Internship Training

At

Deloitte Consulting Pvt. Ltd.

Root Cause Analysis Of Issues In Patient Registration Department Of An EMR Implemented In U.S. Healthcare Facilities

By

Dr. Nabeela Ilyas

PG/14/038

Under The Guidance Of

Dr. Anandhi Ramachandran

Post Graduate Diploma in Hospital and Health Management

2014-16

International Institute of Health Management Research

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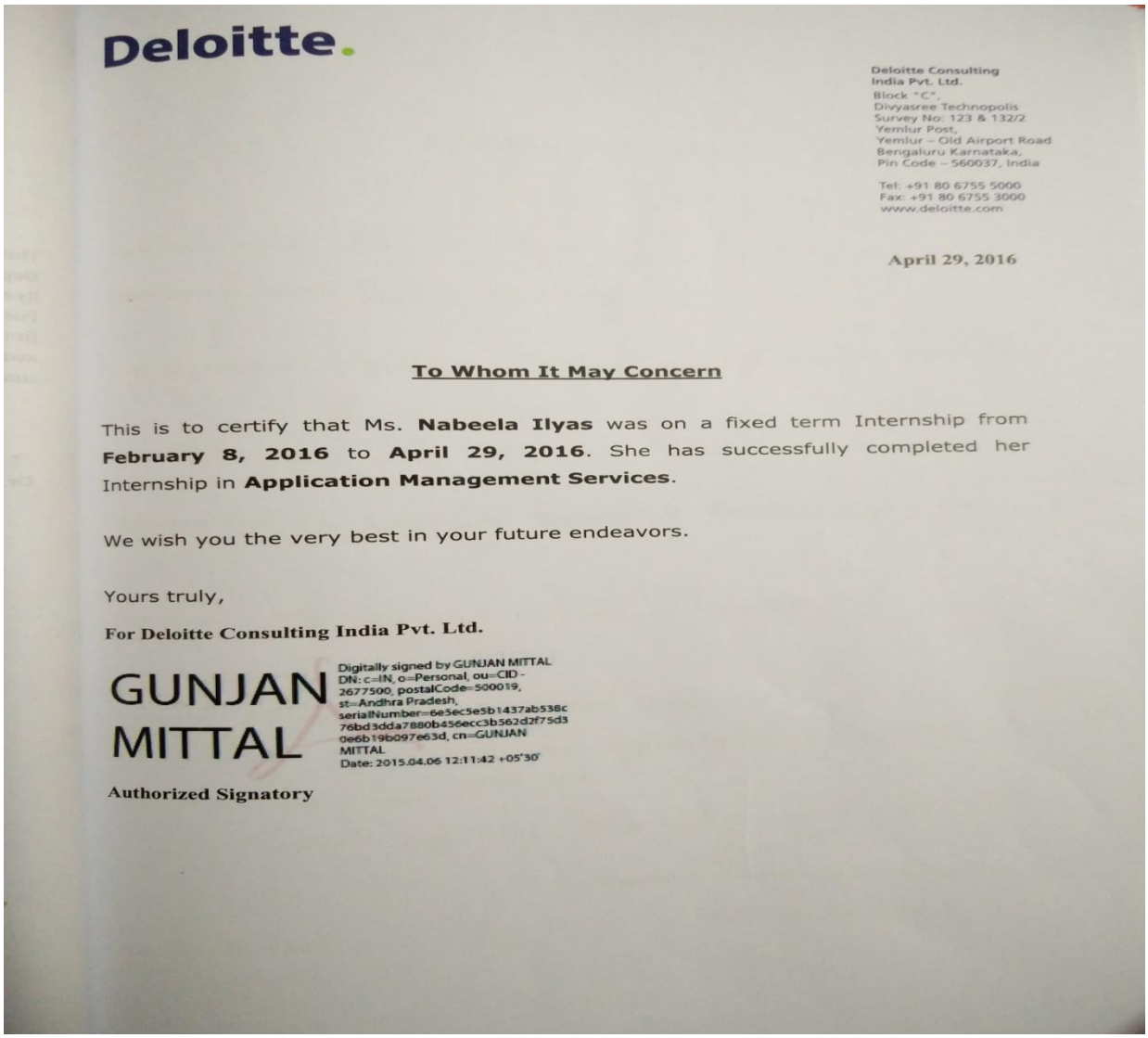

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April 29, 2016

To Whom It May Concern

This is to certify that Ms. **Nabeela Ilyas** was on a fixed term Internship from **February 8, 2016** to **April 29, 2016**. She has successfully completed her Internship in **Application Management Services**.

We wish you the very best in your future endeavors.

Yours truly,

For Deloitte Consulting India Pvt. Ltd.

GUNJAN MITTAL

Digitally signed by GUNJAN MITTAL
DN: c=IN, o=Personal, ou=CID - 2677500, postalCode=500019, st=Andhra Pradesh, serialNumber=6e5ec5e5b1437ab538c76bd3dda7880b456ecc3b562d2f75d30e6b19b097e63d, cn=GUNJAN MITTAL
Date: 2015.04.06 12:11:42 +05'30'

Authorized Signatory

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Nabeela Ilyas**, student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from International Institute of Health Management Research, New Delhi has undergone internship training at **Deloitte Consulting India Pvt. Ltd.** from **February 8,2016** to **April 29,2016**. 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. A.K. Agarwal

Dean, Academics and Student Affairs

IIHMR, New Delhi

Dr. Anandhi Ramachandran

Associate Professor

IIHMR, New Delhi

CERTIFICATE OF APPROVAL

The following dissertation titled **Root Cause Analysis Of Issues In Patient Registration Department Of An EMR Implemented In U.S. Healthcare Facilities** at **Deloitte Consulting India Pvt. Ltd.** 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 Post Graduate Diploma in Health and Hospital 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. Gustad Dommen John	
Dr. Anandi Ramadas	
Dr. Nishikant Bele	

Certificate from Dissertation Advisory Committee

This is to certify that Dr. Nabeela Ilyas, a graduate student of the Post- Graduate Diploma in Health and Hospital Management has worked under our guidance and supervision. She is submitting this dissertation titled "ROOT CAUSE ANALYSIS OF ISSUES IN PATIENT REGISTRATION DEPARTMENT OF AN EMR IN U.S. HEALTHCARE FACILITIES" at "Deloitte U.S India Consulting" in partial fulfillment of the requirements for the award of the Post Graduate Diploma in Health and Hospital 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. Anandhi Ramachandran
Associate Professor,
IIHMR, Delhi

Uday Kamat
Manager AMS
Deloitte US India, Bangalore

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled **Root Cause Analysis of Issues in Patient Registration Department of an EMR Implemented in U.S. Healthcare Facilities** and submitted by **Dr. Nabeela Ilyas** Enrollment No. **PG/14/038** under the supervision of **Dr. Anandhi Ramachandran** for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from **February 8,2016** to **April 29,2016**, 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.

Dr. Nabeela Ilyas

FEEDBACK FORM

Name of the Student: Nabeela Ilyas

Internship Institution: Deloitte Consulting

Area of Training: Admission, Discharge and Transfer workflows of an EMR

Attendance: 100%.

Objectives met: Yes, she has completed her internal trainings.

Deliverables: She has met all the deliverables.

Strengths: Nabeela has got good knowledge in the workflows. Her presentation was appreciated by everyone. Overall She did a good job.

Suggestions for Improvement:
I don't see any. She did a good job.

Signature of the Officer-in-Charge (Training)

(BRINDHA JAYABAL)

Date: 29/Apr/2016
Place: Bangalore

ABSTRACT:

Electronic health record (EHR) systems enable hospitals to store and retrieve detailed patient information to be used by health care providers, and sometimes patients, during a patient's hospitalization, over time, and across care settings. Embedded clinical decision support and other tools have the potential to help clinicians provide safer, more effective care than is possible by relying on memory and paper-based systems.[1] In addition, EHRs can help hospitals monitor, improve, and report data on health care quality and safety. The EHR systems facilitate patient safety and quality improvement through: use of checklists, alerts, and predictive tools; embedded clinical guidelines that promote standardized, evidence-based practices; electronic prescribing and test-ordering that reduce errors and redundancy; and discrete data fields that foster use of performance dashboards and compliance reports. Faster, more accurate communication and streamlined processes have led to improved patient flow, fewer duplicative tests, faster responses to patient inquiries, redeployment of transcription and claims staff, more complete capture of charges, and federal incentive payments.[2] The patient registration department handles all the business functions like admitting the patient in the hospital, managing Inpatients/Outpatients, registering a new/existing patient, transferring the patient to a new facility, accepting a patient from a referral, registering patient in the emergency department or into gynecology department, discharging the patient after completion of his purpose of visit, handling guarantor/coverage/billing errors etc. Admission being the first and the most important step of the EMR workflow, affects all the consecutive processes. Any problem arising during this step can have a domino effect on the whole hospital functionality. This study analyses the commonly occurring challenges faced by the user while doing any of the aforementioned processes. 405 issues were gathered from Incident Management Tool

occurring over the past few months during admitting, discharging or transferring patients. A Root Cause Analysis was done to find out the major problem areas and the recommendations were provided to reduce the recurrence of the similar types of issues in future.

ACKNOWLEDGEMENT

It is not possible to prepare a project report without the assistance and encouragement of other people. This one is certainly no exception.

On the very onset of this report, I would like to extend my sincere and heartfelt obligation towards all the people who have helped me in this endeavor. Without their active guidance, help, cooperation & encouragement, I would not have made headway in the project.

My deepest sense of gratitude towards **Mr. Uday Kamat,** Manager, Deloitte Consulting India Pvt. Ltd for his immense support and guidance. I am thankful and obliged to my mentor at Deloitte, **Ms. Brinda Jayabal** for giving me an opportunity to work on this report and for her continuous support, guidance and perseverance during the course of my report generation. I would like to express my special gratitude towards my Team at Deloitte, Bangalore for their kind co-operation and encouragement throughout the training period. They made sure I always had whatever I needed.

I am immensely grateful to my Mentor **Dr. Anandhi Ramachandran**, **Associate Professor, IIHMR, Delhi** for constantly counseling, motivating and guiding me. Her encouragement has enabled me to be a better person and a better worker. I am highly fortunate to express my gratitude and indebtedness to **Dr**. **A.K. Khokhar, Director, and IIHMR Delhi** for his invaluable inspiration.

It has been my good fortune to be benefited by their knowledge, guidance and deep insight without which this report would not have taken the exact shape. To them, I tender my heartfelt regards.

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LIST OF ABBREVIATIONS

HER	Electronic Health Records
ICT	Information and communication technologies
USR	User Service Request
EMR	Electronic Medical Record
U.S.	United States of America
ED	Emergency Department
OPD	Outpatient Department
IPD	Inpatient Department
ICU	Intensive Care Unit
SOP	Standard Operating Procedure

ORGANIZATION PROFILE

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LEARNING

During my internship in Deloitte Consulting India Pvt. Ltd, I learned about various things given below:

- US health care system and how providers and payors work together in health care industry
- Underwent trainings for various processes followed in the organization
- Underwent EMR specific trainings
- Brief knowledge about HIPAA
- Brief knowledge about impact of ICD-10 on operations
- Underwent other trainings related to healthcare industry

INTRODUCTION:

Information and communication technologies (ICTs) have great potential to improve health in both developed and developing countries by enhancing access to health information and making health services more efficient; they can also contribute to improving the quality of services and reducing their cost. Until recently, hospitals have led the way in the development of clinical information systems. This owed, in part, to several factors: 1) the cost of these systems (including personnel) made information technology too expensive for smaller entities, and 2) hospitals had greater need of meeting regulatory and financial requirements. Electronic Medical Records (EMRs) usually have, as their central component, an Admission, Discharge, and Transfer (ADT) system that manages census and patient demographic information.[3] Billing and accounting packages are also frequently included as core components. In the past fifteen years, most hospitals, regardless of size, have begun to create information systems solutions via integration of departmental systems with the core functions, although almost 20% still do not have electronic implementations of all major ancillary systems.[4] Electronic Health Records (EHRs) are computer systems that medical practices use instead of paper charts. All components of clinical practice are integrated into EHRs—from assessing a patient's chief complaint to developing a treatment plan. Everything that used to be handwritten by health care providers and staff is now entered into a computer, directly into the EHRs. EHRs are not only used to provide medical care, but also can manage all areas of a medical practice's daily operations. These electronic systems include registration of the patient, scheduling features, multi-faceted calendars and appointment reminder systems, transferring or discharging the patient and as well as functions for billing and submitting claims. A comprehensive EHR system has the ability to integrate and streamline the health care delivery process, thereby improving the quality of care, increasing efficiency and reducing the cost of healthcare delivery, as well as

to support research. [5] The EHR systems facilitate patient safety and quality improvement through: use of checklists, alerts, and predictive tools; embedded clinical guidelines that promote standardized, evidence-based practices; electronic prescribing and test-ordering that reduce errors and redundancy; and discrete data fields that foster use of performance dashboards and compliance reports. Faster, more accurate communication and streamlined processes have led to improved patient flow, fewer duplicative tests, faster responses to patient inquiries, redeployment of transcription and claims staff, more complete capture of charges, and federal incentive payments. [6] The modern era of clinical information systems is being driven by concerns of quality, patient safety, and cost, in addition to secondary business and operational issues. Today emphasis has shifted toward providing information systems that support providers during the process of care, resulting in the advent of CPOE systems and a much higher profile for EHRs.

An EHR system cannot simply be used directly as packed. Different groups of users, such as physicians, nurses, other healthcare professionals, administrators, computer professionals, and patients, are involved in the multidisciplinary field of healthcare. Users carry out many complex and time- consuming activities that complement the system. Such complementary activities have been found to be critical in generating benefits from new technology. But the picture is not perfect every time. It is well established that only 20% of physicians are active adopters of innovation and new technology.[7] EMR users require significant amounts of support. A myriad questions and issues arise –some trivial and some substantial, but all can lead to disenchantment and disillusionment if not handled appropriately.

Problems raised by them are called incident tickets. [8] These tickets are of 2 types: Request or Restoration. If something has to be changed or created, it's called request. In case they require a break-fix i.e. correct something that was earlier functioning smoothly, it's called restoration. There is a proper well defined process for the intake of service restoration incident. The analyst collects all required information from the user and gives resolution. The incident is closed after proper documentation.

The issue raised can be categorized into different priority levels according to severity namely:

1. **Critical**- has to be solved urgently
2. **High**- to be solved as soon as possible
3. **Medium**- Analyst can take some time but not more than a couple of days
4. **Low**- To be solved soon but time can be taken, as not affecting patient care adversely.

The patient registration department handles various business functions like admitting the patient in the hospital, managing Inpatients/Outpatients, registering a new/existing patient, transferring the patient to a new facility, accepting a patient from a referral, registering patient in the emergency department or into gynecology department, discharging the patient after completion of his purpose of visit, handling guarantor/coverage/billing errors etc. Sometimes while doing any of the above processes, the user hits a roadblock. This could be due to a fault in the system or due to his lack of training. To solve it, he contacts the service support team. In case they are unable to solve the issue, they reach out to the technical support team, which helps them sail through the problem with as less turbulence as possible. This report focuses on the issues which are cropping up regularly in the patient

registration department of the healthcare facilities using a particular EMR and the analysis of the issues was done in order to find out the problem areas.

REVIEW OF LITERATURE

Carroll et al [9] say that EHR systems are an integral part of efforts to promote health care quality, patient safety, and efficiency. Hospitals use their EHRs to facilitate performance measurement, monitoring, and improvement. They assist providers in crossing boundaries to exchange information and coordinate care across their health care system. The systems have helped promote evidence-based care through standardized electronic order sets, clinical guidelines, and immediate access to medical literature. Further, the EHRs have enhanced efficiency by alerting clinicians to duplicate orders, enabling faster prescribing and other orders, and reducing transcription, medical records, and claims expenses. Hospitals view their investment in the EHR as necessary and part of doing business. One hospital system that measured its impact, estimated significant savings from the EHR and a positive return on investment in five years of implementation. It also states that to realize the full potential of a comprehensive EHR, its adoption must be part of a strategic plan to promote an integrated, patient-centered continuum of care. It is an effective tool for improving coordination of care through faster and more accurate communication across care settings and between clinicians and patients. A comprehensive EHR can be a valuable tool for staff training and recruiting. Data about care decisions, and explanations for any decisions that conflict with recommended care, are embedded in the EHR and easily accessible for teaching purposes. However, the EHR does not change practice by itself, and workflows must be designed to support the use of valuable information contained in the EHR.

Meanwhile Goldberg [10] tries to understand the use of electronic health records in small primary care practices by exploring experiences and perceptions of physicians and staff toward the benefits, challenges, successful strategies for implementation and meaningful

use of advanced EHR functions. It states that usage of EHR resulted in physicians and staff reporting an increased efficiency in retrieving medical records, storing patient information, coordination of care, and office operations. While at the same time costs, lack of knowledge of EHR functions, and problems transforming office operations were few of the many challenges faced. A continued support of practice by providing technical assistance and financial incentives, grants, and/or loans can help the facilities in overcoming the challenges. Facilitators for adopting and using advanced EHR functions include team-based care, adequate technical support, communication and training for employees and physicians, alternative strategies for patient care during transition, and development of new processes and work flow procedures. Admission, discharge and transfer processes play a major role in handling patients in all the departments of a hospital such as ED, ICU, OPD, IPD etc.

Yoo et al [12] found that there is little information about end users' needs and requirements that arise during the routine use of full- EHR systems after implementation. To successfully meet these challenges in the next generation of EHR systems, EHR vendors should actively involve representative users from all departments and subspecialties in the entire process of system development, from user-requirement analysis to design, implementation, and usability testing. Users should continue to make suggestions about their needs and requirements for the system as their activities and tasks are tightly integrated with other technologies and the system, have been changed. The authors also suggest that the key factors to be considered in the development of future EHR systems are innovative new user-interface technologies; special extended functions for each type of users' specific-task-oriented requirements; powerful, easy-to-use functions for research support; new flexible system architecture; and patient-directed functions. Service requests on patient safety and

quality of care are important to support the activities of patient safety, especially for the care-support user group.

But Menachemi[13] says that despite a national push toward the adoption of health information technologies, much is still unknown about the use of IT in physician's offices. They surveyed all primary care physicians and a 25 percent stratified random sample of other specialists in Florida to better understand current trends and factors related to the use of IT in the ambulatory setting. Data was analyzed using logistic regression modeling techniques to compute adjusted odds ratios. Adoption of health information technologies (IT) has been heralded as a critical goal of a 21st-century healthcare system. Toward that goal, a national strategic plan for accomplishing broad IT adoption has been outlined. By the US government.[14] The goal of broad-scale IT adoption is partly based on evidence that suggests that IT in healthcare can improve quality and potentially save money. These benefits would accrue through a variety of mechanisms, which include ready access to medical records, more efficient test and drug ordering, fewer errors, and improved communication between providers. However, before the maximum benefits can be realized, electronic data will need to be pervasively available in all healthcare settings representing the full continuum of care.

OBJECTIVES:

General: To carry out root cause analysis of major issues leading to various service restoration incidents raised by end users of a notable EMR supported by the healthcare IT consultancy organization.

Specific objectives:

- Understand the workflow of the patient registration department adopting the EMR .
- To identify and analyse the different issues raised by the user.
- Identification of major problems occurring in the patient registration department.
- To identify the areas in the workflow where the issues crop up.
- Root cause analysis of the issues.
- Recommendations to minimize the issues.

RESEARCH METHODOLOGY

Research Design

Type of Research: Retrospective Descriptive Research

Sample Design

- Sample Unit: Issue
- Sample Size: 405
- Sampling Technique: Purposive Sampling
- Sampling Area: Hospitals and clinics in USA time zones.

Data Collection

- Source: Secondary Data
    - Data was collected from the system database from the period October'2015 to March'2016.
    - Data available on Internet and from journals
    - Desk Review of the EHR workflow
- Tools
    - The data was collected through incident management application.

Data Analysis

- Root Cause analysis

Techniques:

- Frequency Tables: it is statistical record of how often each value in a set of data occurs.
- Pareto Analysis: It helps to identify the top portion of causes that need to be addressed to resolve the majority of problems. While it is common to refer to Pareto as "80/20" rule, under the assumption that, in all situations, 20% of causes determine 80% of problems, this ratio is merely a convenient rule of thumb and is not nor should it be considered immutable law of nature. Pareto analysis technique makes it clear for an individual as where more efforts are required. It prevents an individual from putting efforts on low priority issues.

Due to the confidentiality clause in the healthcare organization providing support to the EMR, the names of the organization, EMR or the hospitals can't be mentioned. For that purpose, the hospitals were divided according to the time zones they fall in, namely Central and Pacific Time Zone. The organization will now be referred to as ABC Organization and software as XYZ EMR.

RESULTS and DISCUSSION

1. Based on the literature and desk review of the EHR the workflow followed by the EHR has been ascertained.

Admission being the first and the most important step of the EMR workflow affects all the consecutive processes. The outpatient workflow is as follows:

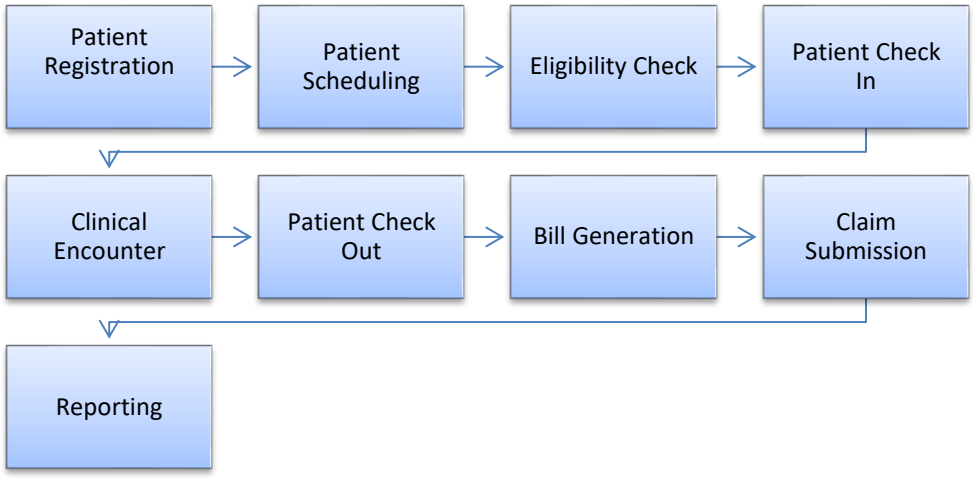

Figure 1.1: Process flow of outpatient department

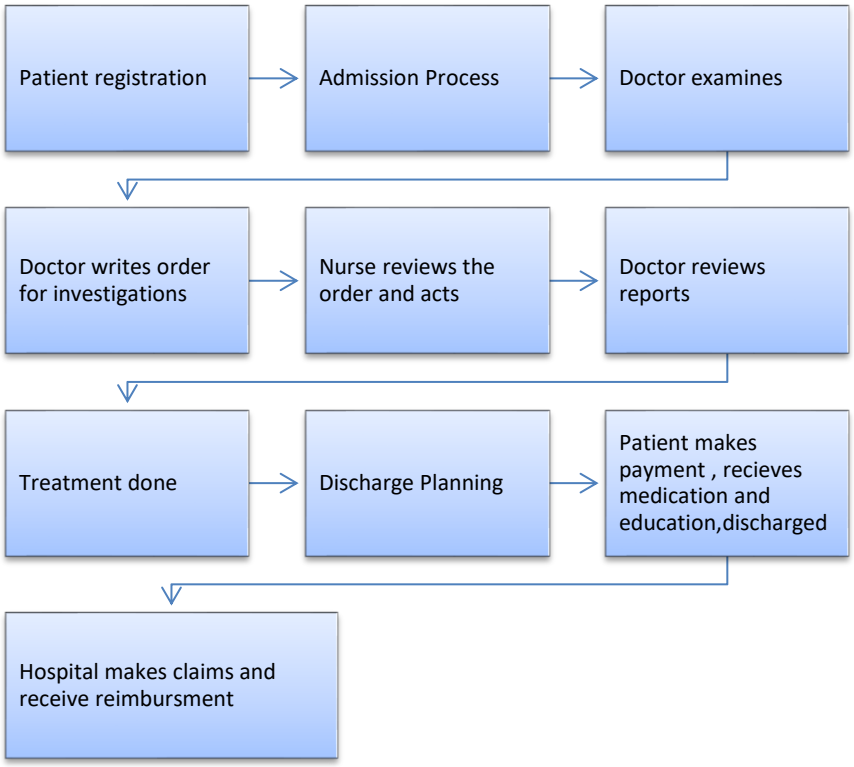

Figure 2: A Typical Process for Inpatient Care

A service restoration is raised whenever the end user faces a problem with the normal functioning of the EHR software. In case they require a break-fix i.e. correct something that was earlier functioning smoothly, they raise a ticket for restoration. There is a proper well defined process for the intake and resolution of service restoration incident.

Incident Intake Process:

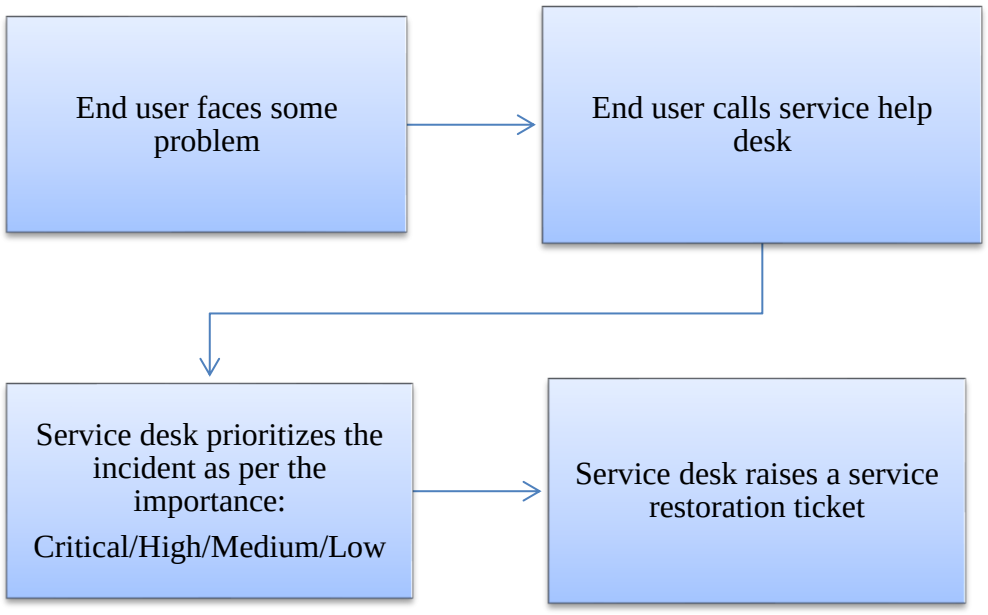

Figure 3: Incident Intake Process

Sometimes while doing any of the admission, discharge or transfer processes, the user hits a roadblock. This could be due to a fault in the system or due to his lack of training. To solve it, he contacts the service support team. Help desk tries to understand the issue and as per the user categorizes the ticket as per priority. Then a service restoration ticket is raised and the incident is received by an analyst.

The issue raised can be categorized into different priority levels according to severity, namely:

1. **Critical**- has to be solved urgently
2. **High**- to be solved as soon as possible
3. **Medium**- Analyst can take some time but not more than a couple of days
4. **Low**- To be solved soon but time can be taken, as not affecting patient care adversely.

Incident Resolution Process:

Once the incident has been received by an analyst, the analyst starts resolving the issue.

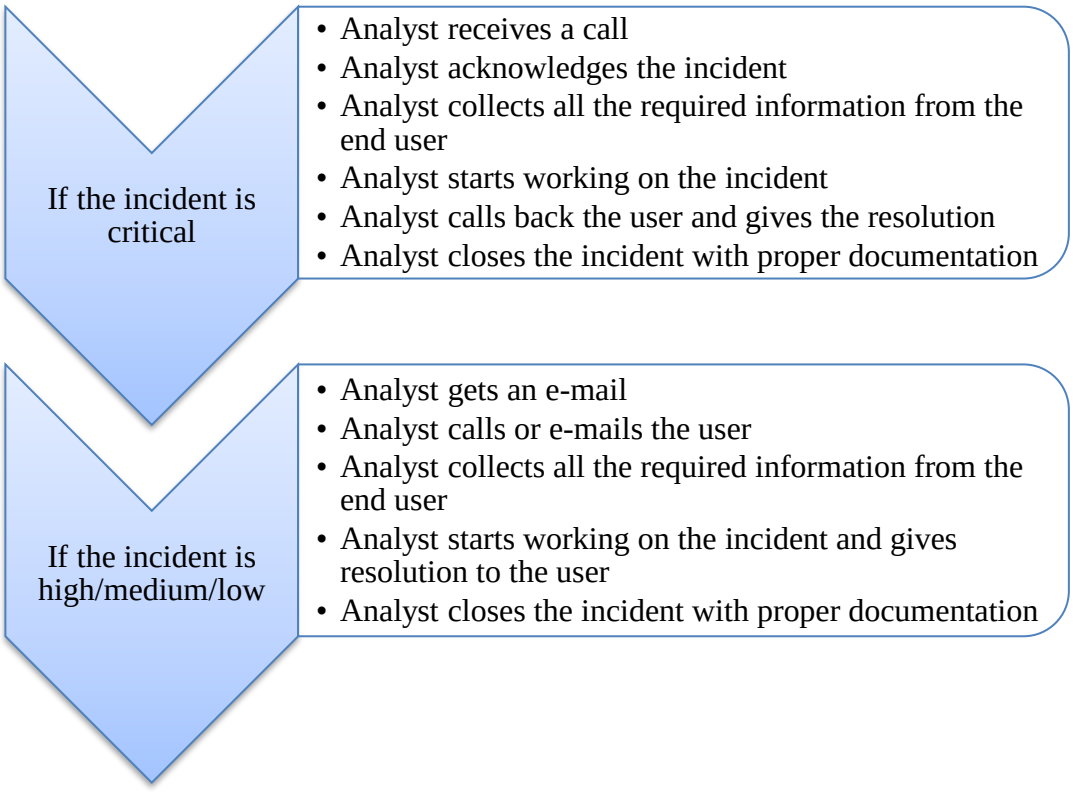

Figure 4: Incident Resolution Process

If the incident is critical: the analyst immediately responds to it as it is affecting patient care directly. The analyst gets a phone call for a critical incident. As it is critical, the analyst starts working on it after collecting all the required information from the user. Then the analyst calls back the user and gives the appropriate resolution. After confirmation from the user, the analyst closes the incident with all the required documentation.

If the incident is high or medium or low: the analyst gets an e-mail in which all the details regarding the incident are mentioned. Still if the analyst finds some information missing, the analyst emails the user and asks for the information. After collecting all the information, the analyst starts working on it and gives the user a resolution. After confirmation from the user, the analyst closes the incident with all the required documentation.

There is also a specified time limit within which the analyst is required to respond to the incident and resolve it.

2. **User Service Restoration.**

Table 1: Total no. of User Service Restorations in the past 6 months

Timeline	**No. of Issues**
October'2015-March'2016	**405**

3. **Priorities of overall issues:**

Table 2: Total no. of User Service Restorations based on the priorities

Priority	**No. Of issues**
Critical	173
High	157
Medium	41
Low	34

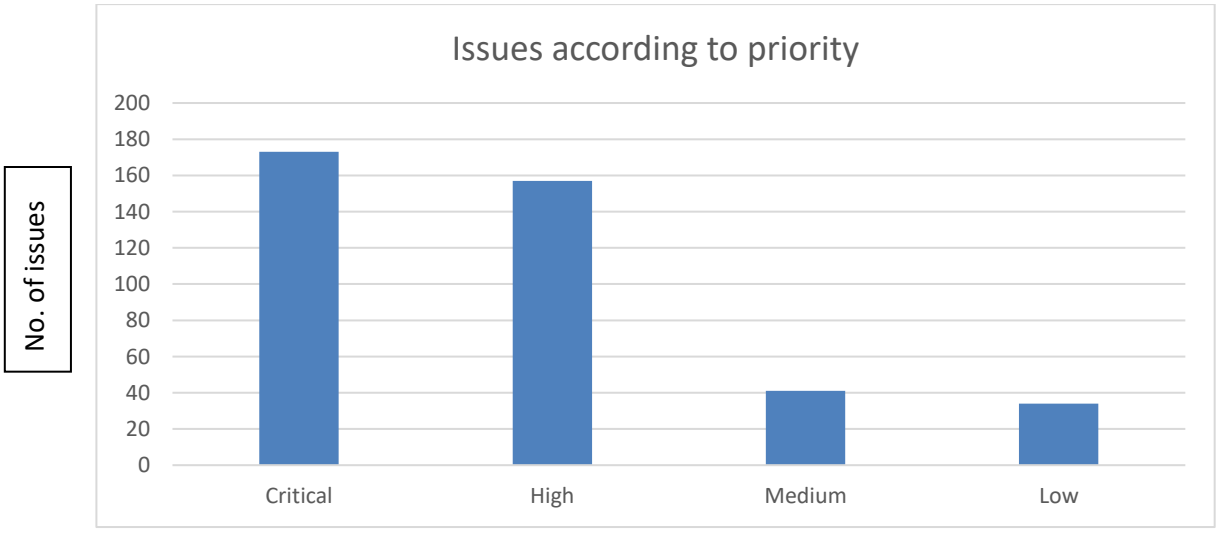

Figure 5: No. of issues according to priority

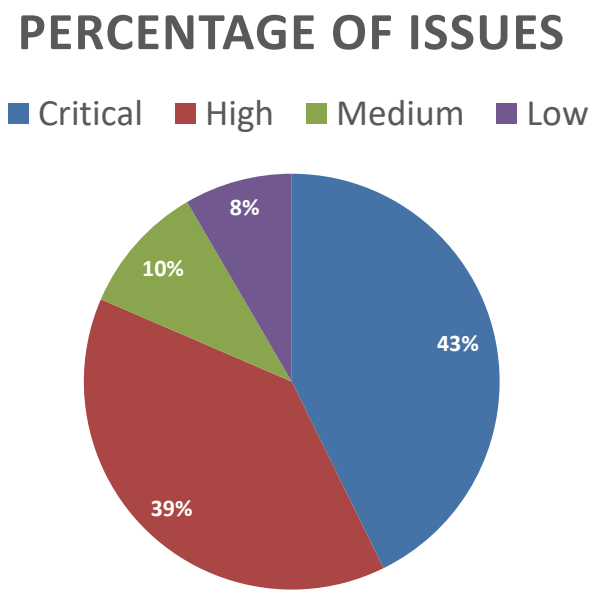

Figure 6: Percentage of issues

4. Incoming of issues according to region:

Table 3: Total no. of User Service Restorations based on the priorities in Central and pacific region

Priority	**Central**	**Pacific**
Critical	119	52
High	89	69
Medium	29	13
Low	14	20

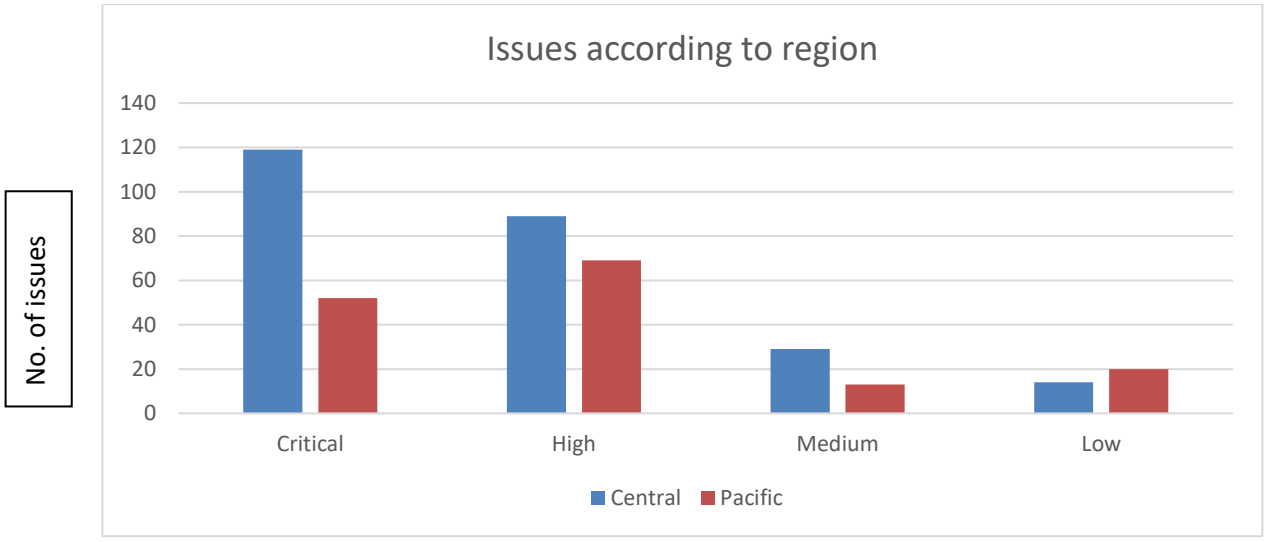

Figure 7: No. of issues according to priority and region

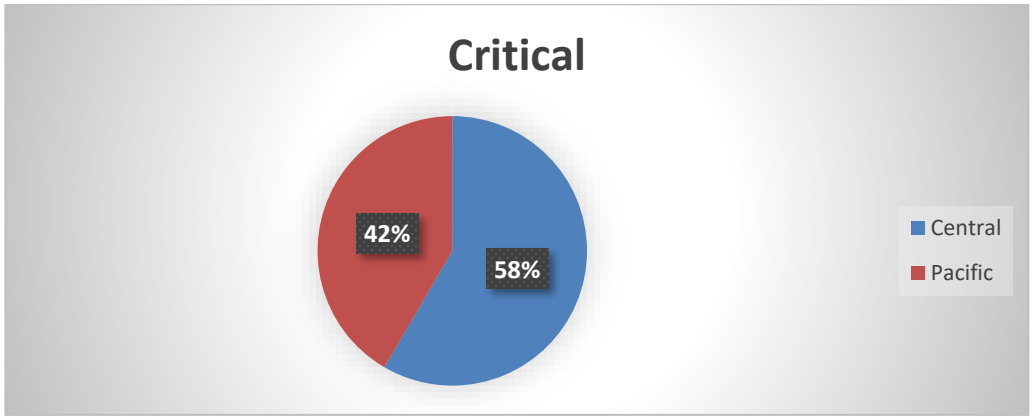

Figure .8.1: Comparison of issues according to priority

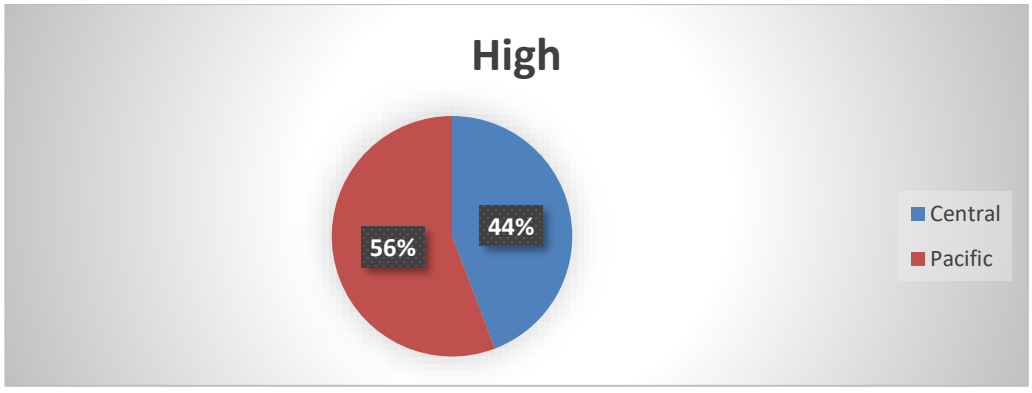

Figure 8.2: Comparison of issues according to priority

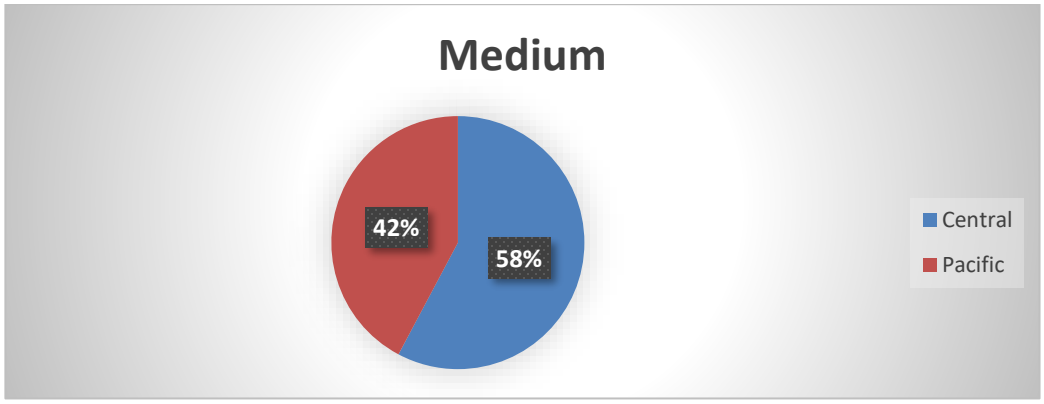

Figure 8.3: Comparison of issues according to priority

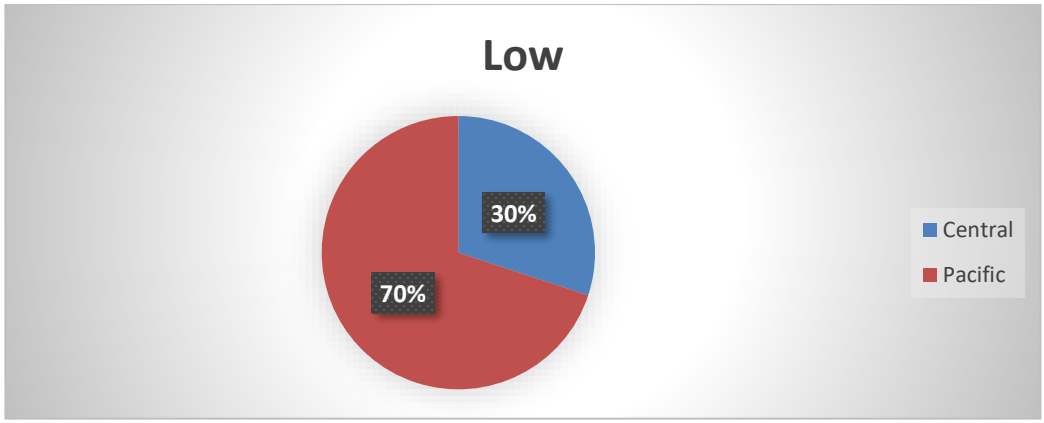

Figure 8.4: Comparison of issues according to priority

5. Root cause analysis of the overall issues:

Table 4: No. of issues according to type of issues

Type of issue	No. of issues
Admit	48
Discharge	36
Registration	36
Transfer	30
Print/scan	26
Coverage	20
Bed planning	20

Signature Pad	18
Insurance issue	14
Order	11
Patient account	10
Labor & Delivery	8
guarantor	6
Patient Class	6
Downtime	5
Work queue	5
Miscellaneous	39

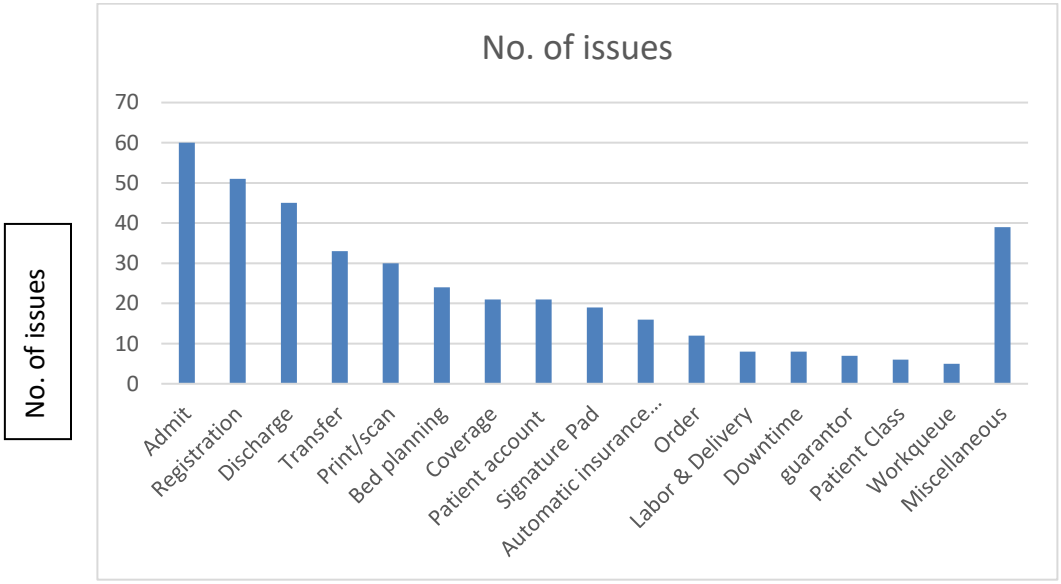

Figure 9: No. of issues according to type of issues

ANALYSIS

As part of the project, the root cause analysis of the issues faced by the end users after the implementation of the EHR in patient registration department has been done.

- The issues raised by the end users that were taken into consideration for this project were 405 User Service Restorations occurring over the past 6 months.
- EHR is implemented in across the clinics and hospitals in the US. As the registration department is very crucial part of any health facility and it directly impacts the patient care. So on the basis of the impact on patient care, the priority of the issues can be categorized into 4 levels, i.e., Critical, High, Medium and Low.
- The critical issues, as the name suggests, are those which have the highest impact on the patient care and are extremely urgent. Such issues have to be resolved in the least time period.
- The analysis of the issues reveal that out of 405 issues analyzed for the year 2015-16, 173 were critical, 157 were high priority issues, 41 were that of medium priority and remaining 34 were that of low priority. So the critical issues being the maximum of all accounts for 48% of the issues after the implementation of the EHR, high issues accounts for 37% of the issues, medium issues accounts for 10% of the issues and issues with low priority accounts for 8% of the issues.
- The root cause analysis of the all the issues, reveals that there are 16 major categories in which all the issues raised by the end user after the implementation of the Outpatient EHR, can be categorized into. They are: Discharge, Admit, Signature Pad, Patient account, Print/scan, Bed planning, Registration, Downtime, Automatic Insurance Confirmation, Labor & Delivery, Transfer, Coverage, Guarantor, Order, Patient Class, Work queue and Miscellaneous.

- What each bucket means:
    - **Admit**: When users faced issues while admitting the patient.
    - **Discharge**: when users has problem while discharging the patient.
    - **Registration**: When the end user was unable to register the patient.
    - **Transfer**: Includes cases when user was unable to transfer the patient to any other department.
    - **Print/scan**: when user had printer mapping issue or unable to scan patient bands
    - **Coverage**: Issue associated with insurance cover
    - **Bed planning**: Problem while allotting a bed or process related with bed assignments.
    - **Signature Pad**: These are usually not a patient registration issue but they come erroneously to this department.
    - **Automatic insurance confirmation**: when there is some issue in getting automatic verification from the insurance company.
    - **Order**: these are also not patient registration department's area of concern but sometimes they get tickets when the physician is unable to complete any order.
    - **Patient account**: when patient record is locked, so the patient information can't be accessed.
    - **Labor & Delivery**: When the user is unable to admit/transfer/discharge a mother or a baby.
    - **Guarantor**: When the guarantor information is invalid or incorrect.

- **Patient Class**: When user faces issue while setting the patient class like inpatient/outpatient, as this is really important for generating patient billing.
- **Downtime**: When the server is down for performing patch updates, the users have to update the patient records once the system is up and running again. Sometimes they face issue while executing that function.
- **Work queue**: these are lists which show all the patient encounters which have some errors (these are manually set). When the user faces any problem regarding these lists, it falls under this.
- **Miscellaneous**: Those incident tickets which do not fall under any of the above categories, are in minority or were resolved by the user themselves without the analyst's help.

- The maximum no. of issues arose due to problems faced by users in the admission workflow (60), followed by registration issues (51) and discharge (45).

Cause and Effect Diagram

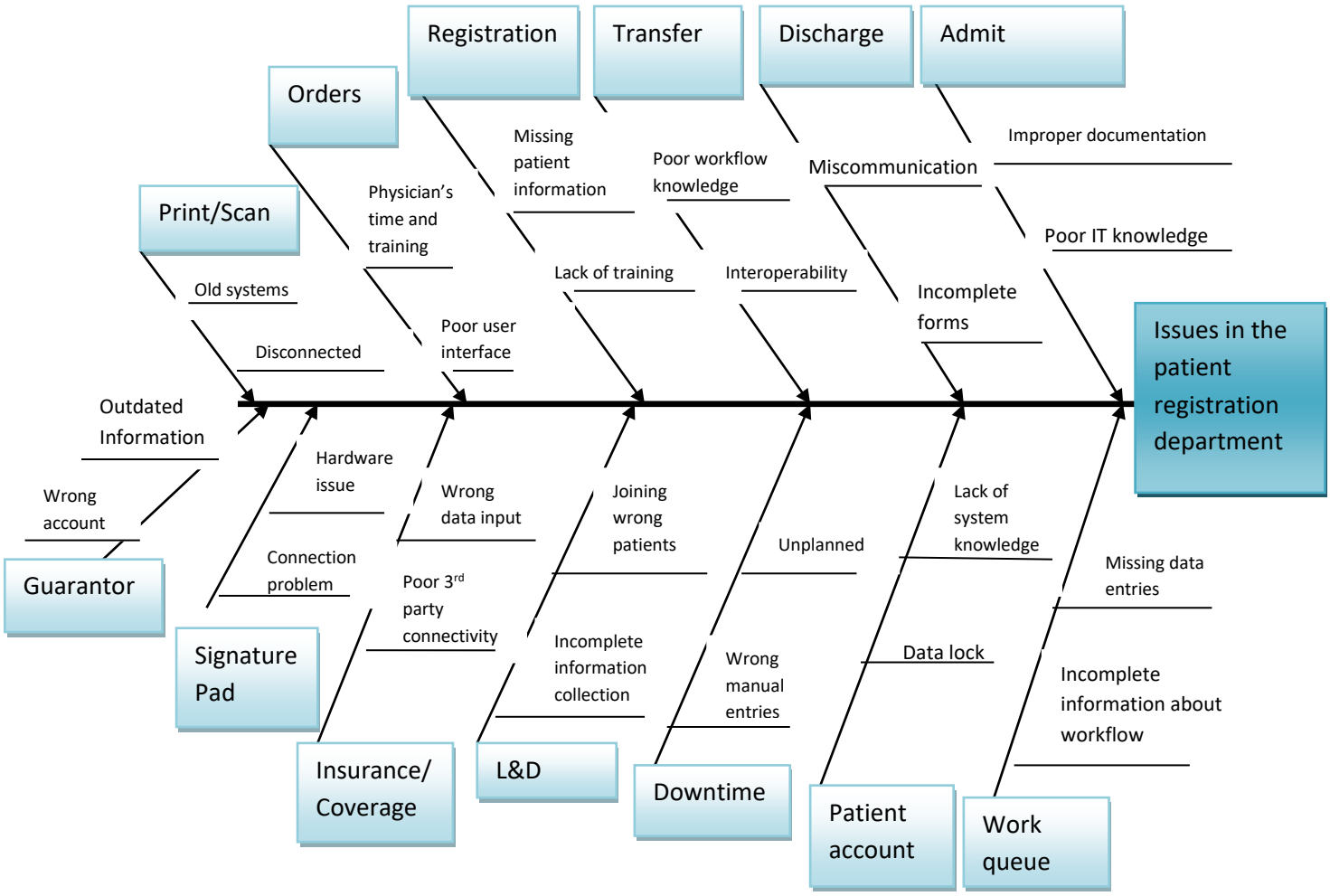

Figure 11: Fishbone diagram showing cause and effect relationship

Pareto Analysis.

- Pareto Analysis of all the User Service Restorations based on types of issues from October'2015-March'2016

Table 5: Pareto Analysis of all the User Service Restorations based on types of issues from October'2015-March'2016

Type of issue	**Number of issues**	**Cumulative count**	**Cumulative Percentage**
Admit	48	48	16
Discharge	36	84	28
Registration	36	120	40
Transfer	30	150	50
Print/scan	26	176	58
Coverage	20	196	65
Bed planning	20	216	72
Signature Pad	18	234	78
Automatic Insurance Confirmation	14	248	82
Order	11	259	86
Patient account	10	269	89
Labor & Delivery	8	277	92
Guarantor	6	283	94
Patient Class	6	289	96

Downtime	5	294	98
Work queue	5	299	100
Miscellaneous	39	-	-

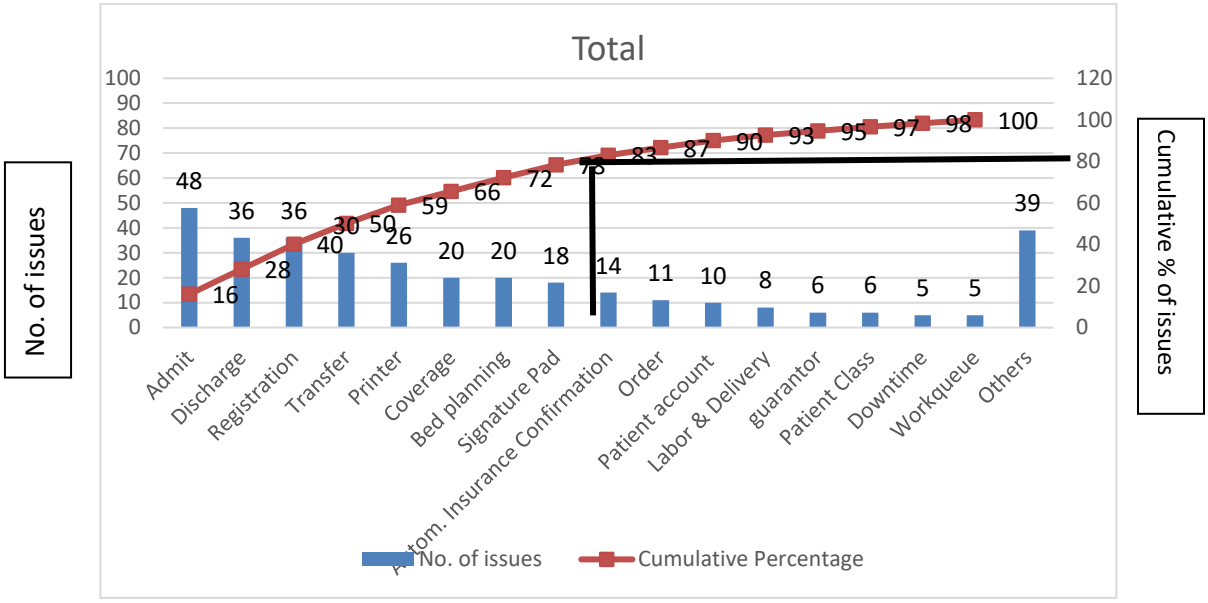

Figure 110: Pareto Analysis of all the User Service Restorations based on types of issues from October'2015-March'2016

- Pareto Analysis is applied to find the User Service Restorations based on types of issues arising from the **Central Region**:

Table 6: Pareto Analysis of all the User Service Restorations based on types of issues arising from the Central Region

Type of issue	**Number of issues**	**Cumulative count**	**Cumulative %**
Registration	51	51	20
Admit	42	93	37
Transfer	29	122	48
Discharge	26	148	59

Print/scan	19	167	67
Coverage	18	185	74
Bed planning	16	201	80
Order	11	212	85
Automatic Insurance Confirmation	9	221	88
Patient account	7	228	91
guarantor	5	233	93
Labor & Delivery	5	238	95
Patient Class	5	243	97
Work queue	4	247	99
Downtime	1	248	99
Signature Pad	1	249	100
Miscellaneous	19	-	-

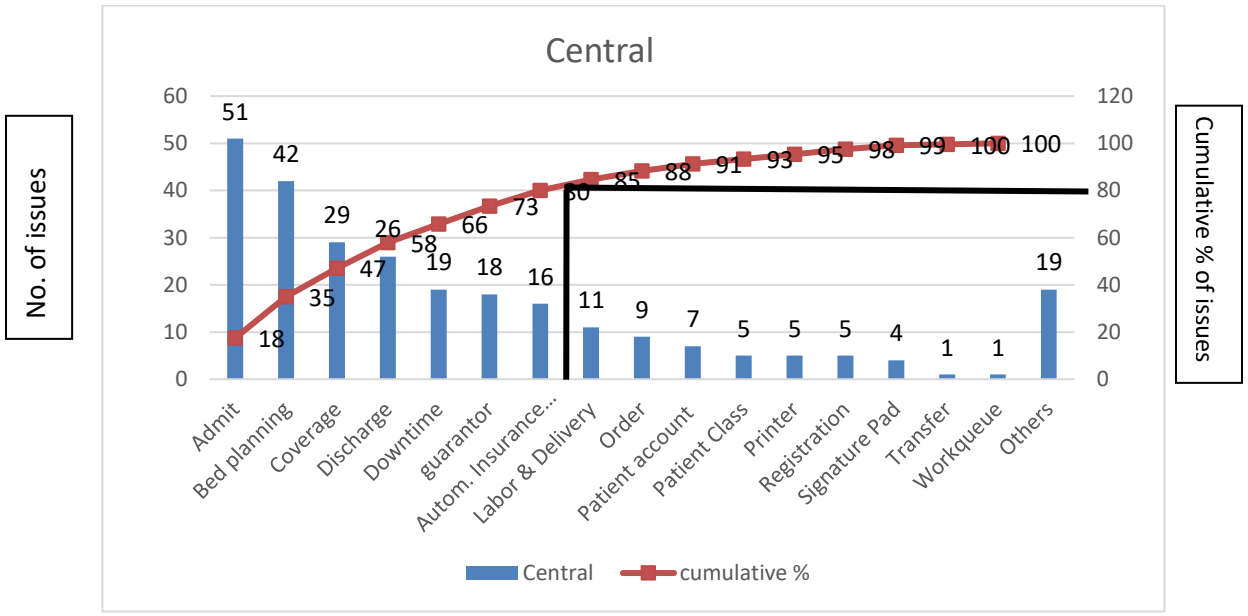

Figure 113: Pareto Analysis of all the User Service Restorations based on types of issues arising from the Central Region

- Pareto Analysis is applied to find the User Service Restorations based on types of issues arising from the Pacific region:

Table 7: Pareto Analysis of all the User Service Restorations based on types of issues arising from the Pacific Region

Type of issue	**Number of issues**	**Cumulative count**	**cumulative %**
Discharge	25	18	14
Admit	18	36	28
Signature Pad	18	54	43
Patient account	14	68	54
Print/scan	11	79	63
Bed planning	8	87	69
Registration	8	95	76
Downtime	7	102	81
Automatic Insurance Confirmation	7	109	87
Labor & Delivery	4	113	90
Transfer	4	117	93
Coverage	3	120	96
guarantor	2	122	97
Order	1	123	98

Patient Class	1	124	99
Work queue	1	125	100
Miscellaneous	20	-	-

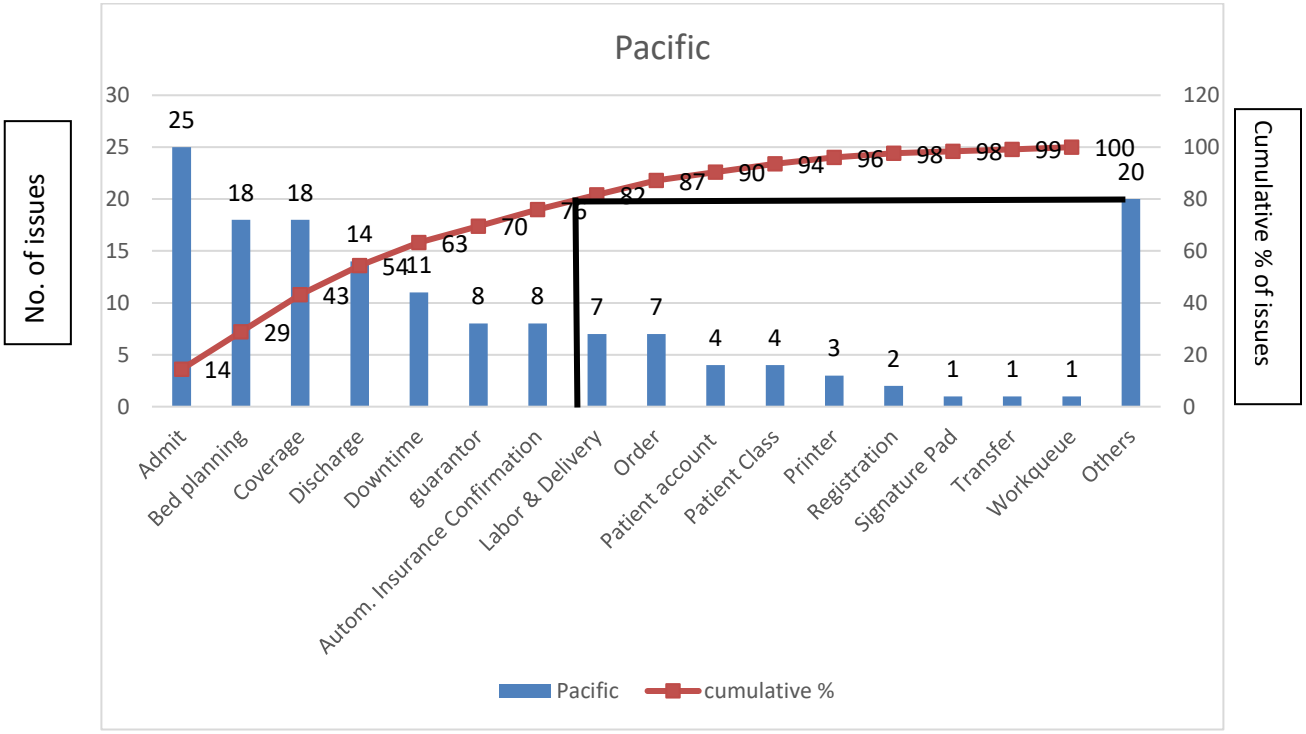

Figure 1412: Pareto Analysis of all the User Service Restorations based on types of issues arising from the Pacific Region

- According to Pareto analysis' 80-20 rule, the 80% problems are arising due to Admit, Discharge, Registration, Transfer, Print/scan, Coverage, Bed planning, Signature Pad, Insurance issue, Order and Patient account .
- When analyzing the central region, 80% problems arose due to Registration, Admit, Transfer, Discharge, Print/scan, Coverage and Bed planning.

- Pacific region's Pareto analysis showed that Discharge, Admit, Signature Pad, Patient account, Print/scan, Bed planning, Registration and Downtime were responsible for major portion of problems.
- This exhibits that the issues that required urgent or immediate action are Admit, Discharge, Registration, Transfer, Print/scan, Coverage, Bed planning, Signature Pad, Insurance issue, Order and Patient account and most of the issues can be addressed within relaxed time frame, but still few issues require immediate action as these issues might be responsible for impacting the patient care.

CONCLUSION:

In the study it was found that user training was the major reason of the problems faced by the patient registration department, followed by system errors. The entire study was based on 405 service restoration incidents related to an EMR Application. The issues which contributed towards these incidents were categorized broadly into following buckets: Admit, Discharge, Registration, Transfer, Print/scan, Coverage, Bed planning, Signature Pad, Insurance issue, Order, Patient account, Labor & Delivery, Guarantor, Patient Class, Downtime and Work queue. They were also analyzed according to the location they came from namely central and pacific regions. Further in-depth analysis was done on the above issues to find the root cause of these problems. Solutions were recommended for the same to prevent their recurrence. Thus from this study, it can be concluded that user training issue caused majority of incidents. Users didn't have required knowledge regarding exact workflows which made them face problems during patient care. Re training and tip sheets can help the users and decrease the no. of issues arising.

RECOMMENDATIONS

- Most of the issues can be taken care of by giving proper user training or by tweaking the workflows.
- It was seen that user training issue was due to lack of knowledge about various workflows. To avoid this, a proper document of workflow can be prepared and forwarded to all end users.
- Training can be imparted again to end users regarding various workflows. Refresher training can be given.
- The word document should contain every detail about that particular workflow like when and how to follow that workflow and under which conditions.
- For device issue related to printing and scanning, some basic settings should be first checked by end users before raising an incident like whether the printer is switched on or ink is available or availability of pages.
- New updated systems can be procured by the organizations, as the old ones might not support the new software versions.
- For electronic insurance confirmation, we can work together with the third party providing us the facility. We can ask them to update the system and install the patches simultaneously at all the locations. Communication with them might improve the condition
- Tip sheets can be created to help the user.
- A checklist can be prepared containing all the required steps regarding registration. If an end user feels some difficulty while doing so, he/she can refer that checklist and can analyze what wrong he did and what he/she is actually supposed to do

- Whenever any analyst makes some changes to the EMR functionality, then those changes should be communicated to the end users through tip sheets in timely manner. This keeps end users updated about the changes
- Prepare and communicate user guidelines regarding the steps to follow in case a resolution doesn't work out. Also the user should be asked to restart the system before raising a ticket as it solves the issue in many cases.
- A trickle-down effect can be used i.e. we can re-train a user from every department and he can further train his sub ordinates and colleagues. This will save time and cost.
- Elbow support should be encouraged, as one user's inefficiency can affect the whole system.
- Tip sheets which are created to help the user for further convenience, should be frequently updated and ensured that they are being followed.
- Re-train the trainers in a way that they address the users at behavioral level during the trainings.
- Gather on-the-floor information about the problems, and their reasons, being faced.
- Prepare and circulate proper documentation of the build changes.
- Standard Operating Procedure of the workflows needs to be designed and strictly adhered, with proper training and implementation for the same.
- A handbook can be created and distributed amongst the analysts to help them solve the issue with ease.
- Also, restarting the system by the end user before raising the ticket many times helps in solving the issue.

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