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Teledermatology and teledermatopathology as educational tools for international dermatology: a virtual grand rounds pilot curriculum

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Abstract

Background—Teledermatology may improve dermatologic care access in underserved areas and expand the clinical experience of dermatologists-in-training. The potential for teledermatology to supplement global health curricula in dermatology residency education has not been explored.

Methods—An international virtual grand rounds (VGR) curriculum was created based on teledermatology cases from Kabul, Afghanistan. The learning objectives included understanding the diagnosis and management of skin diseases in unfamiliar resource-limited settings and highlighting socioeconomic, cross-cultural, and ethical issues. A 17-item, Likert scale questionnaire was used to assess the effectiveness of the curriculum, including specific Accreditation Council for Graduate Medical Education (ACGME) competencies, as well as interest in global health and teledermatology.

Results—The survey was completed by 85 of 118 VGR attendees (72% response rate). Most respondents considered the curriculum valuable to their education (mean 4.5 on a 5-point Likert scale; standard deviation, 0.5), learned more about diagnosis and treatment of skin diseases in international settings (4.5; 0.6) and in the US (4.1; 0.8), and learned more about socioeconomic, cultural, and ethical issues in skin health (4.6; 0.5). The majority also reported being more interested in global dermatology (4.1; 0.8) and would recommend VGR to a colleague (4.5; 0.6).

Conclusion—This pilot curriculum provided an innovative platform to enhance undergraduate and graduate medical education in international dermatology. International teledermatology education may be used to address multiple ACGME core competencies and increase resident awareness of sociocultural determinants of skin health.

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Conflicts of interest: None.

Introduction

Teledermatology and teledermatopathology are emerging healthcare delivery platforms that improve access to care for patients in resource-limited settings by facilitating timely remote consultations about clinical and pathologic findings with dermatologists and pathologists around the world.^{1,2} This model of care predominantly relies on static, store-and-forward (asynchronous) images but may also utilize live video. Studies have indicated that teledermatology and telepathology are feasible and may be reliable in terms of diagnostic accuracy and management when compared with conventional diagnosis via face-to-face consultation and glass slides.¹⁻⁴

Beyond serving as a platform for delivering clinical care, teledermatology may also serve as a valuable educational tool for medical students, residents, and attending physicians. This technology has been used as an educational tool across a number of specialties to improve residents' medical knowledge and diagnostic acuity in nonglobal dermatology care. A survey of United States (US) dermatology residency program directors revealed that 68% were interested in incorporating teledermatology education into their curricula.⁵ Several dermatology residency curricula have already integrated teledermatology to improve residents' diagnostic acumen of skin diseases through case-based practice and supervision from trained dermatologists. Integration of this technology into dermatology resident curricula may also fulfill certain competencies, such as medical knowledge and practice-based learning, in the Dermatology Milestone Project by the Accreditation Council for Graduate Medical Education (ACGME).⁶⁻⁸

While the capacity of teledermatology to improve skin healthcare and general aspects of education has been studied, it remains unclear whether it may be used to improve global health education for dermatologists and dermatology trainees. With the expansion of international commerce and travel, many "exotic" diseases are no longer isolated to a particular region, thereby necessitating a broad global health exposure while in medical training. In one study, German-trained dermatologists reported feeling unprepared to provide care for patients abroad and in tropical nations and requested additional training in tropical dermatology.⁹ Limited access to global health education has also been described by trainees in the US and Canada.^{10,11} Previous global health educational endeavors have also failed to address specific ACGME core competencies such as Interpersonal and Communication Skills and Professionalism.⁶

We hypothesized that an international teledermatology consultation platform may provide untapped educational opportunities for trainees to learn about the socioeconomic, cross-cultural, and ethical issues that influence global skin health. Our study aimed to assess the educational value of an innovative international virtual grand rounds (VGR) pilot curriculum utilizing cases from an international teledermatology collaboration.

Methods

This study was exempted from review by the Emory University Institutional Review Board.

Curriculum development

Based upon perceived educational value, four cases were selected from an established store-and-forward teledermatology and teledermatopathology consultation service between a board-certified dermatologist and dermatopathologist at Emory University (BKS) and a board-certified dermatologist at a teaching hospital in Kabul, Afghanistan (JM). Each 15-minute VGR case presentation was structured as follows: clinical history, de-identified clinical images, differential diagnosis, static teledermatopathology images obtained by a general pathologist in Kabul, key discussion points, and relevance to US-based practice (Fig. 1). The learning objectives included understanding the diagnosis and management of skin diseases in unfamiliar resource-limited settings and highlighting socioeconomic, cross-cultural, and ethical issues. The cases were presented in four quarterly conferences (i.e., one case per conference) during Emory University Dermatology Department Grand Rounds from October 2015 to June 2016. Table 1 presents the four cases by diagnosis and key discussion points, including specific socioeconomic, cross-cultural, and/or ethical issues, as well as relevant teledermatology and teledermatopathology issues.

Participants and surveys

Participants in our study consisted of dermatology faculty, dermatology residents, and medical students attending Emory University Department of Dermatology Grand Rounds. Verbal consent was obtained after informing participants of the anonymous evaluation survey prior to each VGR case presentation. After each case presentation, a 17-item anonymous and voluntary questionnaire was provided to the Grand Rounds audience to collect participant demographics and to assess the educational value of the case presentation. Survey items were developed from the six core competencies for resident education (i.e. patient care and procedural skills, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, systems-based practice), as specified by the ACGME.¹² Likert scales were used to assess 11 statements regarding the curriculum, with 1 being “strongly disagree” and 5 being “strongly agree.”

Statistical analysis

Descriptive statistics were used to summarize the data. Likert scales were additionally dichotomized as “agree” and “strongly agree” for positive statements and “disagree” and “strongly disagree” for negative statements, as appropriate. Potential associations between survey mean scores and participant demographics were explored using student’s *t* test or ANOVA, with $P < 0.05$ considered significant.

Results

Among 118 Grand Rounds attendees, 85 chose to complete the survey for a response rate of 72% (Table 2). All respondents were US-based and physically attended the Grand Rounds sessions, including 31 attending physicians (both Emory-based faculty and community physicians), 36 resident physicians, 13 medical students, and four others. Most respondents (97%) indicated that the curriculum was valuable to their education (mean 4.5, standard deviation (SD) 0.5). Mean score did not differ by training level, prior in-person exposure to

the diagnosis, or substantial experience with international dermatology or teledermatology (each $P > 0.05$).

Most participants agreed or strongly agreed on learning more about diagnosis and treatment of skin diseases internationally (94%) and that this knowledge may be useful for current practices in the US for the US-based attendees (77%). Most agreed or strongly agreed on learning more about strengths and limitations of international teledermatology (87%). In addition, almost all respondents (95%) found the curriculum to be beneficial in improving their interpersonal and communication skills, such as understanding cultural and ethical issues in skin health, learning more about social determinants of health in international settings, and becoming more comfortable engaging with communities from different cultural backgrounds. Notably, most respondents (91%) disagreed or strongly disagreed with the statement that they would rather discuss only US-based cases for future Grand Rounds.

The majority of respondents (82%) reported being more interested in international dermatology as a result of the curriculum, with higher mean scores for those without prior in-person exposure to the diagnosis (mean 4.3 [SD 0.7] vs. 4.0 [SD 0.8], $P < 0.05$). The majority (95%) would recommend the curriculum to a colleague; this result did not differ by participant training levels ($P > 0.05$).

Discussion

This pilot curriculum utilized an innovative platform of teledermatology and teledermatopathology to supplement dermatology education for attending physicians, residents, and medical students. In terms of the six core clinical competencies adopted by the US ACGME and the American Board of Dermatology,¹² one study suggested that US dermatology trainees exposed to teledermatology were most satisfied with improving medical knowledge and practice-based learning and improvement but least satisfied with interpersonal and communication skills and professionalism.⁶ Our results suggest a formal curriculum in international teledermatology can supplement education across multiple ACGME core competencies, such as Medical Knowledge, Interpersonal and Communication Skills, and Professionalism, as well as cultivate interest in global health.

Prior studies have described the potential benefit of teledermatology for diagnostic consultation and general medical education. For example, a free, web-based, open-access, store-and-forward consultation and educational modality entitled “Virtual Grand Rounds in Dermatology” presents complex medical cases using a VGR-style platform. It has received cases from across the globe and positive qualitative feedback regarding the platform’s potential to improve international collaboration and access to dermatologic care in remote areas.¹³ Another study evaluated the benefits of the African Teledermatology Project, a collaborative teledermatology program involving dermatology providers in Africa, Europe, and the US.¹⁴ This platform not only demonstrated value in fostering remote access to care of skin diseases, it also enabled dissemination of educational materials to underserved areas and continued medical education for both local and international healthcare providers.¹⁴ Expanding on these reports, the current study describes how a teledermatology global health curriculum can successfully integrate with ACGME core competencies not routinely

addressed by traditional teledermatology, including Interpersonal and Communication Skills and Professionalism. Such integration is vital to gain traction in US residency programs.

While exposure to global health experiences has been shown to increase residents' cultural awareness and competency, the use of teledermatology in increasing cultural awareness and competency in resident education has not been thoroughly evaluated. Multiple studies across various specialties have described the benefits of in-person international health experiences (i.e. clinical rotations abroad) on residents' cultural awareness and competency.¹⁵⁻¹⁷ Exposure to international health has also been shown to improve resident leadership skills and future involvement in service.¹⁸ Where international rotations are not possible, other studies have shown that didactics or classroom-based education can play a role in improving international health exposure and cultural appreciation.^{15,19} In a telemedicine-based, patient-case focused, ethics in nephrology curriculum, one study reported high trainee exposure to additional contextual features of medicine and cross-cultural appreciation, illustrating that telemedicine could be used to address cultural sensitivity goals in education.²⁰ These experiences demonstrate that international travel is not always necessary to obtain meaningful educational experiences in international health. Our study provides additional evidence that novel educational tools, such as teledermatology-based virtual grand rounds, can improve international health and cross-cultural medical training among residents while addressing ACGME core competencies. Our experience suggests that international teledermatology can be a unique and rewarding tool to expose larger numbers of residents to international health experiences and improve their understanding of the socioeconomic, cross-cultural, and ethical issues in dermatologic care.

The study was limited by its sample size and the scope and number of cases presented. Participants' knowledge of dermatologic diagnoses and competency in cross-cultural care or international health were not directly assessed. Psychometric validation of the evaluation instrument regarding global health competencies was not performed.²¹ Implementation and evaluation of an expanded international teledermatology curriculum will allow further assessment of its impact on trainees' competency in cross-cultural dermatology training and on their perception, interests, and participation in international dermatology work.

Conclusion

This international teledermatology VGR series provided an innovative pedagogical platform to enhance undergraduate and graduate medical education in international dermatology. Survey results suggest that international teledermatology education may address multiple ACGME core competencies and increase resident awareness of sociocultural determinants of skin health.

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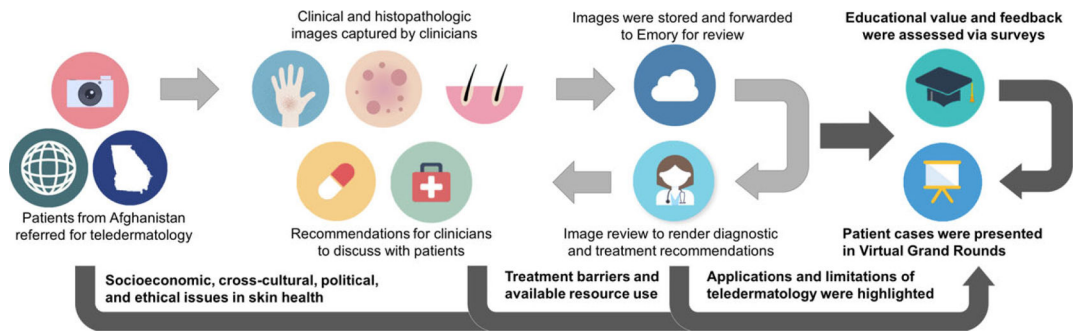


Figure 1.
Creation of Emory dermatology virtual grand rounds case presentations

Case diagnoses and key discussion points

Table 1

Diagnosis	Socioeconomic, cross-cultural, and/or ethical issues	Teledermatology and teledermatopathology issues
Lupus vulgaris	<ul style="list-style-type: none"> • Concurrent disability limiting access to care and other services • Stigma of skin disease as contagious or cursed 	<ul style="list-style-type: none"> • Lack of acid-fast stain
Chromoblastomycosis	<ul style="list-style-type: none"> • Physical disfigurement from skin disease and implications for women vulnerable to domestic violence 	<ul style="list-style-type: none"> • Lack of culture confirmation and speciation • Polymerase chain reaction testing and immunohistochemistry can be performed by sending formalin-fixed blocks or glass slides to the Centers for Disease Control and Prevention Infectious Disease Pathology Branch by US and non-US physicians²²
Kaposi sarcoma	<ul style="list-style-type: none"> • Local opium production and increasing intravenous drug use leading to increasing HIV infections • HIV as a disability in the US • Stigma associated with HIV in the US and Afghanistan 	<ul style="list-style-type: none"> • Unreliable HIV testing results • Lack of human herpesvirus-8 immunohistochemical stain
Mycosis fungoides	<ul style="list-style-type: none"> • Use of natural sunlight phototherapy in context of conservative dress standards • Local culture of cancer diagnosis and nondisclosure to patient 	<ul style="list-style-type: none"> • Limited diagnostic modalities with lack of immunohistochemical stains and molecular diagnostics • Limited available treatments and difficulty with surveillance laboratory monitoring • Limited experience among general pathologists with the diagnosis • Static histopathologic images limit evaluation to selected microscopic fields

HIV, human immunodeficiency virus; US, United States.

Table 2

Survey results (*N* = 85)

Survey statement (relevant ACGME core competencies)	Mean (SD) ^a
This presentation was valuable to my education	4.5 (0.5)
I learned more about the presentation, diagnostic approach, and/or treatment of skin disease in international and/or resource-limited settings (MK, PC)	4.5 (0.6)
I learned more about the presentation, diagnostic approach, and/or treatment of skin disease that may be useful for my current practice in the US (MK, PC)	4.1 (0.8)
I learned more about socioeconomic, cultural, and/or political determinants of health in international and/or resource-limited settings (ICS, P)	4.6 (0.5)
I learned to better appreciate ethical dilemmas, differences in cultural values, and/or challenges confronted in practicing medicine in international and/or resource-limited settings (ICS, P)	4.5 (0.6)
I feel more comfortable in engaging individuals and communities from different socioeconomic, cultural, and/or political backgrounds in my current practice in the US (ICS, P)	4.1 (0.9)
I learned more about different healthcare systems and utilizing available resources needed to diagnose or treat patients in international and/or resource-limited settings (SBP)	4.2 (0.7)
I learned more about the applications, strengths, and/or limitations of teledermatology consultations in providing specialist care in international and/or resource-limited settings (SBP)	4.2 (0.7)
I would rather discuss only US-based cases for future Grand Rounds	1.6 (0.8)
This presentation made me more interested in global dermatology	4.1 (0.8)
I would recommend Global Teledermatology Virtual Grand Rounds to a colleague	4.5 (0.6)

MK, medical knowledge; PC, patient care; ICS, interpersonal and communication skills; P, professionalism; SBP, systems-based practice

^aBased on 5-point Likert scales with 1 being strongly disagree and 5 being strongly agree with each statement.