Strengthening Retina Eye Care Services in Nepal: Retina Eye Care of Nepal project

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Abstract

Recently causes of blindness are changing in Nepal. The number of people blind due to retinal diseases is increasing. Age-related macular degeneration (AMD), diabetic retinopathy (DR), hypertensive retinopathy, and retinal vein occlusion are the major retinal problems in Nepal. As the prevalence of vitreoretinal disorders is increasing with age, it indicates that retinal disorders will be a major public health issue with longevity in future[1].

A rapid assessment of blindness conducted in 2010 had reported posterior segment problems as the second common cause of blindness, after cataract in Nepal[2]. Retinal diseases are very difficult to treat. Results from low-income countries show that many patients present only when they lose vision in both eyes. Delay in presentation was acknowledged as a significant problem and is often due to inadequate primary eye care and to misdiagnosis. Thus, it was highlighted that all ophthalmologists should be trained to recognize and manage retina problems. As blindness from DR is preventable, if caught and treated early, DR provides an excellent opportunity for secondary prevention strategies, such as screenings[3]. So, early diagnoses and preventions are very important.

The projected population of Province 3 and 4 in Nepal is 60, 26,626, and 24, 72,494 respectively in the year 2016. There are altogether 6 tertiary retina care centers in Province 3 and 1 tertiary retina center in province 4 of Nepal to cover that much of the population. But, few eye doctors can treat patients with retinal diseases in Nepal. It is also necessary to train ophthalmic assistants, optometrists, ophthalmic nurses, and other health workers who can assist the treatment of retinal diseases. So, strengthening retina eye care services is very important in Nepal.

Retina Eye Care of Nepal (RECON) project was a joint program of BP Eye Foundation, Kathmandu, Nepal, and Tokushima University, Japan to strengthen 3 retina centers in Province 1 and 1 retina center in province 4. The project duration was from May 2016 to February 2019. The purpose of RECON was to strengthen retina eye care services in Nepal by training ophthalmic human resources, enhancing retina eye care facilities, and conducting retina-screening camp.

Background

Recently causes of blindness are changing in Nepal. The number of people blind due to retinal diseases is increasing. Age-related macular degeneration (AMD), diabetic retinopathy (DR), hypertensive retinopathy, and retinal vein occlusion are the major retinal problems in Nepal. As the prevalence of vitreoretinal disorders is increasing with age, it indicates that retinal disorders will be a major public health issue with longevity in future[1].

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primary eye care and to misdiagnosis. Thus, it was highlighted that all ophthalmologists should be trained to recognize and manage retina problems. As blindness from DR is preventable, if caught and treated early, DR provides an excellent opportunity for secondary prevention strategies, such as screenings[3]. So, early diagnoses and preventions are very important.

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**Methods**

RECON established a unique approach to accomplish its objectives (Figure 1).

**Master Eye Doctor (MED) Training**

Four eye institutes, Hospital for Children, Eye, ENT & Rehabilitation Services (CHEERS) located at Bhaktapur district, Himalaya Eye Hospital (HEH) located at Kaski district, Nepal Eye Hospital (NEH) and BP Koirala Lions Club of Ophthalmic studies (BPKLCOS), located at Kathmandu district were selected as the partner retina centers. CHEERS and HEH had one retina specialist each and NEH and BPKLCOS had two retina specialists each at the time of project execution. Four Retina specialists, one from each partner retina center of Nepal received one-month Training of Trainers (TOT) in retina care from Tokushima University of Japan in the first year of the project and got a certificate of Master Eye Doctor (MED). MED also received advanced retina training for 2 weeks at Kindai University and the Tokushima University of Japan at the beginning of the 3rd year of the project.

**Strengthening of Retina Centres**

All partner retina centers already had vitrectomy machines and laser facilities. Vitreoretinal procedures were already in functional states at all retina centers except at CHEERS. Moreover, BPKLCOS and NEH located at the capital city already had residency programs. HEH is located outside of the capital city while CHEERS is a new hospital at Bhaktapur, within close premises of the capital city. The project supported fundus photography machines, ophthalmic ultrasonic imaging, wide-angle viewing system, and cryo
machine to these partner eye institutes. MEDs started strengthening of retina clinics with knowledge and skills gained during TOT in retina care from Tokushima University.

Advocacy and Retina force networking

MEDs conducted first continuing medical education (CME) on retina eye care with facilitators and visiting retina experts from Tokushima University to the targeted ophthalmologists with a focus on retina force networking. Second CME was on developing vitrectomy in Nepal.

Training Human Resources

These MEDs prepared training materials on retina management for different cadre of ophthalmic human resources including general ophthalmologists, optometrists, ophthalmic assistants, ophthalmic nurses, and female community health volunteers. These MEDs already provided two weeks retina training for ophthalmologists, one-week training for optometrists, ophthalmic assistants, and ophthalmic nurses from different eye institutes of Nepal. The training included early detection and prompt referral of retinal diseases from the community to the retina training centers.

Retina Camps

Outreach retina camps were conducted outside of base hospitals to target the community who otherwise would not visit the base hospital due to various reasons. Portable fundus camera, binocular and monocular indirect ophthalmoscope with 20 dioptre convex lenses were used to screen the retinal diseases at eye camps. The patients with retinal diseases found at eye camps were sent to the respective retina centers for further treatment. Retina camps were conducted in partnership with local health clubs, municipalities, or nongovernment organizations. Each camp shared the task among different cadres of health care workers including MED, optometrist, ophthalmic nurse and ophthalmic assistant. MED performed fundoscopy and advised for further treatment, optometrist performed fundus photography, ophthalmic nurses helped in counseling and ophthalmic assistant helped in taking vision, pupil dilation, and history taking.

Results

Table 1 shows the number of vitreo retina procedures by all 4 retina centers before and during the project period. There were no vitreoretinal procedures performed at CHEERS before the RECON project. All retina centers are doing good performance every year after enrolling in the RECON project. These retinal procedures were invariably performed by the retina specialists of the respective retina centers. Table 2 depicts the number of human resources trained in retina care. Advocacy campaigns and retina camps were held as shown in table 3.

Discussion
The retinal disease is likely to become more common in the developing world. Treatment of retinal conditions is improving, and may be cost effective, even in a developing world eye clinic. Owing to advances in technology, equipment to treat retinal disease, although still expensive, is now much more suitable for use in a developing country. However, a significant limitation remains the shortage of skilled personnel. Ophthalmic education should prepare eye workers not only for the challenges they will face today, but also for future developments. This means that we need more developing world ophthalmologists with subspecialty training in retinal disease who can train future generations of eye workers [4].

A significant barrier was the practice of setting up a screening system without adequate treatment facilities being in place [3]. In our case, all retina centers already had vitrectomy machines, laser facility, and optical coherence tomography. RECON executed skill enhancement, trained, and retrained MEDs of Nepal in capacity building. CME helped in advocacy campaign and retina forces networking. All the trainees, eye doctors, optometrists, ophthalmic assistants, ophthalmic nurses, and physicians were providing education to retina patients about the importance of retina check-up and referring them in need to our retina care centers.

The primary care physicians are often the first medical personnel for patients with diabetes.

The knowledge of the attending physicians regarding diabetic retinopathy is crucial as they are the main source of referrals for these patients to ophthalmologists. Various studies around the world have been done to access the diabetic eye disease awareness among physicians.

Even in resource-rich settings, many of these studies have suggested that the knowledge and awareness of physicians about diabetic retinopathy is inadequate and have recommended more robust training[5]–[7].

Most Eye camp is widely practiced in all over Nepal. To add the retinal disease screening at eye camps is very useful for the prevention of retinal diseases. Retina camps were the means of eye health education, eye examinations, fundus photography to patients in our project.

The conclusion from Bhakapur retina study in Nepal highlighted the real world scenario about retinal diseases in Nepal. The high prevalence of retinal diseases, low awareness on major blinding retinal diseases in the population and high risk groups warrants the prompt attention for awareness campaigns, retinal diseases screening, using allied ophthalmic personnel and allied medical personnel using fundus cameras, proper referral network to tertiary eye hospitals, cross referral with the physician for diseases like diabetes, and hypertension and facilities for treatment of these diseases are required for the prevention of avoidable blindness from these major retinal disorder[8].

In our retina camps, apart from direct beneficiaries who got free consultation in retina camps, there were many indirect beneficiaries in the community. Awareness of diabetic and hypertensive retinopathy and
other retinal diseases were the main aims of retina camp. This is a good step of advocacy for early detection and prompt treatment to prevent retina related visual blindness in Nepal.

The comprehensive campaigns are necessary to promote increased awareness in a community by involving people from various walks of life in collaboration with community eye centres and eye hospitals. Improving awareness will help in early detection of diseases and reduction in visual impairment and blindness[9].

**Conclusion**

RECON was a novel approach to strengthen retina services in Nepal. The aim of the project was the ultimate benefits to the needy retina patients who otherwise were going to miss the retina services. There was a strengthening of retina eye care of all these retina centers. The project focused on the training retina workforces, enhancing retina care by easy access and improved services and awareness to even grass root level in the community by conducting retina-screening camp. We recommend further similar type of strategy in different provinces of Nepal to combat retinal-related blindness in the future.

**Declarations**

**Ethics approval and consent to participate:**

We adhered to the tenet of the Helsinki declaration. The permission to publish project output was approved by the project implementing organization, BP Eye Foundation. Informed consent was waived off in this retrospective study, where the participants were de-identified or could not be contacted. (Reference No.: 522-076/077).

Consent to participate is “not applicable”.

**Consent for publication**

Consent of publication is “not applicable” to participants.

**Competing interests**

The authors declare that they have no competing interests.

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**Authors' contributions**
As collected data and drafted the manuscript. CS, PK, HMG and TN gave input for critical review of the manuscript. All authors read and approved the final manuscript.

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Abbreviations
AMD = Age related macular degeneration [7]
BPKLCOS = BP Koirala Lions Club of Ophthalmic Studies
CHEERS = Hospital for Children, Eye, ENT & Rehabilitation Services
HEH = Himalayan Eye Hospital
NEH = Nepal Eye Hospital

CME = continuous medical education

DR = Diabetic retinopathy

IEC = information education and communication

MED = Master Eye Doctor

RECON = Retina Eye Care of Nepal

TOT = Training of Trainers

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**Tables**

**Table 1: Vitreo retinal procedures**

| Vitreo Retinal Surgeries | Before RECON | During RECON |
|-------------------------|--------------|--------------|
|                         | Year 1 | Year 2 | Year 1 | Year 2 | Year 3 |
| Vitreo Retinal Surgeries |        |        |        |        |        |
| 0                       | 0      | 0      | 18     | 147    | 211    |
| 51                      | 102    | 160    | 167    | 260    |        |
| 44                      | 96     | 210    | 314    | 349    |        |
| 14                      | 27     | 38     | 45     | 48     |        |
|                          |        |        |        |        | CHEERS |
|                          |        |        |        |        | BPKLCOS|
| Intravitreal injections  |        |        |        |        |        |
| 0                       | 0      | 64     | 301    | 402    |        |
| 0                       | 93     | 374    | 370    | 583    |        |
| 72                      | 188    | 367    | 773    | 1544   |        |
| 305                     | 314    | 411    | 686    | 1088   |        |
| Retinal Lasers          |        |        |        |        |        |
| 0                       | 0      | 17     | 113    | 123    |        |
| 65                      | 79     | 178    | 290    | 336    |        |
| 55                      | 73     | 168    | 250    | 448    |        |
| 25                      | 35     | 78     | 99     | 105    |        |

BPKCLOS, BP Koirala Lions Club of Ophthalmic studies; CHEERS, Hospital for Children, Eye, ENT & Rehabilitation Services; HEH, Himalaya Eye Hospital; NEH, Nepal Eye Hospital; RECON, Retina Eye Care of Nepal

**Table 2: Capacity building of human resources**

| Human resources                  | Frequency |
|----------------------------------|-----------|
| Master Eye Doctors               | 4         |
| Ophthalmologists                 | 20        |
| Optometrists                     | 16        |
| Ophthalmic Assistants            | 48        |
| Ophthalmic Nurses                | 17        |
| General Physicians               | 76        |
| Health Workers                   | 28        |

**Table 3: Advocacy and Retina camps**

| No of CMEs                        | 2         |
| No of Retina Camps                | 8         |
| No of Retina patients screened at the camp | 627       |
| No of IEC materials distributed   | 2000      |

No=Number; CME=continuous medical education; IEC=information, education & communication

**Figures**
Figure 1

Algorithm of RECON activities RECON=Retina Eye Care of Nepal