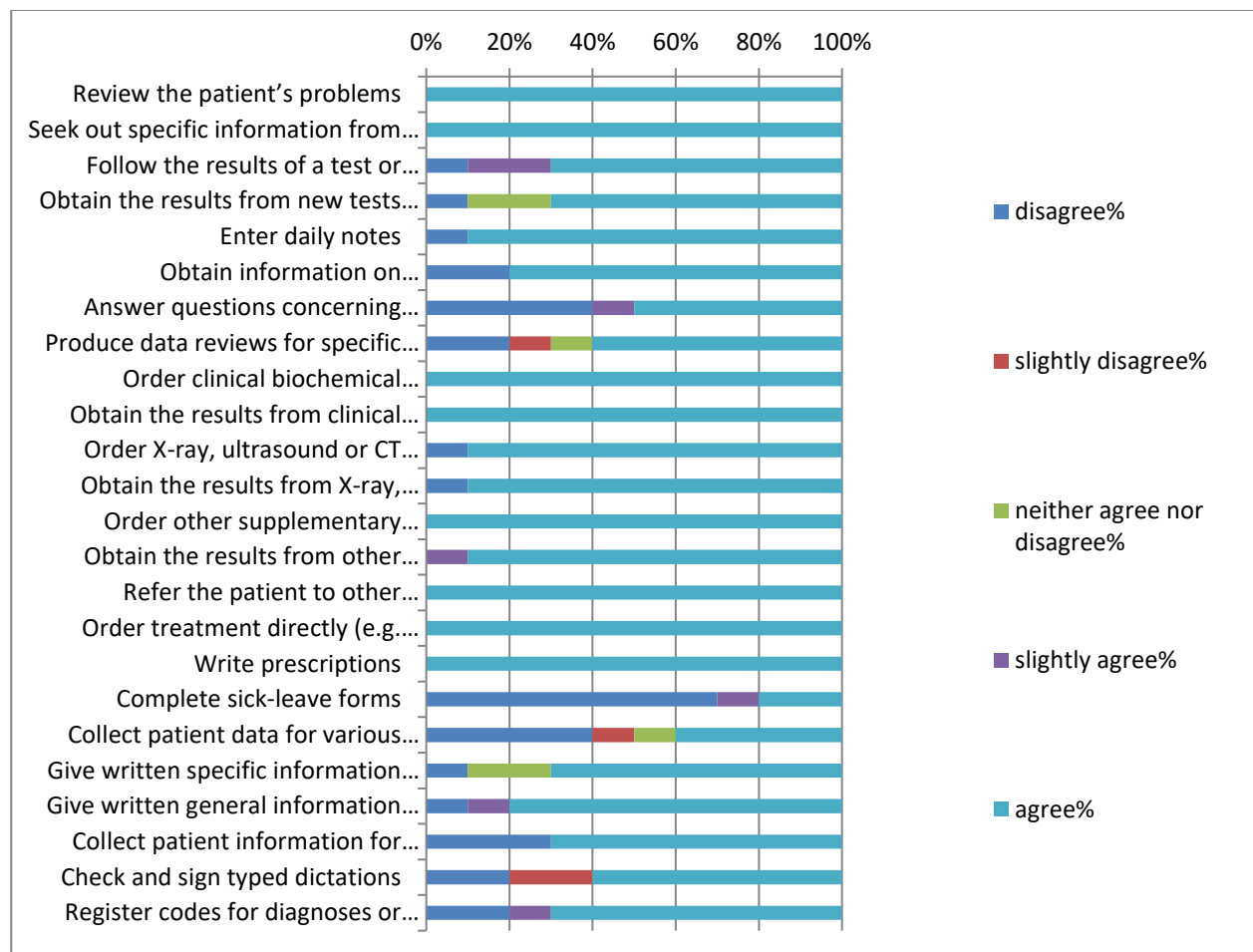
A. TASK RELEVANCY

Fig. 2.5.1(A) Analysis of Question no.1 with respect to individual tasks (I considered the task to be part of my work as a physician in this hospital: Agree or Disagree)
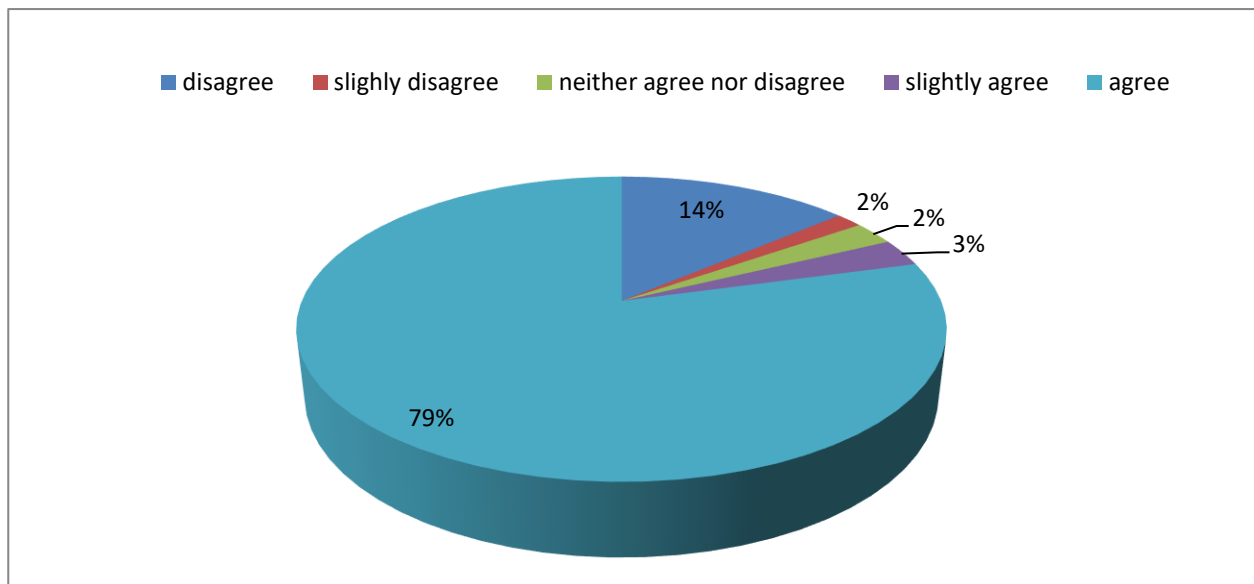
Fig. 2.5.1(B) Analysis of Question no.1 with respect to all tasks taken together (I considered the task to be part of my work as a physician in this hospital: Agree or Disagree)
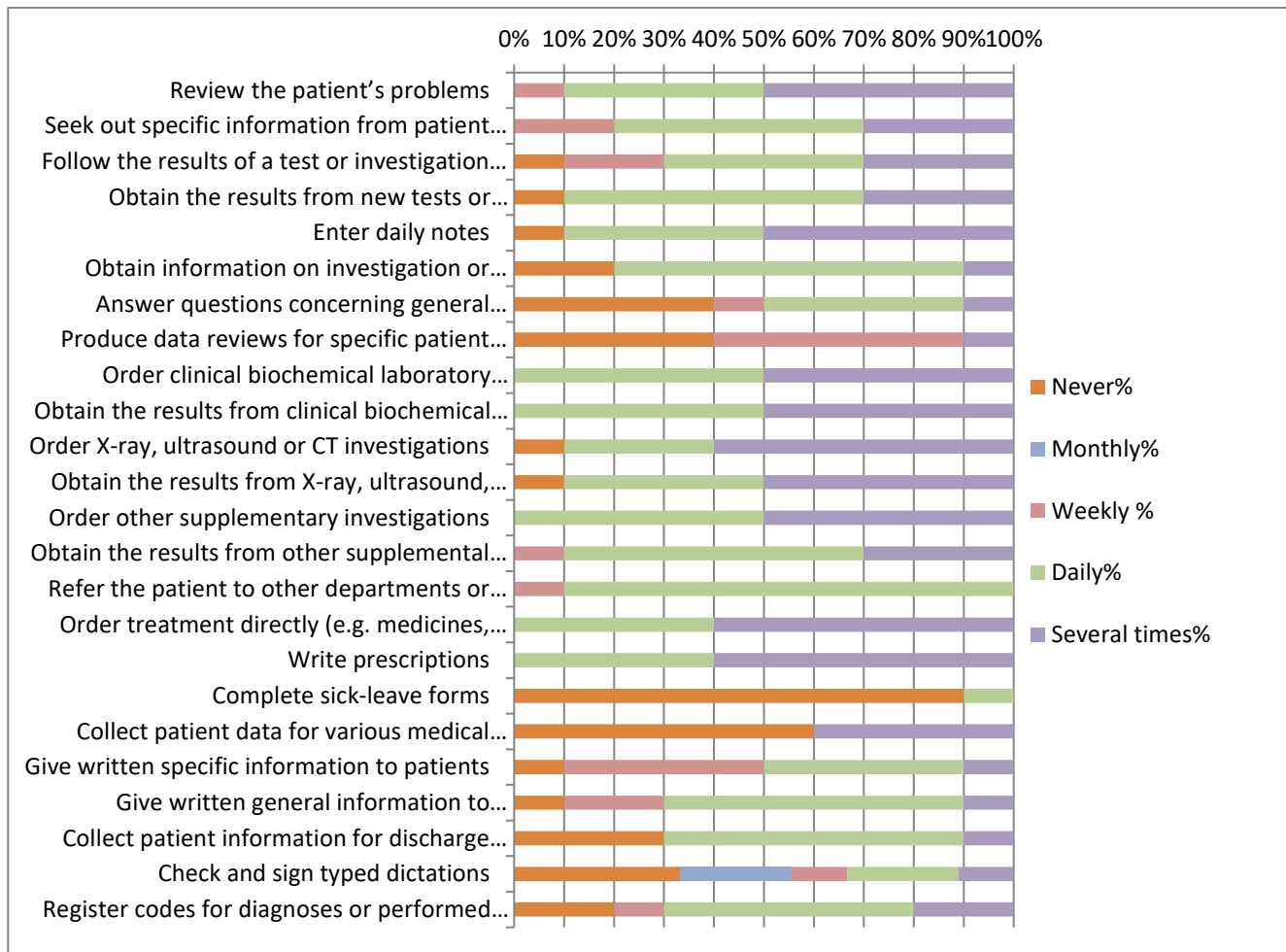
B. TASK FREQUENCY

Fig. 2.5.2(A) Analysis of Question No.2 with respect to individual tasks (How often do you maximally perform this task)
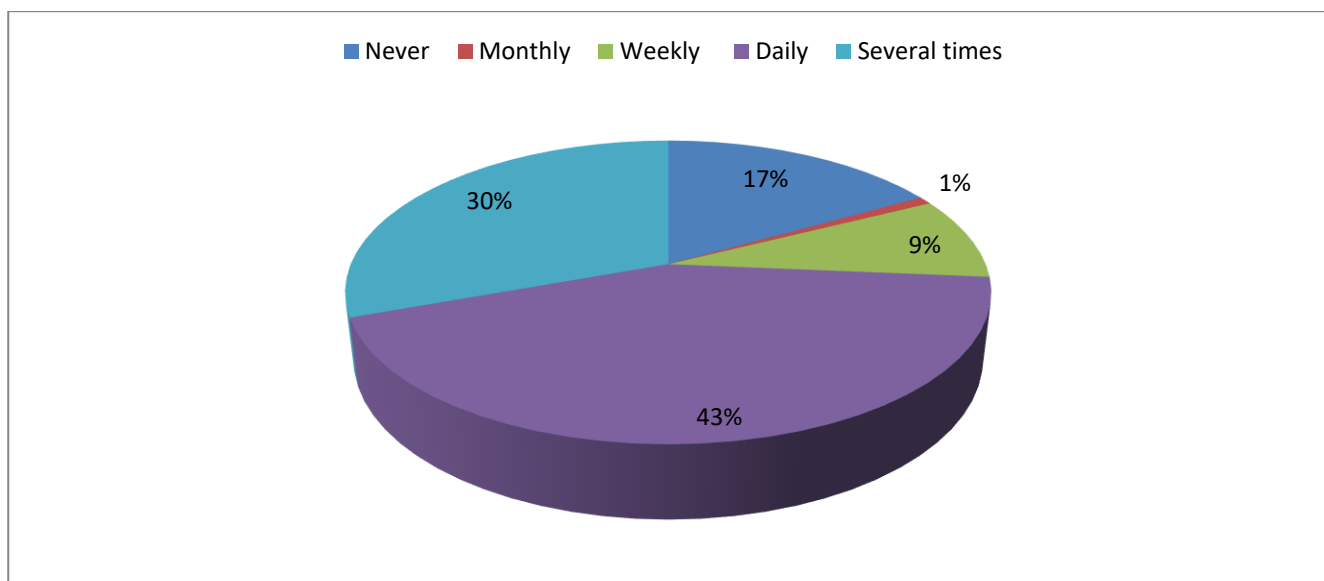

Fig. 2.5.2(B) Analysis of Question No.2 when all tasks taken together (How often do you maximally perform this task)
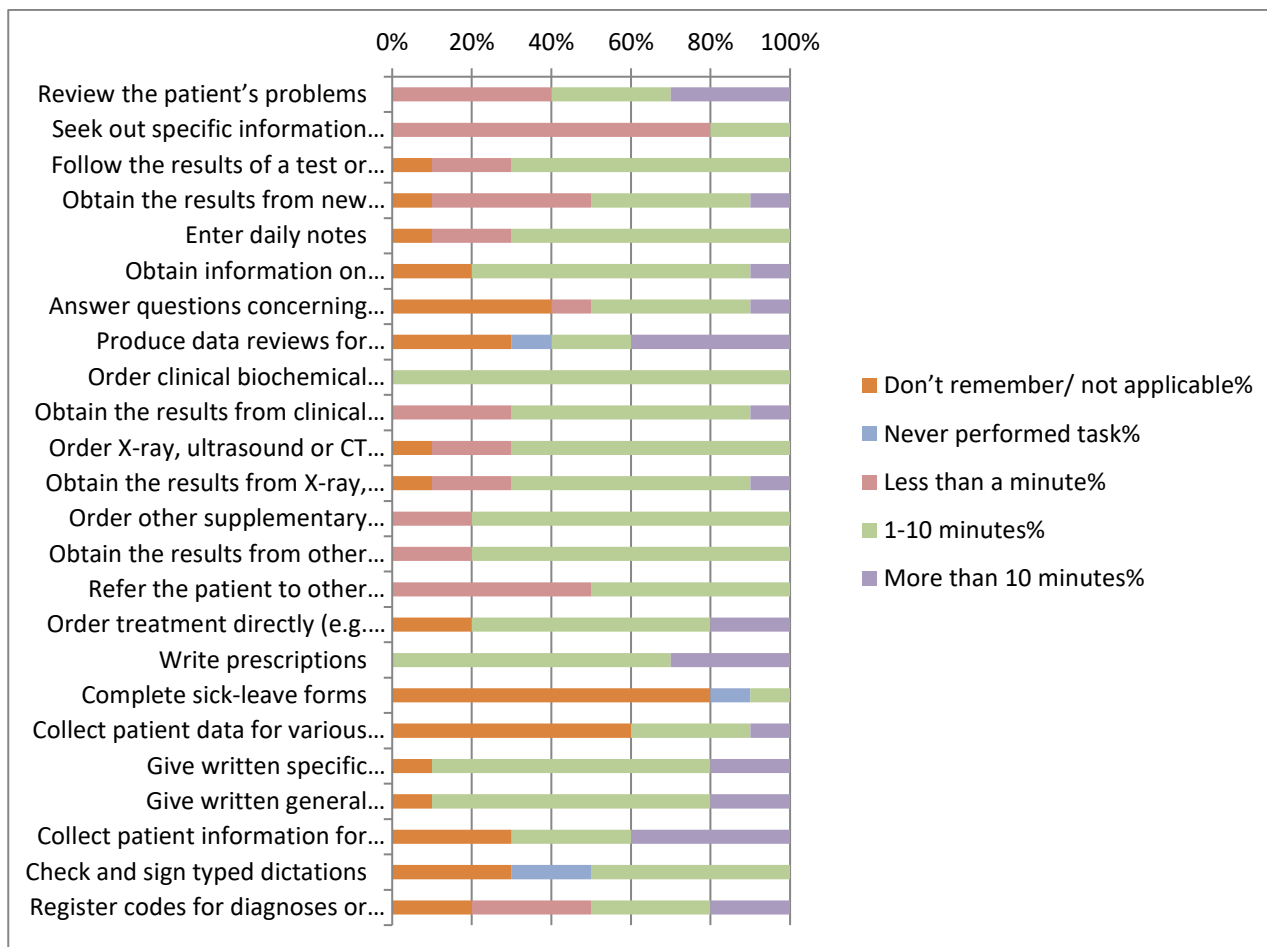
C. TIME TAKEN FOR EACH TASK

Fig. 2.5.3(A) Analysis of Question No.3 with respect to individual tasks (How much time did it take to perform the task last time)
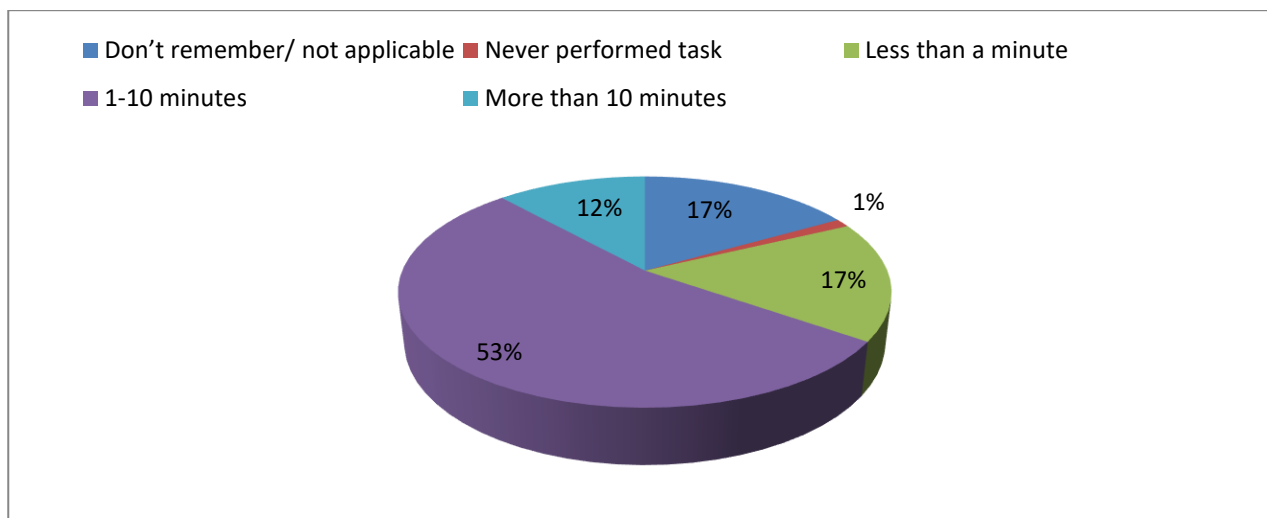

Fig. 2.5.3(A) Analysis of Question No.3 when all tasks are taken together (How much time did it take to perform the task last time)

2.6 RESULTS

a. Task Relevancy

Around 80% of the clinicians agreed to the importance of collecting and maintaining the various aspects of the patient's medical history for the purpose of record keeping and further use (e.g. In case of referrals or relapse) but a significant proportion (approximately 15% of the clinicians) is in disagreement of the same fact. The major disagreement is for the individual tasks 18 and 19, namely complete sick-leave forms and collect patient data for various medical declarations respectively. This might be for the fact that not every individual task is relevant for clinicians of different departments. A great effort is required to change the attitude and practices of this proportion of the clinicians in order to incorporate every task of EMR completely in the hospital.

b. Task Frequency

As is evident from the above data, frequency of task performance is never for 17% of the clinicians. This result is mainly because of individual task 18 and 19 namely complete sick-leave forms and collect patient data for various medical declarations respectively. These two tasks are also the tasks which 14% of the clinicians disagreed to be part of their work. 30% of the clinicians collect the data several times, that is more often than the other clinicians. It is possible that it is far easier to change the attitude of the 30% of the clinicians from several times to daily with a little motivation and encouragement, as compared to changing the attitude of the 17%, where a much greater effort and innovation or incentive would be required.

. b. Time taken for each task

Only around 12% of the clinicians took more than 10 minute to perform the task last time. Majority of clinicians, about 53%, perform the activity in 1-10 min which is a fair practice but still needs improvement so as to take proper and complete information for the patient in the minimal amount of time to improve healthcare quality and delivery. Only 17% of the clinicians were able to perform the task in less than a minute which is the most desirable outcome from EMR use. The reason for time difference is the level of computer literacy and proficiency of the clinicians. Tech savvy and clinicians using computers regularly take less time for EMR use. It is required than clinicians be given timely and adequate training for EMR use so that they can improve and take minimal time in capturing maximum patient information, thereby, providing their services in a better quality.

2.7 LIMITATIONS AND RECOMMENDATIONS

Limitations:

- Small sample size.
- Newly implemented EMR system therefore many operational difficulties were faced.
- Making clinicians accept the new technology was difficult as they were used to writing on prescription which made them more comfortable.
- Clinicians working in different departments evaluated together for EMR use.

Recommendations:

- Specifically trained and dedicated team for EMR implementation who can assist clinicians, if required (In case of non tech savvy clinicians or clinicians having problem in computer use).
- Handwriting recognition pads with stylus pen can be arranged for the clinicians so that time taken in typing can be reduced.
- More training sessions along with update sessions for the Clinicians should be arranged so that full potential of the EMR is utilized.
- Regular updates in EMR software to make it less complicated and easier to access with timely training sessions to the clinicians.

2.8 CONCLUSIONS

It is concluded that most doctors agree that most of the 24 tasks present in the questionnaire were an important part of their work as a physician/clinician and they usually performed these tasks regularly and average time taken by each doctor is in between 1-10 minutes.

Healthcare quality and delivery is an important determinant in deciding the capabilities of any hospital. EMR system is an upcoming tool in deciding and improving healthcare delivery by improving rapid information retrieval and efficient data management, decreasing adverse drug reactions, mortality and morbidity rates and hence, healthcare costs.

The successful implementation of EMR system in Moolchand Medcity is another success milestone for the hospital in improving its healthcare quality and delivery, thereby improving its expansion to more places.

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EMR Questionnaire Tool

Name/Age/Gender/Department :

Sno	Clinical Tasks	A	B	C
		I considered the task to be part of my work as a physician in this hospital : Agree or Disagree	**How often do you maximally perform this task**	**How much time did it take to perform the task last time**
1	Review the patient's problems			
2	Seek out specific information from patient records			
3	Follow the results of a test or investigation over time			
4	Obtain the results from new tests or investigations			
5	Enter daily notes			
6	Obtain information on investigation or treatment procedures			
7	Answer questions concerning general medical knowledge			
8	Produce data reviews for specific patient groups			
9	Order clinical biochemical laboratory analyses			
10	Obtain the results from clinical biochemical lab. analyses			
11	Order X-ray, ultrasound or CT investigations			
12	Obtain the results from X-ray, ultrasound, or CT investig.			
13	Order other supplementary investigations			
14	Obtain the results from other supplemental investigations			
15	Refer the patient to other departments or specialists			
16	Order treatment directly (e.g. medicines, operations etc.)			
17	Write prescriptions			
18	Complete sick-leave forms			
19	Collect patient data for various medical declarations			
20	Give written specific information to patients			
21	Give written general information to patients about the illness			
22	Collect patient information for discharge reports			
23	Check and sign typed dictations			
24	Register codes for diagnoses or performed procedures			

Ranking Criteria: 1/2/3/4/5

A. (I considered the task to be part of my work as a physician in this hospital : Agree or Disagree)

1. Disagree
2. Slightly disagree
3. Neither disagree/ nor agree
4. Slightly agree
5. Agree

B. (How often do you maximally perform this task.)

1. Never
2. Monthly
3. Weekly
4. Daily
5. Several times per day

C. (How much time did it take to perform the task last time)

1. Don't remember/ not applicable.
2. Never performed task
3. Less than a minute
4. 1-10 minutes
5. More than 10 minutes