PRACTITIONERS' SECTION

TELEDERMATOLOGY IN INDIA: PRACTICAL IMPLICATIONS

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ABSTRACT

Teledermatology is considered to be one of the solutions to the problem of inadequate number of dermatologists in remote parts of India. We present a brief account of the technological components involved in teledermatology in India, and an evaluation of the advantages and limitations of the use of teledermatology as a clinical tool.

Key words: Interactive video consultation, 'store and forward' technology, teledermatology

INTRODUCTION

"I shall be telling this with a sigh Somewhere ages and ages hence: Two roads diverged in a wood, I took the one less traveled by, And that has made all the difference."

(From 'The Road Not Taken' by Robert Frost)

Telemedicine is one of the most recent advances in medical technology. The application of the principles of telemedicine to dermatology is generally referred to as 'teledermatology.' Dermatologists have for many years conducted long-range consultations

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Department of Dermatology, Amrita Institute of Medical Sciences and Research Centre, Kochi, Kerala - 682 026, India E-mail: ferozkal@hotmail.com by telephone or e-mail, but the unique feature of advanced teledermatology is the two-way electronic network that allows immediate interactive communication between the patient, the primary care physician, and the specialist^[1] The advantages of such an arrangement are immense, especially in a country like India with a large rural population having minimal access to specialist treatment.

BACKGROUND

Telemedicine services in our institution started toward the end of 2002. Since then, the institution has had more than 1000 teleconsultations from all over India. Included in this are more than 100 teledermatology consultations (two-way interactive consultations). In our short experience with teledermatology, we have noted both the obvious advantages and the definite limitations of this wonderful technology. Through this article, we hope to give a brief picture of the pros and cons of teledermatology, as we see it.

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DEFINITIONS AND CONCEPTS

Telemedicine

Telemedicine can be broadly defined as the use of telecommunication technologies to provide medical information and services.^[2]

The WHO (World Health Organization) defines telemedicine as:

'The delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities.'^[3]

Telemedicine consulting center

This is the site where the patient is present. In a telemedicine consulting center, imaging and communication equipment for acquiring and transferring medical information of the patient is available. A telemedicine consulting center usually has a general practitioner or, in very remote locations, a registered medical practitioner who will be able to communicate to the specialist the symptoms/problems of the patient.^[3]

Telemedicine specialty center

This refers to a site where the specialist is present. He can interact with the patient present in the remote site and view his reports and monitor his progress. A specialty center is generally located in a specialty or superspecialty hospital catering to specific specialties or all specialties.^[3] The two main technological options for the practice of teledermatology are: a) Store and forward b) Real-time video consultations

Both these methods have their own inherent advantages and disadvantages.

Store-and-forward technology

It is the method by which the medical images and data of patients are captured and stored locally in the referring center and/or at a central location and subsequently forwarded/ transmitted to the specialty center. Store and forward teledermatology is a relatively less expensive option for teledermatology because it uses the widely available internet and makes minimal use of the readily available commercial, off-the-shelf equipment. The specialist looks at the clinical photos and patient details and can reply to the referring physician accordingly.^[3-6]

Two-way video teleconferencing (VTC)/Realtime video consultation/interactive video consultation

TC uses a synchronous video and audio transmission to allow a live, interactive consultation between a patient and a remote physician (usually a specialist). The major advantage of VTC teledermatology is that it most closely mimics the traditional face-to-face evaluation and allows a live interaction between the dermatologist and the patient.^[3]

Electronic medical record (EMR)/patient information record (PIR)

These records consist of all information pertaining to the patient for providing care

using telemedicine. They include clinical and nonclinical information. Usually the referring center fills up the nonclinical details (mainly demographic), presenting complaints, available investigation report, etc. The specialist, after the teleconsultation, completes other details like provisional diagnosis, suggested plan of management, etc.^[3] Incidentally EMR is also gradually being incorporated into many hospital systems (in lieu of normal case sheets) to gradually evolve a 'paperless' hospital scenario.

At our institution, we have been dealing with both interactive teleconsultations and storeand-forward consultations. A majority of our interactive consultations have been from the army hospitals in Leh-Ladakh and centers in the Lakshadweep islands. The remoteness of these areas and the evident lack of access to specialists make these an ideal area for the application of teledermatology. We have had store-and-forward consultation from various centers in India, as well as some African countries (through the iPath platform^[7]).

Of late, we have tried to combine the real-time and store-and-forward options. (The referring center initially sends high quality digital still images of the lesions, along with a brief history. The photos and EMR are viewed by us and then a time is fixed up for an interactive consultation in which the patient is present.) The images transferred are in the DICOM 3 (Diagnostic Imaging and Communication in Medicine) format, which is the most accepted format in the case of still images used in telemedicine. The camera in use by us for web consultations is a 'Sony PCS-1600 P' with a resolution of 640×480 and frame rate of 30 fps (frames per second). Live sessions are routed via an ISDN (integrated services digital network) link. We have also started using a mobile telemedicine van, which is sent to medical camps in the periphery, and live consultation can be set up as and when required.

The range of cases we have seen as part of these consultations is amazing. We have dealt with cases ranging from nevi, chronic eczematous lesions, and syringomas to genodermatoseslike epidermolysis bullosa, HIV, and connective tissue diseases. Especially significant is the fact that in a majority of cases that we dealt with, it was the patient's first contact with a dermatologist.

RELATIVE ADVANTAGES AND DISADVANTAGES OF THE STORE-AND-FORWARD AND INTERACTIVE CONSULTATIONS

Store and forward Advantages

- Cost-effectiveness: Minimal and relatively cheap equipment. A large number of images can be reviewed in a short time.
- Clarity: Compared to the resolution offered in a VTC, the images in the store-andforward option are much clearer. The quality of the digital camera used is also a major factor determining the accuracy of diagnosis.^[8] However, with digital camera technology improving day by day, the quality of the still images used can only go up. In fact, many studies have shown that storeand-forward images compare very favorably to actual face-to-face consultations.^[9,10]
- Increased reach: The referring center can

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reach out to a larger number of specialists. A single image on a teledermatology platform can be discussed by a number of consultants across the world.

Disadvantages

- *Case history:* A specialist might not find some questions regarding the history of the case addressed. A subsequent query and a reply to the query might be time consuming.
- *Rapport:* An obvious absence of rapport with the patient and hence a relatively lesser level of patient satisfaction compared to counseling of patients directly.
- Quality of photographs: Improperly taken photographs, for example, in terms of lighting, may determine the ease or difficulty of diagnosis.

Interactive video consultations Advantages

- Minimal information gaps. History can be elicited quite extensively.
- Any area can be examined (especially to rule out the presence of disease in other parts). In store-and-forward consultations, the focus is restricted to only the areas considered important, as perceived by the referring physician.
- Instructions to the referring physician can be carried out immediately.
- Higher patient satisfaction. A good rapport can be established with the patient. However, it has been demonstrated in a number of studies that patient satisfaction with teledermatology is highly subjective. It is understandable that patients having more

serious skin conditions would generally prefer to have a normal face-to-face consultation over a teleconsultation.^[11,12]

Disadvantages

- The main limitation, as of now, is the clarity of images. In a specialty like dermatology, the importance of seeing the lesions clearly cannot be understated. With a resolution of 640×480, it is very difficult to appreciate the finer details of the lesions.
- Cost-effectiveness. The relatively higher cost of equipment may be a burden, especially for the peripheral referring centers.
- Time constraints. The patient, referring physician, and the specialist all have to be present at the same time. Also, the consultation takes up longer time as compared to giving an opinion on still images.
- Patient discomfort. Some patients do have an inhibition to appearing in front of a perceived live camera. This would especially be so in the case of conditions involving private parts.

It is fairly obvious that teledermatology would be a wonderful tool in the context of management of dermatological problems in remote parts of India. However, as of now, we have come across a number of practical problems which need to be addressed before teledermatology can produce a really significant impact. In fact, the effectiveness of teledermatology as a primary health care tool at present is questionable, though it is definitely possible that it may help to prioritize referrals from remote areas.^[13,14] The major practical problems we found are:

- a) Clarity of images: One of the primary limitations we found is the poor clarity of images (in a live interactive session). Often, it is difficult to make out the primary lesions, and we have to rely on the physician's opinion as to whether the lesions are macules, papules, plaques, or vesicles. Finer points like atrophy are virtually impossible to discern. The best results, we feel, are when an initial still image (via 'store and forward'), along with a brief history, is followed up by a prearranged real-time consultation. It is also important to standardize the equipment and the format for the practice of telemedicine in India.
- b) Full body examination: It is understandably uncomfortable for the patient to expose his/her body in front of a camera for a full body examination. In fact, many patients, especially females, seem shy to just appear in front of the camera. Proper counseling of the patient by the referring center both before and after the session might be helpful.
- c) Limitations in follow-up: Many of the referring centers do not have the adequate infrastructure for investigative follow-up. In places where even a potassium hydroxide smear may be difficult to obtain, it would be obviously difficult to suggest a skin biopsy or immunofluorescence examination. Similarly, a lack of access to adequate medications tends to defeat the purpose of the process. We can make a provisional diagnosis, but confirming it or managing the condition accordingly may be difficult in many cases. Interestingly, some studies have demonstrated that teledermatology

management plans were more likely to include biopsies, excisions, or review than was the case at the face-to-face consultation.^[15] We hope that in the future along with the improvement in the quality of telemedicine equipment, the investigative facilities at the peripheral centers will also be upgraded. The future may see more frequent use of telepathology and teledermoscopy in the peripheral centers. ^[16] There have been various studies which have demonstrated the effectiveness of teledermoscopy vis-à-vis face-to-face consultation, especially in the case of melanomas.^[17,18] The same applies for the extended use of telepathology in conjunction with teledermatology.^[19] The increased and more effective use of mobile devices like cell phones and personal digital assistants (PDAs) is another direction towards which teledermatology is expanding.^[20-23] Ultimately, it is presumed that the benefits of a standardized teledermatology system will not only benefit the patients and the referring nonspecialist but also expert dermatologists who can use this as a platform for valuable interaction and learning.[23]

CONCLUSIONS

It might be quite a while before teledermatology becomes a common and accepted tool for primary care dermatology in India, A number of practical issues have to be addressed, especially regarding the standardization of telemedicine equipment and procedures. We feel that a combination of the store-and-forward system with real-time consultation would be the most effective means of teledermatology

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consultation. Along with the development of telemedicine tools, it would be important to expand the investigative and pharmaceutical facilities in the remote hospitals of India.

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