

Study on an Outpatient Electronic Medical Record Adoption Model (O EMRAM) Resonating X EMR software

By

Nupur Kapoor

*Dissertation submitted for the partial fulfillment of the
MBA Hospital and Health Management*

Academic year, 2015-2017



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TO WHOMSOEVER MAY CONCERN

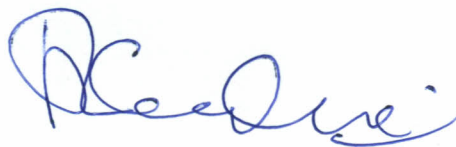
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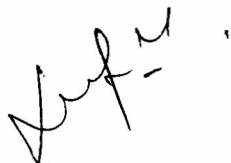
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Signature of student
Nupur Kapoor

Study on an Outpatient Electronic Medical Record Adoption model (O EMRAM) resonating X EMR software

Background

Historically in United States healthcare, documentation of the patient records are generally paper based. Paper records are also not capable that they do not qualify for the checks of decision tools, as they are kept in inaccessible formats. Eventually the information pertaining to patient health care diagnostics and treatment raised an issue of confidentiality in many developed countries like United States, Canada etc. Paper based records found to impede the provision of clinical decision support for the Doctor. Later to compensate, the concept of Health Information System came and the transitioned to Electronic Medical Record

HIMSS

Healthcare Information and Management Systems Society (HIMSS) founded in 1961 as the Hospital Management Systems Society, headquartered in Chicago, Illinois. HIMSS is a non-profit organization deliberately dedicated to improve quality,safety, cost-effectiveness in healthcare. It also helps in providing access through the best use of information technology and management systems. Found in 1961 as the.

Electronic Medical Records (EMR)

EMR means where the patient data and the health Information is compiled and exchanged in the digital format. Through connected networks, enterprise –wide information systems or other third party exchange networks the records are shared across different healthcare settings. EMRs may include a range of data, such as demographics, medical history, medication and allergies, immunization status, laboratory test results, radiology images, vital signs, personal statistics like age and weight, and billing information.

It helps in reducing the risk of data replication and eliminates redundant data reduces, as there is only one modifiable file, which means the file is more likely up to date and decreases the risk of lost paperwork.

Outpatient Electronic Medical Records Adoption Model (EMRAM)

Outpatient Electronic Medical Record Adoption Model (O-EMRAM) sets a benchmark in establishing methodology and algorithms to grade clinics on the maturity of their EMR environments.

This eight-stage (0-7) model is for clinics where there is an encounter between a caregiver and a patient, and the caregiver has licensed access to diagnose, treat, prescribe and generate orders and documentation. The O-EMRAM tests for clinician documentation, including orders, e-prescribing, patient engagement and population health analytics. It helps in moving the outpatient setting closer to achieve a near paperless environment through technology use that improves patient care by compliant to each stage of OEMRAM model.

Research Questions:

1. What is Outpatient Electronic Medical Record Adoption Model for US Healthcare?
2. How is Hospital X compliant with respect to the Eight EMRAM Stages?

Objectives:

1. Study the compliance requirements of Outpatient Electronic Medical Record in Eight stages
2. Understand an EMR Software resonating with Outpatient EMR Adoption model stages
3. Assess the existing O EMRAM stage of X Hospital and provide suggestion for up gradation from existing stage

Research Methodology:

Study Design:

1. For the first objective, the study design is Qualitative systematic review as review of literature is done for studying the requirements for eight-stage OEMRAM model through the internet and research articles.
2. For the second objective, the intern used the checklist to match the system inside the facility.
3. For third objective cross-sectional study design, as the respondents are not present the only checklist is made out of a systematic review of reports and matched with the existing EMR software operating in the study area at one go.

Sampling technique:

Purposive sampling for objective three, mapping done from the checklist to match the Clinic in location A.

Inclusion:

Standalone Clinics for one specialty which practice the studied Electronic Medical record Software

- 1) 500 bedded Hospital.
- 2) Average Outpatient visit/Day in a clinic should be 50 patients.
- 3) Studied specialty is family Medicine Family as a clinic.

Exclusion:

- 1) Facilities, which uses two or three types of EMR for their outpatient services.
- 2) Specialty in clinics other than Family Medicine for the Outpatient setting.

The method of data collection:

Reviewing secondary data, of the facilities from the EMR software with the checklist made

Data collection tool:

Checklist based on prerequisites required in Outpatient EMR adoption Model for certification.

Study duration:

One month (March, 2017-April, 2017)

Outcomes:

- 1) The study helps in providing an orientation for the healthcare providers with respect to the Outpatient EMR Adoption Model and focuses on adoption and implementation of the EMR model through meaningful use.
- 2) The study will also emphasize on the established benchmarks set by the EMR adoption Model for a comparison by the healthcare providers to achieve better outcomes.

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List of Abbreviations

1. **CDSS:** Clinical Decision Support System
2. **CEHRT:** Certified Electronic Health Record Technology
3. **CPOE:** Computerized Physician Order Entry
4. **EMR:** Electronic Medical Record
5. **EP:** Eligible physician
6. **HIE:** Health Information Exchange
7. **HIMSS:** Health Information Management System Society
8. **OEMRAM:** Outpatient Electronic Medical Record Adoption Model
9. **PACS:** Picture Archiving Communication System.
10. **PCP:** Primary Care Physician

1.Introduction

In the U.S. Healthcare system historically, providers documented and delivered patient care by using paper records because of ease and simplicity, cost for utilization is low and widespread acceptance. However, with time and technology advancement taking its own pace, paper records come with disadvantages. Availability and accessibility of the paper records are centered for one person at a time. Paper records bundled up thick as it requires enough space to store them, low utility and needs segmentation with multiple volumes of binding books. Paper records are also not capable that they do not qualify for the checks of decision tools, as they are kept in inaccessible formats. Records that are paper based are found to impede the provision of clinical decision support for the Doctor.

Researchers thought, every healthcare provider needs platform to use the Electronic Medical Record as to provide Quality of Patient care at affordable prices.

Although Electronic Medical Records are now available still, only about five per cent of U.S. primary care providers use them. Recently, with only modest investments, Australia, New Zealand, and England have achieved major breakthroughs in implementing EMRs in primary care. The benefits healthcare provider Organizations derive out of the routine use of Electronic Medical Records include improved quality Patient care, safety, and efficiency, along with increased accessibility to conduct education and research. Implementing specific policies can accelerate utilization of EMRs in the U.S. ⁽¹⁾

EMR Models

The designing and Development of Health Information System (HIM) took place by the local private vendors who were then benefited, in accordance to their set of goals and standards. Later United States has also developed incentives for healthcare providers to make the transition from paper based records to Electronic Medical Records(EMR).

The concept of Electronic Medical Record came which is available 24 X 7, can be operated by more than one user at a time, is accessible from remote locations as well, can nearly always be found, and is legible. A health care provider, either a doctor or a nurse can rapidly report patient's problems and share them with other users for more clarity on cases.

Prescribing medications and writing notes about the diagnosis also become easier with the EMR.

Electronic Ambulatory Medical Record

Ambulatory EMRs typically include a problem list, medication list, allergy list, notes, health maintenance information, and results in retrieval (for laboratory, radiology, and other testing results)⁽¹⁾. Most EMRs include a computerized Physician prescription and many include computerized ordering i.e. computerized physician Order Entry (CPOE).

1.1 Review of Literature

HIMSS (Health Information Management systems society) North America, a business unit within HIMSS, positively transforms health and healthcare through the best use of information technology in the United States and Canada. As a cause-based non-profit, HIMSS North America provides thought leadership, community building, professional development, public policy, and events. HIMSS North America represents 64,000 individual members, 640 corporate members, and over 450 non-profit organizations. Thousands of volunteers work with HIMSS to improve the quality, cost-effectiveness, access, and value of healthcare through Information Technology ⁽²⁾.

HIMSS Analytics, which is a global healthcare advisor helps in figuring out market intelligence solutions that lifts the health industry forward with insight to enable better health with Information Technology which form the backbone support. As a trusted healthcare research and advisory firm, the industry depends on HIMSS Analytics resources, benchmarks, predictive models and assessment tools to improve decision making regarding their IT strategic roadmap and market strategy⁽²⁾.

HIMSS Analytics uniquely positioned and segmented their service delivery area through its industry-focused offerings, which include a Healthcare IT market intelligence tool, Healthcare IT insights and Healthcare IT benchmarks and services. HIMSS Analytics research and advisory consultants discover exclusive insights about how evidence based technology be used to tackle today's healthcare challenges faced by both healthcare delivery organizations and IT companies. Additionally, utilizing EMR software's maturity models, they identify best practices and outline a strategic roadmap that leads transformational change. HIMSS Analytics has helped hospitals and clinical practices track and benchmark their EMR adoption and utilization goals since 2005 through the EMR Adoption Model (EMRAM). EMRAM provides a pathway and direction along an Eight-stage model with comparisons to healthcare

organizations in United States. HIMSS Analytics, a completely owned body of HIMSS, is the healthcare research and advisory firm for healthcare delivery organizations, IT companies, governmental entities, and financial, pharmaceutical, consulting and emerging technology solution partners worldwide.

HIMSS has created four Healthcare Provider Models for optimizing patient care and improving organizational efficiency through information technology.

- 1) Outpatient Electronic Medical Records Adoption Model (O EMRAM)
- 2) Electronic Medical Records adoption Model (EMRAM)
- 3) Continuity care maturity Model
- 4) Adoption Model for Analytics Maturity

1.1.1 Why did HIMSS Analytics create the O-EMRAM?

HIMSS Analytics established the O-EMRAM based on a combination of compliance, market trends and health care delivery demands now influencing today's ambulatory or outpatient settings.

Market trends: HIMSS Analytics studied market trends as it reviewed the need for the O-EMRAM. Research indicated that more than 70 per cent of all healthcare activities involve a face-to-face physician visit (National Center for Health Statistics) and more than 26% of healthcare expenditures relate to ambulatory care, according to the Centers for Medicare and Medicaid.

Healthcare delivery factors: The marketplace now offers leading software to help ambulatory settings transition from paper to electronic medical records. Thus, the O-EMRAM, as the new industry metric, will help 'push the market' toward Stage 7 since the health IT, solutions are both available and effective.

Compliance: Using the O-EMRAM, facilities eligible for the EMR Incentive Program now have a methodology for demonstrating meaningful use.

1.1.2 Benefits of O-EMRAM

HIMSS Analytics Outpatient Electronic Medical Record Adoption Model (O-EMRAM) incorporates the eight-stage (0-7) model measures the adoption and utilization of electronic medical record (EMR) function. This helps the US healthcare organizations moving closer to achieving a near paperless environment that harnesses technology to support optimized patient care.

The Outpatient Electronic Medical Record Adoption Model (O-EMRAM) is an eight stage (0-7) model that measures the adoption and utilization of EMR functions required to achieve a near paperless environment, which is stated in the report.

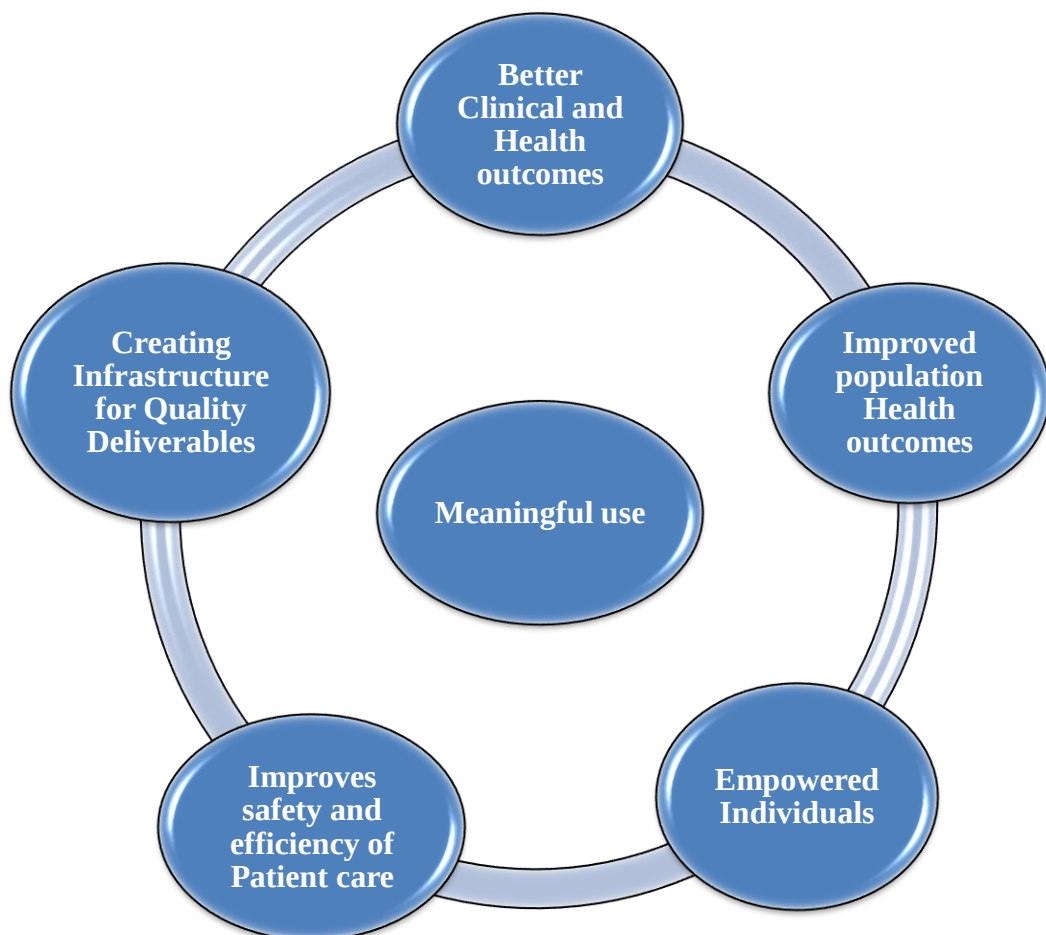
The Outpatient EMR adoption Model is the next-generation tool in monitoring EMR adoption in ambulatory settings. This new evaluation model creates a framework for dialogue among ambulatory facilities because it provides the needed focus on vital IT systems that need implementation for achieving higher levels of access, quality, efficiency, and safety. The benefits of adopting OEMRAM are as follows:

1. It establishes a benchmark for Clinics and Outpatient services in hospitals to be compliant with **Meaningful Use**.
2. Provides an IT strategy roadmap to achieve clinical and operational excellence by **charting** progression and accomplishments
3. Demonstrates a **commitment** to patient outcomes, satisfaction, and safety it is more efficient, connected and holds high-reliability edge towards it.
4. OEMRAM **emphasizes Data Analytics** current level of EMR adoption in a particular health care facility by identifying opportunities/problems, monitor compliance and demonstrate outcomes.
5. It helps **Analyze** current level of EMR adoption
6. **Compare** technology adoption against other healthcare providers
7. **Evaluate and implement** what need to be done to achieve Stage 7

1.1.3 Importance of Meaningful Use

The ultimate of the Meaningful Use stages is to incorporate the widespread adoption of electronic health records systems, by creating virtual structure that enables good quality, safety and efficiency of patient care in the United States from healthcare provider's side. For Meaningful use, the qualifying factors not just include adopting the Electronic Medical Record, but also showcase evidence that they are "meaningfully using" their EHR by meeting a number of objectives designed by the Centers for Medicare & Medicaid Services (CMS) to have a measurable indicators for patient care.

Figure 1: Result of Meaningful use Compliance



1.1.4 How OEMRAM is beneficial in achieving the Meaningful Use Stage 1 and 2?

“The Meaningful Use program, for Medicare, enlists three stages. Each stage builds on the previous one over several years, to expand electronic health records usage to an increasingly larger patient population with a wider range of health care processes. The aim and requirements of the Meaningful Use stages are as follows:

1) Meaningful Use Stage 1: Data capture and sharing:

Launched in 2011, Stage 1 meaningful Use emphasizes proper electronic data capture and data sharing using an EHR technology. Eligible providers can attest to Stage 1 and receive their incentive payment after meeting nine core objectives and one public health objective.

Objectives

Centers for Medicare and Medicaid Services (CMS) provides core objectives for all eligible providers (EP), who must meet those objectives for successful attestation to Stage 1 of Meaningful Use and they can be accomplished with the help of Outpatient Electronic Medical Record (OEMRAM) stage recognition.

1. Use Computerized Provider Order Entry (CPOE) for medication orders: Enter at least one medication order using CPOE for more than 30 Percent of unique patients, or use CPOE for 30 percent of medication orders created by the eligible professional (EP) during the EHR reporting period. Providers can claim exclusions for laboratory orders (measure two) and radiology orders (measure three) for an EHR reporting period in 2015.

2. Submit prescriptions electronically: More than 40 percent of prescriptions written by the EP need to be transmitted electronically using Certified EHR Technology (CEHRT).

3. Implement clinical decision support at the point of care: Implement a clinical decision support rule for specialty or high clinical priority, and use that rule to track compliance.

4. Provide patients with electronic access: More than 50 percent of the patients seen by the EP during the EHR reporting period must receive online access to their health information within four days of its availability. EPs can use their discretion to withhold certain information.

5. Protect electronic health information: Conduct or review a security risk analysis and implement the appropriate technical capabilities to protect electronic health information that has been created or maintained by the CEHRT.

6. Provide patient-specific education: More than 10% of all patients seen during the 90-day reporting period should receive patient-specific education materials, as identified by the CEHRT. Exclusions apply to providers who did not intend to select this objective for Stage 1 prior to 2015 program changes.

7. Perform medication reconciliation: Medication reconciliations are required for more than 50 percent of the patients transitioned to the care of the EP during the reporting period. Exclusions apply to providers who did not intend to select this objective for Stage 1 prior to 2015 program changes.

8. Create and transmit a summary of care record: When transitioning or referring patients to another care setting or provider, the EP must use a CEHRT to create a summary of care record.

9. Enable secure messaging: During the EHR reporting period, patients must be able to send and receive a secure electronic message with the provider. EPs may claim an exclusion for this measure in 2015 since there is no equivalent under original Stage 1 guidelines.

Meaningful Use Stage 1 public health objectives

Stage 1, Eligible Providers must fulfill one public health measure. There are five reporting options available:

1. Immunization Registry Reporting: The EP must be actively submitting and receiving immunization data and forecasts from a public health agency.

2. Syndromic Surveillance Reporting: EPs must be actively submitting syndromic surveillance data from a non-urgent care ambulatory setting. For eligible hospitals, syndromic surveillance must be submitted from an emergency or urgent care department.

3. Case reporting: The EP is actively engaged with a public health agency to submit case reporting of reportable conditions.

4. Public health registry reporting: The EP is actively submitting data to public health registries on behalf of a public health agency.

5. Clinical data registry reporting: The EP is actively engaged in submitting data to a clinical data registry.

2) Meaningful Use Stage 2: advanced clinical processes:

Medicare Meaningful Use Stage 2, which began in 2014, builds on the use and capabilities of EHRs introduced in Medicare Meaningful Use Stage 1. Regulations enforce care providers to put advanced processes at place, increase the interoperability of health information and adopt standardized data formats.

Meaningful Use Stage 2 features the same nine core objectives as Stage 1, only with higher thresholds. The threshold percentages increase to ensure that EHR processes are extended to a larger population. For example, instead of ordering at least one medication for 30 per cent of unique patient visits through Computerized Provider Order Entry (CPOE) during the reporting period (Stage 1), you must submit 60 per cent (Stage 2).

Objectives

1. Use Computerized Provider Order Entry (CPOE) for medication orders: There are three measures to fulfill this objective. Measure 1 requires the use of CPOE to record more than 60 percent of medication orders created by the eligible professional (EP) during the EHR reporting period. For the second measure, more than 30 percent of the EPs laboratory orders must be captured by CPOE during the reporting period. CPOE must capture more than 30% of the radiology orders created during the EHR reporting period by the EP.

2. Submit prescriptions electronically: More than 50 percent of all prescriptions written by the EP must be queried for a drug formulary and transmitted electronically using Certified EHR Technology (CEHRT).

3. Implement clinical decision support at the point of care: This objective requires that the EP meet two measures. The first measure requires the use of five clinical decision support interventions at a relevant point in patient care during the EHR reporting period. These interventions must relate to at least four clinical quality measures. For the second measure, the EP must enable drug-drug and drug-allergy interaction check functionality during the entire 90-day reporting period any EP who writes fewer than 100 medication orders during this period is excluded.

4. Provide patients with electronic access: This objective requires that the EP meet two measures. To satisfy the first measure, more than 50 percent of the patients seen by the EP during the EHR reporting period must receive online access to their health information within four days of its availability. EPs can use their discretion to withhold

certain information. For the second measure, a patient must view, download, or transmit their health information to a third party during the 90-day reporting period.

5. Protect electronic health information: Protect electronic health information that has been created or maintained by the CEHRT by reviewing a security risk analysis from time to time. Also, helps in implementing the appropriate technical capabilities.

6. Provide patient-specific education: More than 10 percent of all patients seen during the 90-day reporting period must receive patient-specific education materials, as identified by the CEHRT.

7. Perform medication reconciliation: More than 50 percent of the patients transitioned to the care of the EP during the reporting period must receive a medication reconciliation.

8. Create and transmit a summary of care record: When transitioning or referring patients to another care setting or provider, the EP must use a CEHRT to create a summary of care record. This record must be submitted electronically to a receiving provider for more than 10 percent of referrals.

9. Enable secure messaging: During the EHR reporting period, patients must be able to send and receive a secure electronic message with the provider.

Meaningful Use Stage 2 public health objectives

For successful attestation at Stage 2, EPs must fulfill one public health measure, with five reporting options available to choose

1. Immunization Registry Reporting: The EP must be actively submitting and receiving immunization data and forecasts from a public health agency.

2. Syndromic Surveillance Reporting: EPs must be actively submitting syndromic surveillance data from a non-urgent care ambulatory setting. For eligible hospitals, syndromic surveillance must be submitted from an emergency or urgent care department.

3. Case reporting: The EP should actively engage with a public health agency to submit case reporting of reportable conditions.

4. Public health registry reporting: The EP is actively submitting data to public health registries on behalf of a public health agency.

5. Clinical data registry reporting: The EP is actively engaged in submitting data to a clinical data registry.

3) Meaningful Use Stage 3: Improved outcomes

Although details have not been finalized, Meaningful Use Stage 3 will aim to simplify the program, drive interoperability between electronic health records, and improve patient outcomes. Based on the current timeline, providers have the option to begin Stage 3 Meaningful Use in 2017 but are not required until 2018. ⁽³⁾

2. Compliance requirements of Outpatient EMRAM in Eight stages

HIMSS analytics Developed Eight stages (0-7) for setting the benchmark in an outpatient or ambulatory services. This helps in assessing the EMR adoption keeping in mind the unique requirements in the ambulatory areas.

Figure 2: US Outpatient Electronic medical records Model (Stage 0-7)

Stages	Cumulative capabilities
Stage 7	HIE capable, sharing of data between the EMR and community based EHR, business and clinical intelligence.
Stage 6	Advanced clinical decision support, proactive care management, structured messaging
Stage 5	Personal health record, online tethered patient portal
Stage 4	CPOE, Use of structured data for accessibility in EMR and internal and external sharing of Data
Stage 3	Electronic messaging, computers have replaced the paper chart, clinical documentation and clinical decision support
Stage 2	Beginning of a CDR with orders and results, computers may be at point-of-care, access to results from outside facilities
Stage 1	Desktop access to clinical Information, unstructured data, multiple data sources, intra-office/informal messaging
Stage 0	Paper Chart Based

The O-EMRAM tests for all the clinician documentation including Physician and Nurse Notes orders, progress notes with e-prescribing feature, patient engagement, and population health analytics. It ensures a hospital is complaint to all the requirements needed to be stage seven certified.

Stage 0: The healthcare organization is paper based without any on-line access to clinical content data on a locally made software

Stage 1: Physicians and nurses have desktop access to on-line reference material, patient eligibility information, and outside testing results are assessable in View only

mode no changes are allowed at Hospital level. The hospitals are reliable on the third party for Testing and printing reports.

Stage 2: The beginning of a Clinical Data Repository (CDR) exists where results from diagnostic tests reside no matter where they are generated in the system. These reports are stored in the system more sort in the form of Data warehousing repository. These reports repository consists of patient demographics, basic clinical documentation from nursing personnel, etc. Reports compiled by the doctor or a registered nurse in the form of my reports, reports could also be retrieved from library search where Medical reports with appropriate vocabulary are maintained.

Stage 3: The nurse and support personnel, who room the patient check for patient eligibility, do charting and scheduling. After Check in, the nurse record medication history, vital signs, some history of present illness, etc. Physicians maintain an on-line problem list and generate e-prescribing orders during the patient encounter. The physician could then prescribe the orders and referrals.

Stage 4: The physician or other licensed provider enters all types of orders electronically into the record during the patient encounter, and clinical decision support (CDS) is interacting with the orders. Physicians are documenting in the record in structured templates that produce some discrete data for interaction with clinical decision support with the help of smart sets available. All laboratory results are electronically imported and stored in the discrete structured form, which enables clinical decision support interactions. Reporting to various external registries such as state immunization registries, tumor registries, and others is electronically submitted.

Stage 5: A patient portal exists with capabilities to see testing results, obtain patient education material, interact with caregivers, update demographic and allergy information, and schedule or request an appointment. This stage is present as to ensure that some evidence exist with the provider to promote patient engagement, and a proportion of the patient population using the patient portal for fixing appointments beforehand.

Stage 6: Advanced clinical decision support such as protocols and pathways are in use and could be demonstrated on the system. Health status and preventive care reminder

flags are actively used and demonstrated in the software. Evidence exists and results could be useful for the patient engagement program. This results in improved health status indicators in the served patient population. There are some connected medical devices operating in the patient care areas. The clinic maintains and utilizes disease registries for case management and population health improvement.

Stage 7:The ambulatory facility no longer uses paper charts. The Electronic Medical Record has a mixture of structured documentation, discrete data elements to drive analytics and clinical advice, data from connected intelligent medical devices, images, test results, etc. The organization is participating in Health Information Exchange with same vendor systems as well as with other vendors. Disaster recovery and business continuity plans exists within the software and are tested routinely. System governance is solid and has a demonstrable history of solving problems and adapting to requested change. Finally, the business and clinical analytics is very good and able to demonstrate improved patient care and improved population health through patient engagement.

3 .An EMR Software resonating with Outpatient EMR Adoption model stages

In this section, an EMR Software in the organization is being studied with respect to the eight stages of Outpatient Electronic Records proposed by HIMSS analytics. EMR software is operational in the facility where all the outpatient services record with respect to the patient is entered. The eight stages mentioned in the previous section are matched with the checklist made based on the review of the literature, the following points are referred in the form of workflow and explanations are given in the text below.

Research methodology

Study Design: Cross-sectional study Design, as the checklist is prepared with the review of the literature.

Sampling: Non-probability, Snow Ball sampling as the research is conducted based on the software suggested by the Organization to be studied as part of the project requirement.

Study tool: Checklist

3.1 Stages of Outpatient Electronic Medical record (O EMRAM)

Stage 0:

The organization is paper based without any online access to clinical content data or reference material. This type of organization has Advantages as well as Disadvantages. A paper-based document management system does have its positives, as follows:

Easy handling: As paper is physical by nature and therefore is handy, a person who need not have any knowledge of computers to handle and work with paper-based documents. Such documents can be stored systematically in files, folders, cabinets etc.

Reproduction: You can Xerox or copy a document with the help of Photocopy Machine It also has shortcomings associated with it as follows:

Storage space: Paper needs to be stacked in columns and it takes up a lot of storage space. With its limited resources, a small business may not be able to afford to rent or purchase storage space onsite or offsite.”

Recurring cost of supplies; If everything is being noted down on paper format, Cost of purchasing several packs of blank papers every month for various activities like

photocopying, printing, fax paper, writing pads, invoice books, accounting books etc. adds to the recurring amount.

Limited mobility: You can courier a document in a hard copy format. For sending it through e-mail, you need to scan and then process it for sending.

Therefore, the Hospital is not using Electronic Medical Record.

Stage 1:

In this stage, Physicians and nurses have desktop access to online reference material but considering data is comparatively unstructured data. Some sort of documentation is in digital format by using multiple data sources as within the EMR software and from one EMR software to another software through HL7. Health Level Seven International (HL7) is a not-for-profit, Accredited standards developing organization dedicated to providing a comprehensive framework and related standards for the exchange, integration, sharing, and retrieval of electronic health information that supports clinical practice and the management, delivery, and evaluation of health services.⁽⁴⁾

EMR software mediates Intra-office/Informal messaging in the hospital premises by share point where one physician or nurse can contact another physician or nurse. These reports are visible on patients' My column tab, where they can review their facility encounters and test reports. In addition, if a patient comes for outpatient services, the nurse would first check for the vitals /allergy, view patient's history in the EMR. The system raises an alert in accordance with the wrong order placed for diagnosis, tests, and medications for the provider's convenience. This process helps in collecting the patient eligibility Information in the EMR software.

Outside testing results are accessible but in read-only mode, the user does not have access to modify the Data. If the third party, as in different EMR is helping in finding the result of the lab test and building the images of the test, the results are passed through an Interface and then Hospital retrieves the images in the form of PACS (Picture archiving and communication system). A picture archiving and communication system (PACS) is a medical imaging technology that provides economical storage and convenient access to images from multiple modalities. Electronic images and reports are transmitted digitally via PACS. This eliminates the need to manually file, retrieve, or transport film jackets⁽⁵⁾. Under result of labs where the results are positive and are major ones, they are highlighted with

red color, and yellow color signifies attention required and green signifies results are perfect negative reports.

Stage 2:

In this stage, Beginning of the results and order in a CDR which is Clinical data repository. A clinical data repository consolidates data from various clinical sources, such as an EMR or a lab system, to provide it in a unified manner in accordance with the care plan a patient has received. It is configured in such a manner that allow clinicians to retrieve data for a single patient rather than to identify a population of patients with common characteristics Some examples of the types of data found in a clinical data repository include demographics, lab results, radiology images, admissions, transfers, and diagnoses.

Documentation pertaining to patient demographics are recorded in the patient bar. Basic clinical documentation from nursing personnel in Nursing intake tab where all the vital signs, flow sheets, nursing notes, charting and e-MAR (e Medication Administrative Record in which all the Injections and vaccines dosage is decided electronically) of a patient. Also through interfaces and PACS (Picture Archiving and communication system) Access to results from outside facilities.

Stage 3:

In this stage, computers have already replaced papers in the healthcare Organization. Charting is conducted and at the point of care by nursing and support personnel who room the patient record medication history. In visit navigator, Physicians maintain an on-line problem list and generate e-prescribing orders during the patient encounter that is also practiced in the form of CPOE (Computerized physician Order entry).**Computerized Provider Order Entry (CPOE)** – CPOE entails the provider's use of computer assistance in directly enter the medication orders from a computer or mobile device. The order is also documented or captured in a digital, structured, and computable format for use in improving safety and organization ⁽⁶⁾.

Stage 4:

The physician or other licensed provider enters all types of orders pertaining to Medications and tests electronically into the system during the patient encounter in the Hospital. The software also enables the physicians to enter **progress notes** through visit navigator in charting; they also record the consultation notes, previous problems and problems diagnosis in problem list. Patient instructions are provided as a part of after visit summary for the patient. Also, software assists physicians in making a wiser decision for better health outcomes with the help of Clinical decision support interacting with the orders. Clinical Decision Support systems link physician's observatory diagnosis pertaining to health with health knowledge as to influence choices made by clinicians for improved health care.

Physicians are documenting in structured templates that produce some discrete data for interaction with clinical decision support. Physician's notes and nurse's notes are in an unstructured format so if patients are coming with similar sort of problems instead of writing notes a physician can document his/her observations in structured templates by editing it accordingly by changing the demographics of the Patient.

All laboratory results are electronically imported and stored in a discrete structured form enabling clinical decision support interactions.

The software also has a feature namely files filter which helps filtering out the big reports that contain one year of huge Data. Various reports pertaining to immunization, vaccination or tumor cases studies could be retrieved from the software for tracking the Hospital workings. The same reports if needed submitted to the federal government, state immunization registries, tumor registries electronically.

Stage 5:

EMR software also helps a patient track his/her report through Personal health record, an online tethered patient portal that is through **My Column**. A patient portal exists with capabilities to see testing results, obtain patient education material, interact with caregivers, update demographic and allergy information, and schedule or request an appointment through **My Column** feature in the software.

In the patient column, a tab called health maintenance is also, present that is visible to Software user, which will provide enough evidence that provider, has an activity to promote patient engagement, and a proportion of the patient population using the portal. If urgently, a message needs to be noticed by the doctor that tab is highlighted by Red color and attention by the nurse is needed.

Stage 6:

Advanced clinical decision support such as protocols and pathways are in use, demonstrated with the help of health status tracking, and preventive care reminder flags. The clinic maintains and utilizes disease registries for case management and population health improvement inside the health facility and for federal government research purposes by the feature called files filteras mentioned previously in this report, this feature helps in filtering out the report as and how required.

There are also some connected medical devices operating in the patient care areas like for ventilators, Electrocardiogram, weighing machine and also patients with special care also needs tongue depressor for a thermometer that could also be placed as an order in that particular department.

Evidence exists and results for the beneficial use of the patient engagement program with improved health status indicators in the served patient population, demonstrated through health maintenance tab in Patient column.

Stage 7:

The ambulatory facility no longer uses paper charts for documentation, every detail recorded pertaining to patient data in the EMR software. In this stage, it is required that the EMR has a mixture of structured documentation, discrete data elements to drive analytics and clinical advice, data from connected intelligent medical devices, images, test results, etc.

EMR software also ensures the organization is participating in Health Information Exchange with same vendor systems as well as other vendors through **Centric Care** feature promoted by the EMR software.

Care everywhere gives healthcare provider facility access to medical information with respect to patient Data, which otherwise is not possible. This Data is then further be used by health care provider for making decisions effectively with the help of CDSS (Clinical

decisions support systems).Examples of Information related to allergies, medications and Immunization, surgeries a patient have had, current illness, Diagnosis,procedures, and treatments are some of the documents shared through this Care everywhere feature of the EMR software ⁽⁷⁾.

The EMR supports Disaster recovery and business continuity plans in case of complete system failure, there should be a proper server point from where the current Data could certainly be retrieved.

System governance is solid and has a demonstrable history of solving problems and adapting to requested change. The EMR software with the help of the Client server makes builds then analyses in support environments for system enhancements that are beneficial for health care provider ease

Finally, the business and clinical analytics is very good and able to demonstrate improved patient care and improved population health through patient engagement.

4. Assessment of the existing Outpatient Electronic Medical Record Adoption Model stage of Y clinic under one Hospital using X Software.

X –Software Name

Y- Clinic Name

In the United States, before a patient reaches the Hospital he/she first needs to approach his Primary care physician (PCP), for their basic problem Identification in an outpatient setting. A primary care provider (PCP) is a Healthcare practitioner inpatient care vertical who checks for people those who have medical problems or abnormalities. Mostly PCP are the Doctors however, a PCP may be a physician assistant or a nurse practitioner. PCP is generally involved in the patient's care for a longer period. Not just in Outpatient setting if the patient is also admitted in the Bigger Hospital, PCP ensure and assist in or direct the care plan depending upon different patient health conditions. The patients have the access to choose their PCPs according to their plan recommended by the Insurance provider.

PCPs are of the following Types considering US scenario. **Family Physician** where our study will revolve, Doctors who have completed a family practice residency and have obtained a certified degree for practice, for this specialty. They provide care for children, teenage and adults of all ages and may include obstetrics and minor surgery. Apart from this specialty, clinics for Pediatricians practice, geriatricians practice, Internists, Obstetricians, Nurse Practitioners, Physician assistant. Although many insurance providers bound the providers, they can choose from, or provide financial incentives for them to select from a specific list of providers compiled by the Insurance companies

For the assessment of clinic which will be sampled for the specialty in Family Medicine under Saint Joseph medical Centre Hospital at **A** location.

A location has approximate ten Big Hospitals under one branch; the hospital will be sampled out based on the sampling method with certain criteria for selection. One hospital is selected from **A** location. The facility features the newest medical technology, a serene healing environment, an efficient patient admissions process, and access to a broad range of

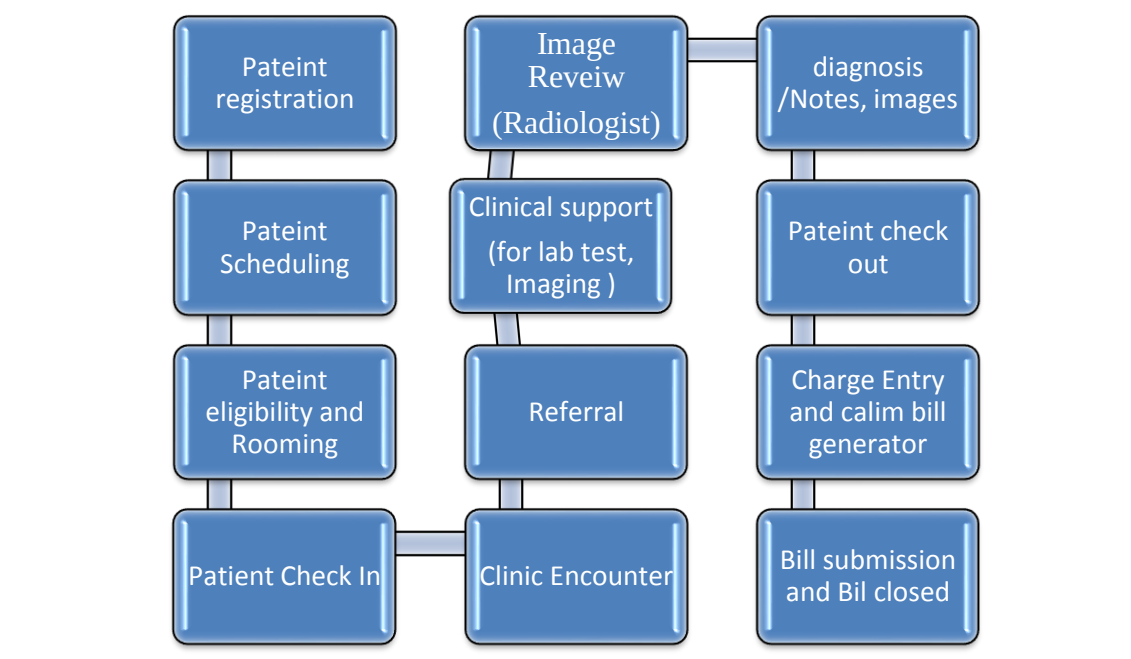
Services. It was declared one of the best-designed health care facilities in the U.S., winning a national design award from Modern Healthcare magazine ⁽⁷⁾.

Family Medicine is being selected for the study as it cares for the needs of the people of all ages, providing expert advice and personalized care at every stage of life

In points, if we site, Family medicine services provide care for the following as:

1. Preventive care, which includes routine weekly or monthly checkups, Immunizations and screening tests.
2. Diagnosis and Treatment of acute as well as chronic conditions
3. Obstetrics and routine gynecologic care for women
4. Children care plan as pediatric service.

Figure 3: Patient journey/process workflow in Outpatient clinic



Stage 7 Hospitals Uniquely positioned themselves as:

1. Population health improvement
2. Improving performance on Core Measures

3. Reducing readmission rates
4. Lowering the incidence of infections
5. Early identification of possible sepsis
6. Decreasing medication error
7. Increasing value

The system is so robust, that it helps in fetching the reports. Computerized Physician Order Entry (CPOE): When health care providers place their orders and prescription or Non-provider enter their order per protocol. Requirements for Outpatient setting is that provider should be able to electronically enter ≥ 95 per cent of orders for four months. To gauge CPOE, Nurse entered orders are excluded. Structured and physician Documentation, HIMSS Requirements should be Note writer, smart Datasets, to compile Discrete Data and with the Help of the X software, this Data can be used to make reports ideally.

Also Considering stage 7 Requirements, the clinic by its own getting compliant to Objective, which needs to be for Meaningful Use stage 1 and 2

Table 1: Meaningful Use stage one and stage two requirements

Objectives	Meaningful stage 1	Meaningful stage 2
1)Computerized Physician Order Entry for Medication Orders	More than 30%	More than 60%
2)Prescription Electronically	More than 40%	More than 50%
3)Access to patient access, in the form of Online	More than 50%	More than 50%
4)Patient engagement: Specific Health Education for patients	More than 50%	More than 50%
5) Patient Reconciliation	More than 50%	More than 50%

Research methodology

Study Design: Cross-sectional and Systematic review as the process suggests the researcher critically evaluates the system in comparison after the previous review done in the first objective, in a much more comprehensive and systematic at one glance into the system.

Sampling methods: Purposive sampling as the researcher is setting certain criteria for sample selection

1. Total hospitals under A locality= 10 hospitals
2. Hospital selected =1 (Based on inclusion criteria)
3. Specialty for Outpatient clinic: Family Medicine

Inclusion Criteria:

1. Approximate 500 bedded Hospital
2. Average Outpatient visit /Day should be 50
3. For specialty clinic: Family medicine is the specialty for Preventive and ongoing care for all ages, and can include pediatric services, obstetrics, and routine gynecologic care.

Research Procedures:

The selected X clinic under one bigger hospital is mapped according to the checklist made by the Researcher. One Hospital is selected based on criteria's set by the researcher. The insight of the X clinic Operational system is mapped based on the checklist made.

Research Instruments:

A Checklist, The Intern, as to match the system with the system has prepared a detailed prerequisites list.

Reliability and Validity:

The Reliability of the checklist is already verified by HIMSS analytics. The validity is checked with the help of the second reviewer who also contributed to the study.

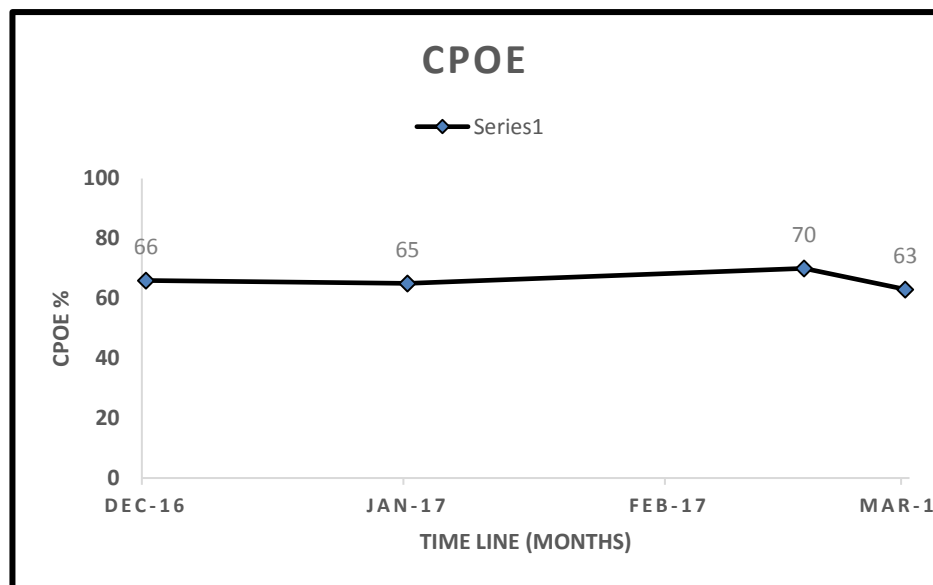
4.1 Results:

X clinic (Family medicine) is on Stage 6 based on the checklist made and mapped with the clinic Functional X system. For stage seven certain criteria's need to be met as follows 1) CPOE percentage by Month, this report is retrieved from the crystal reports made by the reporting team of the X software based on their access to the system.

Table 2: CPOE compliant percentage for Four Months

Time Line (Months)	December 2016	January 2017	February 2017	March 2017
CPOE percentage	66	65	70	63

Figure 4: CPOE compliant percentage for Four Months, a report run on the system for X clinic.



Average of four Months came out to be **66** percent, which does not suffice the standard of **95** percent, required for Outpatient setting. Therefore, Y clinic is not a complaint to Stage 7 standards.

2) Structured Documentation ideally should be more than **20** percent for inpatient(inpatient) department but the researcher found no reports for outpatient.

- 3) Health Information Exchange is also demonstrable with same as well as different vendors. The exchange is also possible within and outside the facility. Although the percentage for the exchange is not found. For reference the intern has tried running reports in the busiest two hours of the clinic i.e. morning time of OPD, the report suggests **1815** Data exchange requests were raised to be precise considering both incoming and outgoing data flows for the Location **A** Hospitals.
- 4) Disaster recovery and Business Continuity plan feature exist at the time when the system failure happens still the reports could be retrieved from the system at one place.
- 5) System governance is efficient, as the system strongly as and when required undergoes optimization and change requests for process flow, through builds, which the System analyst makes. These builds are then analyzed by the lead that then enhances the system workflow.
- 6) Improved patient care is demonstrable in the clinic with the help of patient health assessment format created by X software to ensure population health. Patient engagement is also taken care of in the patient Instructions column by physician login.

For Meaningful, use compliance

- 1) Requirements for stage 1 and stage 2 are already being met by x clinic as it is more than **60 percent** as mentioned above.
 - 2) The prescription is entered electronically into the EMR software as from reports run by the system only **31** percent was found out to be verbal, One percent is written and the remaining **68** percent is electronically entered prescription. These numbers are also matching with the second objective of meaningful stage 2.
 - 3) Access to the patient online portal, the reports for the same could not be found. It can be calculated if how many have access to my column report could be run and total Patients admitted in the Facility at a given point of time.
 - 4) Patient engagement as in Best practice Advisory (BPA) available for the physician and different educational resources given by the healthcare provider to the patients.
- Report

for three months showed **34**percent use of health education resources used by the physicians as a part of the patient engagement practice.

5. Suggestions:

- 1) Outsourcing only one EMR software for physician structuring the documentations, all ancillary services (Pharmacy, laboratory, and radiology) and inpatient services.
- 2) Identification of a core group of a nurse, physician, and leadership champions from the staff for software handling.
- 3) EMR adoption is considered more as an Information system and for Recordkeeping, Clinical systems should be considered as an enterprise project for Business continuity with the patient.
- 4) Multiple clicking on the toolbar present in the software hinders the physician working potential and makes the process hard to operate. The software should be User-friendly should not deviate the healthcare provider from their Patient Encounter.
- 5) Use of e-learning modules that acts as a live demonstration for the user to operate in different Healthcare scenarios. It helps the user to run the software with running Instructions displayed on their screen.

6. Conclusions:

Concisely, Electronic Medical Records provide many benefits, especially to primary care of patients. Standardization of Electronic Medical Record in EMRs would eventually become the standard of care for the healthcare provider. However, the suggestions recommended in this paper can accelerate and help the client to use X EMR software for adoption as well as facilitate the facility in achieving benefits such as common national standards for clinical data and Meaningful use stage 1 and stage 2 Objectives. As demonstrated in the study, X software is efficient in achieving the seventh stage of Outpatient Electronic Medical Record Adoption Model Stage. The effort now lies with the facilities and healthcare providers to be compliant with those prerequisites and set their facilities and services at stage 7. This would bring a change in the entire population and favorably affect the large health care portion of the federal budget. The government should act to facilitate the development of a public-private partnership to encourage adoption of Electronic medical records in primary care, especially in an outpatient setting.

7. Ethical Consideration:

- 1) Confidentiality and anonymity of the software maintained throughout the study.
- 2) Research integrity maintained by avoiding misinterpretation.

8. Limitations and Challenges:

- 1) Onsite view of the Software from user's perspective was not accessible.
- 2) The Data files because of Denied access could not be run for calculating the compliance rates in percentages.

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