

Roles of the eye care workforce for task sharing in management of diabetic retinopathy in Cambodia

Mufarriq Shah^{1,2}, Gail M. Ormsby³, Ayesha Noor⁴, Rahul Chakrabarti², Manfred Mörchen^{5,6}, Fakir M Amirul Islam⁷, C Alex Harper², Jill E Keeffe⁸

¹Pakistan Institute of Community Ophthalmology Hayatabad Medical Complex, Peshawar 25000, Pakistan

²Centre for Eye Research Australia, Department of Ophthalmology, University of Melbourne, Royal Victorian Eye and Ear Hospital, Melbourne, VIC 302, Australia

³Faculty of Education, Science and Business, Lifestyle Research Centre, Avondale College of Higher Education, Cooranbong, NSW 2265, Australia

⁴Vision and Dental Care Clinic, Peshawar 25000, Pakistan

⁵CARITAS Takeo Eye Hospital, Krong Doun Kaev 21151, Cambodia

⁶Regional office Asia South East CBM International Unit 604 Alabang Business Tower, 1216 Acacia Ave, Muntinlupa City 1799, Philippines

⁷Statistics, Data Science and Epidemiology, Swinburne University of Technology, Hawthorn, VIC 3122, Australia

⁸LV Prasad Eye Institute, Hyderabad 500034, India

Correspondence to: Mufarriq Shah. Pakistan Institute of Community Ophthalmology Hayatabad Medical Complex, Peshawar 25000, Pakistan. mufarriq1@hotmail.com

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Abstract

• **AIM:** To identify the current roles of eye and health care workers in eye care delivery and investigate their potential roles in screening and detection for management of diabetic retinopathy (DR) through task sharing.

• **METHODS:** Purposive sampling of 24 participants including health administrators, members from non-government organizations and all available eye care workers in Takeo province were recruited. This cross sectional mixed method study comprised a survey and in-depth interviews. Data were collected from medical records at Caritas Takeo Eye Hospital (CTEH) and Kiri Vong District Referral Hospital Vision Centre, and a survey and interviews with participants were done to explore the potential roles for task sharing in DR management. Qualitative data were transcribed into a text program and then entered into N-Vivo (version 10) software for data management and analysis.

• **RESULTS:** From 2009 to 2012, a total of 105 178 patients were examined and 14 030 eye surgeries were performed in CTEH by three ophthalmologists supported by ophthalmic

nurses in operating and eye examination for patients. Between January 2011 and September 2012, 151 patients (72 males) with retinal pathology including 125 (83%) with DR visited CTEH. In addition 170 patients with diabetes were referred to CTEH for eye examinations from Mo Po Tsyo screening programs for people with diabetes. Factors favouring task sharing included high demand for eye care services and scarcity of ophthalmologists.

• **CONCLUSION:** Task sharing and team work for eye care services is functional. Participants favor the potential role of ophthalmic nurses in screening for DR through task sharing.

• **KEYWORDS:** task sharing; diabetes; diabetic retinopathy; human resources; Cambodia

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INTRODUCTION

Diabetes mellitus (DM) is a major non-communicable disease worldwide. The global burden of diabetes is estimated at 346 million^[1]. Diabetic retinopathy (DR), a microvascular complication of diabetes mellitus affects up to 80% of people with diabetes^[2] and is one of the leading causes of preventable blindness in adults^[3]. Globally, between 2010 and 2030, the prevalence of diabetes is expected to increase approximately 70% in developing countries and 20% in developed countries^[4]. According to the WHO in 2012, the prevalence of diabetes amongst adults (age >20y) in Cambodia was 5.1%^[5]. King *et al*^[6] in 2005 estimated the prevalence of diabetes in a community-based survey of 5% in the Siem Riep Province, and 11% in the Kampong Cham Province, of which two-thirds of all cases of diabetes were undiagnosed prior to the survey. With an 82% increase, the number of people living with type 2 diabetes is expected to rise from 145 000 in 2008 to 264 000 by 2028 in Cambodia^[7]. The prevalence of blindness (presenting visual acuity <3/60 in the better eye) was 3.4% and the prevalence of low vision (presenting visual acuity <6/18 to 3/60) was 21.1%, in Takeo Province^[8]. If strategies to

prevent vision loss due to DR are not implemented, a greater proportion of vision loss would be due to DR over the next two decades^[9]. This shows that demand for the health workforce will increase markedly in all countries.

According to the report by the International Council of Ophthalmology (ICO), Cambodia has fewer than one ophthalmologist and ophthalmic nurse for over 200 000 population^[10] compared with the WHO standard of one ophthalmologist for 100 000 population. This lack of qualified personnel is one of the crucial determinants that promote the idea of task sharing in low-resource countries, in order to provide eye care services with limited capital and human resources.

The name “task shifting” is perceived as a major barrier^[11]. For instance, ophthalmologists in Sub-Saharan Africa feel that their profession is being taken by non-doctors^[12]. To mitigate the barriers to task shifting by changing the perception of other health professionals, we focus on a team work approach and co-managing on common ground with intra- and inter-professional collaboration and move away from “task shifting” to the term “task sharing”. Based on the World Health Organization (WHO) definition^[13], task sharing is defined as “the rational distribution of tasks among health workforce teams, with specific tasks moved from highly qualified health workers to health workers with shorter training and fewer but adequate qualifications for the task assigned (under supervision), to share tasks and make their collaboration and communication more efficient to achieve a task by co-managing on common ground in order to make efficient use of the available human resources”. Screening for DR is defined as a strategy used in a population to identify the possible presence of an as-yet-undiagnosed DR in individuals with diabetes^[14]. Detection of DR is used for people with diabetes visiting hospital whether in- or out-patients. These patients constitute a high-risk group for DR of the population and are likely to give a high yield for DR^[14].

The aim was to investigate the roles of the health work force at eye and health care services in Takeo province Cambodia to evaluate the feasibility of task sharing for management of DR.

SUBJECTS AND METHODS

We used non-probability purposive sampling of medical and non-medical stakeholders to capture a diversity of views. Participants in this study included: Members from National Programme for Eye Health (NPEH), Ministry of Health, Director of Takeo Operational District and all available eye care workers at Caritas Takeo Eye Hospital (CTEH) and Kiri Vong District Referral Hospital Vision Centre (KVDRHVC) including medical director, ophthalmologists, refractionists and ophthalmic nurses. The roles and responsibilities for ophthalmic nurses were developed by CTEH in consultation with the KVDRH and the National Program for Eye Health

and are reported elsewhere^[15]. CTEH in collaboration with the Ministry of Health is one of the main teaching hospitals for eye care staff in Cambodia and eye care services have been delivered since 1997^[8]. Two NGOs-Mo Po Tsyo and Cambodian Development Mission for Disability (CDMD) were also included. Mo Po Tsyo works for people with hypertension and diabetes mellitus in Cambodia and performs screening for diabetes amongst the population across five provinces of Cambodia. Mo Po Tsyo established a peer-educator network for the management of diabetes and hypertension. CDMD provides community based rehabilitation (CBR) to the community and members of CDMD assist staff of KVDRHVC and CTEH during outreach screening programmes.

This was a cross sectional study with mixed-methods design utilizing survey and interviews. Using themes from the WHO Health Systems ‘Building Blocks’ study^[16], a literature review and from expert consultation, semi-structured self-administered questionnaires were developed. The questionnaire consists of three sections. The first section included demographic data such as participant cadre and type of organization. The second section assessed the current system for screening, diagnosis, referral and management of eye care for people with diabetes in Takeo province Cambodia. The third section investigated the current roles of the eye care workers and their potential roles in task sharing for management of DR.

Questionnaires were translated from English into Cambodian local language “Khmer” and administered in the language of the participant’s choice, either Khmer or English. Before site visits, each potential participant was contacted via email to explain the objectives and the research questions of the study. Questionnaires were sent *via* email to heads of the organizations and were delivered to participants to complete at their leisure. Where possible, questionnaires were directly sent through email to participants two weeks before site visits and were collected from each participant before the interview.

Data sources included reviews of existing information available in medical records and databases at CTEH and KVDRHVC. Consultation with participants about referral mechanisms of patients with DR were also collected. Face-to-face interviews explored participants’ views about the current situation for detection and management of DR as well as using task sharing and a team work approach in screening and detection for management of DR. We conducted the interviews in the presence of a translator if someone was less competent in responding in English. The interviews were also audio recorded.

Qualitative data were transcribed into a text program and then entered into N-Vivo (version 10) software (QSR International, Doncaster, Australia) for data management and analysis. Thematic analysis was undertaken on the interview responses obtained from participants to appraise the existing roles of the eye care workers and their potential roles in screening and

Table 1 Number and cadre of participants in the study

Level	Category	Cadre	No. of participants
Policy level personnel	National level managerial staff	Doctors	3
	Provincial level managerial staff	Doctors	4
	District level managerial staff	Doctors	1
Service providers	Ophthalmologists	Doctors	4
	Eye care workers	Ophthalmic nurses and dispensing opticians	7
	Community health worker	Volunteers	2
NGOs	International NGOs in Cambodia (CBM and Mo Po Tsyo)	Manager	2
	National NGO (CDMD)	Manager	1
Total			24

NGO: Non-government organization; CBM: Christian blind mission; CDMD: Cambodian development mission for disability.

detection for management of DR. SPSS (Statistical Package for Social Sciences) version 19 (IBM Corp, Armonk, NY, USA) was used for analysis of quantitative data.

Ethics approval for this study was provided by the Human Research Ethics Committee at the Royal Victorian Eye and Ear Hospital, Australia and by the National Ethics Committee for Health Research Cambodia. Written consent was obtained from all participants who agreed to participate in the study.

RESULTS

Twenty-four participants took part in the study. With a 100% response rate to the survey and interviews; 12 (50%) participants were doctors. The same participants were included in the survey and the following interviews (Table 1).

In CTEH, a total of 105 178 patients were examined and 14 030 eye surgeries were performed by 3 ophthalmologist assisted by 5 ophthalmic nurses and 2 nurse assistants between 2009 and 2012. Ophthalmic nurses support ophthalmologists in operating and eye examination of patients and also perform refraction and low vision rehabilitation at CTEH.

Analysis of the 2012 data for patients' visits to CTEH showed that most of the patients visiting the CTEH were walk-in patients. Referral sources included KVDRHVC, non-government organizations (Mo Po Tsyo and CDMD), and outreach programs for screening for cataract and refractive errors. 'Other' sources (Figure 1) included referral from different organizations such as district hospitals, Commune Health Centres (CHC), private hospitals, private general practitioners and village volunteers.

Collaboration of CTEH in outreach activities for cataract and refractive errors with KVDRHVC, CDMD and Commune Health Centres was an important element of the CTEH activities. Data from CTEH documented that between January 2010 to October 2012, all together 8828 people were screened through the outreach programs of which 3534 people were referred for examination to the CTEH. From the proportion of patients referred to the CTEH, 62% ($n=2198$) were for cataract and the remainder for 'other' conditions. Usually

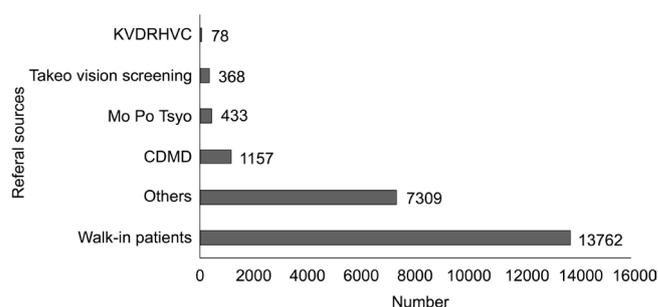


Figure 1 Sources of patients' referral to the CTEH (data sourced from CTEH records, 2012) KVDRHVC: Kiri Vong District Referral Hospital Vision Centre; CDMD: Cambodian development mission for disability.

the screening team consisted of ophthalmic nurses from the KVDRHVC and CTEH, a general nurse from the Commune Health Centre, a Community Leader from the Commune Health Centre and community-based rehabilitation (CBR) workers from CDMD. A community ophthalmologist from CTEH accompanied the screening team when the screening was scheduled in a large village. Through the outreach vision screening programs, provision of health education to people was shared by a general nurse and a member of CDMD during the screening days to allow the ophthalmic nurse to conduct eye examinations. During screening, people with cataract and other eye diseases were referred to CTEH for further investigation and management. People with refractive errors were referred to KVDRHVC and those who were blind or with other disabilities were referred to CDMD for rehabilitation services, vocational training and financial support. People who needed low vision services were referred to the low vision clinic at CTEH.

CTEH has a close network with the local NGO, Mo Po Tsyo for DR screening. Following the screening referral pathway, a peer educator from each health center in the district visits households and those with evidence of an abnormal urine analysis are requested to have further blood tests and are advised to visit a referral hospital in their district on a particular

date. That hospital is visited by a diabetologist employed by Mo Po Tsyo who performs the examination and investigation of these patients. Whilst this method may only capture the proportion of patients with diabetes with renal impairment, through an interview with Mo Po Tsyo staff it was explained that this is a relatively inexpensive tool. After consultation with the diabetologist, patients with high risk factors (duration since diagnosis of diabetes, hypertension, poor glycaemic control) are referred for a retinal examination at CTEH. Findings are recorded in a computerized health information system, and reported back to Mo Po Tsyo. The Mo Po Tsyo provided free group transportation to patients. The costs for diagnosis and possible treatment were covered by the CTEH.

The CTEH was the only facility in the province that had the capacity to perform dilated fundus examinations with a facility for laser treatment of DR. The available data showed that between January 2011 and September 2012, 151 patients (72 males) with retinal pathology including 125 (83%) with DR visited CTEH Outpatients Clinic. In addition 170 people with diabetes were referred to CTEH for eye examinations from Mo Po Tsyo screening programs for people with diabetes.

Review of the KVDRHVC records between April 2010 and November 2012 showed that 7918 patients visited KVDRHVC of which 556 (7%) patients were referred to the CTEH (Figure 2). Primary eye care treatment performed by the ophthalmic nurses at the KVDRHVC was also routinely performed by ophthalmologists at CTEH. Two ophthalmic nurses at KVDRHVC provided refraction services, provision of readymade glasses, screening for cataract and refractive errors and made referrals to CTEH (Figure 2). The ophthalmic nurses in KVDRHVC also performed ophthalmic procedures such as eye irrigation, eye swabbing and padding, suture removal after cataract surgery, foreign body removal, measuring of intraocular pressure using a Schiotz tonometer, lacrimal sac washout and diagnosis of trachoma and prescription of tetracycline eye ointment. The job description of ophthalmic nurses followed the national guidelines for eye nurses and had been developed by the National Program for Eye Health, Ministry of Health.

The results of the survey indicated human resources at the CTEH and KVRHVC, their current tasks and potential activities in task sharing for DR management on the basis of the views of the participants are summarized in Table 2.

CTEH not only provided an accredited training program for ophthalmologists but also a one year national training for ophthalmic nurses under the umbrella of the Ministry of Health. After completion of 12mo training on theory and clinical practice at CTEH the training committee conducted final examinations of ophthalmic nurses. CTEH trained these cadres of eye care staff: Ophthalmologist: 4y of training (Specialist in Ophthalmology); Basic Eye Doctor: 2y of training (Diploma

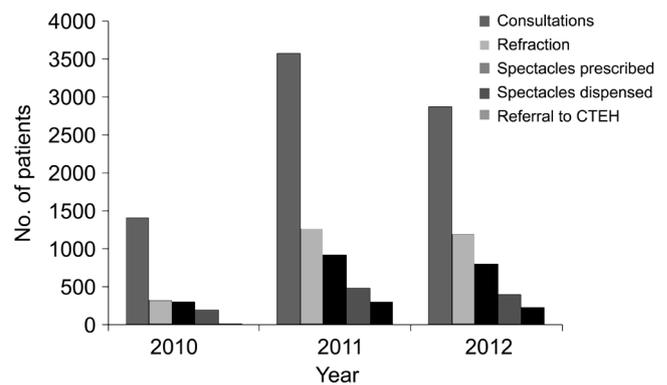


Figure 2 The activities of KVDRHVC (data sourced from KVDRHVC records) Amongst these referred patients, 47% were for management of cataract, 44% for ‘other’ conditions, <1% for glaucoma, 8% were referred for glasses because KVDRHVC does not have an optical workshop and only provides ready-made glasses. There were no records to estimate the proportion of patients with diabetes seen at the KVDRHVC. The CTEH records for 2012 showed that among 234 referrals from KVDRHVC, 78 (33.3%) visited CTEH for eye examinations. KVDRHVC: Kiri Vong District Referral Hospital Vision Centre; CTEH: Caritas Takeo Eye Hospital.

in Ophthalmology); Ophthalmic nurse: 12mo of training (Diploma in Ophthalmic Nursing); Refractionist nurse: 3mo of training after Diploma in Ophthalmic Nursing.

Continuing medical education (CME) is crucial to the professional development of health care providers. To provide clinical experiences and improve skills of the eye care workforce, continuing medical education was conducted twice a year when ophthalmologists, ophthalmic nurses, refractionists and volunteers received refresher courses. Two doctors, five nurses and ten ophthalmic nurse students from CTEH, and two nursing staff from KVDRHVC participated in a CME workshop offered by the Cambodian Ophthalmic Nurse Society in June, 2012. Two doctors and 14 nurses (including ten student nurses) participated in a CME workshop for the Cambodian Ophthalmic Nurse Society in December 2012.

One community ophthalmologist attended a 4-week training course on Community Outreach and Social Marketing of Eye Care Services at Aravind Eye Hospital, during November-December 2012. One ophthalmologist was trained in laser treatment for DR in Aravind Eye Hospital. One ophthalmic nurse received training to perform fundus photography at the Aravind Eye Hospital and one nurse trained in the Lion’s Aravind Institute for Community Ophthalmology

Interview Findings The major themes that emerged from the interviews were: sharing the workload of ophthalmologists, training and role expansion, and task shifting or task sharing to ensure timely management of patients.

Sharing the workload of ophthalmologists Interviewees indicated that when tasks such as taking histories, assessing visual acuity and taking intraocular pressure were shared

Table 2 Human resources, their current tasks and additional tasks that could be realistically performed through task sharing in Takeo Province

Cadre tasks	Caritas Takeo Eye Hospital					Kiri Vong Vision Centre
	Ophthalmologist	Ophthalmic nurse	Nurse assistant	Administrative staff	Optician	Ophthalmic nurse
Dilated fundus examination	●	○				
Diagnosis	●					
Treatment (Laser)	●					
Intra-vitreous triamcinolone	●					
Grading retinal photographs	●					
Fluorescein fundus angiography	●	○				
Fundus photography	●	○	○			○
Measuring intraocular pressure	●	○				●
Slit lamp biomicroscopy	●	○				●
Vitreoretinal surgery	○					
History taking	●	●				●
Timing and follow-up of laser treatment	●					
Performing refraction		●				●
Low-vision and orthoptics		●				○
Testing visual acuity		●	●		○	●
Completing health information records		●	●	●		●
Administering mydriatic drops		●	○			●
Patient counseling and DR education		●	○		○	●
DR screening		○				○
Instructing patients about medication						●
Patient registration and record keeping				●	○	●
Recall for follow-up				●		●
Making spectacles					●	○

● : Staff currently undertaking DR-related tasks; ○ : Additional tasks that could be performed with additional training and resources.

with trained ophthalmic nurses and other mid-level eye care workers, ophthalmologists were enabled to examine more patients. The ophthalmologists often supervised the other mid-level eye care workers so that they could guide them in basic eye examination procedures.

Participants consistently acknowledged the enhanced role ophthalmic nurses played at CTEH and KVDRHVC. An ophthalmologist stated: “Ophthalmic nurses in the CTEH have shared a lot of work with ophthalmologists and reduced their burden. Without this shared care, we cannot cope with all who want to be under our care”.

Training and role expansion The managerial staff at the provincial and district levels highlighted the impact of the work of the specially trained ophthalmic nurses on the eye care provided at all levels, especially at government hospitals without an eye department. The situation analysis indicated that with training and supervision, the ophthalmic nurses at CTEH and KVDRHVC performed a number of tasks that were previously designated only to the ophthalmologists. Participants reported: “Medical doctors in general hospitals do not have sufficient training in eye care. These trained ophthalmic nurses play a vital role in the rural hospitals, thus providing a referral health facility without ophthalmologist”.

Task shifting or task sharing The responses from the members of National Programme for Eye Health and other interviewees indicated that they were in favor of task sharing and supervised roles for the ophthalmic nurses rather than task shifting in eye care services. A participant reported: “I acknowledge the role of ophthalmic nurses in task sharing in eye care under supervision of ophthalmologists in the Takeo province. I will support extending this team work approach from eye care to the health care system including eye care services for people with diabetes”

Timely management of patients One of the key themes that emerged from data analysis was timely patient management. The CTEH has been able to better utilize their human resources and shorten their response time by training the ophthalmic nurses and by providing effective supervision. The ophthalmic nurses shared all pre-operation procedures including biometry for calculating the power for the intraocular lens and preparing patients for cataract surgery that helped the ophthalmologists to perform more surgeries and reduce waiting time for patients. **Potential for task sharing in diabetic retinopathy** All the interviewees noted the importance of linkages between health professionals and community leadership. Staff at CTEH and KVDRHVC worked closely with community leaders to

plan to include them in DR screening and awareness. The role of the community volunteers and NGOs was to act as a liaison, encouraging people from the community to go to eye care facilities. Participants discussed how the health worker shortage in Takeo was handled through task sharing. A community ophthalmologist reported: “As a result of the involvement of NGOs... the primary eye care services... have been extended beyond the provincial hospital to the district referral hospitals where the ophthalmic nurses are in charge of primary eye care services and conduct outreach activities. We have planning to include detection of DR in our outreach programs”.

Study findings indicated that the participants were satisfied with the roles of ophthalmic nurses in primary eye care and were in favor of extending task sharing in screening and detection for management of DR.

DISCUSSION

Findings from this research indicated that task sharing amongst ophthalmologists and mid-level eye and health care workers in primary eye care delivery is functional in Cambodia and has the potential to be exercised in eye care services including people with diabetes. Favoring factors for task sharing were limited number of ophthalmologists, support from health administrators and ophthalmologists, training and continue medical education for mid-level eye care workers. Team work approach and collaboration amongst health professionals, community and NGOs were important elements in implementation of task sharing in Cambodia.

From a health workforce perspective, this study demonstrated the potential roles of mid-level eye care workers in sharing tasks with ophthalmologists in screening and detection of eye diseases and DR in people with diabetes. Findings from this study highlighted the importance of community involvement in the promotion of the community-based screening program for DR and that trained community health workers could bridge the gap between community and health care teams to develop linkages and improve access to the eye care services. These findings were similar to the AEH and LVPEI models where health education is provided by trained community health workers selected from the same community^[17-18]. The lowest stratum of the pyramid model of task sharing practised by LVPEI consists of village health workers who are trained to share tasks with vision technicians and optometrists in screening for diabetes, DR, hypertension and health promotion^[19].

In KVDRHVC, the role of ophthalmic nurses was expanded to carryout primary eye care, rather than sending all patients to the provincial hospital (CTEH). Similarly ophthalmic nurse at KVDRHVC were able to conduct follow-up examinations of patients after cataract, trichiasis and dacryocystorhinostomy surgeries performed at CTEH. This meant that ophthalmic

nurses in KVDRHVC eased the burden of primary eye care tasks on CTEH to allow them to give more attention to tertiary eye care services. The employment of trained eye nurses was seen as a more sustainable option to offer primary eye care and services for refractive error corrections to a rural, remote and impoverished population than hiring ophthalmologists. Such examples can be seen in the LVPEI and AEH integrated models where vision centres perform the same roles as refraction, recognition and making referrals^[20]. Currently there is no capacity for posterior segment examination at the district hospital level in Takeo Province, Cambodia. This could possibly be achieved with non-mydratic retinal imaging and training vision centre workers to use the technology.

One of the reasons for sharing tasks among organizations is to increase access for patients to eye care services^[21]. The service delivery model in the Cambodian health system incorporated task sharing across institutions as well as amongst the workforce within an institution. For instance, there is task sharing in eye care delivery between CTEH, Mo Po Tsyo, CDMD, KVDRHVC and commune health centres. The close network between CTEH and the local NGO, Mo Po Tsyo, offers an insight into how DR can be approached in low-resource settings. However, even with all the task sharing and linkages, the numbers of patients who visited CTEH for eye care directly or by referrals between were quite small. This low uptake was mainly due to long distance of the CTEH. In addition, data obtained from the CTEH indicated that the people screened in outreach programs were for any ophthalmic conditions. These findings suggested that support and facilitation from the government and NGOs is needed in implementation of task sharing in DR management to further improve the eye care systems, giving it the ability to increase coverage for eye care services for people with diabetes even with limited numbers of ophthalmologists.

In conclusion, task sharing and team work was happening in Cambodia at various levels of eye care. The main driver for task sharing was scarcity of ophthalmologists. Health professionals at all levels and community leaders were positive about future eye care services provided by ophthalmic nurses in screening and detection for management of DR through task sharing.

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