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by

Yash Harish Kalyani

Roll No.-0357

Under the Supervision and Guidance of

Dr. Surva Prakash

(Associate Professor)

DECLARATION BY STUDENT

I hereby declare that this dissertation titled “**The impact of interoperability on Electronic health/medical records adoption and patient care in Healthcare Industry**” is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Name of Student: Yash Harish Kalyani

Date:

CERTIFICATE

This is to certify that dissertation titled “**The impact of interoperability on Electronic health/medical records adoption and patient care in Healthcare Industry**” is a record of the research work undertaken by **Yash Kalyani** in partial fulfilment of the requirements for the award of the degree of **MBA (Pharmaceutical Management)** from the IIHMR University, Jaipur under my guidance and supervision and his/her approach to the research study has been sincere, scientific, and analytical.

Dr.Surya Prakash

Associate Professor and Faculty guide

IIHMR University, Jaipur

Date

Dr. P.R Sodani

Dean, Academics and Student Affairs

IIHMR University, Jaipur

Date

ABSTRACT

The healthcare sector has undergone a change thanks to electronic health/medical records (EHR/EMR), which give healthcare professionals digital access to and control over patient data. However, if these systems are not interoperable—that is, if they cannot communicate and share data with other EHR/EMR systems—their effectiveness may be constrained. The widespread adoption of EHR/EMR systems has been significantly hampered by the lack of interoperability, which has also had an impact on the standard of patient care.

Data from healthcare professionals that use EHRs could be gathered using a range of research techniques, including surveys, interviews, or observational studies. The study could also look at changes in workload and job satisfaction before and after EHR deployment or compare the workload and job happiness of physicians who use EHRs to those who don't. The study's findings could have a significant impact on the healthcare sector because electronic health records (EHRs) are a crucial tool for enhancing patient care and lowering medical errors.

As a result, this topic will examine how interoperability affects the adoption of EHR/EMR systems and how it can enhance patient care in the healthcare sector.

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Introduction

Many of the sources of inspiration in the modern world are emerging technologies. EMRs (Electronic Medical Records) have revolutionised the medical field. By better managing the data stream, innovation may enable specialised doctors to expedite and enhance their diagnostic capabilities. Digitalizations have a remarkable potential to enhance work processes and boost medical care quality, consistency, wellbeing, and efficiency. The enormous amounts of data that were previously acquired in electronic medical records will be channelled, sorted, and organised with the use of progressively astounding figuring tools so that a patient's most pressing health issue can be identified more swiftly. EMRs ensure enormous improvements in ongoing care by replacing a large number of the components of traditional paper-based clinical records.

As a result, doctors will be able to make an accurate diagnosis more rapidly. In the medical care sector, digitization has helped health by enabling suppliers to establish a solid and basic foundation by concentrating on the needs of the patient. Increased use of EMRs over time may result in increased funding for medical care, a reduction in clinical errors, and an improvement in patient wellbeing.

The Ministry of Health & Family Welfare (MoH&FW) reported a set out guidelines for Electronic Health Records in September 2013 while also considering how applicable and reasonable they are to India.

The Ministry maintained open standards like SNOMED CT for free usage throughout the nation and chose to work with the National Release Centre (NRC) to handle this clinical expressing standard that is rapidly gaining widespread acceptance among the various medical services IT partner networks worldwide.

The EHR application enables efficient management of patient data, allowing you to maintain accurate, complete, exceptional data about patients, and rapidly recover this data, depending on the situation, to settle on choices about a patient's consideration and treatment.. The application increases productivity, standardizes documentation, and enables enhanced patient care. The EHR application offers the following advantages:

1. Promotes legible, complete, and up-to-date patient medical records, thereby helping reduce medical errors.
2. Allows quick access to patient medical records, enabling improved diagnosis and treatment and a more coordinated and efficient care.
3. Displays the complete patient chart on a single screen and allows you to compare the results over a period of time.
4. Supports electronic prescriptions and investigation orders, which are automatically routed to respective pharmacies, laboratories, and imaging centres.
5. Offers integration with SNOMED-CT codes.
6. Provides easy access to test results and imaging reports.

7. Provides an automated Favourites list to store frequently used entries.
8. Performs automatic drug-to-drug and drug-to allergy interaction checking and alerts you if an unsafe combination or an allergy conflict is identified.

AADI (ATHMA Application for Doctor's Insight) is designed for the physicians to provide them quick access to patient information from their mobile devices. The application helps improve communication among the care team members and enables a more coordinated and efficient care of patients. Features

1. Communicate with the care team members via patient-specific chat platform.
2. Send text, images, audio and video messages to care team members.
3. View patient-related announcements and notifications on the chat platform.
4. Order prescriptions and investigations.
5. Get instant access to investigation results and radiology images on your mobile devices.
6. Record Progress Notes.
7. Get the Mortality Risk Score Prediction for patients.
8. Convey important events to patients' families.
9. Review and sign off Patient Discharge Summaries.

In this case study, we are finding the factors affecting EMR adoption rate in healthcare Industry.

Review of literature

The use of the internet to look up health-related information is strongly correlated, claim Sandefer et al. However, Personal Health Information Management has a poor acceptance rate.

Healthcare IT systems should be created in a way that they can reach people in urban areas, rural areas, and across a range of age groups in order to make personal health information management successful. Customers' motivation needs to be raised to encourage them to use personal health information management.

Customers from various populations have varying opinions about how to use information relating to their personal health, so it is important to comprehend their opinions and design healthcare systems accordingly.

Electronic health is allegedly enhancing the accessibility, quality, effective, and efficacy of healthcare delivery systems, according to the advisory paper e-health in zicht. Electronic health gives the right person the correct information at the right time. Consequently, this will enhance the doctor-patient relationship. Additionally, it offers patients a wide range of options.

According to Yunfeng Shi and Kyungnam Jung, when people's healthcare needs are not addressed, there is a sharp rise in searches for health-related terms. Additionally, it has been shown that healthcare IT fills the accessibility gap.

We can better understand the great demand for online stage that might be used to close the communication gap between the client and the supplier thanks to this increase.

As R. Bratucu noted, acquiring data gets individuals actively involved in the decisions they make in the realm of medicine. The approach itself aids customers in recognising prospective options while also evaluating them, minimising mistakes, casting doubt on them, and motivating them to reach the best decision.

As a result, the manner in which patient data is requested may have an impact on the scope and character of the information sought based on factors like beliefs and attitudes, as well as the quantity of different activities and information provided in light of varied understandings of risks and assets.

Review of Literature

1	Article	“Implementing a national electronic health record successfully”: a quick overview.
	Author	Caitriona Cunningham Orna Fennelly, , Loretto Grogan, Heather Cronin, and Conor O'Shea.
	Research methodology	A quick assessment of the grey literature and data from numerous search engines, including PubMed, CINAHL, Scopus, and Embase, was done in 2019. The expert panel examined, analysed, debated, and interpreted the identified studies (n = 5,040), which were subjected to eligibility criteria.
	Result	The most important organisational, human, and technological factors for a successful EHR implementation were identified in 27 literature reviews. These factors included governance, leadership, and culture, end-user involvement, training, support, resources, and workflows. Individual end-users also varied in their skills and characteristics, perceived benefits and incentives, and perceived changes to the health ecosystem, all of which were crucial for success.

Article	"The Applicability of the Modified Technology Acceptance Model (TAM) on the Sustainable Adoption of eHealth Systems in Resource-Limited Settings"
Author	Nicole Bakhoun , Emma Schremp ,Christian Gerhart
Research Methodology	A prospective time-and-motion observational study of nurses working in the emergency room. March till September 2019, conducted 1:1 observations.
Result	The results of structural equation modelling (SEM) show that attitude and intention to utilise eHealth are significantly influenced by perceived usefulness. The model illustrates 56.2% of the variation in social intention to make use of eHealth systems. In order to improve the associations' specialised structure, staff members' IT skills, and their attitude towards eHealth, implementers should provide ongoing support.

3	Article	"Electronic health record acceptance by physicians: Testing an integrated theoretical model"
	Author	El Kebir Ghandour, Pascaline Kengne Talla, Marie-Pierre Gagnon David Simonyana
	Research Methodology	Canadian Quebec Medical Association physician members received an electronic survey. In order to determine the primary factors of physicians' intention to utilise the EHR, researchers investigated 4 theoretical models (Technology acceptance model (TAM), Extended TAM, Psychosocial Model, and Integrated Model) using path analysis and numerous linear regression analysis. Utilising a multi-group analysis of structural weights invariance, the study assessed the modifying impact of sociodemographic factors.
	Result	The four models did well and were able to account for 44% to 55% of the variation in doctors' intentions to use the EHR. The Integrated model fared the best and revealed that the biggest determinants of physicians' intention to utilise the EHR are perceived ease of use, professional norm, social norm, and demonstrability of outcomes. Age, gender, background, and specialty altered the relationship between those factors and intention

Methodology

Technology Acceptance Model

Technology acceptance model (TAM), is a theory of information architectures, gives recommendations for how people come to accept and use new technologies.

Davis (1986) created a model that more precisely forecasts the acceptability of an information system based on the idea of the Technology Acceptance Model.

The objective of this model is to forecast a tool's availability and to pinpoint the adjustments that need to be done in order to make the tool ideal for users. According to this concept, two important criteria—view utility and perceived ease of use—are taken into account when determining how desirable a technological gadget is.

The Technology Acceptance Model, which is based on the concept of Reasoned Action, maintains that a person's behaviour, which in turn is determined by that person's attitude towards using the software and his perception of how it functions, determines how an information system is used. Davis contends that a user's decision to utilise a technology is fully based on the potential effects it may have on his whole performance, as opposed to merely his thinking.

Perceived utility, perceived usability, attitudes towards technology, top management, and IT support are among the core elements of TAM that have an impact on user motivation. These elements incorporate perceived usefulness (PU) and perceived ease of use (PEU), which are thought to be the primary criteria that directly or indirectly explain a person's behaviour in regard to their desire to use (or "acceptance" of) new technology.

PU, or perceived usefulness

This was defined by Fred Davis as the degree of acceptance that an individual employing a specific technology will enhance their ability to carry out their job. It denotes how a person views the usefulness of the innovation in helping them accomplish their objectives. Users' perceptions of innovation's value may be impacted by outside circumstances. The following hypotheses are put to the test in relation to this specific case in this investigation:

H1: The attitude of the doctor towards using the EMR will improve as a result of perceived usefulness.

PEU, or perceived ease of use

Perceived ease of use is the extent to that a person anticipates that a specific innovation will be simple and easy to use. PEU is thought to be the main element of TAM that aids in determining whether the user will accept or reject innovation.

H2: Perceived ease of use will enhance the perceived usability of EMR.

H3: Perceived usability will have a beneficial effect on a doctor's decision to use an EMR.

Attitude Towards Using EMR

About the advantage of innovation in increasing work execution, time to lead their work, and its impact in enhancing the nature of the work they do, attitude is an inclined perspective. According to several studies, customer attitudes plays an important role in both the practical acceptance and efficacy of the use of innovations.

Findings from many research indicate that as healthcare providers are the system's principal users, their attitudes and acceptance are crucial to the deployment of the EMR system in healthcare systems.

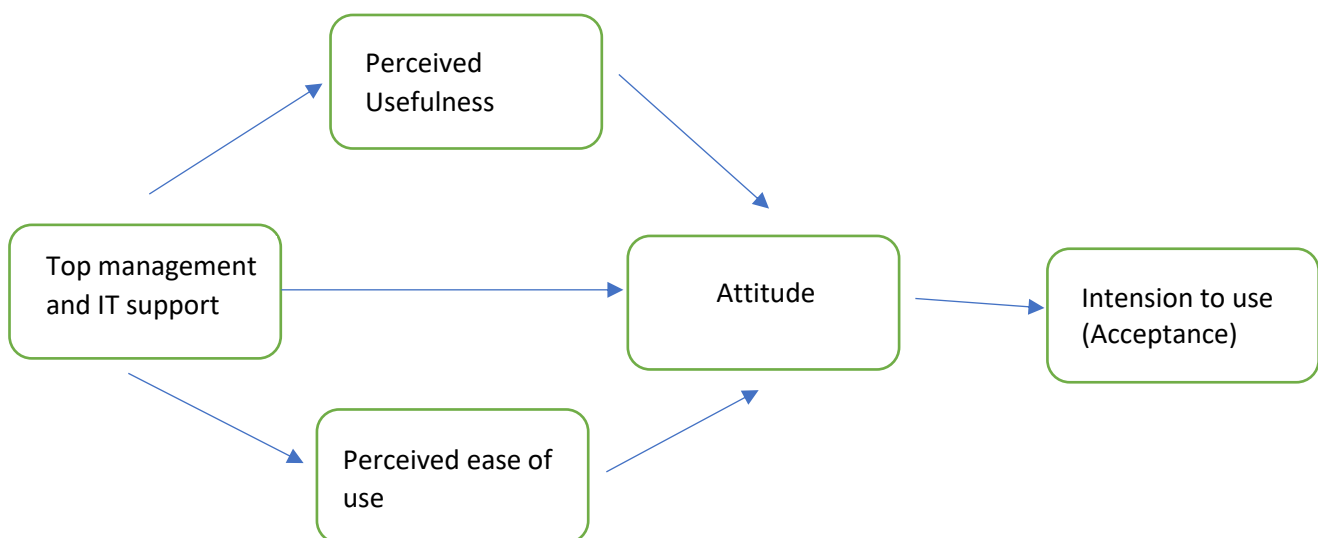
Top Management & IT Support IT

experience controls doctors' IT expertise, ensuring that they are aware of the key benefits of innovation and that they are receptive to it. familiarising them with the EMR framework and assisting them in understanding the benefits of using the EMR for consultation. Specialised infrastructure, such as PCs that can access EMR frameworks, is the present basis of the emergency clinic. Clinical data frameworks, electronic medical records, and other outstanding eHealth applications were found to be intuitive to medical care providers with a solid level of IT competence.H4: Top management and IT assistance will benefit doctors' perceptions of the value of EMR.

H4: Top management and IT assistance will influence doctors' attitudes towards EMR favourably.

H5: The perceived usability of the EMR will improve as a result of top management and IT support.

Fig: - Technology Acceptance Model



Research Question

1. How aware are Indian consumers of electronic health (eHealth) in the healthcare system?
2. What are the most popular online sources of health information for customers?
3. What are the current electronic health (eHealth) practices in India?

Study type – A descriptive cross-sectional study

Study duration – 3 months

Sample size – 99 respondents were taken between age group 18-70

Technique of data collection –

A Google form was used to collect the information. The survey asked about e-health as well as the respondent's name, age, and gender, as well as other demographic questions.

Methodology Used -

Use of MS Excel was done to analyse data

RESULTS

DEMOGRAPHIC DETAILS OF THE RESPONENTS

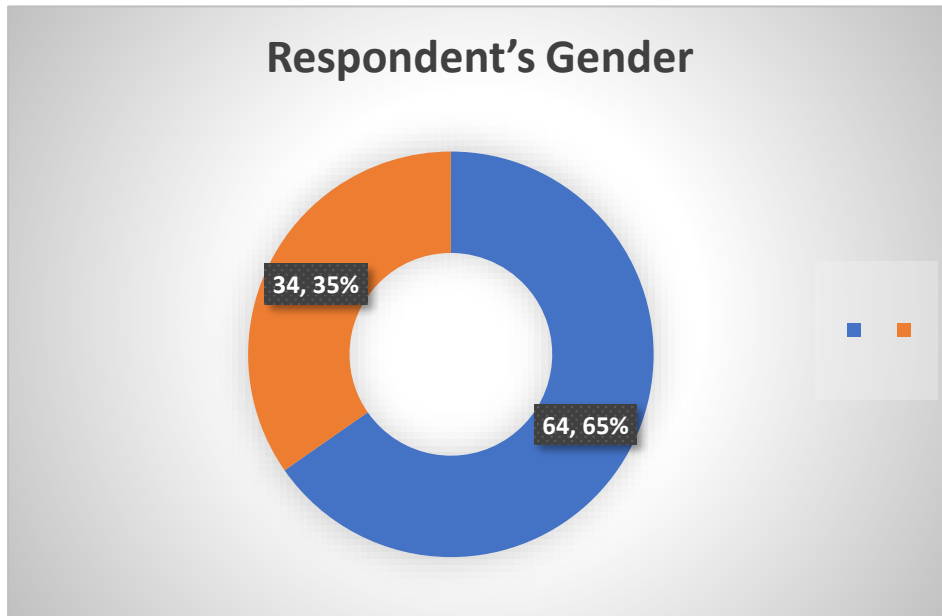


Fig 1

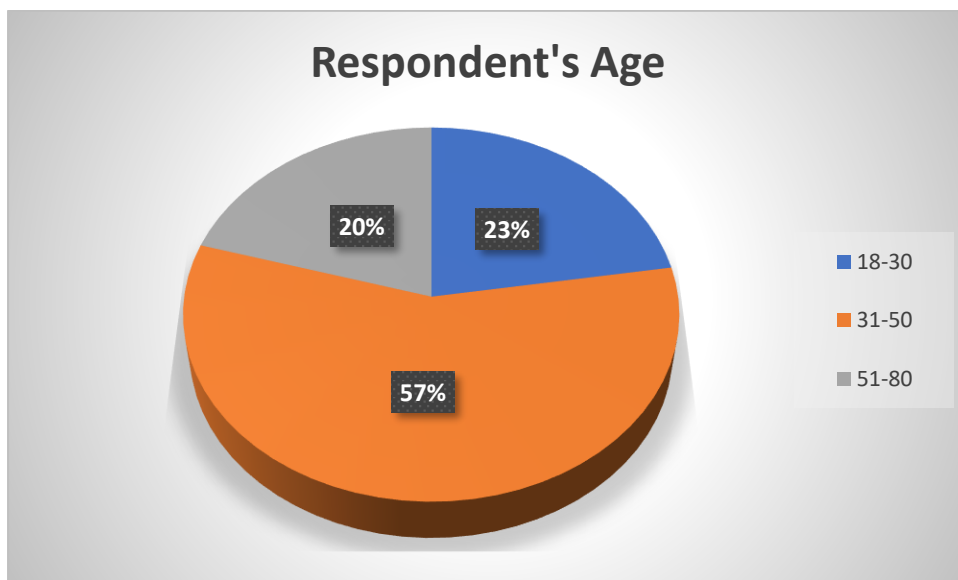


Fig 2

E-Health Services-Understanding by the respondent

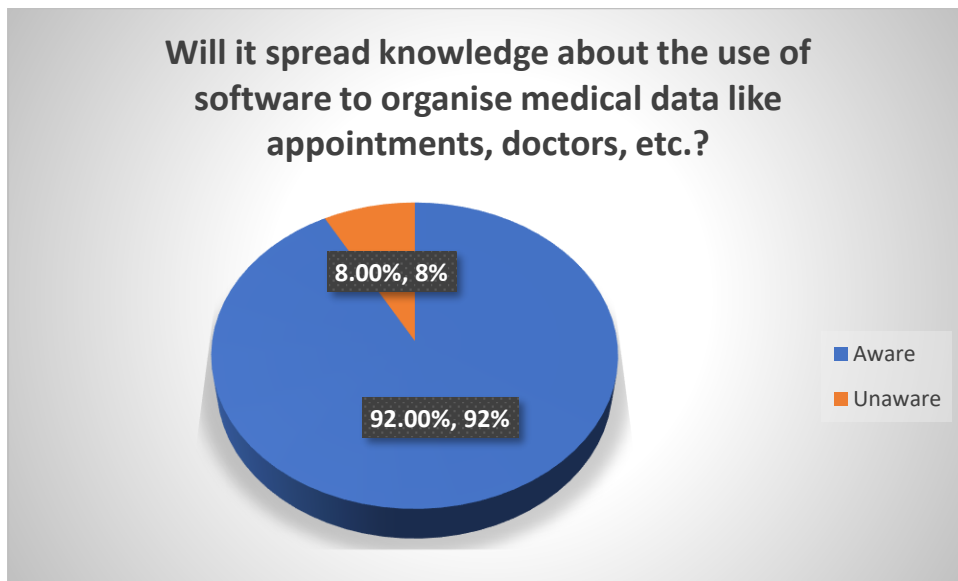


Fig 3

- We can infer from the statistics above that 6% of respondents are not aware of the many internet platforms utilised for different activities, while the rest respondents are.

Various uses of E-health Services

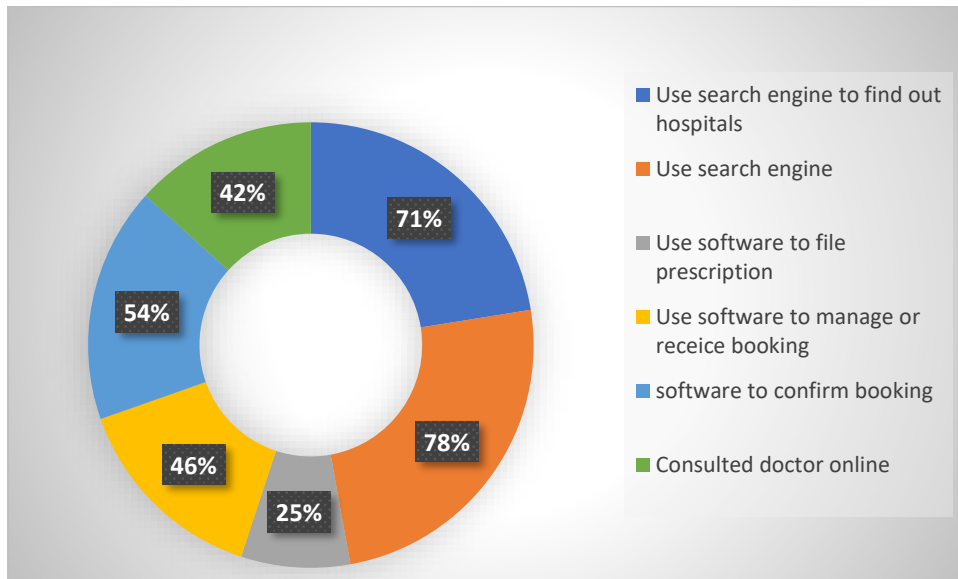


Fig 4

- According to the graph above, 71% of individuals utilise various search engines to find various hospitals.
- About 42% of patients utilise hospital software to confirm their appointments online, while 54% consult doctors online.
- Approximately one-third of people utilise software to submit prescriptions.
- With the aid of software, 51% of respondents have confirmed their reservations.

Instead than relying on a healthcare system to maintain the records, e-health provides full access to medical records.

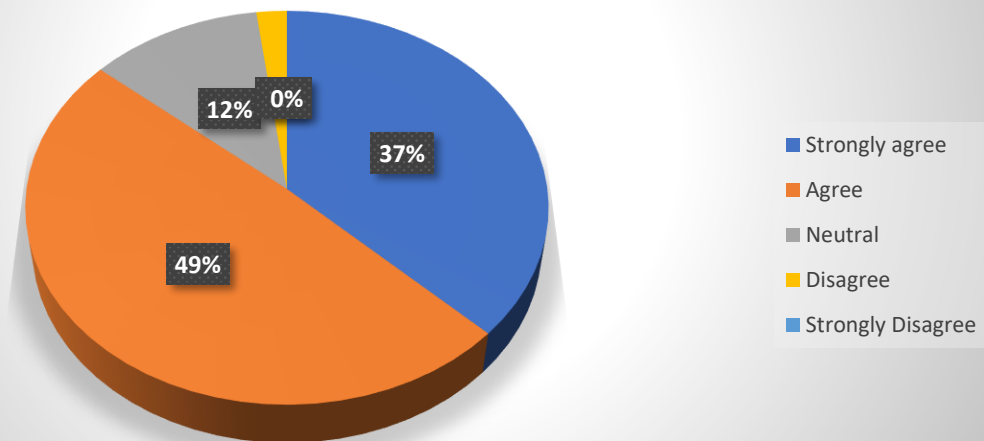


Fig 5

- According to the graph above, 86% of people find it convenient to exchange their medical records rather than carry about paper copies of them.

Results from lab tests are delivered considerably more swiftly with e-health than they would be otherwise.

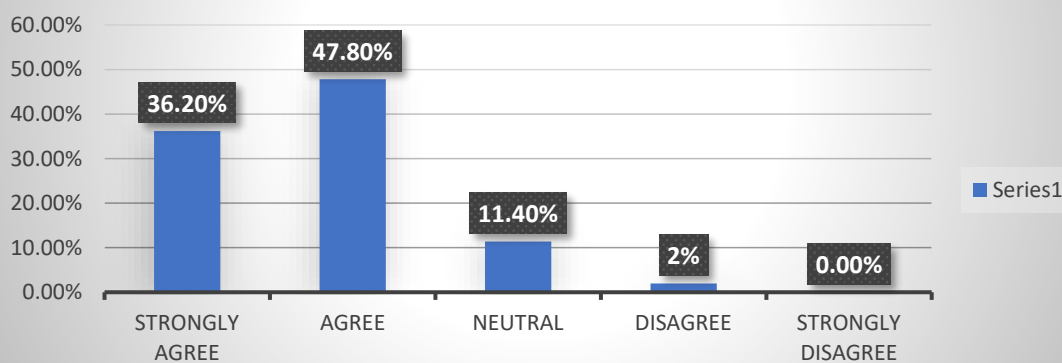


Fig 6

- Most respondents concur that lab results may be obtained more quickly than in the past.

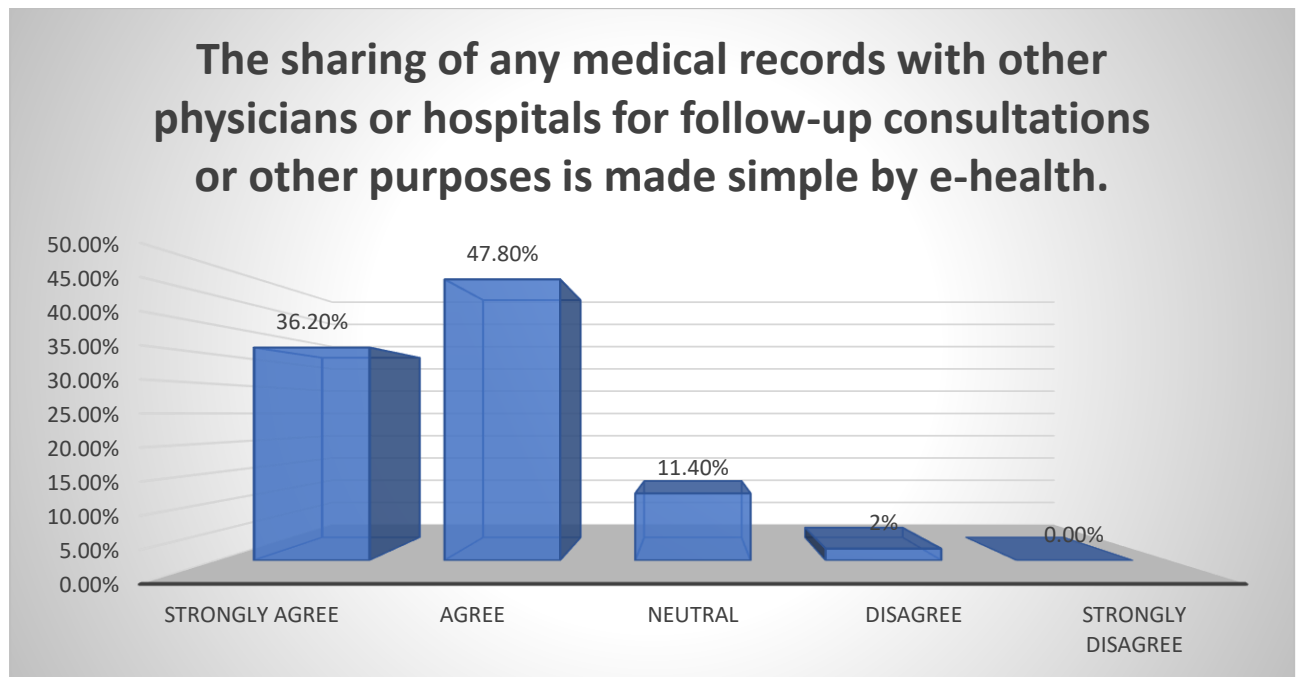


Fig: 7

- The majority of interviewee think it is simple to share their medical details in case of a second opinion.

Discussion: -

- According to a poll conducted using a Google form, the following findings were drawn: -
- 44% of people believe that technology should not be used for health purposes and are opposed to its use.
- The biggest percentage of persons who discuss how difficult it is to utilise electronic health when there is no internet connection is 35%, who have a neutral opinion.
- The electronic health data agreement rate is not private and could be utilised by anyone. 28% of those surveyed concurred.
- More than 40% of respondents concur that face-to-face encounters with healthcare professionals cannot be replaced by online interactions.
- About 28% of respondents concurred that owing to backup failures, saved data could be lost.
- More than 60% of consumers believe that electronic health tools have made scheduling medical appointments simpler.
- ➤ Those who concur that lab findings are received far more quickly than the traditional method comprises 48%.
- For 48% of patients, sharing their medical records electronically makes it simpler to get a second opinion or have follow-up appointments.
- The vast majority of people believe that sharing medical documents electronically rather than physically by carrying files is simpler.

SUMMARY AND RECOMMENDATIONS: -

CONCLUSION: -

- The younger demographic had a better level of compatibility with e-health services than the more senior group. Some patients still prefer to receive care in the old-fashioned manner, which involves physically going to the doctor and getting examined.
- The respondents' awareness of electronic health has increased. Search engines like (Google and Yahoo) were utilised to find information on health-related topics
- IT experience manages doctor's knowledge of IT, understanding the essential advantages of EMR and their willingness to use. Thus analysis of consultant's attitude is needed before relevant intervention as adoption of EMR must be understood as a behavioural change in medical practice.

Recommendations

Despite the apparent benefits of higher hospital productivity, improved patient consideration, lower costs, and maybe financial rewards, the acquisition of electronic medical records by doctors and healthcare providers has been fairly sluggish.

1. Effective EHR implementation requires strong leadership. The doctor should encourage patients to use the widest possible range of EMRs, and those who have the highest compliance rates should be recognised as Super Users who can assist various customers.

2. Supporting Infrastructure: The consultant should have access to the whole IT infrastructure, as well as fast Internet connectivity and direct, non-intrusive meetings through the EMR. Programming should be made simple to comprehend so that experts don't have to focus on writing a lot and can engage patients by providing patient-driven attention.

3. Establish a group setting. Every participant in your training will have a role in implementing and utilising your new EHR foundation. Despite the fact that some tasks are more vital than others, everyone needs to understand their value to the team. Their value and the nature of their work should be clearly defined and highlighted.

4. Increase awareness and enthusiasm for the execution cycle. Plan meetings to discuss the project's importance and the benefits that an EHR provides. Reasonable goals should be established during these meetings to ensure that the framework is carried out successfully. At the same time, keep in mind that everyone has other tasks to complete, from the billing administrator to the doctor.

5. Make a plan before starting the execution cycle. Before beginning to implement an EHR framework, the following assignments need to be understood and organised: During training, evaluate the work process and identify the cycles that will change. Recognise which EHR features are "nice to have" and which you "need to have."

6. Place more emphasis on core competence rather than excessive component demands. Avoid creating for doctors broad information transit cantered layouts.

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