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.6–8

Telemedicine offerings are rapidly expanding, spurred by waivers expediting telemedicine credentialing and billing for most U.S. providers7 while relaxing device certification requirements.8 As of March 30, 2020, these include emergency evaluation and management codes.7 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. A systematic review of emergency telemedicine found that it is effective for minor, low-acuity situations and for consultations. 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. They limited screening to English-speaking patients with triage acuity levels 3-5 (i.e., urgent to nonurgent). 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.

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. 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. Work of breathing assessed via videoconferencing serves as adequate respiratory examination in young, otherwise healthy patients without comorbid heart or lung disease. 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 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. EMTALA defines the medical screening obligations of hospitals with dedicated EDs and of freestanding EDs. Financial penalties for EMTALA violations are substantial. 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:

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 non-discriminatory 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 and for off-site emergency telemedicine. Widely available pathways for ED-based telemedicine have not been established, with the notable exception of critical access hospitals.

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.
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 telemedicine10:

“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.

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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