Internship Training

at

EHNOTE

on

Workflow mapping of an Ophthalmology Electronic Health Record (EHR) System

by

Prannoy Mandal

PG/22/076

Under the guidance of

Dr Pankaj Talreja

PGDM (Hospital & Health Management)

2022-24

International Institute of Health Management Research, New Delhi

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Dissertation Certificate

EHNOTE

20th June 2024

To whomsoever it may concern

This is to certify that **Mr. Prannoy Mandal** has worked as a **Business Development Consultant Intern** in our organization from **20th March 2024** to **20th June 2024**. During the time of his tenure we found him extremely resourceful in all the technologies that he is competent.

We found him to be a good team player besides being a hard worker. We wish him all success in his future endeavors.

Yours sincerely

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TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Prannoy Mandal** student of PGDM (Hospital & Health Management) from International Institute of Health Management Research, New Delhi has undergone internship training at EHNOTE from 20th March to 20th June

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.

Dr. Sumesh Kumar
~~Talreja~~

Associate Dean, Academic and Student Affairs
IIHMR, New Delhi
Delhi

Dr. Pankaj

Mentor
IIHMR, New

Certificate of Approval

The following dissertation titled "Workflow mapping of an opthalmology" at "EHR System." 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
Dr. Anandhi Ramachandran	
Dr. Nishigandh Bele	
Dr. Shiv Shankar	

Certificate from Dissertation Advisory Committee

This is to certify that **Mr Prannoy Mandal**, a graduate student of the PGDM (Hospital & Health Management) has worked under our guidance and supervision. He is submitting this dissertation titled **"Innovating Health: EHNOTE's Transformative Solutions for Modern Medicine"** at **EHNOTE** in partial fulfilment 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.

Dr Pankaj Talreja
Assistant Professor
IIHMR, Delhi

Organization mentor
Position
EHNOTE

NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled ...Workflow Mapping of an Ophthalmology Electronic Health Record system..... and submitted by (Name)

...Prannoy Mandal..... Enrollment No. PG/22/076

.....

under the supervision of ...Dr. Pankaj Talreja.....

for award of PGDM (Hospital & Health Management) of the Institute carried out during the period from 20/03/2024 to 20/06/2024

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.

Prannoy Mandal.

Signature

FEEDBACK FORM

Name of the Student: Mr Prannoy Mandal

Name of the Organisation in Which Dissertation Has Been Completed: EHNOTE

Area of Dissertation: Innovating Health: EHNOTE's Transformative Solutions for Modern Medicine

Attendance: 20th March to 20th June

Objectives achieved: Product knowledge acquisition, Market penetration, Business Development.

Deliverables: Client meeting reports, Market analysis, Sales presentations

Strengths: Displayed a good level of energy and enthusiasm throughout the internship period. Quickly grasped the technical aspects and functionalities of our software. Demonstrated strong communication skills, effectively engaging with potential leads and conveying key product information.

Suggestions for Improvement: Enhance skills in identifying the right prospects by conducting more thorough and keen market analysis, Spend additional time researching potential leads to ensure they are good fit for our services, focusing on their specific needs and challenges. Develop a deeper understanding of market dynamics and

competitor strategies. Improve follow-up strategies to maintain engagement with potential leads post-initial meetings.

Suggestions for Institute (course curriculum, industry interaction, placement, alumni): I suggest you to facilitate students with more real-time interactions, such as hospital visits and healthcare IT business development workshops and develop partnership with companies to offer students more practical training sessions and real-world problem solving experiences.

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

Date:

Place:

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ACKNOWLEDGEMENT

This dissertation represents not only my work at the desk but also a milestone in my academic journey. I owe my gratitude to all those people who have made this dissertation possible and because of whom my experience has been one that I will cherish forever.

First and foremost, I would like to express my deepest gratitude to my mentor, Dr Pankaj Talreja, for his excellent guidance.

I am also grateful to the faculty members and administrative staff of IIHMR, Delhi for their support and encouragement throughout my MBA program.

My sincere thanks also go to my colleagues at EHNOTE for the stimulating discussions Their support and encouragement have been essential in keeping me motivated.

I am deeply indebted to my family, whose love and encouragement have been my strength.

Thank you all for your support and encouragement.

Sincerely

Prannoy Mandal

IIHMR New Delhi (2022-24)

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Fig 1- EHNOTE timeline

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ABBREVIATIONS

1. **EHR-** Electronic Health Record
2. **AI-** Artificial Intelligence
3. **IPD-** In patient Department
4. **OPD-** Out patient Department **ORGANIZATION PROFILE**

Company summary

CEO: Amarnath Reddy C.

Name of mentor: Tejaswi Reddy
History of the Company:

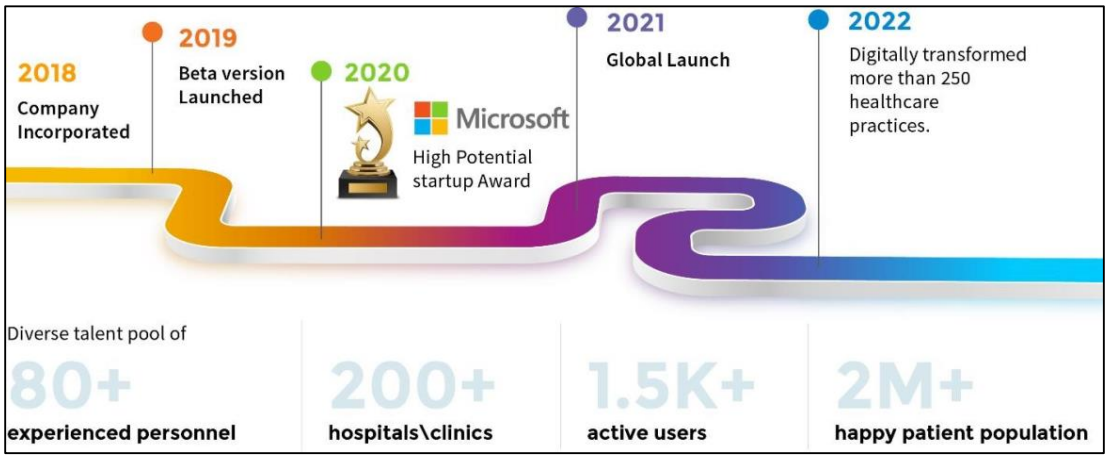


Fig 1: EHNOTE timeline

EHNOTE is set to disrupt healthcare putting a stop to delayed response times and improving the medical care. We share a common mission making it easier for caregivers to do their best for patients. We provide them with concierge-level care, very carefully

designing, executing and managing end-to-end client engagement programs. We begin with technology-driven marketing strategies. We have a passionate team of creative masterminds who are dedicated to developing state of the art designs based on technology and thought leadership. We craft in-context solutions for each of our business.

Company Commitments:

- From Volume to Value: Empowers professionals to deliver value-based care
- Data-Driven Decision-Making: Enables healthcare practices and providers to take decision based on real time data analytics.
- Seamless Engagement: Helps healthcare practices provide personalized experiences throughout the care journey.
- Enhanced Control: We help healthcare practices cut costs and reduce administrative overhead.
- Efficient Operations: The company's goal is to increase at-work time for healthcare practices and improve efficacies across the board.
- Empowers healthcare practices to guard themselves against revenue leakages and scale their financial heights.

ABSTRACT

Background

This dissertation investigates the workflow mapping of an Ophthalmology Electronic Health Record (EHR) system developed by EHNOTE. As healthcare moves from paperbased records to digital platforms, the transition to specialized EHR systems is essential for enhancing healthcare delivery and management. EHNOTE's EHR system is specifically designed to cater to the unique needs of ophthalmology, aiming to streamline workflows, improve patient care, and increase overall efficiency.

Objectives

The primary objectives of this study are:

1. To map the workflow of the latest version of EHNOTE's Ophthalmology EHR system.
2. To compare the new version with the older EHR system and identify the benefits and improvements.

Methods

A descriptive study design was employed, relying on secondary data sources such as Software Requirement Specifications (SRS) documents, the EHNOTE website, and company implementation records. The study involved a systematic review and process mapping of these existing documents to analyze the EHR system's implementation and usage.

Key Findings

- The new version of the EHNOTE EHR system offers enhanced stability, language support, and integration with non-clinical departments such as optical pharmacy and inventory.
- Key features include autofill to reduce manual data entry errors, integrated kiosks for patient self-registration, and support for doctor referrals.
- The system's modular design covers various aspects of ophthalmic care, including outpatient and inpatient management, insurance, pharmacy, inventory, optical counseling, CRM, referral, and audit.
- The new EHR system demonstrates improved performance, reliability, and user satisfaction compared to the older version.

Conclusion

The study concludes that the newer version of EHNOTE's EHR system significantly enhances ophthalmic practices by improving workflow efficiency, data security, and

patient care. The findings underscore the importance of adopting advanced, specialized EHR systems to meet the evolving demands of modern healthcare and drive innovation in the field.

Limitations

- The study relied solely on secondary data, without primary data collection from users or stakeholders, which may limit the depth and relevance of the insights.
- The research was entirely theoretical, based on existing documents and literature, and lacked practical real-time observations or user feedback.

BACKGROUND

Innovative digital health solutions are laying the groundwork for a more efficient and effective healthcare system. The transition from paper-based records to digital platforms is a critical step for enhancing healthcare delivery and management. Digital health technologies not only streamline processes but also improve accuracy, accessibility, and the overall quality of care. This shift is inevitable for healthcare providers aiming to keep pace with advancements and meet the growing demands of modern medicine.

One of the most significant advancements in this digital transformation is the development of Electronic Health Record (EHR) systems. These systems have revolutionized how patient information is recorded, stored, and accessed. With numerous options available, healthcare institutions face the challenge of selecting the most suitable EHR system for their specific needs. This dissertation focuses on uncovering the practical applications and benefits of EHNOTE, an EHR system specifically designed for ophthalmology.

EHNOTE is a pioneering company dedicated to transforming healthcare through innovative digital solutions. The company's mission is to enhance the efficiency and

effectiveness of medical care by providing cutting-edge EHR systems that cater to the unique needs of various medical specialties. EHNOTE is committed to making healthcare more accessible and manageable for both providers and patients. EHNOTE stands out due to its focus on end-to-end client engagement programs, meticulously designed and managed to ensure optimal user experiences. The company's approach begins with technology-driven marketing strategies, highlighting their dedication to leveraging modern technology to improve healthcare outcomes. EHNOTE's passionate team of creative and technical experts is dedicated to developing state-of-the-art designs that are both user-friendly and technologically advanced.

The company's flagship product, the ophthalmology-focused EHR system, exemplifies their innovative approach. This system is meticulously crafted to meet the specific needs of ophthalmologists, integrating various functionalities that streamline workflows, enhance patient care, and improve overall efficiency. EHNOTE's solutions are designed to be intuitive and adaptable, ensuring that healthcare providers can focus more on patient care and less on administrative tasks.

OBJECTIVES

1. **To Map the Workflow of the Newer Version of the Ophthalmology EHR System:**

This objective involves a detailed analysis of the processes and operations of the latest version of EHNOTE. By mapping out the workflow, this study aims to identify how the system supports and enhances ophthalmic practices. This includes understanding how the system integrates with existing workflows and the specific features that contribute to its effectiveness.

2. **To Compare the Newer Version with the Older EHR System and Identify the Benefits:**

This objective focuses on evaluating the improvements and advantages of the newer version of EHNOTE over the previous version. The comparison will assess various factors such as efficiency, user satisfaction, and overall impact on healthcare delivery. By identifying the benefits, this study aims to demonstrate how the latest version of EHNOTE contributes to better patient outcomes and more efficient healthcare management.

By achieving these objectives, this dissertation aims to provide valuable insights into the effectiveness of EHNOTE in transforming ophthalmic healthcare practices. The findings will highlight the system's role in enhancing workflow efficiency, improving patient care, and meeting the specific needs of ophthalmology. Through a comprehensive analysis of EHNOTE's features and benefits, this study will contribute to the broader understanding of how specialized EHR systems can drive innovation in healthcare.

LITERATURE REVIEW

The implementation and development of Electronic Medical Record (EMR) systems have been extensively studied, highlighting their critical role in enhancing healthcare delivery. Smith PD's study, "Implementing an EMR System: One Clinic's Experience," provides an insightful examination of a clinic's journey in adopting an EMR system. The study underscores the importance of meticulous planning, comprehensive staff training, and strong stakeholder engagement for successful implementation. Key challenges identified include data migration issues and resistance to change among staff. Despite these challenges, the implementation resulted in significant positive outcomes, such as improved patient care, enhanced data accuracy, and increased operational efficiency. This underscores the potential of EMR systems to streamline healthcare processes and reduce manual errors.

Similarly, the paper by Funmil A and Ozichi E, "Development of An Electronic Medical Record (EMR) System for A Typical Nigerian Hospital," focuses on developing a customized EMR system tailored for a Nigerian hospital. The study elaborates on the system's design and implementation phases, highlighting essential features like patient registration, appointment scheduling, comprehensive medical history recording, billing, and reporting functionalities. The authors emphasize the importance of a user-friendly interface and robust database management to ensure data integrity and security. Challenges such as technical issues, data migration, and initial resistance to technological change were addressed through pilot testing, staff training, and iterative system improvements. The implementation of this EMR system led to enhanced efficiency in managing patient records, minimized errors, and improved overall patient care, showcasing the system's substantial benefits.

Both studies collectively highlight several critical aspects of EMR systems that are pertinent to secondary research on EMR software features and benefits. The importance of user-friendly interfaces and comprehensive training programs is emphasized to ensure effective utilization and user satisfaction. Additionally, the iterative improvement process, driven by user feedback, is crucial in addressing unforeseen challenges and optimizing system performance. The demonstrated benefits, including improved patient care, enhanced data accuracy, and operational efficiency, reinforce the value of EMR systems in modern healthcare settings.

"A case study of an EMR system at a large hospital in India: Challenges and strategies for successful adoption" by Jeremiah Scholl, Shabbir Syed-Abdul, and Luai Awad Ahmed explores the implementation of an Electronic Medical Record (EMR) system in a large Indian hospital and addresses the challenges encountered, such as resistance from staff,

workflow disruptions, and technical issues. The study highlights strategies for overcoming these obstacles, including strong leadership, continuous training, and adapting the system to fit the hospital's workflow. The paper provides insights into the complexities and potential solutions for EMR adoption in large healthcare settings.

In conclusion, the literature underscores that the successful implementation of EMR systems hinges on detailed planning, addressing technical and human challenges, and continuous system optimization. These insights are invaluable for secondary research focused on evaluating the features and benefits of EMR software, providing a robust foundation for understanding the critical factors that contribute to the success and efficacy of EMR systems in healthcare.

METHODOLOGY

Study Design-

Descriptive Study: This research employed a descriptive design to thoroughly examine the EHNOTE ophthalmology-focused EHR system. The goal was to understand its practical applications and workflow through an in-depth analysis of secondary data sources.

Data Type-

Secondary Data: The study relied on previously collected and existing data, eliminating the need for primary data collection.

Data Sources-

Existing SRS Documents: The study utilized Software Requirement Specifications (SRS) documents provided by the EHNOTE company. These documents detailed the system's functionalities, requirements, and design specifications.

EHNOTE Website: The official website of EHNOTE served as a significant source of information, providing insights into the company's offerings, updates, and system features.

Company Implementation Records: Historical records and documentation of the EHNOTE system's implementation in various healthcare settings were reviewed. These records helped in understanding the practical challenges and strategies involved in deploying the system.

Data Collection Method-

Desk Review (Process Mapping): A systematic review and process mapping of existing documents were conducted. This method involved scrutinizing the SRS documents, website content, and implementation records to map out the processes involved in the system's implementation and usage.

Review of Grey Literature: The study also included an examination of non-peerreviewed materials, such as company reports, white papers, and other relevant documents. This review aimed to gather comprehensive information about the system's practical applications and benefits.

Time Period-

March 2024 - June 2024: The study was conducted over a four-month period, allowing sufficient time for thorough data collection, analysis, and review.

Ethical Considerations-

Not Applicable: Since the study solely involved secondary data and did not involve human subjects, there were no specific ethical considerations or requirements for ethical approval.

Limitations-

Primary Data Not Collected: One significant limitation was the absence of primary data collection. The study did not include new data from users or stakeholders, which might limit the depth and relevance of the insights.

Completely Theoretical Study: The research was based on theoretical analysis, utilizing existing documents and literature without practical, real-time observations or user feedback.

Tools

Flow Chart: Flow charts were used to visualize the steps and processes involved in the implementation and workflow of the EHNOTE system. These diagrams provided a clear and sequential representation of the implementation stages.

Fish Bone Diagram: Also known as Ishikawa or cause-and-effect diagrams, these were used to identify potential challenges and root causes that could affect the implementation process. This tool helped in systematically analysing the factors contributing to any issues encountered.

Wire Frame Diagram: Wireframe diagrams provided a skeletal framework of the user interface design. They depicted the layout, navigation structure, and key interface elements of the EHNOTE system, facilitating an understanding of the system's usability and design.

These components collectively provided a structured and comprehensive approach to understanding and evaluating the EHNOTE ophthalmology EHR system. By leveraging secondary data and employing various analytical tools, the study aimed to uncover the system's practical applications, benefits, and challenges in a healthcare setting.

RESULTS

Modules in the EHNOTE EHR System

1. The **Optometrist Dashboard** in the EHNOTE EHR system provides optometrists with easy access to patient information, examination results, and treatment plans, facilitating quick and informed decision-making. This module is specifically designed to streamline the workflow of optometrists by presenting all necessary patient data in a cohesive and easily navigable interface.
2. The **Ophthalmologist Dashboard** offers detailed patient history, diagnostic tools, and treatment options, which streamline the clinical process for ophthalmologists. This module is tailored to meet the specific needs of ophthalmologists, ensuring that they have comprehensive access to all relevant patient information and diagnostic tools necessary for effective treatment.
3. The **Insurance Dashboard** manages insurance claims and patient eligibility, simplifying the reimbursement process for both patients and healthcare providers. This module ensures that all insurance-related activities are handled efficiently, reducing administrative burdens and ensuring timely reimbursements.
4. The **Pharmacy Dashboard** enables efficient medication management, including prescription handling and inventory control, ensuring that patients receive the correct medications promptly. This module integrates seamlessly with other aspects of the EHR system to provide a holistic approach to medication management.
5. The **Inventory Dashboard** assists in maintaining and tracking medical supplies and equipment, reducing the risk of stockouts and ensuring the availability of necessary items. This module is crucial for the smooth operation of the healthcare facility, ensuring that all essential supplies are readily available.

6. The **Optical Dashboard** focuses on the optical shop operations within the hospital, managing orders, inventory, and sales, thereby enhancing patient services. This module supports the optical shop in providing comprehensive eye care services, including the dispensing of corrective lenses and other optical products.
7. The **Counsellors Dashboard** supports patient counselling sessions by documenting interactions and recommendations, which helps in providing personalized care. This module ensures that all counselling sessions are welldocumented and that patients receive tailored advice and support.
8. The **Referral Dashboard** facilitates the referral process, ensuring smooth transitions and communication between primary care providers and specialists. This module helps in coordinating care among different healthcare providers, ensuring that patients receive timely and appropriate referrals.
9. The **Audit Dashboard** is essential for compliance and quality assurance, allowing for the monitoring and evaluation of clinical practices and administrative processes. This module supports healthcare facilities in maintaining high standards of care and regulatory compliance.
10. The **Report Generation** feature offers customizable templates and over 150 types of reports, providing detailed insights into various aspects of hospital operations and patient care. Additionally, this module can acquire data from older HMIS software, ensuring continuity and completeness of patient records. These modules collectively enhance the efficiency, accuracy, and quality of ophthalmic care, supporting healthcare providers in delivering superior patient outcomes.

Working of the old EHR system

The workflow outlines the sequential steps involved in managing a patient's journey through a healthcare system, facilitated by the EHR (Electronic Health Record) system. This comprehensive process ensures efficient and effective patient care, from the initial registration to follow-up and data analytics.

Patient Registration:

The first step in the workflow is patient registration, where the patient's basic demographic information and contact details are collected. This process may also include obtaining

insurance information and assigning a unique patient identifier. Accurate registration is crucial as it forms the basis for the patient's medical record and subsequent interactions with the healthcare system.

Appointment Scheduling:

Once registered, the next step involves scheduling appointments. This includes booking initial consultations, follow-up visits, and any necessary diagnostic tests or procedures. Effective appointment scheduling helps in managing the healthcare facility's resources and ensures that patients receive timely care.

Medical History Review:

Before the patient meets with the healthcare provider, their medical history is reviewed. This step involves gathering and analysing past medical records, including previous diagnoses, treatments, medications, allergies, and family health history. A thorough medical history review is essential for accurate diagnosis and personalized treatment planning.

Diagnostic Test Entry:

If diagnostic tests are required, the results are entered into the EHR system. This may include laboratory tests, imaging studies, and other diagnostic procedures. Recording diagnostic test results accurately and promptly is vital for guiding treatment decisions and monitoring patient progress.

Treatment Planning:

Based on the medical history and diagnostic test results, a treatment plan is developed. This plan outlines the recommended interventions, therapies, and medications necessary for managing the patient's condition. Collaborative treatment planning often involves multiple healthcare professionals to ensure comprehensive care.

Prescription Management:

Prescription management involves creating, reviewing, and renewing medication prescriptions. The EHR system ensures that prescriptions are accurate, includes dosage instructions, and checks for potential drug interactions. Efficient prescription management enhances patient safety and adherence to treatment.

Billing and Insurance:

Following treatment, the billing and insurance processes are initiated. This step includes generating invoices, processing insurance claims, and handling patient payments. An integrated EHR system streamlines these processes, reducing administrative burden and ensuring accurate financial transactions.

Follow-up Scheduling:

After the initial treatment, follow-up appointments are scheduled to monitor the patient's progress and adjust the treatment plan as necessary. Follow-up scheduling is crucial for ongoing care and ensures that any issues or complications are promptly addressed.

Data Reporting and Analytics:

The final step involves data reporting and analytics. The EHR system compiles data from the patient's journey to generate reports and insights. These analytics can be used to improve healthcare delivery, track outcomes, and support decision-making. Continuous data analysis also contributes to research and quality improvement initiatives within the healthcare facility.

This detailed workflow illustrates how an EHR system supports the entire patient care continuum, from registration to data analytics, enhancing the efficiency and quality of healthcare services.

Gaps identified in the older EHR system

-Frequent system crashes and downtime.

-Limited to a single language for reports.

-Exclusion of non-clinical departments such as optical, pharmacy, and inventory.

-Lack of internal and external doctor referral capabilities.

-Manual data entry required for refraction findings and examinations.

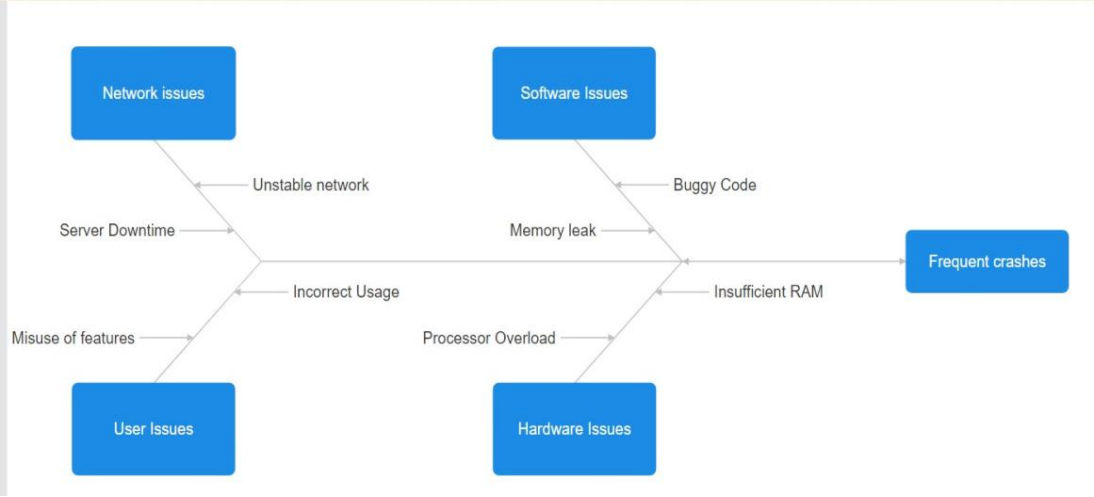
-No patient self-registration kiosks.

-Poor data migration with risks of data loss or corruption.

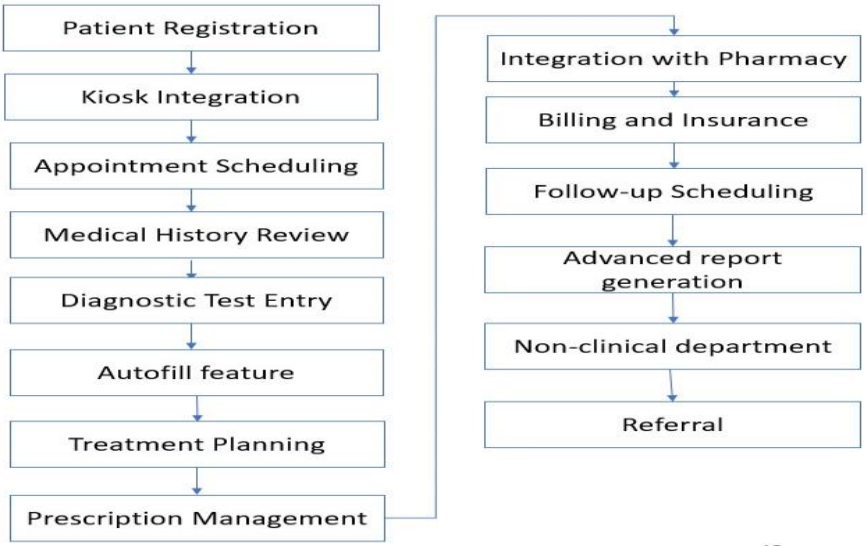
-Complex and non-intuitive navigation.

-Limited dashboard views and reporting capabilities.

Root cause diagram for frequent crashes



Working of New EHR System



Benefits of the Newer Version Over the Older Version

Enhanced Stability: The new version eliminates frequent system crashes, ensuring a more reliable performance.

Language barrier: The newer version of the EHR system prints the reports in multiple languages for example Bengali, Marathi etc

Non-clinical department inclusion: The newer version includes non-clinical departments like optical, pharmacy, inventory, insurance to increase optimization.

Referrals: the newer version has internal and external doctor referral possible which was not possible in the older version.

Autofill feature: The newer version has autofill feature in the refraction findings and examination part of the software where optometrists need not manually put the values.

Kiosk integration: The newer version has an integrated kiosk for self-registration by the patients. It reduces the time.

DISCUSSION

The new EHR system offers enhanced stability, eliminating frequent crashes and ensuring reliable performance with minimal downtime.

It supports multiple languages, such as Bengali and Marathi, making reports more accessible.

By including non-clinical departments like optical, pharmacy, and inventory, the system optimizes overall operations.

The new system also supports internal and external doctor referrals, improving patient care coordination.

An autofill feature reduces manual data entry and errors in refraction findings and examinations.

Additionally, integrated kiosks for patient self-registration significantly reduce wait times and improve efficiency.

CONCLUSION

This EMR software designed for ophthalmology hospitals and centres.

Its modular design covers outpatient and inpatient management, insurance, pharmacy, inventory, optical, counselling, CRM, referral, and audit, enhancing operational efficiency across departments.

The software's advanced report generation feature supports detailed insights for both clinical and non-clinical operations.

This software ensures smooth data migration, maintaining data integrity during transitions.

Its cloud-based infrastructure, built on Microsoft Azure, offers robust, military-grade data security and remote accessibility.

Overall, this is a powerful tool for improving efficiency, data security, and patient care in ophthalmology hospitals and centres.

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