Tort Claims and Adverse Events in Emergency Medical Services

Henry E. Wang, MD, MS
Rollin J. Fairbanks, MD, MS
Manish N. Shah, MD, MPH
Benjamin N. Abo, BS, NREMT-P
Donald M. Yealy, MD

From the Department of Emergency Medicine, University of Pittsburgh, Pittsburgh, PA (Wang, Abo, Yealy); and the Department of Emergency Medicine (Fairbanks, Shah) and Department of Community and Preventive Medicine (Shah), University of Rochester, Rochester, NY.

Study objective: Emergency medical services (EMS) provide care to acutely ill or injured patients in settings less controlled than other health care environments. Although reports describing individual EMS adverse events exist, few broader descriptions exist. The objective of the study is to characterize the types, frequencies, and outcomes of adverse events associated with insurance tort claims against EMS providers.

Methods: We performed a retrospective review of insurance liability claims from a national insurer of EMS agencies. We studied closed and open insurance liability claims from January 1, 2003, to December 31, 2004, arising from EMS response to or provision of patient care and associated with injury to patients or other individuals. We excluded events associated with employee injuries only, events with property or vehicle damage only, and emergency vehicle crashes with less than $10,000 in actual or predicted total incurred costs. We identified the category of the adverse event, the characteristics of the treating emergency units, the injured individuals, the associated injuries, and the estimated or actual total incurred costs.

Results: Among 326 claims included in the analysis, adverse events included emergency vehicle crash or movement (n=122; 37%; 95% confidence interval [CI] 32% to 43%), patient handling (n=118; 36%; 95% CI 31% to 41%), clinical management (n=40; 12%; 95% CI 9% to 16%), response or transport events (n=25, 8%; 95% CI 5% to 11%), and other events (n=33; 10%; 95% CI 7% to 14%). Associated injuries included death (n=54; 17%; 95% CI 13% to 21%), life-threatening or disabling injuries (n=25; 8%, 95% CI 5% to 11%), and non–life-threatening or other injuries (n=247; 76%; 95% CI 71% to 80%). The median estimated total incurred cost was $17,000 (interquartile range $7,000 to $42,000).

Conclusion: Emergency vehicle crashes and patient handling mishaps were the most common adverse events associated with tort claims against EMS agencies. Clinical management and other incidents were less common. This effort highlights potential areas for improving EMS operations and care. [Ann Emerg Med. 2008;52:256-262.]

INTRODUCTION

Background

The emergency medical services (EMS) system provides medical care to patients in the out-of-hospital setting, facilitating the transport of 16 million patients to US emergency departments (EDs) annually.1 Several reports highlight the risks of care in the difficult EMS setting, identifying individual adverse events such as endotracheal tube misplacement, adverse drug events, and ambulance crashes, among others.2-5

One unique method for identifying and characterizing an important subset of medical adverse events is the review of insurance tort claims, which often contain detailed descriptions of a broad range of events. Experts have used malpractice insurance claims to characterize the range and nature of medical adverse events occurring in the operating room, ED, and ambulatory care setting.6-12

Importance

Few efforts describe the spectrum of adverse events associated with tort claims against EMS providers. An examination of these events could provide important initial perspectives about the areas of perceived or actual risk in EMS, generating key
hypotheses and identifying potential areas for improving operations and care.

Goals of This Investigation
In this study we sought to describe the types, frequencies, and outcomes of adverse events associated with insurance tort claims related to EMS operations and care.

MATERIALS AND METHODS
Study Design and Setting
The institutional review boards of the University of Pittsburgh and University of Rochester approved this study.
We performed a retrospective analysis of EMS liability insurance claims data from McNeil and Company, Inc, Cortland, NY. The insurer provides coverage to both private and public emergency response agencies nationally, including ambulance services, fire departments, and medical transport companies, among other operations. The company typically provides comprehensive insurance policies encompassing coverage for general and medical liability. McNeil and Company is one of the nation’s largest insurers of EMS, providing policies to more than 3,000 emergency service agencies across 48 states; these agencies provide an estimated 3.8 million emergency responses and medical and wheelchair van transports annually.

Data Collection and Processing
We obtained claims data from the insurance company’s computer and paper records. A computer database contained key aspects of each incident including claimant and insured identities, basic policy information, financial information (including actual or estimated total incurred costs), and a brief description of the event. Paper records, including legal depositions, consultant reports, and other related documentation, contained additional details of each event. In addition, internal communications and claim summaries existed in a separate computer database.

Trained paramedics performed chart abstraction, following standard record review guidelines. To identify potential cases, we first searched the case descriptions of the computer database, omitting claims clearly meeting exclusion criteria; for example, cases involving wrongful termination or workplace harassment. The abstractors manually reviewed the paper records of the remaining claims to confirm inclusion or exclusion.

The abstractors performed structured chart review of cases meeting inclusion criteria, obtaining information from insurance and legal records; for example, claim summaries, internal communications, consultant reports, legal depositions and communications, and other relevant insurance files. We used manual record review because the electronic data contained insufficient information to characterize the nature of each event. As restricted by our institutional review boards, the abstractors did not use medical records or EMS patient care reports. This approach was appropriate because insurance and legal records often summarize the salient details of an event with greater clarity than general medical records.

The abstractors used a standard, confidential, laptop computer–based data collection instrument developed for the study. We defined variables by study team consensus, drawing on published reports of individuals EMS adverse events supplemented by a preliminary review of sample insurance files. The computer database contained drop-down boxes to help standardize responses. The data set was deidentified before analysis by the lead investigators.

The paramedic abstractors received individual and group training from members of the study team, including the review of written abstraction procedures and the trial abstraction of sample insurance claims files. Inter-rater agreement on initial test cases was fair ($\kappa=0.62$). The abstractors consulted members of the study team when they required assistance in interpreting the events of a case. Randomly selected charts were rereviewed throughout the effort. Inconsistent entries observed on interim reviews of the computer database automatically triggered a rereview of the relevant cases. Because of resource limitations, we did not systematically rereview abstracted data. Because the study was descriptive (and not inferential), we did not blind abstractors to the study goals. The study team communicated through periodic monitoring meetings and frequent telephone and e-mail communications. The abstractors completed data abstraction during January 1, 2006, to October 31, 2006.
Selection of Participants

We included all tort claims filed during the study period January 1, 2003, through December 31, 2004, arising from EMS response to a call or provision of patient care and resulting in alleged injury to patients or other individuals. We included claims associated with fire, ambulance, or other agencies providing EMS-related care. We included incidents occurring during emergency or nonemergency situations, including transports between medical facilities or to or from other destinations (eg, physician offices, patient home).

We excluded events without injury to patients or other individuals, events resulting in injury to employees only, claims of discrimination, wrongful termination or harassment, and events with property or vehicle damage only. We also excluded events occurring on EMS or fire agency property without connection to a specific emergency response or patient care incident; for example, instances in which an individual fell in the station or on the parking lot. Because of resource limitations, we a priori excluded and did not review emergency vehicle crashes with less than $10,000 in actual or predicted total incurred costs. We chose this threshold according to the insurance company’s opinion that emergency vehicle crash claims below this figure were less likely to involve significant bodily injury.

We included both open and closed claims in this analysis. “Closed” cases denoted claims in which the insurer ascertained relevant events and determined final financial remuneration, if any. In contrast, “open” cases denoted instances in which the claim had not reached final resolution; for example, cases in early stages of investigation or discovery, cases currently undergoing court trial, and situations in which the final extent of injuries has not been quantified (for example, an individual requiring extended rehabilitation after a traumatic brain injury). Although most previous efforts primarily used closed claims, we included both open and closed cases to encompass the broadest possible range of the most current cases. During preliminary reviews, we determined that the salient aspects of open cases could be readily identified.

Outcome Measures

We identified the status (open, closed, or unknown) and legal outcome (payment to claimant, out-of-court settlement or trial verdict) of each claim as of the date of data abstraction. We identified the general characteristics of each incident, including the age and sex of the claimants, the type of emergency vehicle involved (ground ambulance, wheelchair or stretcher van, fire department vehicle, air medical helicopters EMS first response vehicle), and the mode of emergency response (emergency versus nonemergency). We identified the general category of each adverse event, broadly classifying the events as (1) emergency vehicle crash or movement, (2) patient handling, (3) clinical management, (4) response or transport, and (5) other events. The study team formulated these broad categories after a review of the literature and a preliminary examination of select cases.

Within the category emergency vehicle crash or movement, we included vehicular crashes, as well as incidents resulting from movement of the vehicle (for example, an individual falling from the stretcher in a moving ambulance). Patient handling or moving events included instances in which the stretcher or wheelchair “tipped,” in which the patient fell or was dropped by emergency personnel, and events in which the patient was otherwise injured during movement or handling. Clinical management included adverse drug events, airway management events, procedural or medical decision incidents, or the absence or malfunction of key medical or rescue equipment. Response or transport events involved EMS dispatch, response, navigation to or from the scene, or delay of care.

We identified the injuries reported for each event, categorizing these outcomes as death, life-threatening, or disabling injuries and non–life-threatening/other/unknown injuries (emotional, death or injury to a fetus, and other). We did not include injuries sustained by emergency personnel.

We collected total incurred cost data compiled by the insurance company for each case as of January 1, 2006. For closed cases, the total incurred cost represented the total accrued cost of the case, including legal, medical, and settlement fees. For open cases, the total incurred cost represented the insurance adjustor’s best (worst-case) projection of the total cost of the case. Insurance adjustors followed established actuarial practices to develop these estimates, drawing on information about the nature of the claim, the involved injuries, the geographic location of the claim, the characteristics of the claimant and insured parties, and historical data from similar cases. In practical application, insurance companies place strong emphasis on the accuracy of these estimates because these figures identify the financial reserves needed at the onset of a claim.

Primary Data Analysis

We analyzed the data with descriptive techniques. We calculated proportions and exact binomial confidence interval for each adverse event category and subcategory and for each of the outcomes (injuries). We evaluated the distribution of injuries within each adverse event category. We calculated the median, interquartile range (IQR), and sum of total incurred cost within each and across all adverse event categories. We performed data storage and analysis using Microsoft Access (Microsoft, Inc., Redmond, WA) and Stata v.9.2 (StataCorp, College Station, TX).

RESULTS

Of 2,753 claims occurring during the study period, 326 met inclusion criteria. Of the 2,427 excluded cases, most were emergency vehicle crashes with less than $10,000 of total incurred costs (60%), incidents not related to EMS response or care (15%), events with property damage only (9%), and discrimination claims (5%). Of the 326 included cases, 144 (44%) were settled without trial and 17 (5%)
Table 1. Adverse event categories.

<table>
<thead>
<tr>
<th>Adverse Event</th>
<th>No. (%)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency vehicle crash or movement*</td>
<td>122 (37; 32-43)</td>
<td></td>
</tr>
<tr>
<td>Emergency vehicle crash</td>
<td>115</td>
<td></td>
</tr>
<tr>
<td>Emergency vehicle movement</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Patient handling</td>
<td>118 (36; 31-41)</td>
<td></td>
</tr>
<tr>
<td>Personnel dropped patient</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Stretcher or wheelchair tipped over</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Patient injured during stretcher/wheelchair movement</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Patient fell</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Clinical management</td>
<td>40 (12; 9-16)</td>
<td></td>
</tr>
<tr>
<td>Airway management</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Adverse drug reaction</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Other medical management events</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Lack of or failure to bring equipment on scene</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Failure or malfunction of equipment</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Response or transport event</td>
<td>25 (8; 5-11)</td>
<td></td>
</tr>
<tr>
<td>Response, dispatch or navigational events, or delay of care</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Transportation events</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Other events</td>
<td>33 (10; 7-14)</td>
<td></td>
</tr>
</tbody>
</table>

CI, Confidence interval.

Total of 326 events. Select incidents were classified with more than 1 adverse event category.

proceeded to trial at the time of data abstraction. Case status was open for 122 (37%) and unknown for 43 (13%). Of the 161 resolved cases, 109 (68%) resulted in payment to the claimant.

The median claimant age was 52 years (IQR 32 to 69 years; range 8 months to 93 years). Pediatric claimants (age <18 years) comprised 21 cases (6%). Most claimants were female (n=194; 60%). Emergency vehicles involved in the events included ground ambulances 219 (67%), wheelchair and stretcher vans 62 (19%), fire department vehicles 19 (6%), air medical helicopters 6 (2%), EMS first response vehicles 9 (3%), and other vehicles 16 (13%). Modes of response included emergency 137 (42%), nonemergency 113 (35%), and unknown 76 (23%). The incident involved an interfacility transfer in 109 (33%) cases.

Emergency vehicle crash or movement and patient handling incidents were the most common adverse events; these 2 categories collectively composed more than 70% of the claims (Table 1). Pedestrians, bicyclists, and occupants of other vehicles were injured in more than half of the emergency vehicle crash cases (n=70; 57%). The most common patient handling event was dropping of the patient; this category primarily included instances in which the stretcher collapsed, the patient was dropped during manual lifting of the stretcher or wheelchair, or the patient was dropped while being manually lifted or transferred to or from a wheelchair or stretcher.

Airway management errors (n=14) comprised more than one third of the clinical management events, primarily encompassing instances in which endotracheal intubation efforts were prolonged or unsuccessful. There were no instances of unrecognized esophageal intubation. Adverse drug reactions (n=5) involved errors in the selection, dose, or manner of administration. Other medical management events (n=15) involved procedural, patient assessment, or medical decisionmaking deviations. Failure of equipment events (n=7) primarily included defibrillator malfunctions and stretcher or wheelchair part failures. The transportation events (n=12) mostly included failure to transport or transportation to an inappropriate destination facility.

Approximately one fourth of the claimants sustained death or a life-threatening or disabling injury (Table 2). Estimated total incurred costs are summarized in Table 3.

**LIMITATIONS**

Critics note the scientific limitations of malpractice or tort claims data, including their representation of only a small proportion of total adverse events, the lag time between an event and the initiation of a claim, and the often poor correlation between the claim of tort and the actual root cause of the adverse event. 

However, claims data often provide comprehensive descriptions of events; additional levels of detail may require prospective study. Claims data also feature incidents associated with bodily or other injury, excluding cases with unclear harm.

Our analysis highlights the most common adverse events resulting in tort claims at one large national insurer of EMS agencies but does not indicate the national prevalence or incidence of these events. Given the range of clients covered by the insurance company, we believe that the relative distribution of adverse events categories observed in this series likely parallels national figures.

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Table 2. Adverse events and associated patient outcomes (injuries).

<table>
<thead>
<tr>
<th>Adverse Event Category</th>
<th>Outcome (Injury)</th>
<th>Life-Threatening or Disabling</th>
<th>Non-Life-Threatening, Other, or Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency vehicle crash or movement*</td>
<td>Death</td>
<td>5</td>
<td>10</td>
<td>107</td>
</tr>
<tr>
<td>Patient handling</td>
<td></td>
<td>3</td>
<td>4</td>
<td>111</td>
</tr>
<tr>
<td>Clinical management</td>
<td></td>
<td>14</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Response or transport event</td>
<td></td>
<td>18</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Other events</td>
<td></td>
<td>12</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>Total (%)</td>
<td></td>
<td>54</td>
<td>25</td>
<td>247</td>
</tr>
</tbody>
</table>

Outcome percentages and 95% confidence intervals reflect a total of 326 events. Select incidents were classified with more than 1 adverse event category.

*Includes only emergency vehicle crashes or movement events with greater than $10,000 in estimated total incurred costs.

Table 3. Estimated total incurred costs.

<table>
<thead>
<tr>
<th>Outcome (Injury)</th>
<th>Death</th>
<th>Life-Threatening or Disabling</th>
<th>Non-Life-Threatening, Other, or Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency vehicle crash or movement*</td>
<td>5</td>
<td>10</td>
<td>107</td>
<td>122</td>
</tr>
<tr>
<td>Patient handling</td>
<td>3</td>
<td>4</td>
<td>111</td>
<td>118</td>
</tr>
<tr>
<td>Clinical management</td>
<td>14</td>
<td>6</td>
<td>14</td>
<td>31</td>
</tr>
<tr>
<td>Response or transport event</td>
<td>18</td>
<td>1</td>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>Other events</td>
<td>12</td>
<td>4</td>
<td>17</td>
<td>33</td>
</tr>
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<td>Total (%)</td>
<td>54</td>
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Outcome percentages and 95% confidence intervals reflect a total of 326 events. Select incidents were classified with more than 1 adverse event category.

*Includes only emergency vehicle crashes or movement events with greater than $10,000 in estimated total incurred costs.
Table 3. Estimated total incurred costs.

<table>
<thead>
<tr>
<th>Adverse Event</th>
<th>Median (IQR) Total Incurred Cost, $</th>
<th>Sum of Total Incurred Costs (All Claims), $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency vehicle crash or movement* (n=122)</td>
<td>23,000 (15,000-48,000)</td>
<td>8,712,000</td>
</tr>
<tr>
<td>Patient handling (n=118) (n=40)</td>
<td>8,000 (1,000-29,000)</td>
<td>3,280,000</td>
</tr>
<tr>
<td>Clinical management (n=25)</td>
<td>24,000 (8,000-71,000)</td>
<td>4,741,000</td>
</tr>
<tr>
<td>Response or transport event (n=33)</td>
<td>22,000 (3,000-48,000)</td>
<td>2,047,000</td>
</tr>
<tr>
<td>Other events (n=24)</td>
<td>17,000 (4,000-35,000)</td>
<td>1,570,000</td>
</tr>
<tr>
<td>All events</td>
<td>17,000 (7,000-42,000)</td>
<td>19,636,000</td>
</tr>
</tbody>
</table>

Figures rounded to nearest $1,000. Includes both closed and open cases. Total incurred amounts estimated by adjustors for open cases as of January 1, 2006. Total of 326 cases.

*Includes only emergency vehicle crash or movement events with greater than $10,000 in estimated total incurred costs.

Many adverse events may occur without triggering a tort claim. We did not conduct additional reviews to determine or verify causality, which may be difficult to prove with tort data. However, the most prevalent events in this series (emergency vehicle crashes and patient handling mishaps) have plausible connections between adverse event and claimant injury.

We did not perform medical record review, which would have required obtaining Health Information Portability and Accountability Act authorization from each claimant, a process that was not logistically feasible. Although insurance and legal records can misrepresent the actual medical condition or alleged injuries, we believed that the data were suitable, given the broader aims of the study.

Because insurance claims and legal documents often summarize the salient details of an event, hindsight bias may have influenced data abstraction.16,17 Also, the use of predefined event categories may have unintentionally introduced classification bias. Because of limitations with the available data, we were not able to link the observed events to individual emergency agency characteristics. We did not articulate additional details of the low-frequency incidents (for example, adverse drug reactions), to preserve the confidentiality of the individual events. We also did not evaluate injuries to EMS personnel, which have been highlighted by previous efforts.18-20

The correlation between total incurred claims costs and clinical severity remains unproven. Total incurred cost figures often include costs not directly related to the incurred injury or medical care; for example, administrative and legal fees. Although the adjustors estimated worst-case figures for open claims, we observed minimal differences between total incurred costs for open and closed claims (P=.7).

Although they do not provide emergency response, we included wheelchair and stretcher van events because of the frequency of their claims and their functional similarities to other aspects of EMS. In addition, many wheelchair and stretcher vans are associated with EMS agencies that provide emergency response.

We did not include emergency vehicle crashes with less than $10,000 in total incurred costs. Because of resource limitations, we were unable to formally test the insurance company’s estimation that most claims under this threshold did not involve serious bodily injury. Had we included all emergency vehicle crashes in this analysis, we clearly would have found that these events composed the largest proportion of all claims events. The data in this series were inadequate to characterize the circumstances of emergency vehicle crashes. However, previous efforts have better elucidated these details by using crash-specific data and methodology.3,21-27

**DISCUSSION**

EMS care encompasses latent factors that may potentiate the risk of adverse events. For example, EMS providers deliver advanced care in the uncontrolled field environment, with minimal supervision or assistance.28 EMS care includes difficult tasks such as endotracheal intubation, cardiac rhythm interpretation, medication administration, and the execution of complex resuscitation algorithms. EMS care also encompasses unique tasks not commonly performed in other settings; for example, the rescue, extrication, movement, and transportation of patients. Few efforts describe the spectrum of adverse events occurring in this setting.29

Our effort provides an important first glimpse at the adverse events associated with tort claims against EMS providers in the United States. This analysis was not designed to indicate the national prevalence or incidence of EMS tort claims or adverse events. However, according to our observations and the insurance company’s aggregate client data, we estimate that tort claims involving harm to patients or other individuals may occur in at least 1 of every 23,000 EMS episodes. The incidence may be higher for nonemergency medical and wheelchair van transports. Our effort also highlights underrecognized incidents; for example, few series describe EMS patient handling mishaps.30-33 Although tort cost figures often contain biases from factors unrelated to the incident, our analysis provides an initial estimate of the financial effect of these adverse events.

Of particular interest in this series was the predominance of emergency vehicle crashes and patient handling mishaps over clinical management adverse events. This observation contrasts with other areas of health care, in which tort claims usually relate to clinical care.9,10,12,15,34-36 This observation draws attention to EMS’s additional and unique care elements; for example, dispatch, response, patient extrication and movement, scene management, and transportation. These elements are not prominent in other areas of health care. Our findings suggest that EMS quality improvement efforts must encompass not just clinical but also operational aspects of care.

Previous efforts describing tort claims against EMS are limited to small series involving single EMS agencies.37-39 One broader effort used a public jury verdict database that included only incidents proceeding to trial, thus underestimating the
frequency of adverse events. In contrast, our effort draws on current cases from one of the nation’s largest insurers of EMS. Our series is also broader, encompassing all tort claims leading to an insurance claim, not just those resulting in threatened or actual litigation. Because many tort claims do not progress to trial, our series may better capture the range of associated adverse events.

Although not designed for surveillance, claims data often provide readily available adverse event information without the need for pre-established reporting systems. Organized evaluations of malpractice claims have provided the foundation for many of the most important improvements in patient safety. For example, observations from the American Society of Anesthesiology’s Closed Claims Analysis Project spurred key safety practices such as the standard use of end-tidal capnography to confirm endotracheal tube placement in the operating room. Despite the inherent limitations of claims data, our analysis offers a reasonable basis for generating hypotheses about EMS adverse events. Our effort also identifies potential areas for improving EMS operations and care.

Emergency vehicle crashes and patient handling mishaps were the most common adverse events associated with tort claims against EMS agencies. Clinical management and other incidents were less common. Our effort highlights potential areas for improving EMS operations and care.

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Address for correspondence: Henry E. Wang, MD, MS, Department of Emergency Medicine, University of Pittsburgh, 230 McKee Place, Suite 400, Pittsburgh, PA 15213; 412-647-4925, fax 412-647-6999; E-mail wanghe@upmc.edu.

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