1 Introduction

John D. Whited, Karen E. Edison, and Hon S. Pak

The goal of this book is to provide practical guidance for anyone who is interested in initiating a teledermatology program or expanding their current system. This book was written for a wide audience to include anyone in a private practice, academic center, large multispecialty clinic, state or federal sector.

To build a successful program several features require consideration and each is addressed in turn throughout this book. Specifically, relevant questions include the following:

1. What are your motivating factors? Do you want to increase access for the underserved? Increase your revenue stream? Maximize flexibility in your lifestyle? Or a combination of these factors?
2. What type of technology should you implement – store-and-forward, real-time interactive, or a hybrid model?
3. What are the equipment needs?
4. What communication systems are available for data transmission?
5. Who should be targeted as users (e.g., referring clinicians, patient population, and/or participating teledermatologists)?
6. Is teledermatology a sustainable enterprise and what are the business models that can be followed?
7. Is teledermatology reimbursable and, if so, how?
8. Is image quality good, and what are the training requirements?
9. Is teledermatology a diagnostically viable way of delivering dermatologic healthcare?
10. What legal, regulatory, and confidentiality issues arise?
11. What are the ethical considerations of using the technology?
12. Can teledermatology be integrated into dermatology training programs?

Although this may seem like a daunting list, it should not discourage you from pursuing a teledermatology implementation plan. With proper forethought and planning, the development of a teledermatology program can be tremendously successful. As well as being among the world experts in

teledermatology, many of the contributors to this book have developed successful and viable teledermatology programs. The knowledge delivered in this book is based on experience that includes successes, failures, and lessons learned in the course of teledermatology development.

What is teledermatology? Teledermatology, in its simplest terms, is the use of communication information technology to deliver dermatologic care. Typically, technology is used when a conventional "face-to-face" clinic visit cannot be performed – implying that distance or some other barrier prevents this conventional method of healthcare. In these situations the patient and clinician are separated by a geographic barrier, with technology providing the link. This is actually a restricted view of how teledermatology may be used in healthcare delivery but is, nonetheless, a useful way to describe the most common rationale for teledermatology implementation – a patient and a clinician separated from one another by distance. As is described in more detail later, there are two types of unique teledermatology modalities. The first type of modality is real-time interactive patient care, which employs videoconferencing events that use audio-visual communication technologies. The patient and clinician interact with one another in real time and are thereby separated only by space and not time. These are also known as synchronous visits or consults. The second method is called the store-and-forward type. Store-and-forward type interventions use "still" digital images bundled with text-based historical and demographic data. Store-and-forward consults are typically generated and reviewed at different times and are, thus, sometimes referred to as asynchronous consults. Store-and-forward consults separate the patient and clinician in both space and time. Aside from the technology, the major difference between these two types of care delivery is the ability of the patient and clinician to interact with each other when using real-time interactive technology. More recently, a hybrid model has emerged that combines both technologies to leverage the advantages of each teledermatology modality.

Dermatology was an early adopter of telemedicine technology, in large part because of the visual nature of the specialty. Some of the first telemedicine reports in modern medical literature resulted from a telemedicine link between Boston's Logan Airport and the Massachusetts General Hospital in the early 1970s [1]. A telemedicine link was established at a traveler's clinic located within the Logan Airport and was staffed by physicians at the Massachusetts General Hospital. Many of these interventions involved travelers with dermatologic complaints [2]. This particular telemedicine program used videoconferencing (real-time interactive) technology. Telemedicine was relatively quiescent for several years after these reports. A resurgence in interest in the late 1980s and early 1990s coincided with the development of cheaper and more efficient videoconferencing technologies, personal computers, and the Internet. With the digital transformation of healthcare, telemedicine had a natural medium for data transmission. Specifically, digital imaging technology allowed for easy capture, transmission,

and review of digitized versions of skin conditions (i.e., digital images) that could be bundled with other digital information. These digital consults could be integrated as part of an electronic medical record or could utilize other existing technology such as web-based interfaces.

Teledermatology is an evolving aspect of healthcare delivery, in part, due to the technology-oriented features inherent to telemedicine. Nonetheless, teledermatology is more rooted in experience and evidence than many other uses of telemedicine technology. In fact, teledermatology has been considered one of the best studied of the telemedicine disciplines [3].

As is described in the literature review chapter (Chapter 4), teledermatology is considered to be a reliable and accurate means of making diagnoses of skin conditions. Successful teledermatology systems have been implemented in the U.S. Department of Veterans Affairs, the U.S. Department of Defense, state-run healthcare programs, academic medical centers, and in private healthcare. Overall, telemedicine has been accepted by practitioners and patients alike in these settings. Reimbursement, specifically federal reimbursement, for teledermatology services (and telemedicine in general) represents the greatest barrier to wider adoption in the United States. Whereas real-time teledermatology interventions can usually bill for services, store-and-forward systems (with some exceptions) cannot. This is an active area of legislation and lobbying, and one that is likely to evolve in the coming years. Interestingly, despite the lack of wide federal reimbursement, utilization of teledermatology appears to be growing. This growth may be a result of an ongoing shortage/maldistribution of dermatologist in the United States. In the conclusion of this book, readers are directed to various web sites and other sources that can provide up-to-date information on this and a myriad other issues that confront teledermatology.

Throughout the book, the following themes and concepts are addressed and integrated into each chapter, as applicable:

1. There is a significant maldistribution of dermatologists. In fact, approximately 40 percent of our population does not have access to dermatological services.
2. Teledermatology utilization is growing in this country and around the world to meet the needs of our patients.
3. Teledermatology primarily improves access to and efficiency of dermatological care delivery. It solves the problem of maldistribution.
4. Teledermatology includes live-interactive, store-and-forward, and hybrid modalities. It may involve primary care provider to dermatologist or patient to dermatologist, depending on the setting.
5. Telecare (direct patient care), teletriage, teleconsultation, and telereferral services are all possible with teledermatology.
6. Teledermatology is safe, timely, equitable, efficient, effective, and patient centered.
7. Teledermatology technologies are increasingly reliable and affordable.

8. The technology must be adapted based on the particular setting to ensure that it adds value to the organization (education, etc.).
9. Human factors are of greater importance than technology. It is more about people than technology.
10. New models of care delivery, like teledermatology, impact the traditional doctor-patient and doctor-doctor relationship. It allows other care delivery models not previously possible without teledermatology such as remote physician extender supervision and virtual hospital consultation.
11. Teledermatology allows for virtual collaboration among experts for challenging patients nationwide or even worldwide.
12. Teledermatology serves as a new evaluation tool in residency training and enhances overall residency education by allowing objective measurements of the core competencies and access to diverse patient populations, otherwise not possible previously.
13. Teledermatology does not seek to replace dermatologists; it allows greater optimization of our scarce dermatology resources by mitigating distance and/or time barriers to care.
14. The key to successful implementation is in clearly identifying the needs and values of the organization, setting realistic expectations, marketing/education/buy-in, and customizing a solution that minimally disrupts the care delivery process.

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2 Teledermatology modalities

Hon S. Pak, Karen E. Edison, and John D. Whited

There are three major teledermatology modalities. Live-interactive and store-and-forward are the two most common modalities with the hybrid model that includes elements of both live-interactive and store-and-forward technologies emerging as the third new modality. Each modality has its advantages and disadvantages and selection is based on the needs of the organization, the dermatology resources available, the teledermatology visit and/or consult volume, existing communication infrastructure, and the objectives of the program.

Live-interactive teledermatology

Live-interactive teledermatology takes advantage of videoconferencing as its core technology. Participants are separated by distance, but interact in real time. Thus, live-interactive patient visits are also known as synchronous visits or consults. By convention, the site where the patient is located is referred to as the *originating site* and the site where the consultant is located is referred to as the *distant site*. A high-resolution camera or monitor is required at the originating site. Videoconferencing systems work optimally when a connection speed of 384 kbps or higher is used. Slower connection speeds may necessitate that the individual presenting the patient perform either a still-image capture or a freeze-frame to render a diagnostic image. For most diagnostic images, a minimum resolution of 800×600 pixels (480,000) is required.

Live-interactive interactions are initiated similar to in-person dermatological care. Patients may make their own teledermatology appointments or a referring provider may request the visit. A live-interactive appointment is scheduled in a manner similar to that of conventional clinic-based visits. A telepresenter is present at the originating site to facilitate the consultation. This could be the referring clinician, but it is often a nurse or other health professional. The telepresenter initiates the videoconferencing telemedicine (VTC) visit and is available to assist in obtaining any information, including imaging, that is necessary to make a diagnosis and management plan.

Live-interactive visits can be used for telereferral, teleconsultation, teletriage, and direct telecare. The referring provider can assume responsibility for patient management based on recommendations provided by the consulting dermatologist or the dermatologist can be responsible for the patient's care.

A major advantage of live-interactive technology is the ability of the dermatologist and patient to interact with one another. The dermatologist can obtain a history, ask directed questions, and view all parts of the skin surface. Other than the inability to palpate the skin condition which is not possible with current technology, the visit otherwise closely mimics conventional care. The training requirements for using the videoconferencing equipment are moderate. Additionally, there is the potential for the referring clinician to derive an educational benefit from the consult, particularly if he or she participates in the teledermatology consult.

One disadvantage of live-interactive teledermatology, compared with store-and-forward care, is that dermatologists are fixed to a schedule much like the structure of a conventional clinic. The originating and distant sites must interact in real time which requires agreement on a scheduled time. Also, the bandwidth requirements necessary to achieve adequate resolution in a videoconferencing session can be costly.

Live-interactive teledermatology is best utilized when communication with the patient and patient education are important elements of the patient-physician interaction. Live-interactive teledermatology can also provide more intensive and interactive training for the referring clinician if he or she participates in the consultation.

Store-and-forward teledermatology

Store-and-forward teledermatology utilizes a set of digital "still" images bundled with what is typically a standardized set of historical and demographic information. A store-and-forward teledermatology consult is analogous to an email system that includes text-based historical information with digital images as attachments. As the name implies, the teledermatology consult is generated and reviewed at different times and therefore represents an asynchronous consult system. The teledermatology consult is generated at the referring site and is forwarded to the site of dermatology consultation. Generally, this is generated by a healthcare professional (e.g., nurse) who has received training in the imaging and consult generation protocol, but can be performed by non-clinicians (e.g., technicians) if adequately trained. After receiving the teledermatology consultation, the dermatologist then generates a report that is sent back to the referring site. This would include a diagnosis, or presumptive diagnosis, and a management plan that is implemented by the referring clinician.

Store-and-forward teledermatology can be used in teleconsultation, telereferral, telecare, or teletriage care delivery mode. Most commonly store-and-forward teledermatology is used in teleconsultation.

If a referring provider has integrated the teledermatology consult system into his/her practice, store-and-forward teledermatology can be an on-demand service in a manner similar to laboratory tests and radiological tests. Alternatively, teledermatology can be scheduled as a periodic service (e.g., twice a month), particularly if the setting would be expected to generate low volume of consults.

An advantage of store-and-forward teledermatology is that it is more scalable for high volume given its ability to optimize the capacity of dermatologists. When teledermatology referrals are integrated into the referring provider's clinic, patients benefit from the convenience of not having to travel to another clinic at another site. Because of the asynchronous nature of the consult process, dermatologists can review cases and complete consults at times and locations that are most convenient. Dedicated time that must coincide with the referral site is not necessary.

One of the disadvantages of store-and-forward teledermatology is that adequate training is required to ensure that imaging is done correctly and imaging protocols are followed properly. Quality assurance is an important element of this type of consult generation. Also, there is no direct contact between the dermatologist and the patient; consequently, counseling and education interventions are hindered if not prevented in this format. Referring provider contact education is indirect with store-and-forward teledermatology.

Store-and-forward teledermatology is best used when bandwidth requirements are unavailable or prohibitively costly. When dermatologist time cannot be dedicated to a mutually agreeable time between the referring site and the consulting site, store-and-forward teledermatology is advantageous. Store-and-forward teledermatology works well for high-volume settings. This is because store-and-forward consults generally require less time to perform than live-interactive consults.

Hybrid model

The hybrid model merges elements of live-interactive and store-and-forward teledermatology and, therefore, benefits from the advantages and strengths of both models. With a hybrid model the videoconferencing equipment does not require a high-resolution imaging device as this feature is used primarily for patient-physician interaction. High-resolution digital still images of the affected area are presented to the dermatologist during the consultation. This eliminates the need for expert video camera operation at the originating site. Although high-end videoconferencing systems are commonly

used in hybrid teledermatology, a webcam or videophone could be used as the interactive technology.

Hybrid consults are initiated by the referring provider or the patient. The patient returns for a later teledermatology appointment. The nurse (telepresenter) obtains the digital still images and history a few minutes prior to the scheduled live-interactive appointment time. The still images can be either forwarded to the dermatologist before the scheduled appointment time or presented during the live-interactive examination. The recommendations can be provided to the referring provider who can then manage the patient or the teledermatologist can take primary responsibility and prescribe the course of treatment.

The hybrid model can be used for telecare, telereferral, teletriage, and teleconsultation. Depending on the arrangement, the referring provider or the consulting dermatologist can be responsible for managing the patient. Scheduling for the hybrid model occurs in the same manner as stand-alone live-interactive teledermatology.

An advantage of the hybrid model is that it combines some features of both types of consult modalities. Physician-patient interaction is maintained. High-quality digital still images are available, thus averting time lost in obtaining high-quality video images, such as of a restless child. This system also avoids the need for large bandwidth connections since the still images can be forwarded over low bandwidth lines – high-quality video images are not necessary. This reduces the cost of hybrid systems over live-interactive only systems. Hybrid models also require synchronization of referring site and consulting site scheduling. A fixed schedule analogous to conventional clinic scheduling is required.

Hybrid models are useful when a combination of store-and-forward and live-interactive elements are desired. The physician-patient interaction is maintained, but the quality of visual information obtained does not require high bandwidth connections or expert video camera performance. The high-resolution images of the involved area are forwarded as still images.

3 Telemedicine implementation and reimbursement surveys

Anne E. Burdick and Shasa Hu

Association of Telehealth Service Providers (ATSP) Surveys

The ATSP published annual reports from 1997 to 2001 that included information on U.S. teledermatology services [1]. The 2001 report was based on a questionnaire sent to 206 telemedicine programs. The report provided information on the 82 telemedicine programs that responded and included the clinical specialties provided. The ATSP report did not include reimbursement information.

2002 AMD Telemedicine/American Telemedicine Association (ATA) Reimbursement Survey

In 2002, AMD Telemedicine and the ATA conducted a survey of telemedicine reimbursement [2]. The initial survey was sent to approximately 2,000 ATA members. Despite a poor response rate, ATA and AMD Telemedicine identified 141 active U.S. telemedicine programs with 72 of the 141 programs that billed for telemedicine services. These 72 programs were then surveyed by telephone. The survey revealed that 38 of the 72 programs (53%) were reimbursed for telemedicine services by private payers and that 150 private payers reimbursed for telemedicine in 24 states. Blue Cross/Blue Shield reimbursed in 13 states whereas Medicaid reimbursed in only 18 states. Four states had legislations mandating private payer reimbursement of telemedicine services: California SB 1665 (1996), Kentucky HB 177 (2000), Louisiana SB 773 (1995), and Texas HB 2033 (1997). Detailed survey results were posted on the "Private Payer Reimbursement Information Directory" web site (http://www.amdtelemedicine.com/private_payer/index.cfm), which is regularly updated with private payers and states in which Medicaid reimburses for telemedicine. As of June 2005, Blue Cross/Blue Shield reimbursed for telemedicine services in 21 states. The Oklahoma state legislation mandated private payers to reimburse for telemedicine services (Oklahoma SB 48, 1997).

The 2002 AMD/ATA survey identified strategies that telemedicine programs used to obtain private payer reimbursement. Some programs sent letters to private payers stating that the programs intended to provide telemedicine services and that in the future, bills would be submitted for these services. Although the programs asked for questions and/or comments from the insurance companies, none responded. Few telemedicine providers use modifiers and/or specialized CPT codes for tracking services. Most do not and submit claims in the usual and customary manner. Therefore, data collection for this survey was difficult to obtain. In addition, reimbursement was not categorized by the type of telemedicine (store-and-forward [SF] vs live-interactive [LI]) or clinical specialties. Some programs did not share their contractual arrangements.

ATA Teledermatology Special Interest Group Reimbursement Survey

Little information existed on teledermatology reimbursement prior to 2000. In December 2000, the Telemedicine Research Center (Portland, OR) sent a teledermatology survey to the six most active teledermatology networks and received responses from four programs: University of California-Davis, University of Missouri, University of Arizona, and Mountaineer Doctor Television at West Virginia University [3]. The survey questions focused on activity and structure of teledermatology services. Although there were no survey questions on reimbursement, all four networks reported receiving reimbursement for consultations. University of California-Davis was reimbursed by the state's Medicaid system, Medi-Cal, as mandated by the California Telemedicine Development Act of 1996, and also by Blue Cross of California.

One other teledermatology reimbursement survey was conducted in January 2003 which was sent by email by the Association of Dermatology Administrators to all academic dermatology programs, but the response rate was low.

In June 2003, the ATA Teledermatology Special Interest Group attempted to determine the extent of teledermatology activity and reimbursement for U.S. teledermatology services [4]. Five hundred questionnaires were emailed to all ATA members, U.S. dermatology program administrators, and various web databases (Table 3-1). The survey questions were:

1. Are you doing teledermatology?
2. If yes, is LI and/or SF teledermatology offered?
3. How many consults did you perform in 2002?
4. Are you being reimbursed? If yes, are you being reimbursed by private payer, Medicaid, Medicare, or self-pay?

Over the next 3 months, a database of teledermatology programs was created based on the responses that included information from the Association