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ORIGINAL ARTICLE

Advancement of Eye Health Services by Adopting Peek Solution in Province of Sindh

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ABSTRACT

Background: In Sindh, the Sindh Institute of Ophthalmology & Visual Sciences (SIOVS) has launched PEEK (Portable eye examination kit) Vision Project in collaboration with Christoffel Blinden mission (CBM). This is to be viewed as a beacon of hope for the patients grappling with eye health issues. The project is related with comprehensive eye care services, ranging from primary to tertiary ophthalmological healthcare systems. This article explains the potential profound impact of the Peek Vision project on the eye health landscape, specifically in Sindh. Peek technology is clinical testified for eye healthcare.
Aim: To reduce the prevalence of avoidable blindness.
Methods: The study performed through PEEK technology, including three community, household and school components to access the gap of referred patients. Screening activities conducted by 21 lady health visitors, 17 lady health supervisors, 401 lady health workers, and 20 teachers trained through PEEK technology for eye conditions.
Result: The findings highlighted the transformative potential of PEEK technology in advancing primary eye health care, offering a viable solution to global health challenges. The results analysed the understandable use of utilizing technology to achieve a fair eye health for everyone, offering insights for forthcoming research, policy formulation, and healthcare strategies in this pivotal domain.
Keywords: Eye health service, PEEK technology, vision, peek solution

INTRODUCTION

The Sindh Institute of Ophthalmology & Visual Sciences (SIOVS), Hyderabad is one of the leading research institutions in Pakistan that is located in Hyderabad, Sindh. SIOVS is primarily committed to reduction of the prevalence of avoidable blindness and treatment of eye diseases. It offers advanced **surgical procedures,** ophthalmic services, specializes in complex eye conditions and innovative research in visual sciences. This research institute runs comprehensive eye examination programs, excellence in clinical care, research training to optometrists and ophthalmologists, access essential eye care services to community as a free of charge that is significantly improvement of SIOVS across the Sindh province.[1,2,3]

In September 2020, Christoffel Blinden Mission (CBM) funded the project "Promoting Inclusive Comprehensive Eye Care Services by Adopting Peek Solutions in the Province of Sindh" and implemented by the Sindh Institute of Ophthalmology & Visual Sciences (SIOVS) in Matiari. The project aims to improve the quality of community life through PEEK solutions that is designed smartphone based tools[4,5,6].

Like many developing countries, Pakistan faces palpable challenges in providing adequate eye care services and support to public. The intensity of the challenge increases in case of rural areas because firstly, rural areas are far less developed as compared to the urban areas of Pakistan; secondly, around 70% population in Pakistan resides in villages and towns[3].

As these areas are far-flung so the access to quality eye health facilities becomes a formidable challenge. Further, limited resources and lack of a strong infrastructure worsen the situation, leaving many vulnerable patients without essential eye care[4].

The eye health project started from September 2020 to January 2024, the structure of workflow has been mapped and ensured a coordinated approach to manage serious eye diseases effectively and timely, including community, household and school components for screening and multi-level referral system for identification serious eye diseases and ensure comprehensive treatment[7,8].

In the workflow chart, it has been defined that screeners identified the potential eye conditions that referred for primary care to RHC, where optometrists performed refraction tests and comprehensive eye examinations at primary level. At the secondary level, if patients are required for further evaluation, then, they are referred to THQs, where ophthalmologists evaluate the need for surgical mediation. At the tertiary level, if patients need further eye examination or surgery, then, referred to the Sindh Institute of Ophthalmology and Visual Sciences (SIOVS), where specialized diagnosed is needed for further treatment.

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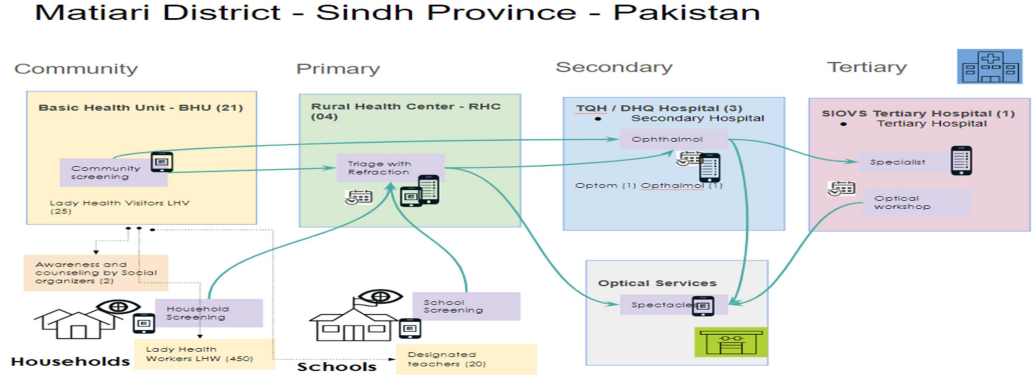
Figure 1: Workflow of the project



In response to these challenges, Peek Vision, in collaboration with CBM, has embarked on a mission to address the loopholes in eye health services. The project aims to provide eye health care at three levels, primary, secondary, and tertiary to meet the diverse needs of the surrounding community. The following sections elaborate these levels and how they can bring to the public the required services in time.

Primary Eye Healthcare: At the basic level of the Peek Vision initiative is the provision of primary eye healthcare services. At this stage, patients are referred with the support of community health workers through a PEEK technology. Patients receive essential eye screenings, diagnosis, and basic treatment for common eye conditions by optometrists[9].

Figure 2: Process of screening through Portable Eye examination Kit (PEEK) by leady health worker.

If patients with more complicated cases are transferred to the secondary eye healthcare level where ophthalmologists evaluated.

Figure 3: External eye examination by using slit lamp examination by Optometrist, Burhan Samejoat THQ,Saeedabad, Matiari, Sindh

Fig. 4:

At this stage, trained healthcare professionals utilize the equipment and system of Peek Vision's innovative technology for conducting comprehensive eye examinations including visual acuity tests, refraction assessments, and screening for common eye diseases such as cataracts, glaucoma, and refractive errors.

Figure 5. Measurement of refractive error, prescription of glasses and contact lens through auto refractor by Piryanka Devi optometrist

Patients who require basic care can utilize this service in which the focal individuals are usually lady health workers. These individuals are trained workers who are expert at initial screening, identifying the nature and severity of the disease, liaising with the medical professionals whose medical skills are required for the screened patients, and referral systems for patients[10].

Figure 6: Using the Ophthalmoscope to examine the patient's eye by Piryanka Devi, Optometrist at RHC Khyber, Matiari, Sindh, Pakistan.

Figure 7: Performed visual acuity test by optometrist

At the primary level, the integration of technology, such as Peek Vision's smartphone-based ophthalmic tools and QR-code-based ophthalmological referral services have revolutionized the provision of primary eye care in Pakistan's developing towns. These tools are used by the trained frontline healthcare workers for conducting accurate assessments in remote areas, expanding the reach of eye health services. The project has an extensive vision and draft to treat the underserved communities. In case the healthcare providers find the acuteness in medical cases, the next-stage services are initiated.

Secondary Eye Healthcare: Recognizing the need for specialized care and treatment, Peek Vision has established secondary eye healthcare facilities in strategic locations in Sindh. These facilities are equipped with advanced diagnostic tools and services. They are staffed by ophthalmologists and optometrists who are trained in expert medical screening, diagnosing, and managing the eye

conditions beyond minor illness. To refer patients to this stage, health workers are required to aid patients after the initial screening and diagnosis. Only after gauging the severity of eye diseases, they refer patients to the most suitable medical expert.

Figure 8: Glasses distributed to students and women.

Figure 9: Pterygium diagnosed by optometrist

Figure 10: Diagnosed subconjunctival haemorrhage by optometrist

At secondary stage, the project aims to screen patients requiring minor and major surgical treatment for eye conditions such as cataracts, glaucoma, cornea transplant and other eye diseases.

They can access these services close to their home that reduces the need for long-distance travel to advanced eye healthcare centres in urban areas of Pakistan. The secondary eye healthcare facilities and systems serve as referral centres for cases that need specialized treatment or surgery beyond the scope of primary care. Peek Vision Project, in this way, ensures a seamless link between patients and ophthalmologists. Among these medical staff, patients can be connected by the health workers on the basis of the eye diseases. So, it is easy to reach the medical specialist in the area of the screened eye diseases. In underdeveloped districts, such eye health centres, and referral systems are considered a special blessing by the suffering patients[6].If initial screening informs that the case cannot be handled at the primary or secondary care level, the patients are referred to the tertiary care.[11]

Tertiary Eye Healthcare: Peek Vision has also established tertiary eye healthcare facilities and referral systems in collaboration with CBM. This level of care is referred to the patients who are diagnosed with complicated eye diseases, and require immediate attention of highly specialised eye doctors.

Table 1: Community Screening Progress

DESCRIPTION	September - 2020	2021	2022	2023	2024 (Till April)
Total Screening	30,571	92,426	80,764	125,958	51,137
Total Refer at Triage Level	9,193	32,827	31,519	19,044	3,796
Total Attended at Triage Level	9,011	32,508	22,732	14,368	2,591
Total Refer at Ophthalmologist	1,764	3,527	3,245	621	441
Total Attended at Ophthalmologist	1,577	2,323	2,074	166	37
Total Refer at SIOVS	147	449	434	413	125
Total Eye Conditions (SIOVS)	61	190	152	141	24
Total Glasses Dispensed	511	2,475	1,472	754	208

Figure 11: Surgical Procedure from auto refractor, visual acuity test using the Snellen chart, slit lamp, preoperative biometry and Extracapsular cataract surgery-ECC)

These centres of excellence are equipped with state-of-the-art technology and staffed by highly skilled ophthalmologists who specialise in various ophthalmological subspecialties such as retinal surgery and paediatric ophthalmology. Patients with advanced eye conditions receive specialized care and surgical treatment at these tertiary healthcare facilities. Moreover, the facilities serve as training centres for aspiring eye care professionals.

MATERIAL ANDMETHODS

The study was conducted from September 2020 to January 2024 at SIOVS. The data consisted of three screening components, community, household and schools at Matiari District. 21 Lady Health Visitors, 16 Lady Health Supervisors, 401 Lady Health Workers and 20 teachers trained for screening as they identified eye conditions through PEEK technology and referred to one of four Rural Health Centres (RHCs) for refraction by optometrists, where optometrists manage locally if any patient does not have serious problems. If needed further examination any patient who has serious problems, then, referred to THQs for ophthalmological assessment. Surgical cases referred to the Sindh Institute of Ophthalmology and Visual Sciences Hyderabad (SIOVS) for specialized care[12,13].

From September 2020 to the end of 2020, 30,571 people examined for eye conditions; this number peaked in 2023 at 125,958 and fell to 51,137 by January 2024. 9193 patients have been referred at Triage level for additional assessment, then increased in the first period to 32,827 in 2021. In January 2024, 3,796 recorded at triage level. 9,011 patients in 2020 and 32,508 patients in 2021 attended their appointments by optometrists. By January 2024, the number of patients decreased to 2,591.Ophthalmologists started eye examinations at 1,764 in 2020 and increased to 3,527 in 2021. In 2023, number of triage at level reduced 621 and slightly decreased to 441 by January 2024.

In 2020, 1577 people attended ophthalmologist appointments and 2,323 attended in 2021. In January 2024, 37 patients attended. In 2021, 449 patients referred to the Specialized Institute of Ophthalmic and Vision Services (SIOVS), and 147 patient in 2020. 125 patients were referred for serious eye conditions in January 2024. In 2020, 61 patients examined eye conditions and 190 in 2021, treated by SIOVS. In January 2024, 24 patients scanned eye problems. In 2020, 511 glasses distributed and an increased number of glasses 2,475 in 2021. In 2022, 1,472 glasses distributed and 754 glasses in 2023. In 2024, it has been indicated that the number of glasses distributed to people. The data reported a large decrease in follow-up by 2024.

Table 2: Household screening Progress

DESCRIPTION	April 2022	2023	2024 (Till April)
Total Screening	34,297	292,974	79,212
Total Refer at Triage Level	7,673	19,787	3,838
Total Attended at Triage Level	2,387	5,050	996
Total Refer at Ophthalmologist	136	102	16
Total Attended at Ophthalmologist	76	22	16
Total Refer at SIOVS	39	45	16
Total Eye Conditions (SIOVS)	14	06	00
Total Glasses Dispensed	205	271	04

In April 2022, 34,297 male and female screened, and 7,673 referred to the triage stage for further refraction, then 2,387 patients appeared to optometrists. 136 patients referred to ophthalmologists, and 76 patients attended for eye examination consultations. 39 patients referred to specialists at tertiary level, then 14 examined eye conditions. In the glasses section, 205 pairs of glasses were distributed.

In 2023, the screening increased to 292,974. At the triage level, the number of referral patients 19,787 improved and 5,050 attended. Referrals to ophthalmologists decreased to 102, and only 22 attended their appointments. 45 patients referred to SIOVS and it slightly the number of patients, however, 6 patients examined eye conditions. 271 glasses distributed to community people, especially in the rural areas of Matiari, Sindh.

By January 2024, 79,212 people were screened by Lady Health workers. Referrals at the triage level 3,838 patients referred at triage level to optometrists and 996 attended their appointments. 16 patients referred to ophthalmologists, and all 16 attended. Referrals to SIOVS, 16 patients referred, however, no eye conditions found. The number of glasses significantly decreased and 4 distributed. The data reported that there was a significant rise in number of screenings in 2023, surveyed a drop in treatments and followed-up appointments by January 2024. In January 2024, the number of glasses to people decreased significantly, and suggested possible difficulties in providing constant care and attention.

Table 3: School screening progress

DESCRIPTION	2021	2022	2023	2024 (Till April)
Total Screening	18,639	19,176	18,652	16,416
Total Refer at Triage Level	1,363	1,618	1,542	1,516
Total Attended at Triage Level	957	1,162	769	580
Total Refer at Ophthalmologist	14	33	30	03
Total Attended at Ophthalmologist	10	24	12	03
Total Refer at SIOVS	22	20	09	10
Total Eye Conditions (SIOVS)	00	10	03	03
Total Glasses Dispensed	244	329	94	30

In 2021, 18,639 students screened, with 1,363 referred at the triage level. 957 visited for refraction tests and comprehensive eye examinations at Rural Health Centres where optometrists were diagnosed. 10 of the 14 patients referred to ophthalmologists. 22 referred to the SIOVS, however, no eye conditions were recorded. **244 pairs** of glasses distributed.

In 2022, screening upturned to 19,176 and 1,618 referred at the triage level, then 1,162 attended. 33 referred to ophthalmologists, and 24 patients attended. Number of referred patients decreased in 2022, 10 documented eye conditions at SIOVS. 329 glasses distributed to students.

In 2023, 18,652 students screened, and 1,542 referred at the triage level. 769 students attended at triage level and its decreased number of students as compared to 2022. 30 students referred to Ophthalmologists, and12 attended. 9 patients have been referred to SIOVS further for examination and three documented eye conditions. The glasses distributed and number of glasses decreased pointedly to 94.

In January 2024, screenings totalled 16,416. 1,516 Referrals were stated at the triage level and 580 patients have been diagnosed by optometrists. 3 patients who have been referred to ophthalmologists' further eye examination, and all attended. In the section of referrals to SIOVS, it has been increased by a little number of patients10, and three patient recognised eye conditions. 30 glasses distributed to students in the different government schools. In the school component, the data showed variations in the number of screenings and developments. It has been noticed that number of glasses decreased in attendance by January 2024, and the reason has been identified in the discussion section with details that challenges faced for maintaining reliable eye care for students.

Impact of Peek Vision Project: The Peek Vision initiative has already begun to yield a palpable impact on the eye health scene of Sindh, Pakistan. Aiming to provide accessible and comprehensive eye care services, the project seeks to enhance the quality of life for countless eye patients, enabling them to improve their eye conditions. This leads them to an independent life again. Moreover, the sustainable system adopted by Peek Vision, in collaboration with CBM, ensures the long-term benefits of the project. Moreover, community engagement and capacity-building initiatives aim to empower local healthcare workers and communities to take ownership of their eye health, required treatments and care thereby fostering resilience and self-reliance.

CONCLUSION

The Peek Vision initiative, established in collaboration with CBM, represents the beginning of a new era in the provision of eye health services in Sindh, Pakistan. Through its primary, secondary, and tertiary healthcare systems, the project seeks to change lives of individuals grappling with eye health issues, providing hope and support. As the project continues to expand its impact, it serves the advancement of eye healthcare systems in the country. The findings showed a notable decline in follow up screenings, referrals and treatment in 2024. The project ensured a systematic approach to manage timely and effective services of serious eye diseases such as cataracts, diabetic retinopathy, and glaucoma from initial screening to advanced surgical care in Matiari. The implementation of this PEEK technology project in Sindh has innovative eye health services, indicating significant improvements in treatment of eye diseases. The mobile health technology solution has proven to be a cost-effective, accessible, and efficient tool in the fight against visual impairment and blindness[14,15].

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