

ORIGINAL RESEARCH

Emergency Medical Services

# State emergency medical services guidance and protocol changes in response to the COVID-19 pandemic: A national investigation

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## Abstract

**Objectives:** The COVID-19 pandemic has had an impact on emergency medical services (EMS) and its guidelines, which aid in patient care. This study characterizes state and territory EMS office recommendations to EMS statewide operational and clinical guidelines and describes the mechanisms of distribution and implementation during the COVID-19 pandemic.

**Methods:** A mixed-methods study was conducted in 2 phases. In phase 1, changes and development of COVID-19 guidance and protocols for EMS clinical management and operations were identified among 50 states, the District of Columbia, and 5 territories in publicly available online documents and information. In phase 2, structured interviews were conducted with state/territory EMS officials to confirm the protocol changes or guidance and assess dissemination and implementation strategies for COVID-19.

**Results:** In phase 1, publicly available online documents for 52 states/territories regarding EMS protocols and COVID-19 guidance were identified and reviewed. Of

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52 (33/52) states/territories, 33 had either formal protocol changes or specific guidance for the pandemic. In phase 2, 2 state and territory EMS officials were interviewed regarding their protocols or guidance for COVID-19 and the dissemination and implementation practices they used to reach EMS agencies (response rate = 65%). Of the 34 state/territory officials interviewed, 22 had publicly available online COVID-19 protocols or guidance. Of the 22 officials with online COVID-19 protocols, all reported providing operational direction, and 19 of 22 officials reported providing clinical direction.

**Conclusions:** Most states provided guidance to EMS agencies and/or updated protocols in response to the COVID-19 pandemic.

**KEYWORDS**

COVID-19, dissemination, EMS, guidance, implementation, pandemic, protocol, statewide

## 1 | INTRODUCTION

### 1.1 | Background

In 2020, the COVID-19 global pandemic had an astronomical impact on patients, clinicians, and healthcare systems.<sup>1-3</sup> As of January 5, 2022, the United States reported 56 million total cases and close to 828,000 deaths.<sup>2,3</sup> The COVID-19 pandemic in particular posed significant burdens on US emergency medical services (EMS) agencies and systems. EMS clinicians operate in an unpredictable environment and typically encounter patients in their homes where exposure to COVID-19 is very different and potentially greater than in healthcare settings.<sup>4</sup>

In response to the COVID-19 pandemic, EMS leadership across the nation had to consider whether changes needed to be made to standard EMS operating procedures and clinical treatment guidelines. Some of the many operational considerations that required attention included the risk of nosocomial spread of COVID-19 from aerosol-generating procedures (eg, intubation or administration of nebulized medications) and shortages of personal protective equipment (PPE).

The Centers for Disease Control and Prevention (CDC) released initial COVID-19 guidance for EMS in February 2020. Several updates were since released. A July 2020 update included EMS recommendations for infection control practices during both routine patient care activities and care for patients with suspected COVID-19 infection.<sup>5</sup> The CDC guidance suggested universal use of PPE for healthcare workers in communities with moderate to sustained transmission and the creation of processes to respond to COVID-19 exposures among healthcare personnel.<sup>5</sup>

### 1.2 | Importance

Although COVID-19 guidance is widely promulgated, it is not clear to what extent statewide EMS systems adopted the CDC's recommendations or whether they made their own modifications to clinical and operational guidance.

### 1.3 | Goals of this investigation

The objective of this study is to characterize the number, extent, and content of modifications made to state-level EMS clinical practice and operational guidelines in response to the COVID-19 pandemic. This study lays the foundation for understanding the dissemination and implementation of pandemic or disaster-related changes to protocols or guidelines and helps prepare for future emergency and disaster responses.

## 2 | METHODS

### 2.1 | Study design and setting

This was a mixed-methods study consisting of 2 phases: a cross-sectional quantitative assessment followed by qualitative semistructured interviews. Both approaches were directed at identifying the number, extent, and content of modifications made to state-level EMS clinical practice and operational guidelines in response to the COVID-19 pandemic. In the United States, EMS regulation is decentralized to the state and territory level; some states issue statewide guidance, whereas others do not.<sup>6</sup> The provision of COVID-19 guidance was defined as any type of recommendation provided by states or territories in response to the COVID-19 pandemic. Protocols were defined as formal changes to the state EMS protocols, whereas guidance was defined as communication of best practice without formal protocol changes. This study was determined to be exempt from human subjects review by the Yale University Institutional Review Board on June 4, 2020.

Phase 1 was a nationwide cross-sectional review of publicly available online state-level EMS protocols and guidelines. The study team used this review to identify both changes made to current policies and procedures and newly created guidance in response to COVID-19. The study team reviewed state governmental websites for all 50 US states, the District of Columbia, and 5 US territories (Guam, Commonwealth of the Northern Mariana Islands, Puerto Rico, American

Samoa, US Virgin Islands) to identify jurisdictions that had mandatory or recommended statewide EMS guidelines. Delegated practice and non-delegated practice states were approached with similar methods. Phase 1 started on July 3, 2020, and it was completed on September 9, 2020.

The result of this review was the compilation of publicly available state protocols and guidance, which were uploaded to our project planning website. This information was made available for all study team members to review using a document review rubric that was developed by our study team (see the Supplement). When state-level documents were found, the study team used the rubric to review those documents and determine what, if any, COVID-specific changes were made. A priori topic areas of interest that were specifically evaluated included PPE, non-transport of patients, management of respiratory distress, personnel exposure management, and modification of disease-specific protocols or guidance (eg, resuscitation, termination of efforts). An additional topic of interest included whether each state had mandatory or recommended state-level protocols.

Each study team member was assigned up to 5 states to research, identify, and compile pertinent publicly available online documents and upload them to the project management website. Study team members then reviewed the documents using the rubric and abstracted data into a study data compilation spreadsheet (Microsoft Excel). Each topic area of interest in the reviewed documents was recorded in the study spreadsheet in a binary (yes/no) format.

In September 2020, emails were sent to state EMS contacts to request website links for states and territories with difficult to access publicly available EMS information. Emails and phone calls to request updated documents were also made to state agencies that did not have protocol and interim guidance publicly available as of September 2020. In cases where multiple documents were released by a state or territory during our study period, the most recent versions of protocols and guidance were used for our document review.

## 2.2 | Selection of participants

In phase 2, the study team conducted semistructured telephone interviews of state EMS officials using a standardized survey tool (Qualtrics online survey software). Using a predeveloped telephone script, interviews were conducted between September 3, 2020, and November 23, 2020. Interview data were entered into a database (Qualtrics). All 56 state/territory EMS offices were contacted and invited to participate in the interviews regardless of whether they had mandatory EMS protocols or recommended statewide EMS guidelines. The telephone interview tool included questions concerning guidance and protocol revision(s) distributed by the state and how the state EMS offices communicated those revisions to EMS agencies and individual clinicians ([Appendix](#)).

## 2.3 | Intervention and study team roles

Every member of the study team was involved in conducting the surveys. The study team was composed predominantly of physicians (S.O.,

### The Bottom Line

In a study of emergency medical services (EMS) offices in 50 US states, the District of Columbia, and 5 territories, the authors found that nearly all offices provided guidance to EMS agencies and/or updated protocols in response to the COVID-19 pandemic, with alterations in dispatch and non-transport practices being the most common topics. Of note, there was large variability in the development and dissemination of COVID-19-related guidance to EMS agencies.

M.H., J.N.F., K.A., Ash. P., J.L., A.C., P.H., M.X.C.) in addition to a medical student (K.M.), a state public health employee (A.P.), and a member of the National Association of State EMS Officials (R.A.). A total of 2 study team members (M.X.C., R.A.) had expertise and experience in survey tool design and development and aided in development of the Qualtrics survey tool. To provide information and insight related to COVID-19 EMS guidance, all interview participants were state or territory EMS officials.

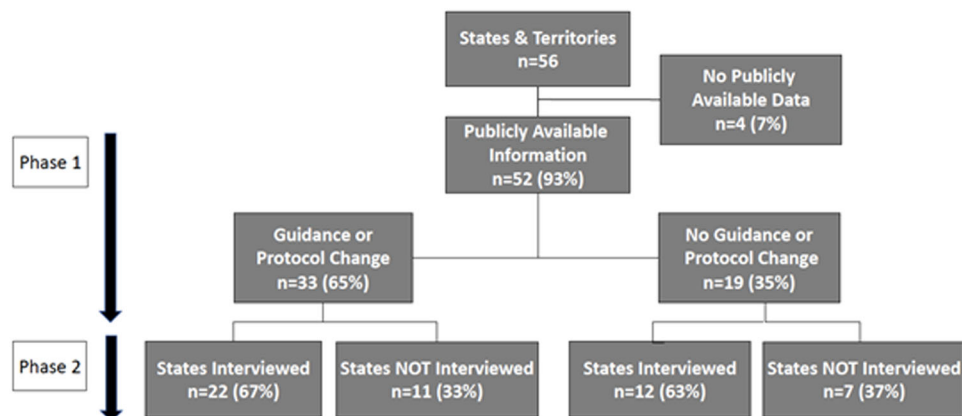
## 2.4 | Measurements

Initially, the study team divided states and territories evenly among the study team members, which averaged to 5 states/territories each. Study team members were assigned to states where they resided, were familiar with EMS protocols and guidelines, and/or had professional relationships or affiliations with the EMS officials. To maximize survey participation, we conducted 3 rounds of outreach to state EMS officials. Each study team member was assigned state/territory EMS offices to schedule interviews with either the state EMS director, the state EMS medical director, or other knowledgeable state EMS office staff.

During the interviews, state EMS officials were asked to verify whether their state had mandatory EMS protocols or recommended guidance, and whether COVID-19 prompted their state/territory to issue COVID-19-specific guidance or make changes to clinical or operational protocols. If state-level guidance or protocols were changed, EMS officials were asked how they disseminated and communicated that information to EMS agencies and clinicians. Interviews were not repeated, recorded, or transcribed; rather, the study team completed the survey and took notes during the interview process, with all data recorded in the Qualtrics tool. Once telephone surveys were completed, an analysis of all interview results was performed to identify the presence of potential themes that might exist across jurisdictions.

## 2.5 | Outcomes

Our primary outcome was to determine how many states/territories had either formal protocol changes or specific operational and



**FIGURE 1** Flow diagram of states and territories included in phases 1 and 2. Of the states, 63% had COVID-19 emergency medical services protocols in place (33/52). This includes states that may not have written their own protocols but directly referenced the Centers for Disease Control and Prevention emergency medical services protocols as recommendations. One change was made with verification

clinical guidance for the pandemic through publicly available online data, as noted in phase 1. Publicly available state protocols and guidance were compiled on the project website. A total of 2 study team members reviewed each document and determined if formal COVID-19 protocol changes or guidance had been issued. Data from phase 2 complemented protocol and guidance information. Descriptive counts and percentages were calculated to describe the prevalence of guidance and protocol change content. The secondary outcomes included determining if having preexisting statewide general EMS protocols was associated with issuing statewide COVID-19 protocols or guidance and assessing dissemination and implementation strategies for COVID-19 protocols or guidance.

## 2.6 | Data analysis

States and territories were stratified by those that did and did not offer clinical and operational guidance during the pandemic to compare population characteristics. Comparative statistics (Fisher's exact test) were performed between states with and without mandatory or recommended statewide EMS guidelines. All statistical analyses were performed using Stata statistical software (version 16.1; StataCorp).

## 3 | RESULTS

### 3.1 | Publicly available online COVID-19 guidance (phase 1)

Publicly available online documents for 52 states/territories regarding EMS protocols and COVID-19 guidance were reviewed. Among those states and territories, 33/52 (64%) issued either formal protocol changes or specific guidance for the pandemic (Figure 1).

The geographic distribution of the states with publicly available online documents is shown in Figure 2.

There was no association between having preexisting statewide general EMS protocols or guidance and the likelihood of having COVID-19-specific protocols guidance available to the EMS agencies. Among the 27 states with statewide general EMS protocols, 20 (74%) provided COVID-19 guidance, whereas among states with no statewide protocols, 13/25 (52%) issued EMS COVID-19 guidance ( $P = 0.150$ ).

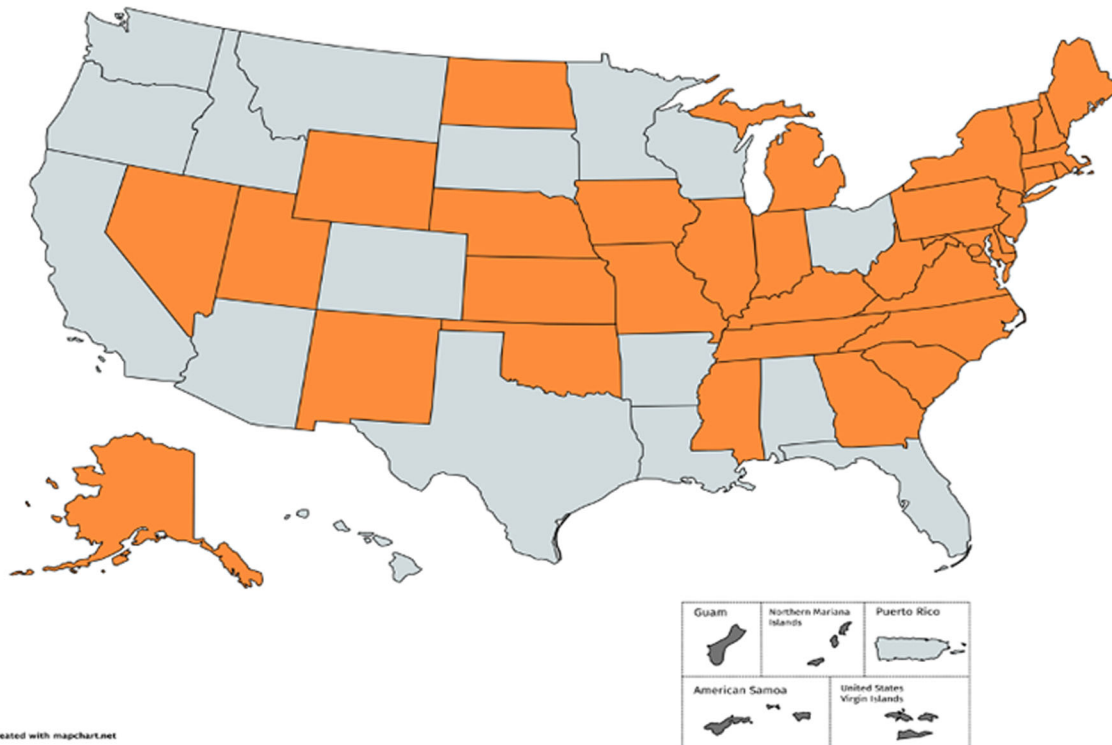
Many states issued changes in operational or clinical care recommendations independent of formal COVID-19 guidance; however, states with COVID-19 guidance were more likely to provide specific information regarding dispatch, PPE recommendations, and aerosolizing procedures (Table 1).

Of those states and territories that provided any form of COVID-19 guidance, 16/33 (48%) referenced national CDC recommendations, which, at the time of data collection, was limited to dispatch, aerosolizing procedures, PPE, and EMS personnel COVID-19 exposure. No guidance on specific clinical conditions, such as termination of resuscitation, was available from the CDC during our study period.

### 3.2 | State EMS officials' interviews (phase 2)

A total of 34 states and territories EMS officials were interviewed regarding their protocols or guidelines for COVID-19 and the dissemination and implementation practices they used to reach EMS agencies (response rate = 65%). Of those 33 states from phase 1 with publicly available online COVID-19 guidance, 22 (67%) had an EMS official who agreed to be interviewed in phase 2. Among the 23 states without COVID-19 guidance, 12 (63%) were interviewed (Figure 1). The same 4 territories that had no EMS online presence could not be reached for phase 2 interviews.

Among interviewed state officials with publicly available online COVID-19 guidance, 22/22 (100%) reported providing direction on operational issues, whereas 19/22 (86%) reported providing direction on clinical issues. There were a total of 12 interviewed state officials without publicly available online COVID-19 guidance. By contrast,



**FIGURE 2** States and territories with publicly available COVID-19 protocols or guidance ( $n = 33$ ; in orange). All 56 states and territories were assessed, and 4 territories had no office of emergency medical services publicly available online presence (Guam, Northern Mariana Islands, American Samoa, and United States Virgin Islands; in dark gray)

9/12 (75%) of interviewed state officials without publicly available online COVID-19 guidance indicated that they provided guidance to EMS agencies for specific operational issues, and 7/12 (58%) provided guidance on clinical issues. Table 2 shows the variability in operational and clinical protocols and guidance given in states and territories without specific guidance for COVID-19.

All EMS leaders interviewed stated that the guidance provided to agencies often extended into multiple other aspects of EMS operations and clinical care including dispatch guidance, safety in EMS agency stations, extension of certification timelines, crew staffing, notification of receiving facilities, EMS personnel physical and mental well-being, crisis standards of care, and prone positioning of patients during transport. This guidance, however, was not consistent among states. During the interviews many state officials indicated their reliance on information provided by the CDC as well as the American Heart Association, a finding that was mirrored in our review of the publicly available online documents we identified.

### 3.3 | Dissemination and implementation practices

Common themes for all states and territories EMS offices interviewed were noted. When evaluating the dissemination plan for the states and territories with publicly available online guidance, 10/22 (45%)

reported that the plan was a formal protocol update. Concerning dissemination timing, 15/22 (68%) of states with publicly available online guidance reported that the changes would be implemented at the agency level within 3 months. In contrast, in states and territories without publicly available guidance for COVID-19, dissemination plans were not as clear because of the rapidity of information release to the community. In this study, of states that issued guidance, only 33% had a defined and publicly available dissemination plan. Only 1 of 12 states reported having a formal dissemination plan concerning the speed of protocol change to full dissemination, 4/12 (33%) reported being able to have the material disseminated within 6 months. Some states and territories reported leveraging medical directors to assist in the dissemination process.

Many states and territories reported that they released formal protocol updates but that tracking of implementation timing was difficult to assess. First, the process of developing guidance for EMS agencies was performed in the setting of a quickly overwhelming pandemic that stretched the resources and infrastructure necessary to respond to this disaster situation. This complexity and difficulty were described by 1 study participant as feeling "like we were building a plane while flying." Second, implementation strategies were variable and dependent on the existing organizational infrastructure present in the states and territories. Common dissemination strategies for all states included leveraging webinar formats, email, social media, and state EMS



**TABLE 1** Operational and clinical EMS recommendations from phase 1 evaluation stratified by states/territories with and without statewide publicly available COVID-19-specific guidance

	No publicly statewide available COVID-19 guidance (n = 19), frequency (%)	Publicly statewide available COVID-19 guidance (n = 33), frequency (%)
<b>Operational recommendations</b>		
Patient triage/dispatch	7/19 (37)	28/33 (85)*
PPE recommendations	9/19 (47)	32/33 (97)*
EMS personnel COVID-19 exposure	11/19 (58)	27/33 (82)
Alternative destination transport	6/19 (32)	9/33 (27)
Non-transport guidance	4/19 (21)	14/33 (42)
Non-transport information sheet	2/19 (11)	10/33 (30)
<b>Clinical disease-specific recommendation areas</b>		
Airway management procedures		
Aerosolizing procedures	7/19 (37)	22/33 (67)*
Nebulized medications	6/19 (32)	15/33 (45)
Intubation (airway)	6/19 (32)	20/33 (61)
Resuscitation guidance	2/19 (11)	11/33 (33)
Termination of resuscitation	1/19 (5)	5/33 (15)
Pediatric guidance	1/19 (5)	6/33 (18)
Febrile illness	1/19 (5)	4/33 (12)
STEMI management	0/19 (0)	1/33 (3)
CVA/stroke management	0/19 (0)	0/33 (0)
Seizure	0/19 (0)	0/33 (0)
<b>State direction to use national CDC standards</b>		
Reference to CDC guidance	1/19 (5)	16/33 (48)*

Abbreviations: CDC, Centers for Disease Control and Prevention; CVA, cerebrovascular accident; EMS, emergency medical services; PPE, personal protective equipment; STEMI, ST-segment-elevation myocardial infarction. \* $P < 0.05$ .

websites. Interestingly, a few states that had publicly available online COVID-19 guidance did leverage clinical data to evaluate implementation of clinical practices (eg, rates of albuterol administration were assessed after protocol dissemination to evaluate whether protocol changes were adopted), whereas others developed task forces to facilitate dissemination and assess rates of implementation by EMS agencies. Ultimately, most interviewed states indicated that tracking protocol dissemination to agency implementation was very difficult, a finding that was independent of having publicly available online COVID-19 guidance.

**TABLE 2** Operational and clinical changes reported by states/territories during interviews (phase 2) stratified by publicly available statewide COVID-19 guidance

Guidance topics	No publicly available statewide COVID-19 guidance, frequency (%)	Publicly available statewide COVID-19 guidance, frequency (%)
<b>Operational<sup>a</sup></b>		
PPE	9/9 (100)	22/22 (100)
Non-transport of patients	6/9 (67)	16/22 (73)
Ambulance cleaning procedures	5/9 (56)	18/22 (82)
Transport destination	4/9 (44)	13/22 (59)
<b>Clinical<sup>a</sup></b>		
Adult respiratory distress	6/7 (86)	13/19 (68)
Adult COPD/asthma	4/7 (57)	13/19 (68)
Pediatric respiratory distress	5/7 (71)	14/19 (74)
Pediatric asthma	4/7 (57)	13/19 (68)
Airway management/RSI	5/7 (71)	16/19 (84)
Cardiopulmonary resuscitation	3/7 (43)	14/19 (74)
Termination of resuscitation	3/7 (43)	12/19 (63)

Abbreviations: COPD, chronic obstructive pulmonary disease; PPE, personal protective equipment; RSI, rapid sequence intubation.

<sup>a</sup>In phase 2 interviews, 31 states reported operational changes, whereas 26 states reported clinical changes.

## 4 | LIMITATIONS

This study has certain limitations. First, telephone interviews were not performed with all states/territories. Because the interviews were performed during a significant increase of COVID-19 cases, some state EMS officials were difficult to reach either because of limitations on their available office hours or lack of time to respond to inquiries. Second, interviews were not recorded or reviewed, which may have led to incomplete survey data collection. Furthermore, although our methods included searching all state/territory EMS office websites, it is possible that guidance was provided to EMS agencies but not made publicly available through a web-based resource. The emergent nature of the pandemic may have limited the public availability of online protocols and guidance; protocols may not have been published online in a timely matter, and online content may not have represented what happened in the field. Third, the issuance of state-level guidance does not ensure uniform adoption of practices recommended by state authorities. In this study, provision of COVID-19 guidance was defined as any type of recommendation provided by states or territories in response to the COVID-19 pandemic. One limitation to the definition of updated protocols/guidelines was the ability to determine if the protocol or

guidance was “COVID-specific” or related to the pandemic. The fourth limitation of this study is the possibility that some states were classified as having not given guidance or recommendations when they actually did, but it was not publicly available or captured through interviews because officials were unavailable. Furthermore, EMS protocols and guidance in many states are developed and maintained at a regional, county, city, or agency level, which was not captured in this study.

## 5 | DISCUSSION

This nationwide study details the large variability in the development and dissemination of COVID-19–related guidance by US state and territory EMS offices to frontline EMS agencies and clinicians. This investigation reveals that states with specific guidance had commonalities in operational and clinical changes. However, states without specific guidance provided less comprehensive information to frontline EMS agencies with gaps in guidance that included lack of recommendations for termination of resuscitation and care of special populations. Furthermore, both states with and without designated guidance reported challenges with evaluating dissemination and assessing implementation of their guidance. It is important to note that some states use a regionalized approach to develop and disseminate guidance, complicating assessment of the scope and impact of state-issued guidance. Although previous work has examined agency-level operational changes and resources for the pandemic,<sup>7</sup> the impact of COVID-19 on specific clinical situations,<sup>8–10</sup> guidance regarding crisis standards of care,<sup>11</sup> and the ethical distribution of scarce resuscitation resources,<sup>12</sup> this study offers a comprehensive national assessment of COVID-19–initiated EMS protocol changes and guidance.

Interestingly, the presence of preexisting protocols or recommended statewide EMS guidelines was not associated with an increased likelihood of states issuing EMS guidance regarding COVID-19 response. Of the protocols and guidance issued, the most common topics were related to alterations in dispatch operations and non-transport practices. Work by Satty et al aligns with this second finding; even in the first 3 months of the pandemic, when EMS call burden in western Pennsylvania was moderate, there was an increase in patient non-transport.<sup>13</sup> Additional common clinical protocols and guidance addressed aerosolizing procedures and endotracheal intubation. Contemporaneous work by Hart et al sought to define best EMS practices for airway management and respiratory support.<sup>14</sup> Guidance regarding cardiac arrest resuscitation, termination of resuscitation, and pediatric issues was least frequently issued, although these topics received significant attention by the lay media.<sup>15,16</sup>

Across the country, statewide plans and execution for communicating, disseminating, and following implementation of COVID-19 guidance was inconsistent and not systematic. The lack of publicly available online documents in 19 of 52 states and territories evaluated may have been a barrier to the communication of important clinical and logistical information to local EMS agencies. Using national guidance such as the recommendations made by the CDC may be problematic for agencies if those recommendations counter state policies for EMS clinicians. No

jurisdictions interviewed had methods in place to follow-up on agency-level implementation of state-issued guidance to ensure the adoption of those recommendations. Unfortunately, the lack of planned dissemination and confirmation of implementation reflects a broader in EMS evidence-based guidelines: they are developed, but there are no systematic and widespread dissemination, implementation, and sustainment strategies in place.<sup>17</sup> Work by Adalgais et al offers insights for facilitating statewide protocol implementation and can inform future COVID-19 protocol dissemination.<sup>18</sup>

Although this analysis evaluated state-level clinical and operational guidance for EMS clinicians, it should be noted that several state officials reported that EMS guidance in their states was issued at the regional, county, or local level. In addition, it was reported that at the height of the pandemic, many of the local changes to EMS protocols arose from EMS medical directors or regional medical advisory councils, not from the state level of EMS oversight.

This study’s results should be considered in the context of past responses to infectious disease epidemics and outbreaks, although the extent to which lessons from H1N1<sup>19–21</sup> and Ebola<sup>22,23</sup> carried over to the COVID-19 pandemic response is unclear. Some state-level COVID-19 guidance was likely informed by those prior responses; however, EMS infectious disease communication plans were still undeveloped by the onset of the COVID-19 pandemic. Despite the H1N1 pandemic, the Ebola outbreak, and the ongoing COVID-19 pandemic, a national comprehensive pandemic plan that adequately engages EMS still does not exist. This study further highlights the need to confront this large gap between public health and emergency preparedness and response.

There are several implications of this work for future pandemics and infectious disease emergencies. First, ready-to-go operational protocols involving clinician safety and non-transport of stable patients are needed for future pandemics. Second, state EMS offices should develop communication and dissemination plans. Third, local EMS agencies should plan for systematic implementation and tracking of outcomes for new emergency guidelines that may be issued in future waves of COVID-19 or other pandemics.

In summary, among the states and territories assessed in this work, most issued guidance in response to the COVID-19 pandemic; however, many did not have defined communication, dissemination, and implementation plans. To plan for future waves of COVID-19 and other pandemics, additional work should correlate state-level and territory-level guidance with COVID-19 clinical and operational outcomes to inform whether guidance was effective in impacting EMS response and service to communities during public health emergencies.

## AUTHOR CONTRIBUTIONS

Sylvia Owusu-Ansah, Matthew Harris, Jennifer N. Fische, and Mark X. Cicero conceived the presented idea, conceived and designed the analysis, collected the data, contributed data or analysis tools, wrote the article, and edited the article. Kathleen Adalgais, John Lyng, Kerry McCans, and Rachel Alter collected the data, contributed data or analysis tools, performed the analysis, wrote the article, and edited the article. Ashish Panchal conceived the presented idea, conceived

and designed the analysis, collected the data, performed the analysis, contributed data or analysis tools, wrote the article, and edited the article. Angelica Cercone, Amanda Perry, and Phyllis Hendry collected the data, contributed data, wrote the article, and edited the article.

### CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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### SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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