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Review

Teledermatology: An updated overview of clinical applications and reimbursement policies☆,☆☆

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ABSTRACT

Telemedicine is an emerging field in healthcare that provides services from different medical specialties to patients all around the world. One of the specialties in telemedicine, teledermatology, has grown exponentially as a cost-effective way to implement dermatological healthcare to underserved areas and populations. This article reviews the literature that pertains to the cost-effectiveness, reliability, public access, patient satisfaction, and reimbursement policies of teledermatology. Teledermatology was found to be cost-effective and reliable in reducing in-person visits and time away from work, and allows for the faster delivery of care. However, reimbursement policies for teledermatology services are rather new and vary significantly from state to state. As public interest in and access to teledermatology continue to grow, the future of teledermatology depends on the development of new technology as well as quality improvement strategies and the evolution of sustainable reimbursement policies.

Introduction

Worldwide, telemedicine provides medical services to underserved areas. In recent years, virtual dermatological care has grown exponentially, making teledermatology a common discipline in telemedicine (Whited, 2015). Teledermatology has two established modalities: store-and-forward (asynchronous) and live interaction (synchronous). Store-and-forward teledermatology consists of an electronic platform where referring healthcare providers upload digital pictures including dermatoscopic images. These images, combined with pertinent information on the patient's medical history, are transmitted in encrypted format to dermatologists who provide a diagnosis and treatment plan. On the other hand, the live interaction modality involves real-time video interaction between the primary care provider and the teledermatologist. Both the store-and-forward and live interaction modalities can be applied between referring physicians and consulting dermatologists or directly between patients and dermatologists.

According to a survey completed by Armstrong et al. (2012b), most teledermatology programs have shifted from live interaction video to the store-and-forward modality due to its technological flexibility and lower cost of service delivery (Pak et al., 2009). As of 2010, there were more than 115 telemedicine programs across the United States and most were at large academic institutions. Approximately 37 of these programs provide teledermatology services and approximately 80% use the store-and-forward modality that referred information from the primary care physician to the consulting dermatologist (Pak et al., 2009).

In the United States, shortages in dermatological providers have led to increased wait times for in-person office visits. This shortage directly impacts access for patients with Medicaid insurance and populations in dire need of dermatological care. In certain settings, teledermatology has proven to be cost-effective when compared with in-person visits (Nelson et al., 2016). In order to implement teledermatology services in underserved regions, the delivery of services needs to be reliable and economically feasible (Armstrong et al., 2007). Studies suggest that clinic-based and teledermatologists have complete or partial agreement in terms of diagnosis and management in more than 75% of cases (Levin and Warshaw, 2009; Whited, 2001). However, reimbursement policies vary significantly among

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different states, have yet to evolve, and are critical in determining the growth and survival of teledermatology in the future.

The aim of this paper is to review challenges that are associated with enhanced access to the public, reliability, patient satisfaction, and changes in reimbursement of teledermatology. As technology rapidly advances, a practical and affordable platform for teledermatology will be an important element for efficient and cost-effective care in the future (Armstrong et al., 2011).

Methods

Relevant articles that were published between 2001 and 2016 and related to teledermatology were collected from different resources including e-journals and electronic databases. To identify relevant search results, the following search terms were included: "teledermatology," "telemedicine and dermatology," "store and forward dermatology," and "real time or live dermatology." Inclusion criteria included publications that reported data on reimbursement policy, public access, patient satisfaction, reliability, and cost-effectiveness for store-and-forward and live video teledermatology. Exclusion criteria included duplicate publications and those that addressed telemedicine specialties other than teledermatology.

Result and discussion

Reliability

In order for teledermatology to be considered reliable, the diagnosis made must be reproducible by physicians using different modalities. Therefore, it is important to compare clinic-based consultation and teledermatology for diagnostic agreement. Systematic reviews by Levin and Warshaw (2009) show that there is good diagnostic agreement when comparing a teledermatology diagnosis and in-person clinical diagnosis or histopathology with traditional face-to-face consultations. Teledermatologists and clinic-based dermatologists completely agreed on a diagnosis in 78% to 84% of cases (95% confidence interval [CI], 71%-89%). The diagnosis concordance between dermatologists and teledermatologists increased to 92% to 98% (95% CI, 87%-100%) when overlaps between differential diagnoses were considered as partial agreements (Levin and Warshaw, 2009). There were no statistical differences when comparing with a diagnosis agreement among in-person dermatologists. Both store-and-forward and live video modalities demonstrated similar diagnostic reliability values when compared with the reliability of clinic-based care. Several studies that involved smaller patient populations showed that clinic-based and teledermatologists agreed on a recommendation for biopsy 90% to 100% of the time (Whited, 2001).

Research evidence to date indicates that teledermatology is comparable in diagnostic reliability with conventional face-to-face consultations. However, several factors may directly impact the reliability of teledermatology including proper imaging, comprehensive relevant history, and skills of the teledermatologists and referring physicians. Therefore, it is imperative to provide support and education to referring primary care physicians on the acquisition of high-quality digital photographs and relevant history as well as the implementation of treatment plans that are recommended by dermatologists to ensure the reliability of teledermatology (Levin and Warshaw, 2009).

Direct-to-patient teledermatology has developed rapidly as a new platform to provide service due to the technology advancement in mobile devices. However, research has brought up serious concerns on the quality of direct-to-patient teledermatology due to a lack of defined standard to confirm patient identity, reliability of self-provided photographs and history as well as a lack of coordination with primary care physicians (Fogel et al., 2016; Peart and Kovarik, 2015).

Cost effectiveness

Teledermatology provides patient access to dermatological services in an efficient and convenient manner. With teledermatology, providers can effectively assess cases and provide recommendations in a timely fashion to the patient or referring provider (Snoswell et al., 2016). When assessing teledermatology cost-effectiveness, it is important to consider societal costs in addition to healthcare system costs that are associated with the delivery of conventional care. By averting the need for clinic-based visits, teledermatology also saves on societal costs that are associated with travel and workplace absenteeism of patients. Therefore, teledermatology not only decreases appointment waiting times and the amount of time needed for a consultation but also decreases travel costs and loss of productivity (Whited, 2001).

The cost effectiveness of teledermatology was assessed by determining the number of prevented face-to-face appointments. As indicated in a recent study, store-and-forward teledermatology is cost effective in terms of significantly decreasing the need for in-person visits (Landow et al., 2014). The study also indicated that a reduction in the number of in-person visits allowed for shorter travel times for patients, decreased time away from work, and faster delivery of care (Landow et al., 2014).

Another study found that the costs of standard care were double those of store-and-forward teledermatology when considering costs that are associated with loss of productivity, which further highlights that teledermatology is a cost-saving strategy (Pak et al., 2009). Real-time interactive teledermatology has been found to be more costly than store-and-forward dermatology due to the need for expensive video-conference equipment and more consultation time (Loane et al., 2000). Since it often involves the participation of both the referring and consulting physicians at the same time during the videoconference, live interactive teledermatology may lead to increased physician costs compared with clinic-based care (Loane et al., 2000). However, some studies have shown that when saved societal costs such as travel are factored in, live video teledermatology incurred the equivalent in costs or cost savings compared with conventional care (Whited, 2011). More research is needed to assess the emerging use of smartphone applications in teledermatology, which could further impact its cost effectiveness (Snoswell et al., 2016).

Public access and patient satisfaction

In the United States, access to dermatology specialists is limited. This lack of access is due to a reduced, insufficient number of physicians and poor geographic distribution. Since the majority of dermatologists are located in urban areas, teledermatology has the potential to provide access to care for populations in rural areas.

In addition, teledermatology could also increase access to other underserved populations such as patients with Medicaid insurance. Due to the limited reimbursement of service fees, most dermatology providers in the private setting no longer provide care to patients with Medicaid insurance, resulting in an increased difficulty in access to conventional care for these patients. In a recent study of Medicaid enrollees in California, half of the individuals were provided with dermatological care through teledermatology services. In 2014, new Medicaid enrollees made up three-fourths of individuals who utilized teledermatology services for care in California. Unsurprisingly, evidence to date has indicated that teledermatology increased access to care for underserved populations even with a lack of national standards to define adequate access (Uscher-Pines et al., 2016).

Patient satisfaction with and acceptance of teledermatology are critical components to evaluate prior to the implementation of services. Several studies on patient satisfaction with store-and-forward teledermatology have not shown a clear preference of patients for teledermatology or conventional care, which suggests that they are equally satisfied with both modalities (Whited, 2001, 2015; Weinstock et al., 2002; Williams et al., 2001). Weinstock et al. (2002) evaluated patient satisfaction with a telephone survey of 148 patients who were randomly selected out of 1030 patients who have been seen by store-and-forward teledermatology. The patient rating of overall satisfaction varied as 42% of patients rated the program excellent or good, 18% average, and 37% fair or poor. Approximately 75% of patients said they would recommend teledermatology to other individuals (Weinstock et al., 2002). When asked how satisfied responders were with their teledermatology providers, 87% rated their providers as excellent or good and 83% rated the explanation they received about the teledermatology service as excellent or good (Weinstock et al., 2002). According to Whited (2001), patients who preferred a face-to-face consultation also perceived teledermatology as an acceptable way for consultation. Patients usually perceived live video teledermatology favorably due to the direct communication with providers that is similar to in-person visits. In rural geographic regions, physicians and patients rated their experience with teledermatology higher than those in urban areas (Coates et al., 2015a, 2015b).

Patient dissatisfaction with teledermatology was expressed for different reasons. With regard to live video teledermatology, 18% of patients reported feeling uncomfortable and 17% feeling embarrassed (Whited, 2001). When assessing store-and-forward teledermatology, patients reported dissatisfaction due to feeling uncomfortable with being photographed and the absence of a face-to-face office visit with a dermatologist (Williams et al., 2001). One of the main areas of patient dissatisfaction for both live video and store-and-forward teledermatology revolved around the lack of follow up from the referring physician (Williams et al., 2001). Therefore, the referring physician plays a pivotal role in conveying the dermatologist's recommendations to the patient, which can have a major impact on patient satisfaction in the field (Whited, 2001). Patient satisfaction will play an integral role in the further growth, development, and implementation of teledermatology.

Reimbursement policies

As teledermatology continues its rapid expansion across the globe, different countries have starkly different policies with regard to reimbursement for services rendered. For example, the Netherlands offers full reimbursement for services and has completely integrated teledermatology into its healthcare system (Tensen et al., 2016). However, in the United States, reimbursement remains a major challenge in telemedicine and continues to evolve in recent years. Currently, all states and the District of Columbia have defined telemedicine law, regulations, and Medicaid policies (Center for Connected Health Policy, 2016). However, telemedicine policy varies greatly from state to state on how telemedicine is defined, regulated, and reimbursed. Reimbursement for live video teledermatology far exceeds the reimbursement for store-and-forward teledermatology. Many states restrict reimbursement coverage to live video teledermatology only and exclude store-and-forward teledermatology (Public Health Institute Center for Connected Health Policy, 2016).

As of March 2016, 47 states and Washington DC (with the exception of Massachusetts, Rhode Island and Utah) provide reimbursement for live video telemedicine in Medicaid fee-for-service (Coates et al., 2015a, 2015b). However, the reimbursement policies vary greatly depending on the state and medical specialty. For example, in California, providers are reimbursed for live video services with transmission and facility fee but in Connecticut, providers are not reimbursed for services provided through telephone only without a real-time videoconference (Public Health Institute Center for Connected Health Policy, 2016). In addition to specialty type, other factors including service type (inpatient consult vs. office visit), provider type (nurse vs. physician), and patient location (metropolitan vs. rural) may also affect or limit the reimbursement according to different state policies. Even with the evolution of Medicaid policies for teledermatology, one of the top ranked challenges among teledermatologists remains reimbursement, especially for store-and-forward services (Armstrong et al., 2011).

Several states continue to require that services are delivered in real time or by live video but exclude coverage for store-and-forward services even though it has been proven to be more cost-effective and equally reliable. By 2016, there were 11 states that reimbursed fees for store-and-forward teledermatology: Alaska, Arizona, California, Connecticut, Illinois, Minnesota, Mississippi, New Mexico, New York, Virginia, and Washington (Center for Connected Health Policy, 2016).

Although Medicaid coverage is limited for store-and-forward services in teledermatology, private payer reimbursement policies are expanding (Public Health Institute Center for Connected Health Policy, 2016). Reimbursement rates for store-and-forward teledermatology vary dramatically by state and payer, from full reimbursement of conventional care to fixed fees that are negotiated between providers with private or public payers. Even if teledermatology services were reimbursed comparably to in-person care such as with California's Medicaid and Medicare programs, providers may still experience income loss due to the lower number of procedures performed and less frequent follow up visits (Armstrong et al., 2011). This may pose a financial challenge for the recruitment of providers to participate in teledermatology compared with conventional practice.

Since 2016, more states have taken part in the development and implementation of bills to address Medicaid and private payer reimbursement in the field of telemedicine (Public Health Institute Center for Connected Health Policy, 2016). Some states require no mandated reimbursement for services while others require equal payment for teledermatology services compared with in-person services for the same level of care (Center for Connected Health Policy, 2016). Nationwide standards have yet to be determined and remain a significant challenge to the development of telemedicine.

Conclusion

The combination of rapidly developing technological advancements and increased demand for dermatological care have led to the expanding implementation of teledermatology. Teledermatology services have become a reliable and more cost-effective way to provide access to underserved populations. However, reimbursement policies continue to be a barrier to routine practice. As each state defines and develops more advantageous reimbursement policies, this will allow for increased teledermatology services nationwide. Teledermatology has been shown to increase patient satisfaction by providing faster access to consultation as opposed to in-person visits for specific populations. While teledermatology presents opportunities for dermatological education with primary care physicians, continued communication and follow up with referring physicians as well as the incorporation of training in dermatology residency programs are significant aspects for future success in the field (Edison et al., 2012). With the rapid advancements in technology, developing a practical and affordable platform for teledermatology could be an essential component for efficient and cost-effective care in the future.

Teledermatology at the University of Connecticut

Dr. Grant-Kels is the principal who initiated teledermatology services at the University of Connecticut. She encouraged the authors to

take the challenge and guided them through establishing and expanding the teledermatology services at the University of Connecticut, which grew exponentially over the last 2 years. Currently, the university's Department of Dermatology has full-scale teledermatology services that offer both store-and-forward and real-time video teledermatology. The store-and-forward teledermatology program started in April 2015 as a collaboration between UConn Health, Community Health Center Inc., Weitzman Institute at CHC Inc., Penobscot Community Healthcare of Maine, and private primary care practices in the community. The goal of this collaboration is to link primary care doctors with dermatologic specialty care to increase access to underserved populations. Patients from eleven Community Health Network clinics across Connecticut and three clinics of Penobscot Community Health Center in Maine are covered by the service. Approximately 70% of these patients are insured by Medicaid, 5% are uninsured, and the remainder are insured by Medicare or private providers.

Since April 2015, the University of Connecticut has seen over 2000 patients through store-and-forward teledermatology, with an average patient load of 100 to 120 teledermatology consultations per month. In addition, the University of Connecticut also collaborates with the Connecticut Department of Correction to provide real-time video teledermatology for inmates. Besides clinical service, the University of Connecticut also developed a new teledermatology education curriculum for all residents as well as research projects on teledermatology.

The authors choose the topic of teledermatology for this article in honor of Dr. Grant-Kels for being a great leader, mentor, and role model for all of us.

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