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Emergency Medical Services Responders' Perceptions of the Effect of Stress and Anxiety on Patient Safety in the Out-of-Hospital Emergency Care of Children: a Qualitative Study

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BMJ Open Emergency medical services responders' perceptions of the effect of stress and anxiety on patient safety in the out-of-hospital emergency care of children: a qualitative study

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ABSTRACT

Objective: Prehospital emergency medical services (EMS) providers report anxiety as the second most common contributor to paediatric patient safety events. The objective of this study was to understand how EMS providers perceive the effect of stress and anxiety on paediatric out-of-hospital patient safety.

Setting: This was a nationwide study of EMS providers from 44 of 50 (88%) US states.

Participants: A total of 753 eligible EMS professionals, including emergency medical technicians, emergency department physicians and nurses (general and paediatric), and respiratory therapists who participate in out-of-hospital transports.

Primary and secondary outcome measures: Outcomes included responses to: (1) clinical situations where heightened stress or anxiety was likely to contribute to safety events, (2) aspects of these clinical situations that cause stress or anxiety and (3) how stress or anxiety may lead to paediatric safety events.

Results: EMS providers reported that the clinical situations where stress and anxiety were more likely to contribute to paediatric patient safety events were trauma, respiratory distress and cardiac issues. Key themes were: (1) provider sympathy or identification with children, (2) difficulty seeing an innocent child hurt and the inherent value of children and (3) insufficient exposure to paediatric emergencies.

Conclusions: Caring for paediatric emergencies creates unique stresses on providers that may affect patient safety. Many of the factors reported to cause provider stress and anxiety are inherent attributes of children and therefore not modifiable. Tools that support care during stressful conditions such as cognitive aids may help to mitigate anxiety in the prehospital care of children. Further research is needed to identify opportunities for and attributes of interventions.

INTRODUCTION

Providing care during critical events is a recognised cause of provider stress, anxiety

Strengths and limitations of this study

- This is one of the first and largest studies of patient safety in the out-of-hospital setting.
- The survey's design promoted privacy, independence and candour in individual responses.
- This study was limited to the experience of US emergency medical response systems and since context varies throughout the world, it is possible that our results may not be generalisable to all countries.

and even post-traumatic stress disorder (PTSD) among hospital workers.¹ Stress, anxiety and PTSD have also been reported among out-of-hospital personnel.²⁻³ A recent systematic review and meta-analysis of PTSD in 28 studies of rescue workers worldwide estimated prevalence at 10%.⁴ Such factors have been associated with provider sickness,⁵ early retirement⁶ and burnout.⁷

In the hospital setting, stress and personal factors have been demonstrated to play a role in medical errors and patient safety. For example, an Australian study found that over 60% of medication errors in a hospital-based pharmacy were due to personal factors such as stress.⁸ In the less controlled setting of out-of-hospital care of acutely ill patients, it is reasonable to expect that stress similarly affects performance and patient safety in delivery of care to critically ill children.⁹

We conducted a qualitative analysis of responses to open-ended questions in a large national survey of emergency medical service (EMS) providers to characterise their perceptions of the role that stress and anxiety may play in patient safety during the out-of-hospital emergency care of children.

METHODS

Study design and participants

We conducted a qualitative content analysis of responses to three sequential electronic surveys of EMS providers across the USA. This study was conducted as part of a larger mixed-methods Children's Safety Initiative-EMS (CSI-EMS) study funded by the US National Institutes of Health (NICHD R01HD062478). The goal of the CSI-EMS is to identify, describe and classify the occurrence of safety events in out-of-hospital paediatric emergency care. The CSI-EMS includes: (1) focus groups; (2) a national Delphi study, on which the current investigation is based; (3) a chart review and (4) in situ simulation.^{10 11} Participants were EMS professionals including: emergency medical technician-paramedic (EMT-P), EMT-intermediate (EMT-I), EMT-basic (EMT-B) and first responders as well as administrative leaders, emergency department physicians and nurses (general and paediatric), and respiratory therapists, professionals who provide care to out-of-hospital children's emergency transports (eg, ambulance transport and fire departments). These provider groups were selected based on each group having a unique perspective on paediatric EMS care and differing lenses for safety events. Participants were recruited through email lists of US EMS and emergency medicine specialty societies and professional groups, as well as through social media. Participants were excluded if they were younger than 18 years of age or failed to complete the demographics section of the survey.¹² Participants who completed all three survey rounds were compensated for their time by being entered in a drawing for 1 of 10 tablet computers.^{11 12}

Survey design and content

Survey questions included questions with structured and unstructured response formats. Demographic information was assessed, including age, gender, level of training, years of experience, full-time or part-time status, paid or volunteer work and the number of paediatric patients seen in the previous year. In order to achieve a rich understanding of the role that provider stress and anxiety may play on patient safety during the out-of-hospital response to children's emergencies, we followed a grounded theory approach of inquiry. We asked questions in an open-ended format to avoid imposing preset expectations on participants' input and to promote open learning from participants' own terms. All survey questions were developed through focus groups.¹⁰ We also conducted cognitive interviews to assess the face validity, clarity of content, instructions and usability of the survey.^{11 12} Subsequent survey questions were shaped by responses from the prior survey round.

In a standard Delphi procedure, experts respond independently of one another, thus reducing the biasing effect of particular group opinion leaders and group pressure.¹³ In the first survey round, participants were

asked, "Based on your experience, how likely is each of the following to be an important contributing factor leading to safety events or errors in the prehospital care of children?." Participants rated the likelihood based on a 9-point Likert-type scale, ranging from 1 (not at all likely) to 9 (highly likely) for 75 potential contributors, including items such as lack of experience with paediatric airway procedures, paediatric-sized equipment availability and heightened anxiety when working with children. Results of the larger study have been previously published;¹¹ notably, heightened anxiety when working with children was highly rated across all survey rounds as a potential contributor to safety events or errors.

In the second round, respondents were asked to describe up to three clinical situations where they felt heightened anxiety was likely to lead to patient safety events. In the third and final survey round, participants were asked to provide narrative responses to two complementary questions: (1) "We know from round 2 that trauma causes heightened anxiety. Please help us understand what aspects of trauma in children contribute to heightened anxiety in providers," and (2) "How can this anxiety lead to safety events or errors?"

All surveys were administered through an electronic web-based survey system (SurveyMonkey), and surveys were completed over a 1-year period between August 2011 and July 2012. Confidentiality of participant responses was emphasised in soliciting participants' candid viewpoints.

ANALYSIS

We adhered to methodologically sound qualitative research methods including following an iterative approach for data collection and analysis, independent reviews of texts, thematic coding by qualitatively trained reviewers and convergence of interpretation across a multidisciplinary team of researchers.¹⁴ Our analysis was guided by principles of grounded theory, in which an understanding of the concept of interest arises from the empirical data rather than from a priori hypotheses.¹⁵ Responses to open-ended questions were entered into *NVivo9* software (QSR International, Cambridge, Massachusetts, USA). Two trained analysts independently reviewed responses to identify and code themes and subthemes. After a preliminary review of the data, the investigators developed an initial list of codes, which were modified and expanded as the analysis progressed. To ensure reliability of the coding structure, all themes and subthemes were reviewed with the larger multidisciplinary research team, which included hospital and prehospital EMS providers, EMS directors, EMS programme managers, physicians, quality and safety researchers, epidemiologists, a qualitative psychologist and a qualitative sociologist. Discrepancies between coders were resolved through discussion in the larger research team.

RESULTS

A total of 753 eligible EMS professionals from 44 of 50 states (88%) consented to participate in the study. A total of 722 participated in the first survey round, 614 (85%) completed Round 2 and 492 (68%) completed the final survey round. Table 1 describes characteristics of study participants. Approximately 80% of the sample comprised EMTs and paramedics. The proportions of professional groups varied <2% across the three survey rounds.

Increased provider-level anxiety was perceived to be the second most common contributor to patient safety events when caring for out-of-hospital paediatric emergencies. The three clinical call situations where heightened anxiety was reported to be most likely to lead to safety events were: (1) trauma, (2) respiratory distress and (3) cardiac issues. Among those reporting a specific call reason, trauma and child abuse were commonly reported (107/271 (39%) and 33/271 (12%), respectively) as situations where paramedic anxiety could contribute to safety events. Table 2 presents six key themes with representative quotes for the ways in which providers reported that anxiety makes errors and patient safety events more likely.

The six most common themes that emerged to characterise providers' perceptions on stress and anxiety and how stress and anxiety affect patient safety were: (1) provider sympathy/identification with children, (2) difficulty seeing an innocent child hurt/inherent value of children, (3) insufficient experience/exposure, (4) family/bystander emotional responses, (5) children's emotional responses and (6) anxiety that the child's medical condition could rapidly deteriorate. Numerous EMS providers reported that they identified with injured or sick children, often associating them with their own

children. EMS providers indicated that they felt this influenced their care and judgement. The second most common theme was the stress in knowing that an innocent life was at stake. Providers felt this created a sense of pressure around correct decision-making. The final theme, 'relative lack of experience with pediatric emergencies' has been the major focus of interventions until now. EMS providers reported feelings of intense pressure and inner dialogue as they are caring for a child.

We organised the themes from the qualitative analysis into an ecological framework to understand the contributors to provider stress and anxiety in the out-of-hospital care of children. Figure 1, which describes this framework, begins on the left with characteristics most central to the provider and expands to more distal influences.^{16 17} This framework distinguishes among characteristics of providers, paediatric patients (related to specific emergencies or inherent to childhood itself) and the family context, such as distressed parents who in some instances may contribute to safety events or errors in out-of-hospital care.

DISCUSSION

This qualitative analysis suggests that the inherent nature of children, compared with adult patients, is a key source of anxiety and stress for EMS providers when responding to an emergent call and that this anxiety is perceived to be an important contributor to patient safety events. Six major themes were identified for the specific ways in which paediatric patients cause stress or anxiety. Top of the list was sympathy/identification with the patient. Providers stated that they often saw their own children in the patient they were caring for and that this identification influenced their clinical

Table 1 Characteristics of study participants*

Participant characteristics	Round 1 (n=722)	Round 2 (n=614)	Round 3 (n=492)
Age	41.7 ±10.3	41.8 ±10.3	42.3 ±10.3
Male	438 (60.7)	368 (59.9)	301 (61.2)
Have children	558 (77.3)	459 (74.8)	372 (75.6)
Provider type			
Paramedic	367 (50.8)	316 (51.5)	254 (51.6)
Advanced EMT	50 (6.9)	39 (6.4)	31 (6.3)
EMT	159 (22.0)	129 (21.0)	99 (20.1)
MD, DO	82 (11.4)	70 (11.4)	64 (13.0)
NP, RN, RT, LPN	64 (8.9)	60 (9.8)	44 (8.9)
Experience			
Years working in EMS	16.8 ±9.4	17.0 ±9.3	17.1 ±9.2
Number of years at current level	14.0 ±9.2	14.0 ±9.1	14.2 ±9.1
Geographic location			
Urban	244 (33.8)	213 (34.7)	165 (33.5)
Suburban	226 (31.3)	183 (29.8)	145 (29.5)
Rural	250 (34.6)	213 (34.7)	177 (36.0)

*Values are presented as mean±SD for continuous variables and as number (%) for categorical variables.

DO, doctor of osteopathy; EMT, emergency medical technician; LPN, licensed practical nurse; MD, medical doctor; NP, nurse practitioner; RN, registered nurse; RT, respiratory therapist.

Table 2 Emergency medical services responders' perspectives on the contributors to stress, anxiety and safety events in the out-of-hospital emergency care of children

Sympathy/identification with patient	<ul style="list-style-type: none"> ▶ "Sympathy for the patient can cloud judgement" ▶ "For those of us that are parents, it is stressful to think about the possibility of being one of our own children, making one have a heightened level of stress" ▶ "If we are parents, we also may have a tremendous sense of identification fear/familiarity that can add to the anxiety level" ▶ "Because of the emotional components: people see their children as being the patient/family on scene causing stress we don't normally have" ▶ "The 'what if that was my kid' questions causes distraction during care" ▶ "Fear of similar injuries in own children is probably the largest factor. The apparent fragility of children and the potential harm that traumatic injuries can impose might also be a large factor"
Innocence of children/perceived value of children	<ul style="list-style-type: none"> ▶ "Children are different than adults in the simple fact that they are children who are innocent and still have their whole lives ahead of them" ▶ "Innocent life being damaged through no fault of their own, lack of experience with pediatrics/fear of making mistakes, cultural: children are more 'valuable' than 'old' people in some people's eyes" ▶ "Most people have a deeper emotional response to injured children" ▶ "Everyone can handle adult trauma because as we get older, we are expected to get hurt and sick, but not our children" ▶ "Fear or ruining someone's WHOLE life, before they have had a chance to live it"
Experience/exposure	<ul style="list-style-type: none"> ▶ "Due to rarity of peds trauma and the fragility of children workers are often shocked with this" ▶ "Lack of experience or confidence" ▶ "Small percentage of our patients" ▶ "Anxiety of not feeling proficient or experienced enough" ▶ "Infrequent exposure to pediatric clinical cases making the clinician feel insecure"
Family emotional response	<ul style="list-style-type: none"> ▶ "Bystanders and parents watching make doing your job difficult. EMS providers are already stressed and then you add a screaming mother, father or sibling" ▶ "Family on scene causing stress we don't normally have" ▶ "Family presence can also increase the stress level as expectations become very high when dealing with people's children"
Child's emotional response	<ul style="list-style-type: none"> ▶ "Crying! It's so difficult to calm an injured child, or ignore the distraction of an upset child" ▶ "Children's fears can exacerbate their perception of the severity of injury and this excites the parents" ▶ "Kids cry more in general and it may be due to fear as well as pain"
Rapid decompensation	<ul style="list-style-type: none"> ▶ "Need to act quickly paralyses decision choices" ▶ "Underestimation of non-visible blood loss since kids compensate so well (vital signs not as sensitive as in adults)" ▶ "Children can have minimal symptoms from a trauma and then crash quickly causing a constant stress during treatment and transport"

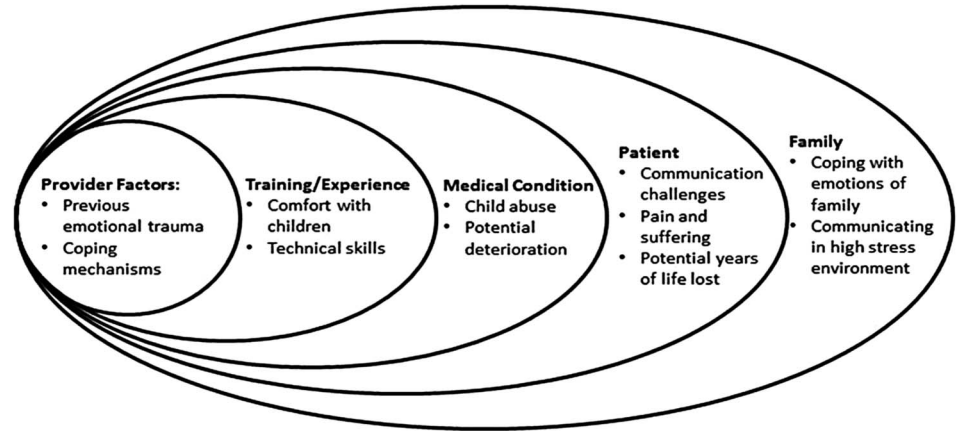
judgement. The second most common cause of heightened stress or anxiety involved personal and societal pressures brought about by seeing an innocent child injured and the fact that the child's whole life could be impacted by the outcome of this event.

Previous studies by our group and others have linked provider stress and/or anxiety to safety events in out-of-hospital paediatric care. Focus groups from earlier phases of the CSI-EMS study identified anxiety as a significant factor in paediatric care.¹⁰ A qualitative study of EMS providers by Cushman *et al*¹⁸ found that stress and anxiety related to lack of experience contributed to errors, and of some concern, they found that in such cases, providers were reluctant to report or discuss their

errors. Other studies suggest that errors contribute to provider anxiety and burnout, creating a potential downward spiral of errors leading to a higher likelihood of future errors through increased anxiety.^{19 20} This literature suggests that stress is detrimental to providers' well-being, and it may also be detrimental to patient safety.

What is the mechanism by which stress affects patient safety? The human factors and neuroscience literature have described a mixed picture about the effect of anxiety on cognition and performance. According to the Yerkes-Dodson Law first described in 1908,²¹ cognitive performance is poor with low or high levels of arousal/stress. One recent study that used a small electric shock to cause anxiety suggested that anxiety may

Figure 1 Concepts are arranged from contributors proximal to the provider (left), expanding to influences distal from the provider (right). Bold font indicates a key concept. Bullet points indicate examples of the concept.



reduce working memory for spatial and verbal tasks which could be a potential mechanism for high anxiety negatively influencing decision-making and performance.²² Similarly, anxiety and cortisol were elevated in paramedics experiencing high and low stress simulations with one confederate helper and elevations in both affected paramedic performance.²³ However, a study among emergency medicine residents suggests that the relationship between stress/anxiety and performance may be even more complicated depending on the level of stress and the experience level of the learner.²⁴ Thus, the relationship between anxiety and performance is complex and not fully understood.

The evidence is growing that provider stress is an important factor to understand and address for provider and patient well-being. To the best of our knowledge, the CSI-EMS project is the largest study of out-of-hospital providers' perceptions of potential contributors to safety events in the out-of-hospital care of children. This qualitative survey represented EMS professionals across the USA. The use of free text survey responses allowed for a rich and unbiased description of EMS providers' experiences. Owing to the size of our study, we were able to identify a wide range of contributors to EMS stress and anxiety and were able to discern that the causes of EMS provider stress and anxiety go beyond lack of experience or insufficient knowledge, originating commonly from features that are inherent to the nature of children. However, the study has important limitations. The study focuses on perceptions by EMS providers rather than observed outcomes. Perceptions of experienced clinicians in the field are critically important to our understanding of patient safety as they are a blend of frequency of events, severity of consequences, and insights into potential mechanisms, causes and preventability. However, it is difficult to know the degree of stress or anxiety and specifically whether and how it actually impacts the EMS care of paediatric emergencies. While our survey sample was geographically diverse, representing 44 of 50 states (88%) in the USA, we had strong representation from the Northwest, Midwest and Northeast and less from California and the Southeast,

which could limit the generalisability of our results to these areas as well as other areas of the world. Although EMS systems and context vary worldwide, it is most likely that the anxiety caused by the inherent nature of children is shared across settings. Finally, attrition occurred across the course of survey rounds with 66% of respondents completing all three surveys; however, the general demographic distribution of respondents remained stable across survey rounds.

Further research is needed to explore the physiological effects of provider stress and anxiety during complex psychomotor processes and to identify how these interplay with care delivery. Specifically for out-of-hospital care, the results of this study suggest that paediatric trauma, respiratory distress, cardiac arrest and non-accidental trauma are clinical areas that are in particular need for the development and testing of interventions such as simulation training, personnel debriefing and cognitive aids which may mitigate the effect of stress at the point of care. Efforts to improve patient safety in prehospital paediatric care will most likely have the greatest impact if these provider-level factors are considered.

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Contributors J-MG contributed to the conception and design of the study, development of survey tools, recruitment of participants and survey distribution, acquisition of the data, qualitative analysis and interpretation of the data, drafting and revising the article for important content and final approval of the submitted manuscript. MH contributed to interpretation and analysis of the data for the study, drafting and revising the article for

important content, and final approval of the submitted manuscript. KOB contributed to the design of the study, development and validation of survey instruments, qualitative analysis of data and critical review of the manuscript. CD contributed to the development of data collection tools, collection, validation and qualitative analysis of data and provided critical review of the manuscript. GM, WL, PE and JJ contributed to the design of the study, development of survey instruments, recruitment of participants, validation, and analysis of data, and critical review of the manuscript.

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