Internship Training at Deloitte-US India Consulting Pvt. Ltd.

By:

Naman Thukral

PGDHM

2012-2014

IIHMR DELHI

International Institute of Health Management Research
New Delhi

Internship Training

At

Deloitte-US India Consulting Pvt. Ltd.

"A Review on the processes of Electronic Medical Record (EMR) with respect to U.S Healthcare system focusing on Business process for Pharmacy and Meaningful use of EMR"

By

Naman Thukral

Under the Guidance of

Dr. Anandhi Ramachandran

Post-Graduate Diploma in Health and Hospital Management

2012-2014

IIHMR DELHI

International Institute of Health Management Research
New Delhi

Deloitte

May 02, 2014

To Whom It May Concern

This is to certify that Mr. **Naman Thukral** was on a fixed term Internship from **February 01, 2014** to **May 02, 2014**. He has successfully completed his Internship in **Application Management Services**.

We wish you the very best in your future endeavors.

Yours truly,

For Deloitte Consulting India Pvt. Ltd.

GUNJAN
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TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Naman Thukral** student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from IIHMR, New Delhi has undergone Dissertation at Deloitte US-India Consulting Pvt.Ltd., Bengaluru from 10- Feb-2014 to 02-May-2014.

The candidate has successfully carried out the study designated during Dissertation and his approach to the study has been sincere, scientific and analytical.

The Dissertation is in fulfillment of the course requirements.

I wish his all success in all his future endeavors.

Dean, Academics and Student Affairs

IIHMR, New Delhi

Supervisor

IIHMR, New Delhi

Certificate of Approval

The following dissertation titled "**A Review on the processes of Electronic Medical Record (EMR) with respect to US Healthcare System focusing on Business Process of Pharmacy & Meaningful use of EMR**" at Deloitte US-India Consulting Pvt. Ltd., Bangalore is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a pre-requisite for the award of **Post- Graduate Diploma in Hospital and Health Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

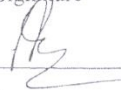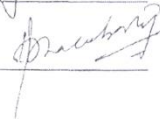Dissertation Examination Committee for evaluation of dissertation.

Name   Signature

PARTHA DEY

Anandhu Ramadedu

ABHIJIT CHAKRABARTY   05/05/2014

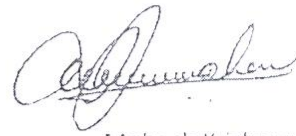## Certificate from Dissertation Advisory Committee

This is to certify that **Naman Thukral**, a participant of the **Post Graduate Diploma in Health IT Management**, has worked under our guidance and supervision. He is submitting this dissertation titled, **"A Review on the processes of Electronic Medical Records(EMR) with respect to US Healthcare System focusing on Business Process for Pharmacy and Meaningful Use of EMR"** 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.

5/5/2014

Dr.Anandhi Ramachandran

Supervisor

Mahesh Krishnamurthy

Manager

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled ...A Review on the Processes of Electronic Medical Record (EMR) with Respect to US healthcare system... and submitted by (Name) ...NAMAN THUKRAL... Enrollment No. ...PG/12/052...

under the supervision of ...Dr. Anandhi Ramachandran...

for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from ...10ᵗʰ Feb 2014... to ...02ⁿᵈ May 2014...

embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Signature

FEEDBACK FORM

Name of the Student: Naman Thukral

Dissertation Organisation: Deloitte Consulting India Private Limited

Area of Dissertation: He reviewed the processes of EMR in respect to US healthcare system where they have focused on Business process for pharmacy and have done a review on Meaningful use. Naman has completed his case study to understand the usability of m-health among the I.T Professionals of Bangalore and their Health Seeking behavior.

Objectives achieved:
- Determine the difference between US & Indian Healthcare System
- Understanding the objective of achieving meaningful use in respect to US EMR
- Analyze the process of Healthcare Enterprise system
- Understanding of the Health seeking behavior of I.T professionals.

Deliverables:
- Collection and analysis of the data pertaining to usability of m-Health
- Pharmacy Functionalities understanding for future use.
- Meaningful use objective
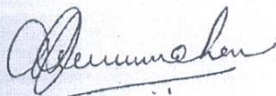
Strengths:
1. He has good knowledge of the health care provider industry.
2. Has picked up new tools and processes relatively fast through self-learning.
3. He is a good team player, gets along well with other team members

Suggestions for Improvement:
1. Need to be more proactive

2. Continue enhancing knowledge in Epic

3. Continue to work on improving presentation skills

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

Mahesh Krishnamurthy
Date: 5th May 2014
Place: Bengaluru

ACKNOWLEDGEMENT

Hard work, guidance and perseverance are the pre requisite for achieving success. Support from an enlightened source help us to proceed on the path to it. I wish thank first of all the almighty that provided me energy for the successful completion of my training.

I am thankful and obliged to the Senior Consultant (Mentor)- Deloitte US-India, Epic (Pharmacy Module) - Mr. Jamalur Khan for giving me an opportunity to work on this project and for his continuous support. I am also thankful to my buddy – Abhinav Peddi (Consultant, Deloitte U.S-India) for his guidance and perseverance during the course of my project.

I am thankful to Miss Chandana Varma for providing me all the trainings and giving the best of your knowledge. She has been always a source of inspiration for me.

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

I am highly indebted to my mentor Dr. Anandhi Ramachandran for her valuable guidance and motivation on various aspects of this project.

Table of Contents

ABBREVIATIONS:

AMS: Application management services

ADS: Automatic Dispensing System

IPS: Intelligent Package selection

IMS: Intelligent Medication selection

CMS: Centers for Medicare and Medicaid Services

GUI: Graphic User Interface

ERP: Enterprise Resource Planning

EMR: Electronic Medical Record

EHR: Electronic Healthcare Record

HMO: Health Maintenance Organization

PPO: Preferred Provider Organization

ERX Record: Electronic Medication Record

PRN: Pro Re Nata

Part-1 Internship Report

The details about internship at Deloitte US-India, Bangalore are divided into following headings:-

1.1 ORGANIZATION PROFILE

Deloitte AMS are the support services division of Deloitte U.S- India, which is one of the big four consulting company with operations in India and spread in other countries worldwide.

Services provided by Deloitte Consulting

- Audit and Enterprise risk services
- Consulting
- Financial Advisory services
- Tax
- Deloitte Growth Enterprise services

Details of the Project:

Deloitte Consulting US- India (Healthcare and life – sciences) is in contractual agreement with group of hospitals in U.S to provide functional support for electronic medical record used by those hospitals. The functional support is in the form of 24x7 models where both the onsite as well as offshore team sitting in Deloitte, Bangalore handle the work. In order to provide support in an efficient way the list of hospitals is divided geographically.

Key Learning:

Performing the above mentioned tasks and undergoing through a rigorous training session at Deloitte, learning about Epic and how the offshore support model works was immense. The summary of learning at Deloitte is mentioned in the form of points:-

- Functional Overview of EMR
- Knowledge of the hospital workflow and its integration
- Backend Configuration
- Overview of the security access rights of EMR users
- Working knowledge of various EMR modules
- Ticket Resolving Process

Apart from the working knowledge of Epic, why it is the most used EMR in the world as compared to other EMR's like Cerner, McKesson is because

- Robust
- Can be integrated easily with any other EMR and can be used as a standalone over the counter healthcare ERP
- Minimum Clicks
- User Friendly & good GUI

Part – 2 Dissertation Report

Abstract

In India, use of EMR is relatively low among healthcare providers. There could be several reasons for it including adoption behavior and absence of single governing body. But one of the key factors can be traced to lack of sophisticated EMR solutions which most of the developed countries like U.S provide. They come up with features like enterprise intelligence, fulfilling meaningful criteria, one database for patient record etc which most of the Indian EMR solutions fail to provide. Another aspect of this issue could be noticeable differences between U.S and Indian healthcare system. U.S Federal government provide incentives to healthcare providers in the form of Medicare and Medicaid programs for the meaningful use of certified EMR to improve patient care.

Beyond these there are various other advantages of a leading certified U.S EMR system. Since for the information to flow seamlessly between providers it is necessary that one facility is connected to other. This aspect is actualized by **Care Everywhere**, which provides a framework for interoperability. It gives the patient freedom to move across different healthcare facilities and systems, at the same time giving clinicians the information they need for providing quality care.

Also EMR data can be used for data mining and research purposes. Some of the questions that might be considered by physician researchers that might intend to use EMR data are : (i) why are EMR data different (ii) How do you extract data from an EMR (iii) where are the data stored? (iv) what is the data quality?

In this regard we try to answer some of the above questions by reviewing and providing an overview of U.S and Indian EMR systems, centralized, decentralized and interface EMR solutions with considerable focus on pharmacy workflows & system and finding measures to achieve meaningful use as nearly as possible.

1.2 INTRODUCTION

What Are Electronic Health Records (EHRs)?

EHRs are, at their simplest, digital (computerized) versions of patients' paper charts. But EHRs, when fully up and running, are so much more than that.

EHRs are real-time, patient-centered records. They make information available instantly, "whenever and wherever it is needed" [1]. And they bring together in one place everything about a patient's health. EHRs can:

- Contain information about a patient's medical history, diagnoses, medications, immunization dates, allergies, radiology images, lab and test results
- Offer access to evidence-based tools that providers can use in making decisions about a patient's care
- Automate and streamline providers' workflow
- Increase organization and accuracy of patient information
- Support key market changes in payer requirements and consumer expectations

One of the key features of an EHR is that it can be created, managed, and consulted by authorized providers and staff across more than one health care organization. A single EHR can bring together information from current and past doctors, emergency facilities, school and workplace clinics, pharmacies, laboratories, and medical imaging facilities.

Health information technology (HIT)

Health information technology (HIT), notably e-prescribing and electronic health records (EHR)[2], have the potential to improve the quality of care, reduce medication errors and adverse events, and decrease overall health care utilization and costs. However, India continues to lag behind other countries in the adoption and use of HIT.

The growth of managed care in U.S has fueled expectations for a more coordinated delivery of clinical services and a reduction of unnecessary utilization. Among the most important issues that constrain these expectations is the transfer of medical information. Electronic

medical record systems appear to offer substantive advantages over paper records for both containing costs and improving the quality of care. However, incorporation of EMR systems into practice settings has languished. Among the barriers to implementation are software problems of codification and entry of data, security issues, a dearth of integrated delivery systems, reluctant providers, and prohibitive costs.

E-prescribing and EHR are both electronic means to provide better coordination of care by enabling various health care professionals to access patient medical records. Widespread adoption of HIT can be especially helpful for the elderly, since this population tends to have more chronic conditions requiring poly pharmacy. Adoption of e-prescribing can reduce medication errors due to poor handwriting, while EHR can promote better clinical outcomes, improve medication adherence and refill rates, improve member satisfaction, and lower overall health care expenditures. Unfortunately, barriers to the adoption of e-prescribing and EHR still exist, including resistance to learning new technology, initial start-up costs, delay in seeing a return on investment, lack of a standardized platform, increased administrative burden, and misaligned incentives. In an effort to promote greater adoption of e-prescribing and EHR, the Centers for Medicare & Medicaid has designed several initiatives, and other private organizations are now becoming more involved to close the HIT gap.

1.3 HEALTHCARE SYSTEM : USA

The healthcare system in United States is characterized by a mix of public and private funding and as such is not governed by a single philosophy. The unique aspect of U.S system in the world is the dominance of private element over public element.

The following is the list of all segments of healthcare:

1) Payer
2) Provider
3) PBMs
4) Government Healthcare
5) Employers
6) Pharma and Life Sciences

The main objective of this section is to facilitate an understanding of the structural and conceptual basis for the delivery of health services and provide a broad understanding of how healthcare is delivered in United States. Subsequently we will take into account the Indian system of healthcare and recognize its shortcomings in comparison to the U.S healthcare system. The table below displays the complexity of the healthcare delivery in United States. Several individuals and organizations are involved in healthcare. These range from insurers, payers, pharmaceutical companies, and claims processors to healthcare providers.

Suppliers	Insurers	Payers	Providers	Government
Pharmaceutical companies	**Managed Care Plans**	**Blue Cross/ Blue Shield plans**	**Preventive Care** Health Departments	**Public Insurance financing**
Multipurpose suppliers	**Blue Cross/ Blue Shield Plans**	**Commercial Insurers**	**Primary Care** Physician offices Community Health Centers	**Health regulations**
Biotechnology Companies	**Medicare**	**Employers**	**Acute Care** Hospitals	**Health Policy**
	Medicaid	**Third-party administrators**	**Auxiliary Services** Pharmacists Diagnostic clinics Medical equipment suppliers	**Public Health**
	Self–insured employers		**Rehabilitative Services** Home health agencies Skilled nursing facilities	**Research Funding**
	Commercial Insurers		**Continuing Care** Nursing Homes	

U.S healthcare is not a network of inter-related components designed to work together coherently, but it is a kaleidoscope of financing, insurance, delivery, and payment mechanisms.[3] 1.3.1 Provider Systems/Models:

Healthcare Delivery System 1- Traditional

Healthcare Provider System 1 (Traditional)

Healthcare Provider System 2 (Hospital)

Healthcare Provider System 3 – Managed Care

Healthcare Provider System 3
(Managed Care Hybrid- Kaiser Model)

Person Requiring Health Services

Makes Doctors Appointment via 800 number

Go To Doctor

Are lab tests required?

- Yes → Blood, Urine, etc taken at lab → Specimens tested
- No → Is medicine Prescribed?
  - Yes → Person goes to Pharmacy in building to fill prescription → Pharmacy verifies Insurance and a variety of other regulatory requirements and fills prescription. Person pays co-pay on the spot
  - No → Is Radiology Required?
    - Yes → Person goes to Radiology department in building to get picture taken → Xray, MRI, CatScan taken
    - No → Is a specialist Required?
      - Yes → Person makes appointment via 800 number (specialist usually in same building) → Person visits specialist that has access to the same health and claim data as primary physician
      - No → Is Physical Therapy Prescribed?
        - Yes → Person makes appointment via 800 number → Person visits Physical therapy clinic has access to the same health and claim data as primary physician
        - No → Healthcare requirement complete

All claims recorded and co-pay collected during visit

Kaiser is its own Insurer/payor

All events update chart

Persons Master chart (manual or digital)

If balance to claim, it is billed until payed (one bill)

Person/ Mailbox @ home

Medical Records

Person Requiring Hospital Services

Ambulance?
- No → Drive Car
- Yes → Emergency Room

Doctor Referral for surgery or observation

Check Patient In

Hospital Claims

- Intensive Care
- Radiology Services
- Brain Surgeon Group
- Heart Surgeon Group
- Rehabilitation (Physical Therapy, Speech Therapy, etc)
- Pharmacy
- Lab Services
- All other services provided by hospital
- Internal Medicine Group

1.3.2 Payer Systems/Models

Healthcare Payer Model 1-Employer

Healthcare Payer Model 1 (employer)

Healthcare Service is provided

Is there a balance due?

No

Yes

Provider Bills balance of service provided

Provider submits claim balance for employer reimbursement

3rd Party Aggregator and payer

Employer synchronizes valid employee/Provider list

Aggregator Cuts check for Employer Reimbursement for the service provided

Bill sent to Individual for each service or vist

Individual makes payment for services provided (balance due, co-pay or deducible)

Explanation of benefits statement that shows payer reimbursement and balance paid or due by individual for each service or visit

Person 1

1.4 PUBLIC SECTOR HEALTH PROGRAMS:

Two healthcare programs are dominant in the United States – Medicare and Medicaid. Medicare is the federal government's health programs that primarily serves Americans over the age of 65, whilst Medicaid is a joint federal – state programs principally designed to finance healthcare for the poor. Both provide care for the disabled.

Public Health Insurance:

Medicare:

- Basics: Medicare is a federal program that covers individuals aged 65 and over, as well as some disabled individuals.
- Administration: Medicare is a single-payer program administered by the government; single-payer refers to the idea that there is only one entity (the government) performing the insurance function of reimbursement.
- Financing: Medicare is financed by federal income taxes, a payroll tax shared by employers and employees, and individual enrollee premiums (for parts B and D).
- Benefits: Medicare Part A covers hospital services, Medicare Part B covers physician services, and Medicare Part D offers a prescription drug benefit. [Medicare Part C refers to Medicare Advantage – HMO's that administer Medicare benefits].

There are many gaps in Medicare coverage, including incomplete coverage for skilled nursing facilities, incomplete preventive care coverage, and no coverage for dental, hearing, or vision care. Because of this, the vast majority of enrollees obtain supplemental insurance. Overall, seniors pay about 22% of their income for health care costs despite their Medicare coverage.

Medicaid:

Basics: Medicaid is a program designed for the low-income and disabled. By federal law, states must cover very poor pregnant women, children, elderly, disabled, and parents. Childless adults are not covered, and many poor individuals make too much to qualify for Medicaid.

States have the option of expanding eligibility if they so choose. For example, states can choose to increase income eligibility levels.

- Administration: The states and the District of Columbia are responsible for administering the Medicaid program; as such, there are effectively fifty-one different Medicaid programs in the country.
- Financing: Medicaid is financed jointly by the states and federal government through taxes. Every dollar that a state spends on Medicaid is matched by the federal government at least 100%. In poorer states, the federal government matches each dollar more than 100%. Overall, the federal government pays for 57% of Medicaid costs.

- Benefits: Medicaid offers a fairly comprehensive set of benefits, including prescription drugs. Despite this, many enrollees have difficulty finding providers that accept Medicaid due to its low reimbursement rate.

Other public systems

S-CHIP: The State Children's Health Insurance Program (S-CHIP) was designed in 1997 to cover children whose families make too much money to qualify for Medicaid but make too little to purchase private health insurance. S-CHIP and Medicaid often share similar administrative and financing structures.

Private Health Insurance

Employer – sponsored Insurance

- Basics: Employer-sponsored insurance represents the main way in which Americans receive health insurance. Employers provide health insurance as part of the benefits package for employees.
- Administration: Insurance plans are administered by private companies, both for-profit (e.g. Aetna, Cigna) and non-for-profit (e.g. Blue Cross/Blue Shield).
- A special case is represented by companies that are "self-insured" – that is, they pay for all health care costs incurred by employees directly. In this case, the company contracts with a third party to administer the health insurance plan. Self-insured companies tend to be larger companies such as General Motors.
- Financing: Employer-sponsored insurance is financed both through employers (who usually pay the majority of the premium) and employees (who pay the remainder of the premium). In 2005, the annual private employer-sponsored insurance premiums averaged $4,024 for single coverage and $10,880 for a family of four.[5]
- Benefits: Benefits vary widely with the specific health insurance plan. Some plans cover prescription drugs, while others do not. The degree of cost-sharing (co-pays and deductibles) varies considerably.

Private non – group

- Basics: The individual market covers part of the population that is self-employed or retired. In addition, it covers some people who are unable to obtain insurance through their employer. In contrast to the group market (employment-based insurance), the individual market allows health insurance companies to deny people coverage based on pre-existing conditions.
- Administration: The plans are administered by private insurance companies.
- Financing: Individuals pay an insurance premium out-of-pocket for coverage. Risk in the individual market depends only on the health status of the individual, in contrast to the group market, in which risk is spread out among multiple individuals. As such, low-risk, healthy patients will have a low premium, whereas the opposite is true for high-risk, sick patients.
- Benefits: Benefits vary widely with the specific health insurance plan.

The financing of health care centers around two streams of money: the collection of money for health care (money going in), and the reimbursement of health service providers for health care (money going out). In the United States, the responsibility for these two functions is shared by private insurance companies as well as the government, both of which are known in policy terms as "payers." As such, the United States can be thought of as a "multi-payer" system.
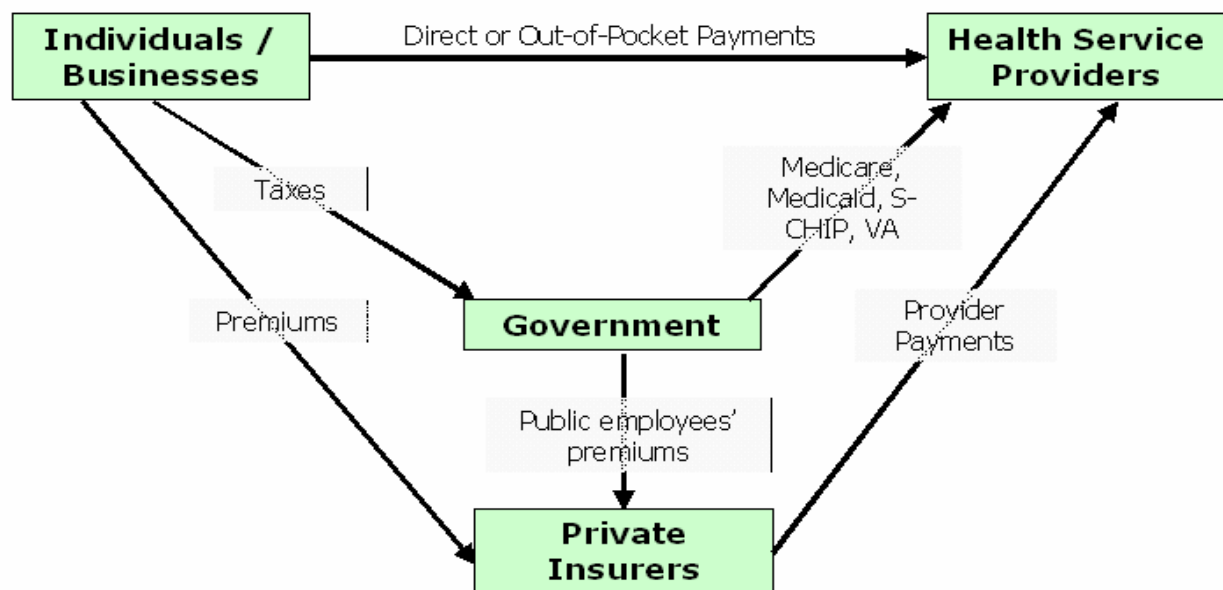
Individuals and businesses

Taxes: Both individuals and businesses pay income taxes to the government. In addition, there is a payroll tax on employers and employees to finance Medicare.

Premiums: Businesses pay all or most of the premium for employer-based insurance for employees, and employees pay the remainder. On the individual market, individuals pay for all premiums out of pocket. Employer-based insurance premiums and individual insurance premiums are collected by private insurers.

Direct or out-of-pocket payments: This is a direct payment to a provider for health care services (e.g. a co-payment).

Government

Medicare, Medicaid, S-CHIP, and the VA: The government uses money generated from taxes to reimburse providers who take care of patients enrolled in these programs.

Public employees' premiums: The government also uses tax dollars to pay private insurers a health insurance premium for federal employees and other public employees.

Tax subsidy: There is a tax subsidy of employer-based insurance (not shown in the graph) that represents a major cost to the government (on the order of $100 billion). Employees receive health insurance benefits as tax-free compensation, and employers are able to deduct health insurance benefits as a cost of doing business. [Since employers are only taxed on profits, defined as any income above the cost of doing business, being able to deduct health insurance benefits as a cost of doing business is a tax subsidy for employers].

• **Private insurers**

Private insurers accept premiums from individuals, businesses, and the government. In turn, they reimburse providers for taking care of patients with private insurance.

• **Health service providers**

Providers (doctors, allied health professionals, hospitals, and other health care facilities) take care of individuals. They are reimbursed for their services by private insurers and the government.

1.5 HEALTHCARE SYSTEM: INDIA

1.5.1 Current Perspective on Indian Healthcare

The healthcare industry in India is currently valued at more than US $ 70 billion and is projected to grow further to reach US $ 280 billion by 2020.[6]

Exhibit below shows the current and projected size of the Indian Healthcare Industry (in USD Billion)[7]
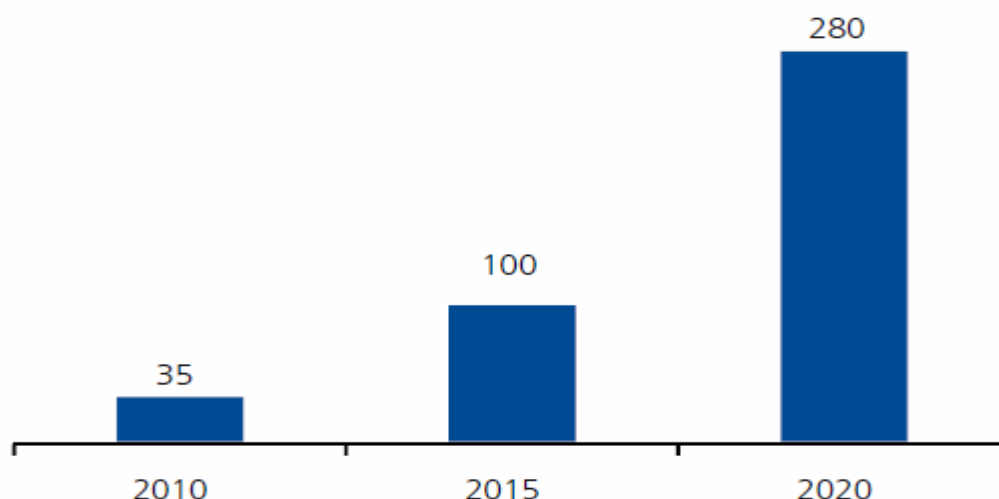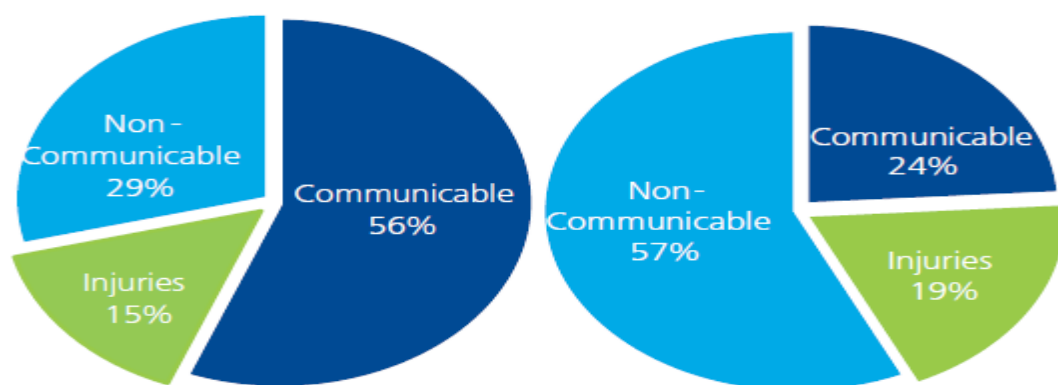

Exhibit below shows the changing disease burden in India – 1990 and 2020.[7](Innovative and sustainable Healthcare, Deloitte and AIMA, Aug 2012)

1.5.2 Structure and Organization :

Under the Indian constitution, health is a state subject. Each state therefore has its own healthcare delivery system in which both public and private(for profit as well as nonprofit) actors operate. States are responsible for the functioning of the their respective healthcare system, certain responsibilities also fall on the federal (central) government, namely aspects of policy making, planning, guiding, assisting, evaluating and coordinating the work of various provincial health authorities and providing funding to implement national programs.

The organization at the national level consists of the Union Ministry of Health and Family Welfare (MoHFW). In each state, the organization is under the state department of health and Family Welfare that is headed by a state minister and with a secretariat under the charge of the Secretary/ Commissioner (Health and Family welfare) belonging to the cadre of Indian Administrative Service. The Indian Systems of medicine consist of both Allopathy and AYUSH.

Each regional/zonal set up covers 3-5 districts and acts under the authority delegated by the state directorate of health services. The district level structure of health services is a middle level management organization and it is a link between the state and regional structure on one side and the peripheral level structures such as Primary Healthcare (PHC) and Sub – center
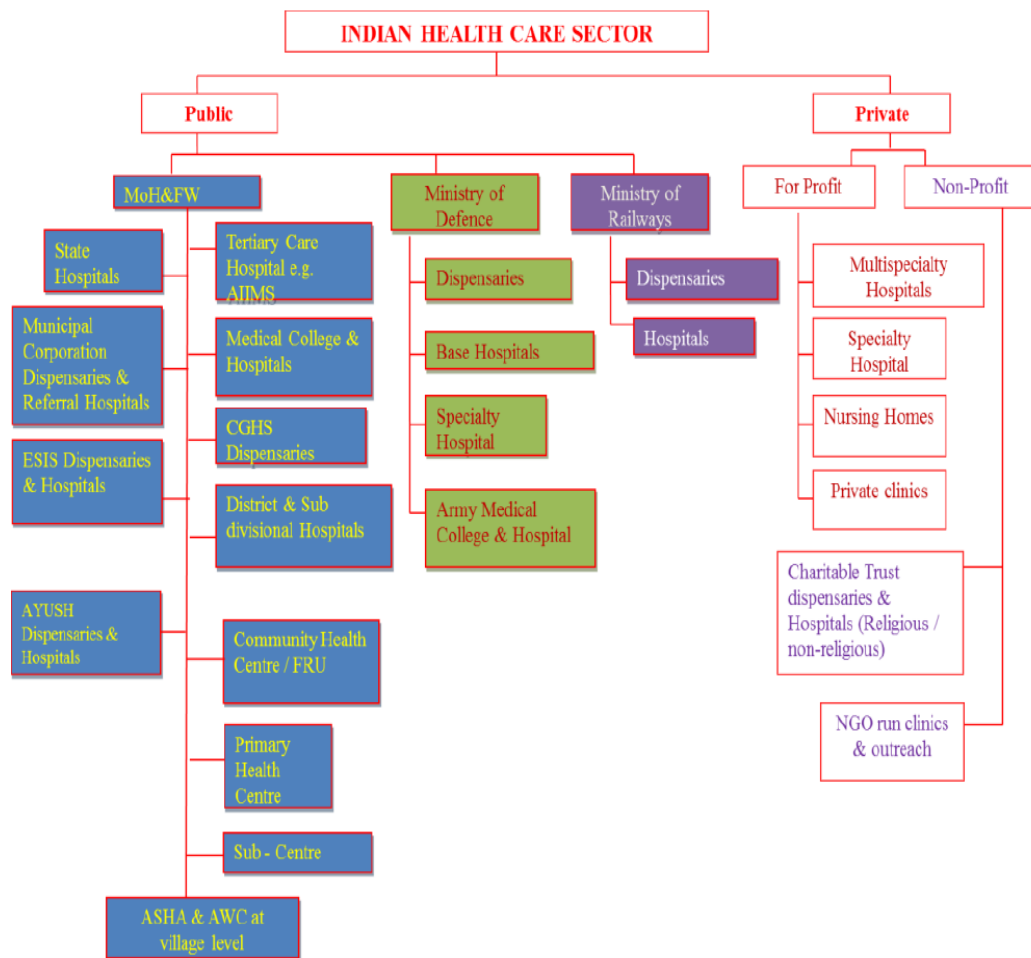
Figure 1: India's healthcare system is characterised by multiple systems of medicine, mixed ownership patterns and different kinds of delivery structures. Public sector ownership is divided between Central & State governments, municipals and Panchayats (local governments). The facilities include teaching hospitals, secondary level hospitals, first-level referral hospitals (community health centres/rural hospitals), dispensaries; primary health centres, sub-centres, and health posts. Also included are public facilities for selected occupational groups like organised work force (Employees State Insurance Scheme), defence, government employees (Central Government Health Scheme – CGHS), railways, post and telegraph and mines among others. The private sector (for profit/not for profit) is the dominant sector and services range from 1000+ bed hospitals to even 2-bed facilities).

Health Infrastructure (Public Sector)

	Population Norms		*Numbers*
	Plain areas	*Tribal areas*	
Sub- Centers	*5000*	*3000*	*147000*
PHCs	*30000*	*20000*	*23500*
CHCs	*120000*	*80000*	*4500*
Urban Areas			
Hospitals			*12700*

The health infrastructure in India includes levels, that include primary, secondary or tertiary healthcare providers. The providers of healthcare at these different levels include both private and public actors. The primary level includes village teams, sub centers and primary health centers. The community health centers and sub district hospitals make up the secondary level, and the District Hospitals and Medical Colleges are at the tertiary level.

1.5.3 Health Insurance:

Health insurance in India is still in its infancy. There are several insurance schemes operated by the central and state governments, such as Rashtriya Swasthya Bima Yojana (RSBY) which targets Below Poverty Line (BPL) families, the Employees' State Insurance Scheme (ESIS) and the central Government Health Scheme (CGHS).

Conclusion:

Nationwide health insurance coverage will only happen if specific measures are taken

Key Recommendations:

Three Tiers Model a better option:

Given India's broad division into three segments – those living below the poverty line, the middle class and the upper class. It would be better if India followed a three tier model, since a one size fits all model won't work well in health insurance. Each of the three tiers- Government, private and public private partnerships (PPP) – suited to meet the needs of different population segments**.**

Outpatient Coverage:

For example insurance caters only to sickness and in-patients or those under hospitalization, generally the most expensive aspect of healthcare. New policies that cover preventive check-ups and OPD treatments could also be introduced, so that hospitalization is avoided.

Switch from patient cure to preventive care:

Patient cure policies should be revised to preventive care policies. Preventive healthcare could ultimately reduce the cost of health operations, including a reduction in insurance claims.

Tax incentives:

The government also needs to implement multiple measures, including promoting tax incentives, to create a conducive environment that speeds up the creation of a critical mass that makes the business viable.

1.6 MEANINGFUL USE DEFINITION & OBJECTIVES

1.6.1 Meaningful Use Defined

Meaningful use is using certified electronic health record (EHR) technology to improve quality, safety, efficiency, and reduce health disparities, engage patients and family, improve care coordination, and population and public health, maintain privacy and security of patient health information

Ultimately, it is hoped that the meaningful use compliance will result in better clinical outcomes, improved population health outcomes, increased transparency and efficiency, empowered individuals, more robust research data on health systems. Meaningful use sets specific objectives that eligible professionals (EPs) and hospitals must achieve to qualify for Centers for Medicare & Medicaid Services (CMS) Incentive Programs.

On August 23, 2012, the Centers for Medicare and Medicaid Services (CMS) published a final rule on the Stage 2 Meaningful Use criteria that eligible professionals (EPs), eligible hospitals and critical access hospitals (CAHs) must meet to qualify as meaningful users of electronic health records (EHRs) and receive incentive payments under the Medicare and Medicaid programs [8]. This final rule builds upon the Stage 2 proposed rule, released on March 7, 2012 [9]

The Stage 2 final rule also revises certain Stage 1 criteria, which were finalized in the July 28, 2010 final rule. Stage 1 of the incentive program, designed to encourage providers to move key clinical data into an electronic format and was focused on establishing the functionalities of a certified EHR system to allow for quality improvement and exchange of health information. With the final rule, CMS continues it's careful, incremental approach to continuing this transitional process and strikes a balance between stakeholders calling for Stage 2 to require demonstrated improvements in care as a result of EHR use and those seeking more flexibility in the rules, with incentives simply to acquire EHR technology. Stage 2 also increases expectations for more robust health information exchange, allowing information to follow the patient through care transitions and referrals [5]

This study provides a summary of the key meaningful use stage 2 objectives achieved by the leading U.S. EMR in general and most specifically in pharmacy module in Eligible Hospital setting. We are specifically looking into the functionality used by our client and also find how this EMR is helping them in achieving patient engagement, data security and privacy and exchange of data across other hospitals for better patient care.

Factors in Achieving Stage 2 of Meaningful Use
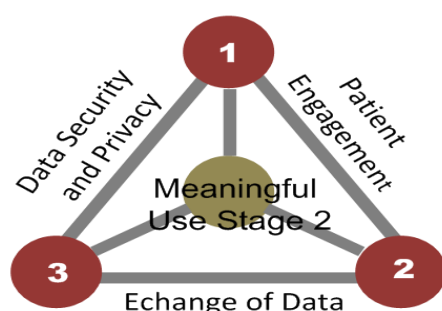
1. Patient Engagement
2. Data Exchange
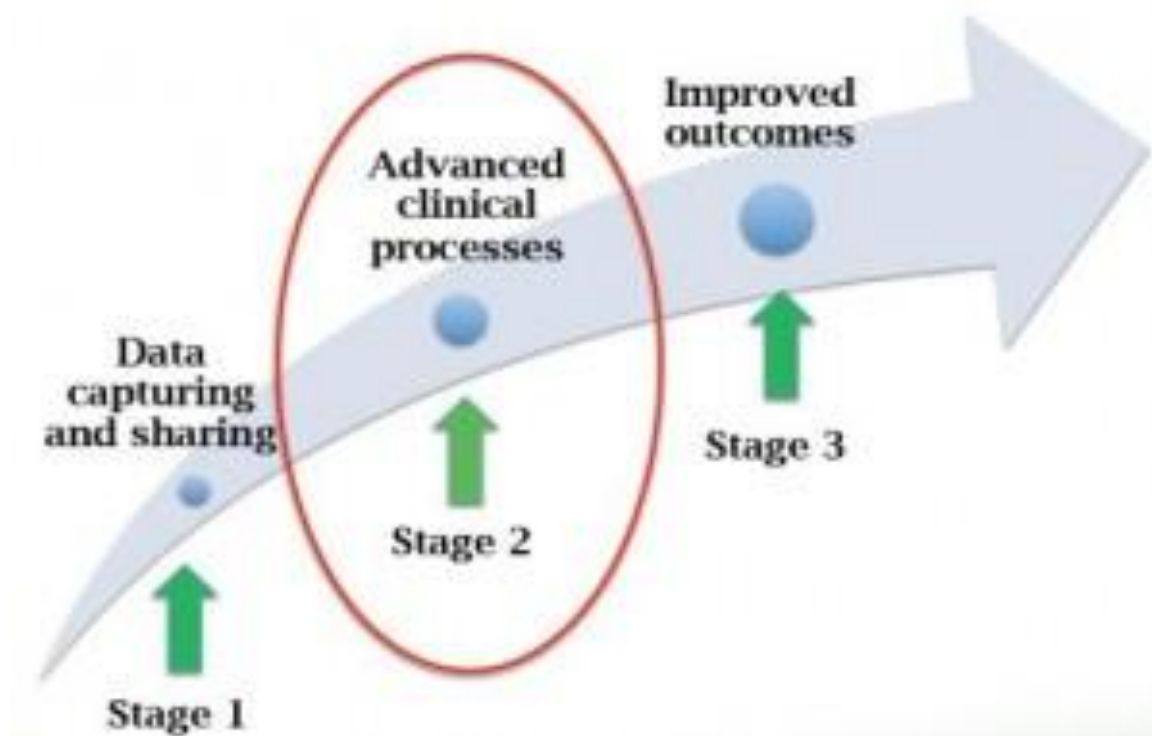3. You can replace this text with yours

1.6.2 Stages of Meaningful Use

These objectives will evolve in three stages over the next five years:

- **Stage 1(2011-2012)-**Data capture and sharing
- **Stage 2 (2014)-**Advance clinical processes
- **Stage 3 (2016)-**Improved outcomes

Stages of Meaningful Use

1.6.3 How to Attain Meaningful Use

Meaningful Use Criteria

Eligible professionals (EPs) and hospitals need to successfully attest to demonstrating meaningful use of certified electronic health records (EHRs) to qualify for an incentive payment through the Medicare EHR Incentive Program administered by the Centers for Medicare & Medicaid Services (CMS). EPs and hospitals that are eligible for the Medicaid EHR Incentive Program do not need to attest to meaningful use in their first year of participation, but must adopt, implement or upgrade to an EHR to receive an Incentive payment from their State.

1.6.4 Summary of Meaningful Use Criteria and Objective

In order to meet the meaningful use criteria, EPs and hospitals must adopt certified EHR technology and use it to achieve specific objectives.[10] Both the core and menu objectives must: 1) improve quality safety, efficiency and reduce health disparities; 2) engage patients and their families in their care; 3) improve care coordination; 4) improve population and public health; and 5) maintain privacy and security of health information. Eligible professionals and hospitals must become meaningful users of certified EHRs to qualify for incentive payments through the Medicare EHR Incentive Program administered by CMS.[11]

Stage 1: Meaningful use criteria focus on:	Stage 2: Meaningful use criteria focus on:	Stage 3: Meaningful use criteria focus on:

Stage 1: Meaningful use criteria focus on:	Stage 2: Meaningful use criteria focus on:	Stage 3: Meaningful use criteria focus on:
Electronically capturing health information in a standardized format	More rigorous health information exchange (HIE)	Improving quality, safety, and efficiency, leading to improved health outcomes
Using that information to track key clinical conditions	Increased requirements for e-prescribing and incorporating lab results	Decision support for national high-priority conditions
Communicating that information for care coordination processes	Electronic transmission of patient care summaries across multiple settings	Patient access to self-management tools
Initiating the reporting of clinical quality measures and public health information	More patient-controlled data	Access to comprehensive patient data through patient-centered HIE
Using information to engage patients and their families in their care		Improving population health

Meaningful use criteria for eligible professionals in Stage 2 are:

1. 17 core objectives
2. 3 out of 6 from menu set objectives

Meaningful use criteria for eligible hospitals/CAHs in Stage 2 are:

1. 16 core objectives
2. 3 out of 6 from menu set objectives

Eligible Hospital Core Objectives[12]	
1.	Use computerized provider order entry (CPOE) for medication, laboratory, and radiology orders directly entered by any licensed healthcare professional who can enter orders into the medical record per state, local, and professional guidelines.
2.	Record all of the following demographics: preferred language, sex, race, ethnicity, date of birth, date and preliminary cause of death in the event of mortality in the eligible hospital or CAH.

3.	Record and chart changes in the following vital signs: height/length and weight (no age limit); blood pressure (ages 3 and over); calculate and display body mass index (BMI); and plot and display growth charts for patients 0-20 years, including BMI.
4.	Record smoking status for patients 13 years old or older.
5.	Use clinical decision support to improve performance on high-priority health conditions.
6.	Provide patients the ability to view online, download, and transmit information about a hospital admission.
7.	Protect electronic health information created or maintained by the Certified EHR Technology through the implementation of appropriate technical capabilities.
8.	Incorporate clinical lab test results into Certified EHR Technology as structured data.
9.	Generate lists of patients by specific conditions to use for quality improvement, reduction of disparities, research, or outreach.
10.	Use clinically relevant information from Certified EHR Technology to identify patient-specific education resources and provide those resources to the patient
11.	The eligible hospital or CAH who receives a patient from another setting of care or provider of care or believes an encounter is relevant should perform medication reconciliation.
12.	The eligible hospital or CAH who transitions their patient to another setting of care or provider of care or refers their patient to another provider of care provides a summary care record for each transition of care or referral.
13.	Capability to submit electronic data to immunization registries or immunization information systems except where prohibited, and in accordance with applicable law and practice.
14.	Capability to submit electronic reportable laboratory results to public health agencies, where except where prohibited, and in accordance with applicable law and practice.
15.	Capability to submit electronic syndromic surveillance data to public health agencies, except where prohibited, and in accordance with applicable law and

	practice.
16.	Automatically track medications from order to administration using assistive technologies in conjunction with an electronic medication administration record (eMAR).

Eligible Hospital Menu Objectives	
1.	Record whether a patient 65 years old or older has an advance directive.
2.	Record electronic notes in patient records.
3.	Imaging results consisting of the image itself and any explanation or other accompanying information are accessible through CEHRT.
4.	Record patient family health history as structured data.
5.	Generate and transmit permissible discharge prescriptions electronically (eRx).
6.	Provide structured electronic lab results to ambulatory providers.

1.6.5 Summary of Stage 1 and Stage 2 Core Meaningful Use Objectives and Measures for Eligible Hospitals and Critical Access Hospitals (Based on Stage 2 Final Rule)[13]

Stage 1 Objective	Stage 1 Measure	Stage 2 Objective	Stage 2 Measure
Use CPOE for medication orders directly entered by any licensed healthcare professional who can enter orders into the medical record per state, local and professional guidelines	More than 30% of unique patients with at least one medication in their medication list admitted to the eligible hospital's or CAH's inpatient or emergency department have at least one medication order entered using CPOE	Use computerized provider order entry (CPOE) for medication, laboratory and radiology orders directly entered by any licensed healthcare professional who can enter orders into the medical record per state, local and professional guidelines	More than 60% of medication, 30% of laboratory, and 30% of radiology orders created by authorized providers of the eligible hospital's or CAH's inpatient or emergency department during the EHR reporting period are recorded using CPOE
Implement drug-drug and drug-	The eligible hospital/CAH has enabled this	*No longer a separate objective for Stage 2*	*This measure is incorporated into the Stage 2 Clinical*

allergy interaction checks	functionality for the entire EHR reporting period		***Decision Support measure***
Record demographics Preferred language Gender Race Ethnicity Date of birth Date and preliminary cause of death in the event of mortality in the eligible hospital or CAH	More than 50% of all unique patients admitted to the eligible hospital's or CAH's inpatient or emergency department have demographics recorded as structured data	Record the following demographics Preferred language Gender Race Ethnicity Date of birth Date and preliminary cause of death in the event of mortality in the eligible hospital or CAH	More than 80% of all unique patients admitted to the eligible hospital's or CAH's inpatient or emergency department have demographics recorded as structured data
Maintain an up-to-date problem list of current and active diagnoses	More than 80% of all unique patients admitted to the eligible hospital's or CAH's inpatient or emergency department have at least one entry	***No longer a separate objective for Stage 2***	***This measure is incorporated into the Stage 2 measure of Summary of Care Document at Transitions of Care and Referrals***
Maintain active medication list	More than 80% of all unique patients admitted to the eligible hospital's or CAH's inpatient or emergency department have at least one	***No longer a separate objective for Stage 2***	***This measure is incorporated into the Stage 2 measure of Summary of Care Document at Transitions of Care and Referrals***
Maintain active medication allergy list	More than 80% of all unique patients admitted to the eligible hospital's or CAH's inpatient or emergency department have at least one entry	***No longer a separate objective for Stage 2***	***This measure is incorporated into the Stage 2 measure of Summary of Care Document at Transitions of Care and Referrals***
Record and chart changes in vital signs: Height Weight Blood pressure Calculate and display BMI Plot and display growth charts for children 2-20 years, including BMI	More than 50% of all unique patients age 2 and over admitted to eligible hospital's or CAH's inpatient or emergency department blood pressure height and weight are recorded as structured data	Record and chart changes in vital signs: Height Weight Blood pressure (age 3 and over) Calculate and display BMI Plot and display growth charts for patients 0-20 years, including BMI	More than 80% of all unique patients admitted to the eligible hospital's or CAH's inpatient or emergency department have blood pressure (for patients age 3 and over only) and height and weight (for all ages) recorded as structured data
Record smoking status for patients	More than 50% of all unique patients 13 years	Record smoking status for patients 13 years old	More than 80% of all unique patients 13 years old or older

13 years old or older	old or older admitted to the eligible hospital's or CAH's inpatient or emergency department have smoking status recorded as structured data	or older	admitted to the eligible hospital's or CAH's inpatient or emergency department have smoking status recorded as structured data
Implement one clinical decision support rule relevant to specialty or high clinical priority along with the ability to track compliance that rule	Implement one clinical decision support rule	Use clinical decision support to improve performance on high-priority health conditions	Implement 5 clinical decision support interventions related to 4 or more clinical quality measures, if applicable, at a relevant point in patient care for the entire EHR reporting period. The eligible hospital or CAH has enabled the functionality for drug-drug and drug-allergy interaction checks
Report clinical quality measures (CQMs) to CMS or the States	For 2011, provide aggregate numerator, denominator, and exclusions through attestation or electronically through the Hospital Reporting Pilot	*No longer a separate objective for Stage 2, but providers must still submit CQMs to CMS or the States in order to achieve meaningful use*	*Starting in 2014, all CQMs will be submitted electronically to CMS.*
Provide patients with an electronic copy of their health information (including diagnostic test results, problem list, medication lists, medication allergies), upon request	More than 50% of all patients of the inpatient or emergency departments of the eligible hospital or CAH who request an electronic copy of their health information are provided it within 3 business days	Provide patients the ability to view online, download and transmit their health information within 36 hours after discharge from the hospital	More than 50% of all unique patients discharged from the inpatient or emergency departments of the eligible hospital or CAH during the EHR reporting period are provided timely online access to their health information More than 5% of all unique patients discharged from the inpatient or emergency departments of the eligible hospital or CAH during the EHR reporting period view, download, or transmit to a third party their health information
Provide patients with an electronic copy of their discharge instructions at time of discharge, upon request	More than 50% of all patients who are discharged from an eligible hospital or CAH's inpatient department or emergency department and who request an	*This objective is eliminated from Stage 1 in 2014 and is no longer a separate objective for Stage 2*	*This measure has been incorporated into the View, Download, and Transmit objective for Stage 2*

	electronic copy of their discharge instructions are provided it		
Capability to exchange key clinical information (for example, problem list, medication list, medication allergies, diagnostic test results), among providers of care and patient authorized entities electronically	Performed at least one test of certified EHR technology's capacity to electronically exchange key clinical information	*This objective is eliminated from Stage 1 in 2013 and is no longer an objective for Stage 2*	*This measure is eliminated from Stage 1 in 2013 and is no longer a measure for Stage 2*
Protect electronic health information created or maintained by the certified EHR technology through the implementation of appropriate technical capabilities	Conduct or review a security risk analysis and implement security updates as necessary and correct identified security deficiencies as part of its risk management process	Protect electronic health information created or maintained by the Certified EHR Technology through the implementation of appropriate technical capabilities	Conduct or review a security risk analysis in accordance with the requirements including addressing the encryption/security of data at rest and implement security updates as necessary and correct identified security deficiencies as part of its risk management process
Implement drug-formulary checks	The eligible hospital/CAH has enabled this functionality and has access to at least one internal or external drug formulary for the entire EHR reporting period	*No longer a separate objective for Stage 2*	*This measure is incorporated into the e-Prescribing measure for Stage 2*
Incorporate clinical lab-test results into certified EHR technology as structured data	More than 40% of all clinical lab tests results ordered by an authorized provider of the eligible hospital for patients admitted to its inpatient or emergency department during the EHR reporting period whose results are either in a positive/negative or numerical format	Incorporate clinical lab-test results into Certified EHR Technology as structured data	More than 55% of all clinical lab tests results ordered by authorized providers of the eligible hospital or CAH for patients admitted to its inpatient or emergency department (POS 21 or 23 during the EHR reporting period whose results are either in a positive/negative or numerical format are incorporated in Certified EHR Technology as structured data
Generate lists of patients by specific conditions to use	Generate at least one report listing patients of the eligible hospital or	Generate lists of patients by specific conditions to use for quality	Generate at least one report listing patients of the eligible hospital or CAH with a

for quality improvement, reduction of disparities, research or outreach	CAH with a specific condition	improvement, reduction of disparities, research, or outreach	specific condition
Use certified EHR technology to identify patient-specific education resources and provide those resources to the patient if appropriate	More than 10% of all unique patients admitted to the eligible hospital's or CAH's inpatient or emergency department are provided patient-specific education resources	Use certified EHR technology to identify patient-specific education resources and provide those resources to the patient if appropriate	More than 10% of all unique patients admitted to the eligible hospital's or CAH's inpatient and emergency departments are provided patient- specific education resources identified by Certified EHR Technology
The eligible hospital or CAH that receives a patient from another setting of care or provider of care or believes an encounter is relevant should perform medication reconciliation	The eligible hospital or CAH performs medication reconciliation for more than 50% of transitions of care in which the patient is admitted to the eligible hospital's or CAH's inpatient or emergency department	The eligible hospital or CAH that receives a patient from another setting of care or provider of care or believes an encounter is relevant should perform medication reconciliation	The eligible hospital or CAH performs medication reconciliation for more than 50% of transitions of care in which the patient is admitted to the eligible hospital's or CAH's inpatient or emergency department
The eligible hospital or CAH that transitions their patient to another setting of care or provider of care or refers their patient to another provider of care should provide summary of care record for each transition of care or referral	The eligible hospital or CAH that transitions or refers their patient to another setting of care or provider of care provides a summary of care record for more than 50% of transitions of care and referrals	The eligible hospital or CAH that transitions their patient to another setting of care or provider of care or refers their patient to another provider of care should provide summary of care record for each transition of care or referral	The eligible hospital, or CAH that transitions or refers their patient to another setting of care or provider of care provides a summary of care record for more than 50% of transitions of care and referrals & provides a summary of care record either a) electronically transmitted to a recipient using CEHRT or b) where the recipient receives the summary of care record via exchange facilitated by an organization that is a NwHIN Exchange
Capability to submit electronic data to immunization registries or Immunization Information Systems and actual	Performed at least one test of certified EHR technology's capacity to submit electronic data to immunization registries and follow up submission if the test is successful (unless none of the	Capability to submit electronic data to immunization registries or Immunization Information Systems and actual submission except where prohibited and in accordance with	Successful ongoing submission of electronic immunization data from Certified EHR Technology to an immunization registry or immunization information system for the entire EHR reporting period

submission except where prohibited and in accordance with applicable law and practice	immunization registries to which the eligible hospital or CAH submits such information have the capacity to receive the information electronically)	applicable law and practice	
Capability to submit electronic data on reportable (as required by state or local law) lab results to public health agencies and actual submission except where prohibited and in accordance with applicable law and practice	Performed at least one test of certified EHR technology's capacity to provide electronic submission of reportable lab results to public health agencies and follow-up submission if the test is successful (unless none of the public health agencies to which eligible hospital or CAH submits such information have the capacity to receive the information electronically)	Capability to submit electronic data on reportable (as required by state or local law) lab results to public health agencies and actual submission except where prohibited and in accordance with applicable law and practice	Successful ongoing submission of electronic reportable laboratory results from Certified EHR Technology to public health agencies for the entire EHR reporting period as authorized, and in accordance with applicable State law and practice
Capability to submit electronic syndromic surveillance data to public health agencies and actual submission except where prohibited and in accordance with applicable law and practice	Performed at least one test of certified EHR technology's capacity to provide electronic syndromic surveillance data to public health agencies and follow-up submission if the test is successful	Capability to submit electronic syndromic surveillance data to public health agencies and actual submission except where prohibited and in accordance with applicable law and practice	Successful ongoing submission of electronic syndromic surveillance data from Certified EHR Technology to a public health agency for the entire EHR reporting period
NEW	**NEW**	Automatically track medications from order to administration using assistive technologies in conjunction with an electronic medication administration record (eMAR)	More than 10% of medication orders created by authorized providers of the eligible hospital's or CAH's inpatient or emergency department (POS 21 or 23) during the EHR reporting period for which all doses are tracked are tracked using eMAR

MENU OBJECTIVES (Eligible Hospitals and CAHs must report on 3 of 6 menu objectives)

Stage 1 Objective	Stage 1 Measure	Stage 2 Objective	Stage 2 Measure
Record advance directives for patients 65 years old or older	More than 50% of all unique patients 65 years old or older admitted to the eligible hospital's	Record whether a patient 65 years old or older has an advance directive	More than 50% of all unique patients 65 years old or older admitted to the eligible hospital's
NEW	**NEW**	Record electronic notes in patient records	Enter at least one electronic progress note created, edited and signed by an EP for more than 30% of unique patients admitted to the eligible hospital
NEW	**NEW**	Imaging results consisting of the image itself and any explanation or other accompanying information are accessible through CEHRT.	More than 10% of all scans and tests whose result is an image ordered by an authorized provider of the eligible hospital or CAH
NEW	**NEW**	Record patient family health history as structured data	More than 20% of all unique patients admitted to the eligible hospital or CAH's inpatient or emergency department during the EHR reporting period have a structured data entry for one or more first-degree relatives or an indication that family health history has been reviewed
NEW	**NEW**	Generate and transmit permissible discharge prescriptions electronically (eRx)	More than 10% of hospital discharge medication orders for permissible prescriptions (for new or changed prescriptions) are compared to at least one drug
NEW	**NEW**	Provide structured electronic lab results to ambulatory providers	Hospital labs send structured electronic clinical lab results to the ordering provider for more than 20% of electronic lab orders received

<p align="center">**Special Features of the EMR in Pharmacy Module**</p>

1. CPOE for Medication, Laboratory and Radiology Orders	
Objective	Use computerized provider order entry (CPOE) for medication, laboratory, and radiology orders directly entered by any licensed healthcare professional who can enter orders into the medical record per state, local, and professional guidelines.
Measure	More than 60 percent of medication, 30 percent of laboratory, and 30 percent of radiology orders created by authorized providers of the eligible hospital's during the EHR reporting period are recorded using CPOE.

Definition of Terms
Computerized Provider Order Entry (CPOE) – A provider's use of computer assistance to directly enter medical orders (for example, medications, consultations with other providers, laboratory services, imaging studies, and other auxiliary services) from a computer or mobile device.

Laboratory and radiology orders are included as part of Stage 2 for CPOE:

Laboratory order – An order for any service provided by a laboratory that could not be provided by a non-laboratory.

Laboratory – A facility for the biological, microbiological, serological, chemical, immune hematological, hematological, biophysical, cytological, pathological, or other examination of from the human body for the purpose of providing information for the diagnosis, prevention, or treatment of any disease or impairment of, or the assessment of the health of, human beings. These examinations also include procedures to determine, measure, or otherwise describe the presence or absence of various substances or organisms in the body. Facilities only collecting or preparing specimens (or both)or only serving as a mailing service and not performing testing are not considered laboratories.

Radiology order –order for any imaging services that uses electronic product radiation. The EP can include orders for other types of imaging services that do not rely on electronic product radiation in this definition as long the policy is consistent across all patient and for the entire EHR reporting period.

<u>Leading EHR Functionality in terms of:</u>
<u>Medication:</u> The EHR has the functionality of ordering medication electronically. This order directly does to Pharmacist dashboard and once the pharmacist verifies the order it is active.

Patient need not to be physically present at the pharmacy if admitted to the hospital to take the medication .All the medication will directly come to nurse for administration.

2. Clinical Decision Support Rule	
Objective	Use clinical decision support to improve performance on high-priority health conditions.
Measure	1. Implement five clinical decision support interventions related to four or more clinical quality measures at a relevant point in patient care for the entire EHR reporting period. Absent four clinical quality measures related to an eligible hospital or CAH's patient population, the clinical decision support interventions must be related to high-priority health conditions. It is suggested that one of the five clinical decision support interventions be related to improving healthcare efficiency. 2. The eligible hospital or CAH has enabled the functionality for drug-drug and drug-allergy interaction checks for the entire EHR reporting period.

Definition of Terms

 Clinical Decision Support – HIT functionality that builds upon the foundation of an EHR to provide persons involved in care processes with general and person-specific information, intelligently filtered and organized, at appropriate times, to enhance health and health care.

Leading EHR Functionality in terms of:
Clinical Decision Support
Evidence-based decision support interventions. Enable a limited set of identified users to select (i.e., activate) one or more electronic clinical decision support interventions (in addition to drug-drug and drug-allergy contraindication checking) based on each one and at least one combination of the following data:
(A) Problem list;
(B) Medication list;
(C) Medication allergy list;
(D) Demographics;
(E) Laboratory tests and values/results; and
(F) Vital signs.
EHR technology is able to electronically identify for a user diagnostic or therapeutic reference information based on each one and at least one combination of the following data: Problem list; Medication list; Medication allergy list; Demographics; Laboratory tests and values/results; and Vital signs.

Drug -drug allergy interaction checks:
(i) Interventions. Before a medication order is completed and acted upon during computerized provider order entry (CPOE), interventions automatically and electronically indicate to a user drug-drug and drug-allergy contraindications based on a patient's medication list and medication allergy list.
(ii) Adjustments. (A) Enable the severity level of interventions provided for drug-drug interaction checks to be adjusted.
(B) Limit the ability to adjust severity levels to an identified set of users or available as a system administrative function.

3.Medication Reconciliation	
Objective	The eligible hospital or CAH who receives a patient from another setting of care or provider of care or believes an encounter is relevant should perform medication reconciliation.
Measure	The eligible hospital or CAH performs medication reconciliation for more than 50 percent of transitions of care in which the patient is transitioned into the care of the EP or admitted to the eligible hospital's or CAH's inpatient or emergency department (POS 21 or 23).

Definition of Terms

Medication Reconciliation – The process of identifying the most accurate list of all medications that the patient is taking, including name, dosage, frequency, and route, by comparing the medical record to an external list of medications obtained from a patient, hospital, or other provider.

Transition of Care – The movement of a patient from one setting of care (hospital, ambulatory primary care practice, ambulatory specialty care practice, long-term care, home health, rehabilitation facility) to another. At a minimum, transitions of care include all admissions to the inpatient and emergency department.

Leading EHR Functionality in terms of:

Clinical Information Reconciliation

Enable a user to electronically reconcile the data that represent a patient's active medication, problem, and medication allergy list as follows.

For each list type:

(i) Electronically and simultaneously display (i.e., in a single view) the data from at least two list sources in a manner that allows a user to view the data and their attributes, which must include, at a minimum, the source and last modification date.

(ii) Enable a user to create a single reconciled list of medications, medication allergies, or problems. Enable a user to review and validate the accuracy of a final set of data and, upon a user's confirmation, automatically update the list.

4. e Prescribing (eRx)	
Objective	Generate and transmit permissible discharge prescriptions electronically (eRx).
Measure	More than 10 percent of hospital discharge medication orders for permissible prescriptions (for new, changed, and refilled prescriptions) are queried for a drug formulary and transmitted electronically using certified EHR technology.
Exclusion	Does not have an internal pharmacy that can accept electronic prescriptions and is not located within 10 miles of any pharmacy that accepts electronic prescriptions at the start of their EHR reporting period.

Definition of Terms

Prescription – The authorization by a provider to a pharmacist to dispense a drug that the pharmacist would not dispense to the patient without such authorization.

Leading EHR Functionality in terms of:

Drug formulary checks

EHR technology must automatically and electronically check whether a drug formulary (or preferred drug list) exists for a given patient and medication.

1.7 CONCLUSION:

The Stage 2 final rule allows health care providers to transition EHR use to foster greater patient engagement and care coordination among providers. With the final rule, CMS has taken steps to lower the burden on providers by delaying the implementation of Stage 2 meaningful use requirements and by streamlining the quality reporting process. In addition, the final rule encourages patients to engage in their own health care by providing electronic access to health information and adding the ability to transmit their information to other providers who are part of their care teams. Significantly, the Stage 2 final rule encourages greater information sharing by making various public health reporting objectives mandatory.

The EHR incentive program has the power to drive improvement throughout the health care system. Currently, one of every nine Medicare eligible physicians and professionals are meaningful users of EHRs.42 percent of all eligible hospitals have received an incentive payment for either demonstration of meaningful use or, in the case of Medicaid providers, or to adopt, implement or update their systems. For the Medicaid program, 17 states are open for registration for the incentive program, and Medicaid incentives have been paid to 2,400 physicians and hospitals so far.

The leading EHR has a strong track record of providing products and the change management required to help hospital and professionals achieve meaningful use[14]. To date, our electronic health records system takes first place in the race to obtain Meaningful Use incentive dollars. In the data released by the Centers for Medicare and Medicaid Services (CMS) and analyzed by Modern Healthcare magazine, the top-ranked EHR vendor among clinicians who received incentives was our EHR Systems. This EHR was used by 28% of these eligible professionals (EPs), or 6,045 providers. That was more than the next four vendors combined.[15]

Currently Our Client is working towards the adaptation of Meaningful use and that process is still in progress. At current stage we are in the process of generating data for meaningful use to present to the government.

Certain Barriers

- The engagement of the Client to the firm is quite recent.
- As the Implementation happened in phase starting from June'2013 so it is still going on. The next Go–live for the newest facility is in July '2014. Ambulatory & clinical in patient implementation happened at different time.
- Initially, doctors and nurses have some communication differences due to which there were certain things not reported. As a result there was no DATA regarding that.
- Due to lack of data, there was no report generation on time which ultimately lead to delay in reporting certain criteria and fulfilling meaningful use which ultimately delayed in getting incentives.
- Reporting was done earlier in excel spreadsheet after the EMR implemented than the data was transferred from those sheet to the Database. This process took long time and ultimately delays in reporting.

1.8.OVERVIEW OF BUSINESS PROCESSES- ENTERPRISE SYSTEM

1.8.1 Enterprise Model of Electronic Healthcare System

EMR system contains patient-centric, electronically maintained information about an individual's
health status and care, and it is focused on tasks and events directly related to patient care and optimized for use by clinicians. When designed and implemented correctly, it should meet all of a clinical, legal and administrative requirements for automation support of the clinical process. It should be noted that administrative requirements refer to the handling of patient information, not financial administration. However, because the data in the EMR system is the foundation for billing and outcomes activity, it must be able to facilitate those processes as well.

1.8.2 EHR System Core Capabilities

An EHR system is composed many integrated core capabilities: clinical system management, interoperability, clinical data repository (CDR), Controlled Medical Vocabulary (CMV),clinical workflow, clinical decision support, clinical documentation and data capture, clinical display (including clinician dashboards), clinical order management(including computer-based physician order entry and e-prescribing), and knowledge management. Of course, the EHR is also be able to adequately meet the needs of a variety of care venues, as well as a wide array of clinician types.

Although current EHR systems have the capability to provide substantial value to their users, there is ample room for improvement. It is important to recognize the implications of limited functionality in any one core capability, so that expectations can be correctly set and business needs met
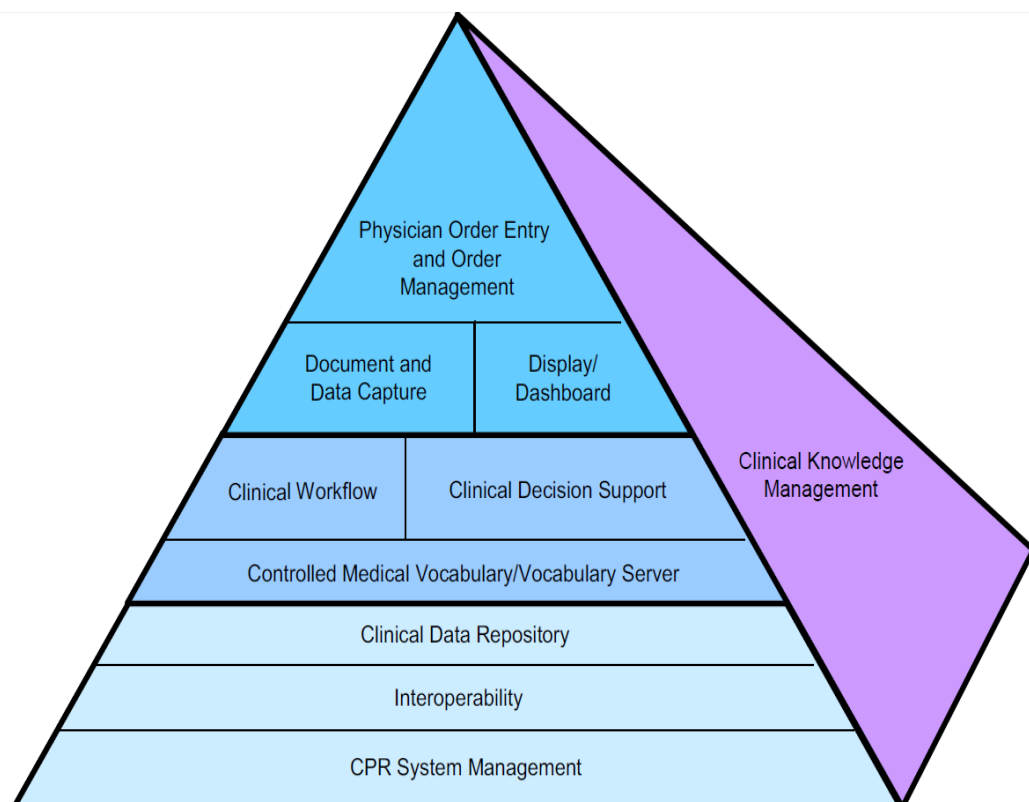
These descriptions of the core capabilities of enterprise EHR System:

• *System management:* The CPR system management subsystem is a rich set of functionality and services that are focused on making the overall system easier to understand, configure provision, maintain and monitor. Significant performance risk is introduced when system configuration management and monitoring functionality are not properly organized, abstracted and presented as coherent administrative

• *Interoperability:* The system cannot fulfill its potential to make patient care better, safer and less costly without excellent interoperability. An EHR system must be able to interact with other systems within a given enterprise, but requirements for extra enterprise interoperability are becoming increasingly important as well

• *Clinical Data Repository (CDR):* At its core, a system must have a flexible permanent data store that guarantees the privacy and security of the data, and that information is stored for the legally required time and can be rapidly and flexibly retrieved

• *Controlled Medical Vocabulary (CMV):* If a CPR system is to adequately support and improve clinical practice, it is essential that it have a CMV to provide a linguistic and semantic infrastructure representing a consistent framework to support the exchange of information between humans and automation systems, and across the human/machine interface.

• *Clinical Workflow (WF):* Automation systems must provide support for the processes involved in clinical care, as well as the information needed. CPR workflow capabilities enable the Care Delivery Organization (CDO) to define key processes in such a manner that the system can then assist humans and automated systems in reliable manner.

• *Clinical Decision Support (CDS):* A key enabler as system progress to more-sophisticated support for clinical care processes is the capability to incorporate rules and decisions.

• *Clinical Documentation and Data Capture:* An EHR must be capable of capturing all clinically relevant information at the point of care, and must be capable of importing data from other clinical systems (such as pathology, radiology or laboratory). Because it is unlikely that all of a patient's clinical encounters will take place within a given CDO, the CPR will ultimately need to input and integrate clinical information from outside the CDO.

• *Clinical Display (Including Dashboards):* Once captured, data must be presented in a meaningful manner that contributes to the clinician's ability to use the data effectively. Key elements of the display are clinical and performance dashboards that can facilitate moving from data to information.

• *Order Management (Including Physician Order Entry):* Orders initiate the majority of clinical activities, such as diagnostic testing, therapy (including medication administration) and patient management. The system must support a variety of mechanisms for order entry, including traditional approaches in which physician orders are written and then transcribed by the medical staff, as well as the more desirable method of direct entry of orders by physicians into the HER system.

1.8.3 The CPR Environment

It is critical to realize that an optimally functioning CPR system cannot exist in isolation; it requires significant interaction with a complex, comprehensive and robust set of healthcare-related applications This model takes into account the relationships between healthcare-related applications and the CPR system by dividing them into three interacting categories — contextual, cooperating and subscriber systems — based predominately on the degree and nature of flow between the applications and the CPR system. In the past, this model was limited to those applications within the boundaries of the CDO. However, in recognition that CDOs and their applications cannot exist in a vacuum, but must now routinely interact with enterprises and systems outside their firewall, we have added a fourth category, "extra enterprise systems."
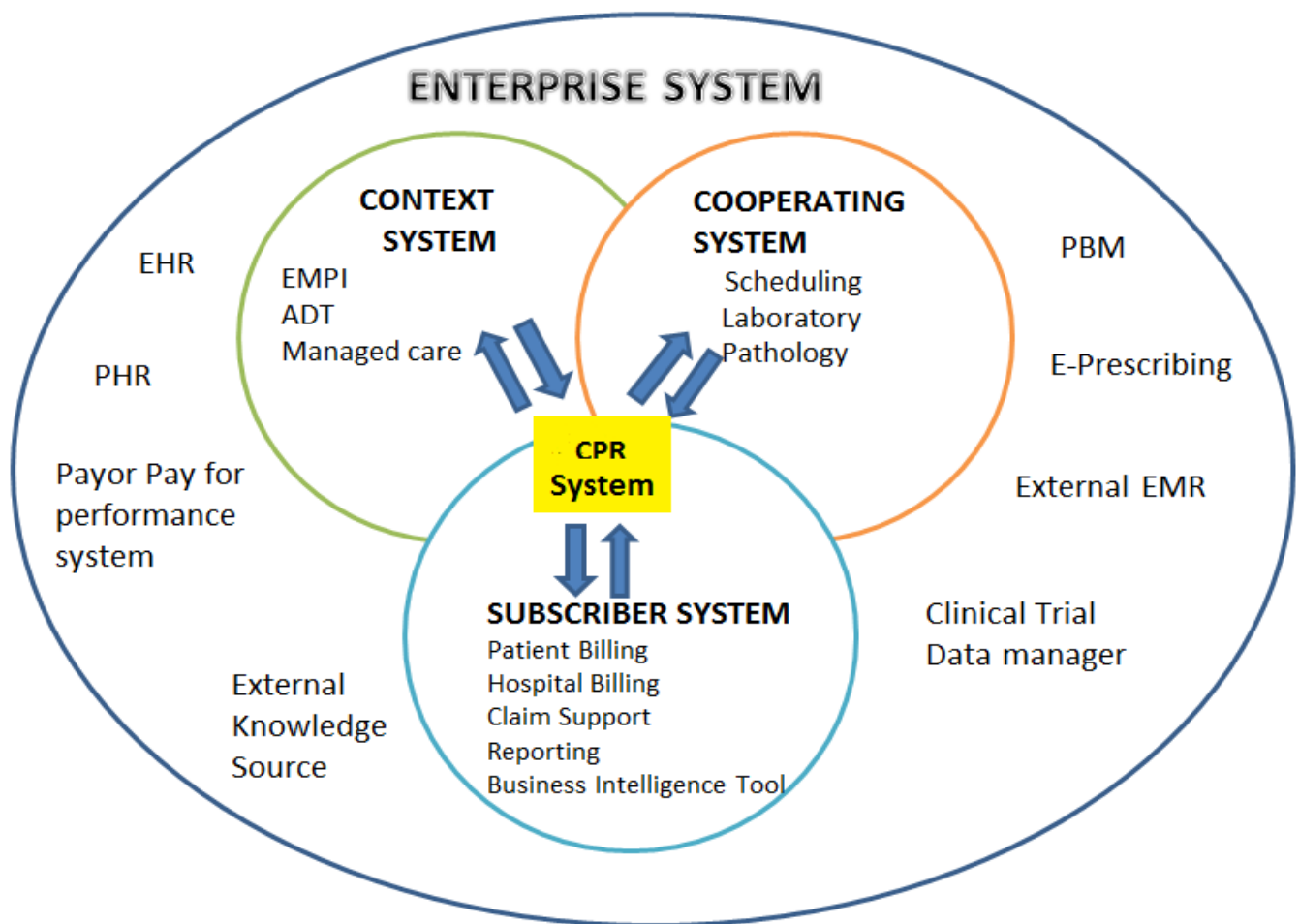
ADT = ADMISSION DISCHARGE TRANSFER SYSTEM   PACS = PICTURE ARCHIVING & COMMUNICATION

PBM = PHARMACY BENEFITS MANAGEMENT   EHR = ELECTRONIC HEALTH RECORD

PHR = PERSONAL HEALTH RECORD   EMPI = ENTERPRISE MASTER PERSON INDEX

RIS = RADIOLOGY INFORMATION SYSTEM   EMR = ELECTRONIC MEDICAL RECORD

1.9 ELECTRONIC MEDICAL RECORD (EMR) PHARMACY MODULE:

Pharmacy is a key component of EMR "closed-loop" medication ordering and administration process, linking pharmacists, ordering physicians and nurses to a single order record. With this module, pharmacists can monitor medication treatment and improve medical outcomes, improving patient safety, minimizing adverse effects and helping control costs.

1.9.1 Ancillary Application:

There are different Ancillary systems related to Pharmacy. To name few are:

- **PyxisR**x: A decentralized medicine dispensing system which aids in medication supply management.
- **RxWorks**: Platform that provides integration of inventory, workflow, packaging and a carousel solution.
- **TheraDoc**: Clinical Surveillance tool that helps clinician's document interventions more effectively.

PyxisRx: It is a decentralized medicine dispensing system. It ensures safe and efficient dispensing of medication by doctors. The Pyxis MedStation system is a cabinet-based storage system used by hospitals and similar institutions to store and safeguard medications and floor stock items. Using a computer in the Pyxis MedStation system main cabinet, users can unlock and open drawers in the cabinets and access the contents of the medications stored in the cabinets.


RxWorks: It is a Medical Inventory management system. Difference between Lawson and RxWorks is that Lawson is supply inventory while RxWorks is drug Inventory.
Pharmacy Department is the Primary End User for RxWorks, involving pharmacy module.

Theradoc: Clinical Surveillance Tool helps clinician's document interventions.
Modules used at our client are:

- Infection Control Assistant (Another system sends ORU to Theradoc): It is Interface from another system to TheraDoc and does not involve EHR.
- Pharmacy intervention assistant (Configured with System): sent from System to TheraDoc. It involves sending ADT and RDE messages.

1.9.2 Communication Between EHR and Pharmacy Module:
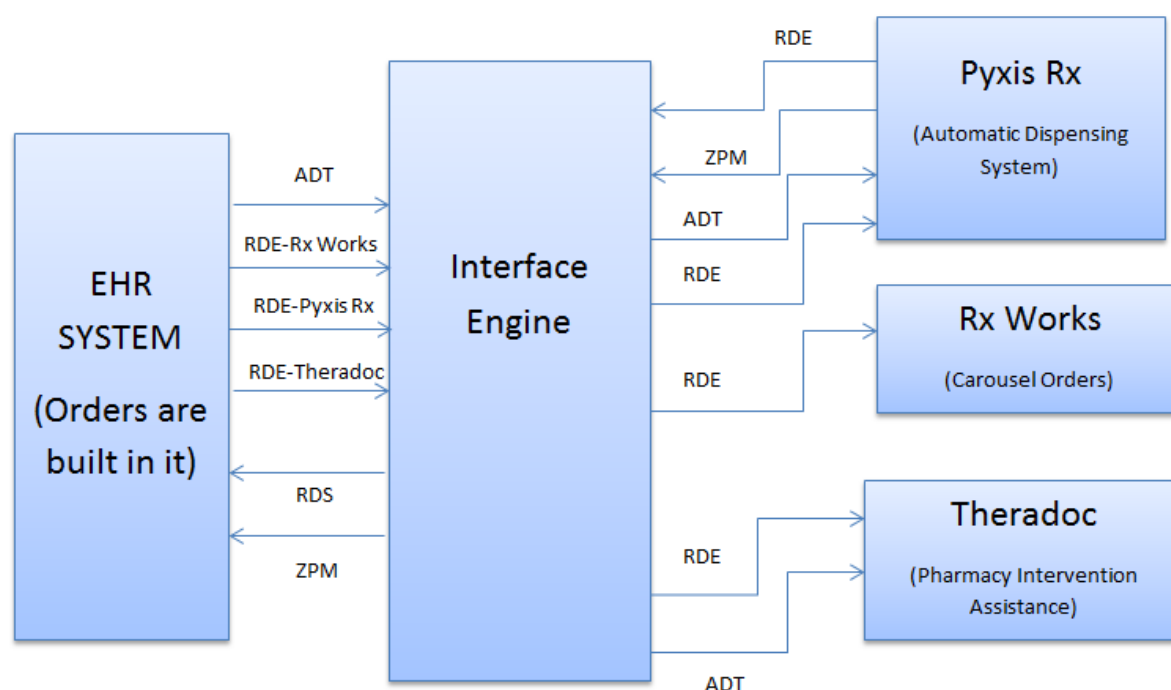
Note:
- The RDE, pharmacy order message, from system after being verified in Willow either goes to Pyxis or RxWorks but not both, whereas all RDE messages are sent to Theradoc.
- RDS is a dispense message which is sent to system each time a medication is dispensed from Pyxis MedStation.
- ZPM message is sent to System each time medicines are loaded or unloaded in Pyxis MedStation. Load/Unload is different from dispensing medication.
  Loading/Unloading happens as and when medicines in the med stations are added as replenishment or removed when they turn obsolete.
- ZPM is sent so that System can update its database and accordingly the MedList is populated in System.

Interface Name	Message Type	Trigger Event	Sending Application	Receiving Application
Outgoing Robot Rx Orders	RDE	Pharmacy/Medication Order message	EHR	RxWorks
Outgoing ADS Rx Orders	RDE	Pharmacy Order message	EHR	Pyxis
Outgoing ADS Orders to Theradoc	RDE	Pharmacy Order message	EHR	Theradoc
Incoming ADS dispense load/unload	RDS/ZPM	Medication Dispense(for RDS)/ Load or Unload	Pyxis	EHR

1.9.3 Automatic Dispensing Station: ADS

EMR automatically picks a dispense location for every order user enter. If a medication can't be dispensed from any of the dispense locations that serve the patient's Unit., then it will dispense from the central pharmacy. Each dispense location is a record in the Pharmacy (PHR) Database. Each of those Pharmacy (PHR) records is attached to a Medication List (EFY) record. The Medication Lists indicate what medications (ERX records) and packages (NDC records) are available that pharmacy.

An ADS system is composed of a computer console and a cabinet. Using the computer console, the nurse enters information about what he needs from the ADS. Then, provided the request is valid, the correct drawer in cabinet opens, allowing the nurse to "pull" the medication. These cabinets are particularly useful for :

1. Common medications, such as acetaminophen
2. PRN medications
3. Regulated medications such as Morphine, which must be closely monitored.

EMR can be configured to identify orders that should be dispensed from an ADS cabinet, but can't currently be dispensed from there because the necessary product(s) or packages(s) aren't currently loaded into the cabinet. When this happens EMR picks a dispense location of ADS LOAD PHARMACY.

The "ADS load Pharmacy" is not an actual dispense location; it does not physically exist. Instead, it's a "dummy" dispense location. The EMR will dispense an order from an ADS cabinet if there is a pocket for that medication (that is, the medication is loaded), even if the pocket is empty (that is, the count is "0").

EMR will only pick the ADS LOAD PHARMACY if the product is not on the ADS cabinet's Medication list at all. If the pocket has run out, EMR will continue to pick the ADS cabinet as the dispense location.

When an order is verified with a dispense location of ADS LOAD PHARMACY the Dispense Location field on MAR appears as "Pharmacy to load in ADS". This tells the nurse that the order will be dispensed from the ADS cabinet, but that is not currently loaded.

When an order is verified with a dispense location of ADS LOAD PHARMACY, a label will print in the central pharmacy. This label is a cue for a technician to load the product into the appropriate dispensing cabinet for the patient. When an order is verified with a dispense location of ADS LOAD PHARMACY, EMR updates the patient's profile in the ADS system and does not wait for the med to actually be loaded.

When a medication is loaded into a dispensing cabinet, the cabinet sends an interface message to System. That message automatically updates the medication record attached to that ADS cabinet. This means EMR now considers the medication to be available from the cabinet.

1.9.4 Medication Reconciliation

Medication Reconciliation is the process of :

- Obtaining an accurate list of medications a patient was taking prior to admission.
- Clearly identifying and communicating which medications should be ordered during the admission.
- When the patient is transferred between services or levels of care, reviewing patients the patient's active orders and clearly indicating which should be continued, discontinued, or initiated upon transfer.
- When the patient is ready to go home, reviewing all the patient's medications (both home and current inpatient orders), entering new prescriptions, identifying and communicating to the patient what medications they should be taking after discharge.

Physician complete medication reconciliation via one of the sections in the admission navigator:

- Med Rec-sign: Used for patients already admitted and "checked-in" on the floor. Orders are released and acted upon immediately when the physician signs them.
- Med Rec-sign & Hold: Used this for patients still in the emergency department, or post-op patients in recovery who need to be admitted. Orders are held when the physician signs them, means they are not active. After the patient arrives on the floor, the nurse will release the orders , thereby making the orders active.

In both the cases the physician has to walk through a five step process:
1. *Review Current Orders*: Physician sees any currently active orders for current visit. For every active order physician chooses to continue, modify or discontinue the order.

2. ***Review Home Medications***: The physician reviews the list of medications the patient was taking prior to admission and indicates when each medication was last taken.
3. ***Reconcile Home Medications*** : If the physician orders home medications for current admission and attempts to order a non-formulary medication this way the system will warn the physician and prompt him to order a formulary alternative instead. If the physician continues with the original order, he will be prompted for an exception code.
4. ***New orders***: The physician then enters any new orders to take place upon admission.
5. ***Review and sign***: The orders will either become active immediately (if he chose med rec-sign) or when the nurse on the receiving unit releases them (if the physician choses Med Rec-sign & Hold).

1.9.5 The Packages (NDC) Database

Every medication record is associated with one or more records in the package (NDC) database. NDC stands for "National Drug Code". The NDC is specific to the manufacturer, the product, the size of the package and type of package. When properly configured, pharmacy module automatically selects the appropriate package (NDC) for any medication that is available in the hospital. NDCs are important specifically to know how much a pharmacy dispenses. The specific package (NDC) associated with the order determines the amount of medication that is dispensed (and possibly charged for).

Additionally, insurance companies and Centers for Medicaid/ Medicare Services (CMS) require that hospitals track the NDCs administered to patients. If they don't track this information correctly, the hospitals might have their claims for reimbursement denied (and they might face legal action).

Because NDCs are required by payors and CMS, and since they create a large impact on how medications are dispensed and charged for, EMR doesn't allow a medication order to be verified without a package having been selected. The order will not auto-verify, if a pharmacist try to enter an order without a NDC package.

1.9.6. Intelligent Package System:

When a physician orders a liquid medication, the system will attempt to intelligently select the best NDC based on what's available in the dispense location and volume needed for each dose.

For e.g. A physician ordered Compazine, 5mg IV. The pharmacy stocks a 10ml vial of Compazine, 2ml unit dose syringes, and 1 ml unit dose syringes. A 5mg dose requires a 1ml injection, so the system automatically picks the 1ml syringe. The way the system picks a package (NDC) records for liquids is called Intelligent Package System (IPS).

1.9.7 Intelligent Medication Selection (IMS) Solids:

When a physician writes an order for an oral medication, she rarely indicates the specific form or strength to use. In this EMR, the product is usually picked in the combination of drug+strength+form, when searched for an order. Foe e.g. a physician orders prednisone 12.5 PO, daily. But Prednisone 12.5 mg tablets are not commercially available. A pharmacist would recognize that this order should be dispensed in the form of a 10mg + 2.5 mg tablet, but would want to enter it as a single order (instead of two spate orders).

This EMR uses Intelligent Medication Selection to minimize the amount of product based ordering user needs to do. When ordering as solid-form medication (tablets, capsules, suppositories, etc.) with a single active ingredient and multiple strengths, it is not needed to pick the strength when searching for the product. Based on the dose of 12.5mg, the system decides to dispense a 10mg tablet from the central pharmacy. This will be dispensed as a single order and appear as a single line on the MAR.

1.9.8 Medication Alerts

Clinical Decision support system called as medication alerts in our EHR gives the alert associated with any given order. It is grouped first by user, and then by Alert type .This feature enhances safety, from maximum single dose warnings to buttons for standard doses and frequencies. Help in improving patient care and also provider in making a safe decision and avoid complications later. When you sign orders, a final check runs, which can help you find and correct other errors on all of the orders. Among others, EHR will look for:

• Drug-allergy interactions

• Drug-drug interactions

• Incorrect doses

• Duplicate therapies

• IV compatibility

• Pregnancy and lactation warnings

In case the provider still want to continue with the same order after the alert than they will have to give the override reason. This makes sure that even after alert they want to go with the same order which helps in documentation.

A third-party vendor supplies the interaction files that cause these warnings to appear. The project team sets up a filter to make sure only the more important warnings appear. The less important warnings are hidden under the **Filtered** hyperlinks.

1.9.10 Electronic Medication Administration Record (eMAR)

Medications ordered in EHR appear immediately appear in the patient's electronic medication administration record (eMAR; the MAR activity in Hyperspace). The system can be setup to fire a warning when a user tries to administer a medication that has not yet been verified by a pharmacist.

Our EHR strongly encourages the use of the eMAR along with Inpatient orders and pharmacy. The immediate availability of the patient's active medications to the nursing staff is an important patient safety consideration. Trying to configure a usable paper MAR can be time consuming and have a large effect on the transition to an electronic medical record. However, due to the extra cost implications associated with available workstations for end users, as well as training concerns, many customers have entertained the idea of a paper MAR.

The medications setup in Pharmacy also has a large impact on the eMAR. The medication names that display for the nurse need to be clear and concise. Typically this involves removing the salts from the 3rd party medication names (for example, penicillin potassium is just "penicillin" on the eMAR). Furthermore, the routes and frequencies need to be easily readable and unambiguous.

1.9.11 In Basket Messages

Now the question comes how to handle common requests from nurses to pharmacist like adjusting the scheduled times of orders, finding missing dose. This can be done by using the In Basket feature to handle nurse requests. In addition to these potential questions from pharmacy staff, sometimes you have to answer questions from other staff. This questions or messages can be easily visible on Pharmacist dashboard and he can revert back to that message immediately.

A common source of questions is the MAR. Though not every question can be addressed here, this section looks at the MAR so that, at the least, pharmacy and nursing staff will be speaking the same language. In addition, some potential sources of questions will be addressed.

1.9.12 Interventions

Sometimes an order might have an open, or unfinished, intervention. The pharmacist might need to review information about this order, or check with the physician before verification. The record of this intervention is called an i-Vent. An open i-Vent will display a yellow triangle icon in the Ist column of the Medications activity. Interventions that have been resolved (or closed) appear with a blue icon.

I-Vents are designed as a tool for pharmacists to document time spent, and to communicate open issues. As such, i-Vents appear ONLY to pharmacists. However, they are a part of the patient's chart and a discoverable part of the legal medical record. I-Vents remain in the database indefinitely.

1.9.13 Reporting

Reporting is an important task of the Healthcare Industry to provide Physicians, Nurses, and CXO's, etc with meaningful information as per individual requirement. Reporting in our EHR can be classified into –

- Native Functionality Reports
- Workbench Reports
- Hyperspace Reports
- Clarity Reports

Crystal Reports is a Business Intelligence application used to design and generate reports from a wide range of Data sources. Clarity Reporting is carried out with the help of 'Crystal Reports' package. Clarity Reporting is moving more close to BO(Business Object) which is a great tool for reporting as it is a more viable option. Both these tools are owned by SAP. Currently, we are using Crystal reports
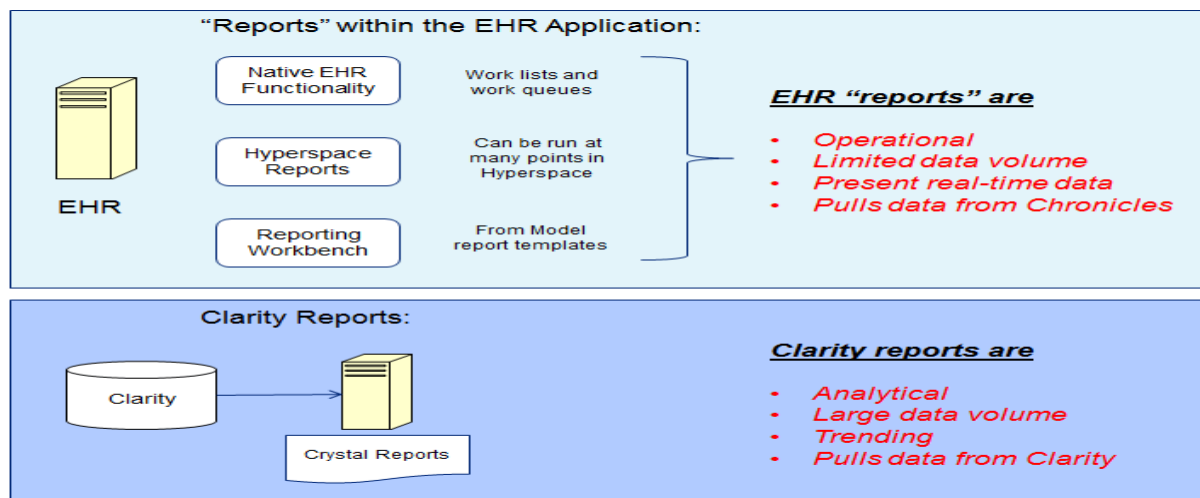
Clarity

This report is run off of a Clarity server which may not contain the current day's data. The Clarity server receives extracts of data from the production server nightly. The Clarity server stores data in traditional relational database architecture, such that experienced report writers can use Crystal report writing tools to build the report. Once the report is written, it can be distributed in a number of different formats.

Reporting Workbench

Reporting Workbench reports can be run off of any server, meaning they are usually set up to be real time. They can be run by an average system end user without much training. They are run in Hyperspace, so they do contain links to patient charts or other areas as appropriate. For more information about running reports from Reporting Workbench, see the Finding Signed and Held Orders and Pharmacist Rounding and Monitoring chapters in this companion.

REPORTS in EHR

Why Clarity Database?

Operational Reports use data stored in Chronicles, hence it provides 'Real-Time' information about patients, medications, etc.
Clarity Reports need to access 'Large' amounts of data and using data stored in Chronicles can slow down the Production Server used by Physician/RN's. Hence, an ETL(Extract, Transform, Load) Process is used to store data from Chronicles to Clarity Database.
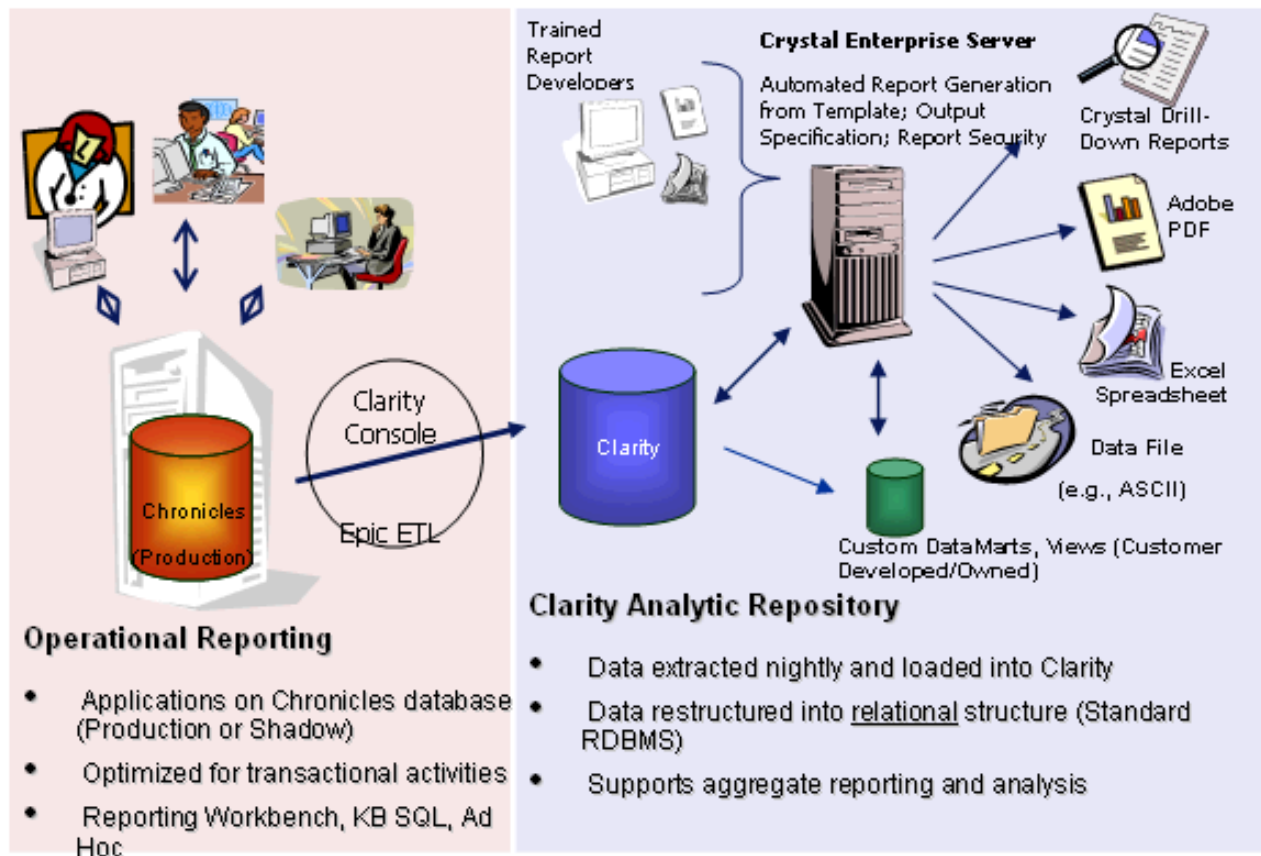Therefore, Clarity Reports run on Clarity Database without affecting Chronicles.
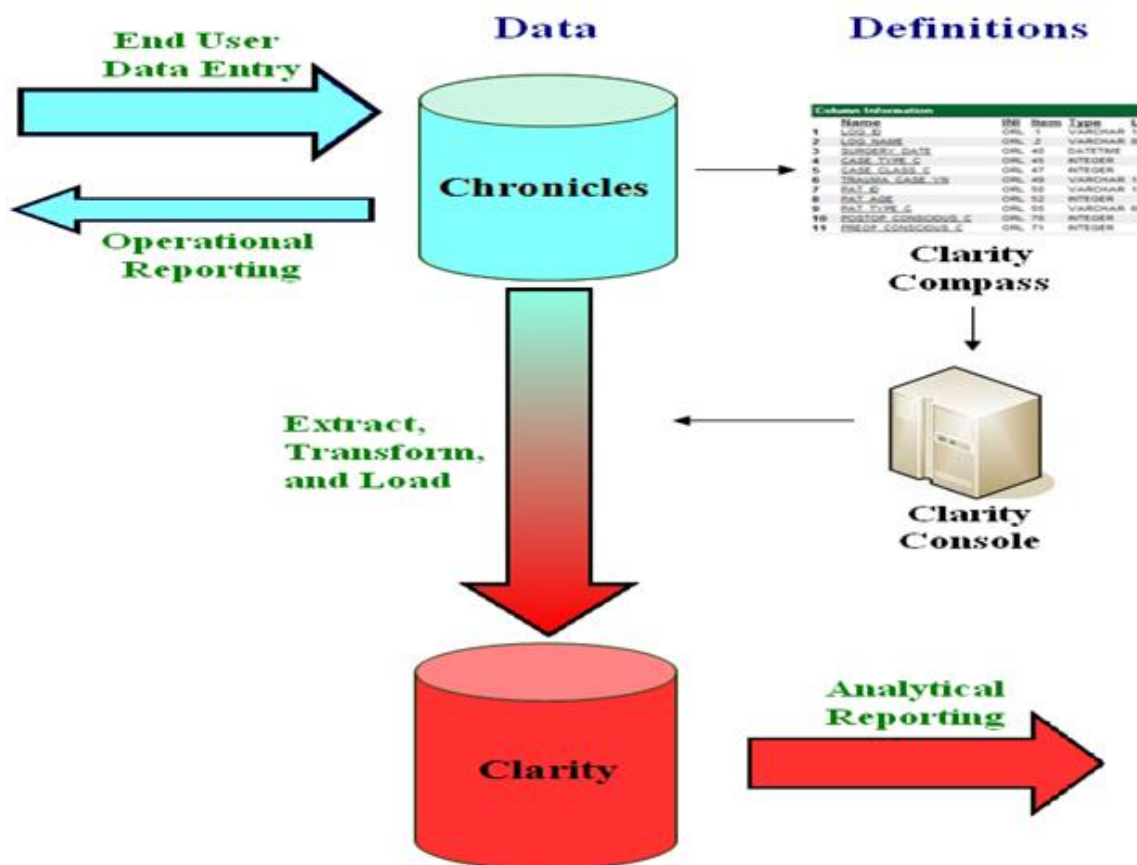
Clarity, another EMR application that requires its own license, is designed to meet the deeper and more complex analytical reporting requirements of healthcare organizations. It runs on a reporting server separate from the production server, allowing multiple reports to be run simultaneously without slowing down the live system.

The diagram below illustrates this concept. On the left side, note Chronicles (the live, transactional EMR system) and the process of data extraction, denoted by the arrow, from Chronicles to the (analytical) Clarity server. Depending on the situation, this extraction, transformation, and load takes place nightly, weekly, or monthly. On the right side, note Clarity (the analytical reporting server) and all of the reporting needs that it can fulfill.

There are two primary purposes for running detailed, analytical reports from a separate server. The first is system performance: With this information on a separate server, administrators can run multiple, in-depth reports without compromising the performance of the live system. The second is data restructuring: in the process of data extraction, data are restructured from the Chronicles DBMS (Database Management System) to a relational structure (RDBMS) that better supports aggregate reporting and analysis.

The information in Clarity is not real-time. Appropriate uses for Clarity include analytical reports that are not needed daily or are not needed for a user to complete his or her day-to-day work. Community Library has a number of Clarity reports available.

Operational Reporting

- Applications on Chronicles database (Production or Shadow)
- Optimized for transactional activities
- Reporting Workbench, KB SQL, Ad Hoc

Clarity Analytic Repository

- Data extracted nightly and loaded into Clarity
- Data restructured into relational structure (Standard RDBMS)
- Supports aggregate reporting and analysis

Example Clarity Reports

- DISPENSE-RETURN STATISTICS BY DISPENSE CODE REPORT
- DRUG-ALLERGY INTERACTION OVERRIDES REPORT
- DRUG UTILIZATION REPORT
- MEDICATION ALERTS REPORT
- NON-FORMULARY USAGE BY MEDICATION AND PROVIDER REPORT
- DISPENSE RECONCILIATION REPORT
- RX EXPIRING MEDS REPORT FOR UNITS
- RX EXPIRING MEDS REPORT - PATIENT LIST

1.10 CASE STUDY:

To understand the usability of m-Health among the IT Professionals of Bangalore and their Health-Seeking Behavior.

1.10.1 Abstract

The awareness level for health in the Indian population has improved a lot. The reason for the improvement is due to the BCC activities conducted through various modes of communication designed by the care providers. One such model is the android market which guides the population through mobile applications. Such mobile applications act as a bridge between the patient and the care provider due to which it is commonly termed as mobile health industry or m-health industry. With the penetration of smart phones in the Indian market, the volume of mobile application developers have increased in the market. With employers becoming conscious regarding the health of the employers and m-health being an interactive tool to improve health, a survey was conducted on the awareness and acceptance level of mobile health application amongst the IT professional in Bangalore.

1.10.2 Introduction

As the focus of the healthcare industry is shifting towards preventive care, lot of methods and mediums have been proposed by the healthcare leaders to imbibe the culture of preventive care in the population. One such method followed is through the use of mobile health. The concept of mobile health came into the market after the mobile application gained pace among the smart phone users. A lot of mobile applications exist in the market that can be used to monitor the vital signs of a human body, help a patient remind of his prescription compliance, help patient measure its BMI index, doctor's alert, calorie monitor etc. Lot of these mobile health applications are available freely but most of them are charged for downloading. Some entrepreneurs have seen this market as a lucrative market to step in as with the help of m-health the cost of treatment has been brought down for example the cost of a vintage retina scanning apparatus result somewhere in lakhs whereas a mobile attachable retina device has its cost in thousands and moreover it more precise as it can detect problems in the retina during stage I. In order to determine the market of m-health, a case study on the awareness and the acceptance level of the people working in Bangalore (Deloitte) was determined.

1.10.7. Problem Statement

In spite of the mobile healthcare application market flooded with various applications, it has been noticed that the usage pattern of these applications by the consumers is not in right proportion. So in order to determine the usage pattern following are objectives on which the case study is based:-

- To study the awareness level of mobile health application by IT professionals in Bangalore
- To study the acceptance level of mobile health application by IT professionals in Bangalore

Review of Literature

1- MONTCLAIR, N.J., Aug. 9, 2012 /PRNewswire-iReach

A new nationwide study conducted by AhHa! Insights, the research division of Verasoni Worldwide, examined the top 150 downloaded mobile health applications (mHealth) among iPhone and Android users through March 31, 2012. With more than 46 percent of the American population now owning smart phones, more and more people are turning to mHealth to help manage, monitor and improve their health. Mobile healthcare applications make up an increasing share of the apps available in the Android and iOS app markets.
The results show that weight loss and exercise applications are more heavily downloaded by far than any others. The study examines the adoption of mHealth as a part of personal health management. It also provides further insight as to what health categories people may be interested in when using mHealth applications to manage their health and wellness.

Key findings include:

- Weight Loss and Exercise apps dominated the top 150 downloaded mHealth apps on both the iPhone and Android devices.

- Phone users are seven times more likely to pay for a mobile healthcare app than Android users.

- Medical reference applications were downloaded ten times more by Android consumers than by iPhone consumers.

- Weight Loss and Exercise comprised 60 percent of total downloads. When "Weight Loss" and "Exercise" were removed from consideration, the following are the top six categories, in order:

  o Women's Health

  o Sleep and Meditation

  o Pregnancy

  o Tools and Instruments

- o Reference

- o Emergency

- • Top grossing applications for both Android and iPhone combined were Exercise, Weight Loss, Sleep & Meditation and Women's Health.

"While mHealth is in its infancy, the potential of mHealth applications is well on its way. Though, nowhere in the top 150 applications for both iPhone and Android did we find significant downloads of connected medical and health applications such as blood pressure monitoring that delivers feedback to physicians' offices, so it appears that the real potential of mHealth in terms of monitoring, diagnosing and providing real time results falls short here," said Abe Kasbo , CEO of Verasoni Worldwide. "What this study tells us is what people are downloading. We do not know if and how these mHealth apps are being used or if they are having the desired effect that both their publisher or user has in mind," continued Kasbo.

2) **Evidence based m-health**

   By Eric Leroux and Homero Rivas, Stanford University

The dramatic increase in the ownership of cell phones and smart phones has resulted in a plethora of mobile health applications. Recent research by Pew Internet revealed that 85% of adults in the US own a cell phone of which 53% were smart phones. In addition, 19% of adults in the US who own smart phones have at least one health app on their phone and there were 31% of Smartphone users seeking health information, especially those who have had any kind of medical problem or change in their health.

Smartphone applications (apps) are becoming increasingly popular among physicians, patients and general public [2]. By 2015 500 million Smartphone users worldwide will be using a medical application. Latin American market is the third biggest mobile market in the world (after Asia and Africa), in 2012 there were 676 million mobile subscribers and it is expected to have another 230 million contracts by 2018 (HUNT Mobile Ads Report Annual - 2012). Top mHealth publishers manage to generate more than 3 million free and 300.000 paid downloads in the USA on the iOS platform. A significant number (15%) of mHealth applications is primarily designed for healthcare professionals. These include CME (Continued Medical Education), remote monitoring and healthcare management applications. Currently there are 97,000 mHealth applications in major app stores, 42% of them adhering to the paid business model. With more and more traditional healthcare providers joining the mobile applications market, the business models will broaden to include health care services, sensor, advertising and drug sales revenues [3-6]. One-of-the-key factors contributing to this market growth is increasing adoption of smart phones and social networking sites. With the growing sophistication level of mHealth applications, only 9% of the total market revenue in the next 5 years will come from application download revenue. 84% of total mHealth application market revenue will come from related services and products such as sensors [7], [8]. In April 2013 most successful free Health & Fitness apps accumulated 5.5 Mil. downloads since their first appearance in the Apple App Store on average and top 10 free Android Health & Fitness apps generate almost 240.000 downloads on average in their lifetime. Today's leading smartphone app market are the USA and the top 5 Western EU countries but according to the Mobile Health Market Report (2013-2017), in 2016 India will be amongst the biggest players in the global app market. By 2017, Research2guidance

forecasts that 50 percent of mobile users will have downloaded mobile health apps. According to this firm mobile application developers have begun to enable the mHealth industry to successfully monetize their services (see the following figure).

Mobile health apps have the potential to contribute to the improvement of health, both from the perspective of the patient and the public as well as the health care professional. However, there are usually defined specific aspects that reveal whether an app is safe or not. There seems to be no real criteria needs or usefulness in the development of the vast majority of apps. In addition, many institutions and individuals have the capacity to develop apps for their own needs, all of which is related to an even greater diversity in design and use of apps.

The existence of several guidelines and the considerable number of publications, related to the quality and impact of health apps in healthcare, implies that there is a growing interest in how to manage the new scenarios that mHealth is highlighting. In a survey conducted by PwC mHealth, one third of patients surveyed were convinced that mHealth would improve the convenience, cost and quality of health care received in the next three years. 59% of respondents indicated that mobile health applications would change the way health information is sought and 50% felt that these apps will radically change the way they manage their chronic disease. These trends described above suggest that mobile health applications as a set of tools and technologies show great potential in promoting and health education in both lifestyle and clinical care settings. The phenomenal growth mainly in individual downloads of health apps however has not been accompanied by clear frameworks of regulation and control to ensure quality design, appropriate recommendations on the use and application as well as a legal vacuum on such essential issues as privacy and confidentiality or safety data.

The lack of regulation for mobile health apps is accompanied by very little evidence for the effectiveness of mobile health apps and as a consequence very little experience on how to best evaluate these apps. The issue at stake therefore is that as healthcare professionals, patients and the general public are increasingly using these health apps, the use is extending to clinical settings, and yet little is known about the possible risks. There have been some published reviews of mobile health apps citing lack of effectiveness for the specified diagnostic and therapeutic recommendations claimed by the applications [10-18]. A particularly stark example was demonstrated by Wolf et al (2013) who demonstrated the low sensitivity of a currently available mobile application claiming to provide diagnostic recommendations for suspected melanomas. The consequences of delayed diagnosis and therefore referral to the appropriate medical practitioner could in this case, be life-threatening for patients.

We conclude therefore, the pressing need for a better framework for the regulation and evaluation of mobile health apps. This could be in the form of a toolkit with clear recommendations on the use of medical apps supported by studies to evaluate the quality, scientific relevance and cost benefit of the mobile health apps for its intended use in populations.

3) <u>Cutting Edge Info M-health case study</u>

<u>Is Mobile Health Changing the Face of Pharma's Relationships with Its Targets?</u>

The simple answer to this question is yes. Pharma has already produced a plethora of mobile and digital devices geared to both patient and physician perspectives. With the accessibility of these versatile apps, pharma's targets continue to demand more. While a few research organizations have reported a rapid rise in physicians' access to tablets, it's not about the technology inasmuch as it's about what the technology has to offer.

Just a year out from the so-called "year of the mobile," physicians want to see how to make technology go further in their specific practices. They want to learn how to access and use mobile apps. They want to be able to stream key opinion leader videos and have access to live one on one video technology. Ultimately, they want to take advanced of technology and make it work for them. Sales reps are the perfect source to provide this information.

A recent Medical Marketing & Media article indicates that iPads and other mobile devices have changed the dynamic between pharmaceutical sales representatives and physicians. Today, physicians are demanding more of their sales reps and it's clearly paying off. As technology develops, physicians require concise information, delivered faster. Mobile devices offer this function.

Equipping sales reps with iPads proves beneficial for pharma and physicians alike. A recent report by Cutting Edge Information, "Pharmaceutical Mobile Health: Transforming Brand Marketing, Healthcare Communication and Patient Adherence," explains the benefits of iPads and other mobile health platforms. The report indicates that among surveyed companies, the physician-facing tablet platform represents the leading company-perceived generator of return on investment (ROI).

The rationale behind why companies view physician-facing applications so favorably is simple. Mobile applications are synonymous with broader access for pharma and physicians. Having access to iPads means physicians can better use health-related technology to interact with peers, patients and pharma companies. In return, iPads help pharma sales reps facilitate active dialogues with physicians concerning healthcare trends. This favorable interaction fosters the type of potential relationship envisioned by pharma.

According to Medical Marketing & Media, more than 15 of the top 20 companies already equip sales reps with iPads. Other companies are following suit. Indeed, Manhattan Research's ePharma Physician2012 study shows the prevalence of iPad-generated presentations, up from 30% in 2011 to 65% this year. And physicians are making it worth reps' time. Upon the conclusion of iPad-based sales presentations, 35% of doctors said that they'd be more likely to request a sample and an additional 29% stated they'd be more likely to prescribe the drug presented.

Increasing iPad presentations shows the functionality of technology in a professional setting. The tactic pushes the bounds of sales and physician interactions beyond brief interactions in hallways. Using iPad and other technology to present sales information empowers sales reps to discuss more than the brand and equips physicians with new points of access. Displaying new technology will build stronger future relationships and possibly open the door to new forms of physician-medical science liaison (MSL) interaction as well.

1.10.8 Data & Methods

- <u>Type of study:</u>

Descriptive /cross-sectional

- Study Population -
Working IT population in Bangalore

- Study Unit
Deloitte U.S – India, AMS Service Line, Bangalore

- Sample Design
Convenience sampling for selecting the respondents for the survey

- Variables
  o Age
  o Technology
 o Health seeking behavior
  o Acceptance
  o Awareness

- Tools and Techniques
Tool- Questionnaire for Deloitte professionals was prepared and interviews were conducted.

- Technique-
Print out were taken and the questionnaire was filled. The responses were extracted

1.10.9. Study Findings and Analysis

Age of Respondents & Sample Size	
Age	N = Sample Size
20 -30 years	29
31-40 years	6
41-50 years	0
Total	35

The maximum number of respondents fall in the age group of 20-30 years while the least fall

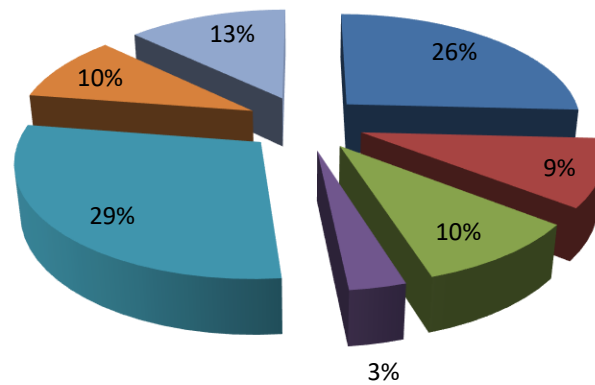in the category of 41-50 years
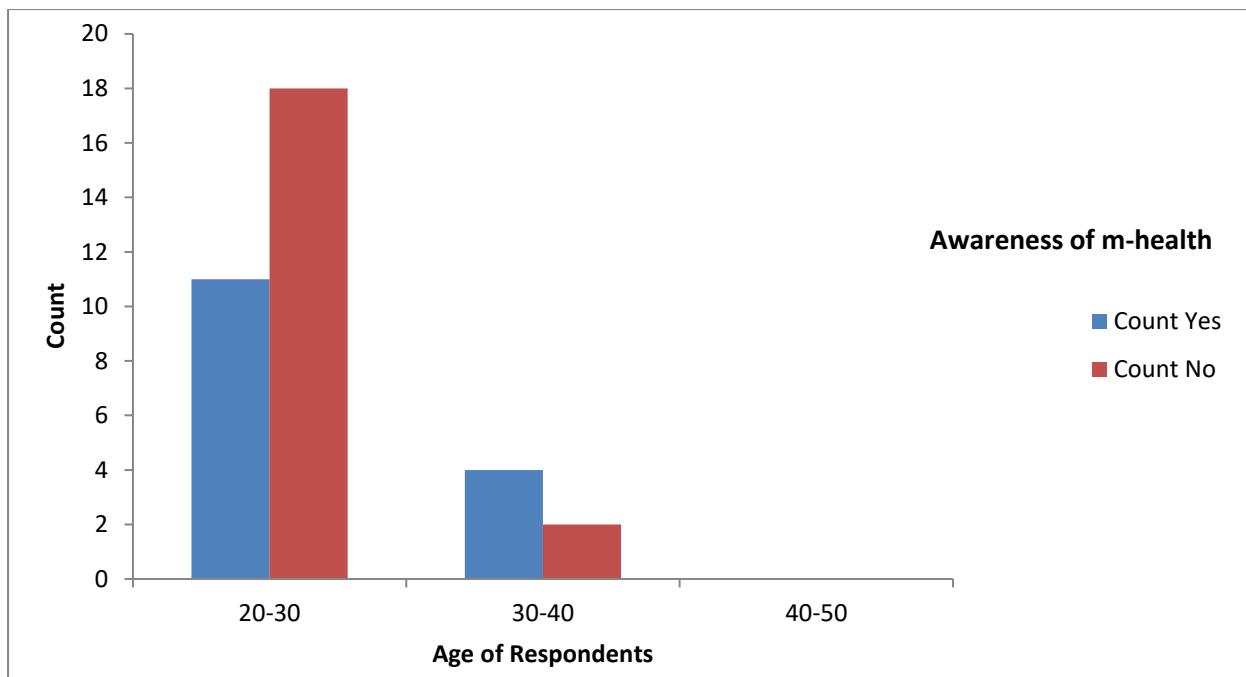
The graph shows the awareness pattern of respondents for m-health according to the age groups they fall in.
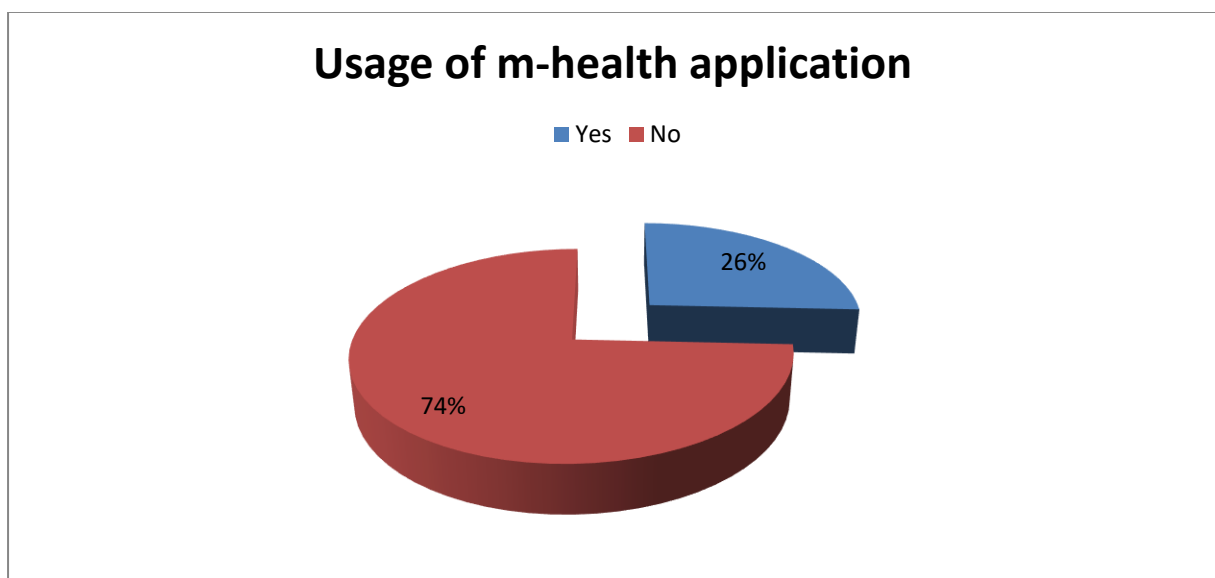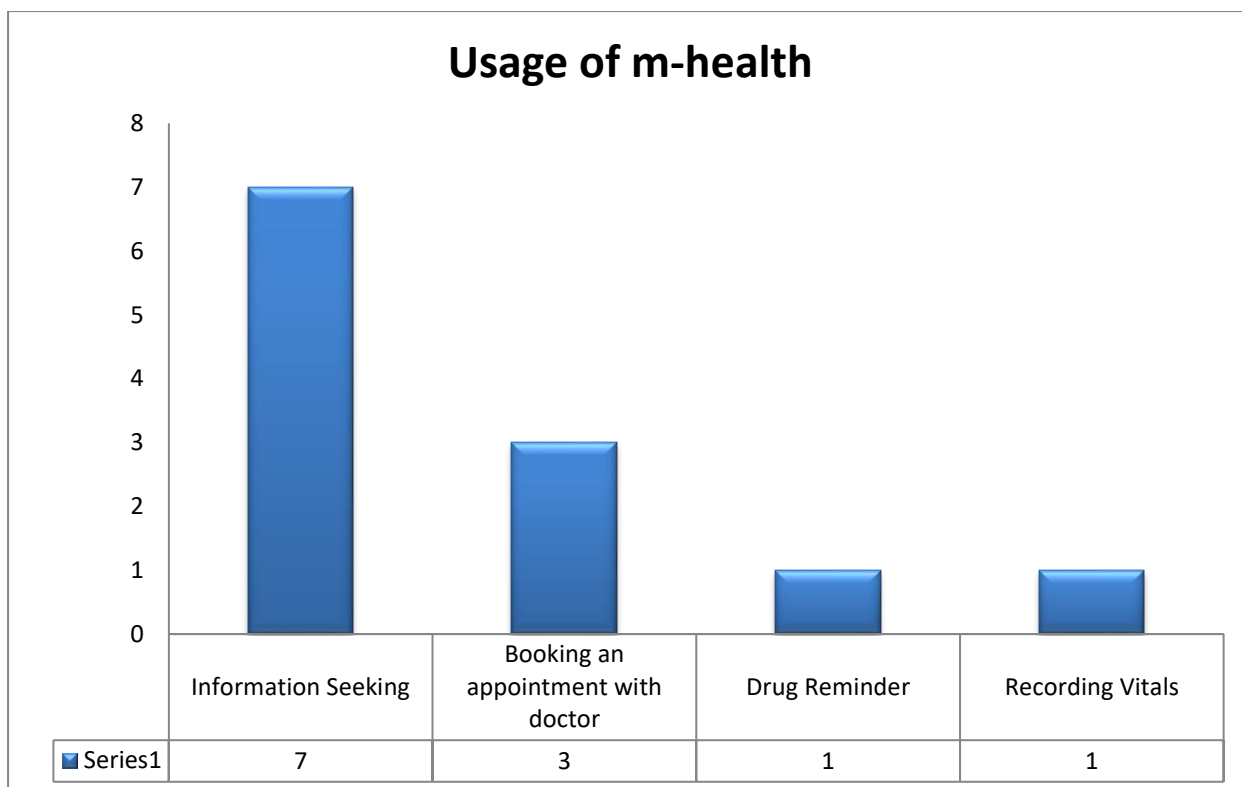

The graph shows the usage pattern of the respondents for m-health who are aware of the m-health applications

Reasons For Reluctance

- Lack of Knowledge
- Privacy Issues
- Reliability of Information
- Cost Of Application
- Lack of Integrated Applications
- Connectivity Issue
- others

The pie chart representation shows the reasons for respondents not favoring the use of m-health

Usage of m-health

	Information Seeking	Booking an appointment with doctor	Drug Reminder	Recording Vitals
Series1	7	3	1	1

The graph represents the usage pattern of m-health amongst the respondents who actually use m-health applications

## Awarness of m-health

No, 20, 57%

Yes, 15, 43%
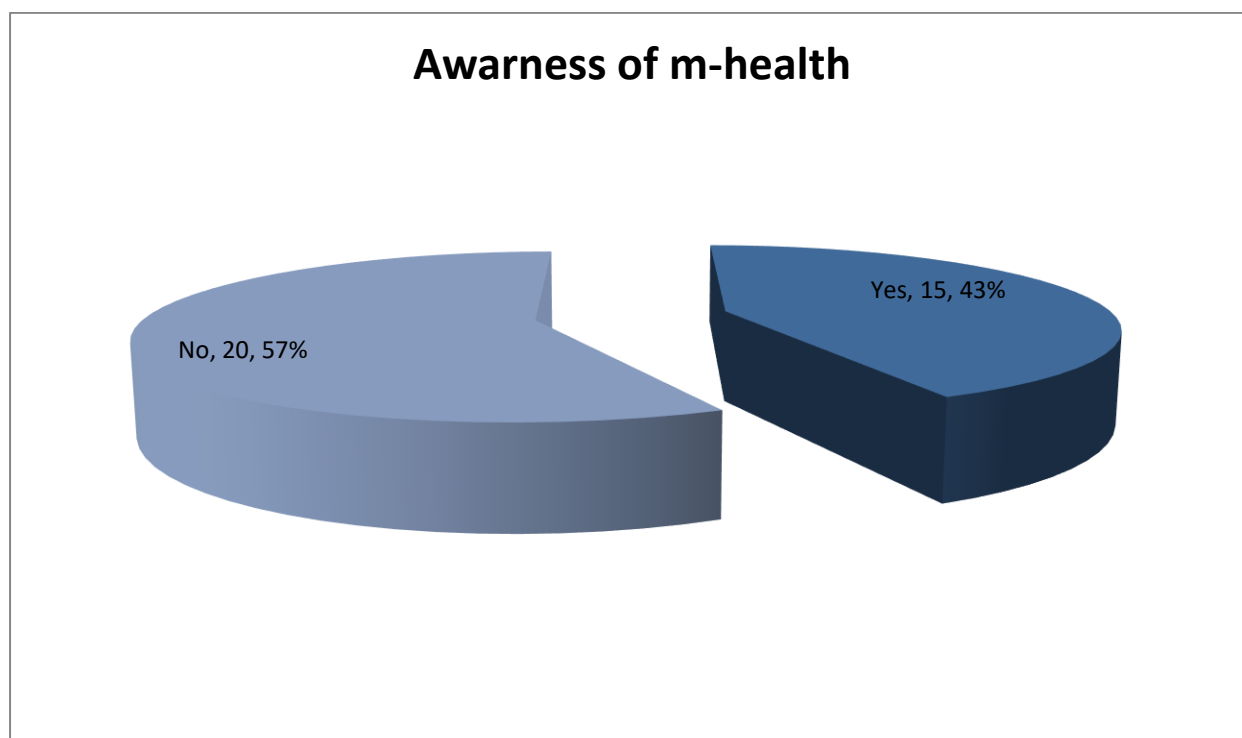
The graph shows the willingness of the respondents wanting to learn about m-health if someone is available to impart the knowledge about m-health. About 9 respondents who said
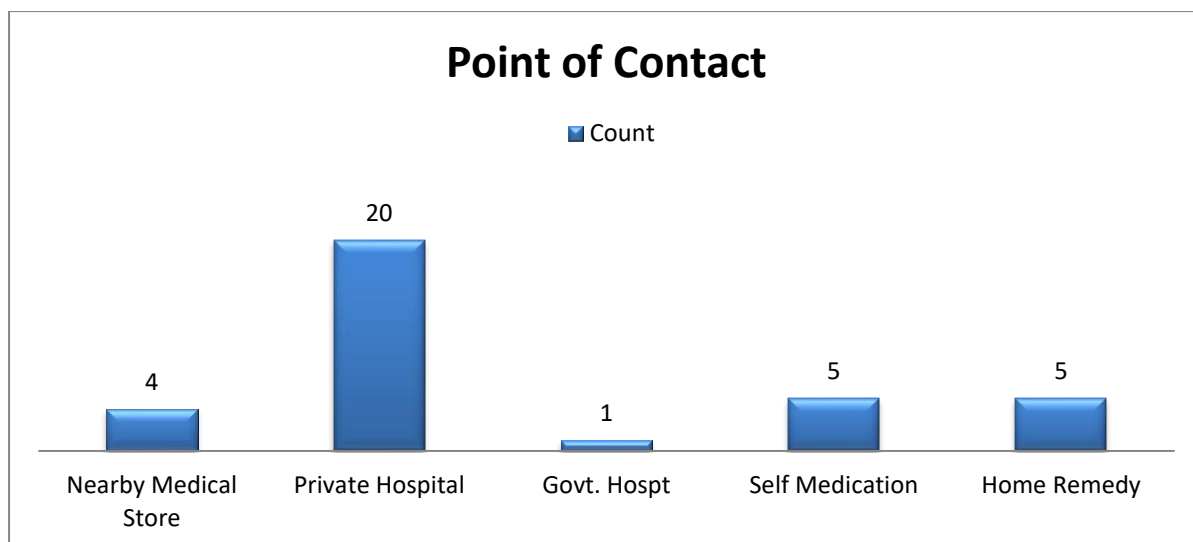
that they were not aware of the concept of m-health, were willing to use m-health if someone is available to impart the knowledge about the subject to them
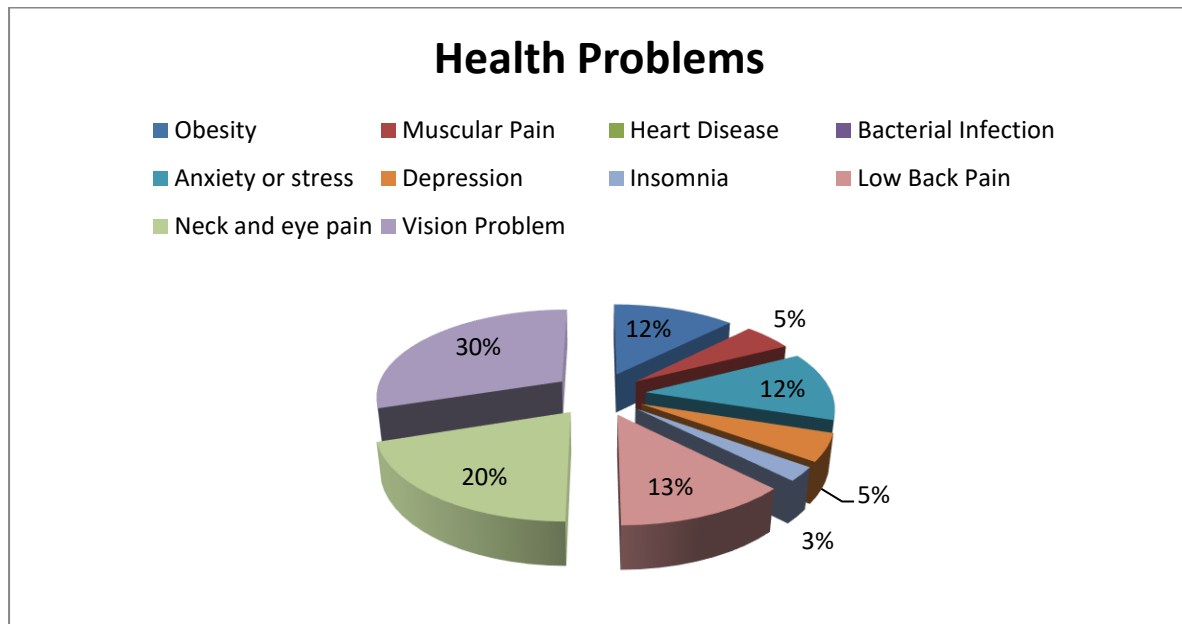

The above graph shows professionals suffering from different kinds of health problems. Most of them complain regarding vision related issues due to long working hours on systems followed by neck and eye pain.
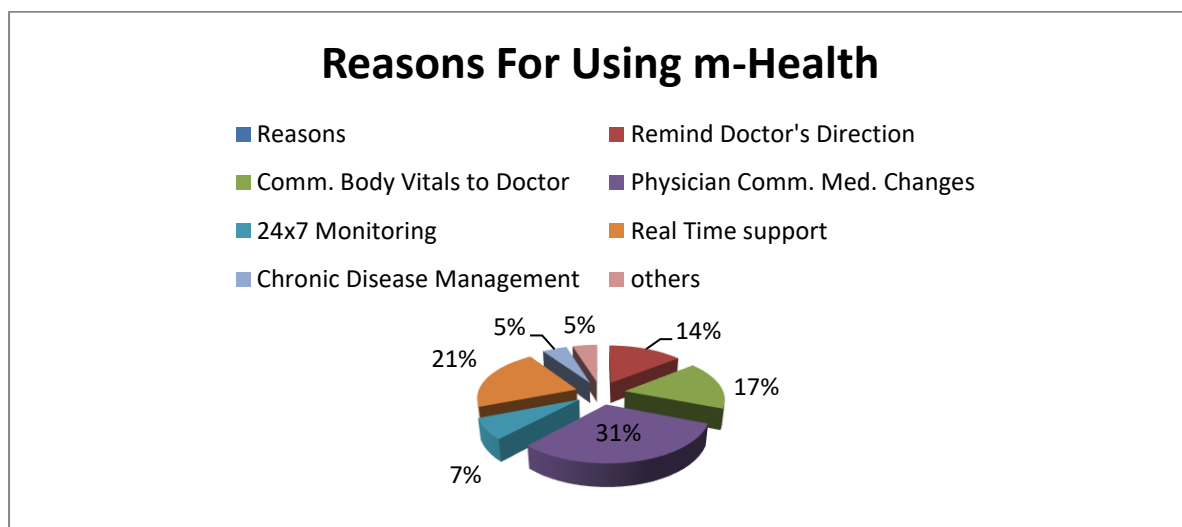
The above pie chart represents the reasons for which the professionals are most likely to use m-health. About 31% of them are in majority of using it for getting medications changed by the physician.

Point of Contact

■ Count

4	20	1	5	5
Nearby Medical Store	Private Hospital	Govt. Hospt	Self Medication	Home Remedy

Most of them said that their first point of contact at time of illness is a private hospital. Here, we can suggest that an m-health application could a viable option if monitored by a physician using m-health technologies, thereby saving patient's time and money.

Reliability on information

■ Count

12	3	20
Yes	No	May be Depending on source
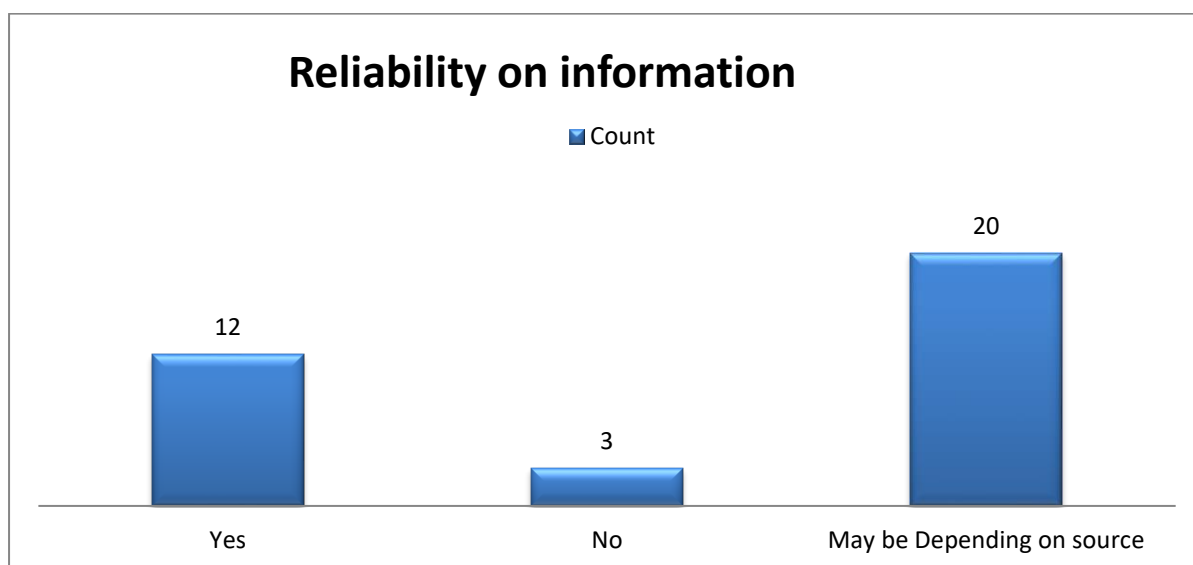
The above graph shows that more individuals are willing to depend on m-health application provided the source of information is reliable.

Discussion

From the above analysis the following points can be summarized:-

- Younger generation is more aware of the concept of m-health as compared to the older generation
- Further it has been seen that some of the respondents who had knowledge about m-health were not interested in using m-health technology and the reasons for the reluctance (including the respondents who did not have knowledge about the concept of m-health) are:-
    - Health data privacy issues (9%)
    - Reliability of available health information (10%)
    - Costly applications (3%)
    - Lack of integrated healthcare applications to solve the purpose (29%)
    - Connectivity Issue (No internet connection / Slow internet/ Cost of Internet connection) (10%)
    - Lack of knowledge (26%)
- Continuing with the above point, since 57% of the respondents were unaware of the concept of m-health, in case if someone was available to guide them with the concept of m-health, 57% of the respondents were willing to use m-health application
- Apart from the ones not interested in using m-health technology, the ones who actually use m-health applications use mostly for information seeking.

- An m-health application could a viable option if monitored by a physician using m-health technologies, thereby saving patient's time and money.

Recommendations

Depending on the analysis following are the recommendation that may be followed:-

- Since the prime most concern is the lack of knowledge and lack of integrated applications, stakeholders like doctors and allied healthcare professionals should be involved in educating the people about the concept of m-health
- A regulatory committee to monitor the content available through m-health application should be there
- An integrated approach should be followed where the application developed and working in silos should communicate with each other so that the healthcare professional as well as the patient are encouraged to used m-health.

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