Telemedicine Education Amidst COVID-19: Review of Literature and Call to Action

Shil U. Punatar, Basharath A. Khan, Matthew Charnetski, Rajendram Rajnarayanan

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Shil U. PunatarBSc, BA, ; Basharath A. KhanBSc, ; Matthew CharnetskiMSMS, ; Rajendram RajnarayananPhD,

Corresponding Author:
Shil U. PunatarBSc, BA,
Phone: +16309039448
Email: spunatar@nyit.edu

Abstract

Objective: In the presence of COVID-19, telemedicine is being utilized to limit person-to-person spread while increasing healthcare access. While telemedicine use is increasing, a mismatch exists with the amount of training to deliver care. For this, the American Medical Association has called for an increase in formalized training for telemedicine. This literature review provides recent examples of telemedicine education techniques to provide guidance for telemedicine training in this time of immediate need.

Methods: The authors conducted a literature review by searching the PubMed (MEDLINE) database for publications pertaining to telemedicine education and training. After review, 12 pieces of literature were analyzed for methods and skills taught in telemedicine, means to assess competency, and future directions.

Results: This study identified a broad scope of skills to be taught from orientation to technology, to patient interaction methods, as well as the current medico-legal guidelines. Using standardized assessments and being supervised by trained physicians, there is a role of telemedicine incorporation into formal curricula. As the field of telemedicine continues to adapt, so should the mechanisms by which training is delivered.

Conclusions: Discussion: While accepted that telemedicine provides access to care, especially in the time of COVID-19, this is not synonymous with quality of care if telemedicine training is lacking. The results of this work provide many current examples of telemedicine teaching to be incorporated across all healthcare disciplines. With this, we emphasize the need for growth in the area of telemedicine education and published data in the field.

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Telemedicine Education Amidst COVID-19: Review of Literature and Call to Action

Shil U. Punatar B.S[1]., Basharath A. Khan B.S[2]., Matthew Charnetski PhD(c) MSMS[3], Raj Rajnarayanan PhD[4]

New York Institute of Technology College of Osteopathic Medicine at Arkansas State University[1,2,4]
Simulation Based Education and Research at Dartmouth Hitchcock Medical Center [3]

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Corresponding Author:

Shil Punatar

spunatar@nyit.edu

630-903-9448

NYITCOM at Arkansas State University

P.O. Box 119

State University, AR 72467

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Introduction:

As the novel coronavirus (COVID-19) continues to spread rapidly throughout the nation via respiratory droplets, a number of measures have been implemented in order to limit the person to person transmission. One such measure is the use of telemedicine (TM) modalities by health care professionals for the initial screening and triage of symptomatic patients, as well as for scheduled office visits for established patients in an effort to limit direct patient contact [1]. The use of TM is aimed at helping to both reduce the rate of infection, and to preserve personal protective equipment for essential personnel. Attending physicians and a variety of healthcare decision makers are utilizing TM to interact with patients, either via programs previously implemented into health systems, or via third-party TM services [1]. Additionally, TM services have increased in public interest and use since the onset of the coronavirus pandemic, and many barriers to TM use have been temporarily waived for many patients, including lack of reimbursement, licensing restrictions, and HIPAA compliance [2,3].

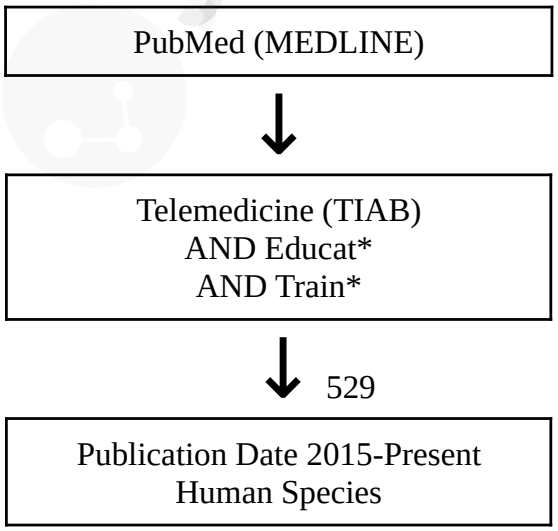
Despite the increased interest in TM services and removal of barriers to use, there continues to remain a lack of proper instruction for health care providers on how to effectively utilize TM. A review of literature between the years 2004-2014 demonstrated only 9 pieces of literature in the field that focused on TM education and training, despite that growth of TM at the time, and remarked on the lack of training as a key issue [4]. A survey by the American Academy of Family Physicians (AAFP) found that only 15% of family physicians used TM in the past 12 months, citing lack of training as the primary barrier to use [5]. Additionally, the American Medical Association called for an increase in formalized training in TM use for medical students and residents, stating that such training is not available for the vast majority of medical students [6]. Given such information, we have performed a literature review of the PubMed database regarding TM education for current and future health care professionals. With elaboration of the existing publications, we hope to establish a baseline for criteria used to train current providers on TM delivery during the COVID-19 pandemic and to establish widespread curricula across healthcare disciplines for TM education in the future.

Methods:

We conducted a review of literature on the PubMed (MEDLINE) database pertaining to published TM articles. PubMed was searched using the term “telemedicine” specifically within the abstract or title of the article and only with publications involving human subjects. Due to the emphasis on instruction of TM, further Boolean operators were used to include both the terms “educate” and “training” in each article. Truncation was applied to the terms educate and training to include articles with variations of the key words within the text. The aforementioned key words were chosen based on the emphasis of our project on TM, education of students, and training of TM technology. Search terms “learning, “curriculum,” and “teach” were bypassed in order to isolate articles solely about teaching the use of TM in the delivery of healthcare, not TM as a tool for delivering educational content. To reflect recent trends and occurrences in TM, articles were limited to publication from 2015 to present. In order to assist in development of curriculum and programming in this time of increased demand, only articles with abstracts or full text access were included. A total of 162 articles were identified after applying the filters to the PubMed database.

Inclusion and exclusion criteria to evaluate the abstracts found for this study are as follows: Inclusion data pertained to studies of providers trained and educated on TM modalities and their use, and/or pitfalls in education, and/or methods of evaluation of taught skills. Exclusion criteria included the use of TM to train and educate a third party rather than prepare for interaction between providers and patients. For example, “TM used to train nurses about mental health” would be disregarded as TM was used as a distance education tool to train nurses. After applying inclusion and exclusion criteria to the results of the PubMed database, the two independent reviewers formed a consensus on 18 publications selected with relevant contributions.

The 18 articles underwent full-text review via two independent reviewers to form a consensus of articles pertaining to review, from which 8 articles were further excluded. Using the 10 identified articles, a literature matrix spreadsheet was created to list all articles as well as their respective contributions to modalities of teaching, areas of improvement, and methods of testing competency. Here, three reviewers analyzed all relevant abstracts and articles with contributions made to the shared literature matrix. (Figure 1)



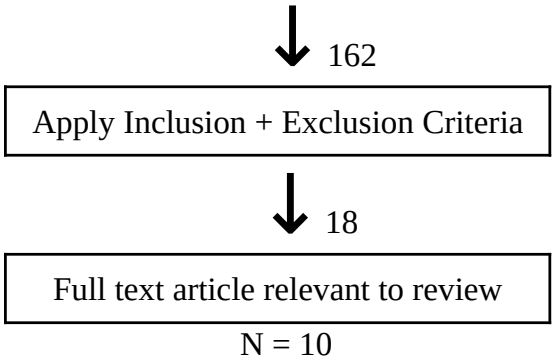


Figure 1. PubMed database was searched using initial keywords from which 529 articles appeared. Limitations on publication date and human species narrowed to 162 articles. Abstract review with inclusion and exclusion criteria narrowed to 18 articles. Full text review established 10 articles relevant to study.

Results:

A total of 10 articles relevant to TM were found from a variety of diverse sources and were reviewed for their contributions to TM education and training. Publications spanned from suggestions in adapting medical school education to opportunities in fellowship training, with emphasis on objectives regarding telemedicine as a discipline and ensuring quality provider-patient interactions [7-16].

The first consideration in the literature was to understand the TM skills being taught and the modalities used to facilitate learning. Upon the introduction of TM in an encounter, the first imposed change is to become comfortable with a new device and care system. Specifically mentioned in training providers for TM, education should emphasize an orientation to equipment as well as the system being used [11-14]. Furthermore, providers should also be taught on ways to troubleshoot equipment [13,14].

The process of placing a device between a provider and patient also calls for a different mechanism of approaching patient encounters. As you lose the ability to perform direct physical exams, emphasis is placed on learning physical exam skills and history taking via TM [6-8,11-13,17]. With this, communication between the TM provider and patient, as well as family members and other members of a care team are important skills to facilitate [11-13, 16, 17]. While not physically with a patient, rules of bedside manner, termed ‘webside manner’ will apply [11,12,16]. Skills can also be developed through didactic sessions and review of cases being enacted through TM modalities [7,11,13,17].

The scope of TM utilization does not end with patient interactions, but also requires focus on the evolving concept of care as a whole [13,17]. TM education also requires education on the medico-legal concerns being introduced such as privacy concerns, licensure, and reimbursement [9-12.15,17].

While developing a new skill set to use TM, review of the literature also suggests multiple means to assess competency. It is proposed to add TM education into the existing medical school curriculum, in which case students may be assessed via standardized patient encounters and graded based on existing standards [7,8]. While medical students enter clinical training, it is possible to incorporate learning into complete clerkships dedicated to digital health and incorporation of TM into fields such as radiology and dermatology [9]. The concept of a TM focused clerkship can be continued into residency and fellowship training with assessments being built into standard resident and fellow evaluations already being given annually [12,13]. While training in school or through

fellowship years, the review of literature notes the importance of attending physicians to provide oversight and learning points [9,11,13,17].

Many potential areas of improvement also exist for TM education systems in place currently. Learners should be exposed to a variety of platforms with training across platforms while using guidance from experts in the field for learning [9,14]. Furthermore, importance is placed on learning the limitations of TM as there are deficiencies in technology, physical exam capabilities, and relationship building [12,14]. With TM aimed to provide patient care, patients should also be involved in feedback of trainees [17]. Also, TM continues to grow and advance, as should the training that accompanies it [13,17]. (Figure 2)

Author	TM Skills Taught	Areas of Improvement	Testing Competency	Year of Publication
Pathipathi et al.	Physical exam, medicolegal issues, patient interaction, clinical cases, TM clerkship, digital health rotation,	Incorporate into medical curriculum	Clerkship assessment	2016
Sartori et al.	Physical exam, relationship development, standardized patient encounters, history taking, management	Incorporate into medical curriculum	Assessment via standardized patient, structured evaluation of clinical case	2019
Lee et al.	Electronic consultations, technical and policy barriers, reimbursement, policy, communication skills,	Use of experts for training, standardized use across platforms, workflow limitations	Clerkship assessments, review by attending physician	2019
Scott Kruse		Lack of implementation models, teaching status, technical challenges, legal and privacy concerns		2018
Afshari et al.	Separate clerkship, technology familiarity, history taking, interaction with patient-family-staff, evolution of TM, delivery modalities, reimbursement, 'webside' manners, future applications,	Tailor training to facility capabilities, case-based discussions, journal club, impatient and emergency consultations	Attending oversight, learner pre and post-assessments	2019
Govindarajan et al.	Module based approach, medicolegal issues, relationship building,	Technology limitations, relationship building limitations, physical	Multiple choice questionnaire, clinical scenario, part of	2017

	‘webside’ manners, consent and privacy, history taking, physical exam, device implementation	examination limitations, recognizing when telemedicine can not be used	resident evaluation	
Jagolino et al.	Capabilities and limitations of equipment, troubleshooting, communication skills, TM clerkship, orientation to TM network, didactics, case conferences, history taking, physical examination, professionalism,	Evolution of training as TM modalities evolve, incorporation into ACGME curricula	Attending supervision, milestone based approach, combine with fellowship/training evaluations	2016
Rienitis et al.	Methods of conducting teleconsultations, medicolegal issues , technical and procedural issues, barriers and benefits of care	Material and equipment requirements for educational courses. Trained staff required for preparation of stations	Post-training self assessment using a 5-point scale of skill improvement, open comment survey.	2016
Teichert	‘Webside’ manners, empathy and compassion, communication skills, relationship building, proper documentation.	Continued ‘webside’ manner training, checklist based encounters		2016
Hilty et al.	history-taking, interview skills, assessment, treatment, documentation, medicolegal issues, privacy concerns, reimbursement, interprofessional skills, communication skills, physical exam, didactic lessons, case series, variety of TM models used	Broader consensus on competencies from medical organizations i.e AAMC/ACGME , further research to define competency, further teaching faculty and staff development, patient feedback, further literature on TM training models, evolution of training as TM modalities evolve.	Attending/Faculty supervision, standardized evaluation, assessment of 'reactions, learning, behavior, results,' simulations, learner pre/post-assessments, practice cases.	2015

Figure 2. Literature matrix was created amongst reviewers. All 10 articles were analyzed in accordance to TM skills taught, areas of improvement, and testing competency. Structural order was determined based on order found in literature search.

Discussion:

Summary of Findings:

In this review, we have encountered many of the methods by which TM has been taught, the ways assessments have been delivered, and areas of improvement in education. While TM training can be established as part of a formal curriculum in medical education, there are also benefits to creating small sessions of learning. In some cases, sessions designed to be 10 minutes in length were sufficient enough to provide an introduction to virtual care, but also to assess communication skills in a virtual encounter [8]. After sufficient orientation to technology and troubleshooting, focus should be delivered to history taking, physical examination, and rapport building skills [7-13]. With attending physician supervision, it has been noted that 3-5 observed patient encounters were enough to allow trainees comfortability in performing consultations independently, with support as needed [13]. The field of TM has made vast changes over the years leading to the importance of teaching trainees the medico-legal issues, reimbursement, and privacy concerns within care delivery [9-12]. As the field continues to change, so should the methods in which trainees are being taught and assessed in their abilities [13].

Strengths and Limitations of Study:

While contributing to the overall breadth of knowledge, this review presents some limitations typical for this form of study [17]. In processing each article, variation in the interpretation of wording occurs with the goals, methodologies, and pitfalls addressed by each individual author. In order to combat this form of bias, we had two author-reviewers independently analyze articles to determine the characteristics of note for each study. Furthermore, it can be said that the inclusion and exclusion criteria set forth as well as the range of publication time and open access provide limitations to the study. To address this, we have set clear goals in the methods section of the aims to be addressed in TM education. Controlling for publication time allows us to present the most current trends with open access allowing for accessibility for those wanting to develop curricula of their own.

Future directions:

While a growing trend, our sample size of 10 presents a small glimpse of the discipline of TM. With this, we emphasize the need for further research, evaluation, and publication of successful models of training. As TM is being increasingly used in the time of COVID-19, future research and publication could arise from the current models of training being utilized in healthcare settings to establish a developing base of literature across several aspects of healthcare. This could allow for better preparation of health care providers in the use of TM, especially during times of increased utilization of TM such as the current COVID-19 pandemic.

Conclusion:

Despite the growing widespread use of TM in healthcare today and especially in the time of COVID-19, little can be said about the means by which trainees receive education. While the prospects of TM increase the access to care and provide care from a safe distance, it cannot be purported that without proper knowledge and training this care is of equal or greater quality to in-person consultations. From small lesson plans to entire curriculum implementation, we call for increased TM education across all healthcare disciplines. With this, we strongly urge this review and citation of used methods of teaching serves as a model and reference for cases in which TM modalities are being used and expected to be utilized.

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