State of teledermatology programs in the United States

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Background: Teledermatology programs in the United States have evolved over the past several decades. No systematic survey of teledermatology programs in the United States is available in peer-reviewed literature.

Objective: To provide up-to-date information regarding the state of teledermatology programs in the United States.

Methods: Active U.S. teledermatology programs were surveyed in 2011 with regards to practice models, clinical volume, and payment methods. These findings were compared with those from 2003.

Results: By January 2012, 37 teledermatology programs were active in the United States. Store-and-forward teledermatology was the most frequent delivery modality offered by 30 (81%) of the programs. The majority of the programs were based at academic institutions (49%), followed by Veterans Administration hospitals (27%), private practice (16%), and health maintenance organizations (HMOs) (8%). The majority of programs (67%) provided services to their home state only, whereas the rest served additional U.S. states or abroad. The median number of consultations per program was 309 (range, 5-6500) in 2011. The most frequent payer sources were private payers, followed by self-pay, Medicaid, Medicare, and HMOs. Since 2003, with the confirmed discontinuation of 24 previously active programs, the total number of active teledermatology programs in 2011 was 60% of that in 2003. However, the annual consult volume per program nearly doubled for the sustainable programs in 2011.

Limitations: Itemized billing information was not uniformly available from all programs.

Conclusion: The turnover in teledermatology programs is relatively constant, with an increase in consult volume for sustainable programs. Store-and-forward is the dominant modality of delivery, while hybrid technology model is emerging. (J Am Acad Dermatol 2012;67:939-44.)

Key words: live-interactive; practice; real-time; store-and-forward; teledermatology; telehealth; telemedicine.

INTRODUCTION

Teledermatology programs in the United States have matured over the past several decades. What began as a handful of pilot programs providing dermatology consultations to select geographically remote communities have evolved into a core set of programs with established policies and procedures that serve both rural and urban underserved communities.

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We used a systematic approach to identify active teledermatology programs in the U.S. First, based on a 2003 ATA survey, we identified a list of previously active teledermatology programs. In addition, we surveyed members of the ATA Teledermatology SIG and the AAD Telemedicine Task Force to identify new programs. Furthermore, we asked members from these two organizations about any additional programs not already identified by the previous two methods. Finally, we conducted an Internet search to identify any other new programs. Between July 27, 2011 and December 2, 2011, a total of 110 questionnaires were distributed electronically to teledermatology programs. Programs unresponsive to the initial survey were contacted at least 3 times via e-mail and at least 3 times by telephone. For programs that were identified as discontinued during the search process, we confirmed the program status with the affiliated institutions. Descriptive summary statistics were performed for this study using STATA 11 (College Station, TX).

RESULTS
U.S. teledermatology programs in 2011:
Practice modalities, clinical volume, payment methods

From the 110 distributed questionnaires, 64 programs (58%) responded. Among the programs that responded, 37 teledermatology programs were confirmed to be active, and 3 programs are in the process of formal initiation. The geographic distribution of the active teledermatology programs as of January 2, 2012 is shown in Fig 1. The staff that was associated with 24 preexisting programs responded to the survey to report discontinuation of their programs. Forty-six other programs could not be reached despite repeated e-mail and phone calls, and no online information could be found regarding the program or contact person for these unresponsive programs as of January 2, 2012. While most of these 46 unresponsive programs were likely to be inactive, we did not classify them in the category of confirmed inactive programs.

The active teledermatology programs provided information regarding their respective practice setting. Among the 37 active programs, 18 programs

METHODS
The Telemedicine Task Force of the AAD and the Teledermatology SIG of the ATA developed a questionnaire to ascertain the current state of teledermatology activity in the United States. This study was approved by the Institutional Review Board at University of California Davis. The questionnaire included the program contact information, availability of synchronous or asynchronous teledermatology services, service areas, accepted payment methods, and the availability of volunteer services.
(49%) were based at academic institutions; 10 programs (27%) were active within the Veterans Administration (VA) Hospital or military; six programs (16%) were based in private practice settings; and 3 programs (8%) were at health maintenance organizations (HMOs) (Fig 2). A total of 25 programs (67%) provided service to their home state only; 6 programs (16%) provided services to their home state as well as several neighboring states; 4 programs (11%) provided services to their home state as well as international locations; one program (3%) provided services to all 50 U.S. states, and one program (3%) provided teledermatology services to all 50 U.S. states as well as international locations.

The teledermatology programs reported whether they employed store-and-forward (S&F), live-interactive (LI), or hybrid modalities. Overall, S&F modality was the most frequent teledermatology delivery method in 2011, which was practiced by 30 (81%) of the U.S. teledermatology programs. Specifically, 19 programs (51%) provided S&F teledermatology only, whereas 7 programs (19%) practiced both S&F and LI teledermatology for separate clinical encounters. A total of 5 programs (14%) practiced LI modality alone (see Fig 2).

“Hybrid” teledermatology was defined as the use of both LI and S&F modalities concurrently during the same encounter. For example, the dermatologist used LI modality to interact with the patient in real time while reviewing images that were transmitted through S&F modality. Our survey showed that 6 teledermatology programs (16%) employed hybrid method for their clinical encounters (see Fig 2). Of these 6 programs, two programs also employed S&F alone for other clinical encounters, and two programs also practiced S&F and LI for separate encounters in addition to their hybrid model.

The programs were offered the opportunity to present their yearly teledermatology visit volume. Among the 30 programs that provided yearly clinical volume, the median number of visits for 2011 per program was 309 consultations (range, 5-6500). Specifically, Kaiser Southern California ranked highest in consultation volume with approximately 6500 consultations in 2011. Overall, HMOs provided the highest volume of visits with an annual median of 3650 consultations (range, 800-6500) per site. Government-associated programs, such as those based at the VA or other military programs, provided the second highest volume of consultations, with a median of 1200 consultations (range, 55-4500) per site in 2011. Teledermatologists who practice in private practice settings completed a median of 244 consultations (range, 20-790) per practice. Among the 14 academic institutions, teledermatologists completed a median of 166.5 consultations (range, 5-3048) per institution in 2011 (Fig 3).

Almost all (n = 36) active programs provided information on payment methods for their teledermatology services. Twelve programs (33%) accepted all forms of payment, including Medicare, Medicaid, HMO, private payer, and self-pay; 8 programs (22%) received federal funding either through the VA or U.S. military, and two programs (6%) provided volunteer services only. Of note, many dermatologists in the military provide teledermatology services as a volunteer activity. The most frequent reimbursement source was private payer, followed by self-pay, Medicaid, Medicare, and HMO. Twenty-five programs (69%) were reimbursed by private payers, 22 programs (61%) by self-pay, 20 programs (56%) by Medicaid, 19 programs (53%) by Medicare, and 17 programs (47%) by HMO. Where specific insurance-based payment provisions were not available to particular patient subpopulations, 21 teledermatology programs (57%) also allowed contract-based services with particular referral clinics. Overall, 11 (30%) teledermatology programs reported performing volunteer teledermatology services, whereas the remaining programs (70%) did not provide volunteer teledermatology services.

Comparison of teledermatology programs between 2003 and 2011

We compared the current 2011 teledermatology program data with those collected in 2003. Because the 2011 questionnaire was more comprehensive than that of 2003, some direct comparisons were not possible. Major differences between 2003 and 2011 included changes in the number of practices, clinical volume, and technology-based delivery modalities (Table I).

Compared with the 62 programs that were reported active in the ATA 2003 survey, this 2011 study showed a decrease in the number of active programs by 40% to 37 programs. Despite a decrease in the number of teledermatology programs, consult volume has increased since 2003. Whereas the annual median consult volume was 184 consultations (range, 2-1500) per site in 2003, the median consult
volume in 2011 nearly doubled to 309 consultations (range, 5-6500) per site.

Significant changes were also noted in the technology-based delivery modality of teledermatology. In 2003, 59% of the teledermatology programs practiced LI modality, 29% of the programs performed S&F services, and 12% offered both LI and S&F services. In comparison, in 2011, whereas 18 programs (49%) used at least one form of videoconferencing (through either LI or hybrid) modality, 81% of the programs performed S&F, making S&F the dominant practice modality.

DISCUSSION

This study represents a systematic, comprehensive effort to capture currently active teledermatology programs in the U.S. in 2011. The findings show that, while the total number of teledermatology programs has decreased since 2003, the annual consult volume per site has increased significantly. Furthermore, the modality of technology used to deliver care has evolved over the past decade.

With 24 of the 62 teledermatology programs in 2003 confirmed to be extinct by 2011, we need to consider key issues governing sustainability of new programs. A number of factors may influence sustainability of new programs, including a viable financial model, support by institutional leadership, continued enthusiasm of key teledermatology personnel, and positive feedback from patients. Programs that were set up on the basis of personal relationships or grant funding alone initially may have a difficult time with sustainability if long-term financial models and efficient workflows are not developed concurrently.

While the total number of teledermatology programs has decreased since 2003, the annual volume
Fig 3. Teledermatology consult volume in 2011. The mean annual consult volume per site is indicated by the solid diamond. The median annual consult volume is represented by the horizontal line within the box. The 75th and 25th percentiles of consult volumes are represented by the upper and lower bounds of the box, respectively. The ends of the whiskers (vertical line) represent the range.

Table I. Comparison of active teledermatology programs in 2003 with programs in 2011

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<thead>
<tr>
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<th>2003</th>
<th>2011</th>
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<tr>
<td>No. of practices</td>
<td>62</td>
<td>37</td>
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<tr>
<td>Annual median</td>
<td>184 (range, 2-1500)</td>
<td>309 (range, 5-6500)</td>
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<tr>
<td>Technology-based</td>
<td>LI only: 59%</td>
<td>LI only: 14%</td>
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<td>delivery methods</td>
<td>S&amp;F only: 29%</td>
<td>S&amp;F only: 51%</td>
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<td></td>
<td>Both*: 12%</td>
<td>S&amp;F and LI only for separate encounters: 19%</td>
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<td>Hybrid: 16%</td>
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*Did not specify hybrid.

per program had nearly doubled by 2011. The increase in consult volume may be attributed to a continued refinement in workflows and financial models by larger teledermatology programs. Of note, the teledermatology program providing the highest volume in 2011 was a relatively newer program. Therefore the duration that a program is in existence does not necessarily predict its sustainability, and new programs with sound policy and systematic support can succeed quickly.

We found that most teledermatology programs have shifted from using LI modality as the primary technological delivery model in 2003 to S&F in 2011. The factors accounting for this shift toward a higher proportion of S&F telemedicine services may include lower program start-up costs, higher image quality from still digital photos, and greater efficiency from the asynchronous operation. Of note, the hybrid model where both S&F and LI technologies are used within the same encounter is used more frequently in 2011, which reflects technological flexibility by certain programs. As the image quality for video-based communication continues to improve and the bandwidth continues to increase, the pendulum may swing back to the LI modality in the future.

Teledermatology is an exciting and rapidly evolving field that will continue to complement traditional face-to-face healthcare delivery models. As newer generations who are more facile with online communication require dermatologic care in the future, they may be more receptive to using teledermatology for their care. In the near future, the availability of teledermatology will likely not be limited to rural or underserved communities; rather, it will likely expand to attract many patients who desire efficient, distance-independent, and time-independent specialty care. To sustain existing programs, dermatologists will need to continually determine how novel technologies may fit into the healthcare delivery models. We will also need to work alongside health policy groups to enable appropriate telehealth legislations\(^7\) that improve patient access and maintain quality specialty care.

REFERENCES


