

Mobile teledermatology for Dermatological Care in Rural Nepal: Dermatology training of medical officers at primary health care centers

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Abstract

Introduction: Skin diseases are common in Nepal but dermatologists are very few, and there is no adequate training for Medical officers to diagnose and treat common skin diseases. We developed a training program based on Mobile teledermatology and evaluated its effectiveness.

Methods: Five medical officers from 3 primary health care centers of Kavre District were trained in their respective working centers. They did 12 days of mobile teledermatology sessions in which they saw minimum of 60 common skin diseases in direct supervision of a dermatologist. Medical officers were involved in all aspect of patient care from history taking, examination of skin lesions, writing down the prescription to counseling and follow up. The effectiveness of training was evaluated by, difference in skin disease knowledge before and after the training, ability to diagnose and treat common skin diseases independently at the end of the training and feedback from the trainees.

Results: Altogether 337 skin diseases were seen by 5 medical officers. There was significant difference between the skin disease knowledge before and after the training (p-value 0.009). At the end of the session they were able to diagnose independently 87% (80%-95%) of common skin diseases. All of them strongly agreed that this is the effective way of training.

Conclusions: Mobile teledermatology is the feasible and effective method of dermatology training to the medical officers at primary health care centres in remote areas, while providing skin care to the villagers at the same time.

Key words: Mobile teledermatology, dermatology training, medical officers, rural Nepal

Introduction

Nepal is among the poorest developing nations with precarious health care in rural areas. Most of the Nepalese population (85%) lives in the rural and remote areas with difficult and inaccessible terrain. The health care in these areas is provided by health workers in the health posts and medical officers (MO) in primary health care centers (PHCs).

For an equal health status in the nation, high quality care has to be provided in the rural areas, where the

majority of the populations live. The ministry of health offers basic health care to all the population of Nepal but it has not been possible to provide specialist care. The major reason is that there are insufficient numbers of specialist doctors and most of them are working in the big hospitals or in medical colleges of the cities. It is a major challenge to provide specialist care for the populations in the rural areas till the time we get sufficient numbers of specialists.

Skin diseases (SDs) are among the most common health problems with very significant morbidity.¹In our

previous study from the rural areas of central Nepal the overall prevalence of SDs was 25% with a high impact on the quality of life for these villagers. It is worth noting that the prevalence was higher in females (30%) than in males (18%).² There are only around 150 dermatologists for a population of 26 million³ and all of them are working in the cities. The MOs have very limited training and the health workers have no training at all to manage the common SDs.

Till now dermatological health camps are the only way to provide specialist skin care to the rural areas, however these camps are sporadic and hence of little importance. Now it's high time to find a valid and feasible method to provide dermatological care to these rural areas.

Our recent study has determined the validity and feasibility of providing consultation via mobile teledermatology (MTD). It was found that diagnostic concordance was 88% between MTD and face to face consultation among 107 SDs. On average MTD consultation required only 7 minutes more time than the face to face consultation.⁴

Based on these data, we are convinced that MTD is a cheap and effective method to provide dermatological care in the remote regions and simultaneously train the MOs at the PHCs or district hospitals.

In Nepal, during the undergraduate medical course MBBS (Bachelor in medicine and surgery), dermatology teaching is 36 hours of lectures and 15 days of posting in dermatology outpatient clinic. This training is not sufficient to learn to diagnose and treat SDs unassisted. Hands on clinical training of short duration would be best for MOs to make them able to diagnose and treat the most common SDs.

This study has determined the validity and the effect of a short and structured training for MOs to diagnose and treat common SDs while providing MTD consultations. To our knowledge, this training is the first of its kind in Nepal and might be an important step in taking dermatologic care to the rural areas of Nepal.

Methodology

The study was conducted for a period of 4 months, 2015 A. D., in 3 PHCs in the rural areas of the Kavre district, about 30 kms east of Kathmandu. Altogether 5 MOs participated in the study, 2 each from Khopasi and Sunthan PHCs and 1 from Methinkot hospital. The study consisted of the following steps –

- Focus group discussion with the MOs
- Skin disease knowledge assessment before training
- Hands on clinical training via MTD
- Skin disease knowledge assessment after training
- Feedback from MOs

Focus Group Discussion

Before the training a focus group discussion was conducted with 7 MOs from different PHCs who have graduated from different medical colleges. The discussion was focused on teaching of dermatology during their medical training, prevalence of SDs in their PHCs, their skill in managing SDs, need of dermatological training for MOs, and their opinion about MTD. All the MOs had attended lectures and clinical posting during their medical training. SDs were common in their PHCs, and it was difficult for them to diagnose and treat common SDs. According to them a short dermatologic training with patients will be very useful. They thought that MTD can be a feasible and effective way to provide skin care and at the same time a way of learning dermatology. One MO doubted about the patient's satisfaction, as the doctor will be asking another doctor for the treatment. Others thought that it is important to inform the patients by telling them they get a better assessment from specialist doctor.

Skin Disease Knowledge Assessment

SD knowledge of the MOs was tested before and after the training. For the assessment, a questionnaire consisting of 50 multiple choice questions was used. The multiple choice questions involved diagnosis (21/50), treatment (14/50) and prevention and counseling (5/50) of common SDs. Photographs of common SDs were used for the questions concerning diagnosis. The questionnaire was pre-tested with 5 other MOs working in private hospitals of Kathmandu. From their feedback, minor parts of the questions were improved. The questions were easy to understand, the photographs clear and the time given to answer a single question (1 minute) was sufficient.

Skin Disease Knowledge Assessment before the training

Altogether 11 MOs participated in skin disease knowledge assessment before the training, only 5 could be enrolled in the training, due to the big earthquake, which resulted in delay of 6 months. During that period,

some of the MOs had finished their contract and some got transferred to another district.

Orientation

The MOs participating in the study were given an orientation on clinical history taking and description of skin lesions, use of mobile phone for photographing, uploading and transmitting photos as well as data by internet application Viber.

Mobile phones, mobile application and internet connection

Mobile phones required an inbuilt camera of at least 5 mega pixels, and wireless internet connectivity. The specifications of mobile phones/tab used are shown in tables 1 and 2.

Table 1. Mobile phones and specifications, used by MOs

	Device	Inbuilt camera	Operating software
1	Samsung galaxy grand prime G530H	8 MP	Android OS
2	Samsung galaxy grand 2 G7102	8 MP	Android OS
3	Acer A1-830 Tablet	5 MP	Android OS
4	i-Phone 6	8 MP	iOS 9.0.2
5	i-PAD air	5 MP	iOS 9.0.2

Table 2. Mobile phone/tab and specifications, used by Dermatologists

	Device	Display screen	Operating system
1	Samsung galaxy grand prime G530H	5 inch	Android OS
2	Galaxy tab 4, SM-T331	8 inch	Android OS

The internet application used for the transmission of images and data was Viber, while the wireless internet connection was of 192 kbps.

Dermatology lectures

Soft copies of Dermatology lectures for MBBS students were provided to MOs to review information regarding SDs.

Mobile teledermatology training

One day per week for 12 weeks was allocated for MTD training for the MO. On that day one MO at PHC and One dermatologist at Kathmandu were available and connected via Viber.

The MO examined the patient with SD. After taking verbal consent with the patient/guardian for MTD, the MO photographed the skin lesions. Minimum of two photographs were taken, one with visible anatomical region and one close up. Lesions on the genital areas and breasts in females were not photographed. The photos and clinical information were then sent to the dermatologist. Immediately after getting the information, the dermatologist asked for more information/photos if required, otherwise formulated the diagnosis and treatment and sent it to the MO. The MO studied the diagnosis and treatment provided by the dermatologist and accordingly wrote a prescription for the patient then took a photo of the prescription and sent it back to the dermatologist. Dermatologist checked the prescription and if needed corrected it, otherwise advised to give it to the patient. The consultation and medicines were free of cost for the patients.

The MTD consultation was divided in 2 parts. During the first 8 MTD sessions, the MOs only examined the patients and sent the photos and information and the dermatologist provided the diagnosis and treatment.

In the last 4 MTD sessions, the MOs first formulated the diagnosis and treatment and then sent it to the dermatologist along with clinical information and photographs. The dermatologist verified it and corrected if required. This part assessed the MOs skill to manage common SDs unassisted.

In this way MOs were directly involved in patient care from history taking, examining the skin lesions, making diagnoses, formulating treatment and writing prescriptions.

It was mandatory for the MOs to see a minimum of 60 SDs which should include at least 10 eczemas, and 5 of each pigmentary disorders, fungal infections, urticaria and acne. These are the most common SDs according to our previous study.²

All SDs with photographs, diagnosis and treatment were recorded by the MOs in power point format.

Skin Disease Knowledge Assessment after the training

After completing the MTD training sessions, the SD knowledge of the MOs was evaluated with a questionnaire of the same pattern as in the test before the training. The scores were compared before and after the training using paired t-test.

Feedback from MOs

The feedback about the training from the MOs was taken 3 months after the completion of the training. They were given 10 questions to answer about the training. Nine were formulated as Likert scale answers and 1 was open ended concerning general suggestions. The feedback questions focused mainly on technical feasibility, cost of MTD, patient satisfaction, effectiveness of training and their confidence in treating SDs after the training.

The study has obtained ethical approval from Institutional Review Board of the Institute of Medicine.

Results

During the MTD training dermatological care was provided to 299 patients (male 122, female 177) in the age group 4 months to 83 years median 25 (IQR 15-40). Altogether 337 SDs were diagnosed in the these patients (table 3).

Table 3. SD categories and number of SDs diagnosed by MOs during MTD consultations

SD categories	MO1	MO 2	MO 3	MO 4	MO 5	Total
Eczema	16	10	17	14	23	80
Fungal infection	6	5	12	9	11	43
Pigmentary Disorders	6	7	6	10	7	36
Urticaria	8	6	7	6	7	34
Acne	9	5	5	6	5	30
Others	21	28	14	19	32	114
Total no of Diagnoses	66	61	61	64	85	337
Total number of patients	63	60	48	59	69	299

The MOs correctly diagnosed 87% (range 80-95%) of common SDs during the last 4 MTD sessions (Figure 1).

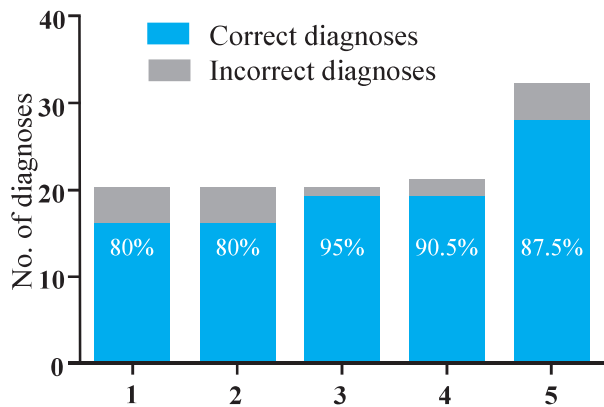


Figure 1. SDs diagnosed independently by MOs

The SD knowledge of MOs improved significantly (p-value 0.009) after the training (Figure 2).

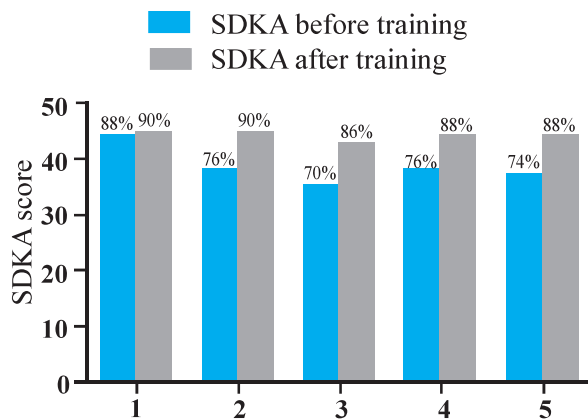


Figure 2. Skin Disease Knowledge Assessment (SDKA) scores before and after the training

The MOs gave positive feedback regarding the training. All the MOs strongly agreed that MTD is useful to provide dermatologic care in areas where there is no or difficult access to dermatologist. They also agreed strongly that MTD is an effective method to learn to manage common skin diseases. After the training, all of them felt confident to diagnose and treat the most common SDs.

Discussion

Dermatology has the advantage of being a visual medical speciality, which makes it suitable for teledermatology.⁵ Our previous study from the rural areas of Nepal has determined the possibility to diagnose and treat common

SDs based on good quality photographs of skin lesions combined with information about the disease⁴.

Mobile phones or smart phones are commonly used in Nepal. The recent smart phones have high quality cameras with adequate photographic resolution, data processing and transmission capability. There is rapid development of wireless internet, and nowadays an internet of low cost and a speed of 192 kbps is available in almost all the PHCs, which is sufficient for transmission of data and images.

There are internet applications, such as viber, whatsapp, which are free and can be effectively used for the transmission of data and images. Alternatively, it is also possible to develop an internet application. We are in the process of developing DCRN (Dermatological Care in Rural Nepal) app, appropriate for MTD in Nepal.

With MTD, we can reach rural health centres which are not accessible or very difficult to access by other means of transportation. It is very cheap and feasible from technological point of view.

In our previous study, we have confirmed that MTD is a reliable, useful and cost effective method to provide skin care to the poor populations, which cannot be reached, in the isolated areas of Nepal⁴.

The present study was aimed to evaluate the effectiveness of training of MOs when tutored by a dermatologist while providing MTD skin care to the patient. It is mandatory that the MOs learn to diagnose and manage the common SDs, which comprise more than 80% of all SDs.² The major advantage of the training is that it is conducted while the MO continue their work in the clinic providing care to the populations and no need to leave work for the training. In our view this is a better way of learning, in comparison to lectures or demonstration of cases to the class.

It is a practice in Nepal that trainings are provided through workshops or internships. Workshops consists mainly of lectures and few or no practical demonstrations. Internships are of longer duration and usually carried out in the hospitals. During internships, there is not always a curriculum or a tutoring by a specialist. Furthermore there is no precise evaluation methodology for this type of training. In both types of training the MO has to be absent from the PHC/district hospital, which compromises their service.

Our training did not incorporate lectures. The MOs have already studied basic dermatology during their medical training. We provided them with soft copies of dermatology lectures for the MBBS course. This way

they can update themselves and go back and review, if required.

Although the study was delayed due to the earthquake in Nepal and was reduced to only 5 MOs it was evident that this learning model was effective. Skin disease knowledge of the MOs after the training increased significantly (p-value 0.009) as compared to before the training. On an average the MOs independently diagnosed 87% of the most common SDs, during the second part of the training. The MOs agreed that MTD is an effective method to learn to manage common SDs, while providing skin care to the people.

Our model of training of MOs is an innovative, cheap, feasible, effective and valid way to diagnose and manage common SDs at the PHCs and district hospitals of rural Nepal. This can be an important step forward in taking dermatologic care to rural and remote areas where dermatologists are not available.

Conclusions

Mobile teledermatology is the feasible and effective method of dermatology training to the medical officers at primary health care centres in remote areas, while providing skin care to the villagers at the same time.

Conflict of interest: None declared

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