COMMENTARY

The Use of Teledermatology in Medical Education

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Abstract

Certain aspects of medical education have transitioned to virtual platforms since the start of the COVID-19 pandemic. This commentary explores advantages and barriers to teledermatology in medical education, which has the potential to reach an extensive pool of learners and preceptors but may be limited by logistical and security considerations of a virtual platform. Dermatology in particular lends itself to an online platform as a highly visual specialty, although clinical exam would be highly dependent on quality of images captured. With teledermatology, learners can begin developing an approach to delivering care remotely, and becoming accustomed to virtual platforms.

Keywords Teledermatology · Education · Online curriculum · Teaching · Telemedicine

In the current state of the COVID-19 pandemic, undergraduate and postgraduate medical education programs have sought to balance a responsibility of keeping learners safe, while not compromising on the educational progress of medical learners. The rapid expansion of telemedicine platforms in response to the crisis to more effectively utilize resources has brought to the forefront a potential opportunity to utilize teledermatology in medical curricula.

Most medical schools have already implemented the shift from in-person clinical exposures to online substitutes. Some specialties give rise to an easier transition, particularly those that already have the framework to deliver care virtually. In many ways, dermatology lends itself to an online platform as a highly visual specialty and due to the pre-existence of numerous online learning modules, most of which were meant originally to supplement curricula lacking in dermatology teaching [1]. This commentary will explore the limitations and advantages of utilizing teledermatology in medical education, while highlighting logistical considerations of a virtual platform in an educational setting and outlining potential implementation strategies.

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Barriers and Advantages to Teledermatology in Medical Education

The major drawback of implementing teledermatology for learners is the inability to see, feel and interact with patients in an organic manner, instead relying solely on 2-dimensional images and verbal descriptions. While visual examination is crucial, tactile examination is also a key aspect in dermatologic diagnosis and management. Without in-person patient interaction, learners are limited in the practice of nonverbal communication skills, bedside manner and aspects of professionalism and a complete physical examination. Experience with procedures and the practice and development of procedural skills will also be limited. Despite these limitations, technological advances have delivered innovative solutions. Several studies have demonstrated the successful integration of robotics and videoconferencing to provide surgical education remotely to students as a method of providing learners the opportunity to continue to experience and even practice procedural skills remotely [2]. Additionally, implementing 3-dimensional printing to reproduce a patient's cutaneous topographic features has been suggested as a potential way to incorporate palpation in teledermatology [3], although this method has yet to be widely accepted. Still, it is important to recognize these limitations and seek to supplement areas of learning that might be impacted.

While concerns of a potentially limited skillset that learners are able to acquire through an online platform are

certainly well-founded, learners may instead obtain a modified skillset more suited for the future delivery of healthcare. With the changing landscape of healthcare delivery following the current pandemic and the increasing use of telemedicine, educating learners through a virtual platform allows them to become accustomed to using telemedicine and to begin to develop an approach to delivering care remotely. Teledermatology calls for an increased reliance on verbal descriptions, asking pertinent questions and improving aspects of communication without being able to see or feel a lesion in person. In sum, learners can start to become competent in delivering remote care, which as it stands may likely become a larger part of the delivery of medicine in the future.

Teledermatology in education has the potential to theoretically reach a much larger, more extensive pool of learners and preceptors alike, and now more than ever, the importance of resource stewardship in the medical community calls for more cost-effective, resource-efficient strategies. For a single preceptor or patient case, the number of learners that can benefit from the educational experience through teledermatology platforms greatly exceeds that of traditional in-person methods. Teledermatology encompasses several modalities of delivery: (i) real-time video consultation where patients and healthcare providers interact live in real time, and (ii) asynchronous store-and-forward, where images and clinical details are stored for later consultation by the provider [4]. A report by Scheinfeld outlines a Store-and-Forward teledermatology platform used prior to the COVID-19 pandemic to supervise dermatology trainees, where trainees staffing an urgent care clinic at a New York City hospital took patient photos and sent teledermatology consults to an offsite attending physician, with whom they discussed the case with over phone [5]. Whether through real-time consultation or store-and-forward technology, the flexibility of teledermatology platforms lends itself to providing trainees the opportunity to learn from multiple experts not limited to their geographic area. In this way, teledermatology can unlock a wider pool of expertise to improve global health education, necessitated by global expansion and travel, for skin conditions that once considered rare or remote may now be found in the local community. Learners have access to mentors and experts they may have normally been unable to interact with in-person and despite the lack of direct in-person contact have increased opportunities to expand their network and grow their body of knowledge beyond what is available geographically or locally.

Yeung et al. outlined a pilot curriculum incorporating international virtual grand rounds using teledermatology at the Emory University School of Medicine where cases were discussed, including the diagnosis and management of issues in resource-limited settings, socioeconomic, cross-cultural and ethical concerns and following which most participants agreed or strongly agreed that they had improved interpersonal and communication skills, understood the strengths and limitations of international teledermatology and learned how to manage skin diseases internationally [6]. Even with limited detail on tactile and dermatoscopic examination, teledermatology represents a unique tool for trainees to practice care coordination, such as through triaging lesions that require reassurance, or deciding whether an in-person visit for examination or biopsy is warranted [7]. Trainees also learn to adapt to various healthcare delivery systems, communicate through virtual settings and learn to work within an interprofessional team, such as during follow-up communication with a consulting physician [8].

Teledermatology in Medical Education for Residents

Teaching in a teledermatology setting allows for oversight of dermatology trainees while providing a high level of independence and autonomy. Residents in the Department of Dermatology at the University of Pennsylvania would review teledermatology consults where ultimate diagnosis and management plans were finalized by attending physicians [9]. Diagnosis and management plans were either partially or fully concordant for 92% and 89% of cases respectively 9. Concordance rates for specific presentations can be easily tracked given the nature of teledermatology, and trainees can more easily pinpoint specific areas of improvement. Feedback on resident decision-making and management plans provided on a teledermatology setting were also found to be effective at improving concordance between faculty and resident consultation drafts [10].

Teledermatology in Medical Education for Medical Students

The benefits of teledermatology at the resident level are largely generalizable to medical student learning; particularly if the infrastructure for virtual dermatologic care is already in place for resident-level learning, including medical students in teledermatology consultations is an efficient and cost-effective way to provide access to greater opportunities to medical students in dermatologic learning. Guidelines for including medical students in virtual patient encounters in dermatology as outlined by Loh et al. indicate that teledermatology is a feasible and cost-effective way to involve students in patient care and introduce students to the virtual delivery of care at an early stage [11, 12]. In particular, teledermatology can provide medical students an early introduction to a virtual model of care and additional instruction on clinical reasoning and decision-making given the limited information of a

virtual setting. Su et al. described a teledermatology rotation designed in response to the COVID-19 pandemic where medical students participated in both real time or synchronous consultation and store-and-forward teledermatology consultation. Students participated in formulating a differential diagnosis and prescriptive treatment plan for eConsults and gained exposure to a broad spectrum of dermatologic conditions [13]. The report highlighted that teledermatology will continue to be an important component of dermatologic care in the future, and engaging medical students in these early experiences will continue to be valuable [13].

Logistical Considerations

Teledermatology relies on the technology available to and skill of the individual capturing the image(s), and requires a certain level of technical infrastructure in place, such as the ability to capture and send high-quality photographs. Whether dermatology clinics have the infrastructure to host teledermatology platforms large enough to support learners in addition to the healthcare team remains to be seen. Security and legal considerations are barriers to establishing any telemedicine system, and teledermatology is no exception. Not all programs or institutions may be equipped to incorporate this technology and provide these opportunities to learners.

The issue with a primarily image-based presentation is that clinical information is largely dependent on the quality of the photographs or videos. Improperly taken photographs can interfere with learning as the representativeness and quality of the photographs is essential to how lesions are presented. Learners might be predisposed to the idea of zoning, where the focus is on the main lesion and other concurrent lesions are in the periphery. Performing a thorough examination of skin lesions, for instance, in a total body skin examination, is difficult logistically particularly when reliant on patient-taken photos or videos of lesions.

Teledermatology can also be challenging to implement in medical education if it has not yet been established in the past. Adjusting a pre-established curriculum to incorporate a virtual component can be challenging with the currently unresolved issues about accreditation and standardization surrounding telemedicine practices in medical education. Furthermore, the additional training is required for learners and preceptors, and even patients, to become adjusted to and familiarized with an online platform [14].

Recommendations and Suggestions for Implementation

Teledermatology platforms for trainee education should ideally be built upon or based in a pre-existing teledermatology system, not only to provide trainees a system based around patient care as opposed to a simulation or trainee-based system, but also as the infrastructure and security measures are already in place. Hussain et al. proposed a system for Store-and-Forward platforms where trainees would see their own reduced teledermatology list in parallel with the consultant, followed by a review of all trainee cases at the end of each session [15]. This proposal mirrors training techniques used by other highly visual specialties such as radiology and provides an effective opportunity for trainees to apply their knowledge with a high level of independence yet still receive detailed feedback. For live or real-time consultation models, previously described systems where trainees interview patients in-person, potentially taking photos or videos of the presenting complaint, and communicate to off-site consulting physicians provide trainees the opportunity to refine their presentations and narrow their focus on the most pertinent information [15].

Current Uses of Teledermatology in Medical Education and Future Considerations

In the past, teledermatology has been employed as part of the medical education curriculum with some success [6, 16]. Currently, some of the restrictions that have previously applied to telemedicine use have been waived by the US Department of Health and Human Services, allowing healthcare providers to use every day platforms such as the video chat platform Zoom to conduct patient visits [17]. The implementation of the Epic Haiku application for dermatology resident education in response to the pandemic as reported by Oldenburg et al. at the University of California has been successful in allowing residents to continue to practice under preceptor supervision using telemedicine [18].

The incorporation of teledermatology in dermatology curriculums and residency programs has been well received. A 2021 report by Zakaria et al. describes how the incorporation of teledermatology in the dermatology residency program at the University of California, San Francisco School of Medicine, was not only well-liked by residents, but also enabled residents to evaluate more than double the number of patient cases per unit compared to in-person clinics [19]. Specifically, the study found that teledermatology provided additional opportunities for direct faculty teaching on morphology and visual diagnostic skills [19], and a survey on residents in the teledermatology program found that "residents specifically appreciate the opportunity to triage patients," suggesting that learning how to triage presentations could be a specific educational objective in a curriculum that incorporates teledermatology.

The nature of healthcare delivery is undoubtedly changing, and the importance of remodelling medical education to better adapt to these changes cannot be undermined.

Teledermatology is a useful adjunct to traditional dermatological education and in the current environment can be an appropriate measure to ensure that medical education is not sidelined. Programs could begin to consider implementing feasible and innovative ways to mitigate the impact of current restrictions on their learners' progress.

Declarations

Ethics Approval N/A

Informed Consent N/A

Conflict of Interest The authors declare no competing interests.

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