Benefits and Realization through Clinical Implementation of VistA Electronic Health Record in Leading chain of Super Speciality Hospital

A dissertation submitted in partial fulfillment of the requirements
For the award of

Post-Graduate Diploma in Health and Hospital Management

By
(Dr Rajat Chaudhary)

International Institute of Health Management Research

New Delhi -110075

AUG-NOV, 2010

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By

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Under the guidance of

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Certificate of Internship Completion

Date:……..

TO WHOM IT MAY CONCERN

This is to certify that Dr. Rajat Chaudhary has successfully completed his 3 months internship in our organization from August 9th , 2010 to November 9th , 2010. During this intern he has worked on…….under the guidance of me and my team at Dell Services, Noida.

We wish him good luck for his future assignments.

(Signature)

_____(Name)

_____Designation

Appendix 5

Certificate of Approval

The following dissertation titled "**Benefits and Realization through Clinical Implementation of VistA Electronic Health Record in Leading chain of Superspeciality Hospital**" 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
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_____	_____
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Appendix 6

Certificate from Dissertation Advisory Committee

This is to certify that **Dr. Rajat Chaudhary** , a participant of the **Post- Graduate Diploma in Health and Hospital Management**, has worked under our guidance and supervision. He is submitting this dissertation titled " **Benefits and Realization through Clinical Implementation of VistA Electronic Health Record in Leading chain of Superspeciality Hospital"** 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.

Faculty Advisor	Organizational Advisor
Designation	Designation
IIHMR	Organization
New Delhi	Address
Date	Date

Abstract

Benefits and Realization through Clinical Implementation of VistA Electronic Health Record in Leading chain of Super Speciality Hospital

By Dr. Rajat Chaudhary

Introduction:

This project is based on the study of the benefits perceived & their realization through clinical implementation of Electronic Health Record in a leading chain of Super Speciality hospitals located in Delhi-NCR region. The Hospital is a leading and well respected corporate healthcare provider in India. It provides high quality healthcare services at primary, secondary and tertiary levels.

The benefits management approach begins with IT professionals and Informaticians together answering questions about a potential IT investment. These questions aim to uncover three important aspects of the investment: the ends (the target performance improvements), the ways (the ways the business must work differently), and the means (the enabling IT capabilities).

The overall performance measurement of a healthcare system should be related to benefits realisation optimisation, looking for equilibrium between resource utilization (*cost* and *time*) and

services provided (*access* and *quality*). The built environment should be seen, not only as *context*, but also as a *resource* that enables and potentially impacts on healthcare operations efficiency, influencing care and service efficacy. Based on an extensive literature review and empirical study conducted, this thesis gives a perspective of the *benefits realisation* structure and, describes a selected group of benefits which are used as preliminarily performance high-level targets (*strategic benefits* and *sub benefits*), organising the basis for further characterisation of detailed (end) benefits.

Therefore, this thesis aims to create a framework of how the benefits of clinical implementation Of EHR can be realized and baseline performance benchmarks can be developed pre-implementation phase. I have done a empirical study (six months data collected). According to the purpose this study focuses on the benefits management process, which stages the benefits management process should include and issues to consider. The result illuminates important aspects of evaluation of benefits and a framework for benefits management process is presented.

Table Of Contents

List of Figures

List of Tables

List of Appendices

List Of Abbreviations

✓ APS	APPLICATION, PROGRAMME & SOFTWARE
✓ ADOPTS	ACCESS, DEFINE, OPTIMIZE, PREPARE, TRANSFORM, SUSTAIN
✓ CPRS	COMPUTERIZED PATIENT RECORD SYSTEM
✓ EHR	ELECTRONIC HEALTH RECORDS
✓ EMR	ELECTRONIC MEDICAL RECORDS
✓ HL-7	HEALTH LEVEL-7
✓ HIS	HOSPITAL INFORMATION SYSTEM
✓ PACS	PICTURE ARCHIVAL AND COMMUNICATION SYSTEM
✓ CPOE	COMPUTERISED PATIENT ORDER ENTRY
✓ MAR	MEDICATION ADMINISTRATION RECORDS
✓ BCMA	BAR CODE MEDICATION ADMINISTRATION
✓ MUMPS	MASSACHUSETTS GENERAL HOSPITAL UTILITY MULTI-PROGRAMMING SYSTEM
✓ DBMS	DATA BASE MANAGEMENT SYSTEM
✓ VistA	VETERANS HEALTH INFORMATION SYSTEMS AND TECHNOLOGY ARCHITECTURE
✓ API	APPLICATION PROGRAMMING INTERFACE
✓ SCORM	SHARABLE CONTENT OBJECT REFERANCE MODEL
✓ CSG	CLUSTER SERVICE GROUP
✓ TAT	TURN AROUND TIME
✓ ALOS	AVERAGE LENGTH OF STAY
✓ ADE	ADVERSE DRUG EVENTS

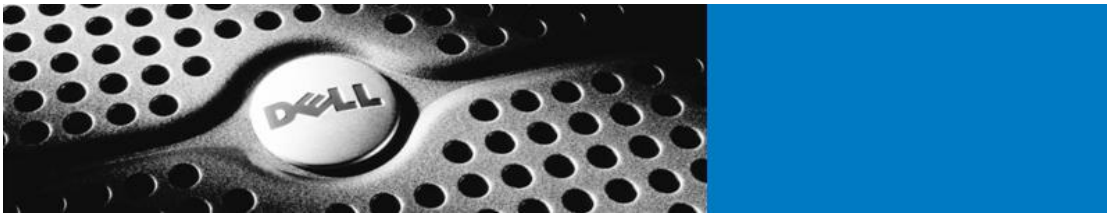
PART –I INTERNSHIP REPORT

1. Organization profile

DELL Services has been involved in many clinical information deployment and support initiatives across all of the major technology vendors and suppliers. We are focusing on empowering our customers to transform their delivery of healthcare services. We have built a diverse group of more than 200 clinicians from multiple disciplines and a strategic group of physicians.

These clinical solutions experts have worked with various teaching, for-profit, and not-for-profit healthcare facilities throughout the U.S. to complete 52 advanced clinical implementations with 11 major platform vendors. This equates to more than 50 different modules. Internationally, we have also completed 48 clinically related projects. We are also in the midst of providing management assistance on the completion of a three-year Cerner Millennium implementation across a number of hospitals in the Gulf Region.

Most recently, we are honored to be recognized by KLAS as the #1 clinical implementation provider among all Professional Service Firms (PSF) / vendors in the industry. Additionally, Dell was the only PSF who had all detail performance scores rank above the industry average, including clinical knowledge, application knowledge, knowledge transfer, and implementing workflow design. KLAS divides workflow redesign into three categories — simple, moderate, and complex. The majority of our customers surveyed (75 percent) said the work we performed for them was complex.



1. History:

Dell Perot Systems is an information technology services provider based in Plano, Texas, USA. Peter Altabef has served as president and chief executive officer since 2004. On September 21,

2009, Perot Systems agreed to be acquired by Dell for $3.9 billion. The acquisition resulted in a compelling combination of two iconic information-technology brands. H. Ross Perot and eight associates founded Perot Systems in June 1988 after having sold Electronic Data System (EDS) to General Motors. Before its acquisition by Dell Inc., Perot Systems was a Fortune 1000 corporation with more than 23,000 associates and 2008 revenues of $2.8 billion. Perot Systems maintains offices in more than 25 countries around the world, including the United States, Europe, India, China and Mexico

As a top-five finisher for the third consecutive year, Perot Systems was named to the Fortune magazine "Most Admired Companies in America" list for IT Services in 2008. [1,8]

The expanded Dell is better positioned for immediate and long-term growth and efficiency driven by:--

- Providing a broader range of IT services and solutions and optimizing how they're delivered.
- Extending the reach of Perot Systems' capabilities, including in the most dynamic customer segments, around the world.
- Supplying leading Dell computer systems to even more Perot Systems customers.

2. ELECTRONIC HEALTH RECORD (EHR)

An Electronic Health Record is an evolving concept defined as a systematic collection of electronic health information about individual patients. It is a record in digital format that is capable of being shared across different healthcare settings by being embedded in network-connected enterprise wide information systems. **[2,11]**

Advantages of an Electronic Health Record

- Easy access to information
- Comprehensive and standardized documentation
- Improved quality of patient care
- Increased nursing efficiency
- Improved process communication
- Reduced medication errors

- Reduced hospital costs
- Meet various accreditation requirements
- Promote evidence based medicine
- Improved patient's experience in the hospital
- Reduced TPA denials
- Better control of Management
- Reduced pilferages
- MIS reports

Rationale: To enhance care delivery excellence by measurably improving quality of service and reducing costs through the effective alignment of people, process and technology. [16]

The EHR currently being implemented in ABC Healthcare is VistA.

2.1 Veterans Health Information Systems and Technology Architecture (VistA)

The Veterans Health Information Systems and Technology Architecture (VistA) is an enterprise-wide information system built around an electronic health record, used throughout the United States Department of Veterans Affairs (VA) medical system, known as the Veterans Health Administration (VHA).VistA, is an integrated system of software applications that directly supports patient care. By 2008, the VHA was the largest single medical system in the United States, providing care to 5 million veterans, employing 180,000 medical personnel and operating 163 hospitals, over 800 clinics and 135 nursing homes. By providing electronic health records capability, VistA is thereby one of the most widely used EHRs in the world.[6]

Features

The VistA system is public domain software, available through the Freedom of Information Act directly from the VA website, or through a growing network of distributors. The VistA software alliance is a non-profit trade organization that both promote the widespread adoption of versions of VistA for a variety of provider environments. VistA is a collection of about 100 integrated software modules. Some of the modules included in VistA which enables the user with a number of advantages are

2.2 Computerized Patient Record System (CPRS) Module

The most significant is a graphical user interface for clinicians known as the Computerized Patient Record System (CPRS), which was released in 1997. In addition, VistA includes computerized order entry, bar code medication administration, electronic prescribing and clinical guidelines. CPRS provides a client–server interface that allows health care providers to review and update a patient's electronic medical record. This includes the ability to place orders, including those for medications, special procedures, X-rays, nursing interventions, diets, and laboratory tests. CPRS provides flexibility in a wide variety of settings so that a consistent, event-driven, Windows-style interface is presented to a broad spectrum of health care workers. CPRS provides electronic data entry, editing, and electronic signatures for provider-patient encounters as well as provider orders. Its computer-based provider order entry (CPOE) capability is an important enabler in the migration from paper-based charting to electronic medical records (EMRs).[10]

2.3. Laboratory Module

Laboratory module enables the user with Ordering of tests and procedures on both patient and non-patient specimens, Collection and Accessioning of specimens into the Laboratory database, Processing and analysis in appropriate department or work areas, review and verification of results, Reporting of results and/or diagnoses for clinical health care treatment, Analysis and reporting of quality control data used in generating results and Providing management statistical data as well as requirements for accreditation by regulating bodies and agencies

2.4. Radiology Module

Radiology / Nuclear Medicine package is a comprehensive software package, designed to assist with the functions related to processing patients for imaging examinations. The Radiology / Nuclear Medicine package automates the entire range of diagnostic functions performed in imaging departments, including request entries by clinical staff, registration of patients for exams, processing of exams, recording of reports/results, verification of reports on-line, displaying/printing results for clinical staff, automatic tracking of requests/exams/reports, and generation of management statistics/reports, both recurring and ad hoc. The Radiology / Nuclear

Medicine package automates many tedious tasks previously performed manually, providing faster, more efficient and accurate data entry and more timely results reporting. One of the important features provided by VistA is

VistA Imaging

The Veterans Administration has also developed VistA Imaging, a coordinated system for communicating with PACS (radiology imaging) systems and for integrating others types of image-based information, such as, pathology slides, and scanned documents, into the VistA electronic medical records system. This type of integration of information into a medical record is critical to efficient utilization.

2.5. Surgery Module

The Surgery package is designed to be used by Surgeons, Surgical Residents, Anesthetists, Operating Room Nurses and other surgical staff. The Surgery package is part of the patient information system that stores data on the Department of Veterans Affairs (VA) patients who have, or are about to undergo, surgical procedures. This package integrates booking, clinical, and patient data to provide a variety of administrative and clinical reports.

2.6. Pharmacy Module

The Pharmacy package provides a method of management, dispensing, and administration of inpatient drugs within the hospital. Hospital Medications combines clinical and patient information that allows each medical center to enter orders for patients, dispense medications by means of Pick Lists, print labels, create Medication Administration Records (MARs), and create Management Reports. Hospital Medications also interacts with the Computerized Patient Record System (CPRS) and the Bar Code Medication Administration (BCMA) packages to provide more comprehensive patient care.

VistA was developed using the M or MUMPS language/database. The VA currently runs a majority of VistA systems on the proprietary Intersystems Cache version of MUMPS, but an open source MUMPS (Massachusetts General Hospital Utility Multi-Programming System)

database engine, called GT.M for Linux and Unix computers has also been developed. GT.M is an implementation of the Standard M programming system (M = MUMPS = Massachusetts General Hospital Utility Multi-Programming System). VistA is written in Standard M. GT.M is an implementation of M from Fidelity Information Services. In addition, the free and open source nature of GT.M allows redundant and cost-effective failsafe database implementations, increasing reliability for complex installations of VistA.

2.7 WorldVistA EHR-An Open Source Customized VistA

WorldVistA EHR is an open source electronic health record (EHR) based on the highly acclaimed VistA system of the United States Department of Veterans Affairs (VA). [9]

WorldVistA EHR features include:

Core VistA functions such as:

- Patient registration
- Clinical reminders for chronic disease management
- Clinical order entry
- Progress note templates
- Results reporting

World VistA EHR also includes functionality tailored to meet the specific needs of clinics and physician offices, such as:

- Ability to interface to existing practice management / billing systems, lab services and other applications
- Scanning and inclusion of scanned documents into the medical record
- Prescription finishing and faxing
- Clinical quality measure reporting capabilities
- Support for disease management, using clinical reminders
- Templates for obstetrics/gynecology (OB/GYN) and pediatrics care

Now VistA which is being implemented in ABC healthcare needs to be integrated to the following three for smooth functioning

- ABC Home Hospital Information system (HIS)
- Picture Archival and Communication System (PACS)
- Lab analyzers.

The middleware platform which is being used for the integration of VistA with the existing ABC HIS is Mirth. An integration engine is software which moves data between information systems. This process involves the transformation of data between messaging standards and requires support for multiple transmission protocols.

2.8 Mirth

Mirth is an open source Java-based integration engine sponsored and primarily developed by WebReach, Inc. Mirth was designed based on the client-server style and the enterprise service bus architecture.

Mirth delivers the industry's first free, open source Health Level 7 (HL7) messaging middleware. The standards-based Mirth software is designed to dramatically reduce the time and cost required to achieve health information system interoperability and data exchange, and to speed secure information sharing across communities of healthcare professionals.

"Mirth's ability to support multi-channel messaging modes, multi-protocol connectors, multiple languages for transformer scripting, and a full complement of end-point technologies make it an attractive interface engine for VistA-based solutions,"

2. Managerial task

Managerial Task in clinical transformation department (Aug 9th to Nov 9th , 2010) :-

Analyzing step by step change management process:

1. ADOPTS Activities[16]**:** Healthcare **(Table:1)**

	Assess	**D**esign	**O**ptimize	**P**repare	**T**ransform	**S**ustain
Governance and Leadership	• Conduct project kick–off • Assess local project governance and decision making • Identify client project manager, work groups • Complete project plan • Complete budget planning and validation • Document lessons learned • Conduct quality review	• Present executive readiness assessment • Finalize governance and leadership structure • Define and validate decision making process • Document lessons learned • Conduct quality review	• Monitor steering committee effectiveness and decision making strategy • Document lessons learned • Conduct quality review	• Monitor go-live readiness • Begin planning for post go-live governance • Begin to implement improvements • Document lessons learned • Conduct quality review	• Make go/no-go decision • Go-live planning and responsibilities reviewed with steering committee • Conduct go-live check-ins with leadership • Document lessons learned • Conduct quality review	• Set up mechanism for ongoing QA • Prepare resource and ownership plan • Determine post implementation optimization strategy • Hand off to support organization • Document lessons learned • Conduct quality review (post-go-live)
Process Redesign	• Identify risks • Identify process owners and team members • Identify reporting requirements • Develop current state workflows and content • Obtain current state workflows sign-off	• Identify multidisciplinary workgroups for future state design sessions • Compare current state to desired future state for design and identify gaps • Develop future state workflows • Revise policies and procedures as required • Develop risk mitigation strategy • Complete design review and sign-off	• Future state workflows modeled and simulated for identified areas • Redesign care delivery systems and roles as necessary • Negotiate future state process migration plans • Conduct future state reconciliation session • Prepare day-in-the-life scenarios	• Final validation of future state workflows and content after testing and training • Incorporate future state processes and content into end user training	• Provide support for new workflows • Revise workflows and build changes as needed • Resolve workflow issues	• Develop ongoing decision-making strategy to address workflow issues, risks and process improvement opportunities. • Annual review of process workflows. • Define escalation process for items requiring review/decision-making by oversight committee.
Change Management	• Assess cultural	• Develop super-user	• Start super-user	• Initiate super-user	• Execute communication	• Determine process for

	readiness (InfoTool) • Executive interviews • Assess current communication strategy • Review organization history with change	roles and responsibilities • Develop communication strategy • Develop stakeholder strategy	orientation meetings • Address policy and procedure gaps • Implement change management strategies	training • Complete super-user training • Begin transition of roles, as applicable • Conduct go-live readiness	plan for go-live • Communicate changes to super-users, physicians, end users • Develop super-user feedback communication plan	change management • Select most appropriate communication media for ongoing organization-wide communications • Incorporate ongoing change into business as usual (BAU)
Clinical Participation and Adoption	• Review current state process for physicians and advanced practitioners • Perform clinician needs assessment	• Organize and initiate evidence-based design sessions • Design to support clinical practice and care management systems • Design content (order sets and decision support) for at least 80% of clinical business	• Optimize clinical order sets • Validate clinical knowledge-based content	• Conduct end-user and physician training • Train physician super-users • Plan for physician support schedule during go-live	• Complete physician readiness assessment for pre-go-live • Validate go-live staffing schedules for clinical support • Validate that physician users have been trained and have access to new policies and procedures	• Ensure a physician governance structure with assigned accountability is in place for ongoing system clinical improvements • Annual review of clinical content
Benefits Realization	• Complete data collection and questionnaires • Assess current indicators and current benefits realization plan • Identify overall program benefit owner	• Confirm benefits indicators and begin baseline measures • Identify individual indicator benefit owners	• Establish benefits targets, thresholds • Develop SCORE dashboard customized for client • Develop indicator definition forms for each indicator • Develop value proposition	• Incorporate benefits measures into training materials • Develop data collection, management strategies, reporting, and variance tracking processes • Implement benefits educational program	• Validate metric data collection during go-live • Initiate benefits realization/monitoring	• Measure benefits indicators post go-live • Establish benefits dashboard as means to capture and report to customer executives • Establish ongoing quality assurance and review

			s for each indicator			
Technology Implementation	• Revise the infrastructure capacity plan • Assess disaster recovery impact • Conduct infrastructure capacity planning • Assess technical readiness	• Design learning/training strategy • Start user prerequisite IT skills training • Design inputs (clinical data reporting, clinical documents) for report outputs • Acquire/install hardware and software • Develop interface specifications	• Localize training materials and tools • Complete local build and proof-of-concept • Prepare for unit testing resource requirements • Conduct build review and sign-off • Complete interface development • Conduct end user device walkthrough	• Conduct unit test of local build • Initiate integrated and interface testing, resolve issues • Complete end-to-end testing • Deploy and test all hardware, connectivity, and communications • Conduct mock go-live (dress rehearsal) • Align training materials with future state workflows • Initiate end user training • Complete plan for pre-go-live support	• Conduct mock go-live walkthrough • Provide just-in-time training as needed • Validate printer configurations • Validate super-user work schedules • Ensure command center, help desk, support services, and infrastructure teams are ready for go-live • Initiate command center • Identify go-live issues • Go live	• Continue ongoing training • Resolve outstanding issues or changes assigned to local, implementation, vendor, or support teams to complete • Establish upgrade strategy • Conduct mock downtime reveiws • Initiate upgrade planning

2. ADOPTS Deliverables[16] : Healthcare (Table:2)

	Assess	**D**esign	**O**ptimize	**P**repare	**T**ransform	**S**ustain
Governance and Leadership	• Vision and scope established • Status of existing governance and leadership • Executive summary	• Governance structure implemented • Governance org charts completed • Finalize project charters • Guiding principles • Decision-making matrix	• Decision making process and function of steering committee monitored	• Leadership checklist completed • Go-live date confirmed • Go-live plan signed off	• Leadership prepared for go-live responsibilities • Decision making process for go-live completed • Go-live initiated	• Project to management transition completed • Ongoing quality assurance provided • Lessons learned • Executive dashboard report

Process Redesign	• Current state (CS) Visios • Risk assessment and mitigation plan • List of regulatory requirements • List of reporting requirements	• Future state (FS) Visios • Risk mitigation plan • Develop policies, procedures, and job descriptions • Process tracking complete	• FS workflows modeled and simulated for identified areas • Human resources requirements • Day in Life scenarios completed and delivered	• FS workflow walkthroughs completed • Process changes with training and testing identified and incorporated into new Visios as needed • Policy and procedures signed off	• FS process workflow distributed to go-live areas	• Plan for ongoing optimization of processes and content standards established • Process redesign executive summary report
Change Management	• Culture and change readiness survey completed • Readiness executive report • Knowledge transfer initiated	•Communications plan • Stakeholder plan • Knowledge transfer	• Role-based documents • Communication posters • Knowledge transfer	• Patient and family communications prepared • Super-user training complete • Go-live readiness • Knowledge transfer	• Go-live communications • Super-users provide go-live support • Knowledge transfer	•Communication and stakeholder plan incorporated into business as usual (BAU)
Clinical Participation and Adoption	•Physician/clinician adoption strategy assessment and analysis	• Creation of clinical knowledge-based content • Physician Advisory Group (PAG) initiated	• Clinical-based content completed and signed off	• Clinician training complete • Physician training materials	• Go-live support for physicians provided	• Clinician governance plan • Physician utilization report
Technology Implementation	• Status of existing infrastructure • Technical project plan	• Downtime procedures designed • Detailed system design and interface specifications • Gap analysis for technology	• System build complete • Data conversion plan • Device deployment plan	• Unit, system, integrated, stress testing completed • End user training • Conversion plan • Go-live plan	• Go-live support, workflow, software and technology training complete • Go-live staffing schedules validated • List of go-live issues	• Ongoing training follow-up established • Clinical and technical go-live issues resolved • Upgrade strategy plan
Benefits Realization	• Clinical, financial, and operations business and benefit opportunities identified	• Final panel of clinical indicators • Baseline performance data • Assigned	• Indicator measurement and definitions established • Value propositions	• Baseline benefits measures delivered	• Data collection, reporting, variance tracking processes implemented	•Quarterly/monthly benefits reports • Conduct ongoing benefit program

		resources and ownership	for all indicators • Benefits optimization strategies completed		• Dashboard	management, and transition to BAU

3. ADOPTS Tools [16]: Healthcare (Table:3)

	Assess	**D**esign	**O**ptimize	**P**repare	**T**ransform	**S**ustain
Governance and Leadership	• Executive interview questionnaires • Agenda templates • Lessons learned template	• Sample committee charters • Roles and responsibility matrix • Sample guiding principles	•Readiness assessment action plan	• Leadership checklist completed • Go-live plan	• Go-live governance structure • Go-live and resourcing plan • Go-live issues log	• Executive summary template • Client reference template •Sustainability guidelines
Process Redesign	• Sample current state Visios • Visio style guidelines • Visio training — PPT • Departmental questionnaires • Process tracking template	• Sample Future State (FS) Visios • How-to guide for future state — PPT • Decision matrix • Current and future state workbooks • Client sign-off form	• FMEA template • Day-in-life scenarios • Future state reconciliation template	• Policy and procedure template	• FS Visios • Issue tracker	• Process redesign executive template
Change Management	• InfoTool survey questions • Sample InfoTool executive report	•Communications plan • Stakeholder plan	• Sample role document • Sample posters	• Super-user roles document • Go-live readiness template	• Change support communications (pamphlets, posters, email, other)	• Transition to client checklist
Clinical Participation and Adoption	• Adoption assessment survey • PC skills assessment survey	• Creation of clinical knowledge-based content begun • Physician Advisory Group (PAG)	• Sample naming convention templates	• Favorites template • Physician training plan • Physician pocket guides	• Go-live support for physicians schedule • Issue tracker (same one for process redesign)	• CPOE graphs and dashboard • Physician change management plan
Benefits Realization	• SCORE panel of indicators	• Indicator selection survey • Indicator	• Value propositions • Scoring	• Value dashboad framewor	• Sample reporting graphs	• Sustain protocol •Sustainabilit

	• Data request worksheet • Benefits realization matrix	specification form • Stakeholder matrix	guidelines	k	• Sample executive benefits dashboard reports	y guidelines • Action planning document • Reporting template
Technology Implementation	• Technical project plan	• Reporting requirements survey • Design specification documents • Role-based document	• Build issues tracking template	• Test plan • Test scripts • Training materials • Quick reference guides • Go-live project plan	• Cut-over plan • Cut-over checklist • Downtime plan • Floor walking plan • Go-live issue tracker	• Training effectiveness survey

3. Reflective learning

Healthcare today finds itself at cross roads facing three major moving targets:

- Cost
- Access
- Quality

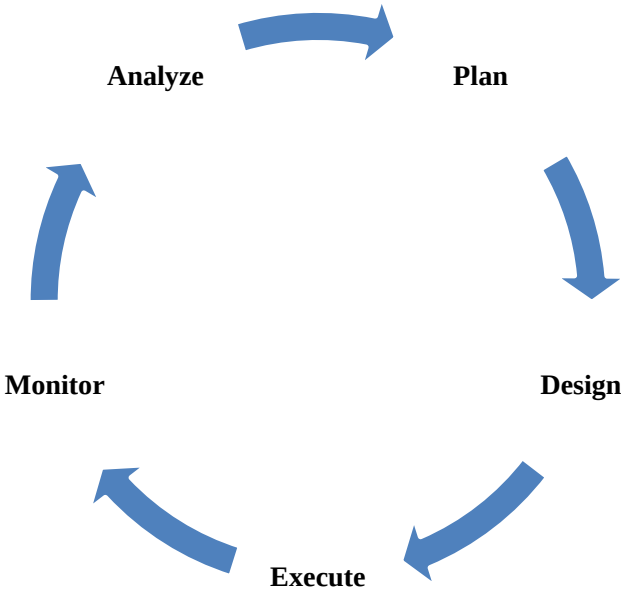


Figure 1 Quality care cycle

For healthcare to be sustainable and be able to meet the patient's requirements, it has to be cost efficient & provide access to quality care (Fig 1). Increasingly the Information Systems are called upon to support these objectives. The benefit of Information Systems adoption in achieving these objectives flows from the following :

- Time - Real time flow of information
- Place - Remote dissemination of information
- Standardization - processes & workflows
- Coordination - care providers
- Decision support – clinical knowledgebase, Clinical pathways & protocols
- Telemedicine – making remote encounters possible

- Retrospective analysis – trends, audits, outcomes
- Predictive analysis – what-if, simulation & modeling

The Clinical Transformation Point of View[17]:

We realized that by combining the right mix of these key elements, healthcare organizations can achieve a more successful, value-driven approach to clinical information systems design and deployment. Balancing these forces is truly the key that enables the effective use of technology that allow healthcare providers to manage organizational change and clinical implementation.

People issues include:

1. Flexible, learning culture; fostering an organization-wide commitment to change.
2. Aligning leadership within the organization to the objectives of the clinical transformation effort.
3. Defining clear performance incentives and results metrics
4. Establishing a collaborative governance and structure
5. Developing a clear communications plan, among other efforts.
6. As a core component of transformation, a focus on people is frequently one of the most neglected areas.

PART - II

DISSERTATION OVERVIEW

1. Problem Statement

We want to realize the potential benefits of VistA HER implementation in client's organization seamlessly, without defects, where all stakeholders are aware and informed of the outcomes and status.

Today we have too many implementation failures that result in too many rollbacks. If we ignore this problem; we may not able to monitor performance benchmarks or the potential benefit indicators of the system which is moving from paper based system or HIS to a complete electronic record, further damage to quality reputation.

We will use ADOPTS methodology in evaluating the performance benchmarks in pre-implementation phase.

2. Objective

General objective:

To realize the potential Benefits through Clinical Implementation of VistA Electronic Health Record in Leading chain of Super Speciality Hospital, to monitor baseline parameters pre-implementation phase of EHR Deployment.

Specific Objectives:

To monitor the accountability on three important benefits realized by EHR implementation:

- Reduction of paper usage would decrease to a large extent
- Average length of stay for a patient in a hospital would decrease.
- TPA claim denials would reduce.

Divide in phased approach, first gauging the **pre implementation phase and setting the baseline parameters**.

Rationale of Study: Paper based records or HIS system of the client will be revamped to a complete electronic and an integrated system. Thus improving the overall quality, standardization and efficiency in to the client's system.

3. Scope of the project

The study answer the question –

Who the study benefits – Benefits is for the users of the system and above all the organization.

Who will be benefitted- responsibility for realizing the benefits in pre-implementation phase and anticipate the potential outcomes.

4. Need

Overall purpose is to achieve real and lasting improvements in the quality of healthcare provided by care delivery organizations to patients. This focus can be named as Drive to Quality. By simple definition, healthcare transformation is a comprehensive ongoing approach to care delivery excellence that delivers value by measurably improving quality, enhancing service, and reducing costs through the effective alignment of people, process, and technology. Proving the value of healthcare transformation efforts with **hard data is the challenge of the measurement component and should be an integral part of the process.** Framework for understanding and describing quality in measurable terms becomes a critical first step. A set of high-level measures to gauge the impact of transformation efforts at the system-level becomes important to detect the effect of changes in one area of the enterprise on others. Desired performance levels for all affected patient care processes should be clearly articulated at the onset of any clinical systems implementation project. The set of measures associated with these patient care processes becomes the scoreboard for determining success of the overall effort. The measure set in pre-implementation phase should be balanced and reflect the key quality characteristics desired from those processes.

5. Benefits

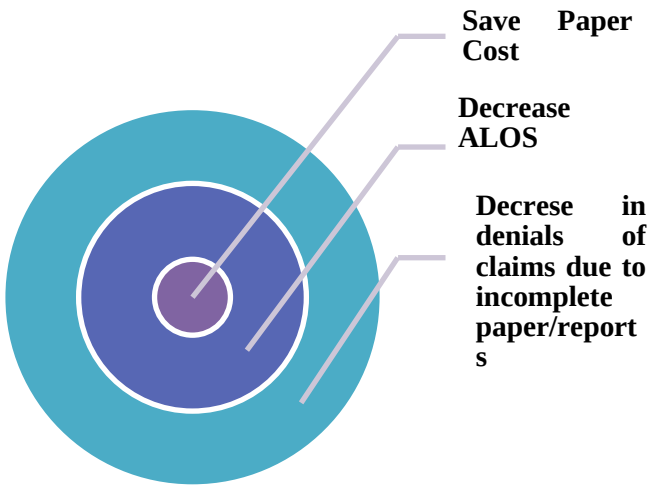


Figure 2 Target benefits

1. **Health Information Management and paper costs**

Benefits Expected:**

- Real time online access to patient data.
- Save on costs of patient record related stationery expenses.
- Avoid errors of duplicate documentation and multiple paper registers.
- Drive automated reports and audit through electronic data capture.
- Enhance clinical analytics and support research.
- Nurses and doctors will have more time to devote to clinical work.

2. **Denial Management of Insurance Claims**

Benefits Expected:

- Decreased Insurance denials through complete and improved documentation.
- Decreased Insurance Queries through complete and improved documentation.
- Decreased delay in realization of claims related cash flow.

3. **Length of Stay Management**

Benefits Expected:

- Improve throughput and hospital capacity.

- Improve patient satisfaction.
- Improve care delivery: appropriate care setting, right care, right time.
- Increase profitability.
- Decrease clinical denials.

6. Assumptions

6.1. For paper consumption (not an hypothesis)**:**

- 10 percent of forms can be retained for downtime procedures. (not an hypothesis)
- 60% of all paper costs related to forms and EHR related is taken into consideration.
- 50% reduction in paper use for patient care notes and orders and results following EHR deployment. Anticipatory statement made (not an hypothesis).
- Savings will be achieved from different types of forms currently utilized at each hospital and the reduction of printer cartridges.
- The study can be carried forward with 6 months time period.
- Full benefit will be achieved at 24 months (by hospital).
- Current total expenditure on paper, registers and printing- 20000000(anticipatory based on current consumption)

Formula:

- Total cost on paper X 60%X50%

6.2. For Denial Management of Insurance Claims (not an hypothesis)**:**

Assumptions:

- Total revenue through TPA- 22% of group revenue- 6 crores per month.
- 2 % of denials related to incomplete documentation-0.5%.
- Total revenue from CGHS/ECSH- 1.2 crore/mth.
- 4 % claims with deductions- 4%.

- 5 %deductions due to incomplete documentation-2%.
- The above denials and deductions can be avoided if documentation submitted is complete.

Formula:

- Total revenue per year from TPA claims X 0.5% .
- Total revenue per year from CGHS/ECHS claims X 2%.

6.3. Length of Stay Management (not an hypothesis):

Assumptions:

- Current Pan ABC average LOS for TPA, CGHS patients ranges from 3.7 to 4.25 days.
- Direct variable cost per bed day is Rs. 5000.
- Total no of discharges per year- 40000. (for all hospitals)
- TPA, CGHS and package patients – 43% of all admissions (nearly 50%).

Formula: Total no of discharges X 43% X 0.25 X 5000

= (no. of discharges) X (% of package insurance ppl) X (direct variable cost per bed) X 0.25days / 6 hrs. (reduction in ALOS stay due to standard documentation EHR prepared as opportunity summary).

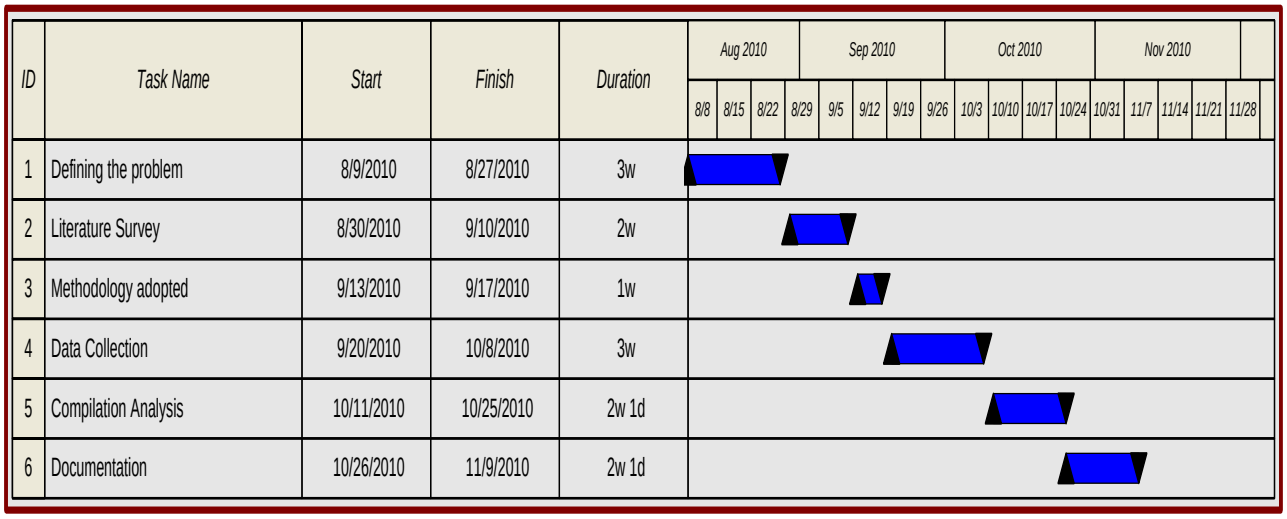
7. Data Sources

TYPE OF DATA	**:**	**Primary,secondary data & Questionaires.** **(From Medical Record Department** **From Medical Store** **From Insurance Department)**

8. Work plan

Gantt Chart for the following :

ACTIVITY	TIME TAKEN
Defining the Problem	9th AUG – 29th AUG 2010
Literature Survey	30th AUG- 12th SEP 2010
Methodology Adopted	13th SEP-19th SEP 2010
Data Collection	20th SEP-10th OCT 2010
Compilation and Analysis	11TH OCT-25TH OCT 2010
Documentation	25TH OCT-9TH NOV 2010



9. Limitations

The biggest limitations of the project it carries 6 months study of baseline parameters pre-implementation phase. The actual benefits can be realized within a span of 18 months of implementation (6 months phases).

Questionnaires prepared were not allowed to ask from the client due to permission constraints.

** Referred to joint agreement between the Dell and its client. To also look into the benefits owner for sign off formalities.

PROJECT OVERVIEW

1. Background

The objective of this project is to implement VistA EHR in ABC Healthcare and ensure smooth and uninterrupted running of the same as this will enable the hospital to have a whole range of data in comprehensive form including patient demographics, medical history, medication and allergies, immunization status, laboratory test results, radiology images and billing information. This objective is set to be attained by the means of clinical transformation "a comprehensive ongoing approach to care delivery excellence that measurably improves quality, enhances service, and reduces costs through the effective alignment of people, process and technology.

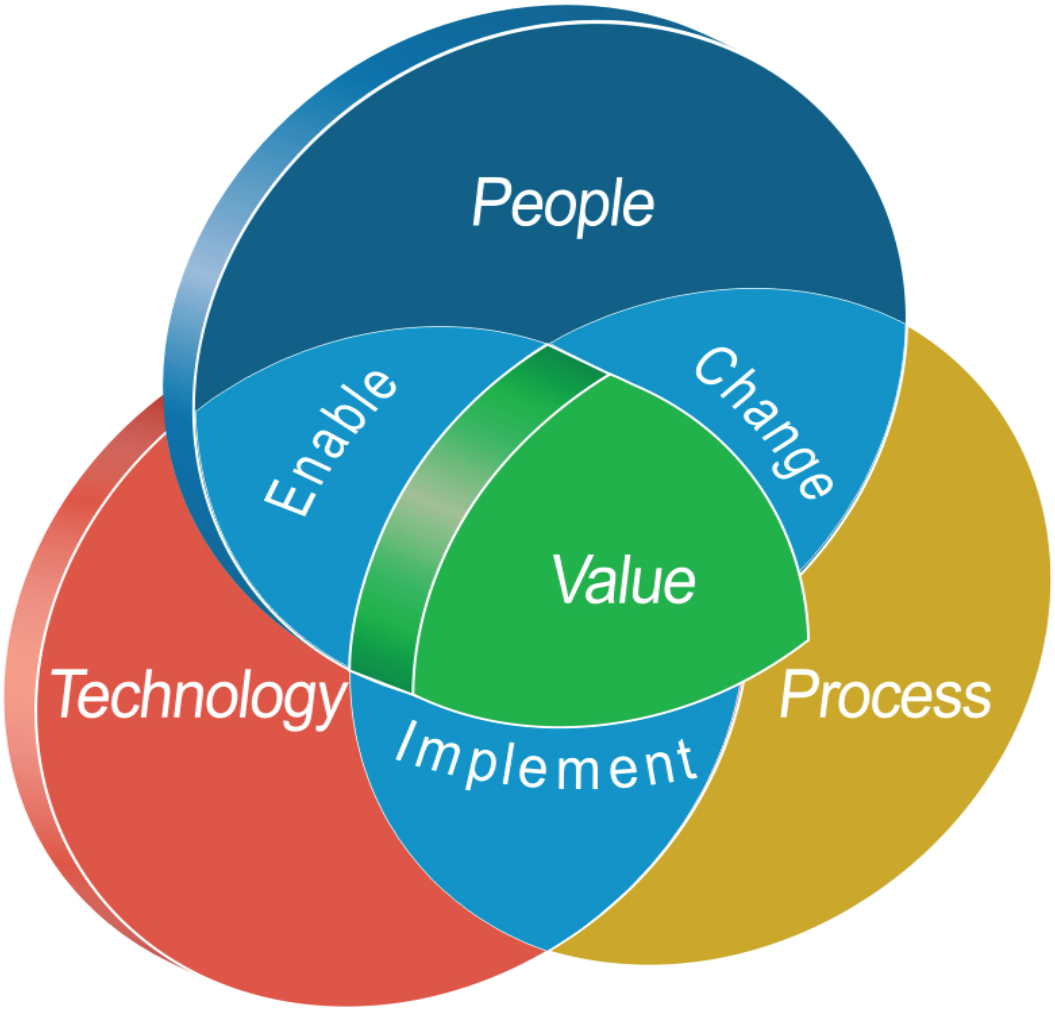


Figure 3 The Clinical Transformation Triad

The measurable benefits of this transformation for the client, the clinicians, and the patients include [15]:

- Increased safety through reduction of adverse medical events
- Increased quality through implementation of clinical best practices
- Decreased costs through identification of opportunities for improved operational efficiency
- Improved clinical adoption by effectively engaging clinicians
- Well defined metrics for success
- Improved clinical decision making, leading to accelerated process improvements throughout the organization

The goal is to attain the above sated benefits by means of clinical transformation and to **monitor baseline parameters set in pre implementation phase**.

Dell is not only working with customers to successfully implement technology in their care environments, but is also striving to incorporate clinician adoption and benefits realization into these initiatives to ensure measurable success. For example, the early benefits of adding this performance improvement and tracking capability is the ability for nurses to perform 100 percent chart audits on admission and shift assessments. This capability and focus allows for improved care planning, reduced potential for omission of critical assessment information about the patient, and dramatically improved compliance.

2. Literature Survey

The empirical work was preceded of a literature study to get a general view of the subject and an insight of earlier researches within the problem area. Since the problem domain revolves around a subject that is under a constant evolution I aimed to find articles from the scientific frontline. Through scientific literature, articles and dissertations and above all the White papers of Dell's ADOPTS methodology[16] on clinical transformation have researches within the subject been penetrated. The articles were obtained from the article database net searched on google. The databases that we mainly used were Science Direct and Wiley Inter Science. Articles were also obtained from different scientific journals as the Electronic Journal of Information Systems Evaluation [12,13], International Journal of Information Management, International Journal of Project Management, Journal of Information Technology and Project Management Journal. In the literature study the initial search was wide, but gradually it narrowed and was limited to specific literature within the problem area. I narrowed the search to specific words; those words were benefits management, benefits realization, benefits evaluation in clinical implementation of EHR. We also searched for frequently referred articles found in the reference list in our already possessed literature.

The continuous process of transformation, or the transformation cycle, is comprised then of three key elements[14]:

- **Strategy** drives transformation efforts by creating a vision of the future and synergies among people, process, and technology to achieve the vision.
- **Dell ADOPTS methodology** discussed below, provides the roadmap for implementation of the change efforts (technical and non-technical).

The model includes the following components:

- **Assess —** Define the environment and enterprise clinical and business needs in response to a problem or change.
- **Design —** Design the ideal solution and determine how the market or clinical environment can support the clinical and business needs of the enterprise.
- **Optimize —** Ensure the effective solution design and change strategy that can best meet clinical and business needs.
- **Prepare —** Positioning the organization for the successful deployment of the solution as demonstrated by benefits realization.
- **Transform —** Initiating the change that enables the realization of benefits.
- **Sustain —** Establishing and anchoring the change that enables the ongoing realization of benefits.

Some of the key principles related to this methodology are:

The successful deployment of any CIS requires a concurrent focus on all three dimensions — people and process in addition to technology.

To facilitate an effective focus on the three critical components of healthcare transformation, Dell Services has developed a practical, experienced model for the effective implementation of clinical information systems.

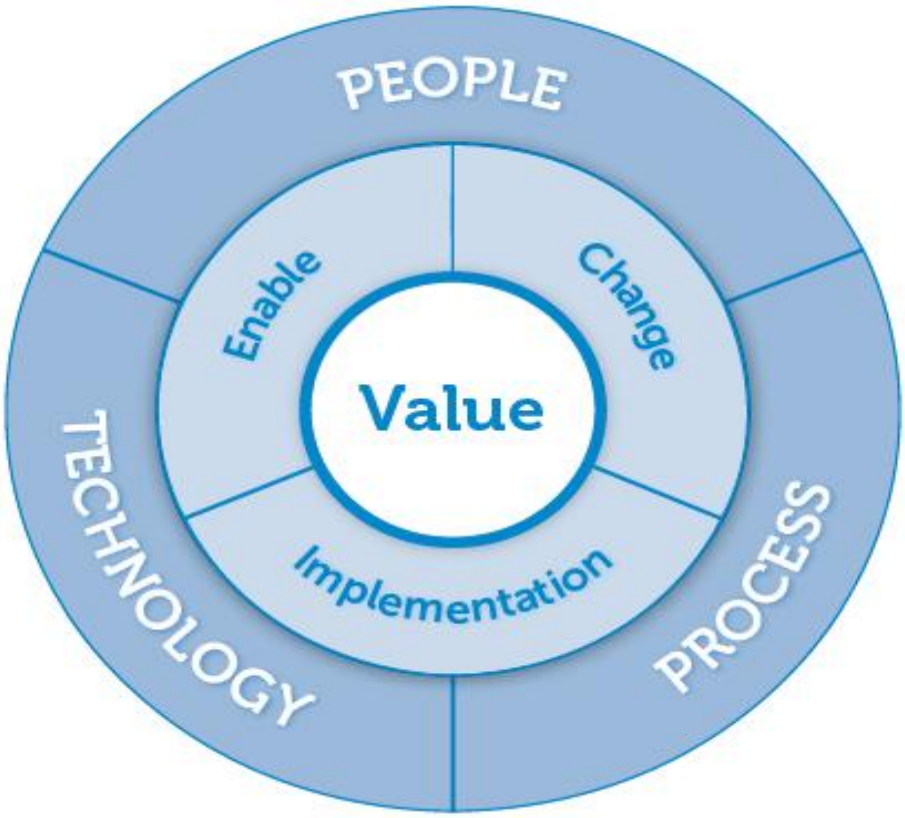


Figure 4 People Process Technology

- Measurement is the final part of the cycle and provides the means to assess the results, optimize outcomes, and ensure sustainability.

Benefits Realization Measurement

The ADOPTS methodology and associated toolkits are designed to promote user adoption and include an emphasis on communication, change management, and multi-disciplinary user involvement to achieve adoption. Dell is committed to measuring value and, as detailed in the

embedded figure, Dell have developed a panel of indicators (SCORE) to reflect the benefits that may be obtained in healthcare transformation.

Score Benefits Indicators [18] (Table 4):

Safety / Quality	Clinical Adoption	Operational Efficiency	Return on Investment	Use of Evidence Based Order Sets
• Medication errors by type • Adverse drug event rate • CMS compliance score • The Joint Commision/ National Patient Safety Goods compliance scores (e.g., Fallas, SSI, med reconciliation rate) • Reduced mortality and morbidity • Completion of screening assessments (e.g., vaccinations) • Patient education/ discharge teaching	• User satisfaction • End-user login percent by discipline • Remote access utilization to patient-related information • Help desk calls by reason for call • CPOE utilization rate • Ordering provider electronic signature timeliness • Clinical documentation completion rate	• Emergency Department Left Without Being Seen (LWBS) • Throughout Emergency Department (time from door to admit/discharge) • Missed transfers (bed availability) • Coding Compliance (CMI Appropriateness) • Worked hours per unit of service by department • Duplicate tests (Lab/Rad) by cancelation reasons • Medical Records deficiency rate • Time to process (Tests/ Specimens/Procedures) • Time to results (Lab/Rad Order to Final Results)	• Denials • Discharged Not Final Billed (DNFB) • LOS and cost for top 25 DRGs by payer source • Overall pharmacy cost per case mix adjusted discharged • Operating Expense/ Adjusted Discharge • Recruitment cost avoidance • Adverse Drug Events/ 1,000 patient days •Reproduction, document/ storage costs	• Use of evidence-based order sets • Use of alert overrides • Use of acceptance reminders • Use of knowledge resource links • Use of clinical pathways • Use of patient risk assessment tools

3. Data Collection

Primary data collected from following departments in ABC Hospital:

i) **Last six months** study on average paper consumption & patient discharge (April'10 to Sep'10) **From Medical Store.**

ii) **From Medical Record Department -** patient's ALOS (April'10 to Sep'10) and the six inpatient sample files used for the (for paper consumption).

iii) **From Insurance Department –** insurance cases rejected (Jan'10 to Jun'10).

Study of secondary data sources

- In addition, detailed study of various company documents like detailed project reports, feasibility reports, organizational announcements, etc. was also undertaken.
- **Questionnaires* An4** were prepared to gauge knowledge on EHR Benefits for the client.
- Organizational, Rather Than Person-Centric Focus.
- Attention to Metrics and baseline parameters pre-implementation phase.

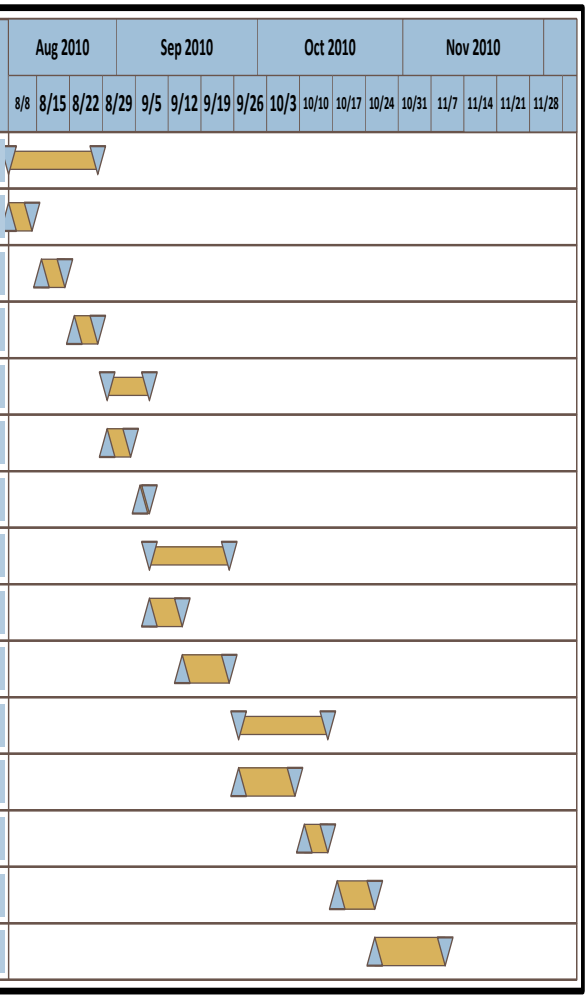
DATA ANALYSIS : The data was analyzed in MS Excel to calculate variation in cost of paper consumption (April'10 - May'10), Benefits Score Cards and Baseline measurements.

VARIABLES STUDIED:

1. Items Identified in hospital : 133 (HOSP. A) & 177(HOSP. B) For paper consumption (clinical, administrative and registers).
2. Number of Discharges 6 Months : 6877 (HOSP. A & HOSP. B)
3. Average Length of stay per speciality & per location.
4. Claim cases of TPA only.

4. Project Management Plan

ID	Task Name	Start	Finish	Duration
1	**Defining the problem**	**8/9/2010**	**8/27/2010**	**3w**
2	Identifying the nature of Problem	8/9/2010	8/13/2010	1w
3	Defining Objective and Scope of Project	8/16/2010	8/20/2010	1w
4	Defining the need,benefits and assumptions,Limitations	8/23/2010	8/27/2010	1w
5	**Literature Survey**	**8/30/2010**	**9/7/2010**	**1w 2d**
6	Referring to internet search,whitepapres,journals	8/30/2010	9/3/2010	1w
7	Referring to books	9/6/2010	9/7/2010	2d
8	**Methodology adopted**	**9/8/2010**	**9/24/2010**	**2w 3d**
9	Observations,Interviews	9/8/2010	9/14/2010	1w
10	Observations, Group Discussions	9/15/2010	9/24/2010	1w 3d
11	**Data Collection**	**9/27/2010**	**10/15/2010**	**3w**
12	Primary Data Collection	9/27/2010	10/8/2010	2w
13	Secondary Data Collection	10/11/2010	10/15/2010	1w
14	**Compilation Analysis**	**10/18/2010**	**10/25/2010**	**1w 1d**
15	**Documentation**	**10/26/2010**	**11/9/2010**	**2w 1d**



5. Results

Results and findings

5.1 Paper Consumption Clinical & Administrative Data

For details of 133 & 177 items from medical store see Annexure-1, 2.

Hospital A

	COST OPERATIONAL EFFICIENCY						
Indicator and goal	**April'10**	**May'10**	**June'10**	**July'10**	**Aug'10**	**Sep'10**	**Total Consumption in Rs (INR)**
Monitor 6 months **paper consumption** (in Rs INR.) Hospital A	**234,219**	**199,356**	**204,179**	**193,352**	**203,197**	**221,490**	**1,255,795/-**

Table -5.1 Paper Consumption Clinical & Administrative Data (in INR)

Hospital B

	COST OPERATIONAL EFFICIENCY						
Indicator and goal	**April'10**	**May'10**	**June'10**	**July'10**	**Aug'10**	**Sep'10**	**Total Consumption in Rs (INR)**
Monitor 6 months **paper consumption** (in Rs INR.) Hospital B	**264,907**	**260,277**	**234,147**	**322,535**	**347,094**	**214,505**	**1,643,465/-**

Table -5.2 Paper Consumption Clinical & Administrative Data (in INR)

	OPERATIONAL EFFICIENCY							
Indicator and goal	**April'10**	**May'10**	**June'10**	**July'10**	**Aug'10**	**Sep'10**	**Target**	**Threshold**
Monitor 6 months Avg. no. of Discharges for HOSP (A & B)	**1094**	**1177**	**1041**	**1084**	**1260**	**1221**	**6877**	

Table – 5.3 Avg. no. of Discharges for HOSP (A & B)

In Rs. (INR)	April'10	May'10	June'10	July'10	August'10	September' 10	Total
Hospital A	234,219	199,356	204,179	193,352	203,197	221,490	1,255,795
Hospital B	264,907	260,277	234,147	322,535	347,094	214,505	1,643,465
Total							2,899,260/-

Table – 5.4 Total Paper Consumption Clinical & Administrative Data (in INR)

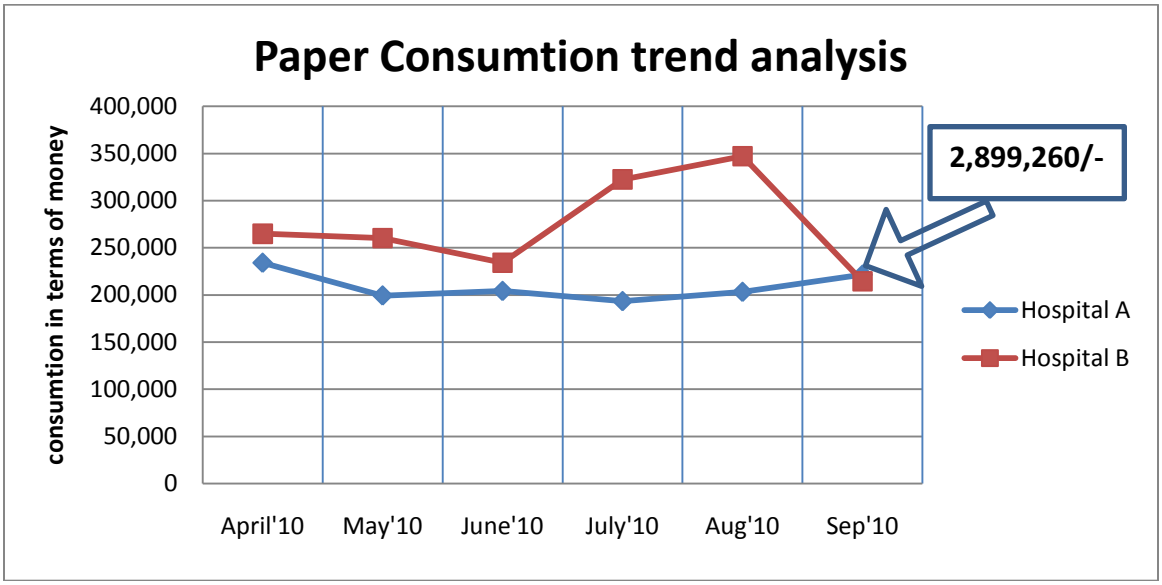


Figure 5 Paper Consumption Trend

It was found that the paper consumption in two hospitals is around 2.8 million for six months. By applying the assumptions and the formula devised for the purpose we get the following result.

Formula applied:

- = 1**,255,795/-+1,643,465/-** (Total cost on paper **clinical + administrative**) X 60% (paper costs related to forms and EHR related) 50% (reduction in paper use for patient care notes and orders and results following EHR deployment)
- = **Rs 1,748,835/-** equivalent to 1.75 million in 6 months for Hospital A & B (immediate savings to be achieved after deployment of the EHR).

Preprinted forms used in Inpatient scenario (clinical forms)
Assessment Forms Doctor
Assessment Forms Nursing
Progress Notes
OP Summary/OPD Card & Forms
Emergency Forms
Registers (Administrative) (40 per month)

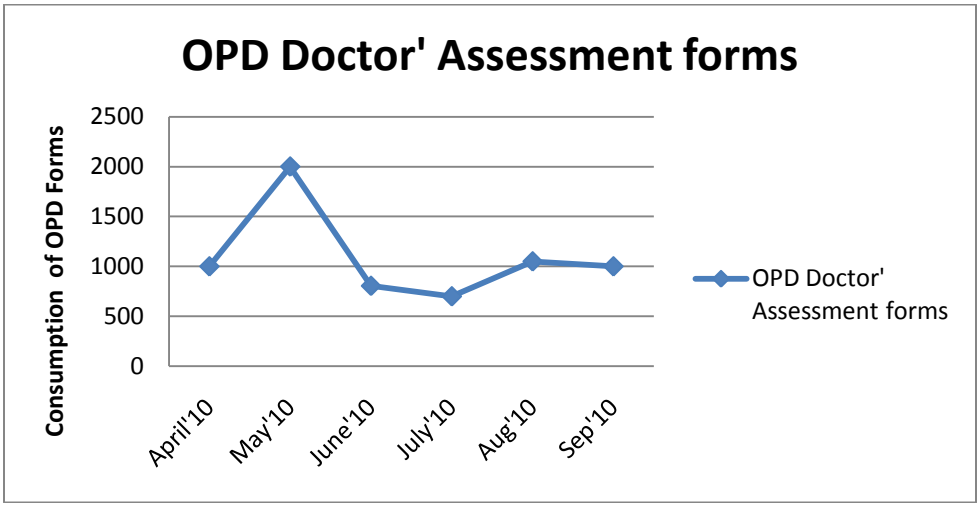


Figure 6 OPD Doctor's Assessment forms

Average of OPD's doctors assessment forms used in past six months: **1092**

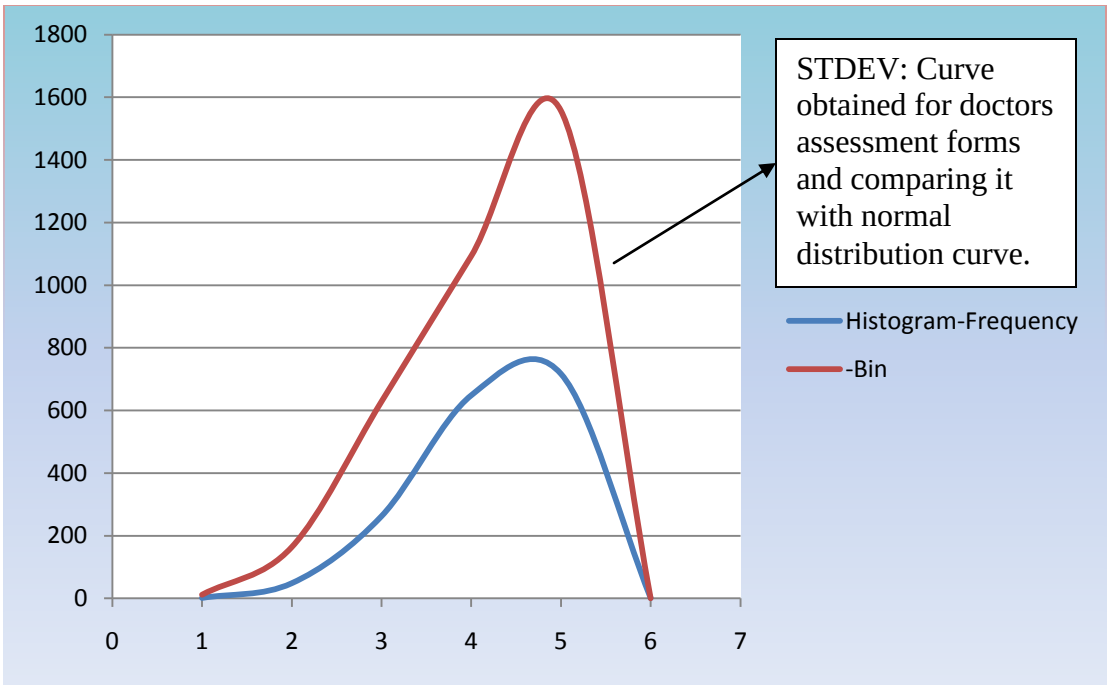
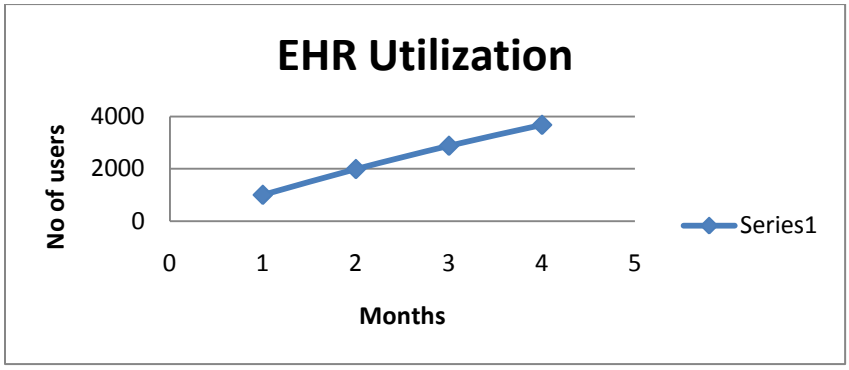


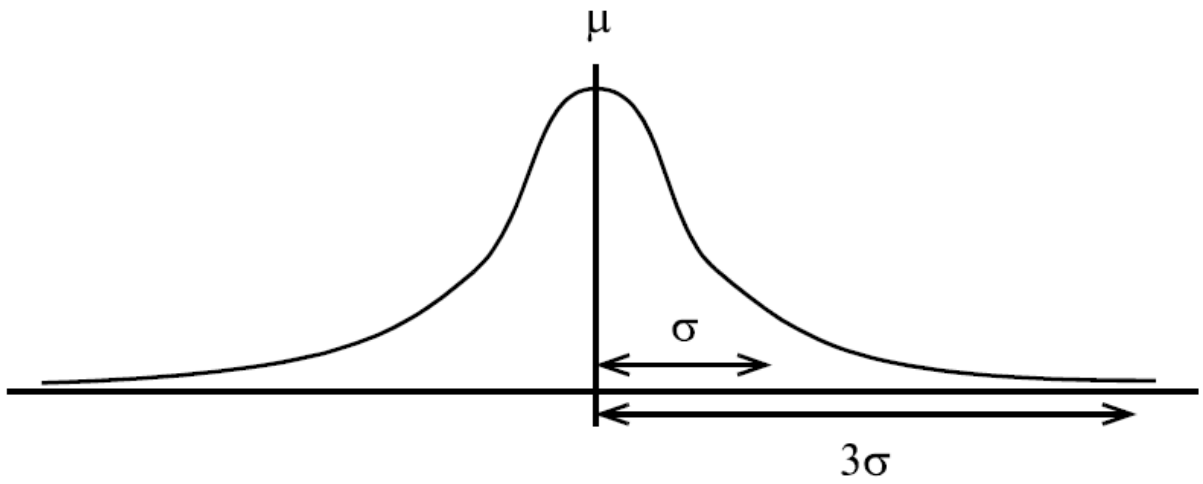
Figure 7 OPD's Doctors assessment forms normal distribution

By assessing the standard deviation (normal distribution curve) for the OPD Doctors assessment forms we come to a conclusion that the sample/consumption of the forms is uneven.

The curve is not symmetrical, it is said to be skewed to the right. This conditions is due to the number in the population is small.

It is likely that consumption of the preprinted forms will go down by deployment of Electronic Health Record system. Thus the normal curve will regain its importance as the number of users of EHR increases as shown below in the diagram.





Interpretations in comparison to normal curve - Often when data is reported for an average and standard deviation, it takes the form $\mu \pm \sigma$,

A characteristic of the normal population curve is that :

68.3% of the data points occur within $\pm 1\sigma$ of μ

95.4% within $\pm 2\sigma$ of μ

99.7% within $\pm 3\sigma$ of μ.

If this is not the case, the curve may be more peaked or flatter than the normal curve; or, if the curve is not symmetrical, it is said to be skewed positively or negatively. These latter two conditions are often seen when the total number in the population is small or when samples are taken from the total population.

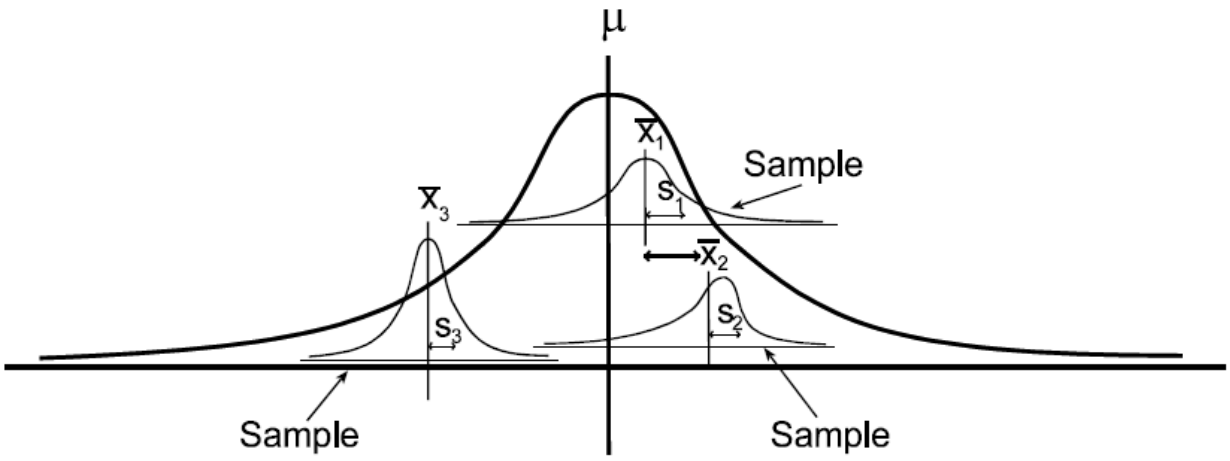


Figure 8 Three distributions for different samples taken from the population.

The distribution representing the data values of sample 1 in shows the hoped for outcome: the sample is normally distributed and includes the population average.

The distribution representing the data values of sample 2 also includes the population average but the sample is skewed to the right.

The distribution representing the data values of sample 3 do not include the population average and the sample is more peaked than the population distribution.

Trying to assess the forms saved clinically - say In one OPD encounter of a patient /IPD visit the number of preprinted forms used for the patients will go down as the records will be maintained electronically thus reducing the efforts, time & cost spent on paper documentation. One encounter will contain all the assessment forms from Doctor, Nurses and reports stored electronically.
Also allowing safer documentation in less space reducing the need of paper.

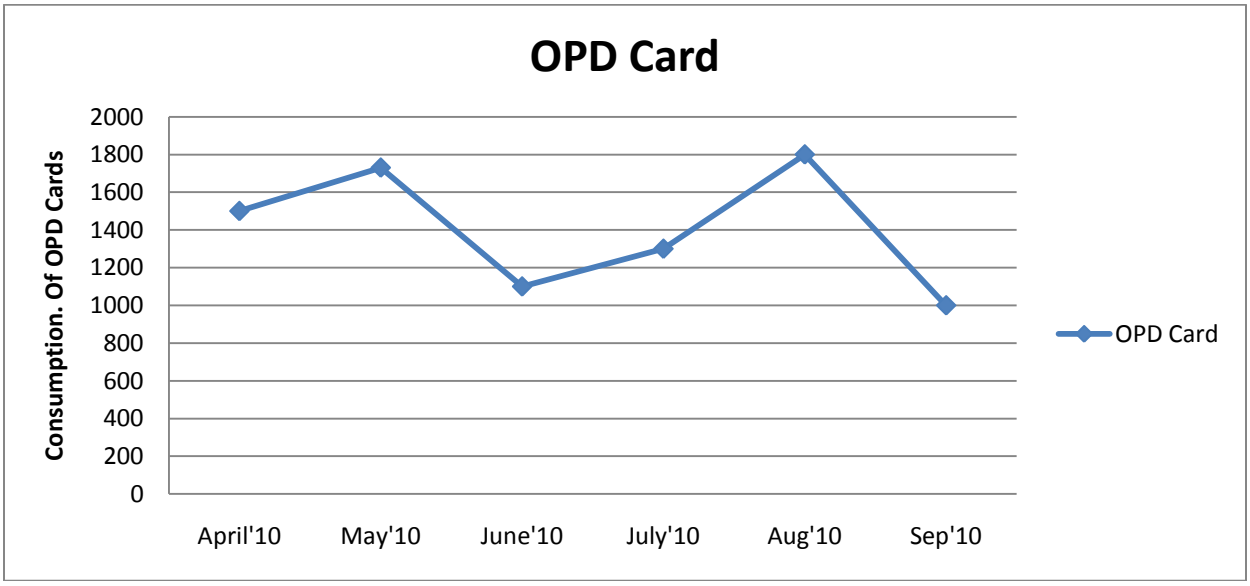


Figure 9 OPD Cards

Average number of OPD Cards used: **1405**

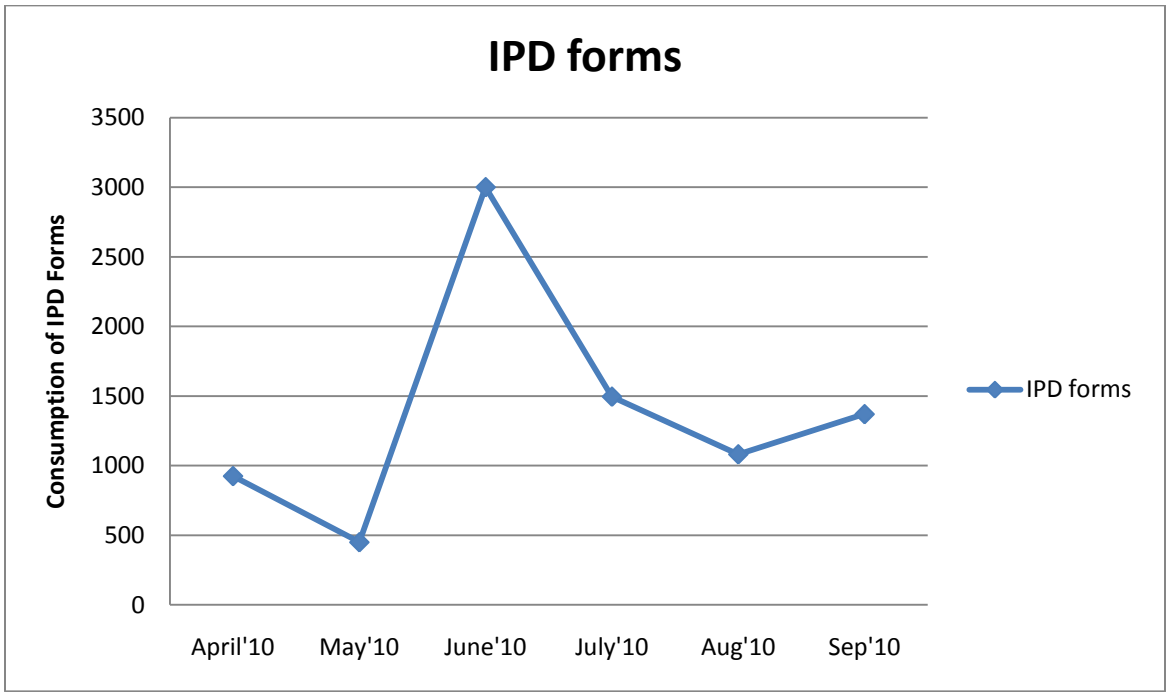


Figure 10 IPD Forms

Average no. of IPD Forms used: **1387**

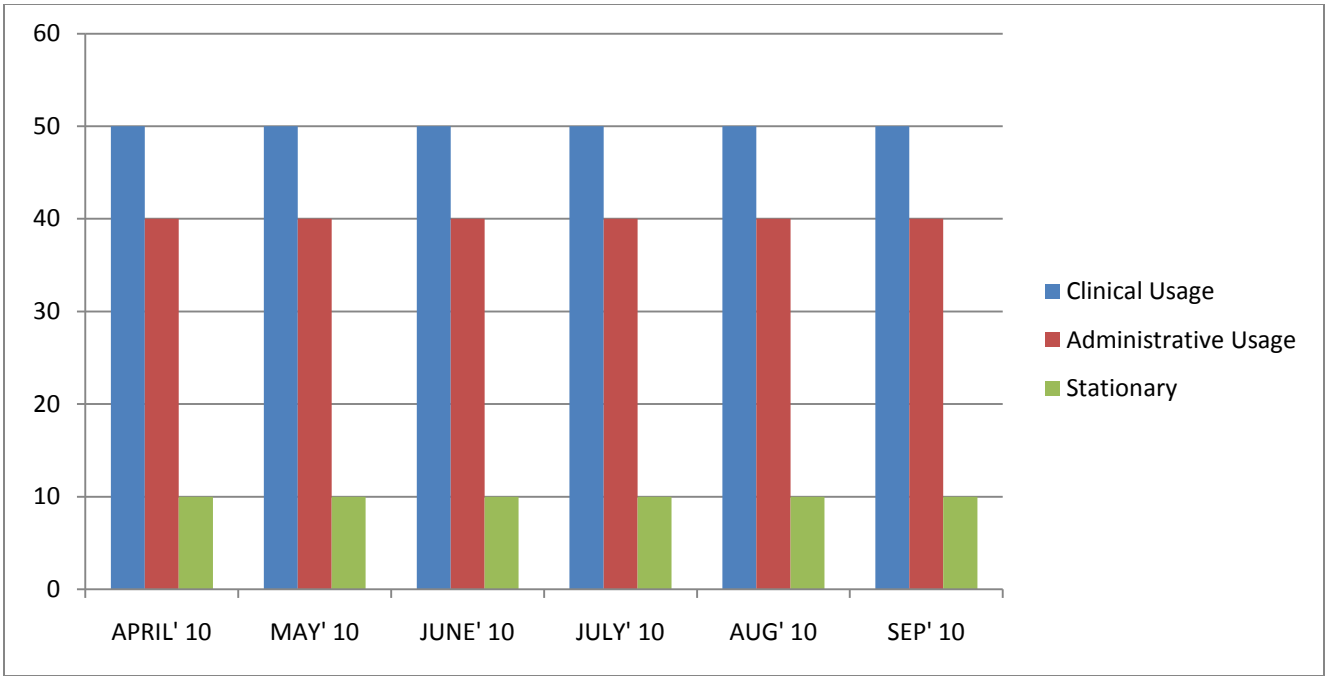


Figure 11 % Type of Paper Consumption

Conclusion by this analysis: delay in procedure can be minimized by changing the attitude of clinician & front office about the usage of Electronic Health Record.

Saket – Cost Benefit Analysis (only clinical usage) - Second Approach

Cost of File: By taking the sample of six in patient files (in different specialities) and assessing the number of preprinted forms used.

- Assessment Forms Doctor.
- Assessment Forms Nursing (vary according to patient length of stay in a hospital).
- OP Summary/OPD Card & Forms.
- Progress Notes (vary according to patient length of stay in a hospital).
- Reports are generally computerized.

Assumption that on an average some 60-80 preprinted forms used in impatient file it varies due to the following factors:

Depending upon the speciality: Cardiac (angiography, angioplasty procedures), CTVS, Orthopaedics, General Surgery, Paediatrics (inpatient files assessed)

Depending upon patient length of stay in the hospital.

Cost also includes the machine, labour, file cover cost and cost of forms used.

Hospital	**Discharge (6 months)**	**Cost Per File (Rs.)**	**Total (Rs.)**
HOSPITAL (A + B)	**6877**	**FC(90)+VC(30) =120/-**	**8,25,240/-**

FC: Fixed Cost.

VC: Variable Cost.

(Outsourcing of files) Storage Charges for ABC Hospitals (HOSP. A & B)

Storage Charges for HOSP. A:-

	APRIL'10		MAY'10		JUNE'10	
	Cartons	Amt.	Cartons	Amt.	Cartons	Amt.
Initial Operation Cost @ Rs. 42	21	882	33	1386	67	2814
Monthly Storage Charge @ Rs. 8	1604	12764	1637	12983	2125	16693
Retrieval Charges		2004		3878		1066
Service Tax @ 10.3 %		1611.95		1879.44		2119.02
Total		**17261.95**		**20126.44**		**22692.02**
Round off		**17262**		**20126**		**22692**

JULY'10		AUGUST'10		SEPTEMBER'10		G Total	
Cartons	Amt.	Cartons	Amt.	Cartons	Amt.	Cartons	Amt.
44	1848	49	2058	58	2436	272	11424
2169	17192	2218	17524	2276	17993	12029	95149
	597		597		7227		15369
	2022.61		2078.44		2848.57		12560.03
	21659.61		**22257.44**		**30504.57**		**134502.03**
	21660		**22257**		**30505**		**134502**

Storage Charges for HOSP. B:-

	APRIL'10	MAY'10	JUNE'10	JULY'10	AUG'10	SEP'10	G Total
Amt in Rs (INR)	**18,032**	**17,063**	**15,853**	**17,562**	**17,951**	**18,845**	**105,306**

Cost for Clinical Papers only (6 months) :-

Files Cost (HOSP. A & B)	**825,240/-**
Storage Charges (in Rs INR)	**134,502 +105,306**
Grand Total	**1,000,000**

Total Cost Clinical + Administrative Papers following EHR deployment (6 months) :-

(HOSP. A & B) (Administrative + Registers)	**1,748,835/-**
Storage Charges (in Rs INR)	**134,502 +105,306**
Cost Clinical Papers ONLY (6 months)	**1,000,000**

Cost of EMR S/W Approx	**2.9 million**

5.2 Average Length of Stay:

For Details see Annexure -2 (across 35 specialities in Hospital A and B)

	OPERATIONAL EFFICIENCY							
Indicator and goal	**April'10**	**May'10**	**June'10**	**July'10**	**Aug'10**	**Sep'10**	**Target**	**Threshold**
Monitor 6 months no. of discharges (Hospital A & B)	**1094**	**1177**	**1041**	**1084**	**1260**	**1221**	**To reduce it by 0.25(6hrs.)**	
Monitor 6 months Length of stay	**4273 Days**	**4460**	**4161**	**4303**	**5057**	**4399**		
Monitor 6 months Length of stay	**3.9 Days**	**3.8**	**4.0**	**4.0**	**4.0**	**3.6**		

Table 5.5: Length of stay & no. of discharges.

Average Length of Stay :- (3.9 + 3.8 + 4.0 + 4.0 + 4.0 + 3.6) / 6 = 3.88 ALOS

What is average length of stay & its importance :-

Average Length of Stay (ALS) = H / (D+d)

Total number of bed-days in a year = H

Number of discharges and deaths D+d in the same year

N = Daily average of beds occupied

D = Discharges

d = Deaths

H = Hospitalized patient day/No. of patient bed days.

- **Formula applied**: Total no of discharges X 43% X 0.25 X 5000

- = 6877(discharges) X 43% (package insurance ppl) X 5000 (direct variable cost per bed) X 0.25 (reduction in stay due to standard documentation EHR) = Rs 36,96,387 (6 Months value for Saket.

Note: (43% can be explained in these terms like discharges were 6877 & cashless people availing is 3600).

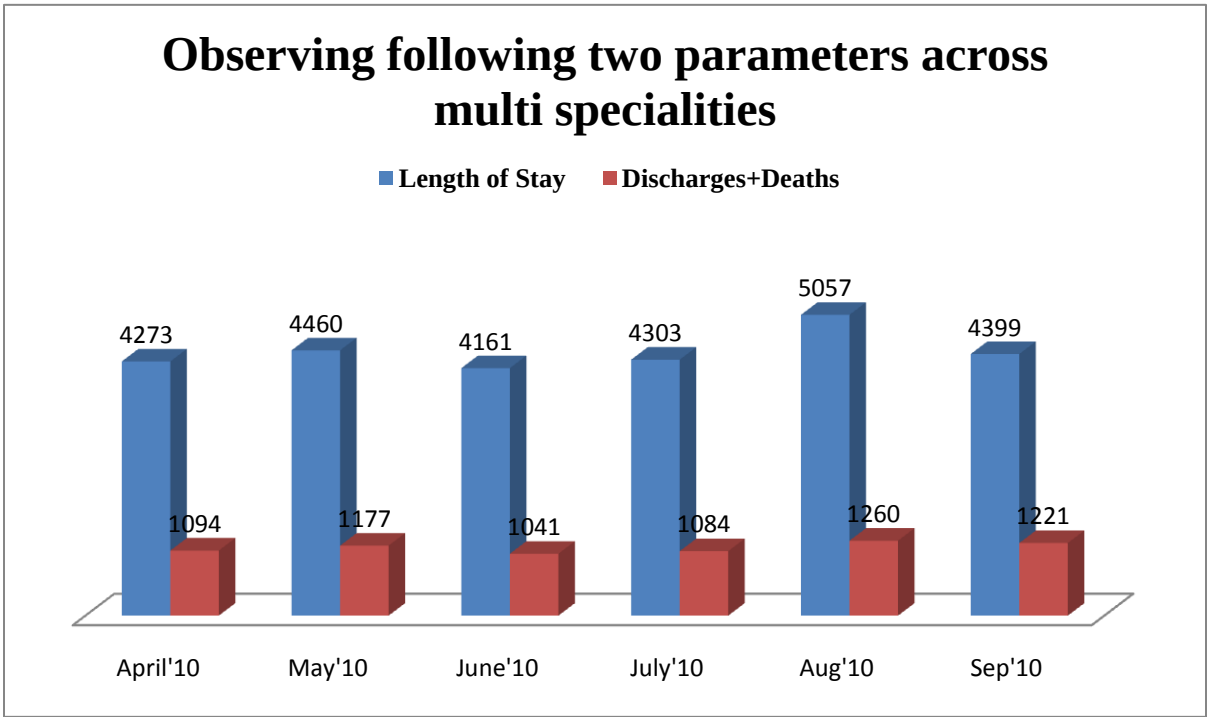


Figure 12 LOS vs Discharges & Deaths

5.3. Decrease in Denials of Insurance

- Cashless cases identified pass 6 months :-

Jan	Feb	March	April	May	June	Total
474	547	647	615	697	620	3600

Table 5.6 Cashless cases identified

- Out of 3600 cases there are 40 cases which were queried.
- These 40 cases accounted for approximately Rs 4,300,000/-
- 18 out of 40 cases identified due to incomplete documents (cases rejected) **Rs1,959,859/-**

6. Conclusions

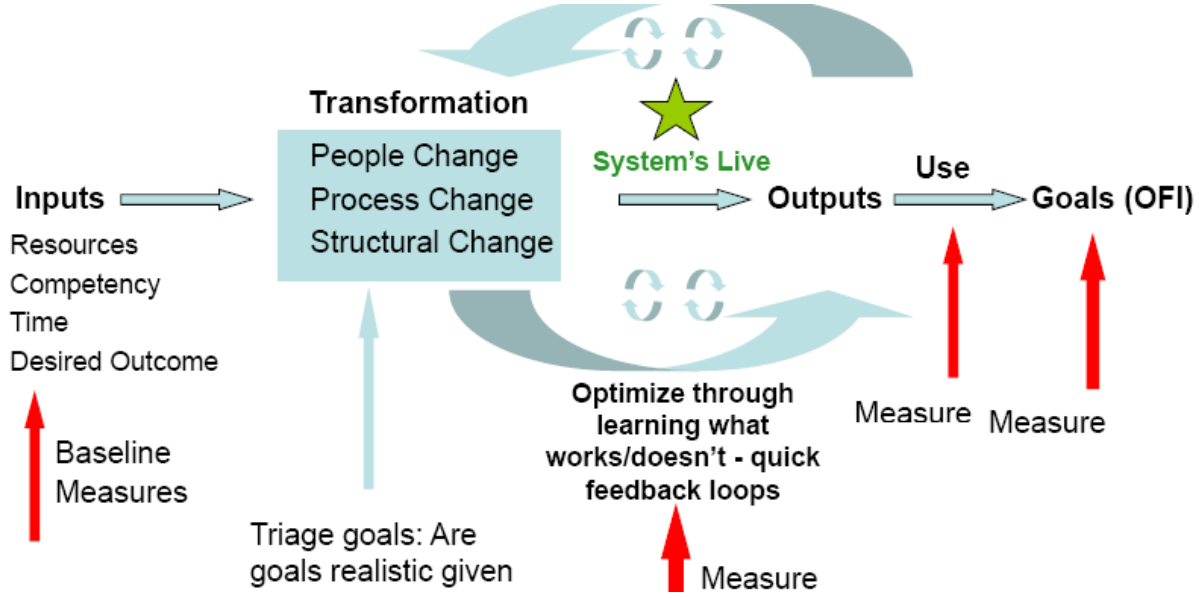


Figure 13 Input Output Process

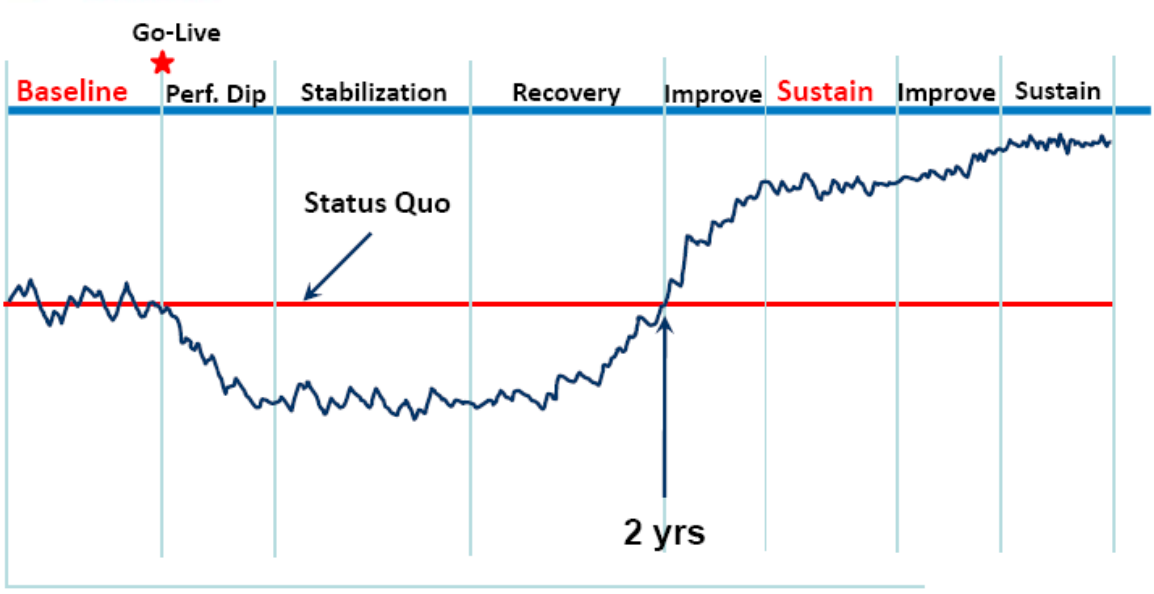


Figure 14 Anticipated Performance Curve

Conclusion: Monitoring of Parameters with the baseline data Before the go live stage

Baseline: Status quo performance prior to intervention at 'Go-Live"

Performance Dip : Changes in Performances to "below" baseline/status quo level.

Stabilization: Stable, predictable performance (within a range of variability) & "below" baseline / status quo levels.

Recovery: Signals desirable changes in performance, trend towards & achievement of baseline/status quo levels.

Improve: Favourable performance "above" baseline /status quo performance.

Sustain : Stable, predictable performance (within a range of variability) and "above" baseline /status quo performance.

Conclusion by analysis for paper consumption:

Delay in procedure can be minimized by changing the attitude of clinician & front office about the usage of Electronic Health Record.

Optimization Strategies:

- Limit printing of forms and results.
- Optimise workflows and data flow through different modules of the solution at design.
- Enhance clinician adoption and participation.

Opportunity Summary:

- 90 percent decrease in cost of forms.

Conclusion for ALOS:

- Reduction in average length of stay will cause more revenue generation as more will prevail the beds faster.
- The redundant time taken during discharge process due to various factors can be brought down.
- This system also minimises the discharge time of a patient which in-turn helps in optimal utilisation of beds. Ideally, if the doctor continuously updates their patient records, when the doctor requests for a discharge, the records for the discharge summary of a patient is already in place. Thus, whenever the turnover of the patient is faster, you have a new set of patient in the same bed and the revenue goes up. Also by bringing down the average length of stay, the ROI goes up.

Optimization Strategies:

- Manage every patient with a targeted LOS.
- Order sets include LOS targets.
- Data communicated back to individual physicians re LOS.
- Hospital based physician advisor.
- Reduce discharge summary time by automated discharge summary.
- Reduce pharmacy returns.

Opportunity Summary:

- Decrease LOS by 0.25 days (6 hrs.) for all discharges.

Conclusion for decrease in denial of insurance:

Optimization Strategies:

- Ensuring high rate of clinician adoption and training for clinical documentation.
- Optimization of workflows and solution functionality to prompt for completion of documentation.
- Medical records publishing directly from EHR to include all clinical documentation and results.
- Protocol based order sets and alert rules built for TPA and CGHS patients.

Opportunity Summary:

- Decrease denials related to incomplete documentation-0.5% of all TPA claims- a total of Rs.36,00,000/ year.
- Decrease deductions due to incomplete documentation of CGHS/ECHS claims- a total of Rs. 28,80,000/year.

Annexure

Annexure 1

	HOSP. A
Sr. no.	**Item Name (clinical + administrative printable items taken into consideration)**
1	Continuation Sheet A4
2	Letter Head For DDF (70GSM Maplitho Bilt Classic, 5 Colours, A4)
3	Letter Head ABC Medcentre panchsheel Park
4	Envelop Printed MDDHVI 9.5"x4.5", 95Gsm SS Bilt
5	Letter Head Oncology (CC)
6	Letter Head Dr Praveen Chandra, A4, Executive Bond paper,80Gsm,F/col.
7	Letter Head A4 (80 Gsm, Executive Bond Paper, F/Col)
8	Anaesthesia Record CTVS
9	Nurshing Admission Assessment 11.5"x18", 80gsm SS, 1 color, B/side printing
10	IPD forms size11"x9"
11	OPD form size 11"x9"
12	Physicion Order Sheet @
13	Anaesthesia Record Mhc.
14	Door Signgae – Plane
15	Door Signgae single Pat. Name
16	Door Signgae Double Pat. Name
17	Envelopes (10"X12")Non invesive Cardiology 120Gsm, S.shine bilt classic, 4 color
18	Cardiac Evaluation Form
19	Envelopes Green 10"x12", 120Gsm SS Bilt Classic, 4/5 color
20	Division of Padiatric Cardiology Inpatient
21	OPD Card
22	Envelopes White 10"X12" A4
23	ABC Green Sheet (Thick)-A4
24	Critical Care Flow Sheet (MB)
25	conferance pad
26	Plastic Folder A4 8.25"x11.5" Side closed
27	Grey/Green Files Cobra 10.5"x14" 19kg plup Andhra single colour
28	Grey / Green File Cobra (CC)
29	I.P. Folder with Plastic Clip (14"X22", 300 GSM Nivea)

30	I P Folder (CC)
31	Cube Pad Small
32	Registration form 3.75"x8.75"
33	Diet Requisition Form (1+2x50)-1/8
34	Abdominal Aorta Scan
35	Ambulatory ECG / Holter Report
36	PATIENT EDUCATION HIV TESTING (Printing Single Side)
37	VASCULAR ACCESS MONETORING (Printing single side)
38	MEDICATION CHART (Printing Single Side)
39	Intake /Output Chart
40	BLOOD REQUSITION FORM
41	ADMISSION REQUEST (Printing Single Side)
42	CARDIOLOGY & NUCLAIR MEDICINE TEST REQUEST (Printing Single Side)
43	CATH LAB CONSUMPTION FORM (Printing Single Side)
44	CLINICAL CHART(Printing Single Side)
45	DOCTOR PROGRESS NOTE (Printing Single Side)
46	INFORMED CONSET (Printing Single Side)
47	INFORMED CONSET HIGH RISK CASES (Printing Single Side)
48	INVESTIGNATION TRACK SHEET (Printing Single Side)
49	I V THERAPY CHECK LIST (Printing Single Side)
50	PRE OPERATIVE NURSHING CHECK LIST (IAMS) (Printing single side)
51	DEPARTMENT OF TRANSFUSION MEDICINE DONOR QUESTIONNAIRE AND CONSENT (ENGLISH VERSION)
52	Doctor Progress Note (CC)
53	Transthoracic Echo - Doppler Report
54	BLOOD CHECKING WORK & PERMISSION LETTER (HINDI) (printing Both side)
55	NURSE FOCUS NOTE (Printing Both Side)
56	Patient Diet Card (Pad)
57	Patient Diet Ticket Normal A4
58	Patient Diet Ticket Diabetic (A4 70Gsm Carbonless paper, single color, 1+1x50)
59	Prescription Pads
60	History & Physical Examination Record (IAMS)

61	PATHOLOGY REQUISITION FORM (Printing Single Side)
62	Informed Conset-Anaesthesia
63	Envelop ABC Green 14"x17", 120Gsm S.Shine Bilt, Four Colour
64	Visiting Cards ABC Address Facilities 3.5"x2.5", 300Gsm Art card Nivea, 4 color, both sides
65	DEATH CERTIFICATE
66	PHARMACY CASH BILL A/4
67	DIABETIC CHART (Printing Single Side)
68	Consent Form For Haemodialysis
69	IP Receipt (1+2x50)-1/8
70	NURSE FOCUS NOTE (IAMS) (Single side)
71	INTAKE OUT PUT CHART (IAMS) (Printing Single Side)
72	VITAL SIGN I O CHART(IAMS) (Printing single side)
73	PENDING REPORT STATUS SHEET (IAMS) (Printing single side)
74	Nutrition Care Plain Calorie Count Chart
75	Nutrition Care Plan Enteral Feed Form
76	Patient Status (Dietary) Carbonless Paper A4 Size
77	Nursing Admission Assesment (IAMS)
78	Physician Order Sheet (IAMS)
79	Letter Head ABC Heart Continue Sheet
80	OT Consumption List (MAS)
Sr. no.	
1	Visiting Cards 3.5"X2", 220Gsm Galgo, 3 color + Screen Printing
2	Pharmacy Pouch Small (95Gsm Ns Andhra, 3 Color)
3	Pharmacy Pouch Big (95Gsm NS Andhra, 3 color)
4	Envelope Window 9"x6", 95Gsm SS Bilt, 4 color
5	Register Issue (CSSD)
6	CSSD RECEIVING REGISTER
7	REGISTER MEDICAL RECORD HAND OVER .(17"x13" -100 sheet each)
8	REGISTER NARCOTIC LOG (17"x13" -100 sheet each)
9	PATHLOGY REGISTER (17"x13" -100 sheet each)

10	REGISTER STOCK REGISTER CAPITAL ITEMS(17"X13"-100Sheet each)
11	Register Complaint Biomedical
12	Register Admission & Discharge IPD (Nursing)
13	Register Spirometer (PFT) Size 12 x 23 Sheet Each
14	MLC FORM 1+2 (MB)
15	CC388A HP Cartridge.
16	Facility Cards 3"x2.5"
17	REGISTER ECG (17"x13" -100 sheet each)
18	REGISTER OPD (17"x13" -100 sheet each)
19	Register Patient Belonging
20	Register CSSD
21	Sticker (Compatiable Lable) for Blood Bank
22	Sticker LEUCOREDUCED
23	REGISTER OT
24	REGISTER NARCOTIC RECORD (17"x13" -100 sheet each)
25	REGISTER STOCK REGISTER BIOMEDICAL (17"X13"-100Sheet each)
26	REGISTER X RAY (12"X23" 100 sheet each)
27	Register Complaint Engineering
28	Register Equipment Inventory list User Size 12 x 23 100 sheet each
29	Register Maintenance Log Book Size 12 x23 100 Sheet Each
30	Register Stent /Baloon
31	Register x- Ray Dispatch (OPD &PCS)
32	Free / Discounted Patient Form (1 + 1 X 50)
33	Register Narcotic Record (CC)
34	Register Fire Extinguisher PM Check List
35	Register Daily Check List Fire Fighting System

Annexure 2

	HOSP. B
Sr. no.	Item Name (clinical + administrative printable items taken into consideration)

1	I.P. Folder with Plastic Clip (14"X22", 300 GSM Nivea)
2	Grey/Green Files Cobra 10.5"x14" 19kg plup Andhra single colour
3	Letter Head A4, 70 Gsm Bilt Classic, 2 color
4	Activity Sheet 11.5"x18", 70Gsm Carbonless,1 color, 1+1x100
5	Plastic Folder A4 8.25"x11.5" Side closed
6	Writing Pad A4 Sprial with Water Mark (Cover 300Gsm Art Card, Inside 95Gsm,cover f/col,inside B/W
7	Letter Head A4 (80 Gsm, Executive Bond Paper, F/Col)
8	Cube Pad (Big) 80gsm NS Andhra, 3 color
9	Physicion Order Sheet @
10	Cube Pad Small
11	Patient Diet Ticket Normal A4
12	Anaesthesia Record
13	Continuation Sheet (MHC) Exe. Bond
14	IP Advance Receipt (Initial/Interim) (1+2x50)-1/8
15	IP Receipt (1+2x50)-1/8
16	Operation Notes (Valves) (MB)
17	Other Receipt (1+2x50)1/8
18	History & Physical Examination Record (IAMS)
19	conferance pad
20	Letter Head A4, 70 Gsm Bilt Classic, two color MSSH
21	Letter Head ABC Lab Nabl Logo A4, 70gsm Bilt Classic, Two Color
22	Critcal Care Flow Sheet (11"x36", 120gsm ss Bilt, Three Color)@
23	Patient Diet Ticket Diabetic (A4 70Gsm Carbonless paper, single color, 1+1x50)
24	Nurses Daily Assessment
25	Envelopes White 10"X4.5" Printed
26	Intake /Output Chart
27	Credit Invoice (MB)
28	DYLYSIS UNIT TREATMENT SHEET (MB)
29	PICU / NICU FLOW SHEET

30	DOCTOR PROGRESS NOTE (Both Side Printing)
31	Register Admission & Discharge (FO)
32	REGISTER PNDT (12"X23" 100 sheet each)
33	REGISTER X RAY (12"X23" 100 sheet each)
34	NURSE FOCUS NOTE (IAMS) (Single side)
35	ADMISSION REQUEST (Printing Single Side)
36	CLINICAL CHART(Printing Single Side)
37	INFORMED CONSET (Printing Single Side)
38	INVESTIGNATION SHEET (Printing Single Side)
39	INVESTIGNATION TRACK SHEET (Printing Single Side)
40	I V THERAPY CHECK LIST (Printing Single Side)
41	NURSE FOCUS NOTE (Printing Both Side)
42	VITAL SIGN I O CHART (Printing single side)
43	Microbiology Requiation Form
44	o p invoice cum receipt
45	Plan of Action Sheet
46	critical care medicine daily progress note
47	Drug priscription note
48	Register ETOSize 12 x 23 100 sheet each
49	OPD Card
50	Intensive Care Flow Sheet
51	Door Signgae – Plane
52	Door Signgae single Pat. Name
53	Door Signgae Double Pat. Name
54	Pain Assessment Form
55	Pending Reports Status
56	Patient Diet Card (Pad)
57	Letter Head Neuroscience
58	Anaesthesia Record Mhc.
59	Letter Head Internal Medicine

60	IPD forms size11"x9"
61	Inpatient information Broucher
62	Writing Pad A4 Sprial with Water Mark (Cover 300Gsm Art Card, Inside 95Gsm,cover f/col,inside B/W
63	Envelope Window 9"x6", 95Gsm SS Bilt, 4 color
64	DOCTOR PROGRESS NOTE (Both Side Printing)
65	REGISTER OPD (17"x13" -100 sheet each)
66	PATHLOGY REGISTER (17"x13" -100 sheet each)
67	REGISTER SAMPLE RECEIVING (17"X13"-100Sheet each)
68	I V THERAPY CHECK LIST (Printing Single Side)
69	VITAL SIGN I O CHART (Printing single side)
70	Door Signgae Double Pat. Name
71	VEG -GREEN (STICKER)
72	Registration form 3.75"x8.75"
73	Letter Head ABC Lab Nabl Logo A4, 70gsm Bilt Classic, Two Color
74	REGISTER NARCOTIC LOG (17"x13" -100 sheet each)
75	NURSE FOCUS NOTE (IAMS) (Single side)
76	Nurses Daily Assessment
77	REGISTER NARCOTIC RECORD (17"x13" -100 sheet each)
78	Continuation Sheet (MHC) Exe. Bond
79	Medicine Indent (1+2x50)-1/8
80	pre operative check list neuro
81	Muscle Charting I (department of physiotherpy)
82	ABC Lab Sticker
83	IPD forms size11"x9"
84	Inpatient information Broucher
85	physiotherpy critical care progress notes (Pad)
86	Physiotherapy chart for adult surgical (both sides print Pad)
87	Department of Physiotherapy & Rehabilitation (form)
88	pediatric rehabilitation assesment/review form

89	Physiotherapy assesment form (both side print)
90	department of Phusiotherapy & rehabiliation (pad)
91	functional independence mesure (Pad)
92	Range of motion/ voluntory control (Pad)
93	patient satisfaction questiories (pad0
94	orthopaediatric physiotherpy progress notes(Pad)
95	Informed Consent- Physiotherapy
96	Letter Head A4, 70gsm Bilt Classic, 4 color
97	Cardiac Evaluation Form MSSH
98	CYTOPATHOLOGY REQUISITION FORM (MB)
99	VISITING CARD B/SIDE
100	REGISTER MRI SCAN (17"x13" -100 sheet each)
101	REGISTER OUT SOURCE (17"x13" -100 sheet each)
102	REGISTER MICROBIOLOGY C/S (ALL LOCATION).(12"X23" 100 SHEET EACH)
103	REGISTER MICROBIOLOGY C/S (SAKET) (12"X23" 100SHEET EACH)
104	IN PATIENT PAEDIATRICS / TEENAGE HISTORY AND PHYSICAL RECORD
105	Dialysis Daily Consumption
106	Register Operation Size 17 x 27 100 Sheet each
107	Register Serology Access
108	Register Haemodialysis Patient Record
109	Mamography Register
110	NONG - White (Sticker)
111	OPD form size 11"x9"
112	Physician Order Sheet (2color printing)- 11"x18"
113	HISTOPATHOLOGY REQUISITION FORM (MB)
114	REGISTER DEATH
115	REGISTER MEDICAL RECORD HAND OVER .(17"x13" -100 sheet each)
116	REGISTER CONSUPTION DISPATCH .(12"X23" 100Sheet each)
117	DIABETIC CHART (Printing Single Side)
118	PATHOLOGY REQUISITION FORM (Printing Single Side)

119	Patient Report Status Dietary
120	Neonatal Birth Sheet (Both Side Printed)
121	Identification Card (Blue)
122	Identification Card (Pink)
123	Part. C Postoperative Physiotherpy (Pad)
124	Phisiotherpy critical care assesment form (Pad)
125	PVC Digital ID Card With Proxymity
126	Birth Certificate A4
127	CYTOLOGY REQUISITION FORM (MB)
128	DEATH CERTIFICATE
129	NUTRITION ASSESSMENT TOOL (Adult) (Printing Single Side)
130	Laboratry Flow Sheet
131	material in register
132	Histopathology Requisition from (IAMS)
133	Pharmacy Credit bill A4
134	Register Implant
135	REGISTER STAT.
136	REGISTER ULTRA SOUND (17"X13"-100Sheet each)
137	PHYSIOTHERAPY CHART FOR NON SURGICAL PATIENT / ORTHOPADIC (Printing Single Side)
138	PRE OPERATIVE NURSHING CHECK LIST (IAMS) (Printing single side)
139	progress notes (phisiotherpy) Pad
140	Radiology Provisional Report (1+1 X 50)

Annexure 3 & 4

	Apr-10			May-10		
	Discharges	LOS	ALOS	Discharges	LOS	ALOS
Cardiology						
CAG	139	284	2.0	128	238	1.9
PTCA	87	360	4.1	85	315	3.7
Other Cath	30	109	3.6	19	69	3.6
Other Procedures	3	12	4.0			
OBS	80	345	4.3	107	404	3.8
Cardiac Surgery	90	875	9.7	92	757	8.2
Consultant - Critical Care Medicine						
OBS	1	21	21.0	8	35	4.4
Surg.				1	12	12.0
Consultant-Emergency						
OBS						
DERMATOLOGY						
OBS				1	1	1.0
Other Procedures	1	3	3.0			
Surg.						
ENT						
OBS	2	3	1.5	1	1	1.0
Other Procedures	3	3	1.0			
Surg.	43	66	1.5	32	40	1.3
ENDOCRINOLOGY						
OBS				2	9	4.5
Other Cath						
Surg.						
Gastroenterology and Hepatology						
OBS	3	13	4.3	4	18	4.5
Other Procedures				1	1	1.0
Surg.	1	1	1.0	1	3	3.0
General & Laproscopic Surgery						
OBS				2	7	3.5
Other Procedures	2	2	1.0			
Surg.	8	45	5.6	4	18	4.5
General Surgery						
OBS	20	80	4.0	9	39	4.3
Other Cath						
Other Procedures				2	9	4.5
Surg.	71	167	2.4	71	164	2.3
INTERNAL MEDICINE						
OBS	20	140	7.0	28	140	5.0
Other Procedures						
Surg.	1	18	18.0	2	18	9.0
Medical Oncology						
OBS	26	98	3.8	27	290	10.7
Other Cath				1	16	16.0
Other Procedures	27	67	2.5	37	142	3.8
Surg.						
Minimal Access Metabolic Bariatic surgery						
OBS	11	24	2.2	15	41	2.7
Other Cath				1	8	8.0
Other Procedures	1	1	1.0	3	6	2.0
Surg.	217	514	2.4	256	589	2.3
NEPHROLOGY						
OBS						
NEURO SURGERY						
Surg.						
NEUROLOGY						
OBS				1	15	15.0
ONCOLOGY						
OBS						
Other Procedures						

OBS						
NEURO SURGERY						
Surg.						
NEUROLOGY						
OBS				1	15	15.0
ONCOLOGY						
OBS						
Other Procedures						
OPHTHALMOLOGY						
Surg.	2	2	1.0			
ORTHOPEDICS						
OBS	2	3	1.5	2	28	14.0
Other Cath						
Surg.	22	227	10.3	8	62	7.8
Paediatric Cardiac Surgery						
OBS				1	1	1.0
Other Cath						
Surg.	2	14	7.0	3	18	6.0
Paediatrics						
OBS	2	7	3.5			
Pediatrics Cardiology						
OBS	2	6	3.0	3	9	3.0
Other Cath	1	3	3.0	3	6	2.0
Other Procedures	1	6	6.0			
Surg.	16	134	8.4	15	124	8.3
PLASTIC SURGERY						
OBS				2	4	2.0
Other Procedures						
Surg.	4	7	1.8	25	44	1.8
Psych						
OBS						
Pulmonology						
OBS				1	5	5.0
Radiation Oncology						
OBS	9	49	5.4	12	66	5.5
Other Procedures	7	13	1.9	8	83	10.4
Surg.				1	4	4.0
Surgical Oncology						
OBS	6	33	5.5	7	36	5.1
Other Procedures	7	18	2.6	6	7	1.2
Surg.	40	221	5.5	38	277	7.3
Urology						
OBS	17	65	3.8	15	37	2.5
Other Procedures	6	6	1.0	5	9	1.8
Surg.	49	120	2.4	68	190	2.8
VASCULAR SURGERY						
OBS	1	6	6.0			
Other Cath						
Other Procedures						
Surg.	11	82	7.5	13	45	3.5
Grand Total	**1094**	**4273**	**3.9**	**1177**	**4460**	**3.8**

	Jun-10			Jul-10		
	Discharges	LOS	ALOS	Discharges	LOS	ALOS
Cardiology						
CAG	105	169	1.6	125	217	1.7
PTCA	71	246	3.5	78	330	4.2
Other Cath	21	69	3.3	25	55	2.2
Other Procedures				3	20	6.7
OBS	85	344	4.0	92	362	3.9
Cardiac Surgery	105	783	7.5	71	519	7.3
Consultant - Critical Care Medicine						
OBS	11	88	8.0	12	201	16.8
Surg.				2	14	7.0
Consultant-Emergency						
OBS	1	8	8.0			
DERMATOLOGY						
OBS				1	4	4.0
Other Procedures						
Surg.				1	5	5.0
ENT						
OBS	2	4	2.0	1	1	1.0
Other Procedures				1	1	1.0
Surg.	26	27	1.0	25	47	1.9
ENDOCRINOLOGY						
OBS	6	25	4.2	3	9	3.0
Other Cath						
Surg.						
Gastroenterology and Hepatology						
OBS	1	3	3.0			
Other Procedures	1	16	16.0			
Surg.	1	9	9.0			
General & Laproscopic Surgery						
OBS						
Other Procedures						
Surg.						
General Surgery						
OBS	12	51	4.3	23	141	6.1
Other Cath				1	14	14.0
Other Procedures				3	15	5.0
Surg.	56	198	3.5	57	150	2.6
INTERNAL MEDICINE						
OBS	21	139	6.6	24	211	8.8
Other Procedures				1	1	1.0
Surg.	1	25	25.0	2	13	6.5
Medical Oncology						
OBS	14	159	11.4	22	171	7.8
Other Cath	1	13	13.0			
Other Procedures	26	46	1.8	41	71	1.7
Surg.	1	11	11.0			
Minimal Access Metabolic Bariatic surgery						
OBS	7	14	2.0	6	10	1.7
Other Cath						
Other Procedures	1	5	5.0			
Surg.	218	500	2.3	196	496	2.5
NEPHROLOGY						

OBS	1	3	3.0			
NEURO SURGERY						
Surg.						
NEUROLOGY						
OBS				1	13	13.0
ONCOLOGY						
OBS						
Other Procedures						
OPHTHALMOLOGY						
Surg.				1	1	1.0
ORTHOPEDICS						
OBS	1	21	21.0	3	23	7.7
Other Cath	1	22	22.0			
Surg.	9	64	7.1	12	108	9.0
Paediatric Cardiac Surgery						
OBS						
Other Cath						
Surg.	1	5	5.0			
Paediatrics						
OBS						
Pediatrics Cardiology						
OBS	1	3	3.0	3	8	2.7
Other Cath				4	13	3.3
Other Procedures	1	5	5.0			
Surg.	18	156	8.7	29	231	8.0
PLASTIC SURGERY						
OBS	1	1	1.0	1	2	2.0
Other Procedures				1	2	2.0
Surg.	29	54	1.9	34	87	2.6
Psych						
OBS				1	3	3.0
Pulmonology						
OBS				2	12	6.0
Radiation Oncology						
OBS	20	130	6.5	18	82	4.6
Other Procedures	6	52	8.7	10	29	2.9
Surg.	2	4	2.0	2	3	1.5
Surgical Oncology						
OBS	10	49	4.9	11	56	5.1
Other Procedures	8	22	2.8	4	11	2.8
Surg.	50	380	7.6	47	331	7.0
Urology						
OBS	12	24	2.0	8	22	2.8
Other Procedures	4	6	1.5	4	4	1.0
Surg.	53	129	2.4	52	132	2.5
VASCULAR SURGERY						
OBS	3	13	4.3			
Other Cath	1	1	1.0	1	2	2.0
Other Procedures	1	6	6.0	1	1	1.0
Surg.	14	59	4.2	18	49	2.7
Grand Total	**1041**	**4161**	**4.0**	**1084**	**4303**	**4.0**

Annexure 4

Questionnaires
Name of Audit Lead: ABC

Purpose of Survey: To monitor the potential benefits perceived pre implementation phase and to assess the potential short and long term impacts from the Electronic health record deployment.

Date: XYZ

Questionnaire: Use of **EMR** can improve accessibility, legibility, quality and cost of care in hospital/healthcare centre. **Realization of the Benefits.**

1. Are you a (a) Nursing staff (b) Administrative Personnel (c) Medical Professionals.
2. Is your Hospital / Healthcare centre computerized? YES/NO.
3. ARE you of computerization in your healthcare organization.
4. Is your hospital/healthcare centre have HIS/HMIS.
5. Is your hospital/healthcare centre have EMR/HER. If yes please specify?
6. Please mention specific software / vendor.

1. What do you know about the impending (electronic patient record) to be introduced in 2011? (Tick the choice options)			
All records will be transferred from paper based to electronic	All Paperless	Entirely electronic	Electronic
I am aware that it will occur in stages,	Awareness / Stages	Phases	
goal of which is to transfer patient records to electronic system	e-goal		Paper-lightelectronic
2. Please outline your views on the electronic patient record			
May initially slow down			

patient care processes			
Eventually will provide benefits and decreased errors			
Improve the delivery of patient care			

S No.	Question	Strongly Agree	Agree	Neutral	Dissatisfied
1.	Has cost of medical care gown down.				
2.	➢ Improve compliance with quality measures.				
3.	➢ Improve patient care outcomes				
4.	➢ Allow informed clinical decision-making at point of care.				
5.	➢ Reduce practice variation				
6.	➢ The discharge diagnosis can pulled from EHR (assumption)				
7.	Order sets are evidence based and standardized across the system.				
8.	**E-documentation, e-communication and**				

	less waiting.				
9.	Shorter Q-lengths/provision to see more Patients.				
10.	**Documentation, Indent & Return of medicines Comment**				
11.	More Quality time for Patient				
12.	Waiting for test reports Comment				
13.	Patient with **e-**records				
14.	**Direct electronic pushing of orders into the HIS will reduce the sources of error.**				
15.	Reduction in paper consumption.				
16.	Safer documentation in less space reducing the need of paper.				
17.	Continuity of care and faster retrieval of past records.				
BENEFIT SUMMARY For organization Tick the options in the column					
1. Work and quality improvement processes. 2. Cost savings resulting from less number of redundant test ordering. 3. Greater use of lower cost medications. 4. Reduction in rework and process repetitions.					

5. Enhanced credibility with insurance companies. 6. Shortening of admission time and discharge time will decrease ALOS.				
7. Better and faster communication among individuals, groups in the organization.				
8. Satisfaction of needs and expectations of patients, providers, and other stakeholders				
9. Organizational risk mitigation due to reduction in medical errors.				
10. Reduced ordering of redundant laboratory and radiology examinations.				
11. Standardization of processes .				
12. Improvement in overall performance and efficiency of the staff.				
13. Operational cost reductions.				
14. Revenue enhancement due to better management of resources.				
15. Productivity gains.				

BENEFIT SUMMARY For Physician				
1. Relevant history available at the click of a button. 2. Decision support and less chances of errors of omission and commission. 3. Less chances of ordering redundant tests. 4. Easier and faster communication between providers of care. 5. Security of orders. 6. Less chances of delay in treatment planning. 7. Better quality of research work. 8. Practice evidence based medicine. 9. Better care planning.				
BENEFIT SUMMARY For Patients				
1. Advances in care processes. 2. Improved outcomes. 3. Better monitoring of diseases and other health risks. 4. Reduced medication errors. 5. Improved satisfaction levels due to reduction in delays and better service quality. 6. Less chances of missing out important relevant information since doctor would have all records available at the click of a button for registered patients.				

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