Dissertation Report
ATTUNE Technologies Pvt. Ltd

Post Graduate Diploma in Hospital & Health Management

Implementation of HIS in Patient Registration and Billing in Hospital

By

Dr. Tarun Joshi

Under the Guidance of

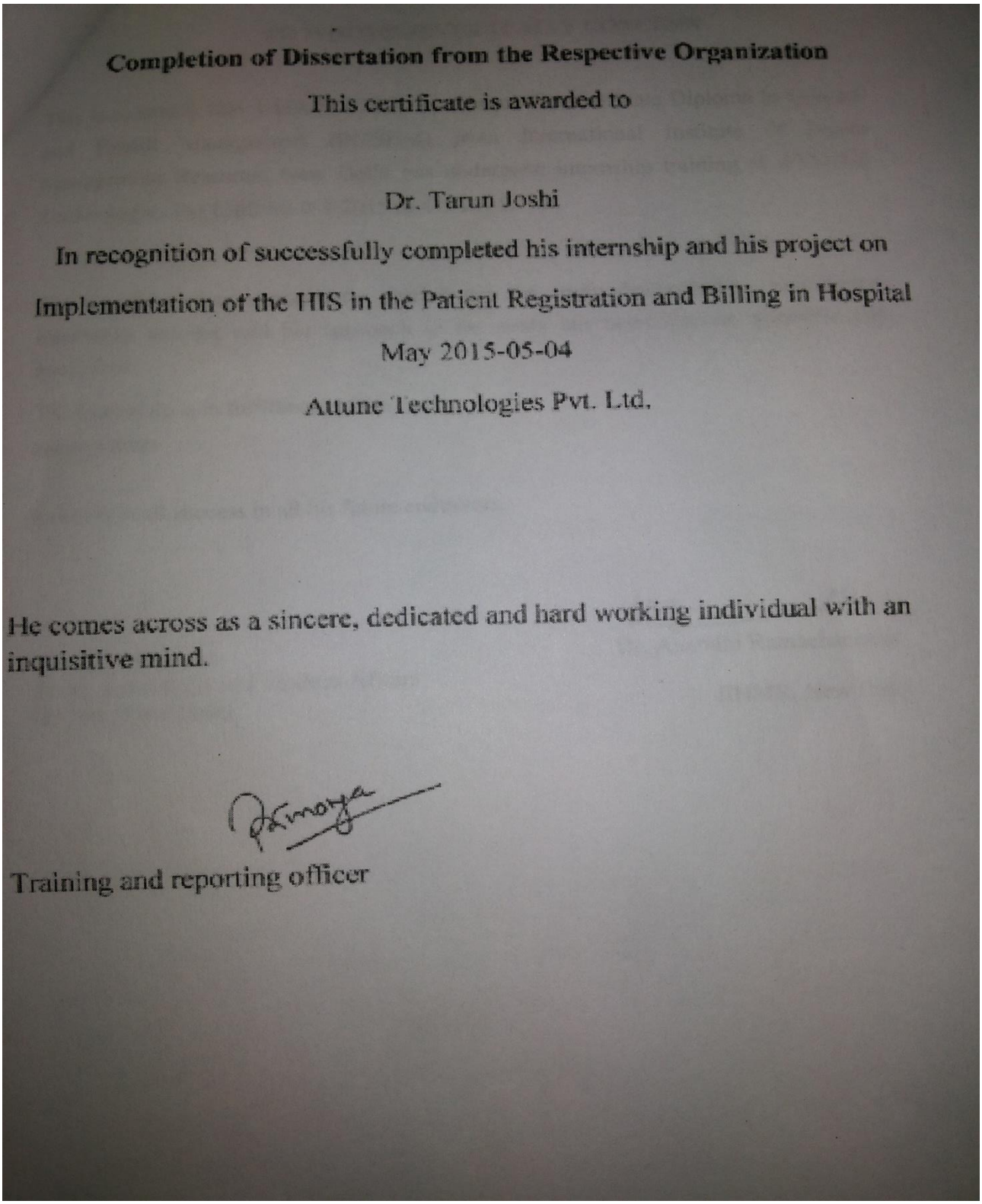
Dr. Anandhi Ramchandran

Post-graduate Programme in Hospital & Health

Management, Health IT

2013-15

International Institute of Health Management Research
Plot No-3, Sector-18A Dwarka, New Delhi-110075
Ph:- 011-30418900, Email:- info.delhi@iihmr.org
Website:-www.delhi.iihmr.org



Completion of Dissertation from the Respective Organization

This certificate is awarded to

Dr. Tarun Joshi

In recognition of successfully completed his internship and his project on Implementation of the HIS in the Patient Registration and Billing in Hospital

May 2015-05-04

Attune Technologies Pvt. Ltd.

He comes across as a sincere, dedicated and hard working individual with an inquisitive mind.

Training and reporting officer

TO WHOMSOEVER IT MAY CONCERN

This is to certify that TARUN JOSHI 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 ATTUNE Technologies Pvt Ltdfrom 4-2-2015 to 4-5-2015.

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

The Internship is in fulfillment of the course requirements.

I wish him all success in all his future endeavors.

Dr. A.K. Agarwal
Dean, Academics and Student Affairs
IIHMR, New Delhi

Dr. Anandhi Ramachandran
IIHMR, New Delhi

April, 2015

Certificate of Approval

The following dissertation titled **"implementation of HIS in OPD and Billing"** is hereby approved as a certified study in management carried out and presented in a manner satisfactory 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. Anandhi Ramachandran	
Mr. Chaudhary	

CERTIFICATE FROM DISSERTATION ADVISORY COMMITTEE

This is to certify that Dr. Tarun Joshi, student of Post Graduate Diploma in Health & Hospital Management had worked under our supervision and guidance. He is submitting his dissertation titled Implementation of HIS in Patient Registration and Billing in Hospital at Attune Technologies Pvt. Ltd. in partial fulfilment of the requirements for the award of Post Graduate Diploma in Health and Hospital Management.

This dissertation had a 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
Assistant professor,
Consultant,
IIHMR-Delhi.

Mrs. Paramjeet Kaur
ATTUNE Technologies. Pvt. Ltd.
Chennai.

CERTIFICATE OF SCHOLAR

This is to certify that the project, "Implementation of HIS in Patient Registration and Billing" is submitted by Dr. Tarun Joshi Enrollment no. PG/13/068 under the supervision of Dr. Anandhi Ramchandran for award of Post Graduate Diploma in Health and Hospital Management of the Institute carried out from the period 4-02-2015 to 4-05-2015 embodies my original work and has not form the basis of any award, degree, diploma associate ship, fellowship title in this or any other institute or institution of higher learning.

Signature

FEEDBACK FORM

NAME OF THE STUDENT: Dr. TARUN JOSHI

DISSERTATION ORGANISATION: IMPLEMENTATION SPECIALIST

AREA OF DISSERTATION: Implementation of HIS in an institution and training of the concerning staffs.

ATTENDANCE: 100% (FULL)

OBJECTIVES ACHIEVED: Training of staffs at the patient registration and billing counter

DELIVERABLES: Training of staffs at patient registration and billing counters, understanding and solving challenges faced during the implementation.

STRENGTHS: Tarun is highly motivated; shows high initiative; he is extremely diligent; he has a curious and inquisitive mind; he is highly conscientious; he has a great sense of humor.

SUGGESTIONS FOR IMPROVEMENT: He requires guidance, so he can develop decision making skills. I believe experience allows one to gain clarity of thought and practice decision making. I am sure Tarun will strengthen these skills, in time and with practice.

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

Date: 17-05-2015

Place: New Delhi

ACKNOWLEDGEMENT

Words can never be enough to express my sincere thanks to **ATTUNE Technologies Pvt. Ltd.** and especially **Mrs. Paramjeet kaur,** my reporting officer for her continuous guidance and support.

I convey my gratitude to **Mr. Raghothaman, VP of ATTUNE Technologies Pvt. Ltd.** who gave me the opportunity to be a part of this Project. I express my greatest thanks to **Mr. Aminderbir singh, my senior in ATTUNE Technologies and also a past Alumni of IIHMR-Delhi** for his support and guidance to make this project possible.

I also express my thanks to my IIHMR mentor **Mrs. Anandhi Ramachandran** without whom this project would have been a distant reality. I would also thank **Dr. L.P.Singh (Respected Director of IIHMR-Delhi)** and **Dr.A.K Agrawal (Respected Dean IIHMR-Delhi).**I pay my sincere offering to the almighty without whose grace I would not be able to add a new dimension to my life.

In the end, I am thankful from the core of my heart to my beloved parents and my sister who supported me throughout the course of study. Last but not the least; I am thankful to all the colleagues for their help and cooperation.

Dr. Tarun joshi
Health IT
2013-15
Roll No: PG/13/068

ABSTRACT

Introduction of study:

We can divide Software Development Life Cycle (SDLC) is a four step process which includes:

- Requirement gathering
- Development of the product
- Implementation and Training
- Maintenance and support

Problem Statement: The main problem is the chaotic and tedious process of patient data collection, patient registration, appointment and its cancellations and billing. Another issue is the hassle full retrieval of data at the time of need and the inefficient management of queue of patient at the time of peak hours. The third issue was that the waiting time of PR and Billing was too long.

Objectives: To manage the appointment, past institution visit record, billing and the follow up of the patient in the institution in a better way by using the concerning software in more effective and hassle free way.

Scope of study: This study will cover the process of training of HIS in OPD module and patient registration and billing.

Methodology:

- The research design for the study is descriptive in nature.
- The test person is the clerk at the front desk, receptionist, and clerk at the billing counter.
- Sample size is 4 and the data collected is majorly secondary in nature.
- Tools used are the simple questionnaire and observational checklist.

Expected outcomes:

- Organized maintenance of data and its easy retrieval as and when needed.
- Increase in work efficiency of OPD.
- Better management of Que.
- Ro create a paper free, less tedious working environment.

Limitations:

- Name of the sources of data can’t be disclosed due to clause of confidentiality.
- This study is limited to a limited geographic location.
- Dependence mainly on the secondary data.

- Time to conduct the study is very less for the analysis of the outcome results.

Conclusion:

Implementation is just not only limited to the training and monitoring but it also involve human factor and the understanding the problems of the end users. It would not only help the implementation to be successful but also allow the cooperation by the users to adapt the change in the work culture plus maintain the change even after the implementation team will leave the premises of the institution.

INTRODUCTION

About the Organization

ATTUNE Technologies is an India based organization with its HQ based in Chennai, Tamil Nadu and Singapore. The CEO of the organization is Mr. Arvind Kumar. The organization came into existence in November 2008. It is one of the pioneers in Cloud Based LIS, ATTUNE TECHNOLOGIES offers next generation Healthcare IT products to the market with primary focus on delivering business benefits to its customers. Technology platform & architecture can serve a Single Centre as well as a National Healthcare Network. They have more than **3 MILLION PATIENT RECORDS** on cloud. They are backed by premier investors from **Singapore** and **US**. Their unique solutions run in METROPOLIS, SERUM, MEDALL Precision and many more eminent labs. Customers are in **Singapore, India, Philippines, Indonesia, Kenya, Sri Lanka & Malaysia.** They constantly keep innovating new solutions for the entire healthcare value chain. They now are having 200+ employees working with them since their origin.

The products which Attune majorly provides are:

- Health Kernels
- Lab Kernels
- Clinical Kernels

} All these S/W Kernels are very much customisable as per the specifications of the clients.

Clienteles of ATTUNE covers all over the India and abroad. The likes of Metorpolis, Ivy groups, GOI, Vasan eye care, Irene hospitals, I-genetics are to name a few.

There are six pillars on which the very soul of company depends:

- Vision
- Values
- Transparency
- Trust
- Respect
- Win-win

Vision - To manage world's health information

Values - To provide innovative solutions to business problems by appropriate usage of technology

Transparency – Take utmost care to ensure transparency in all our engagements with all the clients and vendors. To actively share relevant information and enabling them to take informed decisions in all activities pertaining to our operations.

Trust - Trust among various stakeholders is the key driver for a successful business. Attune strongly believe in this philosophy and leave no stone unturned to establish relationships based on mutual Trust.

Respect – Attune strongly value the relationships with all our stakeholders and greatly respect their needs and decisions. Mutual Respect and Understanding is the cornerstone of all their relationships.

Win-win - We strongly believe in establishing win-win relationships with all our stakeholders. Our engagements with customers and vendors shall be based on evolving long-term win-win relationships.

Work culture at Attune:

Work culture at Attune includes the trio factor:

- Entrepreneur
- Team work
- Positive contribution

Entrepreneur- Culture and Innovation: We actively foster Entrepreneurship and Innovation across the organization. In this era of Knowledge Economy, we strongly believe that the most valuable asset of an organization is its human talent. By promoting Informed Risk taking, we provide the ability to tap the combined potential of individual team members to add more value to our customers. For us, encouraging Innovation involves fostering a culture of applying un-conventional ideas to solve everyday business problems of our Customers. By challenging ourselves and practicing a vibrant and informal work culture, we ensure constant flow of ideas and suggestions across the organization.

Team work - One of the critical success factors of our business model is the ability of our project teams to deliver effective solutions to our Customers. This requires seamless co-ordination and transfer of knowledge among various specialized teams. Ability to work in cross-functional teams is a key pre-requisite for any member coming on board. Our Recruitment, Retention, Reward & Recognition Policies are aligned to foster and encourage team work across all levels of the organization.

Positive contribution - The organization promotes a culture where everyone is free to challenge the ideas of any other person in the organization. Every employee is expected to positively challenge the issues and come out with alternatives and in the end, the valid propositions are accepted based on objective discussions. Once a decision has been arrived at, the team goes ahead implementing it without postponing any further.

ACRONYMS

EHR – Electronic Health Records

EHRIS - Electronic Health Record Information System

HIS – Hospital Information System

HIPPA – Health Information Protection & Portability Act

HL7 – Health Level 7

ICT – Information Communication Technology

IT – Information Technology

OPD - Out Patient Department

QMS - Queuing Management System

SDLC – Software Development Life Cycle

TABLE OF CONTENTS

BACK GROUND OF THE PROJECT

We can divide Software Development Life Cycle (SDLC) is a four step process which includes [*quintegrasolution.com/quintgra%20hmis.pdf]*::

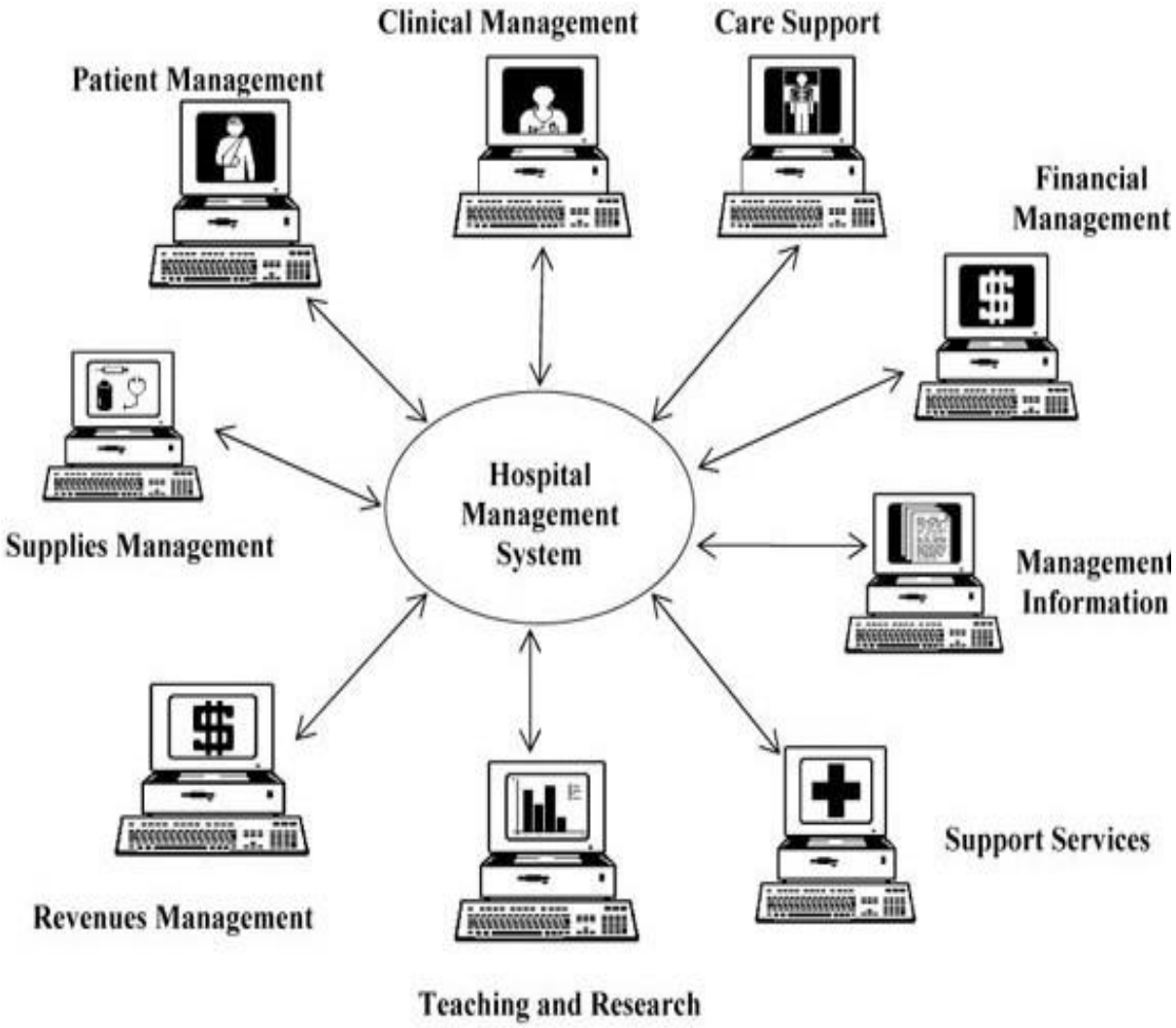
- Requirement gathering
- Development of the product
- Implementation and Training
- Maintenance and support

Among all the above steps Implementation is the most challenging step. It is because during this phase the end user and the product and reputation of the company are at the stake. Service provider faces the real challenges during the training process plus the time span and the real time problems and the reactions of the clients.

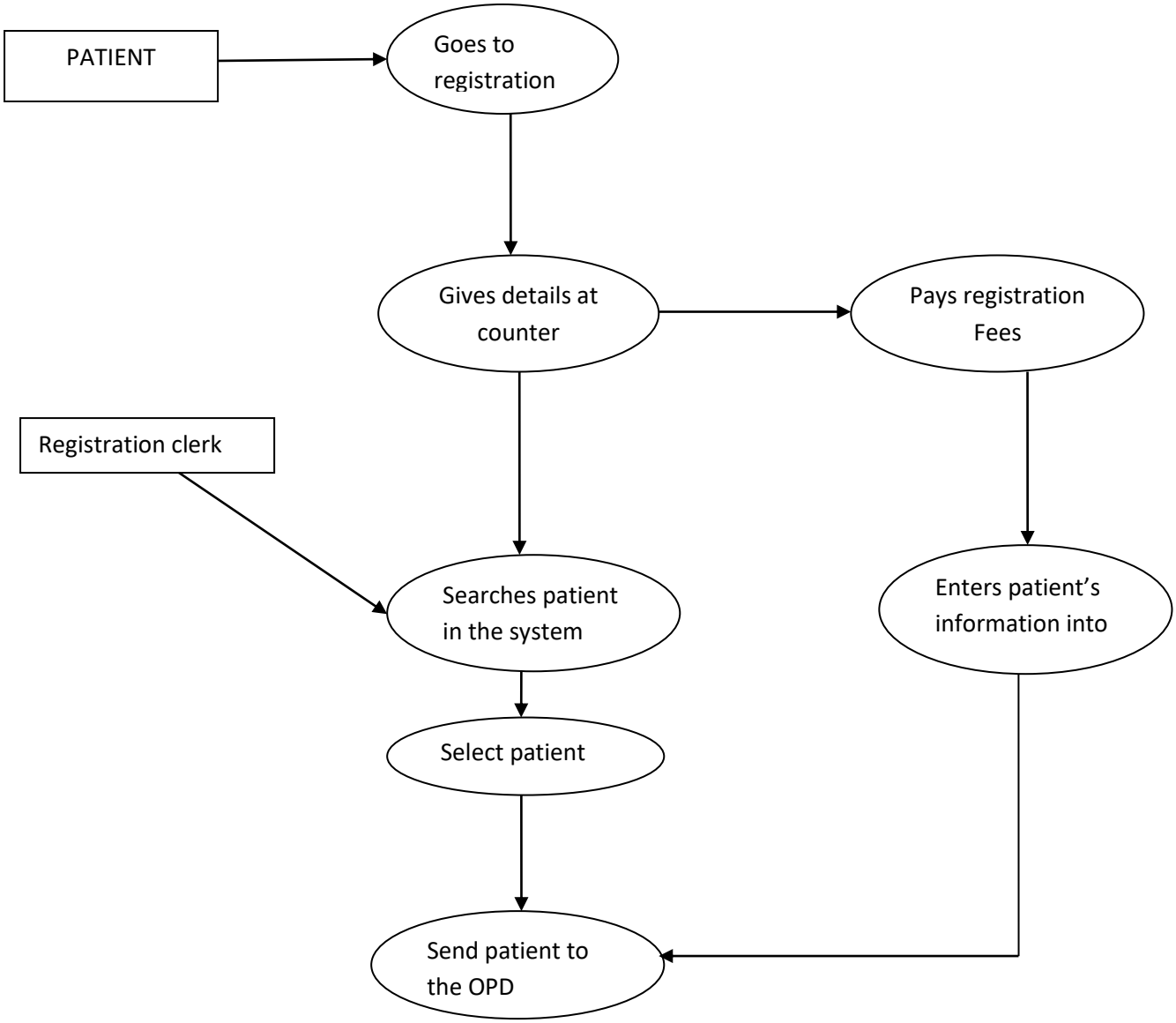
Software Development Life Cycle (SDLC):

Rationale behind HIS implementation:

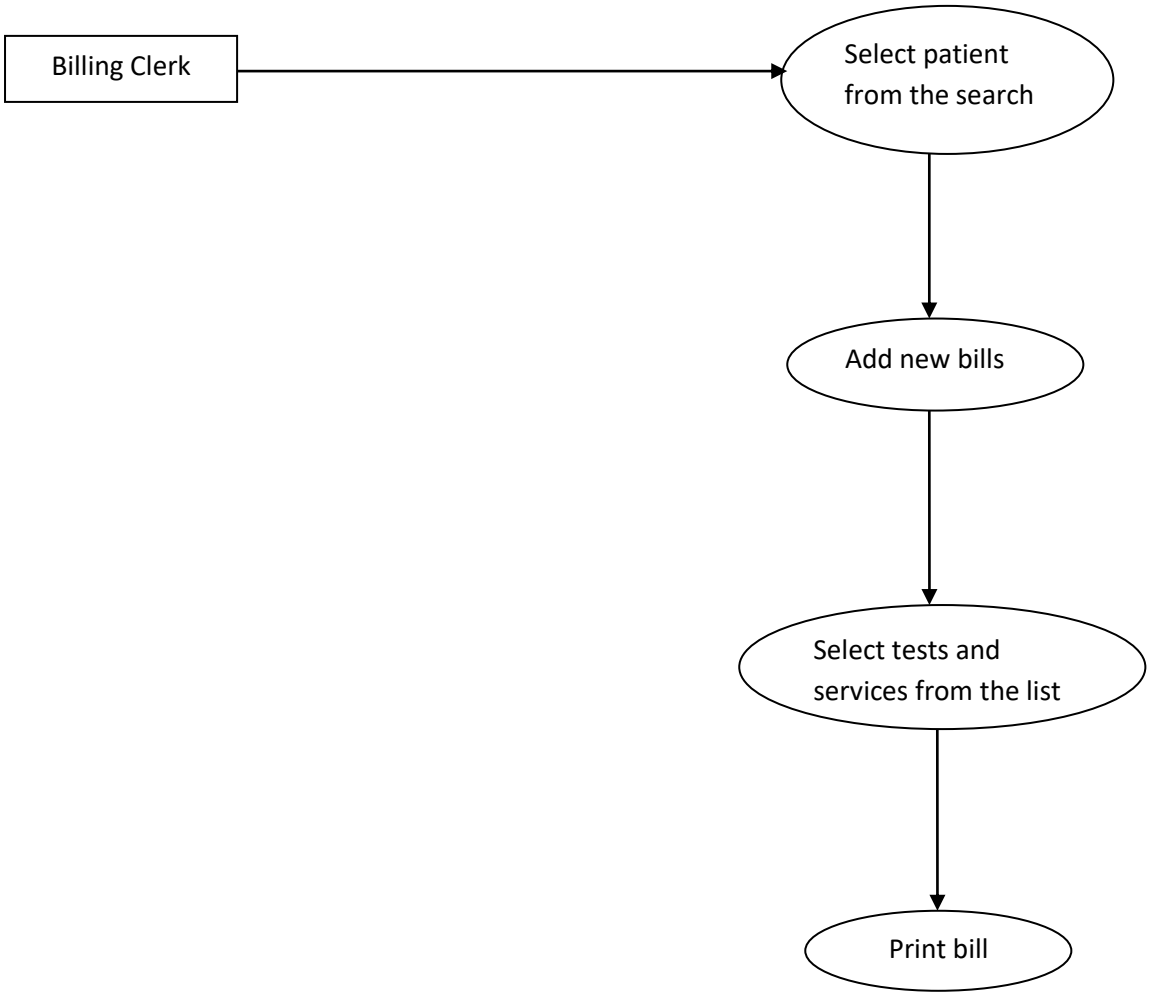
Hospital is a very complex institution with a complex work flow in different departments. These workflows of various departments despite of being operational separately are linked with each other. There should be a common interface among them so that all the departments can work in synchronization with each other and the optimization of resources can be there. Diagrammatically it can be described as follows (*http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1807-17752011000100009):*



Flow chart diagram in an OPD for Registration of patient:



Billing flow chart:



Challenges & benefits of IT implementation in an institution [2]:

S.No.	Challenges	Benefits
1	Change management	Common interface between all the departments
2	Acceptance by the end users	Optimization of the resources
3	Acceptance by the administration	Easy accessibility and anytime data retrieval
4	Bulky investment	Less space for storage & more security
5	Transcription of data in to computerized form is a tedious process	Easy data collection and its analysis
6		Smooth and hassle free operations in the institute

Further HIS also have some additional advantages too:

- Patient-centric approach
- User-friendly
- Easy to use & web-enabled applications
- Multi-level distributed hospital information system
- Security & privacy (authentication, authorization, privacy policy)
- Integration of features:
  - Patient identification
  - Single log-in
  - Data consistency
  - Transparency
- Robustness
- Reliability
- Performance
- HIPAA and HL7 compliance
- Scalability & portability (open modular architecture, declared interfaces, etc)

Feasibility study:
OPD workflow:

Table2. F.S. - OPD

As-is Process: Existing	To-be Process: Proposed	Process Re-engineering envisaged

• Functional OPDs: Medicine, Surgery, Ortho, Eye, Dental, Skin, Child, and Gynae.
• There is one doctor in an OPD at any given time.
• During consultation, the following information is captured on the OPD slip:
  ○ Chief complaint
  ○ Investigations, if required
  ○ Medication , if required
• A patient is directed to an OPD from the registration, his name is called out in the respective OPD and the doctor provides the consultation.
• Data that is recorded for each patient in the OPD register is :
  ○ Registration number, Serial Number for that day, Name, Age, Father's name, Address
• Report generated :
  ○ A daily report is generated at the end of the day.
	Patient process:
	• As the patient registers, firstly he goes through the triage where he is directed to the specific OPD. Then he falls in the queue of the respective OPD he was directed for.
	• As the patient comes, doctor clicks on patients name in the queue & dashboard for patient's medical record opens, where doctor can enter the following in the OPD entry screen:
	  ▪ During consultation, doctor
	  ▪ enters provisional diagnosis of the patient
	  ▪ There's provision for free text to enter doctors notes if any
	  ▪ Doctor can post the patient for any procedure (minor & major OT)
	  ▪ To end the visit- doctor can call the patient for follow-up visit whenever due, or cured, reviewed (if no follow-up visit is required), or admit a patient, or to internally refer a patient to the Consultant or any other department.
	
	Clinical history/Medical Record
	• Clinical Summary (Details of the previous encounters- chronological visits of the patient, name of doctor & OPD consulted)
	• Laboratory (Full report)
	• Radiology (Full report)
	• IPD (Details of current and previous admission- summary of inpatient stay)
		• Provision to see Reports of Laboratory & Radiology (X-ray and Ultrasound) reports on the Patient Dashboard. This will appear as the results are entered by the technicians in the respective departments.
		• As the drugs are issued to the patients in the Pharmacy or in the indoor (by the nurses), the details of the drugs appear in the Pharmacy record of the patient.

	• Pharmacy (Details of the drugs issued to the patient by the Pharmacy) ❖ Since cash/billing is not done, as services are free, either of the following could be done, • Billing module is introduced (with zero billing) centrally or with each department. • Queues are generated when the tests are selected by the doctor in the OPD module.	

Billing workflow:

Table6. F.S. - Billing

As-is Process: Existing	To-be Process: Proposed	Process Re-engineering envisaged
• Registration, Laboratory Tests, Radiology Tests and IPD are billable.	• Billing Module(HIS) including prices of all billable services , will be done in 4 main categories • **Patient Billing:** charges for all investigations , inpatient admission/ discharge, cabins, medical examination, procedures/operations, • **Ambulance Billing** – charges for use of ambulance • **Tender billing** – charges for tender/auction earnest money • **Miscellaneous** - fee from canteen etc. • For all patient services, orders will go from billing once payment for respective service is made. • Bill cancellation (Voiding a Bill): Bills can be cancelled or edited by administrator. • Patient Bill Print out will have following details: Patient Name & Identifier, Bill ID, Date, Services billed (with individual	• Pre-printed Billing stationary • Option to free patient in the system at the time of Billing. In cases where current system has no billing/cash counter and if billing module cannot be introduced, then orders should be able to go from OPD/IPD to Laboratory or Radiology as required.

	break-up) • Ambulance Bill Print out will have following details: Bill ID, Name of Driver, Date, Patient name, Receipt number, Number of trip, Origin, Destination & Amount • Miscellaneous Bill Print out will have following details: Name, Date, Service billed, Amount paid • In case advance for services is taken, the billing clerk should be able to refund the amount and make changes in the bill once printed. • **Non-functional status of billing service:** In case certain tests are not functional (X-Ray or CT Scan machine not working, blood tests not working, reagents not available etc.), Laboratory or Radiology technician will provide feedback of this cessation of functioning to the billing clerk, who will then disable those services, so that those services are not requested **REPORTS** • Daily cash report, along with collected money with details of collections from each service can be printed • Other reports having the details of all bills generated can be printed.	

Implementation steps:

Implementation of IT in patient registration is a complex process which must be divided into phases in order to avoid any confusion. It should be phased such that small pilot sample should come in priority, so that in case any contingency arise we can change the implementation plan without any hassle. The implementation process can be planned as:

- Requirement gathering
- Identify the super users and the end users
- Repo building with them by executing the communication plan with them
- Implement the software
- Training of the super users
- Training of the end users
- Execute change management plan side by side
- Go live
- Reporting on daily basis

Steps of implementation in details are as during the implementation:

1) **Requirement gathering:**
   A team of product specialists & implementation specialists go to the client site where software implementation is required. Here the work flow of the concerning department is observed and understand by the team. Now, the gaps in the work flow are marked by this team & it is sent to the back end team for further analysis.
   A person is been appointed from the side of the institution, who will be responsible for all the support to be provided to the implementation team for the development of the product and its implementation. This person is also known as Single Point of Contact (SPOC).
   The master data is collected with the help of this staff. Master data is the data which contains all the details that is needed to be kept in mind while designing the product. (It includes doctor's name, doctor's schedule, inventory details, VAT deductions, etc).
2) **Identification of the users:**
   Before the implementation of the software pointing out of the users is done. It includes:

   - Admin
   - Super users
   - End users

   Here training is even later on to each and every one on the basis of the role in the organization. Like admin had the right to view, edit and save the data. While super users and end users can only view and save data.
   Mostly the hospitals are very large where s/w is implemented, with a staff over 150 in number. It is not possible for the implementation team to train each and every staff one on one. So we choose the head of these departments and train them on the use of

the s/w. They can further give training in the respective departments. They can consult to the implementation and the support team whenever there are any doubts while using the tool.

3) **Repo building:**
Implementation team go to the institute and ask all sorts of question to the end users and the hospital staff in order to understand the challenges they faces in daily activities at work as well as in the personal dimension. This will help them to understand them and will develop a personal and human bonding, which will help them during implementation and change management.

4) **Training of the super users and end users:**
It is not possible for the implementation team to train each and every staff member one on one in a big institute. So, they mark super users from the various departments of the institute, who will be trained by the implementation team and in return they will be training all the peers and staff of the institute. However implementation team will be there for the support services on case of any doubts and difficulties.

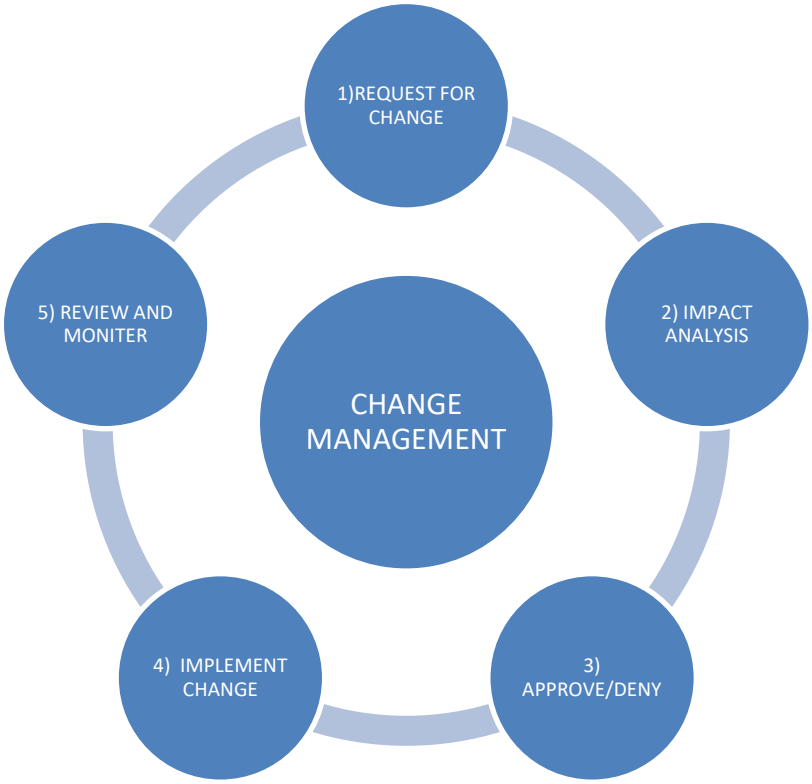
5) **Change management side by side:**
Along with the implementation of the software there are various steps carried out to bring the change management. Change is never easily accepted by anyone so while implementation the team try to find out the factors responsible for the hindrance in the implementation of the project (Any personal problem leading to the defiance, defiance due to fear of losing his/her stature in the organization).
To adapt to the new technology instead of traditional paper work might be difficult for the staff, hence implementation team let both the s/w system as well as the manual work running side by side to see if the s/w is running properly and the staff is adapting the system without any pressure.

6) **Go live:**
Lastly comes the day for going live. On this day the client institute starts working with the product as a whole. After this the team is there for daily reporting and for the support of the client for the next few months depending on the size of the project.

7) **Daily reporting:**
In the last stage of implementation comes the support work which is there for the next few months. During this period the team keeps on reporting the back end team about how is the product working (no. of daily registrations, no. of admissions, etc).
This would help the vendor to evaluate the success of the product and thus will increase the credibility of the organization in the market. Plus it will also help the vendor to do the analysis and thus built the confidence in the client about the product and to state how the software had helped the hospital in increasing the efficiency, optimization of the resources and bringing the transparency in between the client and the consumers.

Change management:

Change management is the most complex, most difficult and the most important part of the implementation process. It includes *[providersedge.com/ehocs/ehr_articles/analyzing_cprsa]*:



Change management includes 6 major steps:

- Visioning and detailed planning
- Strong executive stake holder support
- Continuous communication
- Assessment of implementation milestones
- Training and informational activities
- Reinforcement until the change becomes a part of the new work culture

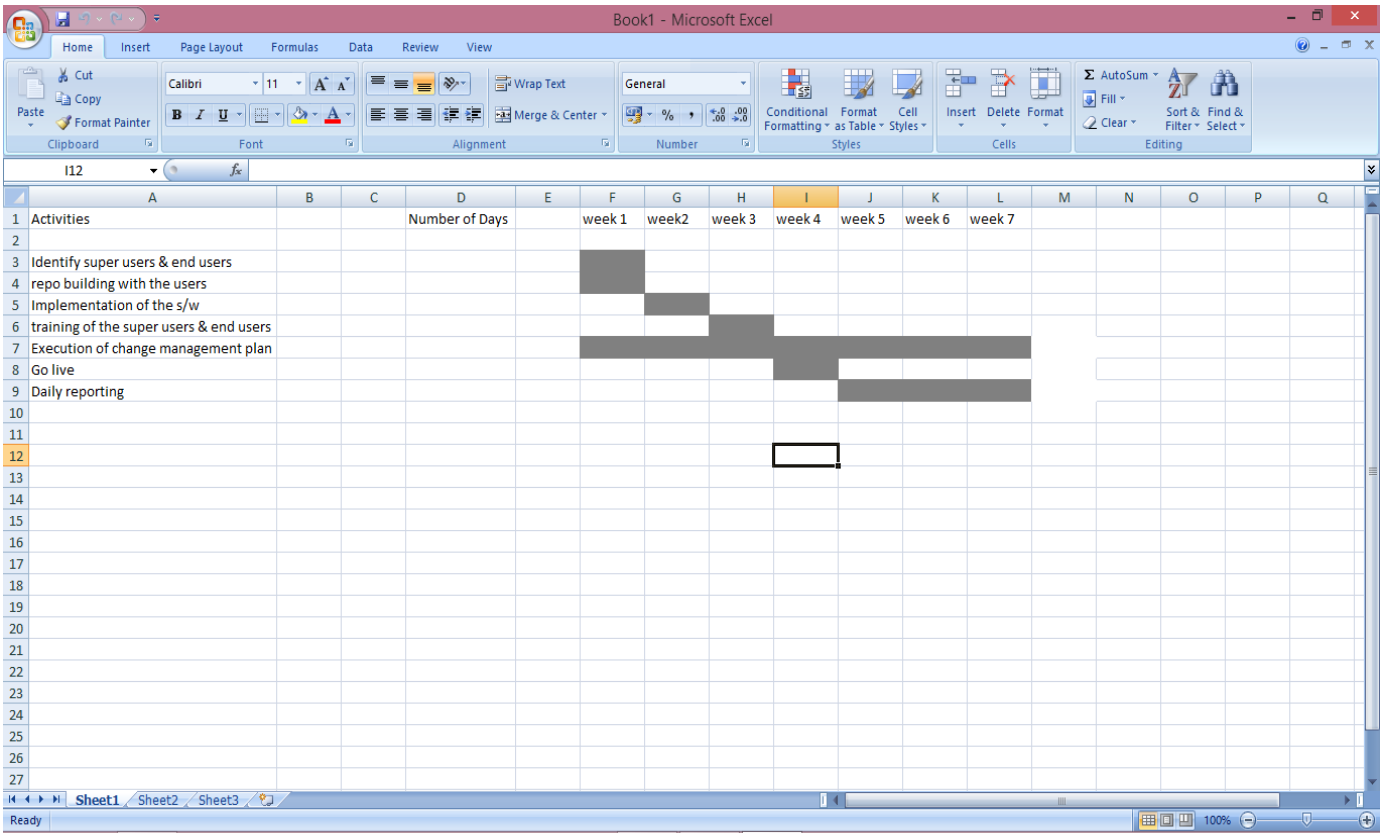
In detail:

1) **Visioning and detailed planning:**
   Implementing the software is an expensive and tedious job. So it is better that the implementation team should do an extensive planning about what should be our approach while carrying out the implementation and also plan about the contingency if any that might occur during the implementation. The vision should be very clear keeping these things in mind:
   - Where are the clients now?
   - How would this implementation affect the client?
2) **Strong executive stake holder support:**
   Change is never accepted easily by anyone. And the staff (specially the old ones) mostly avoids undergoing any changes imposed on them by the changing technologies. In order to convince them the team should have the support of executives from the hospital. If the higher authority stands by the side of the project, then it is must for the staff to follow the instructions. It goes both in the public as well as the government sector. A major portion of the success of the product implementation depends on this factor.
3) **Continuous communication:**
   This is the most important part in the implementation. But it starts right in the beginning of SDLC. It is very important that the client and all the stake holders who are involved in the project should be in loop about the progress of the development and implementation in the project. If it is not done properly it might create havoc in the end between the required and the delivered product.
   It is because of this vendors today prefers AGILE model rather than the WATER FALL model of SDLC. As in AGILE model it is communication after each and every development right from the requirement gathering until the handover. So it is more practical than the WATER FALL model.
4) **Assessment of implementation milestones:**
   Implementation mostly is done phase wise. The busiest module which is least complex is implemented first so that one can do assessment of the implementation and evaluate the change and the working of the product plus the adaptability among the staff. It is a planned process with a pre determined timeline. One has to stick to this time line as with every day an extra cost is added over. During the implementation many unexpected hurdles comes up, that too have to be managed in that timeline only.
   So it is necessary that a regular assessment is to be made after every milestone in order to avoid any extra cost to the company and any trouble to the client.
5) **Training and informational activities:**
   During the implementation, training is to be given to the end users as they are the ones who had to use the s/w on daily basis. Plus there is a training session to the IT staff in the hospital about all the features and trouble shooting in the product so that

they can continue handling the queries of the end users even after the implementation team had left the institution.

6) **Reinforcement until the change become the part of the new work culture:** This is one of the most important steps of the implementation as it is very common that staff using software make excuses and skip steps in the s/w format in the beginning. So it is the responsibility of the implementation team to solve their problems and make them work on the system again and again so that they might get used to the system. For this they will need support and help from the authority too.

Gantt chart:



Problem Statement:

The main problem was the chaotic and tedious process of patient data collection, patient registration, appointment and its cancellations and billing software. Another issue was the hassle full retrieval of data at the time of need and the inefficient management of queue of patient at the time of peak hours. The third issue was that the waiting time of PR and Billing was too long.

Scope of study:

- This study will cover the process of training of HIS in OPD module and the patient registration and billing.

Rationale of Study:

- This tool will help the institution to plan the resources as per the need of the department.
- Organized maintenance of data and its easy retrieval as and when needed.
- Increase in work efficiency of OPD.
- Better management of Que.
- It will help to keep a track on the number of registrations, consultations, revenue generation in the institution.

REVIEW OF LITERATURE

1) The study by Tricia L. Erstad. This study is a wide-ranging literature review of computer-based patient record (CPR) implementation over the past decade reveals that clinical, workflow, administrative, and revenue enhancement benefits of the CPR outweigh barriers and challenges — but only if healthcare organizations redesign certain work processes. Among other key efforts, organizations must train and motivate users to navigate CPR systems, as well as develop a common structured language. Clinicians who used CPRs found that electronic access to clinical information saves time and provides a thorough and efficient way to manage patient information
2) Azim Izzuddin Muhamad, Mohamad Rahimi Mohamad Rosman, Mohammad Ikram Ramzi, and Mohd Idzwan Mohd Salleh in 2012. Conceptualizing Medical Application Software for Managing Electronic Health Records (EHR) and Cash Flow Management in Private Clinics. This study tells us about the growth of Information and Communication Technology (ICT) had certainly contributed to the better record management practice, especially in dealing with electronic record. Most major industry has shifted from paper record into electronic record as this kind of records were more reliable, accurate, cost-saving, and robust. This paper describe the development of medical software know as EHRIS (Electronic Health Record Information System). This system was developed using Microsoft Visual Studio 2008 as it main platform, with Microsoft Access as it database. Its include modules such as

patient information, payment tracking, billing, medicine and supply, and QMS (Queuing Management System). It's suitable for small and large clinic, easy to installed and user-friendly. It's adopting the concept of EHR (Electronic Health Record) and refers to a systematic collection of electronic health information about individual patients or populations. This study undertakes the concept of System Development Life Cycle (SDLC) using the waterfall model.

3) According to Andreas Holzinger , he emphasized the importance of computer-based methods in medical documentation and the automation of clinical processes, including analyzing diagnoses. In their paper, they developed a methodology for text mining in medical text corpora and implemented a tool to evaluate their idea. The outcome of the calculations showed valuable results although based on a relatively low number of sentences. Observing all the diagnoses, generated in a hospital daily, will definitely improve the diagnostic value.
4) Technical and Human Challenges of Implementing Hospital Information Systems in Saudi Arabia, Mohamed KHALIFA, a Consultant, Medical & Clinical Informatics, King Faisal Specialist Hospital and Research Centre, Jeddah, Saudi Arabia, February 2014. This study is about the challenges and difficulties faced during the process of implementation of HIS in a hospital.
5) Hospital Information Systems in Nigeria: A Review of Literature Ayodele Cole, Benson, MB, BCH, PhD, DHA. This study tells us about the barriers in the implementation of HIS in hospital.

OBJECTIVES

General:

- To manage the appointment, past institution visit record, billing and the follow up of the patient in the institution in a better way by using the concerning software in more effective and hassle free way.

Specific:

- Organized maintenance of data and its easy retrieval as and when needed.
- Increase in work efficiency of OPD.
- Better management of Que.
- Ro create a paper free, less tedious working environment.
- Hassle free clearance of the claims.

METHODOLOGY

The study done here is a descriptive study which tells about what is the present scenario in the institute is all about and how it had been affected with the training provided to the staff to make them comfortable to use the HIS at the OPD and Billing modules respectively.

The test persons taken for sampling were chosen by convenience, there by convenient sampling method. Sample population includes a clerk and a receptionist working at the front desk and 2 clerks working at the billing counter. So the sample size is 4 in number.

Data collected is mostly secondary data with a hint of primary data as and where required in the form of the feedback from the sample population. Tools used were the questionnaire and the checklist. Also the data collected were from only the nonclinical staff and the language used was Hindi. The data for pre and post implementation and after Go-Live was collected in a time span of 2 weeks.

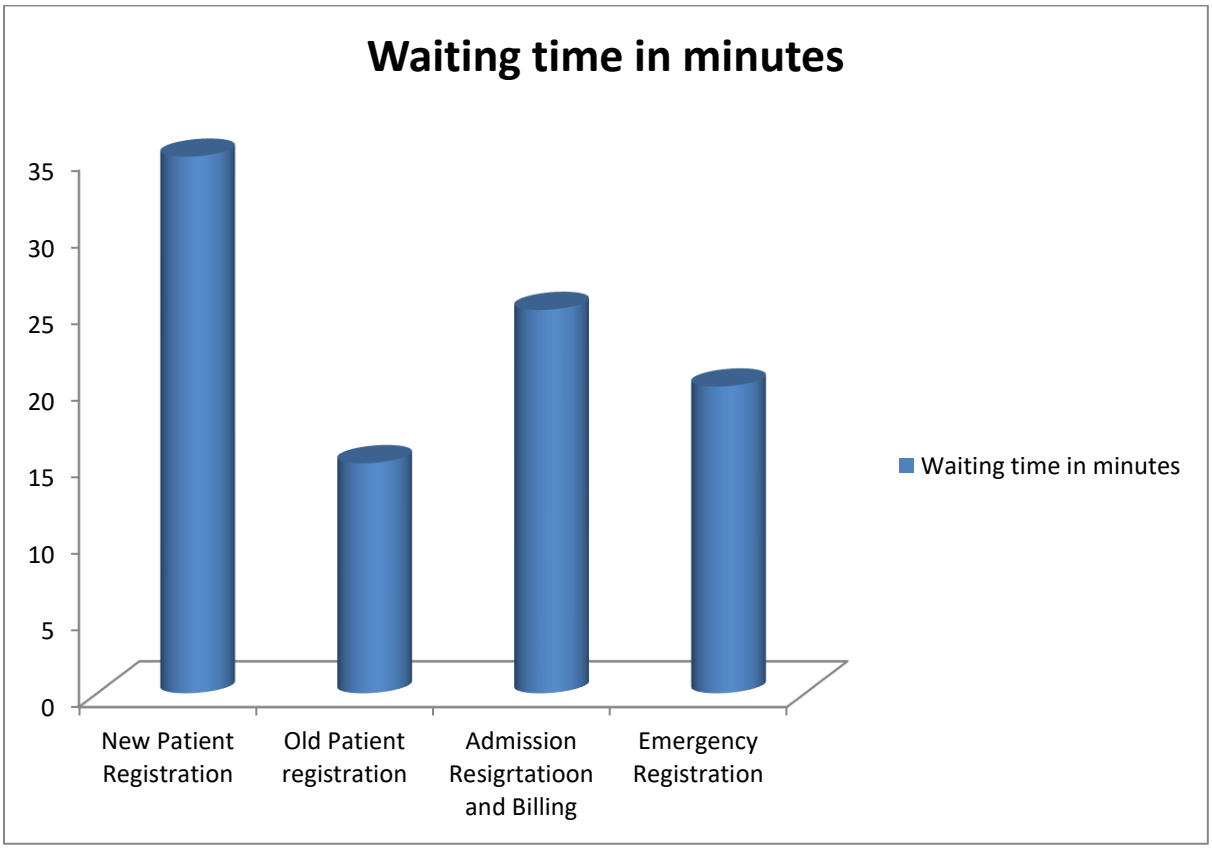
Qualification distribution of the respondents

Values	Numbers
Higher education	0
College degree	2 (clerk at Billing counter)
High school	1 (clerk at Patient registration counter)
Basic education	1 receptionist at PR counter)

Checklist for the challenges in the process of implementation and training:

S. No	**Technical challenges checklist**	**Human challenges checklist**
1	No previous guidelines for using the HIS	Lack of awareness and importance of HIS
2	Network and computer issues	Lack of knowledge of using HIS
3	HIS module not fully integrated	Lack of healthcare staff support for using HIS
4	No technical and maintenance staff	Lack of motivation to learn and train on HIS
5	New user interface	Less number of health informatics professionals
6	Complicated HIS	Lack of experience in computer applications
7		Using HIS creates administrative problems sometimes
8		HIS slow down productivity

Before implementation and training:



Implementation team have taken the feedback of the concerning staff at the OPD and the Billing counter beforehand the implementation, so that it could be compared with the post implementation feedback of the staff. This will help them to do the analysis of the scope and the utility of the product and the evaluation of the success pre and post implementation.

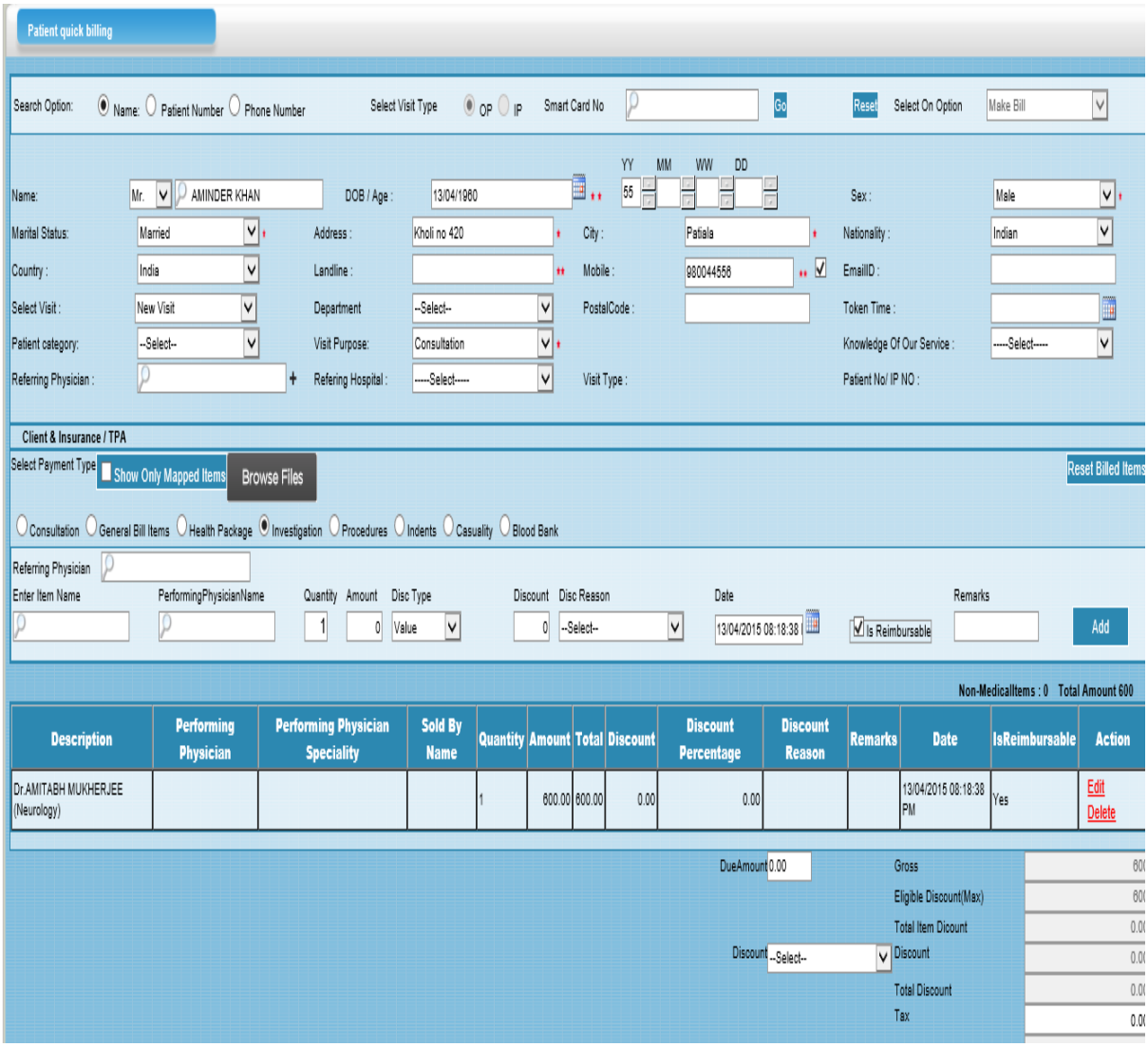
During implementation and training:

Training process included a population of 4 persons as per the selected sample which included three clerks and a receptionist. While training we used demonstration of the software to the sample population. We used the screenshots and demonstration for the training of the staff at the PR and Billing counters respectively:

OPD and Patient Registration module:

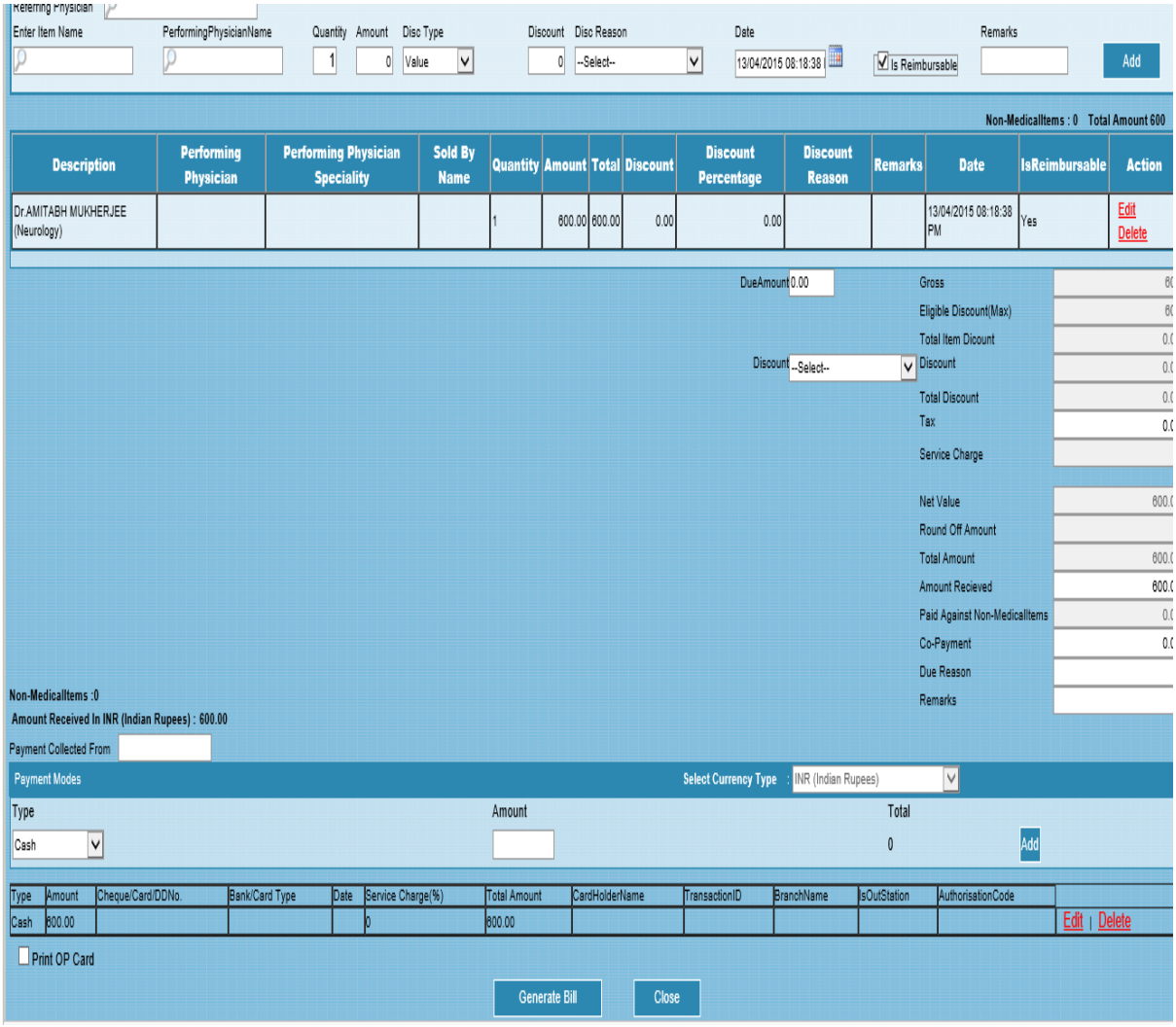
Shot one:

Patient registration module:



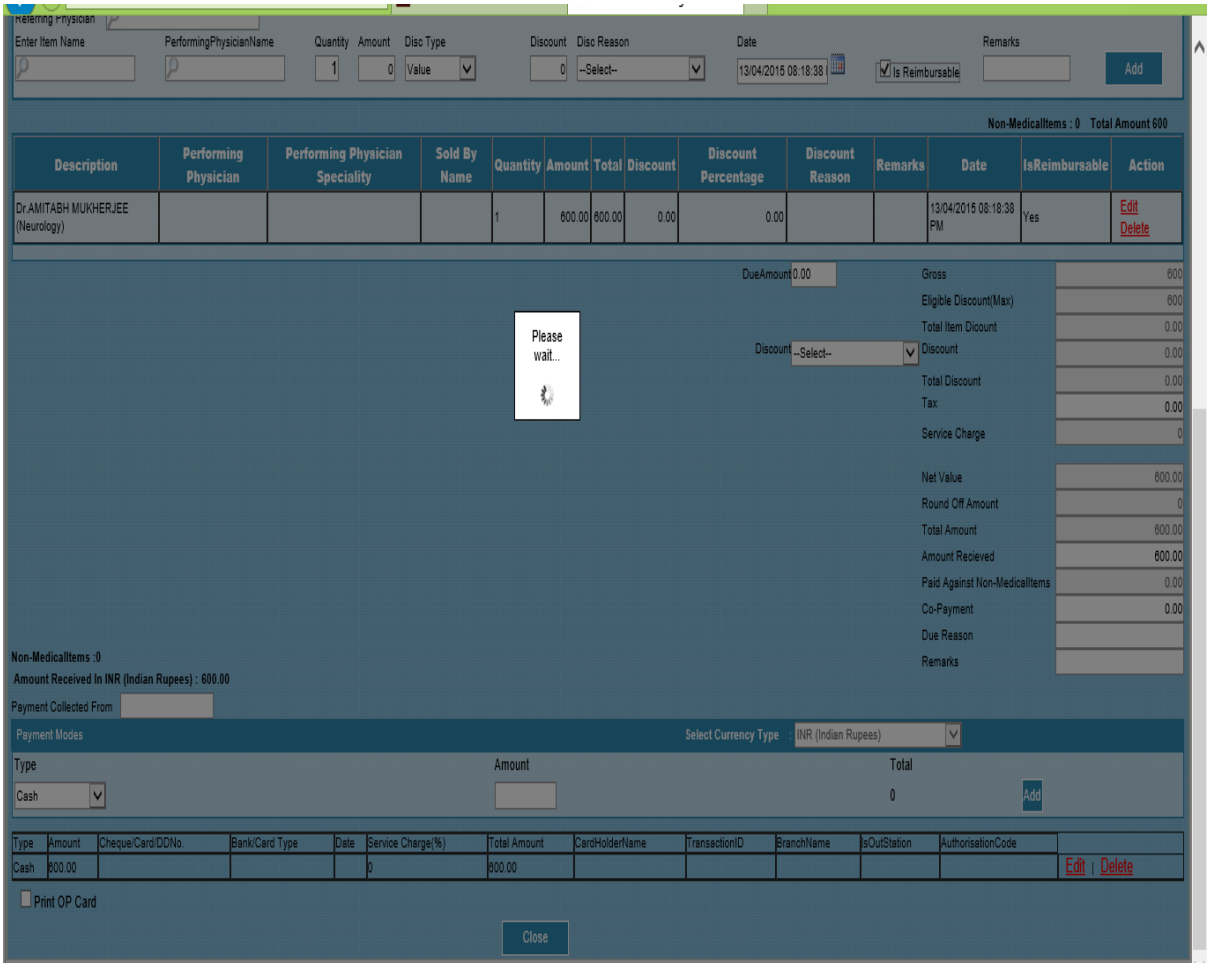
Shot two:

Billing module:



Shot three:

Processing:



Shot four:

Final bill:

PAID BILL

Patient ID	: 6962	Bill Date	: 13/Apr/2015
Patient Name	: Mr. AMINDER KHAN	Bill No	: 11319
Patient Age	: 55 Year(s)		
Sex	: Male	Patient Phone No	: 9800445568
		Registered Date	: 13/Apr/2015 20:30 PM

Client / Insurance Provider: GENERAL

S.No	Description	Units	Amount	Discount Amount	Discount Reason	Remarks
1	Dr.AMITABH MUKHERJEE (Neurology)	1	600.00	0.00		

Payment Mode
Cash Indian Rupees 600.00

Gross Amount : 600.00

Grand Total : 600.00

Net Amount : **600.00**
Total Amount : **600.00**

Amount Received : **600.00**

Amount Received in Words: (Rupees) Six Hundred Only

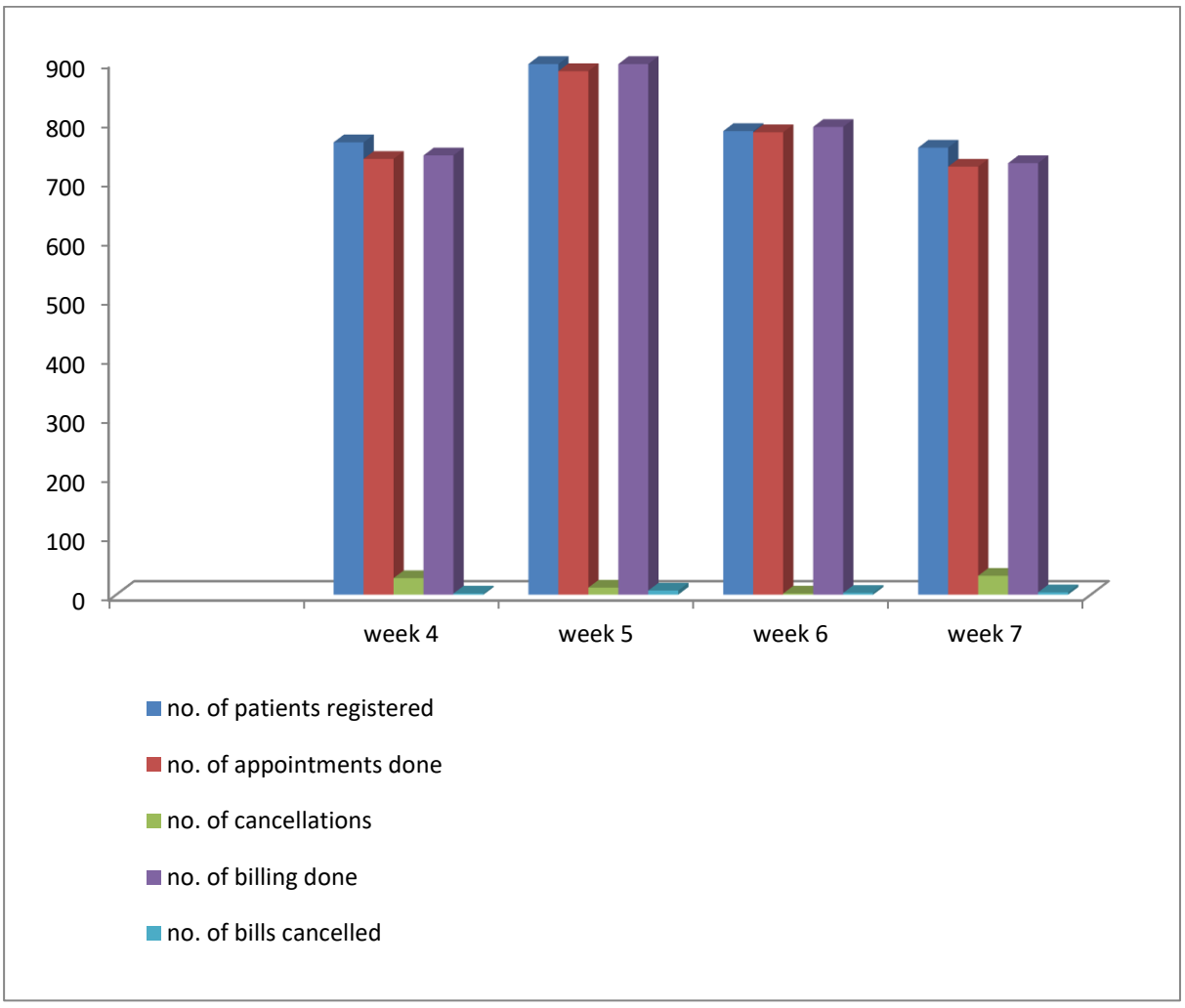
BILLED BY: (MR.ARIJIT)

Go-live:

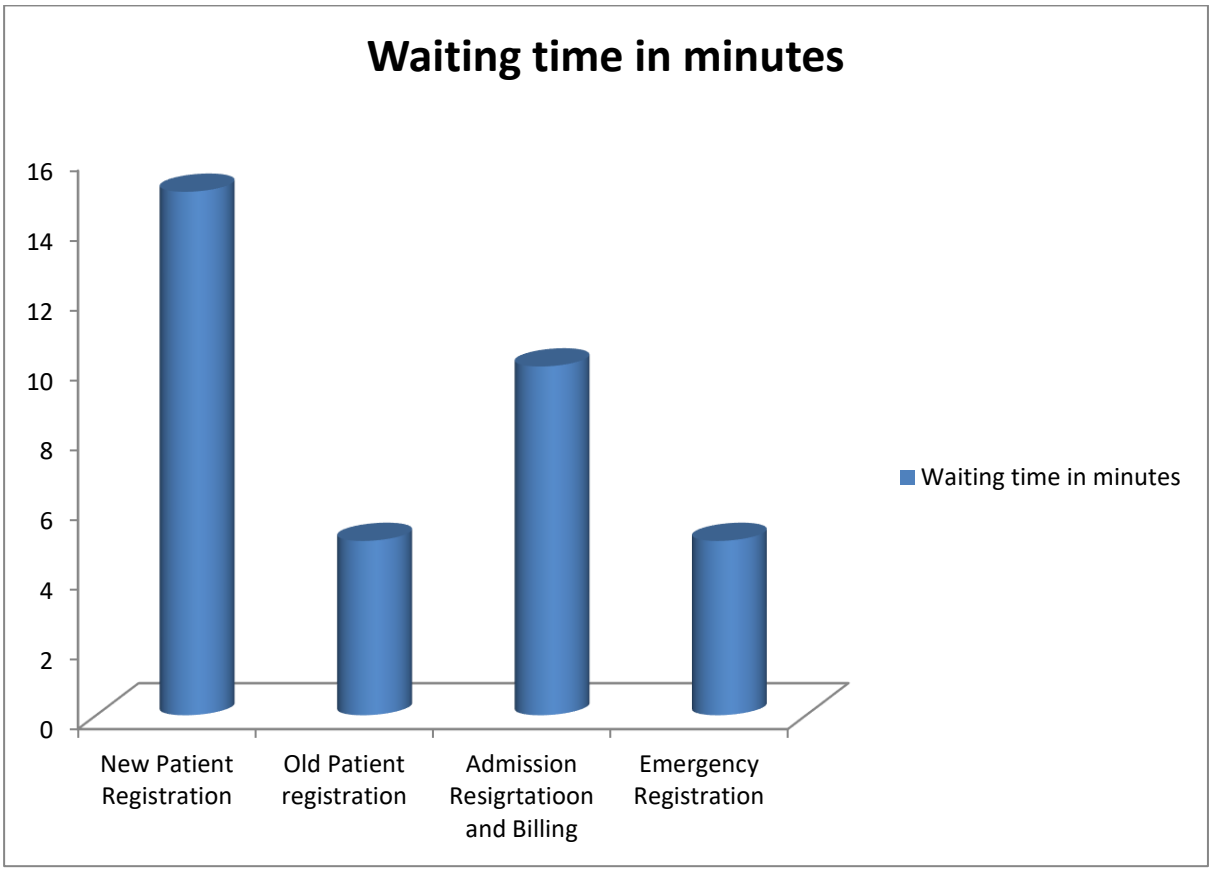
Next step after the training phase was the go-live phase in which we have to report day to day activities performed in the respective module by the staffs after being trained by the team to the backend team to make further evaluation of the HIS implemented in the particular institution. Here are the activities presented in graphical format:

Activities performed after GO-LIVE:

The above graphical representation of data is from week 4 to week 7. Here it is clear that HIS had made it possible to calculate the weekly footfall and revenue generation with extreme ease.



After training:



The above chart clearly shows that post implementation of the OPD module software in the institution, there is a marked rise in the efficiency of the working capacity of the concerning staff. This had lead to the decrease in the waiting time of the customers, and thus led to increase level of patient satisfaction, which will cause more increase in revenue cycle of the institution in the near future.

Analysis and Evaluation:

Before Training	During training	After training
Knowledge of HIS was minimal. No experience of using computer apps. Time taken for one patient registration and billing was approximately 30-35 minutes. Waiting time was on the high side. No synchronization of data was there. Analysing the data was a tedious job.	Acceptance of using new technology was an issue. Lots of errors (pressing wrong button, unable to start and shut down the system, inability to login, unable to find the desired function on the screen, etc) were done by the staff. Finding proper time to train the staff was an issue due to their busy schedule.	Time taken for PR and billing reduced to a considerable mark. Efficiency of the front desk staff has been increase. Analysis and evaluation of the data (patient footfall, number of patient registrations, and number of billings) were made easy to do.

Limitations:

- Small sample size so it is difficult to get the quantitative data.
- Available data cannot be shared due to clause of confidentiality.
- Communication with end users in different shifts was a big issue.

Recommendations:

- Instead of waterfall model, AGILE model could be a better option to follow.
- To ensure that HIS vendors and commercial providers are supplying hospitals with the proper system documentations, user manuals and guidelines for using and troubleshooting HIS.
- We have to make sure that computer and networks are working fine in terms of hardware and that they have less maintenance problems, so that we can guarantee that the software will consequently work better. Hardware maintenance and technical support is essential.
- Improving the awareness of the importance and benefits of using HIS by focusing on the topic through a multi-phase approach.
- Improving the knowledge of using HIS through formal training during different levels of medical education and training

Learning and challenges:

- Acceptance level towards IT and change in work culture from end users and administration is a tricky task.
- Transcription of data from paper to digital is a tedious job.

- If the organization is using an IT system before hand then the product must be developed such that it is compatible with the old one.
- Old school work culture affect the implementation process adversely.
- Managing client feedback is the key of successful implementation.

Conclusion:

Implementation is just not only limited to the training and monitoring but it also involve human factor and the understanding the problems of the end users. It would not only help the implementation to be successful but also allow the cooperation by the users to adapt the change in the work culture plus maintain the change even after the implementation team will leave the premises of the institution.

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