NAMED LECTURES

President's Lecture

Sustainable Eye Health Systems through Teleophthalmology: The LV Prasad Eye Institute Experience

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Being the text of the President's Lecture delivered during the 46th Annual Scientific Conference of the Ophthalmological Society of Nigeria on 1st September, 2022

INTRODUCTION

The World Health Organization (W.H.O) recognizes a sustainable healthcare system as one that improves, maintains, or restores health while minimizing negative impacts on the environment. Such a system leverages opportunities to restore and improve the environment, to the benefit of the health and well-being of current and future generations.

Shari Blanch *et al* outlined four pillars of health care sustainability: economic (profits), environment (planet), social (people) and systems[1]. We will discuss how teleophthalmology utilizes the 4 pillars to construct a sustainable eye health system. This paper goes on to discuss the role of teleophthalmology in building sustainable eye health systems at the LV Prasad Eye Institute, India.

SUSTAINABILITY OF EYE HEALTH SYSTEMS THROUGH TECHNOLOGY ENABLED PRIMARY CARE

Innovations such as the concept of task shifting, and on-the-job training were crucial to the process of making primary eye care sustainable. This was accomplished through the training of high school graduates who were given the knowledge and tools

Figure 1 a (Doctor and Vision Technician interaction) and 1 b (Doctor and patient interaction) shows delivery of technology enabled primary care through teleophthalmology

to become effective primary eye care providers. In this capacity, these newly trained vision technicians perform the **3 R's**:

Refraction and prescription of eyeglasses, Recognize vision-threatening eye problems and Referring them, if necessary, to appropriate care. Furthermore, the vision technician captures the results of the slit lamp eye examination, the intraocular pressure, anterior and posterior segment photographs, the patient's medical history and their consent for the teleconsultation.
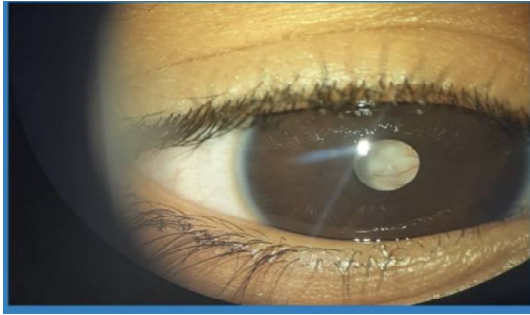
Figure 2: A case of Retinoblastoma managed through immediate Red referral from primary to tertiary care
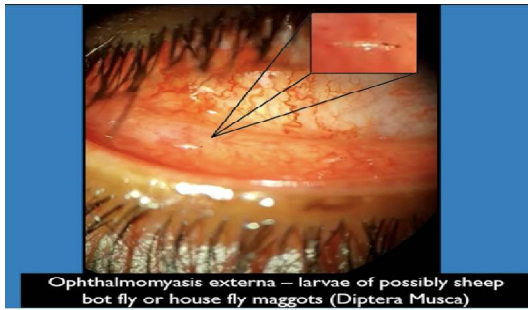

Figure 3: A case of ophthalmomyiasis externa managed at the primary eye care by teleconsultation alone (Green referral)

All of these details are recorded in the form of an electronic medical record, on a tablet available to the technician, and then uploaded and distributed through a cloud network to an ophthalmologist at a Tertiary Care Centre[2]. The case details and relevant pictures are reviewed, and a plan of management is communicated with the vision technician and patient via a video-call placed on Skype Lite. The Ophthalmologists' guidance and e-prescriptions are captured online at the vision centre and then provided to the patients.

Constant innovation was essential to building sustainable eye health systems. We adopted a triaging system classified by referral colour coding for efficient referral and tracking: Red indicates an urgent referral, Yellow is semi-urgent and Green refers to conditions that can be managed through teleconsultation alone.[3]

Figure 2 shows an example of Red referral wherein a 2-year-old girl child with leukocoria was seen by our primary eye care vision technician. The case was diagnosed as possible retinoblastoma through teleconsultation and was sent to tertiary care for further management.

Figure 3 shows an example of Green referral where in vision technician at primary eye care removed larvae from external surface of conjunctiva under supervision of ophthalmologist through teleconsultation. The patient was prescribed antibiotic and lubricant drops.

INNOVATIONS – DEVICES FOR USAGE DURING TELECONSULTATION

1. ***Grabi* – Smart phone anterior segment image capture attachment**
   It is necessary to use additional tools to capture usable and quality anterior segment photographs to help supplement the information gathered during teleconsultation. One such device that we have built is a smartphone anterior segment image capture attachment called *Grabi* that can be easily
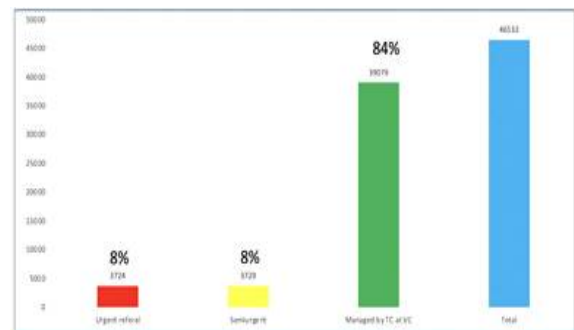

Figure 4: Primary eye care teleophthalmology numbers (2021)

used by a patient, caregiver or eye care practitioner on any smartphone. This device has the capability to capture clinical-quality details, facilitating effective tele-consultation[4].

2. **Portable Perimeter – *Om device***
   Portable perimeter through *Om devices* at futuristic / technology enabled vision centers enabled effective teleconsultation for glaucoma

3. **Measurement of Visual acuity (VA)**
   Measurement of visual acuity is very important for teleconsultation purposes. In a validation study, we found that *PEEK acuity* had similar results to standard visual acuity chart testing.[5]Though the *PEEK Acuity* app was originally developed for health care workers
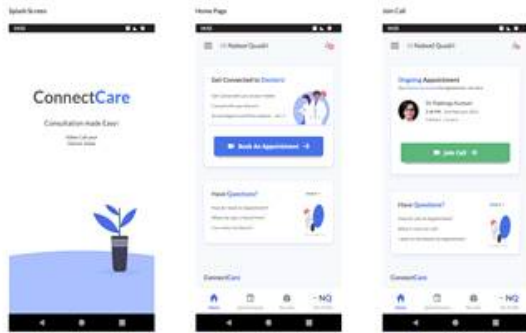
Figure 5: Development of Mobile Teleophthalmology system (ConnectCare) at tertiary eye care

to be used in field visits, we found that with proper orientation, the layperson can also use it. Such orientation can enable caregivers to effectively measure VA at home. Such a tool enhances teleophthalmology consultations and can minimize the need for short follow-up visits[6].

ECONOMIC AND ENVIRONMENTAL IMPACT OF PRIMARY CARE TELEOPHTHALMOLOGY

Over the past year, we have performed 46,532 tele consults at the Primary level. About 84% of

Figure 6: Online consultations at tertiary level through mobile app

those were managed through teleconsultation alone at our Primary Care centres (Figure 4). Only 16% of patients required referral to the next level of care. The economic and environmental implications of these observations are significant.

4. **Development of Mobile app based teleophthalmology at the Tertiary level**
Recognizing the importance of teleophthalmology during the Covid-19 Pandemic, we developed and launched a mobile app-based telemedicine portal called

ConnectCare which has been integrated into the patient care pathway (Figure 5). With this app, our doctors can now directly connect with patients on their mobile phones by scheduling appointments – as a type of virtual outpatient clinic. The primary purpose of the Tele-consult portal post-lockdown was to reduce in-person follow-up visits – this, in turn, eases the congestion in our waiting rooms, allows for the remote review of reports and enables our team to provide second opinions to new patients.[7]

Around 60,000 online teleophthalmology consultations took place between June 2020 – March 2022 (Figure 6). Patients from 8 ophthalmic sub-specialties from 13,202 locations across the country received online consultations from 144 ophthalmologists through the LV Prasad Eye Institute network. Figure 6 clearly indicates an increase in the number of patients utilizing the teleconsultation facility corresponding to the peak of the COVID-19 Pandemic between October 2020 and May 2021.

Along with the obvious economic impact, an intangible benefit is the social impact and the power of tele consults to be able to remove barriers associated with access and distance.

Notable examples of teleconsultation care included a case of Mucor mycosis (black fungus) with advice delivered to a patient admitted in an intensive care unit. The case was managed by interdisciplinary care between retina and oculoplasty using the feature of cross consultation available on the mobile app.

Other specialized models of tele eye care include prematurity retinopathy where, in diagnosis and treatment, guidance is given by remote monitoring of premature babies in remote rural areas.

Our *Silver Sight initiative* is a homecare service using teleophthalmology to reach elderly and disabled patients in both urban and rural areas. Telerehabilitation is, once again, a unique specialty in which our team reached close to 2000 visually impaired people in the last two years. Telerehabilitation guidelines and experiences have been published.[8]

To summarize, sustainable eye healthcare systems may use teleophthalmology to create a healthcare system that bypasses social barriers and reaches the most marginalized and inaccessible parts of society (bridging every gap – gender, geography,

expertise). Sustainability is possible through a focus on prevention, scope and equity in eye care, technological innovations, task transfer, sharing, triage and specialized eye care models. Primary and tertiary care teleophthalmology has significant economic and environmental impacts and could create a carbon-free health care system. Focusing on developing this system will bring us closer to our ultimate goal as an organization "So that All May See".

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