DISSERTATION

On

Ambulatory EMR Implementation Issues in Ophthalmology Care in US Health Care System

SUBMITTED BY

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PG/15/027

UNDER THE GUIDANCE OF

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INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT & RESEARCH

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By

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ABSTRACT

Health care in the United States is provided by many separate legal entities. Current estimates put US healthcare spending at approximately 15% of GDP, which is the highest in the world. In the United States, around 85% of citizens have health insurance, either through their employer or purchased individually. Under 2009's Health Information Technology for Economic and Clinical Health (HITECH) Act, the Office of the National Coordinator for Health Information Technology (ONC) was given the authority to manage and set standards for the adoption of electronic health records (EHR) and supporting technology in healthcare facilities across the United States. Providers began receiving financial incentives for demonstrating the "meaningful use" of these technologies, which eventually progressed into penalties for those who failed to use the tools effectively. Functionalities of EHR systems vary, as does the use of EHR functionalities by individual physicians within a single practice. EHR implementation studies must consider how changes in practice patterns and professional concerns could hinder full implementation and integration. The use of a fully functional electronic health record (EHR) system is linked to improved quality measures. Electronic Medical Record (EMR) provides clinical charting for ophthalmologist and eliminates paper charts. The major function of a medical record is to document the patient's medical history and treatment, which in turn ensures of better patient safety & care. However, almost half of ambulatory providers with an EHR do not use the full functionality. Attempts to encourage optimal use of EHRs must address barriers associated with the need to change medical practice.

The study was aimed towards analyzing the barriers physicians face on both a personal and practice level during the implementation and use of ambulatory EMR. The following results were obtained from the study; 10 fundamental issues that emerged as perceived barriers to physicians' adoption and use of EHR systems of an Ambulatory EMR system in ophthalmology; Implementation Cost, Threat to Professionalism, Training Concerns, Practice Workflow Issues, Interoperability, Privacy Concerns, Revolution in Practice Approach, Administrative Concerns, Interfaces with doctor-patient relationship and Loss of Productivity.

The purpose of this study is to summarize the fundamental issues in ambulatory EHR implementation that are important for ophthalmology. We hope that this will help ophthalmologists to identify the important issues that should be addressed when implementing EHR systems and assist federal agencies to develop future guidelines regarding meaningful use of EHRs. More broadly, the American Academy of Ophthalmology (Academy) believes that ambulatory EHR will improve access to relevant information at the point of care between the ophthalmologist and the patient, enhance timely communications between primary care providers and ophthalmologists, mitigate risk, and ultimately improve the ability of physicians to deliver the highest-quality medical care.

ACKNOWLEDGEMENT

I am using this opportunity to express my gratitude to everyone who supported me throughout the course of this project. I am thankful for their aspiring guidance, invaluably constructive criticism and friendly advice during the project work. I am sincerely grateful to them for sharing their truthful and illuminating views on a number of issues related to the project.

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I would also like to thank my project guide Dr. B.S. Singh from the IIHMR who provided me with all the guidance required and conductive conditions for my project.

I am thankful to all the members of MDoffice who helped me in one way or the other to carry out my work successfully and to learn about the Electronic Medical Records (EMR) systems and those who were a part of my project without whose unconditional cooperation my study would not have been completed successfully. My colleagues from different colleges also hold a special mention here for supporting me throughout the training and making it a great learning experience.

Thank you,

Dr. Disha Biala

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LIST OF ABBREVIATIONS

AAO: American Academy of Ophthalmology

ACO: Accountable Care Organizations

aEMR: Ambulatory Electronic Medical Records

AMD: Age-related macular degeneration

ARRA: American Recovery and Reinvestment Act of 2009

ASC: Ambulatory Surgery Centers

CDC: Center of Disease Control

CDSS: Clinical Decision Support System

CMS: The Centers for Medicare & Medicaid Services

CPT: Current Procedural Terminology

EHR: Electronic Health Record

EMR: Electronic Medical Record

GDP: Gross Domestic Product

GI: Gastro Intestinal

HITECH: Health IT for Economic and Clinical Health Act

HL7: Health Level 7

HOPD: Hospital Outpatient Department

HRSA: Hospital Resources and Services Administration

MU: Meaningful Use

ONC: Office of National Coordinator

OPPS: Outpatient Prospective Payment System

ONC: Office of the National Coordinator

PFS: Physician Fee Schedule

SRS: Software Requirements Specification

WHO: World Health Organization

JCAHPO: Joint Commission on Allied Health Personnel in Ophthalmology

INTERNSHIP REPORT

Eli India is part of ELI Global-a globally diversified information and financial services group founded in 1991.Today ELI have more than 40 business units in diverse verticals across three continents.

Eli started its India operations in 2007 as a Research and Publications organization and our current business spans across diverse verticals including Healthcare, Market Research Reports, Collections & Recovery, Certifications, Online Reputation Management, Collectibles, Insurance and Annuities, Media & Publications and more. . It offers a much sought-after work environment for people at different stages in their careers. They are agile towards our targets and they attract employees who are similar to us. They offer an enviable workplace with not just the tangible measures of remuneration, flexibility with working arrangements; it is also the less tangible measures of maintaining a strong company culture, work environment and support which make the real difference.

ELI's one of the business unit is MDoffice and they have Electronic Health Record (EHR),Practice Management, Revenue Cycle Management and Patient Engagement product which empower and enables ophthalmologist practices to provide effective and integrated care delivery. MDoffice delivers the next generation of electronic medical records and practice management solutions built upon best-of-breed and best-in-class healthcare software. The MDoffice solution creates a foundation for heterogeneous communication amongst healthcare providers throughout the ophthalmology sector as well as all caregivers within the Hospital Network.

MDoffice has been offering Electronic Medical Records and Practice Management systems since 1984.Regardless of the specialty or the number of locations and size of your practice, MD office's unified EMR and PM software will manage the flow of your patients from check-in to check-out smoothly.
MDoffice understand that speed and agility are keys to success in competitive times.

At MDoffice, products are designed to help medical practices increase productivity, reduce account receivables, and increase cash flow. Healthcare providers know the powerful benefits of Mdoffice's unified solution: improved efficiency, increased revenue, fewer medical errors, and more personal freedom for you. MDoffice lets you tailor your own easy-to-use charts, whether you work in one office

Or are a physician linked to a clinic. Mdoffice's flexible and customizable medical records, you can write your own problem-specific forms and use personal phrases to detail encounters. You can quickly and easily organize notes and records of lab findings, prescribed medication, allergies, vitals, and images; you can also draw and annotate directly on stock drawings, or insert drawings and images into your notes and patient charts; you can make graphs to chart the trends of vitals, test and lab results; and you also get access to medical databases MDoffice takes the hassle out of managing medical records.

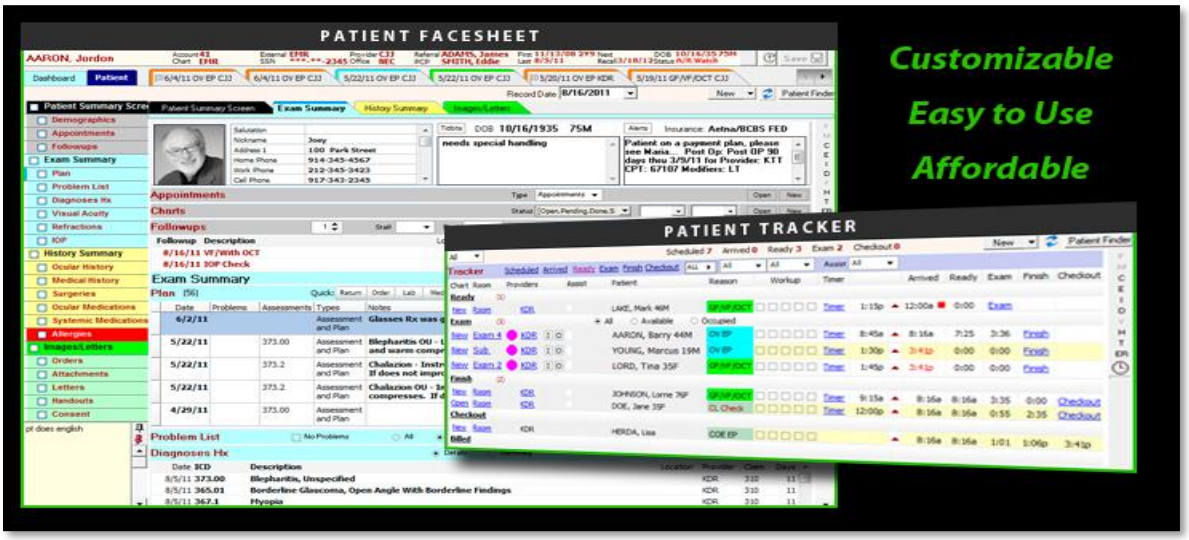
MDoffice list of products:

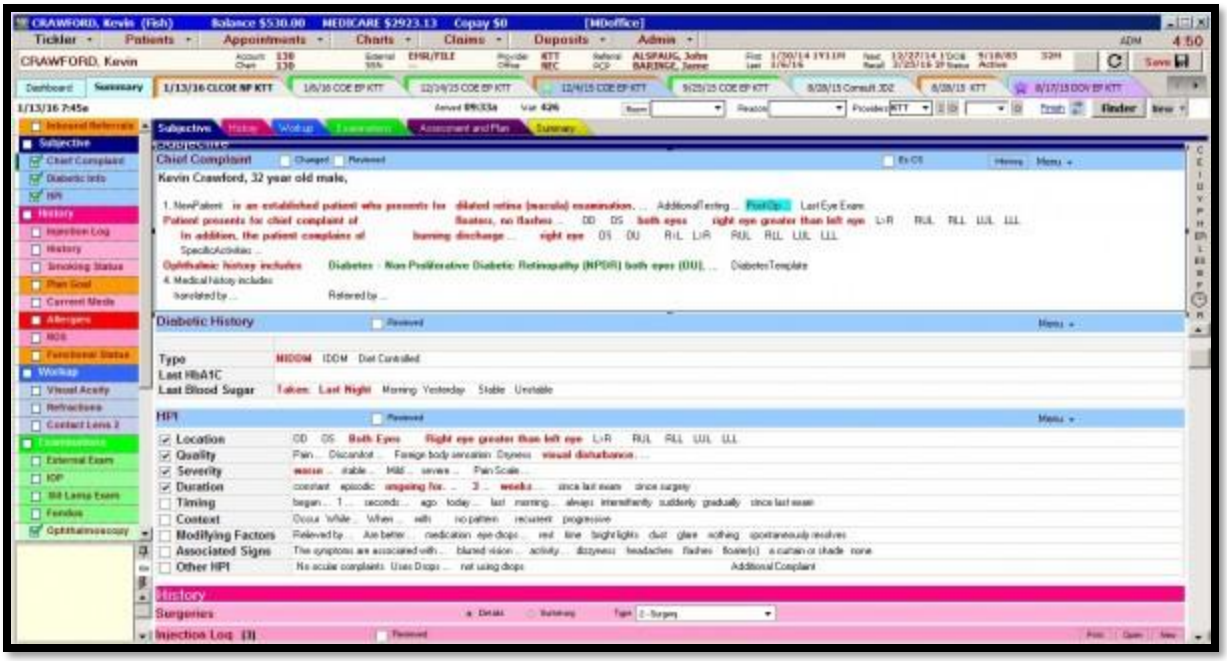
- MDoffice desktop version (EMR+Practice management)
- Cloud (EMR+Practice management)

- Mobile (EMR+Practice management)
- Patient portal.
- E-prescription.
- Ambulatory surgical care.
- Revenue cycle management.

In the MDoffice Cloud application, all the data is maintained in multiple tabs called modules:

- Ticklers
- Patients
- Schedules
- Billing
- Deposits





Ticklers:

Ticklers act as an in-house communication tool for a practice with single or multiple locations. The tickler messages can be patient messages or general messages for staff. You can also set event reminders for yourself or any other staff member using ticklers.

Patients:

You have to access the Registration module either to register a new patient or access an existing patient's details like patient demographics, contacts, insurance coverage, and claims. You can also store medical and accounting alerts to warn your staff about special patient conditions, needs, drug allergies, payment schedules, and overdue balances. You can create custom fields to print on letters, statements, and insurance forms.

Schedules:

You can check the encounters and appointment details of a patient from the Schedules accordion without going through the Schedule module. In this Schedules page of a patient, you will see the list of all appointments (encounters/old and future appointments) and recalls for that patient.

Billing:

The Billing module covers the complete cycle of validating claims, billing, and entering payments, posting collections and payments, and tracking receivables. It allows you to save time, monitor accounts more accurately, and improve collections.

Deposits:

All money coming in from any source must be entered in the Deposit module as New Deposit and then applied (posted) to open (unpaid) claims. Amounts when posting payments:

-Allowed: The maximum amount an insurance company will pay for a particular service or procedure.

-Payment: The actual amount paid by the source.

-Adjustment: The amount adjusted as per your practice/provider's discretion.

-Write-off: The difference between your charged amount and the amount covered or allowed by an insurance company.

During my internship I was involved in getting training with respect to EMR Software & studying and discussing the various modules of the software. I did market research on various organizations as a part of Mergers & Acquisitions activity of the organization. I underwent assessment of my learnings based on EMR Software. I was involved in getting training in relation to several tools of MS Excel. I underwent training about HIPAA Basics, Information Security Certificate and Preventing discrimination & Harassment at Workplace. I also did research on other ambulatory EMR softwares involved in providing support to the health care providers in ophthalmology care.

Learning from the Internship Period

The major learning gathered from this period are as follows-
1. Hands-on experience on EMR Software.
2. Insight over the different queries raised by the clients over the EMR Software.
3. Different tools of MS Excel utilized during analysis.
4. Market Research for Mergers & Acquisitions Activity.
5. Design Specifications according to the User Interface
6. Interaction with the various clients involved

DISSERTATION REPORT

Ambulatory EMR Implementation Issues in Ophthalmology Care in US Health Care System

1. INTRODUCTION

In the current scenario of healthcare sector, providers are under constant pressure to increase productivity while improving the quality of the care they provide. The ever-present political hassle over budgets and Medicare reimbursement are amplifying that pressure to reduce costs and maximize productivity. Medicare reimbursement is based on correct coding, which relies on accurate, timely and comprehensive discharge summaries, and through the Health IT for Economic and Clinical Health (HITECH) Act, physicians will be eligible for $40,000 to $65,000 of financial incentives through Medicare and Medicaid if they show they are meaningfully using an EMR, playing a part in increasing the adoption rates. Due to a mix of government incentives and the general trend toward moving everything online, most healthcare settings now use EMR software. An electronic medical record (EMR) is a digital version of a paper chart that contains all of a patient's medical history from one practice and is mostly used by providers for diagnosis and treatment.

An EMR is more beneficial than paper records and the widespread use of electronic medical records (EMRs) in the United States healthcare system promises to bring with it many benefits:

- Track data over time and reduced medical errors
- Exchange health information electronically between organizations over secure networks
- Trigger warnings and reminders
- Send and receive orders, reports, and results
- Improved financial performance
- Digital formatting enables information to be used and shared
- Improved overall quality of care in a practice
- Improved provider and patient satisfaction

Nevertheless, estimates of EMR use in the ambulatory setting, especially in small practices, remain low and usually in the range of 12.9% to 23%.
Ambulatory surgery centers, or ASCs, are facilities where surgeries that do not require hospital admission are performed. ASCs may perform surgeries in several specialties or dedicate their services to one specialty, such as eye care or sports medicine. Sometimes called as surgicenters, they are usually small businesses owned by members of their community. In fact, 70 percent of ASCs have 20 or fewer full-time employees.
Although, Hospitals play an important role in our communities providing advanced support for the full range of services from surgery to intensive care, an ambulatory surgery center provides a convenient alternative to the hospital with the same quality care at a lower cost. Also, ASCs have an excellent track record of providing safe patient care, and as a result ASCs experience only one surgical site infection per 1,000 patients on average while the estimated national average of surgical site infection rates at hospital facilities is around 2% (or 20 per 1,000 patients). ASCs provide cost-effective services and a convenient environment that is less stressful than what

many hospitals can offer. Additionally, 77% of ASC cases are finished within the scheduled time, compared to 38% at a hospital facility, leading to increased patient satisfaction rate. Therefore, when considering options, it's important to understand some of the above mentioned differences between an Ambulatory Surgery Center (ASC) and hospital or hospital-based facility.

Workflow of an ASC

All ASCs must have at least one dedicated operating room and the equipment needed to perform surgery safely and ensure quality patient care.

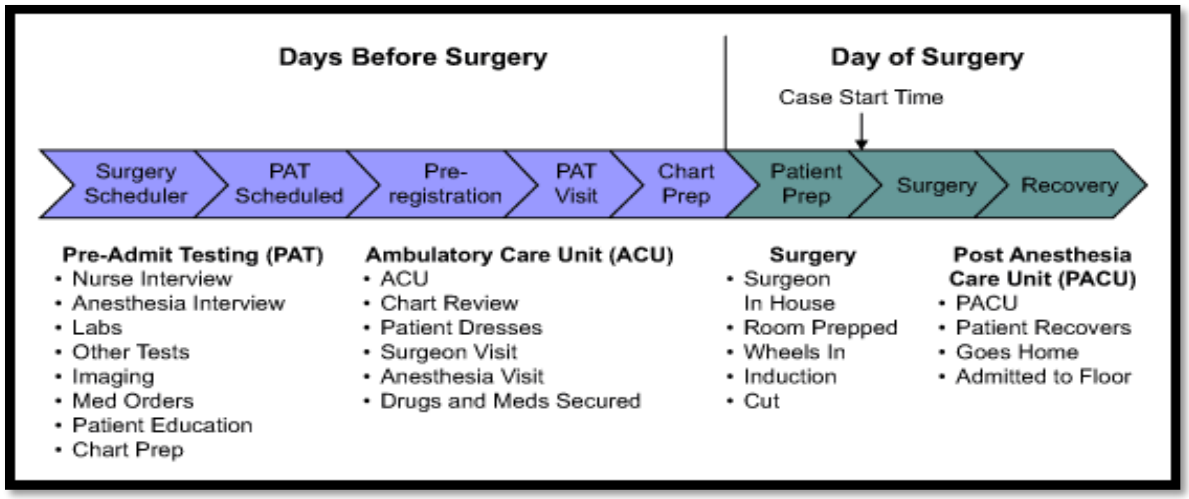


FIGURE 1- Workflow of an ASC

Patient's Journey through an Office Visit:

Day before surgery-

- **Step-1:** Patient Engagement (Appointment)
- **Step-2:** Insurance Eligibility Verification
- **Step-3:** Chart Pull – Record Ready (EHR)
- **Step-4:** Arrival
- **Step-5:** Check-In
- **Step-6:** Ready to Be Seen
- **Step-7:** Tech portion of the Exam is done by the ophthalmic techs that are trained and certified by organizations such as JCAHPO. (Joint Commission on Allied Health Personnel in Ophthalmology)
- **Step-8:** Diagnostic Testing, if Any
- **Step-9:** Doctor Exam
- **Step-10:** Follow-up Orders (Surgery Scheduler)
- **Step-11:** Checking out, Patient co-pays and / or Refraction charges
- **Step-12:** Billing process – Payers

Day of surgery-

- **Step-1**: Room is prepared
- **Step-2:** In-house surgeon performs the surgery

- **Step-3:** Patient is transferred to the Post Anesthesia Care Unit
- **Step-4**: Patient recovers and goes home.

Approximately there are 5,500 ASCs in the country that continue to deliver solid profits. According to a recent overview of the ASC industry, each year, physicians perform more than 23 million procedures in ASCs. The big four specialties for ASCs include ophthalmology, orthopedics, GI and pain management, according to an ASC analysis. Ophthalmology, GI and pain management provide the largest number of cases to ASCs by case volume. Orthopedics, in contrast, comprises 15 percent of all ASC surgeries.

Global Burden of Diseases

According to Centre of Disease Control (2015), 53 million adults in the US live with a disability. CDC identified the proportion of population of US living with some disabilities. This includes-

- Number of adults aged 18 and over with at least one basic actions difficulty or complex activity limitation: 74.8 million.
- Number of adults aged 65 and older with at least one basic actions difficulty or complex activity limitation: 26.1 million
- Number of adults with any physical functioning difficulty: 39.6 million
- Number of Adults with hearing trouble- 37.2 million
- Number of adults with vision trouble- 22.9 million

According to WHO Report on Global Data on visual impairment (2010), the prevalence of eye diseases and conditions:

1) Global prevalence of eye diseases and conditions-
    - 285 million visually impaired
    - 39 million blind
    - 246 million having low vision

2) Globally,
    - The major causes of visual impairment are:
        - Uncorrected refractive errors (myopia, hyperopia or astigmatism), 43 %
        - Cataract, 33%
        - Glaucoma, 2%
        - AMD, Diabetic retinopathy, trachoma and corneal opacities, 1%
        - Undetermined causes, 18%
    - The causes of Blindness are:
        - Cataract, 51%
        - Glaucoma, 8%

- AMD, 5%
- Childhood blindness and corneal opacities, 4%
- Uncorrected refractive errors and trachoma, 3%
- Diabetic retinopathy, 1%
- Undetermined causes, 21%

3) In American region,-
   - 3.5 Blind per million population
   - 25.6 low vision per million population
   - 29.1 visually impaired per million population

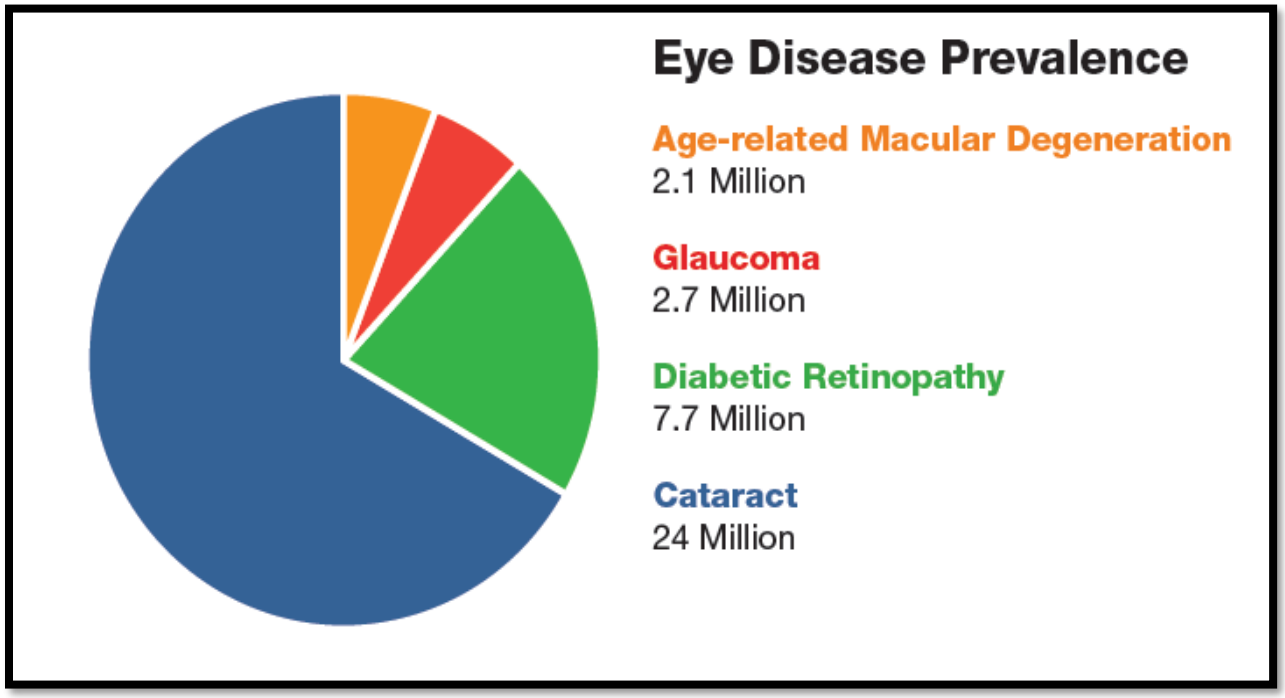


CHART 1- Prevalence of Eye Diseases [Source-Eye Disease Statistics (Prevalence of eye diseases in America), 2014, www.nei.nih.gov]

Considering the information mentioned above, Ophthalmology ASCs are on a rise because of the possible reasons-
-Growth in cataract volume- An Ophthalmic Market Perspectives report estimated the volume of cataracts has grown from 2.4 million in 2000 to 3.2 million in 2010.
-Growth in volume attributable to new technology, such as premium intraocular lenses and femtosecond lasers- Femtosecond laser holds great promise, currently it is not feasible for ASCs to use profitably because of its high cost.
-Integration of vitreoretinal surgery into ASC- Vitreoretinal surgery can be profitable because

reimbursement rates for the procedure are increasing. However, the ASC must have enough volume to offset the cost of equipment and supplies and have physicians who can perform the procedure efficiently.

-Hospital acquisitions of ophthalmic ASCs

-Emergence of ACOs

Ambulatory settings are a current target of federal policies incentivizing health IT adoption. Also, Medicare's payment rates and beneficiaries' cost sharing are generally lower in ASCs than in HOPDs.

ASCs and Medicare

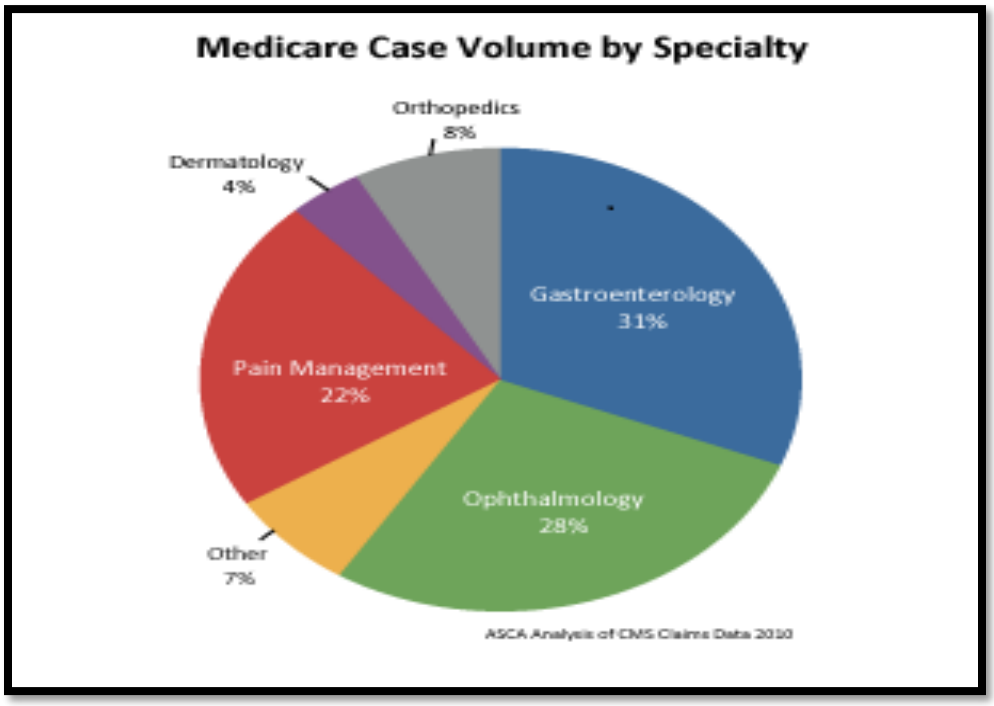


CHART 2- Medicare Case Volume by Specialty

Since 1982, Medicare has covered and paid for surgical procedures provided in ASCs. Medicare covers about 3,400 procedures under the ASC payment system. Physicians who perform procedures in ASCs or other facilities receive a separate payment for their professional services under the payment system for physicians and other health professionals, also known as the physician fee schedule (PFS). Physicians who perform surgeries in ASCs they own, receive a share of the ASC's facility payment in addition to payment for their professional services.

To receive payments from Medicare, ASCs must meet Medicare's conditions of coverage, which specify standards for administration of anesthesia, quality evaluation, operating and recovery rooms, medical staff, nursing services, and other aspects of care.

Medicare pays for a bundle of facility services provided by ASCs—such as nursing, recovery care, anesthetics, and supplies—through a system that is primarily linked to the outpatient

prospective payment system (OPPS), which Medicare uses to set payment rates for most services provided in HOPDs.
The ASC system underwent substantial revisions in 2008, the most significant changes included a substantial increase in the number of surgical procedures covered, allowing ASCs to bill separately for certain ancillary services, and making large changes in payment rates for many procedures.
Existing studies suggest that Medicare accounts for about 20 percent of ASCs revenue (Medical Group Management Association 2009b). The average 2008 Medicare sub charge (submitted charges divided by allowed services), average allow charge (Medicare-allowed charges divided by allowed services, including co-pays and deductibles paid by patient), and average payment (Medicare payments divided by allowed services, not including co-pays and deductibles paid by patient) for ophthalmology procedures commonly performed in ASCs are:

- Post-cataract laser surgery (CPT 66821)
  - average sub charge: $1,019
  - average allow charge: $282
  - average payment: $221
- Cataract removal, insertion of lens (CPT 66984)
  - average sub charge: $2,99
  - average allow charge $964
  - average payment: $763
- Glaucoma screening
  - 20% of Medicare-approved amounts, and the Part B deductible applies.
- Routine eye exams
  -100% out-of-pocket under Original Medicare for routine eye exams
- Treatment of macular degeneration
  - 20% of Medicare-approved amounts for diagnosis and treatment of diseases and conditions of the eye after the Part B deductible is applied
- Eye prostheses
  - 20% of Medicare-approved amounts after the Part B deductible is applied

EMRs have the potential to provide significant financial benefits as Medicare reimbursements depends on the quality and completion of data recorded in accordance with the US federation norms and Global Surgery Package, and while that potential is easy to realize with a hospital EMR, the numbers are a bit more nebulous regarding EMR implementation in the ambulatory setting.

Ambulatory EMR
An ambulatory electronic medical record (aEMR) is a computer-based medical record specific to a clinician, practice or organization. It is the record a clinician maintains on patients attending a specialty clinic and details patient and provider demographics, medical and drug history, and diagnostic information such as laboratory results and findings from diagnostic imaging. Ambulatory EMRs are deployed in community and hospital outpatient settings.
An aEMR is similar to an electronic medical record (EMR) but while EMRs keep track of inpatient care (surgeries and care that require spending overnight or longer in a hospital), aEMRs only apply to medical procedures and care that do not result in an overnight stay in a hospital or

that are given in non-hospital settings such as urgent care clinics, physicians' offices and at-home medical care.
By the end of 2012, just over 107,000 unique eligible professionals had attested to meaningful use of a complete EMR in an ambulatory setting. By 2013, that figure had almost doubled, jumping to just over 209,000—a 95 percent increase.

STANDARD AMBULATORY EMR COMPONENTS:

(a) Computerized provider order entry
Enable a user to electronically record, store, retrieve, and modify the following types: medications, laboratory; and radiology/imaging.
(b) Electronic prescribing
Enable a user to electronically generate and transmit prescriptions and prescription-related information.
(c) Record Demographics
Enable a user to electronically record, modify, and retrieve patient demographic data including preferred language, gender, race, ethnicity, and date of birth.
(d) Patient reminders
Enable a user to electronically generate a patient reminder list for preventive or follow-up care according to patient preferences based on the data elements included in: Problem list, Medication list, Medication allergy list, Demographics, and Laboratory test results
(e) Clinical decision support

- Implement rules- Implement automated, electronic clinical decision support rules (in addition to drug-to-drug and drug allergy contraindication checking) based on the data elements included in: problem list, medication list, demographics and laboratory test results.
- Notifications- Automatically and electronically generate and indicate in real time, notifications and care suggestions based on clinical decision support rules.

(f) Electronic copy of health information
Enable a user to create an electronic copy of a patient's clinical information, including diagnostic test results, problem list, medication list, medication allergy list and laboratory test results. This must be in human readable format.
(g) Timely access
Enable a user to provide patients with online access to their clinical information, including lab test results, problem list, medication list, and medication allergy list.
(h) Clinical summaries
Enable a user to provide clinical summaries to patients for each office visit that include diagnostic test, results, problem list, medication list, medication allergy list in human readable format.
(i) Exchange clinical information and patient summary record
Electronically transmit, receive, and display a patient's summary record, from other providers and organizations including diagnostic tests results, problem list, medication list, and medication allergy list.
(j) Calculate and submit clinical quality measures
Electronically calculate all of the core measures and in addition three clinical quality measures specified by the CMS for eligible professionals.

BENEFITS OF EMR USE IN AMBULATORY SETTING

PHYSICIAN PERSPECTIVE

Improved patient care

- An electronic health record has the potential to strengthen the quality of care and the relationship between clinicians and patients through ready access to accurate and up-to-date patient information from office or remote locations. Communication between physicians, staff, and patients is also a key benefit. EHRs also provide the opportunity to access national databases, resulting in improved chronic disease management and preventive service delivery.

Improved office efficiency

- An EHR saves staff time otherwise used searching for charts, entering charges manually, etc. Depending on the size of the practice, this "found time" can be devoted to value-added activities or eliminated, thereby reducing overtime charges. Through the use of EHRs, productivity increases because of improved office efficiency. If a half hour of paperwork is eliminated, that could mean two more patients seen daily or 30 more minutes a provider could spend at home with family members.

Potential financial benefits

- Large financial incentives are being provided to eligible practitioners for adopting and using a certified ambulatory electronic medical record to: (1) capture health information in a coded format, (2) track clinical conditions and quality reporting, (3) support clinical decision making and care coordination, and (4) eventually improve performance.

FINANCIAL BENEFITS

- Increase in the pace of information flow including service delivery.
- Coding/billing accuracy.
- Better capture of charges.
- Better documentation of patient encounters.
- Reduction in overall administrative and maintenance costs of healthcare institutions.
- Reduction in costs for the patient.
- Reduction in transcription costs.
- Decrease in malpractice insurance premiums.
- Decrease in paper consumption has the potential to lead to yearly estimated savings of $1.3 billion in the US.
- Reduction in overtime expenses.

PATIENTS PERSPECTIVE

More Positive Health Outcomes for Patients through Coordination of Care

- With the old paper system, doctors had to request patient records from other doctors, which delayed their ability to provide effective treatment. Additionally, patients did not always provide complete information about the type of care they received from other medical professionals. EHRs eliminate this problem and allow doctors to receive complete information electronically from all doctors who have the system. With much more information at their fingertips, doctors are able to make accurate decisions about proper care, which improves the chances of patients having positive health outcomes.

Patients Get Better Diagnoses from Medical Professionals

- EHRs that include dashboards help doctors get more information in less time. Comprehensive EHRs for different specialties help doctors thoroughly assess patient's health and reduce the possibility of overlooking some symptoms. The information includes:
  -Lab results
  -Insurance coverage
  -The patient's medical history
  -Recommended treatment options

- All of this information supports the doctor, which helps him/her make a better diagnosis of the patient's condition. With more information available, there are fewer chances of misdiagnoses, malpractice, and fewer instances of death.

Patients are not Double Billed

- With the old system, patients who visited multiple doctors were likely to pay for services multiple times. For instance, patients may get their blood work performed by a primary physician, and then again in a specialist's office. With the rising costs of health care and insurance costs, lab work and digital imaging can be expensive. Now, with EHRs, doctors can use the same results, depending on the circumstances and the time frame. Sharing test results benefit patients because they will not be charged again, and their doctor can make a quicker diagnosis. Billing solutions have become more common with the use of EHR's in medical practices.

EHRs Improve the Patient's Experience

- Everyone has a busy life, so going to the doctor generally means patients have to wait 30 to 45 minutes to be seen by the physician. Additionally, new patients are required to complete extensive paperwork prior to being treated. The wait and the extensive paperwork, make it difficult for anyone to get excited about visiting the doctor. EHRs reduce the time patients wait and streamline the paperwork they are required to complete. Since many EHR systems are comprehensive, patient records are synchronized, and up-to-date, so administrative professionals and physicians are able to provide improved

services. An efficient and positive experience at the doctor's office improves patient care all around.

Becker's ASC Review identified the top ten ambulatory EHR products in US market providing the above mentioned standard components:

• Epic Systems Corporation

• Meditech (NASDAQ:MEDT),

• Computer Programs & Systems, Inc. (NASDAQ:CPSI),

• Cerner (NASDAQ:CERN),

• McKesson (NYSE: MCK),

• Healthland,

• Siemens (OTC: SMAWF),

• Healthcare Management Systems,

• Allscripts (NASDAQ:MDRX),

• NextGen Healthcare.

The charts below illustrate meaningful use market share in 2014 versus one year ago:

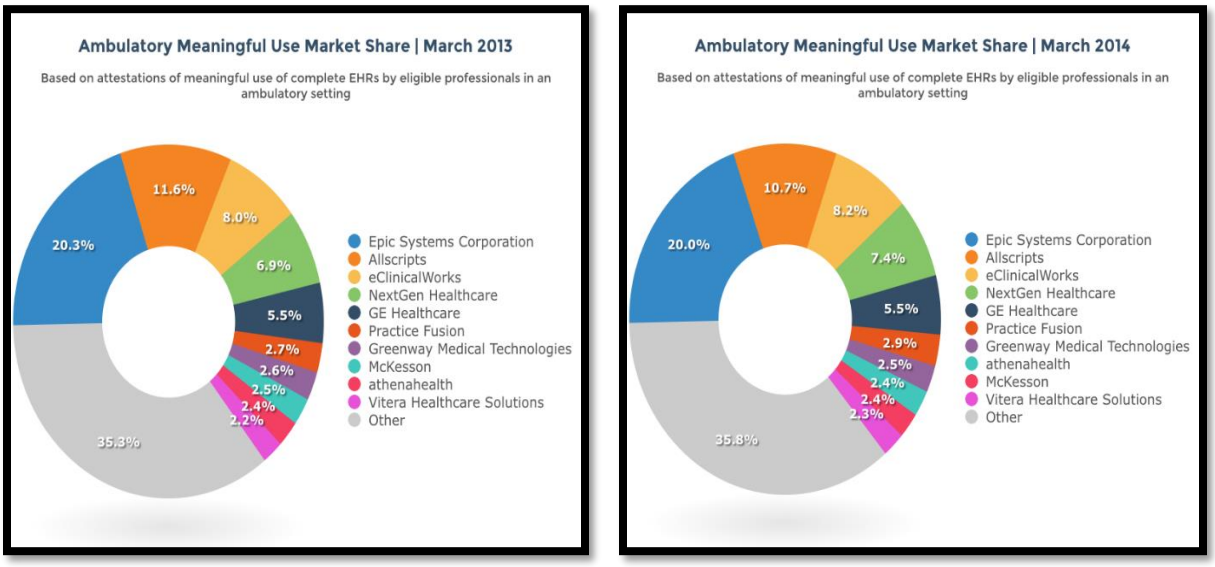


CHART 3- Meaningful use market share in 2014 versus one year ago (Graphic copyright Software Advice)

EHR implementation is a complex set up of information technology and business process "system builds." Successful implementation requires that end users understand each workflow, that all technology components work properly with the corresponding workflow and that each end user knows how to use relevant software components. The changeover to new and unfamiliar systems always brings some disruption, but small practices often face challenges

SCOPE OF THE STUDY

There is a significant scope for enhancing healthcare services considering that healthcare spending as a percentage of Gross Domestic Product (GDP) is rising. The study will be limited to the description of Ambulatory Surgical Centre along with its workflow, Ocular disease burden with a specific focus on Prevalence of Ophthalmic diseases in Ambulatory Surgical Centre along with Electronic Medical Record Software; with a specific focus on highlighting the barriers of Ambulatory EMR implementation pertaining to United States Healthcare Scenario.

REVIEW OF LITERATURE

A comprehensive search of the literature using key sources "MedScape", "BioMed Central", Becker's ASC Review and "PubMed" was done. Keywords entered included "ophthalmology and technology", "electronic or computer", "EHR or EMR implementation", "ambulatory care or outpatient care", "implementation issues". The literature was reviewed in relation to topics associated EMR/EHR implementation, the WHO Health System Framework, EHR/EMR implementation issues.

The Fundamental Issues in Implementing an Ambulatory EMR

According to a study in relation to the fundamental issues in implementing an Ambulatory EMR, perceived barriers to physicians' adoption and use of EHR systems: (1) need to change practice style (2) threat to professionalism (3) shift of expertise (4) required changes to interactions with patients (5) concern about the impact on medical education and training and (6) concern about the potential impact on clinical practice itself.
In accordance to a study conducted by Sima Ajami and Tayyebe Bagheri-Tadi, possible barriers to implementing EHRs, namely- Time, Cost, Absence of computer skills, Workflow Disruption, Concern about Privacy and Security, Communication among users, Interfaces with doctor-patient relationship, Lack of Incentives, Complexity, Physical Space, Concern about the ability to select an effectively install EHR system, Technical Support, Interoperability, Access to computers and computer literacy, Vendor Trust, Expert Support, Concern about data entry, Training and after-sail experiences with their vendor, Reliability, Inadequate data exchange, Concern about patient acceptance, Formal training, Speed, Interinstitutional integration, Wireless connectivity.

Key surface barriers to EMR use that emerged as persistent themes from our interview data included High initial cost and uncertain financial benefits, High initial physician time costs, Technology, Difficult complementary changes and inadequate support, Inadequate electronic data exchange, Lack of incentives, Physicians' attitudes; these were the issues highlighted by study conducted in relation to "Physicians' use of Electronic Medical Records: Barriers and Solutions" (2004).

According to a study conducted in a Primary Care Setting by Jeff Hummel (2012), focusing on EHR Implementation with Minimal Practice Disruption, the Most Common Errors in EHR Implementation Contributing to Practice Disruption are Leadership Issues, Workflow Issues, Provider Issues, Training Issues, Data Interface Issues and User Interface Issues.

With the help of surveys like the info-Tech Research Group EMR Readiness Assessment Question naire, the Accustat EMR Questionnaire and an EMR Questionnaire from Laerum & Faxvaag (2004), some of the critical issues in EHR implementation were identified with context to the Provider and Vendor Perspectives. The major critical issues were; Integration of System into Current IS and IT Used in the Organization, Management Project Support, Physician Project Support, Nurse Project Support, and Allied Health (Support Staff) Project Support, System Easily Integrates with Current Business Processes, Security, Business Continuity Planning, System Capabilities for Clinical Decision Support Privacy, System Properly Allows Certain Professionals to See Only Information that is Needed, CCHIT Certification, Physical

Infrastructure for the System, Service-Level Agreement, EHR Project Team Composition, Clear System/Project Goals and Documentation, Integration with HIE, RHIO, or Other Organizations to Share Patient Data, Test Results, Billing, etc., Cost-Benefit Analysis.

The utilization of various components of Ambulatory EMR by the health care providers.

Based on certain components like Electronic access to test results, Electronic decision support & Electronic Communication, etc., a Cross-sectional study was conducted to identify the usage of Ambulatory EMR Software by registered nurses and MDs as a part of a collaboration of researchers at Vanderbilt University Medical Center and The Massachusetts General Hospital, by Catherine DesRoches et. al. (2008), showing that there remains a relatively low rate of utilization for ambulatory EMRs.

	Routine User			
Functionalities Routinely Used by Nurses	**RNs Only**	**MDs Only**	**Both**	**Neither**
Electronic medical information about patients, including problem list, key patient demographics	16%	5%	43%	34%
Electronic ordering of tests, procedures, or drugs	30%	5%	37%	25%
Electronic clinical and patient notes	18%	7%	31%	40%
Electronic access to test results	14%	2%	66%	15%
Electronic decision support	18%	4%	24%	49%
Electronic communication	17%	5%	34%	41%
Patient support materials	34%	2%	27%	34%

FIGURE 2- Use of Ambulatory EMR Components Varied by Provider
***RN-Registered Nurse, *MD-Medical Doctor**

PROBLEM STATEMENT

Ophthalmology is high-volume ambulatory specialty in which patients are screened and treated at a rapid rate. Surgical procedures generally are carried out either in the office or in operating rooms and pre and post-operative evaluations are usually done by non-ophthalmologists. Although many practices have technicians and orthoptists, the key portions of the examination, assessment, surgery and plan are performed and documented directly. Thus, EMRs must support documentation and flux between the office and operating room.

The American Recovery and Reinvestment Act of 2009 (ARRA) constitutes $17.2 billion of financial incentives through Medicare and Medicaid to accelerate adoption of health information technology. It also includes penalties for providers failing to adopt by 2017.

Implementing the right system the right way is essential for ensuring project success and protecting patient safety. An understanding of the factors associated with physician's acceptance will allow organizations to better assess the system and help in successful implementation. Almost half of eye care providers with an ambulatory EMR do not use the software to its full functionality. Only 40% of US ambulatory care providers used a fully functional system including patient history and demographics, problem lists, physician clinical notes, comprehensive medications and allergies lists, computerized prescription orders, and laboratory and imaging results viewed electronically, implying that reported use of an ambulatory EMR in an eye care setting cannot be equated with meaningful integration of an EMR into practice.

Providers somewhere feel that EMRs hinder their ability to see patients in a timely manner and they also have to compensate by working additional hours to meet meaningful use requirements and catch up on documentation, negatively affecting the patient satisfaction. It has also been documented that the patient workload and appointment schedule will actually see a decrease in activity as the new system is implemented and doctor's become familiar with it.
In order to encourage the optimal use of EMRs, barriers associated with the need to change medical practice should be addressed.

Healthcare organizations of all sizes encounter major challenges in the course of EMR implementation. At its worst, these challenges result in wasted resources, frustrated or dissatisfied providers, loss of confidence by patients and families and patient safety issues.

This study focuses on the barriers physicians face on both a personal and practice level during the adoption and use of such systems. The primary research question of this study is, what are the fundamental issues that create barriers to EHR implementation and use?

Addressing these pain points for the EMR system will allow the practice or clinic to move forward with digital medical information and scanned patient chart information readily available, minimizing interruption, protect against loss of revenue, and increase the efficiency to better service patients in the new electronic records environment.

OBJECTIVE

To study the perceived barriers to Ambulatory EMR implementation in ophthalmology care.

SPECIFIC OBJECTIVES

- To study the fundamental issues in implementing an Ambulatory EMR.
- To review the utilization of various components of Ambulatory EMR by the health care providers.

RESEARCH METHODOLOGY

Research Design

This is a review study. The data collection sources for this study are secondary data sources.

Search Strategy

All major bibliographic databases and several specialist datasets were searched. The search strategies included terms such as: electronic or computer, EHR or EMR implementation, ambulatory care or outpatient care, implementation issues. Citations of papers that used a reference standard for assessment of quality were searched. A literature search of four relevant databases ("MedScape", "BioMed Central", Becker's ASC Review and "PubMed") was conducted. There was no limitation of publication date in the search.

Selection Criteria

Selection criteria to be included in the literature review: 1) articles written in English, 2) article solely focused on EMR or EHR, not involving other electronic systems used in medical practices, 3) articles related to implementation barriers linked to physicians (medical specialists, general practitioners) including other medical staff also, 4) based on empirical studies and published in scientific journals, 5) articles focused on implementation of ambulatory EMR. The articles first identified in the reference lists of the papers found through the database searches were also assessed.

Data Analysis

A sub-systematic method was followed, which was divided into three phases: literature collection, assessing, and selection. The literature search was conducted and 25 articles were collected. After excluding the duplicated articles, some articles were excluded based on the following criteria: 1) articles related to barriers linked to physicians or to other medical staff in a hospital set-up, 2) articles that dealt with patient acceptance only, 3) articles that were purely technical in nature. For each of the studies that had survived this filtering, the research approach was first assessed. If it was a qualitative study, the number of cases and the methods used in data collection were identified. If it had used a quantitative approach, information concerning the sample size was sought. Secondly, the results of the studies related to implementation of ambulatory EMR were summarized. Thirdly, pragmatic results of the studies related to expected or experienced barriers were summarized for further analysis. After filtering 14 articles were selected. In the analysis phase a comparative approach was used in which all the selected articles were investigated to identify the barriers to implementation of EHRs by physicians.

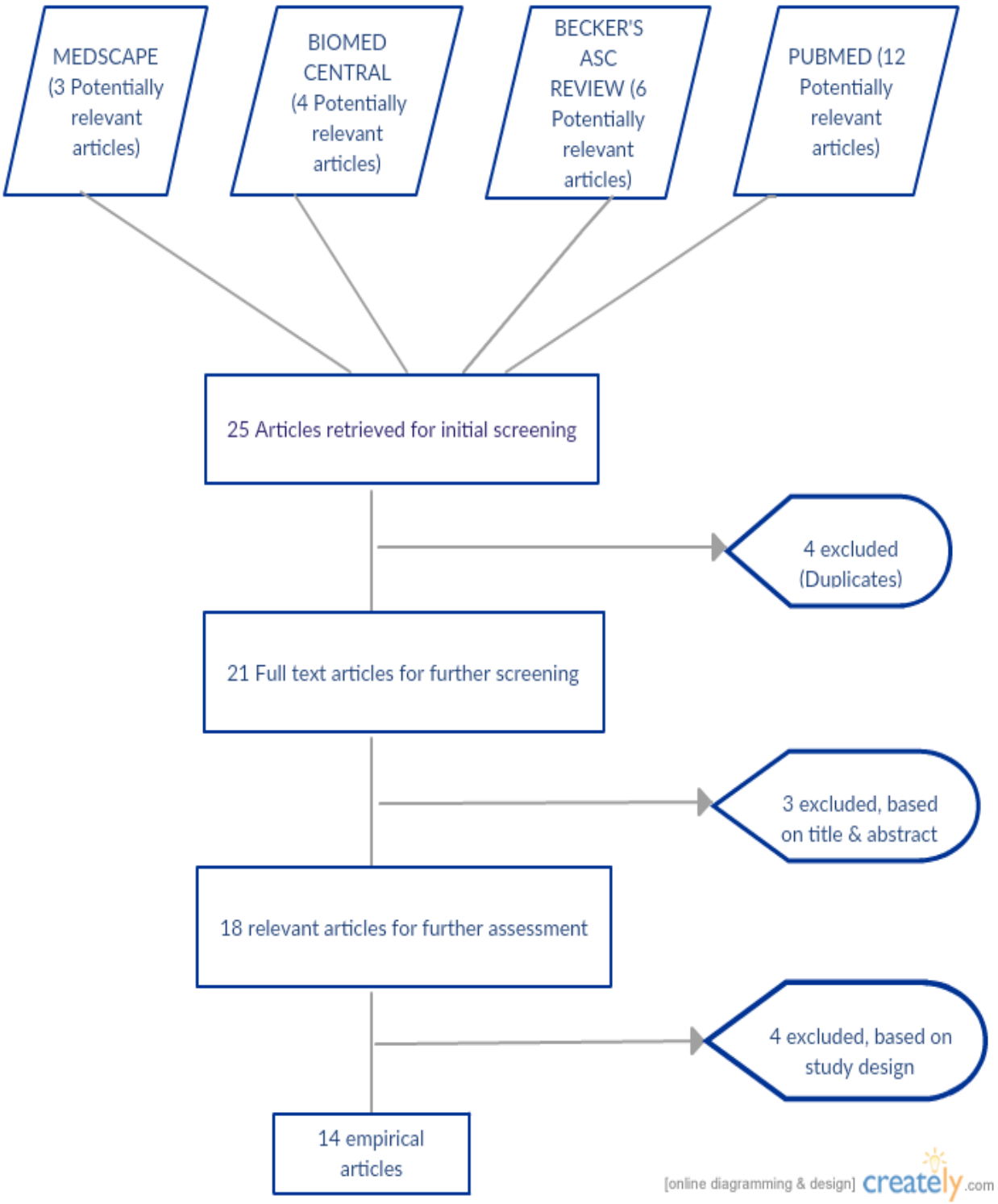


CHART 4- Flow chart of study selection process

TABLE 1- Overview of Included Studies

S. No.	Title	Author	Time/Year	Type of Research	Sample Size	Method of Data Collection	Results
1	Fundamental Issues in Implementing an Ambulatory Care Electronic Health Record	Ann Scheck McAlearney, et. al.	2015	Qualitative study	47 physician and 35 administrative informants	Focus Group Discussion and Key Informant Interviews	6 Fundamental issues that emerged as perceived barriers to physicians' adoption and use of EHR systems: (1) need to change practice style; (2) threat to professionalism; (3) shift of expertise; (4) required changes to interactions with patients; (5) concern about the impact on medical education and training; and (6) concern about the potential impact on clinical practice itself.
2	Barriers for Adopting Electronic Health Records (EHRs) by Physicians	Sima Ajami and Tayyebe Bagheri-Tadi	2013	Un-systematic Review	27 Articles		The review of identified articles shows the wide range of possible barriers to implementing EHRs, namely- Time, Cost, Absence of computer skills, Workflow Disruption, Concern about Privacy and Security, Communication among users, Interfaces with doctor-patient relationship, Lack of Incentives, Complexity, Physical Space, Concern about the ability to select an effectively install EHR system, Technical Support, Interoperability, Access to computers and computer literacy, Vendoe Trust, Expert Support, Concern about data entry, Training and after-sail experiences with their vendor, Reliability, Inadequate data exchange, Concern about patient acceptance, Formal training, Speed, Interinstitutional integration, Wireless connectivity.

3	Physicians' use of Electronic Medical Records: Barriers and Solutions	Robert H. Miller and Ida Sim	2004	Qualitative Study	About 90 interviews between 2000 and the end of 2002 with EMR managers and physician champions in thirty physician organizations, representatives from EMR vendors, professional medical associations, and IT consulting firms.	Semi structured interview questionnaire	Key surface barriers to EMR use included High initial cost and uncertain financial benefits, High initial physician time costs, Technology, Difficult complementary changes and inadequate support, Inadequate electronic data exchange, Lack of incentives, Physicians' attitudes.
4	Barriers to ambulatory EHR: who are 'imminent adopters' and how do they differ from other physicians?	Nir Menachemi	2006		All primary care physicians and a 25% stratified random sample of clinical specialists total n=14,921	A five-page survey was developed specifically for this study, and mailed to physicians with a clear and active license to practice medicine in Florida.	Key findings were: lack of time to acquire and implement an EHR system, differences in financial barriers, differences existed in productivity-related and technical-related barriers, disruption to the workflow of their office's physical layout, Upfront cost of hardware/software and inadequate return on investment.
5	EHR Implementation with Minimal Practice Disruption in Primary Care Settings: The Experience of the Washington & Idaho Regional Extension Center	Jeff Hummel	2012		The vignettes described, which are based on the real-experiences of clinics, reveal patterns in EHR implementation that can result in either avoidable errors (Clinics A		The Most Common Errors in EHR Implementation Contributing to Practice Disruption are Leadership Issues, Workflow Issues, Provider Issues, Training Issues, Data Interface Issues and User Interface Issues.

					and B) or successful adoption (Clinic C).		
6	The top 10 barriers to EHR implementation	Healthcare IT news Blog	2010				Sourcing results of the top 10 barriers to successfully deploying an EHR: Usability, Politics/naysayers, Fear of lost productivity, Computer Illiteracy/training, Interoperability, Privacy, Infrastructure/IT reliability, Vendor product selection/suitability, Cost and People.
7	Impact of an Electronic Health Record Operating Room Management System in Ophthalmology on Documentation Time, Surgical Volume, and Staffing	David S.Sanders	2014		Ophthalmic OR nurses (n = 13) and surgeons (n = 25) at an academic medical center.	For documentation time and circulating nurses per procedure, a prospective cohort design was used between January 10, 2012, and January 10, 2013. For surgical volume and overall staffing requirements, a case series design was used between January 29, 2011, and January 28, 2013.	The key findings were that (1) there was overall worsening in intraoperative documentation time following implementation of an EHR OR management system, which eventually improved to near–paper baseline levels for most procedure categories and (2) surgical volume and overall OR staffing requirements did not change significantly after implementation, although an increase in circulating nurses persisted through the study in cataract procedures.
8	Top 10 EHR Adoption Challenges	EHR Intelligence article	2012				A list of the top EHR adoption hurdles: Cost, Time, Preparation, and Rollout strategy, Availability of vendors, Training, Communication, Interoperability, Culture and Data migration.

9	Impact of Information Technology on Information Gaps in Canadian Ambulatory Care Encounters	Lauren Korosec, Krista Balenko, and Simon Hagens	2015	Exploratory Study	A sample of specialist physicians practicing in outpatient clinics (n=1800 patient encounters)		Unconnected physicians were significantly more likely to be missing information they needed for patient encounters (13% of encounters for Unconnected physicians vs 7% for Connected physicians). Unconnected physicians were also more likely to report that missing information had consequences (23% vs 13% of encounters). Lab results were the most common type of patient information missing for both Unconnected and Connected specialists (25% for Unconnected physicians vs 11% Connected physicians).
10	Critical Issues in EHR Implementation: Provider and Vendor Perspectives	Prashant Palvia et. al.	2015		A total of 456 responses with 128 being mostly incomplete, which left a usable sample size of 328 responses. Of these, 284 were from physician providers and 44 were from EHR vendors and consultants.	These surveys included 1) the info-Tech Research Group EMR Readiness Assessment Question naire, 2) the Accustat EMR Questionnaire, and 3) an EMR Questionnaire from Laerum & Faxvaag (2004).	Critical EHR Implementation Issues are- Integration of System into Current IS and IT Used in the Organization, Management Project Support, Physician Project Support, Nurse Project Support, and Allied Health (Support Staff) Project Support, System Easily Integrates with Current Business Processes, Security, Business Continuity Planning, System Capabilities for Clinical Decision Support Privacy, System Properly Allows Certain Professionals to See Only Information that is Needed, CCHIT Certification, Physical Infrastructure for the System, Service-Level Agreement, EHR Project Team Composition, Clear System/Project Goals and Documentation, Integration with HIE, RHIO, or Other Organizations to Share Patient Data, Test

							Results, Billing, etc., Cost-Benefit Analysis.
11	Barriers to implement Electronic Health Records (EHRs)	(Sima Ajami and Razieh Arab-Chadegani	2013	unsystematic-review study	43 Articles		The most significant barriers were lack of national information standards and code sets (62 percent), lack of available funding (59 percent), concern about physician (51 percent), and lack of interoperability (50 percent). The major barrier to adoption of the EHRs system, as identified by some studies, was a misalignment of cost and benefits or financial reimbursement. Other barriers that have been identified are technical issues, system interoperability, concerns about privacy and confidentiality, lack of health information data standards, lack of a well-trained clinician informatics workforce to lead the process, the number of vendors in the marketplace, and the transience of vendors.
12	6 common challenges in EHR implementation	office practum blog	2016	Blog			Potential challenges and barriers you may face in EHR use-The technical ability, The cost of use, The people, The workflow break up, The training, The concerns with privacy.

13	Registered Nurses' Use of Electronic Health Records: Findings From a National Survey	Catherine DesRoches et. al.	2008	Cross-sectional study	The first sample (n = 987) is limited to RNs working in acute care hospitals, specialty hospitals, and ambulatory care settings. The second is restricted to RNs who reported working in a hospital setting in the past year (n = 806)	6-page survey mailed to a nationally representative sample of RNs	Fewer than 1 in 5 RNs work in healthcare settings that have adopted a minimally functional EHR. Use was related to measures of nursing excellence and increased efforts at quality improvement. There were no differences between RNs using an EHR and those not using one on time spent in patient care-related tasks. This study is the first to provide national data on RNs' use of EHRs. It suggests important relationships between EHR use, quality improvement, and nursing excellence.
14	6 Common EHR Implementation Challenges and How to Avoid Them	Go practice blog	2014	Blog			Implementation challenges are: The EHR implementation is breaking your budget, The EHR just doesn't fit into the workflow, EHR training is difficult and time consuming, Physicians resist using the HER, Your chosen vendor hasn't—or doesn't intend—to meet Meaningful Use Stage 2 requirements, The practice falls behind in meeting Meaningful Use requirements.

RESULTS

This review of study provides with the following key finding in relation to Ambulatory EMR implementation-

- Despite of availability of adequate number of ambulatory EMR products providing standard as well as unique features the utilization rate of ambulatory EMR software is still low.
- Fundamental implementation issues faced by physicians and vendors are one of the reasons for low software utilization rates.
- Implementation issues as concluded from the comparative study of the filtered articles are: Implementation Cost, Threat to Professionalism, Training Concerns, Practice Workflow Issues, Interoperability, Privacy Concerns, and Revolution in Practice

Approach, Administrative Concerns, and Interfaces with doctor-patient relationship and Loss of Productivity.

DISCUSSION

- Despite the positive effects from using EMRs in medical practices, the adoption rate of such systems is still low and they meet resistance from physicians. For instance, they are seen as contrary to a physician's traditional working style, they require a greater capability in dealing with computers and installing a system absorbs considerable financial resources. Also the software utilization varies according to the practice and physician perspective.
- This study analyzes the reasons behind the relatively low adoption rate of EMRs among physicians. Implementing an EMR system clearly changes the workflow in a medical practice. Moreover, an EMR implementation is a major change that is felt throughout the practice; it demands complementary adjustments and innovation in other aspects such as to the structure and culture of a practice. Therefore, fundamental implementation issues faced by physicians and vendors are one of the reasons for low software utilization rates.
- Reviewing the selected studies enabled to characterize the fundamental issues that emerged as perceived barriers to physicians' implementation and use of an Ambulatory EMR system in ophthalmology. The key issues evaluated from the study are:
    - Revolution in Practice Approach
      Impact of an EMR system on clinical practice emerged as an important issue as there was a need for physicians to explicitly change their behaviors and activities to use an EMR. Changing requirements for documentation associated with the EMR could threaten the completeness of medical records. As it is long to type a lot of things, physicians end up doing very abbreviated sentences and not, perhaps, including some of the details because it is too long, it becomes a disincentive to document well or physicians end up using your administrative academic time or nonworking time to catch up on abstractions. This issue was experienced differently by physicians of different ages and types; older guys are set in their own ways, and they are really very efficient and productive in the old method whereas the younger guys pick it up as if it were nothing.
    - Administration Concerns
      It’s hard to get sponsorship from senior leaders and many EMR implementation projects fail from underestimating the importance of one or more strong clinician champions to serve as opinion leaders for providers in the clinic. Most leadership problems stem from inadequate leadership support and failure to manage the EMR implementation project. This is often compounded by a lack of skills, knowledge, and understanding of change management principles. Frequently, smaller practices have instituted decision-making processes that lack structure including formal communications with staff. Regardless of who plays a leadership role, the key concept is that those people must have organizational support, ability to remove barriers, strong framework for communications plans for all staff members and sufficient time allocated to lead the EMR project.

- Training Concerns
  Training is one of the most important parts for successful EHR implementation. Clinics often underestimate the number of hours they need for training in efforts to reduce costs, or they may opt for over-the-phone (versus in person) training to avoid vendor travel costs. Providers often assume they can learn anything on the spot, and may skip aspects of training altogether. Clinics receive inadequate training, forego a full dress rehearsal and end up going live unprepared, leading to implementation failures. During EHR implementation, practices are suggested to train their employees throughout the new and improved workflow process. Unfortunately, this takes extra time, effort and resources some practices may not be able to afford.
- Practice Workflow Issues
  Clinical personnel, including providers, often have little insight into the clinic's workflows and the roles others play in care delivery. This blind spot results in inadequate planning for the most important determinant of successful implementation. There is commonly a lack of agreement on how the information is processed and organized, and finally where in the workflow the information will be used and by whom.
- Interoperability
  EMRs must make it easier for care teams to find information. Failure to complete and adequately test data interfaces (e.g., lab, radiology) before go-live results in "work-arounds" that contribute to post-implementation costs by wasting valuable staff and provider time handling or looking for information needed at the point-of-care for clinical decision making. Additionally, errors or gaps in data migration from legacy systems or paper charts contribute to post implementation costs by: Failing to capture data likely to be required for clinical decisions; Storing important information in ways that make it difficult to find; Wasting resources entering old information into the EMR that is unlikely to be used in the future such as old progress notes. Also failure to set up preference lists for diagnoses, medications or tests leaves providers scrolling through pages of choices, which is time consuming, frustrating and error prone.
- Threat to professionalism
  The transition to electronic records was also considered a major threat to physicians' professionalism because of the corresponding requirement for practitioners to adhere to the requirements of the EMR, including electronic documentation and compliance with standard guidelines. Physicians were concerned about their inability to seem competent using computers and the EMR system as the others could view what they had documented. Another barrier to changing medical practice was the notion that the transition to an EMR involved a shift in expertise and, correspondingly, a shift in the professional hierarchy. This reportedly occurred when junior physicians more comfortable with computers became EMR "experts" compared with their colleagues who had more clinical experience. This reflection on the need to maintain integrity exemplified the loss of confidence and perceived competence many physicians expressed with the introduction of the EMR.
- Implementation Cost

Advances in health information technology, such as EHRs, can be expensive in both implementation and usage. The high up-front financial costs of implementing EMRs are a primary barrier to their adoption. Physicians have to weigh the costs of creating and supporting their own IT structure and applications, or using external vendors to provide the services. These costs may include purchase price, coordination costs, monitoring costs, hardware, software, implementation assistance, training, and ongoing network fees, negotiating costs, upgrade costs, and governance costs. For small to medium sized practices without large IT budgets, costs remain the biggest barrier to adoption.

- Privacy Concerns
  One major issue that has risen on the privacy of the U.S. network for electronic health records is the strategy to secure the privacy of patients. Nonusers believe that there are more security and confidentiality risks involved with EMRs than paper records. There is added concern for privacy, confidentiality, and security for computerized patient information. According to USF Health, some healthcare providers and patients may be concerned about medical privacies when using EHRs. Common concerns include lost information due to a natural disaster and cyber hacks. Such security breaches could cause substantial harm to patients, as well as result in legal issues to providers. According to the HRSA, the common privacy concerns with EHRs are unauthorized access to records, tampering with records and the risk of losing information due to a natural disaster. Today records can be exchanged over the Internet and they are subject to the same security concerns as any other type of data transaction over the Internet.
- Interfaces with doctor-patient relationship
  One of the barrier that emerged involved how the introduction of an EMR caused physicians to change the way they interacted with their patients. Physicians had to relearn how to look at a person, how to talk to them in the examination room, carrying a laptop, compared with what they used to do. Patient eye contact is and, therefore, the more complete the interpersonal communication, possibly leading to higher quality of care. Unfortunately, not everyone is on board with the idea of implementing and using EHRs. Before bringing EHRs into the practice, the barriers that may be faced with patients and coworkers should be considered.
- Loss of Productivity
  Taking extra time to use EMR and not being compensated for taking a lighter load were perceived barriers. Many practices may not have the extra time required to learn how to work with a new system and not understanding how to use an EMR program can have a negative impact on productivity, so overcoming usability issues is important. Multiple screens, unclear navigation and too many options also leave physicians and nurses frustrated or unable to process patient notes. Clinicians are concerned they will lose 25% of their productivity for 3 months after implementation. Many providers, especially those working in small practices, report that they fear losing business as a result of putting the right amount of time into deploying an EHR

system. Considering the revenue these providers generate from their patient encounters, a dip in patient visits prove to be detrimental to their bottom line.

CONCLUSION

Healthcare system is moving towards greater and more meaningful use of EMR systems. Considering the significant expansion over the past five years, the U.S. market for ambulatory electronic medical record (EMR) software will increase 30% by 2020, increasing at a compound annual growth rate of 5.3 percent in the next five years, according to a new report from market research firm Frost & Sullivan.

Healthcare organizations of all sizes encounter major challenges in the course of EMR implementation. At its worst, these challenges result in wasted resources, frustrated or alienated providers, loss of confidence by patients and families and patient safety issues, and individual organizations may benefit from understanding the barriers to implementation.

Physician barriers to EMR implementation include a lack of participation in EMR selection and planning, a lack of consideration of the effect on physician compensation, a decrease in productivity during training time, the lack of a champion for the innovation, and the lack of supportive leadership. Workplace culture is another element critical to the success of health information technology implementations.

Study highlights 10 perceived barriers related to physicians' professional hierarchy, clinical workflow, and medical training. These changes have implications for clinical practice overall and may hinder successful utilization of full EHR functionality. The present study provides crucial information to individual organizations with operationalizing culture and workflow variables. The study findings also have important implications for EMR vendors. In addition, vendors must take user feedback into account during system builds and redesigns.

The impact of EMR implementation on the process of culture shift is a finding of particular interest. It was noted that Administrators and physicians also noted that not only do medical schools need to teach students to interact with an EMR, they also need to teach the integration of EMRs into the process of patient care. Specific elements of the EMR that have been linked to increased patient quality may be the most difficult for individual physicians to implement, a potential explanation for the gap between EHR implementation and utilization of a fully functional system. Another area for future research is the potential link between individual elements of an EMR (and EMR systems) and the issues identified here. If the goal is to increase the utilization of fully functional EHR systems, understanding how different types of EHR functionalities and systems impact the physician experience is critical.

This review study can be used to serve as a foundation for conducting further research based on primary data with respect to perceived barriers in a real time scenario pertaining to workflow, clinical practices, and surgical pathways with respect to EMR software in ambulatory surgery set-up.

LIMITATIONS

This review study experienced certain limitations, which are as follows-

- Source Limitation- There was considerable variability in the breadth of literature related to each of the implementation issues. The review study was limited by secondary data sources. Since there was no primary data source, the study included various reports, articles available on web portal, scholar articles & books etc.
- Search Limitation- A bias in the literature towards EMR implementation issues may limit our ability to capture some of the positives.
- Timeliness of evidence- Health IT and EMR technology is rapidly evolving and as a result, evidence and research may quickly become dated. A number of studies were conducted in the 1990s and early 2000s and while largely applicable, their specific applicability to the current health care system is uncertain.

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