Teledermatology:
A Tool for Nurse Practitioner Practice?

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ABSTRACT

Teledermatology is the practice of dermatology from a distance and can be used in several ways. This emerging technology has the potential to impact the current health care delivery system and provide dermatology care to a greater number of patients in underserved areas. Current research shows that the diagnostic concordance rates and accuracy rates are high, but there are also limitations with teledermatology use. Nurse practitioners have the potential to become active participants in the practice of teledermatology and ensure the provision of dermatology services to underserved populations.

Keywords: nurse practitioner, store-and-forward, teledermatology, telehealth

The idea of telehealth is not a new concept. In the past, radio and telephone systems were used to provide medical care from a distance. With the advancement in technology, telehealth has evolved to become a legitimate method of providing health care. Cellular and computer technology have more recently been used to provide care to people dwelling on remote islands, space shuttles, and ships.[1]

Teledermatology is a specialized form of telehealth that facilitates the practice of dermatology from a distance.[2] Teledermatology allows dermatology specialists to provide services without face-to face interaction through various computerized means. While useful for interactions between general practitioners and dermatology specialists, teledermatology can also facilitate second-opinion consultations by specialists on difficult cases. Additional uses include monitoring of chronic dermatology conditions from a distance and distance education. Teledermatology can provide care to patients who would not normally have access to specialty health care. This concept motivated the development of the technology.

TYPES OF TELEDERMATOLOGY

Multiple methods for performing teledermatology have been proposed or used in practice. Store-and-forward teledermatology (SAFT) involves reviewing a static image that can be assessed at the provider's convenience. As the most common type of teledermatology, SAFT is easy to establish, inexpensive, and referred to as the basic model.[3] SAFT involves capturing an image with a camera and referring the image by computerized means for evaluation by a dermatology provider. Other subjective and objective data about the patient's health will be sent to help evaluate the skin condition. The benefits to the provider include cost efficacy, diagnostic support, establishment of a referral network, and convenience. Benefits to the patient are decreased referral wait time, decreased travel, and increased access to specialty care.[3,4]

Mobile teledermatology using cellular devices, personal digital assistants, or laptop computers for capturing an image are becoming more popular as cellular and computer technology continues to improve. The image is captured by a type of mobile device and transmitted to other mobile phones or email accounts for diagnosis. Although this inexpensive, readily available method has the ability to provide rapid feedback for diagnosis, patient safety, privacy issues, and malpractice issues must not be overlooked.

Live interactive teledermatology is another option for evaluating skin pathology from a distance. This method involves live streaming video transmitted via satellite communication. The general practitioner and patient are able to correspond directly with the dermatology provider by videoconferencing. This system is very costly to establish because of the high cost associated with equipment and the scheduling of 2 simultaneous

providers. The benefit of this method over others is the possibility of verbal communication. As a result of this verbal exchange, patients report greater satisfaction than with mobile teledermatology and SAFT.[5]

Hybrid technology is a combination of live interaction and SAFT. The combination helps to balance the less attractive attributes of each other. The hybrid teledermatology allows live conversation with evaluation of static images. This method increases patient and provider satisfaction.[3] Teledermatopathology involves the transmission of histological skin images for expert opinion. A virtual slide system is established that allows the dermatopathologist to manipulate and magnify the visualized field.

Teledermoscopy can also be incorporated into the teledermatology process to transmit images obtained through hand-held epiluminescent microscopy for assessing atypical lesions.[6] This technology can be helpful in screening for skin cancers by magnifying suspicious lesions when providers generating the consults have sufficient knowledge and take the time to identify lesions requiring evaluation.

CURRENT RESEARCH

Most studies evaluating teledermatology measure the diagnostic concordance rate (DCR) and diagnostic accuracy. The DCR refers to the rate of agreeability of diagnosis between those accessing the skin pathology. Diagnostic accuracy relates the diagnosis made by the provider and the actual pathology determined via biopsy. SAFT is the most widely examined method of teledermatology and therefore provides the most data for evaluation. A systematic review by Warshaw et al[5] determined diagnostic accuracy by comparing teledermatology diagnosis with the diagnosis obtained by histopathology or other confirmatory laboratory testing. The review included studies that measured DCR in 2 ways. Six studies reported an aggregated diagnostic accuracy rate and 11 studies reported primary diagnostic accuracy rates. In the 6 studies, the weighted absolute mean difference was 19% better for clinic dermatology versus teledermatology. For the 11 studies that reported primary diagnostic accuracy rates, the weighted mean absolute difference was 11% greater for clinic dermatology versus teledermatology. This review provides data to conclude that clinic dermatology is more accurate than teledermatology.

The same review by Warshaw et al[5] provided statistics on diagnostic concordance. This statistic provides information based on simple agreement between the clinic dermatologist and teledermatologist without verification for histopathology or laboratory testing. For SAFT lesion studies (circumscribed skin lesions), 4 studies were evaluated to provide a weighted average aggregate DCR of 64.4%. The data for SAFT general studies (rashes and lesions) used 10 studies that found the average aggregate diagnostic agreement rate of 65.3%. For live, interactive consultations, 8 studies revealed a weighted average primary DCR of 70.5%. It appears that live teledermatology provides a more accurate concordance rate versus SAFT.

A review by Heinzellman et al[8] revealed that the diagnostic accuracy for SAFT is 80%-90%. There is a mean agreement between face-to-face consultation and SAFT of 75%. This review reveals a 60%-80% total agreement and a 70%-90% partial agreement when face-to-face interaction is compared with live interactive and SAFT. As seen above, DCR and accuracy rates vary between studies, and this variation is representative of current literature findings.

CURRENT USES OF TELEDERMATOLOGY

As an emerging technology, teledermatology has the potential to impact the current health care delivery system and provide dermatology care to a greater number of patients in underserved areas. Canada, for example, has a large rural population, with over 25% of its residents living in remote locations. In provinces of Nova Scotia and Ontario, offering teledermatology services via video-conferencing and face-to-face consult has decreased wait time from 13.7 weeks to 4.6 weeks for scheduled teledermatology video-conferencing consults.[2]

Teledermatology has become an established practice in India, Norway, United Kingdom, and Australia, and the United States Armed Services. The US Army has been practicing teledermatology for several years and has performed over 30,000 consultations as of 2010. Data from the US Army's teledermatology program have demonstrated that this technology results in cost-effective care and reduction in referral time.[2] However, teledermatology has not been widely adopted into the private sector in the US.

Although more research needs to be conducted, some studies have established the benefit from teledermatology services in rural areas. This study demonstrates the benefit