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CARING FOR INFECTIOUS DISEASE IN THE PREHOSPITAL SETTING: A QUALITATIVE ANALYSIS OF EMS PROVIDERS EXPERIENCES AND SUGGESTIONS FOR IMPROVEMENT

Andreia B. Alexander, MD, PhD, MPH, M. Meredith Masters, MD, Karma Warren, MD

ABSTRACT

Objective: The purpose of this study was to examine the attitudes and behaviors of emergency medical technicians (EMTs) and Paramedics when faced with the decision to care for patients with suspected Ebola Virus Disease (EVD) and to illicit suggestions for improvement of infectious disease (ID) preparedness. **Methods:** A convenience sample of 22 EMT/Paramedics were recruited from an emergency department at one of the designated Ebola centers. Each provider participated in one of three on-site focus groups. Participants answered questions about how they gained their knowledge, felt about caring for EVD patients, made decisions about caring for EVD patients, and suggestions for improvement of ID preparedness. Focus groups were recorded, transcribed, and coded using inductive content analysis. **Results:** Analysis revealed five prominent themes: reactions to scare, education/training, danger, decision making, and suggestions for future responses. Overall, first responders were excited to be a part of the response to EVD. They were more comfortable caring for EVD patients if they received adequate education and transparency from the administration. This resulted in a decreased perceived danger of the disease and decreased hesitancy when caring for EVD patients. However, those that expressed the most hesitancy also expressed the most emotional distress. Suggestions for improvement of ID preparedness included continuing education, tiered training models, peer training models, collaboration between emergency medical services (EMS) systems, better communication between departments, and the development of an infectious disease response team. **Conclusions:** Although first responders were excited to be a part of the response to EVD, this did not come without

hesitation and emotional distress. Some of these concerns may be mitigated by first providing a clear definition of “duty to care,” followed by interventions such as the development of clear and consistent ID preparedness training and interventions that address the emotional distress experienced by these providers. **Key words:** emergency medical services; infectious diseases; Ebola virus disease; qualitative research; duty to care

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INTRODUCTION

Ebola Virus Disease (EVD), a rare but often fatal zoonotic disease first described in 1976 in Zaire, has played a significant role in the resurgence of vector-borne diseases. Since its discovery, the Centers for Disease Control and Prevention (CDC) have reported 37 outbreaks. A recent outbreak from 2014 to 2016 in West Africa was the largest, with over 15,000 confirmed cases and more than 11,000 deaths worldwide (1). Furthermore, for the first time, the United States health care system was directly affected by this EVD outbreak (2).

Prior to 2014, outbreaks of EVD were small (3) and poorly studied. Therefore, planning for the 2014 outbreak required health care workers to draw from experience with previous infectious disease epidemics such as influenza, Severe Acute Respiratory Syndrome (SARS), and Human Immunodeficiency Virus (HIV). While allowing public health professionals to lay the groundwork for prevention plans, the unique aspects of EVD presented many challenges including the highly contagious nature and often rapidly fatal course of the virus. The case fatality rate of EVD (50–90%) far surpassed previous outbreaks of influenza (0.01%) (4) and SARS (9.6%) (5).

It is assumed that health care providers will report to work even during disasters and mass casualty incidents. Yet, research has shown that health care providers are less willing to work during infectious disease outbreaks compared to other disaster/mass casualty incidents, with the exception of radiation exposures (6). Factors such as consistent training, confidence in employer preparedness, and safety of self and family contribute to a health care provider’s willingness to work (7, 8).

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Frontline providers, such as emergency medical technicians (EMTs) and paramedics, play a unique role in disease outbreaks. Often the first point of contact with infected patients, they work in less controlled environments than hospital-based workers. Furthermore, they have a different training, work culture and structure (9). Research exploring the impact of caring for patients during disease outbreaks, while scarce, focuses on hospital workers, leaving the role of first responders under-addressed (9). The purpose of our study was to utilize a qualitative approach to:

1. examine the attitudes and experiences of EMTs and paramedics when caring for patients with suspected or confirmed EVD (we will use the term Persons Under Investigation [PUI] to refer to patients with suspected or confirmed EVD from this point forward);
2. understand how EMTs and paramedics make the decision whether or not to care for PUI; and
3. elicit suggestions in preparation for the response to future outbreaks of similar infectious diseases.

METHODS

Study Design

This was an exploratory study utilizing qualitative procedures based on a grounded theory approach (10–12).

Study Setting and Population

Researchers recruited participants from the emergency medical services (EMS) system affiliated with the emergency department (ED) of a large urban tertiary care center located in Northeastern United States. that was the receiving hospital for one of the five CDC/Department of Homeland Security (DHS) mandated airports designated for screening all flights from West Africa. This hospital was designated a Tier II EVD facility: a hospital close to possible points of entry for suspected EVD patients with the capability of handling the initial triage and screening of PUIs (13). This hospital cared for approximately 30 PUIs throughout the epidemic, the majority of whom were transported by the hospital affiliated EMS system.

Researchers used a purposive sampling approach. To participate in this study, providers needed to be a current practicing member of EMS, either an EMT or paramedic. Data collection ended when theoretical saturation was reached (14), as determined by the research team.

Study Protocol

This study was approved by the Rutgers Health Sciences Institutional Review Board. Researchers obtained written informed consent from all participants included in the study. Participants were recruited via e-mail and flyers placed in the ED which notified participants of the time and location of the focus groups. Participants voluntarily attended the focus group sessions. Participants filled out the informed consent and a demographic questionnaire, followed by a 30–60 minute focus group. Three focus groups were held ($n=7, 10, 5$, respectively). As an incentive, researchers entered each participant into a raffle for a \$25.00 gift card drawn at the completion of each focus group session.

Measurements

To provide a transparent delineation of the entire project from development to the reporting of findings, an audit trail was created (15) including data collection instruments, raw data, field notes, and a field journal which included personal notes, observational notes, preliminary analyses, data reduction and analysis, data reconstruction and synthesis, and methodological decisions and rationales.

The first author of this study (A.B. Alexander [AA]) conducted all focus groups. AA was a resident physician in Emergency Medicine at the time of data collection. She also has a PhD in Health Behavior with a focus on patient and provider decision making around sensitive/difficult topics. She has graduate training in qualitative research methods, and 12 years of experience in conducting qualitative research studies. Focus groups took place in June 2015, 8 months after the first patient with EVD in the United States was confirmed. A grounded theory approach was used in data collection, as each focus group informed the subsequent focus groups (10). Focus groups were audio recorded and transcribed.

Each participant self-administered a demographic questionnaire to gather information such as occupation, age, ethnicity, marital status, and number of children. Respondents then participated in a focus group aimed at describing the attitudes, experiences, and decision making process used when faced with caring for PUIs, and suggestions for improving future responses. Due to the nature of qualitative research and the grounded theory approach of this study, focus groups were analyzed as they were completed, and the guide was adjusted to test new theories/questions that emerged from the preceding data.

Analysis

Data for this study were analyzed as part of a larger study examining the attitudes and experiences of ED nurses, ED physicians and EMS personnel when caring for PUIs. Data on ED nurses and physicians will be published elsewhere.

Data were analyzed using inductive content analysis (12, 16). At least two researchers read and openly coded each transcript as the focus groups were completed. The researchers came together to discuss their individual codes and identify preliminary concepts/hypotheses. Concepts identified in each transcript were tested in subsequent focus groups. This process continued until theoretical saturation was reached (no new concepts emerged from the data) (14). Disagreement between researchers was resolved through discussion. Detailed accounts of this coding process were documented in the field journal as part of the audit trail (15).

RESULTS

Characteristics of Study Subjects

Three focus groups were held with a total of 22 EMS personnel participating in this study. Of the 22 participating members of service, 12 (54%) provided care for at least one PUI during the epidemic. Six participants were EMTs (27%), with paramedics making up the rest of the group ($n = 16$; 73%). The majority were male ($n = 19$, 86%) and white ($n = 16$, 73%), with an average age of 38 years and an average of 14.5 years of experience in the field. A complete account of demographics for each group can be found in Table 1.

Overall

During data analysis of the focus groups, five major themes were identified: *Reactions to Scare*, *Education/Training*, *Danger*, *Decision Making*, and *Suggestions for Future Response*. However, *Education/Training* and *Danger* also emerged as minor themes within *Decision Making*, and therefore, will be discussed within *Decision Making* along with the additional minor themes of *transparency* and *hesitancy*. Each theme is discussed in detail in the following sections. Example quotes of each theme can be found in Table 2.

Reactions to Scare. Among EMS providers, there were a range of reactions to the EVD epidemic. Most expressed excitement with being involved with the EVD epidemic. They felt that it was “cool” and “something different” from their day to day

TABLE 1. Demographics

Group	EMS	N (%) or Range (Median)
Type	EMT	6 (27)
	Paramedic	16 (73)
	Total	22 (100)
Years in Practice		1–27 (15)
Age		25–52 (40)
Gender	Male	19 (86)
	Female	3 (14)
Race/Ethnicity	White	16 (73)
	Black	1 (4.5)
	Hispanic	1 (4.5)
	Asian	0 (0)
	Other	4 (18)
Marital Status	Married	13 (59)
	Single	8 (36)
	Divorced/ Separated	1 (4.5)
Children	Yes	11 (50)
	No	11 (50)
	Range	0–4 (0.3)
	Mode	0

activities. However, a significant number also expressed some level of fear. Those that expressed the most fear were particularly concerned about how contracting the disease, or having to be in quarantine, would affect their families. A handful of more senior providers were nervous about the epidemic and reflected on their experience with the response to the HIV/AIDS epidemic in the 1980s, as described by one paramedic,

I was a new medic back in the 80s when HIV was the end all be all ... and then we realized with some mild awareness and precaution you'll be ok. So it's like this thing too ... It's in your head but it's not wearing on me all day.

However, they all felt EVD would not become as serious or widespread as HIV.

Decision Making. During the focus groups it was evident that not all EMS providers were comfortable with, or even willing to care for, PUIs. Therefore, the researchers decided to further explore this by asking questions regarding how providers decided whether or not they would care for PUIs, and what factors went into that decision. Overall, EMS providers expressed that they would be more comfortable taking care of PUIs if they felt they received adequate education and training, and if the hospital administration was transparent about the process of protocol development at an appropriate level. This resulted in a decrease in perceived danger of the disease, and subsequently reduced hesitancy when

TABLE 2. Example quotes representing the major themes that emerged from the data

Example Quotes

REACTIONS TO SCARE

"First I'm thinking of my kids. My wife is sitting there. She is nervous BEcause nobody knew what we were walking into at the time."
~Paramedic

"Just percentage-wise the chances of that patient actually having any issue is so slim that I don't really feel an issue with it. Our percentages are good where you're not going to be dealing with a patient like that, so, as long as you do what you're taught, there's no real issue."
~Paramedic

"I mean, mortality crosses my mind every single time I come to work. What's going to happen? Am I going to die of Ebola, and bleeding out of every orifice? That's probably worse than getting shot, but yea, it crossed my mind."
~EMT

"It was actually kind of really cool in the beginning because it was like if you worked in late or mid 80s with AIDS. It had a similar feel based on what we heard or were feeling. We were on the leading edge of something that was there for a while but wasn't really HERE. You know, Ebola has broken out a couple of times worldwide, but to have it happen and to be in a situation where there was definitely a possibility of having to see some of these patients was definitely kind of cool."
~Paramedic

EDUCATION

"The problem is from prehospital medicine point of view; we probably have a larger gap in terms of our understanding of infectious diseases than we do in a lot of other things we see more routinely. So, the unfamiliarity with the entire infectious disease portion of emergency medicine is probably our biggest challenge. So, the fact that we went 0 to 60 on this ... a lot of us didn't have much of a base prior, and we probably should have."
~Paramedic

"About a week after we found out and everybody started getting to a frantic, we actually sat down and had training on how to don and take off our protective equipment with the appropriate procedures. We also talked about the spread of infection, the different routes of travel."
~EMT

"Hold it! Here, try this Tyvex suit on. This is how you don it, this is how you doff it. That's it. It focused on response, not the education."
~Paramedic

TRANSPARENCY

"And this guy's got a fever and they're all coming to me saying, "Well, what do you think?" So, customs, border control, port authority, the lady from CDC who comes out maybe once in a while to see what's going on. And then I'm sure there's other people who we're not sure what they do. There's no doubt in my mind that there's a lot of interagency coordination at the top levels. However, from the operational standpoint, um, there's definitely a gap in familiarity in what, um, you know, everybody's responsibilities are and who's who."
~Paramedic

"I'm not sure that there was necessarily, um, enough or the right communication at the ground level to make everybody 100% comfortable that it was going to be a seamless transport."
~Paramedic

PERCEIVED DANGER

"Of the 10 patients I'm gonna see today, probably 8 of them have some type of contagious disease. As far as I'm concerned, a response to a known Ebola or an unknown fever travel is a low risk, low frequency type event."
~EMT

"I don't want to speak for everybody, but I know my level of suspicion is elevated when I go on the airport truck because of the nature of it, and the different people coming in from various countries. So, when I'm on an airport truck for the shift my suspicion might be a little bit higher just based on where the patients are coming from."
~Paramedic

HESITANCY

"Nobody gives a s*** about responding to this stuff. You know, we take calculated risks every day when we come to work ... We're willing to take the calculated risk, but we'd like to take a lot of the variables out of it when we're doing it."
~Paramedic

"When I was positioned up, the first thing going through my mind, I'm seeing my kids."
~EMT

"At the end of the day we were going to mitigate that emergency. There wasn't a question of whether or not we would do it. It was a question of step 2,3,4 needs to happen. Are those things in place down the road?"
~Paramedic

"Honestly, I hoped the ambulance would break down."
~Paramedic

SUGGESTIONS FOR FUTURE RESPONSE

"In order to make anything worthwhile and something that's going to stick and be useful, you need to figure out how to use that stuff even when Ebola crisis is gone. Keep skills sharp for future things. We don't know what the next big disease outbreak is going to be, but we know that we do occasionally respond to hazardous materials incidents and incorporate the same skillset and training."
~Paramedic

"In technical rescue disciplines, we do awareness, operational, and technician level training. Awareness is four hours of instruction making you aware of inherent risk of what you may respond to. At the operation level you're capable of responding ... you have protocol to take some action. At a technician level you could supervise other people who were doing this stuff, or engage in all activities required in that skillset (don doff, provide treatment in that hot zone). By having stratified tier training, you can focus on the most intense training that requires the most upkeep on selected core individuals, maintain that skillset, and be most useful in emergencies."
~EMT

"For something like this I'd like to see the cost saving measures taken out of it. It's easy to track if you rotate units out of service, come in early, even if you're not getting paid, to put on or take off PPE, but we do everything with a sense of cost saving. The hospital has budget constraints we have to live within. Unfortunately, in situations like Ebola you can't fall into that spectrum. It's more important to do a lengthier and appropriate training than it is to get as many thru as quickly as you can."
~EMT

"I think we can't get specific on procedures and stuff. But as long as you contain that small group of people that are going to do hands on operations at the first responder level basics, we can train for that and keep it fresh in our mind. Whether it's Ebola or Lassa or Marburg, the procedure is gonna be just the same. We can train for the basics. If we're good for that, the other things that happen aren't as big of a deal."
~Paramedic

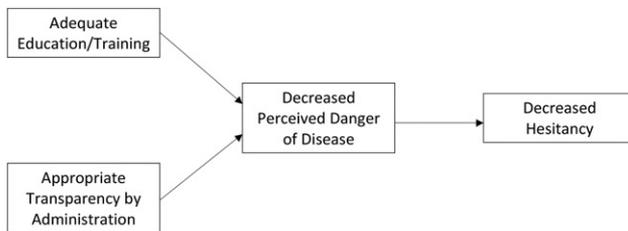


FIGURE 1. Factors affecting the decision to care for Persons Under Investigation (PUI).

faced with the decision to care for PUIs (Figure 1). While not all EMS providers in this study cared for a PUI, they all took part in the preparation and response. We did not identify any differences between those providers that cared for PUI and those that did not. In the following section, we will discuss the components of this decision making model as it pertains to the EMTs and paramedics.

Education/Training

Early on in the response to Ebola, the most common education medium reported to have been utilized was internet sites (including CDC, Wikipedia, Google, and NIH), followed by television news stations such as CNN and Fox News, and NPR radio. Some EMS personnel discussed drawing on their knowledge of books they read in the past including *Hotzone* and *The Andromeda Strain*.

As the EVD response progressed, EMS personnel were exposed to more education/training at work in the form of flyers, contingency trainings, and on the job training. During this time, EMS personnel started to lose confidence in the media reports of the outbreak, relying more on self-taught information (i.e., internet) and discussions between coworkers and their families.

In regard to training at work, the majority of EMS training consisted of sessions discussing the logistics of patient transport and patient screening, followed by the use of personal protective equipment (PPE). The majority of EMS providers felt this training was inadequate because they lacked the basic knowledge of infectious disease transmission. Furthermore, some EMS providers felt this added knowledge was not important as it would not change their practice. Overall, they reported the disseminated information was inconsistent, which resulted in a lack of confidence in the response framework, and a feeling of danger when caring for PUIs.

Many EMS personnel were disappointed by the timing of their trainings. They felt the institutional response to training was delayed and reactive, when the institution should have been proactive

instead. This resulted in a decrease in the perceived quality of administered trainings. However, most of the EMS personnel also acknowledged that the education/training at our institution was much better than other area healthcare systems, based on their interactions with other agencies.

Transparency

Transparency is the level of openness and communication the administration demonstrated throughout the response to EVD. The more open the administration was, the more transparent they were deemed. All but one of the EMS providers felt the administration was not transparent with how they developed the process of designing protocols for triaging and transporting PUIs. This translated into a lack of confidence in the protocols they received, especially as they changed on an almost daily basis, and further reinforced the perceived sense of danger.

Danger

While EMTs and paramedics felt Ebola was a dangerous disease, the majority of EMS providers felt there were other diseases more dangerous than EVD (i.e., Hepatitis, meningitis, TB, and HIV). This was largely because they encountered these diseases with greater frequency, thus yielding a higher overall risk of acquiring the disease. As described by a group of EMS personnel:

EMS1: “There are so many other aspects of this job that take higher precedence. Meningitis scares me the most. Meningitis, TB, Hep C.”

EMS2: “Yea. We’re more worried about that stuff than Ebola. You’ve got a greater chance of contracting one of these.”

Furthermore, EMS providers felt their perceived level of danger was situational. When they were assigned to the “airport truck,” the ambulance that serves the airport, or when the media was involved with an EVD case, their perceived danger increased. Perceived danger was also increased by inconsistent training, and when too many people (e.g., EMTs, Paramedics, Supervisors, CDC, etc.) were involved in the transport/care of PUI. Perceived danger decreased with adequate knowledge about Ebola, training on the use of PPE, adequate resources including managerial support and proper equipment, and as time passed since the initial cases.

Hesitancy

Hesitancy is the amount of reluctance providers felt when faced with caring for a PUI. Most of the hesitancy came from concern about how contracting the disease or having to be in quarantine would affect their families. Overall, however, EMS providers felt taking care of PUI was “just part of the job.” Among EMTs and paramedics that expressed a significant amount of hesitancy, caring for PUIs was often a prominent emotional stressor.

Generally, providers felt they did not have a choice on whether or not they cared for a PUI. If they were on the “airport truck” or their ambulance was called to the scene of a PUI, then they had to care for these patients. When asked if they would care for PUI if a choice was given, 9% ($n=2$) of EMS providers, stated they would not care for PUIs at the time of the focus groups, the lowest number of all groups of health care personnel interviewed.

Suggestions for Improvement. Members of EMS openly offered suggestions for improvement in preparation for the next infectious disease epidemic. Many EMS personnel felt continuing education was the key to improvement and preparedness for future responses. This education should come in the form of drills for the triage and transport of infectious patients, similar to that of mass casualty and disaster drills currently implemented by the department. Additionally, EMS personnel should be trained periodically in the donning and doffing of the PPE used for different exposures. This would avoid exhausting manpower in having to rapidly train hundreds of providers on how to use their PPE during future epidemics. Many providers felt this would be useful because PPE used during potential future exposures may be similar to the Tyvek suits and Powered Air Purifying Respirator (PAPR) PPE implemented during the EVD epidemic. Furthermore, providers felt they should be educated in the form of regular in-service training on infectious disease basics, including transmission, vectors, treatment, and so forth.

In regard to improving efforts during the next infectious disease response, EMS providers suggested using a tiered training model. A few core personnel would be trained comprehensively, who would then train subsets of providers based on what their roles would be. Another suggestion was to implement a peer training approach where a few providers on the ground were trained, who in turn trained a group of their peers, until all members of service were appropriately trained.

A considerable majority of EMS providers felt collaboration and communication between departments

was an area in need of improvement. Providers felt that in situations similar to the EVD epidemic, EMS systems should work to combine resources and collaborate during provider training. This would allow more providers to be trained in a shorter period of time. Furthermore, providers felt communication was lacking, both between departments (e.g., the Emergency Department and EMS) and between institutions (e.g., our hospital and CDC). One EMS provider expressed frustration when representatives of the CDC were present at the triage and transport of a PUI and did not clarify their role,

I think the other big problem in working at the airport is there are...10 agencies and they stand there wondering what the other one is doing. Then a lady from CDC shows up and gives orders. Lieutenant commander and guys from customs asks me who she is. I have no clue.

Finally, EMS providers suggested the development of a permanent infectious disease response team that would meet regularly to maintain and update protocols, oversee the training of personnel, and ensure institutional readiness of disease outbreaks and epidemics.

DISCUSSION

The results of this study are in line with prior research and ethical debate on health care worker duty to care during infectious disease outbreaks (17, 18). Although this prior research was not studied in the prehospital setting, like other health care workers EMS providers expressed a spectrum of hesitancy, or willingness, to care for PUI. Providers were more hesitant when they perceived EVD as being more dangerous not only to themselves, but more often, to their families and friends. Furthermore, this perceived danger increased when providers felt administration was not being transparent about the decision-making process and current state of the response efforts, and when they questioned the adequacy of the infection control equipment and protocols provided to them (9, 19). All of which resulted in significant emotional distress for many EMS providers.

Our EMS providers were particularly upset about the time it took for our system to respond and the level of education they received throughout the epidemic. As a result, they focused on providing suggestions for improvement of infectious disease preparedness. These suggestions included both traditional and nontraditional EMS training models (20), and even borrowed from other areas of service

including the military (21, 22) and public health (23, 24). While it is important to explore these suggestions in a more formal manner in order to determine their effectiveness, we need to go beyond educational methods of infectious disease preparedness in order for our prehospital men and women of service to truly be prepared to respond to future epi/pandemics.

All EMS providers felt they had some degree of “duty to care.” However, what exactly this meant differed between providers. Those providers that endorsed this “duty to care” were also less hesitant about caring for PUI. This is consistent with what has been found in hospital-based literature with physicians and nurses. Before we can ask health care workers to consistently show up and perform duty to care, we must first define “duty to care” (17, 18). Like many health professional organizations, the National Association of Emergency Medical Technicians (NAEMT) does not address or define “duty to care” in their code of ethics (25). Therefore, before we can truly begin to implement solid protocols for infectious disease preparedness, which may begin to mitigate the risk associated with providing care during infectious disease pandemics, we must define “duty to care” and address this expectation in the code of ethics.

Once we have explicit statements of “duty to care” in place, and we understand what is expected from EMS providers during these pandemics, we can then advocate for other safeguards to be implemented (17, 18, 26). Some suggestions from prior literature include disaster pay, increased disability insurance and life insurance for providers that suffer morbidity or mortality as a result of performing this duty to care, and emotional support for providers and their families (17). By implementing interventions on this level, we will begin to address many of the most salient concerns expressed by the EMS providers in this study, including the perceived risk and emotional distress. This will likely improve willingness to provide care in these risky situations (27). It is at this point that the suggestions for improvement of infectious disease preparedness offered by our EMS providers have the potential to become the most effective.

Limitations

Several limitations should be considered when evaluating the results of this study. Participants were all self-selected and from one institution, limiting the generalizability of this study. Finally, focus groups have the propensity to become influenced by one or two dominant people. While this did occur at times, the focus group facilitator was

experienced and worked hard to capture the opinions of everyone participating in each session.

CONCLUSION

EMS personnel play a crucial role in infectious disease outbreaks. Although EMS providers understand that taking risks is part of their job, showing up for work during disease outbreaks is not without hesitation and emotional distress. Our study shows that some of these concerns may be mitigated by providing clear and consistent pandemic preparedness training before, during and after a disease outbreak occurs, appropriate transparency by administration, and developing interventions that address the emotional stresses experienced by EMS providers. We suggest beginning by defining “duty to care” for EMS providers, and implementing appropriate safeguards to mitigate some of the risk associated with this “duty to care.”

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