FEATURE ARTICLE

CE 2.0 Contact Hours

Teledermatology

Virtual Access to Quality Dermatology Care and Beyond

Michael Roman, Sharon E. Jacob

ABSTRACT: Teledermatology is the treatment of skin disease whereby there is transfer of electronic medical information from one provider in one location to another provider at a different location. There are two primary forms of Telederm: store-and-forward method and live/real-time interactive dermatology, which are both discussed in this article. The potential benefits of teledermatology include increased healthcare system efficiency, reductions in patient wait time from evaluation to treatment, and improvements in overall patient access. This article discusses the conditions suitable for face-to-face consults versus teledermatology consult, the limitations of teledermatology, and the ethical considerations of this patient care service modality.

Key words: Access, Dermatology, Store-and-Forward, Teledermatology

WHAT IS TELEDERMATOLOGY?

Telemedicine a medical term used to denote health services provided through telecommunication technology, whereby there is transfer of medical information electronically (audio, visual, and data) from one place to another. These modalities are widely used in radiology, ophthalmology (retinal evaluations), dermatology, and medical education programs. When skin disease is the patient care issue being addressed, the specific term used is teledermatology (henceforth Telederm). Telederm is a valuable tool in the diagnosis and management of dermatologic diseases for it affords patients the opportunity to receive care who would otherwise have no or limited access, for example, immobilized patients or those living in rural areas (including deployed service people, rural Veterans Affairs outpatient clinics, community-based outpatient clinics, etc.). Furthermore, it may also be useful in primary care settings to triage cases and streamline dermatology clinic referrals.

Michael Roman, BS, *David Geffen School of Medicine at UCLA, Los Angeles, CA.*

Sharon E. Jacob, MD, *Loma Linda University, Loma Linda, CA.*

Sharon E. Jacob served as an independent investigator on the safety and efficacy of T.R.U.E. Test (Smart Practice; Phoenix, AZ) panels 1.1, 2.1, and 3.1 in children and adolescents, Pediatric Research Equity Act (PREA-1) trial, and now serves as an investigator on PREA-2. She has served as a consultant for Johnson & Johnson. She has no conflicts of interest associated with the subject matter in this manuscript. Michael Roman has no relevant disclosures or conflicts of interest.

Correspondence concerning this article should be addressed to Sharon E. Jacob, MD, Department of Dermatology, Loma Linda University, Faculty Medical Offices, 11370, Anderson Street, Suite 2600, Loma Linda, CA 92354.

E-mail: sjacob@contactderm.net

DOI: 10.1097/JDN.0000000000000086

HOW DOES TELEDERM WORK?

There are two main forms of Telederm: store and forward (SAF) and live/real-time interactive dermatology. The SAF method is the more common of the two forms (Figure 1). This method involves sending or forwarding digital images associated with medical information to a remote consulted specialist. For example, a referring provider would send a patient, along with an electronic consult (including relevant history of general medical and present dermatologic disease), to the Telederm nurse or Telederm technician to be imaged. The Telederm imager is an integral component of the overall Telederm process because of the unique services it provides. Once the images of a lesion are captured, they are then associated with the electronic consult and referred on to a dermatologist or dermatology nurse practitioner (DNP) for a medical opinion.

The consultant would then be able to assess the image and offer the appropriate recommendations without physically being in the same room as the patient. Advantages of this method, as compared with the live/real-time interactive method, are that it is not reliant on the presence of both parties at the same time and does not usually require expensive equipment.

In real-time/live interactive Telederm applications, the provider and patient usually interact via live videoconferencing (akin to "Skype"). An example would be a primary care provider or general nurse practitioner and a patient who are together conducting a video conference call with a remote dermatologist or DNP. This mode generally requires videoconferencing technological equipment for both the

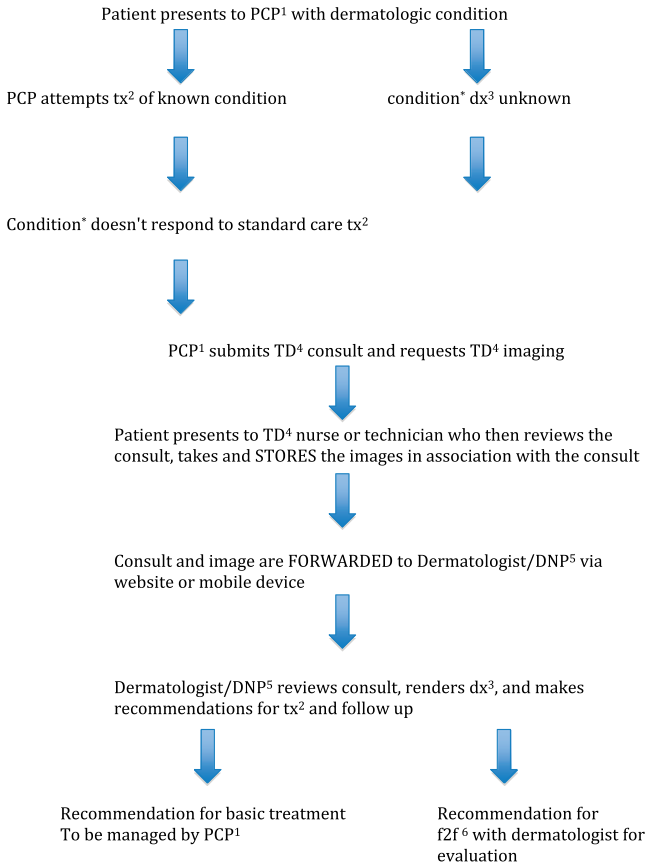

FIGURE 1. Store-and-forward teledermatology consult flow diagram.

referring and consultant providers. Moreover, another restriction is that all participants must be available at the same time.

WHERE TELEDERM CAN HAVE AN IMPACT

There are several benefits of Telederm. One is the potential to significantly reduce patient wait time from evaluation to treatment (Bowns, Collins, Walters, & McDonagh, 2006; Ferrandiz et al., 2007; Hsiao & Oh, 2008; Moreno-Ramirez et al., 2007; Whited et al., 2002). Another major benefit that Telederm provides to the healthcare system is improving overall patient access by increasing the number of patients that can be evaluated and treated. For example, a patient with a symptomatic seborrheic keratosis (Figure 2) could receive evaluation and reassurance by the consultant dermatologist and then return to the primary care provider for cryotherapy, obviating the need for the patient to utilize a face-to-face visit with the dermatologist/DNP. Supporting primary care providers in their diagnosis and treatment

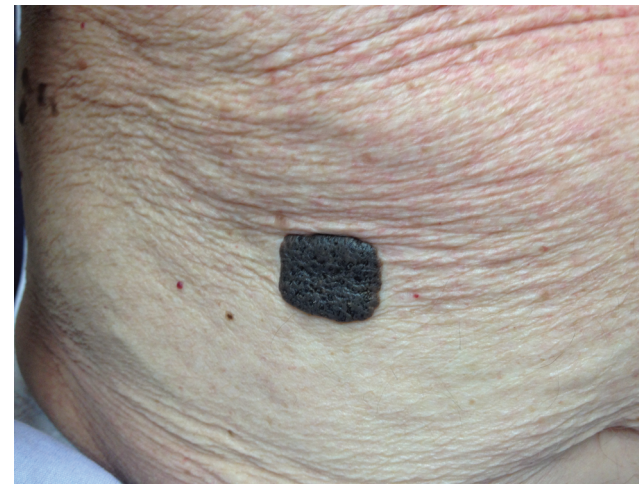

FIGURE 2. Patient with a symptomatic seborrheic keratosis (courtesy of S. E. Jacob).

of basic skin disease improves the overall efficiency of the system.

One of the most important issues when it comes to effective patient preselection for referral is exclusion versus inclusion of different diagnoses (Landow et al., 2014; Lim, Oakley, & Rademaker, 2011; Thind, Brooker, & Ormerod, 2011). The most appropriate categories of diagnoses to be referred to Telederm include eczematous dermatitis (van der Heijden, de Keizer, Bos, Spuls, & Witkamp, 2011), papulosquamous disorders, and stable conditions or growths for which a diagnoses is requested (Table 1). Telederm is not appropriate for all dermatologic conditions; for example, the patient should receive a face-to-face evaluation with a dermatology specialist for any lesion suspected to be melanoma or skin cancer. Furthermore, there are conditions for which Telederm is absolutely contraindicated, and delay in treatment could have detrimental effects and thus require face-to-face emergency consult, such as pemphigus or erythroderma (Table 2).

TELEDERM SHORTCOMINGS

The main limitations of Telederm, especially in SAF, are the ability to provide pointed relevant history and high-quality

TABLE 1. Diagnoses Most Appropriate for Teledermatology Consults

Eczematous dermatitis (localized atopic, nummular eczema, contact allergic eczema, seborrhoeic eczema)
Papulosquamous disorders (localized lichen planus and psoriasis, pityriasis rosea)
Acneiform conditions (rosacea, folliculitis, acne vulgaris)
Intertrigo, tinea cruris/pedis, tinea versicolor
Stable growths with an unknown diagnosis
Benign tumors (naevi, seborrhoeic warts, sebaceous hyperplasia, or other not suspected to be malignant)

images to the consultant. What to photograph is critical. Continuing medical education in the field of dermatology is vital for primary care providers for it increases skill, knowledge, and aptitude in dermatologic science and conditions and increases the probability of adequate dermatologic care to patients either from the primary care provider or in appropriate referrals for unknown dermatologic disease (Collins, Singer, & Eugster, 2012). Second, image quality may be compromised by poor lighting conditions, color distortion, and/or excessive pixilation. Each of these may detract or reduce the consultant's ability to diagnose the lesions properly. Even if the image quality is excellent, there is always the potential for missed lesions that are not imaged or included within the boundaries of the provided image, which could provide vital information to the consultant (Grenier, Bercovitch, & Long, 2009). For example, the primary provider might refer a patient for a stable café-au-lait macule (but not notice that the patient has four of these lesions, plus axillary freckling and spots on the iris, which, as a clinical constellation, would render the patient the diagnosis of neurofibromatosis). Table 3 presents the key elements for improving the efficacy of Telederm.

ETHICAL CONCERNS

The same ethical principles that apply to physicians in face-to-face encounters also apply to Telederm encounters. This can be challenging because Telederm introduces a virtual component with electronic transfer of medical information where there is an even greater need for vigilance to protect patient's private information and confidentiality. Furthermore, to protect private patient data from becoming available to unintended and potential harmful parties, data encryption techniques are necessary (Grenier et al., 2009).

TABLE 2. Diagnoses Most Appropriate for Face-to-Face Consults

Suspicious pigmented lesions (e.g., melanoma)
Lesions suspicious for malignancy (rapid growth, rapid change)
Bullous reactions (pemphigus, pemphigoid, lupus)
Erythroderma
Graft versus host disease
Infectious skin diseases
Widespread pustules
Palpable purpura
Skin necrosis
Suspected generalized drug reaction (DRESS, TEN, SJ)
Skin conditions with acute onset of mucosal erosion
Skin lesions of unknown etiology (systemically ill patients)

Abbreviations: DRESS = drug reaction with eosinophilia and systemic symptoms; TEN = toxic epidermal necrolysis; SJS = Steven Johnson sydrome.

TABLE 3. Three Ways to Improve the Effectiveness of Teledermatology

Appropriate selection and referral of dermatologic conditions
High-quality photographic images
Efficient infrastructure and culture that supports innovative virtual care

SUMMARY

Telederm is a valued aspect of dermatological clinical practice with proven benefits and endless potential. Both SAF and live/real-time Telederm enhance overall patient access, allow for more efficient patient evaluation and treatment, and reduce patient wait times. Although Telederm may have its limitations and ethical concerns, it is nonetheless an integral component of telemedicine that will continue to evolve and improve. ■

REFERENCES

Bowns, I. R., Collins, K., Walters, S. J., & McDonagh, A. J. (2006). Telemedicine in dermatology: A randomised controlled trial. *Health Technology Assessment (Winchester, England)*, *43*, 1–39.

Collins, M. T., Singer, F. R., & Eugster, E. (2012). McCune-Albright syndrome and the extraskeletal manifestations of fibrous dysplasia. *Orphanet Journal of Rare Diseases*, 7(Suppl 1), S4.

Ferrandiz, L., Moreno-Ramirez, D., Nieto-Garcia, A., Carrasco, R., Moreno-Alvarez, P., Galdeano, R., … Camacho, F. M. (2007). Teledermatology-based presurgical management for nonmelanoma skin cancer: A pilot study. *Dermatologic Surgery*, *33*, 1092–1098.

Grenier, N., Bercovitch, L., & Long, T. P. (2009). Cyberdermatoethics II: A case-based approach to teledermatology ethics. *Clinics in Dermatology*, *4*, 367–371.

Hsiao, J. L., & Oh, D. H. (2008). The impact of store-and-forward teledermatology on skin cancer diagnosis and treatment. *Journal of the American Academy of Dermatology*, *2*, 260–267.

Landow, S. M., Mateus, A., Korgavkar, K., Nightingale, D., & Weinstock, M. A. (2014). Teledermatology: Key factors associated with reducing Â face-to-face dermatology visits. In *Journal of the American Academy of Dermatology*, *71*(3), 570–576.

Lim, D., Oakley, A. M., & Rademaker, M. (2011). Better, sooner, more convenient: A successful teledermoscopy service. *The Australasian Journal of Dermatology*, *1*, 22–25.

Moreno-Ramirez, D., Ferrandiz, L., Nieto-Garcia, A., Carrasco, R., Moreno-Alvarez, P., Galdeano, R., … Camacho, F. M. (2007). Store-and-forward teledermatology in skin cancer triage: Experience and evaluation of 2009 teleconsultations. *Archives of Dermatology*, *4*, 479–484.

Thind, C. K., Brooker, I., & Ormerod, A. D. (2011). Teledermatology: A tool for remote supervision of a general practitioner with special interest in dermatology. *Clinical and Experimental Dermatology*, *5*, 489–494.

van der Heijden, J. P., de Keizer, N. F., Bos, J. D., Spuls, P. I., & Witkamp, L. (2011). Teledermatology applied following patient selection by general practitioners in daily practice improves efficiency and quality of care at lower cost. *The British Journal of Dermatology*, *5*, 1058–1065.

Whited, J. D., Hall, R. P., Foy, M. E., Marbrey, L. E., Grambow, S. C., Dudley, T. K., … Oddone, E. Z. (2002). Teledermatology's impact on time to intervention among referrals to a dermatology consult service. *Telemedicine Journal and E-Health: The Official Journal of the American Telemedicine Association*, *3*, 313–321.

For more than 33 additional continuing education articles related to dermatologic conditions, go to NursingCenter.com\CE.