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Perspective

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Electronic personal protective equipment: A strategy to protect emergency department providers in the age of COVID-19

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ABSTRACT

Emergent policy changes related to telemedicine and the Emergency Medical Treatment and Labor Act during the novel coronavirus disease 2019 (COVID-19) pandemic have created opportunities for technology-based clinical evaluation, which serves to conserve personal protective equipment (PPE) and protect emergency providers. We define electronic PPE as an approach using telemedicine tools to perform electronic medical screening exams while satisfying the Emergency Medical Treatment and Labor Act. We discuss the safety, legal, and technical factors necessary for implementing such a pathway. This approach has the potential to conserve PPE and protect providers while maintaining safe standards for medical screening exams in the emergency department for low-risk patients in whom COVID-19 is suspected.

Key words: personal protective equipment, telemedicine, telehealth, emergency medicine, medical screening exam, EMTALA

INTRODUCTION

The novel coronavirus, severe acute respiratory syndrome coronavirus 2, and associated respiratory illness, coronavirus disease 2019 (COVID-19), have put unprecedented strain on the U.S. healthcare system and its supply of personal protective equipment (PPE).[1–4] The Centers for Disease Control and Prevention has provided strategies for conserving PPE.[5] Despite these measures, PPE shortages are expected in many regions.[6]

Telemedicine offerings are rapidly expanding, spurred by waivers expediting telemedicine credentialing and billing for most U.S. providers[7] while relaxing device certification requirements.[8] As of March 30, 2020, these include emergency evaluation and management codes.[9] These measures do not address on-site emergency providers, who are governed by the Emergency Medical Treatment and Labor Act (EMTALA) and must complete legally defined medical screening exams (MSEs). A Centers for Medicare and Medicaid Services (CMS) waiver released on March 30 allows for MSEs to be performed using telehealth equipment during the pandemic.[10]

This policy shift presents an opportunity for the use of electronic PPE (ePPE) to facilitate on-site emergency department (ED) MSEs without physical contact. This represents a novel strategy to maintain patient access to emergency evaluation and treatment while keeping providers safe and conserving PPE.

In this article, we define ePPE; evaluate telemedicine tools as a medium for ePPE; and discuss safety, legal, and documentation considerations.

DEFINING EPPE

ePPE consists of telemedicine tools used by on-site emergency providers to evaluate patients physically in the ED to avoid physical proximity. Although ePPE toolkits overlap with telemedicine toolkits, ePPE is not telemedicine. We make this distinction because, unlike telemedicine, the provider is immediately available on site to physically examine or resuscitate the patient if screening warrants such action. We liken this approach to the use of 2-way phones on opposite sides of glass windows as used in banks and prisons. Instead of glass and phones, we advocate for tablets in environments in which physical construction of such barriers is not feasible. As described subsequently, this approach can fulfill EMTALA obligations for MSEs.

TELEMEDICINE TOOLS AS A MEDIUM TO DELIVER EPPE

While we assert that ePPE within physical EDs is distinct from telemedicine, ePPE's use will be subject to similar technical limitations as traditional telemedicine. The only significant difference is the immediate availability of the provider if the patient is sicker than anticipated. Therefore, we use prior literature from telemedicine to consider the safety implications of ePPE-based evaluations.

Some hospitals have studied the feasibility of emergency telemedicine to keep healthy patients with minor complaints out of the ED with optimistic outcomes.[11] A systematic review of emergency telemedicine found that it is effective for minor, low-acuity situations and for consultations.[12] However, these studies are lacking in rigorous methodology.

To date, we are aware of only 1 U.S.-based trial evaluating telemedicine tools to perform MSEs, followed by in-person visits.[13] They limited screening to English-speaking patients with triage acuity levels 3-5 (i.e., urgent to nonurgent).[14] At their academic medical center, they screened 5 patients/h and reduced their left without being seen rate. These data, while limited and not fully generalizable to the current situation, suggest that technology-based screening could improve timeliness of care in addition to protecting staff. We are unaware of any trials of MSEs performed by on-site providers using ePPE exclusively.

The March 30 addition of emergency evaluation and management codes during the pandemic may provide opportunities to widen the scope for and facilitate the study of emergency telemedicine.[9]

SAFETY CONSIDERATIONS OF EPPE

Telemedicine tools have been used safely in other settings. Telemedicine-based history and examination is reliable in the outpatient setting, and has been shown to be effective in diagnosing respiratory illness in children.[15–18] One frequently raised concern is the difficulty of telemedicine-based auscultation without using remote digital stethoscopes. Auscultation of the lungs has been shown to have poor test characteristics for detecting pneumonia as compared with tachypnea, accessory muscle use, and overall clinical impression.[19–22] Work of breathing assessed via videoconferencing serves as adequate respiratory examination in young, otherwise healthy patients without comorbid heart or lung disease.[17] We believe the benefits of forgoing auscultation during ePPE-based MSE far outweigh the risk, given the pressing need to preserve PPE and minimize viral exposure. Greenhalgh et al[23] from the United Kingdom have proposed a structured telemedicine exam for respiratory complaints that is ideal for the described situation.

To minimize risk, we recommend performing MSEs using ePPE on low-risk patients (i.e., 4 [less urgent] to 5 [nonurgent]) with reassuring vital signs, few comorbidities, and chief complaints suggesting lower respiratory infection (fever, cough, shortness of breath).

LEGAL CONSIDERATIONS

This section provides a review of federal laws as they relate to ePPE-based MSEs. There are standard of care and legal considerations that vary regionally. Consult legal counsel before implementing this practice.

EMTALA was passed as part of the Social Security Act in 1986 by Congress to ensure public access to emergency services, regardless of ability to pay.[24] EMTALA defines the medical screening obligations of hospitals with dedicated EDs and of freestanding EDs. Financial penalties for EMTALA violations are substantial.[25] Central to EMTALA is the notion of an MSE, which is intended to evaluate for the presence of emergency medical conditions and facilitate resuscitation and treatment related to them. The definition of an MSE is broad and articulated by CMS's EMTALA interpretive guidelines:[26]

> *Depending on the individual's presenting signs and symptoms, an appropriate MSE can involve a wide spectrum of actions, ranging from a simple process involving only a brief history and physical examination to a complex process that also involves performing ancillary studies and procedures. . .If a hospital applies in a nondiscriminatory manner (i.e., a different level of care must not exist based on payment status, race, national origin, etc.) a screening process that is reasonably calculated to determine whether an EMC exists, it has met its obligations under EMTALA. If the MSE is appropriate and does not reveal an EMC, the hospital has no further obligation under 42 CFR 489.24.*

Generally, EMTALA protects patients, but its role in emergency telemedicine is still evolving. Prior literature has discussed the implications of EMTALA in general[26–29] and for off-site emergency telemedicine.[30] Widely available pathways for ED-based telemedicine have not been established, with the notable exception of critical access hospitals.[31]

There is little published historically on whether an ePPE-based MSE would qualify, though CMS guidance in anticipation of an Ebola outbreak in 2015 suggests that in highly infectious environments, MSEs could be performed via electronic means:[32]

> *The use of audio, video and other telehealth equipment by an on-site physician to perform medical screening examinations is not specifically prohibited under EMTALA. However, the hospital is still obligated to perform an appropriate medical screening examination to determine the presence or absence of an emergency medical condition. In investigating any complaints related to this, the appropriateness of an examination using this type of equipment would be determined based on the specific facts of each individual case, including the clinical signs and symptoms of the individual at the time of presentation. If an in-person or hands-on examination is necessary, use of equipment alone would not meet the EMTALA requirements for an appropriate screening examination.*

Within this context, we propose that MSEs facilitated by electronic means in which both clinician and patient are physically present within the ED, but in separate rooms, would allow for rapid and effective evaluation while putting neither patient nor clinician at infectious risk and conserving physical PPE for sicker patients. Supporting this notion, the March 30 CMS update to EMTALA enforcement allowing on- and off-site MSEs by qualified medical personnel using telemedicine[10]:

> *Hospitals may use telehealth equipment to perform the MSE by Qualified Medical Personnel (QMP). The QMP may be on-campus (and using telehealth to self-contain) or offsite (due to staffing shortages). Either way, the QMP must be performing within the scope of their state practice act, and approved by the Hospital's Governing Body to perform MSEs.*

TECHNICAL APPROACH

Workflow integration

As with any technical project, workflow considerations are as important as technical decisions. Therefore, we do not recommend modifying triage processes (beyond baseline changes necessary for avoiding ED contamination during the pandemic) in order to ensure that critical patients obtain timely traditional care.

There are many locations where an MSE via ePPE could be performed, including an isolated waiting room for respiratory patients or within the triage station itself. The initial provider, usually the triage nurse, is best suited to determine appropriateness for ePPE and to initiate communications based on their evaluation. This provider would then notify the EMTALA-qualified medical provider, confirm availability for ePPE-based evaluation, and establish a connection. After connecting, the triage staff could provide the patient's name and birthday to initiate the call. The MSE-performing clinician will verify the medical record number for a "2-way handshake" to confirm identity. A streamlined electronic health record–based note could be completed in real time. This note would include documentation of the use of ePPE for tracking and future study.

Based on our review of EMTALA-related precedent and recent waivers relaxing software requirements, this ePPE-based exam for low-risk patients meets the requirements as an MSE. Laboratory testing for infectious diseases such as COVID-19 and influenza can be ordered based on this examination, and if the patient is deemed appropriate for discharge based on evaluation, any vital signs performed, and institutional protocols, they could be discharged at this point. If the provider determines that a more in-depth physical exam is needed or the patient requires additional testing or treatment, the ePPE-based visit can progress to a traditional ED visit.

InDoc solutions (Southlake, TX), a telehealth consulting firm for emergency medicine and primary care, has proposed several additional approaches to implementation of ePPE-based telescreening.[33]

Device selection

Given the need for rapid deployment in the setting of the ongoing pandemic from severe acute respiratory syndrome coronavirus 2, we recommend looking to existing, well-used, and flexible ePPE platforms.

Historically, telemedicine requires Health Insurance Portability and Accountability Act–certified software, which is complex and expensive to obtain. A Notification of Enforcement Discretion made by the Department of Health and Human Services and the Office for Human Rights lifted historical restrictions from the Health Insurance Portability and Accountability Act requiring certified telemedicine software.[8] Specifically, they allowed the use of more readily accessible software to facilitate patient care (eg, FaceTime [Apple Inc, Cupertino, CA] or Skype [Microsoft Corp, Redmond, WA]) as long as used in good faith and with every practical effort made to protect patient privacy.

The Department of Veterans Affairs has an extensive record of standardized use of iPads (Apple Inc) and a customized mobile "Telestroke Stand" with an attached speaker, a basket, and mobile integrated charger.[34] There are number of additional commercial options available as well. The provider can use either a compatible mobile phone or tablet device based on availability and ergonomics.

We strongly recommend using an application that is well known to staff and using end-to-end encryption—current options include FaceTime (Apple Inc), Skype (Microsoft Corp), or Zoom (Zoom Video Communications Inc, San Jose, CA). If our recommendations are implemented, it should be noted that features change frequently, so it is important to evaluate candidate applications for adequate security. Additionally, we encourage consultation with local information technology teams to ensure adherence to network and device security standards.

DOCUMENTATION CONSIDERATIONS

There is not clear precedent for ePPE-based encounter documentation and billing. We recommend using a streamlined electronic health record–based note to facilitate documentation, guided by local information technology standards. We recommend expedited review by compliance committees for adherence to local policy. We also recommend documenting within the medical record that an MSE was performed using ePPE.

The Supplementary Appendix contains an example note template that we constructed for use with COVID-19–suspected patients in our external respiratory fast track using our electronic health record (Epic Systems, Verona, WI). Local coding and billing standards vary, and collaboration with clinical leaders and coding staff will be essential to successful deployment.

The March 30 addition of emergency evaluation and management codes during the pandemic combined with the March 30 EMTALA waiver may provide opportunities for off-site MSEs and associated documentation, though this is out of the scope of this article.[9,10]

CONCLUSION

We recommend using ePPE to protect staff and conserve PPE while providing rapid access to emergency care and fulfilling EMTALA obligations for low-risk patients during the coronavirus pandemic. ePPE has potential applicability to settings such as emergency medical services, medical wards, and intensive care units, where ePPE may facilitate more frequent patient contact while reducing staff exposure and conserving PPE.

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AUTHOR CONTRIBUTIONS

RWT was the primary author responsible for designing the proposal, drafting the manuscript, and organizing the authorship team. IJ facilitated compliance and legal review, and contributed substantially to the design of the manuscript. STR provided informatics-specific expertise and contributed substantially to the editing of the manuscript. CS provided operational supervision for the project's design and contributed substantially to the editing of the manuscript. MJW was the primary advisor of the study, was deeply involved in the conception and design of the proposal and operational plan, and contributed substantially to the editing of the manuscript.

SUPPLEMENTARY MATERIAL

Supplementary material is available at *Journal of the American Medical Informatics Association* online.

CONFLICT OF INTEREST

None declared.

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