DOI: https://doi.org/10.4038/jcosl.v30i1.90

Research article

Teleophthalmology care model for Sri Lanka

Malinda De Silva[1], Aruna Fernando[2], Rohana B. Marasinghe[3]

The Journal of the College of Ophthalmologists of Sri Lanka 2024; 30: 27-31

Abstract

Introduction and objectives: *The ophthalmic disease burden poses a global challenge, with teleophthalmology emerging as a digital health intervention to bridge gaps in care delivery. The objective of this study was to propose a tailored teleophthalmology model for the local context.*

Material and method: *Qualitative study methodology was adopted to conduct this study, in 2 phases. Thematic analysis performed during phase 1 of the study on shortlisted articles about already established teleophthalmology care models revealed 5 key components of low-resource settings. During phase 2, using the Delphi technique, the expertise of 10 Sri Lankan ophthalmologists was obtained to refine and reorganize the identified components of the model, to organize them into a locally adoptable teleophthalmology model.*

Results: *Discovered key components of the model were disease contexts, type of care, telemedicine principles, necessary technologies, and contact points. The panelists achieved consensus on the teleophthalmology model. A schematic representation of the teleophthalmology model was done. Electronic medical records and artificial intelligence were considered necessary adjuvants to the model.*

Discussion and conclusion: *There is an opportunity to establish a locally favorable teleophthalmology care delivery model with the acceptance of the wider stakeholder community of eye care in Sri Lanka. Policy direction, prototyping, and use of standardized equipment are recommended prior to implanting this model.*

Key words: teleophthalmology, care delivery models, digital health

Introduction

With the rising global ophthalmic disease burden, gaps in care delivery are bound to widen. This impacts the ophthalmic disease outcomes significantly in low- and middle-income countries (LMICs), where the authorities may find scaling the services provided, challenging due to resource scarcity[1]. Therefore, globally it necessitates exploring innovative approaches and novel care delivery models to close the gaps in ophthalmic care delivery. Teleophthalmology emerges as a promising digital health intervention, across the world which has shown to be impactful, particularly in low-resource settings[2].

Telemedicine is the delivery of health care services where distance is a critical factor, by health care professionals using information and communication technologies (ICT)[3]. Teleophthalmology, on the other hand, involves using ICT to deliver consultations, opinions, and care plans as a service to clients who are located remotely from the opinion provider. These clients could be care-recipients or even care providers seeking further expert opinions to serve care recipients, better[4].

Given the fact that Sri Lanka is a LMIC and has a significant ophthalmic care delivery gap based on its ophthalmic disease burden and availability of trained resources, there have been recommendations to adapt teleophthalmology and propose innovative care delivery models to close the gaps[5]. However, it is essential to customize a such care delivery model to suit the local context. Against backdrop of finalizing a digital health blueprint[6] for the country, this study provides a timely guide on the provision of eye care via teleophthalmology in the local context.

Method

The study was conducted in 2 phases to achieve its objective of, proposing a teleophthalmology care model tailored for the Sri Lankan context. During the first phase of the study, a literature review was conducted using a rapid review technique on existing teleophthalmology care delivery models, with more emphasis on publications in low-resource settings. Articles were narrowed down by inclusion and exclusion process (PRISMA diagram in Figure 1) and were thematically analysed. 5 key components of a

[1]*Post Graduate Institute of Medicine, University of Colombo, Sri Lanka,* [2]*General Sir John Kotelawala Defense University, Sri Lanka,* [3]*University of Sri Jayewardenepura, Sri Lanka.*

teleophthalmology care delivery model were found following Braun and Clarke's method of thematic analysis[7]. The resultant components were then refined and reorganized with the expertise of 10 ophthalmologists from Sri Lanka, who had experience working with teleophthalmology. They were recruited via an open invitation circulated among the members of the College of Ophthalmologists. Delphi technique, a qualitative study methodology was adopted for this phase of the study, which comprised 3 rounds of Delphi, seeking opinions and consensus of the panellists. This led to the refinement and reorganization of the components of the teleophthalmology model, to suit the local context. They were then schematically arranged based on the health systems modelling principles, resulting in the teleophthalmology model, to which the consensus of the panellists was obtained[8].

Results

The output of the 2nd phase of the study was the teleophthalmology care delivery model shown in Figure 2. It demonstrates the 5 components identified in the literature review, which were reorganized to suit the local context. The 5 components namely are the contact points, disease contexts, type of care, time frame needed for delivery of care, and necessary technologies.

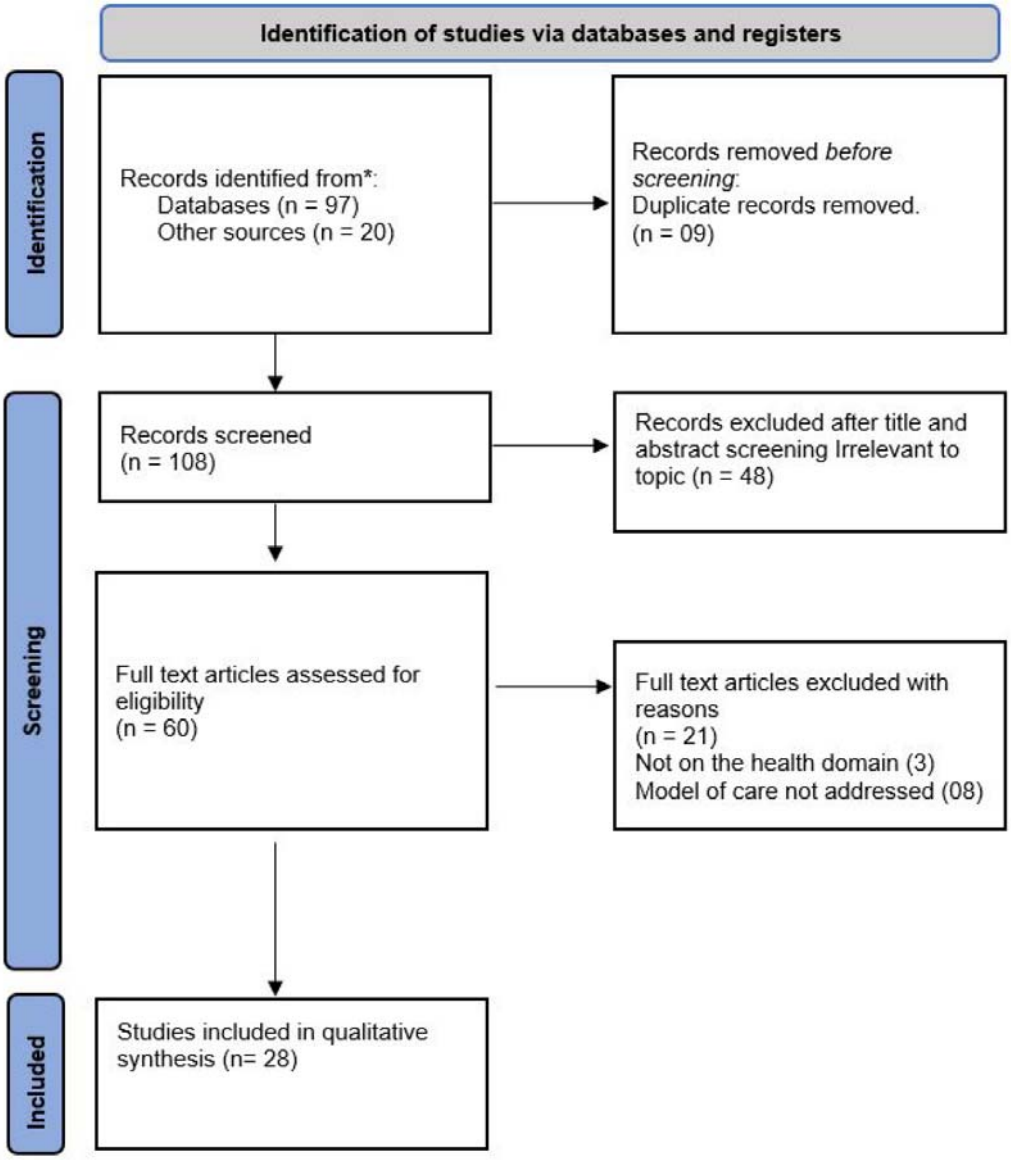

Figure 1. *PRISAM flow filtering the literature.*

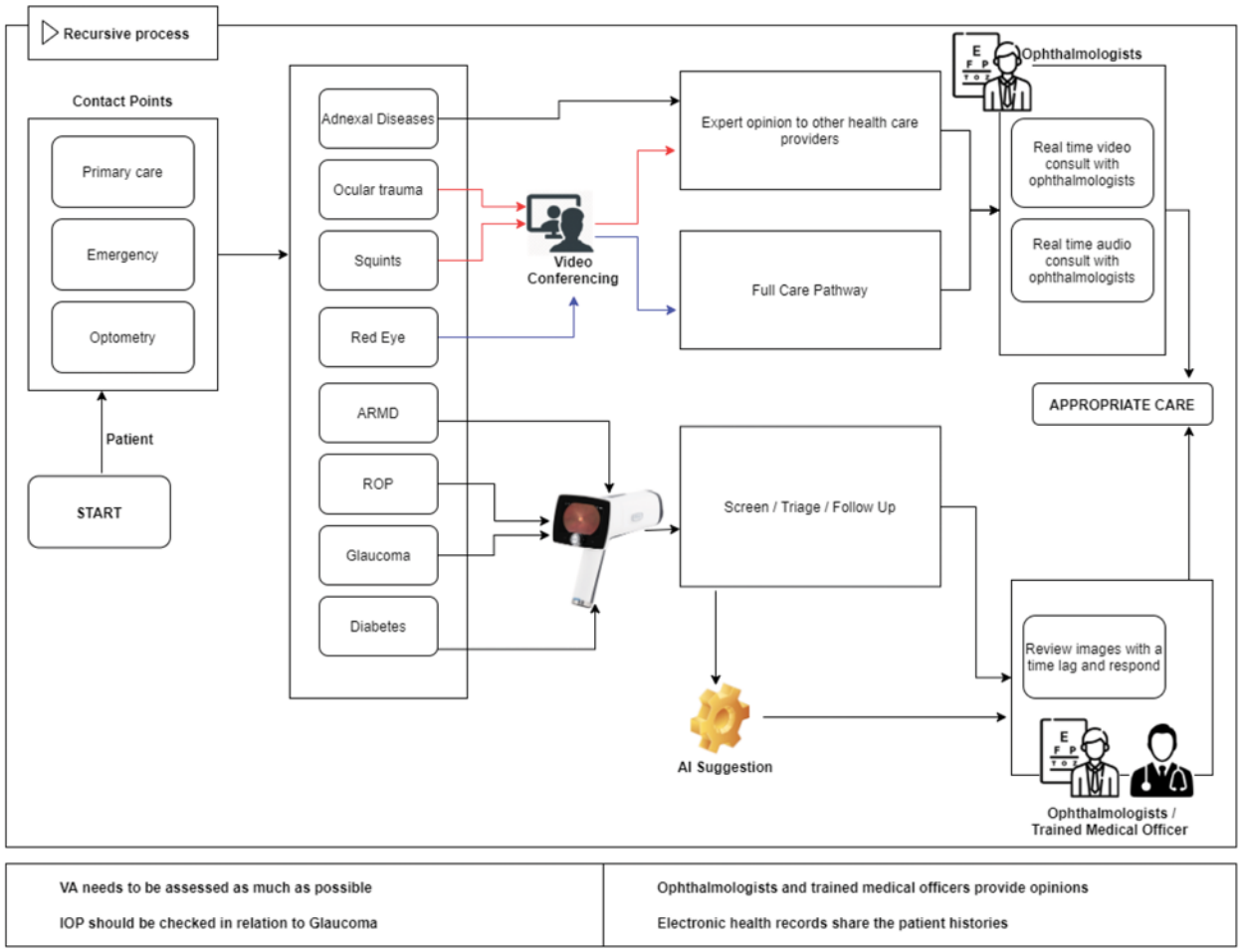

Figure 2. *Teleophthalmology care delivery model for Sri Lanaka.*

Contact points

Patients would come to the contact points, with symptoms, without symptoms, or due to referrals pertaining to ophthalmic conditions. The contact points, encounter these first.

The contact points where teleophthalmology encounters could take place are;

1. Primary care institutions
2. Optometry clinics (Where optometrists encounter patients)
3. Emergency departments

Disease contexts:

These are the disease contexts/ presentations that can be cared for by means of teleophthalmology.

Types of presentations or diseases that can be cared for by teleophthalmology at these contact points are as follows:

- Asymptomatic: Diabetic retinopathy, Glaucoma, Age-related macular degeneration (ARMD).
- Symptomatic: Red eyes, Adnexal diseases, ocular trauma, squints(strabismus), and poor vision.

Types of care delivered

It is essential to be clear about the type of care or interventions that can be facilitated or delivered by means of teleophthalmology for these presenting patients.

- Screening: It's the process of detecting the presence of a disease.
- Triage: It's the process of grading the urgency of treatment and arranging the necessary management.

- Full care pathway: It's the process of provision of medical care including examination, diagnosis, and treatment plan.
- Expert opinion to other healthcare providers: It is an expert (ophthalmologist or an experienced doctor) providing opinion on the plan of management to an onsite team who are with the patient.

Time frame that needs to be adhered

- Real-time consultation by means of video consultation or phone conversation.
- Review records of the patients and provide opinions later (store and forward basis).

Technologies needed

These are the technologies that are used to capture relevant information of the patients that gets transmitted to the relevant care providers in the form of images, videos, text, or audio.

- Realtime audio/video consultations: This is needed to facilitate real-time consultation with an experienced care provider. The encounter must be initiated by an onsite team caring for the patients.
- Fundal imaging devices: Fundal cameras to capture the retinal images and ability to synchronize with the image-sharing platforms.
- Ocular photography: Cameras that can capture images/videos of the external eye.
- Image or video sharing platform: A platform to share captured images and videos with experts where digital health records.

Discussion

The study successfully achieved its general and specific objectives, leading to the development of a teleophthalmology care delivery model tailored to Sri Lanka's healthcare setting. This outcome addresses a notable knowledge gap and fulfils an identified need within the Sri Lankan healthcare context for telemedicine applications in eye care delivery. Answering the research question, "What is a suitable care delivery model to deliver eye care using telemedicine in Sri Lanka?", the study contributes a well-structured, locally relevant model for delivering eye care via teleophthalmology.

The components identified for a teleophthalmology care delivery model aligned with the health care systems modelling framework, mapping onto its core elements namely input (disease context), service (type of care), process (time frame), setting/human resource (contact point), technology and goal (type of care). This guided the design of the teleophthalmology model in Phase 2, providing a structured approach for the design.

In Phase 2, the Delphi[8] served as an appropriate method for consolidating expert opinions, facilitating a stepwise approach to developing the model based on stakeholder consensus while gathering diverse perspectives. It was noteworthy that experts recognized that diabetic retinopathy, glaucoma, and trauma are disease contexts best served by teleophthalmology. Moreover, the need for inclusion of AI and digital health records, within the model was also expressed by the experts. Interestingly the model has not considered the client triggered interactions through m-Health technologies or mobile phone applications.

This model serves as a reference to the policymakers demonstrating its place in the digital health ecosystem. Furthermore, the model is a guide for any teleophthalmology implementation within the country or in any geography, which shares socio-economic background similar to Sri Lanka. To ensure a sustainable deployment of teleophthalmology, the cost-effectiveness of care delivery via this model must be explored by further health economics studies.

The fact that only 10 experts were recruited for the Delphi rounds is identified as a limitation of the study as literature indicates recruitment of 25 to 100 in studies[9]. The model still needs refinement in that regard with further inputs from experts. The feasibility of this model needs to be explored further with proof of concept.

Conclusion

This study aimed to design a teleophthalmology care delivery model tailored to the Sri Lankan healthcare context and successfully achieved its objective. The designed model, guided by healthcare system modelling frameworks, achieved stable consensus among experts. Serving as a reference for policymakers and implementers, this model fills an essential knowledge gap in exploring how ophthalmic care delivery can be done via teleophthalmology means. The model is expected to evolve with further inputs from experts and during implementations.

References

1. Burton MJ, Ramke J, Marques AP, Bourne RRA, Congdon N, Jones I, et al. The Lancet Global Health Commission on Global Eye Health: vision beyond 2020. *Lancet Glob Health.* 2021; **9**(4): e489-551.
2. Recommendations on digital interventions for health system strengthening [Internet]. [cited 2023 Apr 3]. Available from: https://www.who.int/publications-detailredirect/978924155050
3. American Telemedicine Association [Internet]. ATA. [cited 2023 Apr 4]. Available from: https://www.americantelemed.org
4. Caffery LJ, Taylor M, Gole G, Smith AC. Models of care in tele-ophthalmology: A scoping review. *J Telemed Telecare.* 2019; **25**(2): 106-22.
5. Piyasena MMPN, Gudlavalleti VSM, Gilbert C, Yip JL, Peto T, MacLeod D, et al. Development and Validation of a Diabetic Retinopathy Screening Modality Using a Hand-Held Nonmydriatic Digital Retinal Camera by Physician Graders at a TertiaryLevel Medical Clinic: Protocol for a Validation Study. *JMIR Res Protoc.* 2018; 7(12): e10900.
6. Sri Lanka Digital Health Blueprint Version 1.0b. Ministry of Health Sri Lanka;
7. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol.* 2006; **3**(2): 77-101.
8. Latif RB, Dahlan A, Abdul Mulud Z, Nor M. The Delphi Technique as a Method to Obtain Consensus in Health Care Education Research. *Educ Med J.* 2017; **9**: 89-102.
9. Cascella M, Miceli L, Cutugno F, Di Lorenzo G, Morabito A, Oriente A, et al. A Delphi Consensus Approach for the Management of Chronic Pain during and after the COVID-19 Era. *Int J Environ Res Public Health.* 2021; **18**(24): 13372.