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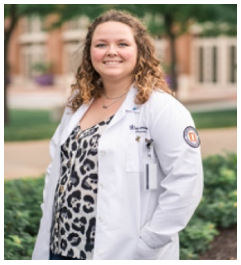

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INDIA'S FIGHT AGAINST BLINDNESS

Introduction

According to the World Health Organization, there are 39 million blind and another 246 million visually impaired people in the world. India however contributes to nearly one fifth of the global blindness crisis[1]. Knowing this, India adopted 'Vision 2020: The Right to Sight' in 2004 with the intentions to eliminate blindness to the best of their ability by the year of 2020. This program recommended that for every 50,000 people, there should be 1 vision center.[1] The major reasons for this high number of blindness and visual impairments is due to an ageing population, population growth, lack of understanding of eye care, and a weak primary eye care system.[2] A way to help decrease the prevalence of poor vision in the future is to "focus on the future". This can be done by concentrating on pediatric eye care in India - as this age group makes up 40% of the current population and that number is growing every day.

Primary Eye Care in India

"Primary eye care largely refers to a combination of activities encompassing promotive, preventative, therapeutic, and rehabilitation service delivered at community level to avert serious sequels resulting in blindness".[1] It is important to note different roles of people who work in these clinics and what they do. The Para-Medical Ophthalmic Assistant (PMOA) is the key person who provides eye care services and is trained in conducting refraction and screening of common ocular conditions. The Medical Officer (MO) can provide management for common ocular conditions. Typically, schooling for a MO is a minimum of a bachelor's degree but can be as educated as a MD. PMOAs receive on the job training and certifications and are more hands on with patients as well. Community volunteers Accredited Social Health Activist workers if appropriately trained and sensitized can serve in local vicinities. Their work can be supervised by the PMOA's and MO's.[1] A Vision Technician is a high school graduate with 1 year of training in optometry. They screen the population for blinding eye conditions, conduct refraction and refer patients to higher level centers for further management. This person is supported by Village Health Guardians who is a community level worker who identifies the patients for cataract surgery at primary level and then takes them to the base hospital and helps them until the follow-up at the vision centers.[1] One trained PMOA with a minimum of 2 years of experience should be at each vision center.

Primary Eye Care centers in India can be in fixed centers, mobile vans, or through tele-medicine. Most of the fixed centers do not have an ophthalmologist who check patients every day. The mobile vans have an ophthalmic technician with support staff whose main job is to identify diabetic retinopathy and to manage it with laser therapy in the van. A retina specialist also travels with the team, which is an added resource. Tele-ophthalmology allows for patients to have direct contact with an ophthalmic specialist at the base hospital via video conferencing. This helps that patient consult with specialists without having to travel which bridges the gap of inaccessibility to services.[1] An Ophthalmic Assistant is at the

Primary Eye Care center during these meetings and relays information back to the doctor at the base hospital. Tele-health has really reduced the burden of secondary level hospitals. The mobile van is believed to be the most efficient because it can detect and identify ocular conditions early on as well as less of a financial and travel burden. In a study done in 2017, 40% of parents who thought that their children could see as well as their peers in fact had a visual impairment[3]. Being able to identify ocular conditions early on is crucial for the future of Indian eye health.

Vision Centers

"Vision Centers (VCs) provide easily accessible eye care services and a way for patients with chronic blinding eye conditions to readily monitor their eye health status".[2] All of these centers carry out 3 basic functions: *Recognize* eye conditions, *Refract* for refractive error and provision of spectacles, and *Refer* a patient to the referral hospital and do network in the community.[2] VCs are part of a larger eye care network that provides Primary Eye Care in remote rural areas of the country. They are compact centers with usually 2 or 3 rooms and typically there are 2 people working, a Vision Technician and one other staff member who does a variety of other activities. The services they provide are refraction and dispensing of glasses, diagnosis of common eye conditions, and referral of cases needing further intervention to a hospital. There are many benefits of incorporating VCs into eye care services. VCs can offer service on the spot as a first level care facility so that hospitals can focus on bigger issues. They are linked to sight because they reduce the prevalence of blindness by identifying patients who need cataract surgery and other sight saving services. They then reach referred patients and reach out to the community, arrange for transport, and systematically remove barriers that keep the patient from receiving the surgery. These centers reduce barriers such as economic barriers, no felt need or desire, no one to accompany or issue with transportation, fear of surgery, and lack of awareness. Vision Centers also provide patients a convenient way to complete a follow-up post-operatively which is crucial for a positive outcome with cataract surgeries to complete the circle of care because complications of cataract surgeries are the leading cause of blindness in India.[4] A quarter of all cataract surgeries in the world were done in India in 2016.[5] Another reason why Vision Centers are so good for the community is because establishing them in remote areas allow for job opportunities, especially for women. The reason for this is because females already are established in their communities and are unlikely to move away once their training is completed. By having VCs in these less populated areas, there is less dependency on outreach programs to transport patients, better compliance, and follow up care.[2]

Status of Pediatric Eye Care in India

Evidence suggests that 1 out of every 1000 child is blind in India as well as a child becomes bilaterally blind every minute in a developing nation.[6] A survey was sent out to 1204 institutions and 55.5% responded saying only 192 (28.7%) of them provided pediatric eye care services.[6] It was also shown that majority of these institutions had access to only the basic pediatric diagnostic equipment. The most common surgical procedure performed within the pediatric population in India is cataract surgery followed by squint surgery. It was shown that available facilities offer training opportunities to ophthalmologists, but rarely to an entire pediatric team which you need a team made up of an optometrist, nurse, and anesthesiologist as well to deliver the most effective eye care due to the wide range of

skills.[6] The main problem seen in India is that there has been no formal training for pediatric ophthalmology until recently and even in those departments that offer it, they cater to all age groups and not just children. To a lot of ophthalmologists, the clinical workload would not be enough to focus only on pediatrics due to the low diagnosis rates and low parental awareness of their child's vision. To attract ophthalmologists to take up the pediatric field, "it would be necessary to allow them to also attend to ophthalmic problems in other age groups to generate adequate professionally satisfying workloads".[6] The world Health Organization recommends that 1 pediatric ophthalmology service center for every 10 million people would meet the needs. Each center would have at least 1 specialty trained or oriented ophthalmologist that would be available at all times. During the study, there were 69 centers available for 1.1 billion people, which translated to 0.63 pediatric ophthalmology service units per 10 million people.[6]

Many of the hospitals do not have all the equipment, infrastructure, or staff needed to provide the best care possible to the pediatric population. The centers are also not homogenously distributed across the country where the North and East India completely lack proper functioning centers.

The Solution

In order to start making a step in the right direction for India's eye care, we need a model that is both easily accessible and affordable. The model provided in Table 1 is such a model that has recently been proposed and exceuted throughout India. "India needs to build a pyramidal eye care system, train a required number of eye health personnel, equip and maintain the infrastrutucutre for safe and quality eye care delivery, emphasize on comprehensive ophthalmologists as much as the super specialists, and finally bring a synergy beteween the public and private eye care providers".[5]

Table 1

Structure	Population Serving	Technical Personnel	Level of Care	Quantum of Care
Primary	50,000	Vision technicians	*Eye screening *Refraction *Spectacles dispensing *Refer	49% of visual impairment (URE)
Secondary	500,000	* Ophthalmologists *Vision Technicians *Surgery assistants	*Comprehensive eye exam *Community care surgery of common disorders	75% of visual impairment (URE + cataract surgery)

Tertiary	5 million	* Ophthalmologists *Optometrists *Nurses *Rehabilitation *Microbiology *Pathology *Eye banking	*Secondary level care and all eye surgery *Corneal transplant *Low vision and rehab *Training *Clinical research	90% of visual impairment (URE + surgery + care for glaucoma + DR)
Advanced Tertiary	50 million	*Tertiary level and basic scientists *Policy makers	*Tertiary level care and translational research *Policy and planning	100% of visual impairment including policy execution

Every year, over 1,500 ophthalmologists are trained in India, however, these new grads stated that basic diagnostic skills were just average, the refraction skill was dismally poor, training in modern cataract surgery was suboptimal, and the almost 50% of them did not perform surgery under supervision.[5] Based on the 2016 India population of a little over 1.32 billion people, an estimated 26,400 VCs/PECs, 2,640 secondary centers, 264 tertiary centers, and 27 advanced tertiary care centers would be needed to meet the eye care needs of the Indian people.[5] There would be a need of 98,244 eye health personnel and 6,382 practicing ophthalmologists needed to run all of these facilities and this does not include optical dispensing people, and the need for a larger number of skilled people in busy and large hospitals[5].

Conclusion

There are 5 critical factors that play a role in the future of India's eye care. Human resource development and skill-based training, appropriate eye care to all and in all geographic locations, partnership and synergy between public and private eye care providers, use of technology for uniform documentation, big data collection and analysis, and India centric innovation and translational research are all going to need to have a large contribution if we want Indian eye care to be going in the right direction.[5] Association of Community Ophthalmologists of India (ACOIN) is the only professional ophthalmic association in India that include a diverse strata of community eye health care personnel. ACOIN aims to "achieve the ultimate goal of 'reaching the unreached' with an aim to provide 'affordable, accessible, and accountable eye care for both curable and incurable blindness".[7] This organization believe that in the fight for sight that the soldiers (ophthalmologists) are not enough, but the para-military forces (ophthalmic assistants and optometrists) must be included.[7] Overall, we need to start small and make small attainable goals like informing the public about signs to look for in visual impairments before shooting for the stars and reaching for something that isn't plausible at this moment in time.

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