

## SPECIAL CONTRIBUTION

## Education

# Telehealth in emergency medicine residency training: A model curriculum

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## Abstract

Emergency physicians are well-positioned to take a leadership role in telehealth, particularly in emerging categories such as triage, direct acute unscheduled care, and virtual observation. However, the growth of telehealth has outpaced curricular development in emergency medicine (EM) residency programs. This manuscript presents a model longitudinal telehealth curriculum, developed by the consensus of education experts, including representatives from the telehealth interest groups from EM's two primary specialty societies: the American College of Emergency Physicians and the Society for Academic Emergency Medicine. The curriculum describes overarching goals and components that may serve as a foundation for individual institutions seeking to train future operational and academic leaders in telehealth.

## 1 | INTRODUCTION

The United States is unique among developed nations in its lack of universal healthcare coverage for its citizens. Its hybrid public-private system provides fragmented coverage that leaves millions of Americans (8% of the population) uninsured.<sup>1</sup> Mismatch between clinician

supply and patient demand is especially noted for specialty services and for patients in rural areas.<sup>2</sup> These coverage gaps exacerbate healthcare inequities that disproportionately affect certain populations such as patients who are elderly, living in rural areas, and people of color.<sup>1</sup> Telehealth, the use of technology to facilitate a remote medical encounter, holds promise as a way to bridge gaps in coverage for these

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medically underserved populations, moving the United States toward a healthcare system that provides access to timely, quality care for all people.

Prior to the COVID-19 pandemic, the adoption and expansion of telehealth faced barriers at the state and federal level due to several issues, including licensure laws that limited patient access to doctors across state lines, lack of coverage and payment parity for virtual versus in-person visits, restrictions on geographic location and originating site (eg, care from home), restrictions on oversight, and privacy concerns (ie, health insurance portability and accountability act (HIPAA)).<sup>3</sup> The CARES Act<sup>4</sup> added telehealth flexibilities that rapidly accelerated its utilization; however, most residency programs have not kept pace in evolving their curricula to include telehealth-specific training.<sup>5,6</sup> Given the potential of telehealth and this emerging field, it is important for the next generations of emergency physicians to be exposed to, trained in, and become comfortable with telehealth in their future practices.

## 2 | TRIAGE/PRE-HOSPITAL

Fifty-seven million people, or 18% of the US population, live in a rural community, and rural residents, on average, are more likely to be older, sicker, and poorer.<sup>7</sup> The closure of rural hospitals prolongs the time to definitive care by increasing emergency medical services (EMS) response and transport times, which contributes to patient morbidity and mortality (M&M).<sup>8</sup> There is an immediate need to support rural patients, especially those who have severely limited access to acute care services.

Prehospital EMS workers have been familiar with telehealth for many years with the regular use of radio and telephone communication used to connect with in-hospital physicians for direct medical oversight via online medical control. This workflow has been present since the 1970s when the federal government established a limited number of very high frequency (VHF) radio channels for communication between EMS workers in the field and the in-hospital base station.<sup>9</sup> While historical use has been primarily audio-only, tremendous potential exists for audiovisual technology to transform the current EMS delivery model. Literature to support video telehealth in EMS is dominated by tele-stroke and tele-mental health. Recently, however, there has been growing evidence of the safety and reliability of a video telehealth system outside these immediate domains.<sup>10</sup> Prehospital evaluation using telehealth can also extend to the triage of patients in locations such as urgent care, long-term care, and correctional facilities.

After emergency department (ED) arrival, tele-triage has the potential to improve ED throughput metrics by making use of remote emergency medicine (EM) physicians or advanced practice providers to place orders, either from home or within the hospital. This emerging field has grown due to the increased burdens on ED throughput including prolonged wait times, increased admission and boarding times, left without treatment completed, left without treatment, left without being seen (LWBS), and increasing time-to-provider. Several stud-

ies have demonstrated improved LWBS and time-to-provider using tele-triage, although limited in improving ED visit length.<sup>11,12</sup>

## 3 | DIRECT ACUTE UNSCHEDULED CARE

Telehealth visits consist of two major categories: provider-to-patient and provider-to-provider. A subset of provider-to-patient care is direct-to-consumer (DTC) models, which are most commonly used for acute unscheduled care. This consists of low-acuity patients, similar to those seen in urgent care. These are often done via two-way audio/video encounters but may be audio or chat-based only.

Provider-to-provider telehealth entails providing consultation services between practitioners. In-hospital telehealth for EM has primarily centered on provider-to-provider telehealth for remote specialty consultation. The addition of video has expanded consultation opportunities for specialties where visual assessment is critical, including but not limited to pediatrics, dermatology, neurology, orthopedics, and several other surgical specialties. An opportunity for EM includes emergency physician-to-emergency physician consultation, for example, remote patient management from a tertiary referral center to a rural hospital for determining risk, creating a plan of care and, if needed, coordinating transfer to a higher level of care.<sup>13</sup> These models have also demonstrated an educational component with improved rates of adherence to sepsis protocols, for example.<sup>14</sup>

## 4 | VIRTUAL OBSERVATION

Another emerging field is virtual observation and remote physiologic and therapeutic monitoring. Patients can be sent home to be monitored with devices that capture real-time health data, send that information to physicians, and set up follow-up telehealth visits. These programs aim to effectively create observation units at home and several are run by emergency departments.<sup>15,16</sup>

Despite the growing number of programs and care models, the development of standards, quality guidelines, and medical education remains a gap. Healthcare institutions should develop training that meets the scope of their telehealth offerings in order to ensure quality and provide a consistent patient experience.

## 5 | COMPETENCIES CREATED/DEFINED BY OTHER ORGANIZATIONS

Several sets of telehealth competencies have been put forth by academic telehealth groups. The first comprehensive overview, by Sharma et al. (2016),<sup>17</sup> categorized telehealth competencies into three domains: digital communication and webside manner (familiarity with the platform and optimizing body language and lighting), scope and standards of care (licensing, billing, HIPAA compliance), and the virtual interaction (environmental assessment and virtual physical examination). In 2021, Galpin et al. presented an expert consensus statement<sup>18</sup>

that expanded upon the domains of professionalism, ethics, patient safety, and access and equity.

This work served as the basis for “Telehealth Competencies Across the Learning Continuum” by the Association of American Medical Colleges (AAMC) in 2021,<sup>19</sup> a set of competencies specifically directed toward the medical student, resident or young faculty learner. The AAMC set of competencies is particularly well-suited as a framework for a residency training program, as it partitions the skill acquisition into discrete steps, ranging from the early learner stage (recent medical student graduate) to recent residency graduate, to attending physician 3–5 years in practice.

In 2021, the Accreditation Council for Graduate Medical Education (ACGME) named digital health as an Internal Medicine Milestone.<sup>20</sup> Telehealth has not yet been added to the EM milestones, but has been incorporated into the American Board of Emergency Medicine’s 2022 Model of Clinical Practice.<sup>21</sup>

Several recent articles have pointed to the lack of a required curriculum or competencies for residency programs and for practicing providers in the use of telehealth.<sup>22,23</sup> In response, some specialties have begun to develop curricula for telehealth for their residents.<sup>24,25</sup> The Society of Teachers for Family Medicine includes a five-part online module, with supplemental resources and videos.<sup>26</sup> An internal medicine program from the Medical University of South Carolina implemented a 3-year longitudinal curriculum consisting of didactics (mixed in-person and online) and clinical experience (monitoring patients with chronic diseases). Survey outcomes demonstrated increased resident ability to utilize telehealth and identify barriers to effective use.<sup>24</sup> Similarly, an ophthalmology program at Massachusetts Eye and Ear introduced residents to ophthalmic telehealth through didactic lectures, resulting in self-reported increase in confidence with and knowledge of telehealth.<sup>27</sup>

Most have functioned as electives rather than a fully integrated curriculum into EM residency training. More recently, a multispecialty group using a modified Delphi process published a consensus set of 34 telehealth competencies across specialties that mapped to the six ACGME core competencies.<sup>28</sup> Some notable examples include “Demonstrates ability to manage difficult patient situations via telemedicine” mapped to interpersonal and communication skills and “Demonstrate the ability to appropriately identify and help manage emergencies through local protocols, and determine the need for intervention in the telemedicine setting” mapped to patient care.<sup>19,28</sup>

A structured longitudinal EM curriculum incorporating these competencies into residency, however, has not yet been outlined. This paper presents the consensus of education and telehealth experts, with stakeholders from multiple national EM professional organizations of year-specific competencies in a PGY 1–3 or PGY 1–4 residency.

## 6 | OVERVIEW OF PROPOSED CURRICULUM

Telehealth section leadership from the American College of Emergency Physicians (ACEP) and telehealth experts from the Society of Academic Emergency Medicine (SAEM) were invited to participate

in the creation of a structured longitudinal EM curriculum via expert consensus. The group included education leaders and subject matter experts in telehealth as evidenced by prior leadership roles in telehealth fellowship program development, federal funding in telehealth research, and telehealth book authorship.

This curriculum, approved by the boards of ACEP and SAEM, is framed with goals based on the ACGME core competencies (Table 1) as well as through post-graduate year-specific recommendations (Table 2), similar to how an observation medicine curriculum was previously outlined.<sup>29</sup>

Optimal methods for educating EM residents on telehealth have not been published. Through the 2020 Society for Academic Emergency Medicine’s annual consensus conference, experts in EM and telehealth made recommendations on various aspects of telehealth and created a research agenda for telehealth.<sup>30</sup> The consensus regarding formal telehealth education was that it should include both didactics and experiential, longitudinal learning. Additionally, it was noted that the training content should include technical knowledge, as this has been cited as a key barrier to utilization.<sup>31</sup> In designing the telehealth curriculum, we followed the consensus conference recommendations while adding asynchronous learning, a third method included by the authors of the model observation medicine curriculum<sup>29</sup> as well as a quality assurance component.

Lectures are included as a component of our curriculum since they provide a straightforward approach to disseminating knowledge and are a recommended best practice for didactics in EM resident education.<sup>32</sup> Given the breadth of topics encompassing telehealth, we believe implementing didactics via a longitudinal curriculum should solidify fundamental principles while also introducing more complex applications as learners progress in their training and gain more practical experience in telehealth patient encounters.

Furthermore, regular review of telehealth patient encounters in the traditional M&M format has the potential to identify both best practices and unique pitfalls associated with patient care delivery using this technology. The examination of clinical cases in a collective, non-punitive setting is consistent with the ethos of traditional M&M conferences. These have evolved to become integral to the medical residency curriculum and are recommended as an element of didactics by the Accreditation Council for Graduate Medical Education (ACGME).<sup>33</sup> Telemedicine M&M should maintain fidelity to the best practices established for conventional M&M, including a comprehensive case analysis that focuses on systemic enhancements and provider education, a blend of structured presentations and facilitated discussion, and the fostering of a non-punitive culture committed to safety and continuous learning.<sup>34</sup> Likewise, journal review is an ACGME accreditation requirement and a standard curricular component of EM residency programs and regular review of original research addressing telehealth-related topics will further enhance learning.

Longitudinal quality assurance is another key element of the telehealth curriculum, composed of elements such as participation in chart review, case review with faculty, peer review, and patient follow-up. Retrospective care assessments are a way to identify diagnostic

**TABLE 1** Example of telehealth curriculum core competency goals.**Patient care (PC)**

The resident should convey digital empathy in their interactions with patients, demonstrating an understanding of the patient's needs and effectively communicating this understanding to patients. The resident should know the limits of telehealth for each complaint and patient and be able to choose the appropriate telehealth tool for a clinical context. The resident should demonstrate appropriate utilization of telehealth systems, including referral to a higher or lateral level of care when appropriate including referral to in-person care. The resident should be trained to respond to medical emergencies that may occur during the virtual encounter.

**Medical knowledge (MK)**

The resident should identify patient presentations that are appropriate for a telehealth visit and effectively triage patients presenting for virtual care. Residents should perform telehealth physical examinations, order accessible and appropriate diagnostic tests, and develop treatment plans that can be effectively carried out in the telehealth setting.

**Technical knowledge (TK)**

The resident should be familiar with the medical system's frequently used telehealth platforms. The resident should have sufficient technical knowledge, so that the patient and resident can effectively conduct an examination, including troubleshooting basic technical challenges (i.e., issues with internet connectivity, sound, and lighting), leverage interpreter services, and utilize remote devices such as virtual stethoscopes.

**Interpersonal communications (IC)**

The resident should demonstrate proficient communication over telehealth using best practice principles. The resident should be aware of verbal and nonverbal cues (eye contact, posture, hand gestures, tone, and speed of language) that may enhance or diminish the patient care experience. The resident should be able to engage with family members and care partners who may be in a three-way call encounter. The resident should select the appropriate means and timing of communication with other members of the health care team in the event of transition of care, referral, or implementation of follow-up plan.

**Practice-based learning and improvement (PBL)**

The resident should engage in self-assessment after telehealth interactions to drive informed practice changes. The resident should demonstrate adjustments to the physical examination and workups that are in line with the best available evidence for telehealth care. The resident should have a basic understanding of the literature that informs tele-emergency care. Residents should also follow up on a subset of patients to help guide future encounters.

**Professionalism (P)**

The resident should ensure that the patient visit occurs in a secure and private setting. The resident should display respect for the patient for the duration of the telehealth encounter, through professional dress, minimization of wait time and distractions, and attention to cultural needs. The resident should write orders and complete medical documentation in a timely manner.

**System-based practice (SBP)**

The resident will demonstrate proficiency in telehealth utilization across the continuum of services under the emergency medicine umbrella and adapt to advances in the context of the healthcare system. The resident will demonstrate proficiency in the virtual evaluation of patients in the pre-hospital (Emergency Medical Services), acute care (ED), observation, and post-acute care follow-up landscape. The resident will understand how telehealth fits into a larger strategy of reducing the volume of patients at points of in-person care delivery and optimizing system resources for patient needs.

errors and errors in thought processes. Chart audits and feedback can affect resident compliance with standard of care guidelines and improve clinical performance.<sup>35</sup> Not only are chart review and chart audit methodologies important to ensure proper documentation from a clinical perspective, but also from a regulatory compliance, billing, and medico-legal perspective.

Mirroring the design of the ACGME Emergency Medicine milestones which, in part, were developed to describe progressive expectations, we incorporated increasing responsibility into our telehealth experiential curriculum, for example, PGY 1 and 2 residents should participate in direct telehealth care, while PGY 3 residents should manage telehealth visits with minimal faculty oversight.<sup>36</sup>

As is good practice in all clinical medicine, didactic learning should be complemented by experiential learning. While many components of telehealth care mirror those of in-person care (e.g., obtaining a history and medical decision-making), others are modified (eg, performing a physical examination, digital empathy,<sup>37</sup> and discussing follow-up options). Emergency physicians should familiarize themselves with commonly used telehealth platforms, such as those supporting

tele-consult (e.g., telestroke), on-demand urgent care, and post-ED discharge follow-up. They should also be able to evaluate said platforms to be effectively utilized in acute unscheduled care settings. Folded into experiential learning is the ability to aid the patient in troubleshooting technology issues, establish good "webside manner", and escalation to in-person care as appropriate. Telehealth documentation may entail unique features such as an assessment of the patient's environment for safety concerns and an assessment of whether the patient is an appropriate telehealth candidate.

Finally, our curriculum includes asynchronous components allowing the resident to gain knowledge of telehealth outside of the traditional group-based lectures. We included asynchronous learning as its effectiveness in residency education has been demonstrated in the literature and is accepted by the ACGME for up to 20% of a residency's planned didactic experiences.<sup>33,38</sup>

The type of instruction for telehealth-based care will vary depending on the type of EM setting it is used in. In triage-based telehealth uses such as pre-hospital care and tele-triage for long-term acute care facilities, the telehealth interaction typically facilitates decisions about

**TABLE 2** Model curriculum.

PGY1 curriculum	PGY2 curriculum	PGY3/PGY4 curriculum
Attend introductory didactic lectures on telehealth	Attend didactic lectures on telehealth topics	Review key literature regarding telehealth and related topics
Review telehealth educational materials/protocols provided by the residency program	Continue to review key telehealth literature	Participate in telehealth morbidity and mortality conferences
Participate in direct patient care of the telehealth patient	Participate in direct patient care of the telehealth patient	Participate in quality assurance meetings of telehealth
Review telehealth cases with faculty	Follow up on individual telehealth cases	Participate in chart reviews of telehealth patients
Follow-up on individual telehealth cases	Engage in one-on-one meetings and case reviews with telehealth faculty	Manage telehealth visits with limited faculty oversight
Participate in morbidity and mortality reviews of telehealth cases	Further learn and develop the skills needed to successfully manage a telehealth service	Optional: Complete a telehealth-related research topic, scholarly project, or presentation
Review telehealth literature (including presenting at a Journal Club)	Participate in peer review audits, return visit audits, and telehealth complaint reviews	Optional: Attend and participate in telehealth section meetings at regional and national specialty meetings
Explore telehealth interest groups/section websites	Increase participation and exposure to telehealth through websites, and interest groups at regional/national meetings	
	Optional: Begin or continue telehealth-related research topic, scholarly project, or presentation	

interventions and appropriate level of care for the patient. This may be presented as a didactic, a review of protocols, or case-based training.

Direct acute unscheduled care has unique interactive features that should be explicitly taught to trainees such as digital empathy, creating a safe and private virtual environment, and understanding of limitations and advantages of a virtual modality.<sup>39</sup> The distinct approach to the telehealth examination can be reviewed in didactics and then executed in simulated practice.<sup>40,41</sup> Furthermore, trainees should be formally educated on equity concerns related to telehealth to acknowledge its limitations in some patient populations and address technology barriers.<sup>42</sup> Direct acute unscheduled care should be practiced in a simulated encounter early on in training, then later as supervised clinical training with the attending either directly observing the encounter or receiving a case presentation.

Similarly, out-of-ED observation such as post-ED follow-up and remote home monitoring can be conducted with direct and indirect attending supervision. A knowledge of the technological tools and testing options available would need to be integrated into a didactic or asynchronous format so that trainees could in turn educate their patients.

## 7 | ASSESSMENT/EVALUATION

While there is not a standardized assessment tool for EM telehealth, previously existing clinical assessment tools may be adapted for the variety of EM telehealth settings that exist.<sup>43</sup> For example, the Objective Structured Clinical Exam is highly structured and objective, with

high inter-rater reliability and correlation to clerkship scores.<sup>44–46</sup> A similar model can be adapted with an additional focus on the use of technology and communication in the virtual setting for medical student learners who may ultimately participate in teletriage or direct acute unscheduled care. In the residency setting, direct observation is the core of entrustment and assessment.<sup>47</sup> Tools should be based on observation of clinical engagement with real patients using telehealth by supervisors who understand and model telehealth competencies in their practice. Noronha et al. proposed specific observation tools for medical students, residents, and faculty based on the AAMC competency domains. These excellent modules should be specifically adapted for the various EM telehealth models to assess trainee performance. In many settings, this may require a specific focus on faculty training in both the clinical skills and assessment of telehealth encounters.<sup>39</sup>

Finally, an assessment of communication skills and utilization of technology may be reasonable to obtain from the patient, who is on the receiving end of the telehealth trainee. A systematic review of telehealth survey instruments revealed 12 communication instruments.<sup>48</sup> A quarter focused on technology alone and one-third examined the quality of human interaction and communication, which can be modified and implemented as a patient-generated source of assessment data.

## 8 | CONCLUSION

Telehealth is becoming an important part of the practice of EM and residency programs need a structured curriculum to ensure that residents

are prepared for this work. As EM has grown as a specialty and incorporated new practice domains such as ultrasound, observation medicine, and disaster medicine, residency programs have adapted their curricula to ensure competency in these new domains. As telehealth joins the ranks of emerging EM competencies, the proposed curriculum can serve as a framework for incorporating telehealth training into existing medical systems and residency training programs.

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