DISSERTATION

On

"Transfer of Care in Post-operative Cataract Cases in US Healthcare System"

SUBMITTED BY

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PG/15/032

UNDER THE GUIDANCE OF

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ABSTRACT

United States is witnessing the increase in the population of baby boomers, who are medically complex and contributing towards the sick population. This situation is necessitating greater input from physicians with medical expertise and consistent and rapid availability. With an increasing proportion of the population ageing, chronic eye diseases are expected to increase in numbers, consequently, more Americans will require long term management of eye conditions and access to tertiary services. Changing patterns of vision loss as a result of age-related eye diseases will dictate the course of change in eye health service delivery.

The proportion of optometrist and ophthalmologist varies greatly within the geographical distribution. This variation in the proportion of both the health care providers sometimes compromise the health seeking behavior of the patients. Collaborative care and task sharing present an opportunity to utilize the existing skills of the current workforce to meet future demands

An exploratory study was conducted to understand the existing framework of co-management for ocular diseases in US Healthcare system and the integrated approach of ophthalmologists and optometrists in the management of post-operative cataract cases, to review the quality of service required by an individual in this cycle of shared care and to determine the role of Healthcare IT in providing an electronic platform for co-management.

This research demonstrates that integrated care between optometry and ophthalmology is a safe and effective approach to deliver quality eye care and efficient management of any post-operative complications after cataract surgery. This research also demonstrates that there are opportunities for task sharing to meet the future demands on the eye care setting to manage patients who require long-term monitoring. This research can be utilized to

further develop electronic platform for efficient management and even out the disease cases through clinical and other referral pathways.

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 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,
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LIST OF CHARTS

LIST OF ABBREVIATIONS

1. ACO- Accountable Care Organization
2. AMD- Age related macular degeneration
3. ASC- Ambulatory Surgical Care
4. CDC- Centre of Disease Control
5. CMS- Centres for Medicare & Medicaid Services
6. EHR- Electronic Health Record
7. ELI- Engage Learn Inspire
8. GBD- Global Burden of Diseases
9. GP- General Practitioner
10. Healthcare IT- Healthcare Information Technology
11. HES- Hospital Eye Services
12. HIPAA- Health Insurance Portability & Accountability Act
13. IOL- Intraocular Lens
14. MD- Doctor of Medicine
15. OD- Doctor of Optometry

16. PM- Practice Management
17. RCM- Revenue Cycle Management
18. USA- United States of America
19. WHO- World Health Organization

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 and Recovery, Certifications, Online Reputation Management, Collectibles, Insurance and Annuities, Media and 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 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 unified solution: improved efficiency, increased revenue, fewer medical errors, and more personal freedom. MDOffice lets the heath care provider tailor their own easy-to-use charts, whether they work in one office or are a physician linked to a clinic. MDOffice flexible and customizable medical records, providers can write own problem-specific forms and use personal phrases to detail encounters. They can quickly and easily organize notes and records of lab findings, prescribed medication, allergies, vitals, and images; they can also draw and annotate directly on stock drawings, or insert drawings and images into their notes and patient charts; they can make graphs to chart the trends of vitals, test and lab results; and also get access to medical databases MDOffice takes the hassle out of managing medical records.

MDOffice list of software products and applications are as follows:

- MDOffice desktop version (EMR+PRACTICE MANAGEMENT)
- CLOUD (EMR+PRACTICE MANAGEMENT)
- MOBILE (EMR+PRACTICE MANAGEMENT)
- PATIENT PORTAL.
- E-PRESCRIPTION.
- AMBULATORY SURGICAL CARE (ASC)
- REVENUE CYCLE MANAGEMENT (RCM)

Fig.1 MDOffice list of products (Desktop version and Mobile)

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

- Ticklers
- Patients
- Schedules
- Billing
- Deposits

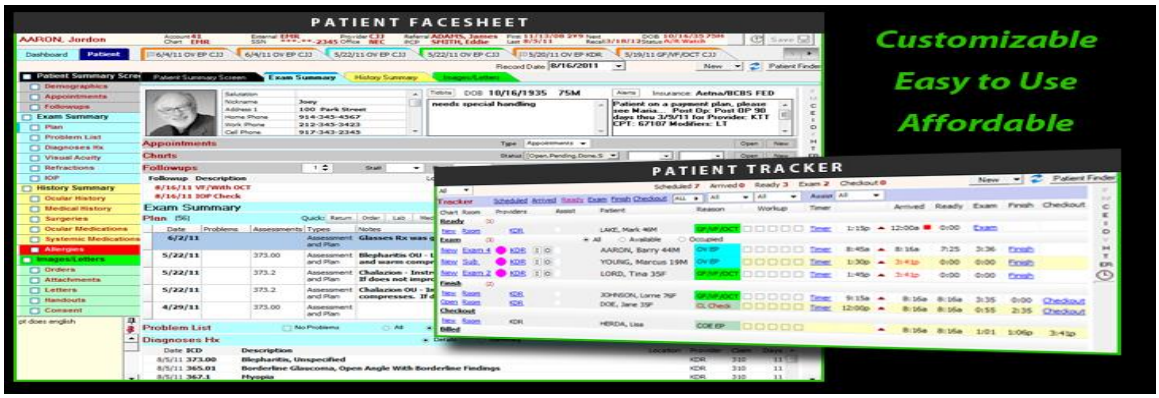


Fig. 2. MDOffice Desktop version

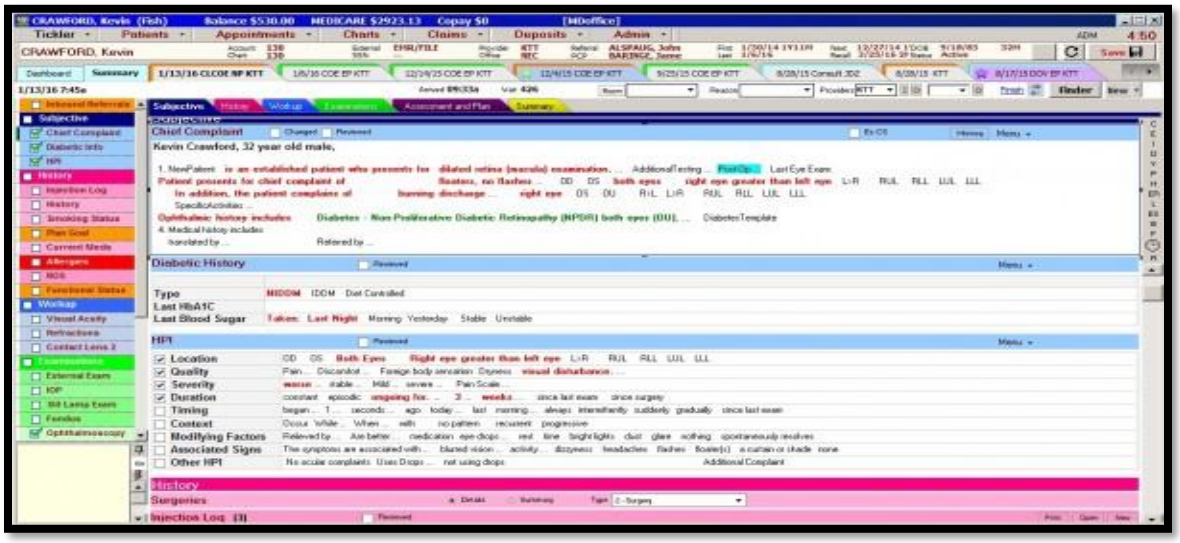


Fig. 3. MDOffice EMR Software showing patient summary

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. Providers can also set event reminders for themselves or any other staff member using ticklers

Patients:

Providers 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. They can also store medical and accounting alerts to warn their staff about special patient conditions, needs, drug allergies, payment schedules, and overdue balances. They can create custom fields to print on letters, statements, and insurance forms.

Schedules:

Health care providers 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, they 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 the user 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 practice/provider's discretion.

Write-off: The difference between 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 and studying and discussing the various modules of the software. I did market research on various organizations as a part of Mergers and 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 and Harassment at Workplace. I also did research on other ophthalmology software involved in providing co-management support to the health care providers.

LEARNING FROM INTERNSHIP PERIOD

The major learnings 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 and Acquisitions Activity;
5. design specifications according to the user interface;
6. interaction with the various clients involved.

DISSERTATION REPORT

Transfer of Care in Post-operative Cataract Cases in US Healthcare System

1.INTRODUCTION

The state of health is eminent for all the healthcare providers, community stakeholders, Government and the people of the country. Health as a state subject, plays a pivotal role by highlighting the burden of diseases over the community, the proportion of population suffering from morbidities and disabilities, the fraction of population maintaining the essential standard of living and further contributing towards the development of overall economy of the country. It serves as a foundation for integration of knowledge, experience, expertise, skills and technology. Affordability, accessibility, accountability, effectiveness along with maintenance of quality of care form the pillars of comprehensive health care delivery system.

In order to ameliorate the coverage of health care delivery system, there is a need of integration of specialties and sub specialties accompanied with diversification of treatments. With this purpose, the concept of medical co-management was introduced among the health care providers. Co-management occurs when two or more physicians representing different specialties share responsibility, authority and accountability for the management of hospitalized patients. It is different from traditional medical consultation where an attending physician assumes primary responsibility for the patient while the consultant limits his involvement to a specific problem and remains subordinate to that attending physician.

Co-management generally develops in three distinct ways. It may evolve as a logical consequence of a longstanding working relationship between departments that wish to collaborate in a more structured manner to improve the care of patients. It may be instituted by a hospital administrator or department chair who mandates co-management

as a solution for service, quality or other performance deficiencies. Finally, co-management may develop seemingly accidentally, where there is transfer of care to another physician by the physician responsible for the patient.

In well-designed co-management arrangements, physicians and surgeons work equitably under clearly and mutually defined rules of engagement, share responsibility for patients, and collaborate to improve care and learn from each other.

Global prevalence 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

In accordance to WHO Report on Global Data on visual impairment (2010), the prevalence of eye diseases and conditions is as follows-

1) Global prevalence of eye diseases and conditions-
    a) 285 million visually impaired
    b) 39 million blind
    c) 246 million having low vision
2) Globally,
    - The major causes of visual impairment are:

    a) Uncorrected refractive errors (myopia, hyperopia or astigmatism), 43 %

b) Cataract, 33%
c) Glaucoma, 2%
d) AMD, Diabetic retinopathy, trachoma and corneal opacities, 1%
e) Undetermined causes, 18%
    - The causes of Blindness are:

a) Cataract, 51%
b) Glaucoma, 8%
c) AMD, 5%
d) Childhood blindness and corneal opacities, 4%
e) Uncorrected refractive errors and trachoma, 3%
f) Diabetic retinopathy, 1%
g) Undetermined causes, 21%

3) In American region,-
    a) 3.5 blind per million population
    b) 25.6 low vision per million population
    c) 29.1 visually impaired per million population

According to National Eye Institute, prevalence of eye diseases in America (2014), is as follows-

a) 24 Million- Cataract
b) 7.7 Million- Diabetic Retinopathy
c) 2.7 Million- Glaucoma
d) 2.1 Million- Age related Macular degeneration

United States is witnessing an increase in the population of baby boomers, who are medically complex and contributing towards the sick population. This situation is necessitating greater input from physicians with medical expertise and consistent and rapid availability. Surgeons and specialists are increasingly eager to focus their practices, reduce their workloads and allocate greater time to performing financially lucrative procedures. Hospital administrators, under pressure to contain costs, improve quality of

care and retain high-demand specialists, often encourage medical co-management to facilitate these ends.

Co-management and Ophthalmic diseases

In the field of Ophthalmology, it has been experienced that for efficient and effective patient management, there has been collaboration of care providers. Both ophthalmologists as well as optometrists harmonize to expand horizon of the health care services.

Co-management is a relationship between an operating ophthalmologist and a non-operating practitioner for shared responsibility in the postoperative care when the patient consents in writing to multiple providers, the services being performed are within the providers' respective scope of practice and there is written agreement between the providers to share patient care. This involves "transfer of care", where there is complete transfer of responsibility for a patient's care from one qualified healthcare provider operating within his/her scope of practice to another who also operates within his/her scope of practice.

It refers to an arrangement in which selected groups of patients are reviewed by optometrists as part of a multidisciplinary collaboration with ophthalmologists and other eye care professions. It is an organized and formal mechanism to actively engage a group of physicians to achieve greater operational efficiencies and improved patient care outcomes. The locus of co-management varies according to local requirements, and in context of the diseases or conditions. These arrangements also called as clinical co-management and medical co-management agreements. These arrangements involve different protocols which lay a foundation for the description of the roles of ophthalmologist as well as optometrist. These protocols varies from diseases to diseases.

It represents a relationship between the ophthalmologist and optometrist for shared responsibility in the pre-operative and post-operative care following any surgery.

Ophthalmologist and Optometrist-

An ophthalmologist is an MD, trained to care, diagnose and treat all eye diseases and conditions, performs eye surgery, prescribes and fits eyeglasses and correct vision problems. Many ophthalmologists are also involved in scientific research on the causes and cures for eye diseases and vision disorders. She/he specializes in a specific area of medical or surgical eye care.

An optometrist's role is confined to performing eye exams, vision tests, prescribing and dispensing corrective lenses, detecting certain eye abnormalities, and prescribing medications for certain eye diseases.

Optometrists are healthcare professionals who provide primary vision care ranging from sight testing and correction to the diagnosis, treatment, and management of vision changes. An optometrist is not a medical doctor. Many optometrists perform pre- and post- operative care for eye surgeries including cataracts, retinal detachments, laser refractive surgeries and diabetic retinopathy. Optometrist have been successfully co-managing patients with ophthalmic surgeons for many years.

The Federal government has recognized the role of optometrists in providing this care within this arrangement. There are approximately 19,216 ophthalmologists and 45000 optometrists in USA. However, there is a need to identify whether the growing number of optometrists in comparison to ophthalmologists and the transfer of care are providing any aid in better management of patients while maintaining the quality of care and at affordable cost.

Circumstances depicting co-management-

- The operating ophthalmologist and non-operating practitioner provide postoperative care within an integrated health system in which both the operating ophthalmologist and non-operating practitioner are employees of the parent entity and, as such, do not directly participate in Medicare co-management. The protocol for co-management or transfer of care emphasizes patient safety and the timing of this transfer is based on postoperative stability and patient preference.

- Patient inability to return to the operating ophthalmologist's office for follow-up care
    - Patient is unable to travel to the ophthalmologist's office due to distance.
    - Lack of availability of the person(s) or organization previously responsible for bringing the patient to the operating ophthalmologist's office.

- Operating ophthalmologist's unavailability
    - The operating ophthalmologist will be unavailable to provide care (e.g. travel, illness or leave, surgery performed in an ophthalmologist shortage area).

- Patient prerogative
    - The patient requests co-management or transfer of care to minimize cost of travel, loss of time spent travelling, or the patient's inconvenience, and gives informed written consent to the co-management arrangement or the transfer

of care and the operating ophthalmologist is familiar with the non-operating practitioner and is confident that the practitioner has the adequate training, skills and experience to accurately diagnose and treat the conditions that are likely to be presented as well as the willingness of the non-operating practitioner to seek advice from operating ophthalmologists whenever necessary.

- Change in postoperative course
  - Development of another illness or complication best handled by another qualified health care provider.

- Development of an intercurrent disease.

Besides the several circumstances depicting the existence of co-management for ocular diseases, there are some of the problems that were documented during this review study of co-management in eye-care are:

- Legal risks- These derive from state anti-kickback and fee-splitting laws. Arrangements that call into question the purpose of the co-management and cause speculation about the ethical behavior of those involved may be considered illegal. Additionally, state laws govern the scope of practice of ophthalmologists and optometrists and limit what can be delegated to another doctor by the surgeon.
- Medical risks- These are associated with poor outcomes or mismanagement.
- Loss of patients- Co-managing surgeons also run the risk that patients will seek out a better offer with a competitor.

- Routine co-management or transfer of care referral arrangements are not appropriate. Instead, co-management and transfer of care arrangements should be conducted pursuant to written patient-specific protocols.

Cataract and Co-management

Cataract is a clouding of the eye's naturally clear lens. Most cataracts appear with advancing age. The exact cause of cataract is unclear, but it may be the result of a lifetime of exposure to ultraviolet radiation contained in sunlight, or may be related to other lifestyle factors such as cigarette smoking, diet and alcohol consumption. Cataract can also occur at any age as a result of other causes such as eye injury, exposure to toxic substances or radiation, or as a result of other diseases such as diabetes. Congenital cataracts may even be present at birth due to genetic defects or developmental problems. Cataracts in infants may also result from exposure to diseases such as rubella during pregnancy.

According to the World Health Organization, cataract is the leading cause of blindness in the world. In the United States, cataract is sometimes considered a conquered disease because treatment is widely available that can eliminate vision loss due to the disease. However, cataract still accounts for a significant amount of vision impairment in the U.S., particularly in older people who may have difficulty accessing appropriate eye care due to cost, availability or other barriers.

Treatment of cataract involves removal of the clouded natural lens. The lens is usually replaced with an artificial intraocular lens (IOL) implant. Cataract removal is now one of the most commonly performed surgical procedures with more than a million such surgeries performed each year. Surgery is not truly a cure for cataract, however, and its success in controlling vision loss comes with a price. It is estimated that the direct annual medical costs for outpatient, inpatient and prescription drug services related to the treatment of cataract total $6.8 billion. Cataract affects over 24.4 million Americans age

40 and older, or about one in every six people in this age range. By age 80, more than half of all Americans have cataract. Cataract is slightly more common in women than in men.

The 2000 United States census data estimated that roughly 20.5 million Americans older than 40 years of age had a cataract. By 2020, that number is expected to rise 46.8%, to 30.1 million. The postoperative follow-up schedule for a typical cataract patient is generally advocated at one day, one week, one month and two months subsequent to the surgical extraction of the cataract. Conventionally, the surgeon will see the patient the day after the surgery, and the optometrist assumes postoperative care at the one-week or one-month visit. This may vary depending on the co-management relationship with the surgeon._Cataract surgery involves removing the cloudy lens and replacing it with a permanent prosthetic intraocular lens ("IOL"). The typical IOL ("Conventional IOL") provides patients with clear distance vision but does not correct any pre-existing refractive problems that may have been causing the patient to have difficulty seeing at near or intermediate distances. Patients receiving a Conventional IOL would still require glasses or contact lenses to correct these vision problems.

Referral Pathways-

The typical cataract referral and treatment pathway consists of several steps which includes, referral of a patient by an optometrist to general practitioner (GP) following eye examination. The patient has appointment to see the GP and is then referred to Hospital Eye Service (HES). Afterwards ophthalmologist diagnoses patient and assesses suitability for surgery. The patient undergoes biometry at hospital followed by surgery at the hospital. The patient is assessed 24 hours after surgery at hospital. Then the ophthalmologist assesses the patient for discharge. The patient then visits optometrists for post-operative refraction and supply of spectacles.

This leads to quite a protracted process for the patient and what may be a significant period of time before they are supplied with suitable spectacles for their post-op refraction.

Co-management schemes reduce the number of steps in the process and may be as follows-

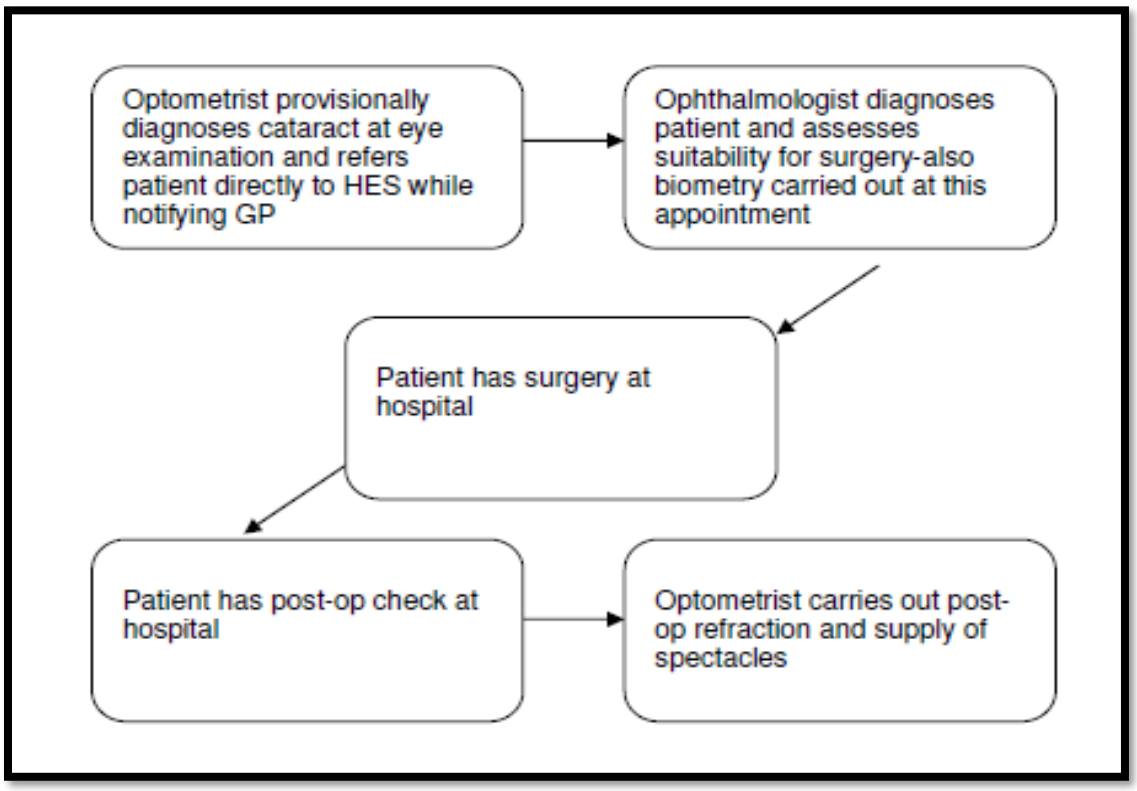


Fig.4. Referral pathway in co-management

Cutting out the excess steps in the patient journey reduces the number of appointments needed at the hospital and therefore the waiting list time for surgery.

Financial Modality-

Cataract surgery involves removing the cloudy lens and replacing it with a permanent prosthetic intraocular lens (“IOL”). The typical IOL (“Conventional IOL”) provides

patients with clear distance vision but does not correct any pre-existing refractive problems that may have been causing the patient to have difficulty seeing at near or intermediate distances. Patients receiving a Conventional IOL would still require glasses or contact lenses to correct these vision problems. Newer types of IOLs can correct vision at multiple ranges or correct astigmatism (collectively, "Premium IOLs"). Patients opting for a Premium IOL may no longer require glasses or contact lenses after surgery. The Medicare program covers Conventional IOLs when reasonable and necessary for a patient. In addition, even though glasses and contact lenses generally are excluded from Medicare coverage, Medicare does cover one pair of glasses or contact lenses following cataract surgery.

Cataract surgery is a global surgical procedure, which means that Medicare pays the physician one global fee for the pre-operative care, the surgery, and the post-operative care for 90 days following the surgery. Payment for the Conventional IOL implant is bundled into the facility fee for the surgery. When a physician transfers care to another health care professional during the global surgical period (e.g., the surgeon transfers the patient back to his or her optometrist for post-operative care), the health care providers bill Medicare using the -54 (surgical care only) and -55 (post-operative management only) modifiers.

Premium IOLs cost significantly more than Conventional IOLs. In addition to the implant itself being more costly, the facility and physician may require additional resources for fitting and inserting the Premium IOL. Additional visual acuity testing may also be necessary in connection with Premium IOLs. The Centers for Medicare and Medicaid Services ("CMS") considered how to cover Premium IOLs and ultimately issued two rulings explaining that both the professional fee and the facility fee are partially covered by the Medicare program. Correction of refractive errors does not fall into a covered benefit category. If a Medicare beneficiary elects to receive a Premium IOL rather than a Conventional IOL, Medicare pays for the medically necessary cataract surgery when a Premium IOL is inserted, as well as the covered aspect of the IOL. However, the beneficiary is responsible for the professional and facility fees associated with increased

testing and other services related to the correction of refractive errors, as well as the difference in cost between the Premium IOL and the Conventional IOL.

Scope statement-

The study will be limited to the Ocular disease burden with a specific focus on Cataract and its post-operative co-management pertaining to United States Healthcare Scenario. The study will highlight the patient outcomes, perception of healthcare providers in cataract co-management along with role of Healthcare IT in providing an electronic platform for effortless service delivery during transfer of care in post-operative cataract cases.

2.LITERATURE REVIEW

A comprehensive search of the literature was performed using key sources in ophthalmology and optometry. International journal indexes searched were the PubMed and Sage Journals and Discovery. Keywords entered included ‘eye workforce’, ‘eye services model of care’, ‘vision impairment’, ‘ophthalmology referrals’, ‘community care’, ‘task sharing’, ‘task shifting’, ‘ophthalmology and technology’, and ‘access to eye services’, ‘optometry’ and ‘collaborative care’.

The literature was reviewed in relation to topics associated with models of eye care; demand, access, workforce, models of care, technology, referral practices and the WHO Health System Framework.

Quality of care in post-operative cataract co-management

With an integrated approach for the management of post-operative cataract cases, it is imperative for the optometric workforce to maintain the quality of care during the health care service delivery.

According to a study in relation to Quality of care in cataract surgery cases experiencing post-operative complications with co-managed care [2], in 89.5% of cases co-management was successful in diagnosing complications and in managing the patient to maximize vision function. 99.8% (2,454 of 2,458) of co-managed cases contained evidence that the optometrists provided high quality post-operative care and were able to diagnose complications. Using physician evaluations as the standard, the sensitivity of detection of complications by optometrists was 95.9% and the specificity was 99.5%.

And in accordance to a study on evaluation of referral pathway (Park JC et. al., 2009) [1] it was found that, Optometric referrals, relative to general practitioner referrals, were more likely to include information relating to objective visual loss (100 vs 87%, P¼0.0061) and to counsel the patient (97 vs 18%, P¼0.0001).

The experiences and perspective of patients and care providers in relation to co-management.

The concept of co-management involves integrated care and transfer of care for efficient patient management with perpetuation of quality of care accompanied with beneficial outcomes for the health care providers involved in the circle of care.

A study conducted focusing on Shared care for chronic eye diseases: perspectives of ophthalmologists, optometrists and patients[5] (O'Connor PM et, al., 2012) highlights model of shared care between optometrists and ophthalmologists for patients. According to which, Optometrists not only met ophthalmologists' expectations but exceeded them, appropriately detecting and referring patients with additional, previously undetected conditions. Patients reported savings in travel time and were satisfied with the quality of care they received. Optometrists, ophthalmologists and patients indicated a general acceptance of shared care arrangements, although there were some issues relating to interprofessional trust.

In accordance with a study, where the Consumer Quality Index Cataract Questionnaire was used to measure patients' experiences with the quality of care after uncomplicated first-eye cataract surgery [2]. Patients in the co-managed care pathway reported similarly good experiences with the quality of care as patients who received their reviews by an ophthalmologist.

According to a report published by Review of Optometry, (2013); a survey was conducted following the trends of co-management. The survey was sent by email to some 32,000 ODs. More than 10% opened the email and nearly 400 optometrists responded to the survey.

93% of ODs who answered the Comanagement Survey say they participate in some form of Comanagement at least once a month. And 80% report that the number of patients they comanage has been increasing during the past few years.

In a study concerning towards Patient outcomes with co-managed post-operative care after cataract surgery[5], it was found that Eighty-seven percent of eyes were co-managed.

Average number of post-operative visits within 90 days was 4.7 and 6.2 for co-managed cases with and without complications, respectively.

Successful visual acuity outcomes (< 20/40) were experienced by 86% of all co-managed patients. For co-managed patients without pre-existing medical or ocular conditions, 92% had successful vision outcomes, while 77-90% with these conditions had successful outcomes. Ninety-three percent of co-managed cases had no post-operative complications, and the rate of specific types of complications ranged from 0.04 to 2.0%. Using physician evaluations as the standard, sensitivity of optometrist detection of complications was 59% and specificity was 99.6%. Optometrists located in separate offices demonstrated 95.8% accuracy in assessing patients for post-operative complications.

The role of Healthcare IT in co-management of ophthalmic cases.

A system, a method, and an electronic platform provide co-management of two or more healthcare practices, such as an ophthalmology practice and an optometry practice. In one aspect, the disclosure provides for a method including retrieving an electronic health record for a patient and storing first health information for the patient corresponding to a diagnosis of the patient by the first healthcare practice. The patient is referred to the second healthcare practice in response to the diagnosis of the patient, corresponding to treatment provided by the second healthcare practice. The electronic health record and the health information are provided to the second healthcare practice, and second health information is stored for the patient corresponding to treatment of the patient by the second healthcare practice. At least one follow-up visit is scheduled for the patient at one of the first healthcare practice or the second healthcare practice. A first portion of a referral fee from the second healthcare practice is distributed to the first healthcare practice, and a second portion of the referral fee is distributed to a co-management system provider.

This component may be an open source platform for clinical data, which captures written chart notes, electronic patient data, and any other data necessary for a collaborative platform to measure the pre-operative, operative, and post-operative data for every co-managed patient. This component may also record and catalogue video of certain surgical procedures as well as the written and electronic information for each patient. This may include an education area that houses links to categorized surgical videos, new technology websites, and posted reference material content to enable both ophthalmologists and optometrists to educate themselves, their respective staff, and patients. This component may measure the transfer of payments between entities and sort ongoing payments by patient name, type, technology type, disease state, facility location, etc. This may also include the transfer of medical grade images, x-rays, scans, etc. from one user to another.

3.PROBLEM STATEMENT

Aging baby boomers and their risk towards age related conditions add to the global burden of diseases. According to World Health Organization, approximately 285 million visually impaired people are reported; with cataract becoming the major cause of visual impairment. With a growing population of baby boomers and following the trends of growing eye diseases and eye conditions, there is a need of incorporation of the concept of co-management in the field of optometry. Both ophthalmologists and optometrists playing their pivotal role in providing follow up care for ocular diseases.

Ocular diseases can range from mild to severe, some are chronic while some may resolve on their own. Eye diseases and conditions require early diagnosis, prompt treatments, surgeries accompanied by follow up care. Follow up care plays an eminent role in patient management because it comprises of identification of any post-operative complications and rehabilitative care for the same.

Quality as well as affordable care contribute to the foundation of healthcare. In US Healthcare system, it has been an arduous task. However with the introduction of Medicare, it has been facile for the baby boomers to seek affordable as well as quality care. With the introduction of global surgery package, Medicare initiates reimbursement for the billing procedures for different surgeries along with specific modifiers for the claims.

Co-management as well as Medicare reimbursement policies; in an integrated way carve out the path of easy accessibility to the management of eye diseases accompanied with the follow up care.

With increased referrals of patients as a part of transfer of care, there are chances of mismanagement of patients and mishandling of patient's record along with creation of chaos due to which the patient's follow up care is compromised, cases become complex and the services provided by health care providers get affected.

Healthcare IT initiates in providing an electronic platform for the physicians in order to manage the database created by several patient records. Following the co-management referral system; for the efficient management of post-operative follow up care, there is a transfer of not only care as well as patients records and data. Healthcare IT can provide for a method for storage and retrieval of electronic health record and easy and quick work flow for efficient patient management as well as provision of distribution of the patient's data within the referral pathways.

This review study focuses on highlighting the existing scenario of co-management in the field of optometry in US healthcare system. It discusses the role of co-management, the key players, the financial modalities and quality of care. It also explains the role of healthcare IT in providing an electronic platform for the management of patients from both the parties accompanied with provision of quality care and reduction of waiting time for the patient.

4.OBJECTIVES-

To review the existing framework for co-management in US Healthcare and to envisage the role of Healthcare IT in co-management of ophthalmic cases.

Specific Objectives-

1. To assess the quality of care in post-operative cataract co-management.
2. To study the experiences and perspective of patients and care providers in relation to co-management.
3. To envisage the role of Healthcare IT in co-management of ophthalmic cases.

5.RESEARCH METHODOLOGY-

- Research Design

The study 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 Co-management of post-operative cataract cases, shared care, collaborative care in ophthalmic diseases, Quality of care in co-management of cataract cases. Citations of papers that used a reference standard for assessment of quality were searched. A literature search of three relevant databases ("Medscape", "Biomed Central" and "PubMed") was conducted. There was no limitation of publication date in the search.

- Selection Criteria

Selection criteria for the literature review:

1) Articles written in English

2) Articles focused on Co-management, Medicare and co-management, collaborative care in cataract post-operative cases, financial modalities of cataract co-management.

3) Articles related to quality of care in co-management scenario, patient perspective towards co-management, Healthcare providers considering transfer of care in the management of cataract cases.

4) Based on empirical studies and published in scientific journals

5) Articles focused on transfer of care in cataract co-management. The articles first identified in the reference lists of the papers found through the database searches were also assessed.

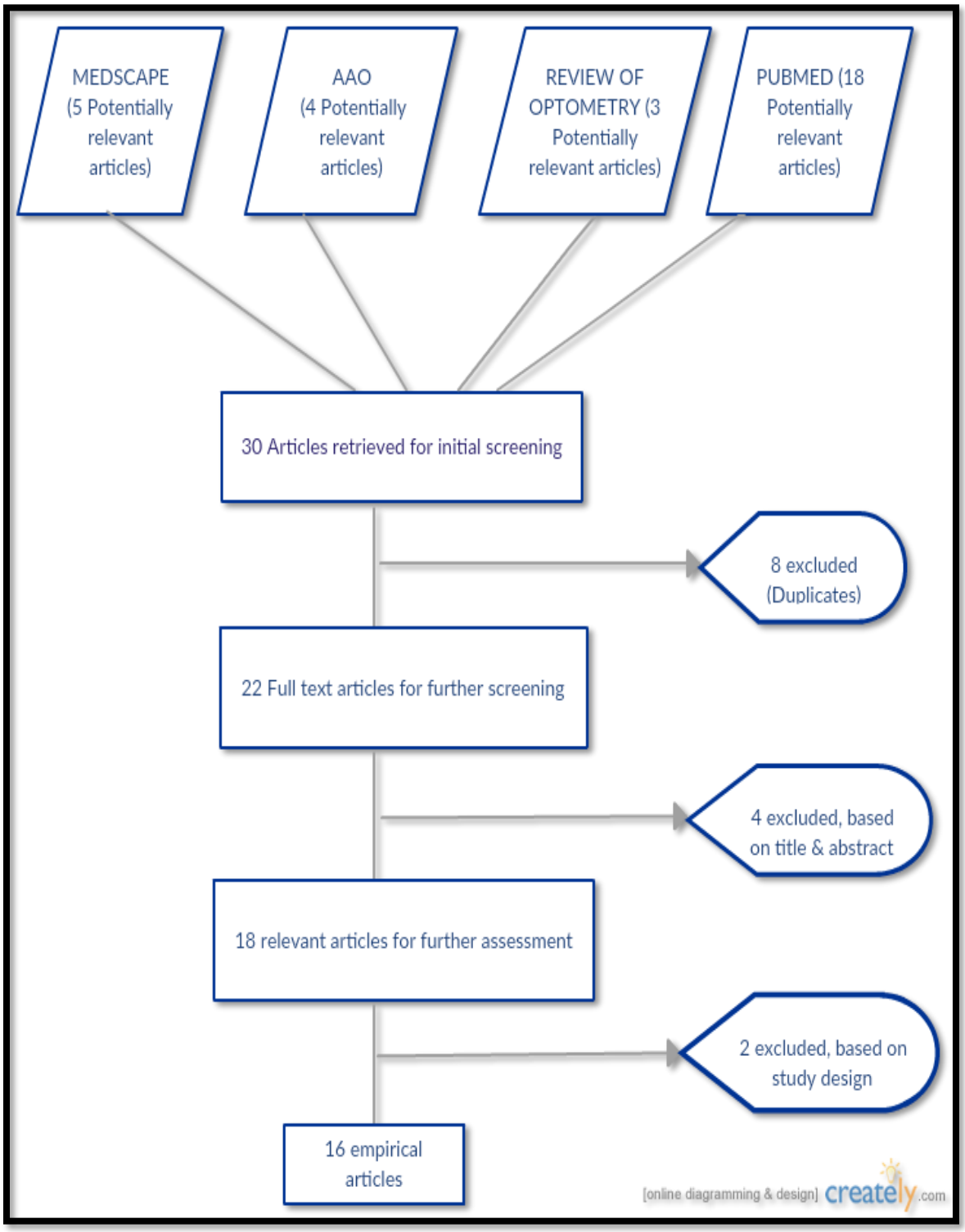
Data Analysis

A sub-systematic method was followed, which was divided into three phases: literature collection, assessing, and selection. The literature search was conducted. 30 articles were collected. After excluding the duplicated articles, some articles were excluded based on the following criteria:

1) Articles related to co-management of diseases other than cataract cases.
2) Articles related to cataract co-management in geographical areas other than USA
3) Articles related to highlighting the role of Healthcare IT in domains other than ophthalmic co-management.

After filtering 16 articles were selected. All of them were investigated to explore the existing scenario of ophthalmic co-management accompanied with role of Healthcare IT in ophthalmic co-management. Then perspective of optometrists and ophthalmologists towards co-management and its benefits were also reviewed.
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 co-management of cataract post-operative cases were summarized. Thirdly, pragmatic results of the studies related to perception of optometrists and ophthalmologists towards co-management, quality of care and patient satisfaction were summarized. In the analysis phase a comparative approach was used in which all the selected articles were investigated to review the existing scenario of co-management as well as role of healthcare IT in management of shared care of ophthalmic cases.

A. Flowchart of study selection process-



B. Overview of included studies-

S.no	Title	Author	Time/ Year	Type of research	If quantitative, sample size	Method of Data Collection	Results
1	Evaluation of a new cataract surgery referral pathway	Park JC1, Ross AH, Tole DM, Sparrow JM, Penny J, Mundasad MV.	2009		124 patients		Optometric referrals, relative to general practitioner referrals, were more likely to include information relating to objective visual loss (100 vs 87%, P¼0.0061) and to counsel the patient (97 vs 18%, P¼0.0001). GP referrals, relative to optometric referrals, were more likely to comment on personal circumstances (32 vs 3%, P¼0.0001), past medical history (95 vs 68%, P¼0.0001), and drug history (94 vs 69%, P¼0.0009). Operative rates were higher for the optometric direct referrals relative to GP referrals (87 vs 69%, P¼0.0284). There was no difference in the visual acuity before or after surgery between the pathways.
2	Quality of care in cataract surgery cases experiencing post-operative complications with co-managed care	Revicki DA1, Poe ML.	1995			50 Medical Records reviewed	In 34 of the 38 remaining cases (89.5%), co-management was successful in diagnosing complications and in managing the patient to maximize vision function. 99.8% (2,454 of 2,458) of co-managed cases

							contained evidence that the optometrists provided high quality post-operative care and were able to diagnose complications. Using physician evaluations as the standard, the sensitivity of detection of complications by optometrists was 95.9% and the specificity was 99.5%
3	Patients' experiences and preferences with co-managed care in a cataract pathway	van Vliet EJ1, Reus NJ, Sermeus W, Vissers JM, Sol JC, Lemij HG	2010 Oct	case control study		Questionnaire	Patients in the co-managed care pathway reported similarly good experiences with the quality of care as patients who received their reviews by an ophthalmologist. Patients who were reviewed by a nurse reported to prefer the same first-day review method significantly more often than those who were reviewed by an ophthalmologist. Most patients preferred the final review by an ophthalmologist
4	Patient outcomes with co-managed post-operative care after cataract surgery	Revicki DA1, Brown RE, Adler MA.	1993				Eighty-seven percent of eyes were co-managed. Successful visual acuity outcomes (< 20/40) were experienced by 86% of all co-managed patients. For co-managed patients without pre-existing medical or ocular conditions, 92% had successful vision outcomes, while 77-90% with these conditions had successful

							outcomes. Ninety-three percent of co-managed cases had no post-operative complications, and the rate of specific types of complications ranged from 0.04 to 2.0%. Using physician evaluations as the standard, sensitivity of optometrist detection of complications was 59% and specificity was 99.6%. Optometrists located in separate offices demonstrated 95.8% accuracy in assessing patients for post-operative complications.
5	Shared care for chronic eye diseases: perspectives of ophthalmologists, optometrists and patients	O'Connor PM1, Harper CA, Brunton CL, Clews SJ, Haymes SA, Keeffe JE.	2012	Qualitative study		Semi-structured Interviews	Optometrists not only met ophthalmologists' expectations but exceeded them, appropriately detecting and referring patients with additional, previously undetected conditions. Patients reported savings in travel time and were satisfied with the quality of care they received. Optometrists, ophthalmologists and patients indicated a general acceptance of shared care arrangements, although there were some issues relating to interprofessional trust.
6	An extended role for the hospital optometrist	J. Oster, L.E. Culham, R. Daniel	1998				The results showed a high level of diagnostic accuracy which suggests that the role of hospital optometrists may be

							successfully extended to include some aspects of patient evaluation not typically undertaken.
7	cataract shared care model: community optometrist-delivered postoperative discharge scheme	George Voyatzis, Harry W Roberts, Jonathan Keenan1,	2014		1492 patients		Uneventful postoperative recovery was recorded in 93.77% of patients with 2.95% of patients re-referred. Post cataract surgery follow-up by community optometrists provides the advantages of care closer to home and avoids unnecessary hospital visits for patients undergoing uncomplicated cataract surgery.
8	Novel optometrist-led all Wales primary eye-care services: evaluation of a prospective case series	Sheen NJ1, Fone D, Phillips CJ, Sparrow JM, Pointer JS, Wild JM.	2009			Telephone interviews and review of optometric and hospital notes	4243 (66%) of the 6432 individuals were managed in optometric practice; inappropriate management was apparent in 1% of individuals. 392 hospital notes were reviewed; 75% exhibited appropriate optometric referrals to the HES. 87% of individuals travelled less than 5 miles to attend an optometrist
9	Postoperative management of cataract surgery patients by ophthalmologists and optometrists.	Bass EB1, Sharkey PD, Luthra R, Schein OD, Javitt JC, Tielsch JM, Steinberg EP.	1996		538 (82%) of 655 eligible ophthalmologists and 130 (84%) of 154 eligible optometrists.		97% of ophthalmologists performed the first postoperative examination on their cataract surgery patients, and 60% of ophthalmologists reported that no other eye professional saw their patients postoperatively. Forty-six percent of responding

							optometrists participated in postoperative care of cataract surgery patients, More than 80% of responding optometrists involved in postoperative care of cataract surgery patients im mediately refer a patient to an ophthalmologist if there is evidence of acute glaucoma or an unexplained decrease in vision in the eye that was operated on. For less urgent complications, most optometrists promptly make a referral to an ophthalmologist.
10	Cataracts and co-management: a clinicolegal view	Classé JG	1991				When optometrists refer patients to ophthalmologists for cataract surgery, if the surgery is negligently conducted, the optometrist is not responsible for the patient's injury unless the surgeon was not selected with due care. Optometrists who co-manage patients during the postoperative period should develop protocols for examination and communication with the surgeon because joint liability can result, involving both practitioners.
11	Should optometrists be able to refer patients to ophthalmologists	Riise D1, Arnesta d JE, Saetrom KM.	2000			198 referrals from optometris ts and 208 from general practitione	Referrals to be relevant to the ophthalmologist for nearly 95% in both groups. The existing practice in which optometrists can refer their patients

						rs were evaluated.	directly to ophthalmologists should be continued.
12	Healthcare co-management platform	Michael Andrews	2011				A system, a method, and an electronic platform provide co-management of two or more healthcare practices, such as an ophthalmology practice and an optometry practice. In one aspect, the disclosure provides for a method including retrieving an electronic health record for a patient and storing first health information for the patient corresponding to a diagnosis of the patient by the first healthcare practice.
13	Co-management of cataract postoperative care	Johnston RL	1994				Postoperative management of the cataract patient in the optometrist's office is beneficial to the patient, and allows involved providers to practice to the full extent of their training and expertise
14	Current Trends in Comanagement	John Murphy	2013	quantitative	400 optometrists	Questionnaire	93% of ODs who answered the Comanagement Survey say they participate in some form of Comanagement at least once a month. And 80% report that the number of patients they comanage has been increasing during the past few years
15	Joint Management of Cataract Surgery by Ophthalmologists and Optometrists	Jay C. Erie, David O. Hodge	2016	Data base Study			The overall national rate of joint management of cataract surgery by ophthalmologists and optometrists among FFS

							Medicare Part B beneficiaries was 10.9% (range by state, 0%–75%) in 2012 and 11.1% (range by state, 0%–63%) in 2013. In 2013, the mean extremal quotient was 67 and the CV was 82.2, demonstrating very high variation in joint management between states
16	The short-sighted perspective of long-term eye health-care	Khalid Fahad Jamous, Michael Kalloniatis	2014				A stronger foundation of primary eyecare providers for effective and efficient management of patients with chronic ocular involvement could partly counter the anticipated at the same time, securing their focus on medical and surgical procedures. The main benefit to the patient would then stem from shorter waiting times and easier accessibility to services

6.RESULTS

This review of study provides with the following key finding in relation to co-management of ophthalmic cases-

1. 93% of optometrists participated in co-management at least once in a month.
2. 99.8% of co-managed cases provided with the evidence that the optometrists provided high quality services for the post-operative cases and were able to diagnose any possible complications.
3. Optometrists met the expectations of ophthalmologists by appropriately detecting and referring patients with previously undetected complications. Also optometrists displayed 99.6% specificity in detecting the complications.
4. Patients reported good experiences with respect to quality of care provided during post-operative services.
5. Patients also reported savings in terms of travel time and waiting time for the follow up care.
6. Healthcare IT can provide an electronic platform for both ophthalmology as well as optometry practice.
7. With the help of integration with EMR software Healthcare IT can help in patient management falling under co-management.

7.DISCUSSION

According to the Global Burden of Disease (GBD) study data there are currently an estimated 32.4 million people blind and 191 million with moderate to severe vision impairment worldwide (1). The GBD study also identified a 30% change in population growth, and the number of people aged over 100 years increased by 185% (1).

Within the circle of co-management; with both the key eye care professionals, Ophthalmologist and Optometrist the quality of care has been established for the post-operative cataract cases. The optometrist are able to diagnose any post-operative complications saving the patient from any further surgeries affecting their health. The patients are benefitting from co-management in terms of quality care, shorter waiting times, the opportunity to discuss surgery before referral, more convenient post-operative care and fewer appointments to attend.

Optometrists, ophthalmologists and patients indicated a general acceptance of shared care arrangements. Postoperative management of the cataract patient in the optometrist's office is beneficial to the patient, and allows involved providers to practice to the full extent of their training and expertise.

The concept of co-management provides several benefits to patients as well as healthcare providers.

It entitles the optometrist with benefits like;

- Availability of treatment options not limited to just contacts or glasses result in increased practice credibility and strengthens the physician-patient relationship.
- Co-management of premium cataract services ensures that patients always get the best treatment available at the time of diagnosis.
- Improved goodwill, resulting from the patients knowing that the optometrist has his or her best interest as the guiding principle in their care.
- Establishment and solidification of a lifelong relationship with the patient, not limited to just purchase of glasses or contacts.

- Increased revenue to the practice.

The ophthalmologist also benefits from this integrated approach of shared care by;

- Increased satisfaction of working with patients who have been pre-screened for procedures.
- Improved outcomes resulting from better patient preparation and pre-op measurements
- Decreased patient anxiety, as the patients are co-managed with the doctor they know and trust
- Reduced professional stress resulting from division of responsibilities
- Increased focus on surgical procedures
- Increased surgical volume
- Increased practice revenue

Accompanied with the quality of care, reduced waiting time, increased practice revenue, is the electronic platform for coherent management of patients. Healthcare IT can help in providing a system for this integrated approach of shared care so that there is sharing of not only care, but patients' data and knowledge database.

8.CONCLUSION

This research demonstrated the theory of task sharing in two different spheres, ophthalmology and optometry and how one can influence and inform the other. Task sharing can generate a strengthened and flexible health workforce that can respond to the changing landscape of clinical and public health needs, such as accessibility and demand and to ease bottlenecks in service delivery. Task sharing can create opportunities to expand community relationships and also better utilize the availability of ophthalmologists and optometrists in efficient patient management and quality health care service delivery.

The exploratory study of existing scenario of co-management in US Healthcare demonstrated the circumstances of task sharing exist for co-management of ophthalmic diseases, existing perception of patient and healthcare providers towards co-management. Opportunities are possible due to advancements in technology and the willingness of key stakeholders to support such changes. Patients who require long-term monitoring for chronic eye diseases will be dependent on services for longer and if changes do not occur in methods of service delivery then access to quality of care could be compromised.

There is a need to provide co-management infrastructure such as integrated software for ophthalmologists and optometrists which help practices build their co-management network, provide consultancy and support to patients on the process, billing, accessing patient portal, patient education etc. focusing specifically over the aging population, Increase patient referral to this co-management network.

Task sharing is an efficient means to manage the future demand of patients who require long term monitoring. Future training and education will need to be built on contemporary and predicted future needs and not based on historic patterns of service delivery. These findings come at a time where the need for change has been acknowledged and open dialogue is closing the gap between professions introducing an innovative approach for the future of eye health service delivery.

Integration of Ophthalmologists & Optometrists providing shared care with an EMR Software can provide a portal for sharing of knowledge base and database pertaining to patients' records as well as smooth billing procedures involving re-imbursement process and patient management. By integrating with healthcare IT, the referral information can be combined between both the health care providers along with provision of a patient portal which helps in educating the patients about the diseases, post-surgical complications, several interventions and post-surgery instructions. This may also help in smooth billing practices between both the health care providers as well as receivers. By combining referral information from optometrists and ophthalmologist, a high-quality and efficient cataract surgery patient pathway can be established. This can reflect towards major economic advantage.

Shared care between local optometrists and ophthalmologists can help to reduce patient waiting time for review and offers an opportunity for these two groups of eye care professionals to collaborate in providing localized care for the benefit of patients. However, trust and relationship building need to be further developed. This review study can be used to serve as a foundation for conducting further research based on primary data with respect to roles of health care providers and patients in co-management & identification of various issues in the clinical practices and referral pathways.

9.LIMITATIONS

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

- Search Limitation- Only post-operative phase of co-management cases was reviewed for the study. The availability of articles stating co-management for ocular diseases was compromised.
- Source Limitation- 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 and books etc.
- Timeliness of evidence- Health IT 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.

10.REFERENCES

- Bourne RR, Stevens GA, White RA, Smith JL et al. Causes of vision loss worldwide, 1990-2010: a systematic analysis. The Lancet Global Health. 2013; 1(6):e339-49.y
- Patient outcomes with co-managed post-operative care after cataract surgery, Battelle Medical Technology Assessment and Policy Research Center, 370 L'Enfant Promenade, Washington, DC 20024 U.S.A
- O'Connor PM et. al., Shared care for chronic eye diseases: perspectives of ophthalmologists, optometrists and patients, Med J Aust. 2012 Jun 4;196(10):646-50
- Revicki DA[1], Poe ML, J Am Quality of care in cataract surgery cases experiencing post-operative complications with co-managed care, Optom Assoc.1995 May;66(5):268-73
- Classé JG[1], Alexander LJ, Protocols for co-management, 1994; 4(2):101-22.
- Michael Andrews, Healthcare co-management platform, Sep 15, 2011, US 12/939,868
- Johnston RL, Co-management of cataract postoperative care, 1994, 7849416
- Classé JG, Cataracts and co-management: a clinicolegal view, Optom Clin. 1991, 1799822
- Riise D, Arnestad JE, Saetrom KM, Should optometrists be able to refer patients to ophthalmologists?, 11006727
- E J van Vliet, Patients' experiences and preferences with co-managed care in a cataract pathway,
- Jay C. Erie, Joint Management of Cataract Surgery by Ophthalmologists and Optometrists, http://dx.doi.org/10.1016/j.ophtha.2015.10.037
- John Rumpakis, Comanagement essentials: it is important to keep up with the legalities of pre- and post-cataract surgery care, Review of Optometry

- Prevalence of Visual Impairment and Selected Eye Diseases among Persons Aged ≥50 Years With and Without Diabetes --- United States, 2002, (https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5345a3.htm)
- Visual impairment and blindness, (http://www.who.int/mediacentre/factsheets/fs282/en/)
- Clinical Co-Management Models and Compensation, (http://www.physicianspractice.com/blog/clinical-co-management-models-and-compensation)
- Shared Savings Program, https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/index.html?redirect=/sharedsavingsprogram/
- Current Trends in Comanagement, https://www.reviewofoptometry.com/article/current-trends-in-comanagement-44930
- Hospitalist Co-Management of Surgical Patients: Expanding Your Inpatient Medicine Program, http://www.medscape.com/viewarticle/546964
- Surgical Comanagement by Hospitalists Improves Patient Outcomes, http://www.medscape.com/viewarticle/866741
- Comprehensive Guidelines for the Co-Management of Ophthalmic Postoperative Care, https://www.aao.org/ethics-detail/guidelines-comanagement-postoperative-care
- Comanagement of the Postoperative Patient from the Ethics Committee, https://www.aao.org/ethics-multimedia/co-management-of-postoperative-patient-from-ethics
- Joint Management of Cataract Surgery by Ophthalmologists and Optometrists, http://www.aaojournal.org/article/S0161-6420(15)01259-2/references
- Ophthalmology and optometry: working together, http://eyeworld.org/article-ophthalmology-and-optometry---working-together