Incident Reporting in Emergency Medicine: A Thematic Analysis of Events

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Background: Incident reporting is a recognized tool for healthcare quality improvement. These systems, which aim to capture near-misses and harm events, enable organizations to gather critical information about failure modes and design mitigation strategies. Although many hospitals have employed these systems, little is known about safety themes in emergency medicine incident reporting. Our objective was to systematically analyze and thematically code 1 year of incident reports.

Methods: A mixed-methods analysis was performed on 1 year of safety reporting data from a large, urban tertiary-care emergency department using a modified grounded theory approach.

Results: Between January 1 and December 31, 2015, there were 108,436 emergency department visits. During this time, 750 incident reports were filed. Twenty-nine themes were used to code the reports, with 744 codes applied. The most common themes were related to delays (138/750, 18.4%), medication safety (136/750, 18.1%), and failures in communication (110/750, 14.7%). A total of 48.8% (366/750) of reports were submitted by nurses.

Conclusions: The most prominent themes during 1 year of incident reports were related to medication safety, delays, and communication. Relative to hospital-wide reporting patterns, a higher proportion of reports were submitted by physicians. Despite this, overall incident reporting remains low, and more is needed to engage physicians in reporting.

Key Words: patient safety, emergency medicine, medical errors, incident reporting

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Incident reporting has long been recognized as an important tool for healthcare quality improvement. Following the Harvard Medical Practice Study, which estimated that 108,000 people die from iatrogenic injury each year, the release of the landmark *To Err Is Human* called on hospitals to participate in voluntary reporting as a means of enhancing patient safety programs.[1,2] Since that time, voluntary reporting systems have proliferated and are now mandated by both the Centers for Medicare and Medicaid Services and the Joint Commission.[3,4]

These systems, which aim to capture both near-misses and harm events, enable organizations to gather critical information about their failure modes and to design mitigation strategies to prevent these events from happening again.[5] Although now widely adopted, the utility of these systems is variable. For these systems to effectively drive improvements that reduce harm, organizations must not only collect events but must also categorize the frequency, type, and contributing factors associated with the events.[6–8]

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The emergency department (ED) is an area fraught with error.[9–13] The combination of the complexity of care, overcrowding, resource constraints, frequent interruptions, numerous handoffs, the urgency of many interventions, and limited available data have been shown to contribute to this error-prone environment.[9,14–17] Despite this, little has been written about the safety themes in emergency medicine incident reporting. To our knowledge, only 3 previous studies have been published in the peer-reviewed literature related specifically to incident reporting in emergency medicine. Of these, one included physician reporting related to diagnostic error only,[18] one looked only at medication-related reports,[19] and one at ED radiology-related reports[20]; none analyzed the content of all incident reports. The remainder of the studies looking at error in the ED has instead relied on other sources of data such as patient interviews, malpractice claims, and morbidity and mortality conferences.[14,21–24]

Our objective was to systematically analyze and thematically code 1 year of incident reports, with the objective of better understanding the areas of greatest risk and to determine whether the source of data would identify new areas of opportunity to improve patient safety in this complex environment.

METHODS

Study Setting and Subjects

This project was conducted at a large, urban tertiary-care ED as a part of a larger departmental patient safety effort directed to better understanding the areas of greatest risk in the ED. At the time of this study, the institution used a home-grown electronic health record (EHR) to record most patient data. This EHR also provided clinical decision support with integrated best practice guidelines for test ordering and medication management capabilities to help mitigate medication error. This included alerts for excessive dosing, known allergies, and certain mediation contraindications.

The project site's patient safety infrastructure was robust at the time of study. This included a 20-member interdisciplinary ED quality and safety committee chaired by a senior physician responsible for quality and patient safety in emergency medicine. The departmental quality infrastructure was also supported by 2 ED nurses with responsibilities that included the investigation and mitigation of safety events and by a central safety specialist in the hospital's center for quality and safety who served as a content expert to support the department.

As a quality improvement effort, this study was exempt from human subject review by the institutional review board. We assessed incident reports submitted between January 1, 2015, and December 31, 2015.

Incident Reporting System and Themes

The project site uses incident reporting as a voluntary method for reporting events deemed to be a risk to patient safety. These include adverse events as well events that are thought by the reporter to have had potential to result in patient harm. All hospital employees have access to the confidential online safety reporting

system and are oriented to its use at the time of hire. Employees undergo annual training on the hospital's credo and boundaries statement, which requires reporting of errors, and are encouraged by their departmental patient safety leaders to report.

Reports consist of patient information, reporter role, location of the event, and an open-ended field for a narrative description of the event. Once submitted, reports are triaged by a centralized team of safety specialists, who analyze the severity of the event on the basis of the degree of potential harm and the potential frequency of the event. Once a severity score has been assigned, the event is "tagged" to the departments involved. Reports can be tagged to several clinical departments. Reports are then sent to departmental patient safety leaders and are investigated.

Investigation is framed using root cause analysis approach to look at contributing factors and views individuals' behavior in a just culture framework. Once investigated, detailed action plans are developed and improvements are implemented and tracked, both locally within the ED quality and safety committee, as well as centrally within the center for quality and safety for events that are deemed more serious on the basis of the severity score. The detailed content of all safety reports and the investigation are protected by peer review privilege as afforded by state law.

A modified grounded theory[25] was employed to develop a set of codes related to the reports. An initial set of codes was developed by the project lead through an iterative reading of the entire set of incident reports. The ED quality committee, a group of ED nurses and attending physicians involved in incident reporting review and investigation, then revised the codes. The final codebook was pilot tested on 10% (75) of incident reports with no subsequent revisions deemed necessary.

The project lead (E.L.A.) reviewed all safety reports tagged to the ED during the study period. Reports were initially read to determine thematic areas represented in the report. They were then re-read to determine whether there were any subthemes identified. To establish reliability, a second member of the project team (S.N.) re-coded 10% (75) of the incident reports. The final codebook had 29 thematic code categories. It was determined that multiple themes could be applied to a single incident report, if applicable.

Statistical Analysis

Descriptive statistics were generated to quantify summary statistics and the frequency of themes. Concordance between the reviewers was assessed by κ statistic.

RESULTS

During the 1-year study period, there were 108,436 ED visits. A total of 750 incident reports were filed (0.69%), 366 (48.8%) by nurses, 83 (11.1%) by pharmacists, 68 (9.1%) by attending physicians, 62 (8.3%) by technologists, 50 (6.7%) by resident physicians, 35 (4.7%) by managers, and 16 (2.1%) by nurse practitioners. Administrative and support staff, case managers, clinical nurse specialists, and physicians assistants each filed less than 2% of reports.

Agreement in coding themes between the first and second reviewer was very good ($\kappa = 0.862$). Table 1 depicts the number and percentage of themes identified in incident reports. The most common themes were related to delays (138/750, 18.4%), medication safety (136/750, 18.1%), and failures in communication (110/750, 14.7%).

DISCUSSION

In an effort to understand the themes in emergency medicine incident reporting, we analyzed 1 year of voluntary incident reports, representing 1 safety report per 145 patients. Most themes in these reports were related to delays, medication safety, and communication.

Medication safety, a well-documented area of risk in emergency medicine,[15,19,24,26,27] was also a theme in our study. Most events were related to documentation, incorrect dosing, a known contraindication, or the wrong medication or patient. Wrong patient errors have previously been documented as a failure mode in both medication and radiology safety in the ED.[19,20] In our study, wrong patient errors represented 8.9% of medication-related reports and 33.3% of all radiology-related reports.

At the time of this study, our institution was preparing to transition to a new EHR. Barcoding, a technology associated with many of the new EHRs, has been shown to substantially reduce medication-related errors.[27] Additional study is needed to understand whether the prevalence of medication- and radiology-related safety reports decrease after the implementation of this technology.

Interestingly, communication was a prevalent theme in our study, representing the third most common theme in the overall incident reports during the study period. Although this has not yet been identified in the limited emergency medicine incident reporting literature, previous studies have looked at the role of communication in other aspects of safety event analysis. Cosby et al.[21] examined contributing factors in 15 years of morbidity and mortality conferences and found that teamwork, including miscommunication, was among the top 3 contributing factors leading to medical error. Risser et al.[22] subsequently looked at a retrospective sample of malpractice cases and found that an average of 8.8 teamwork failures occurred per case. In another prospective, observational study of reported errors at an academic ED, 12% of errors were found to be related to communication.[14] Specific to provider-provider communication, Curley et al.[28] found that critical vital sign abnormalities were omitted in 1 of every 7 ED handoffs.

This theme, which we found to be predominantly related to provider-provider communication, reinforces the need for standardized communication aids and the adoption of tools specific to certain phases of communication, such as illness severity/patient summary/action list/situational awareness/synthesis by receiver for handoffs.[29] In addition, ED leadership may want to invest in more general strategies to help support structured communication, such as crew resource management. Crew resource management, borrowed from aviation and now endorsed by the Agency for Healthcare Research and Quality and the Institute of Medicine, focuses on nontechnical skills to increase situational awareness and mitigate risk through structured communication.[30,31]

In our study, 366 (48.8%) of incident reports were submitted by nurses, whereas 118 (15.7%) of reports were submitted by attending and resident physicians. The low rate of physician reporting relative to nursing reporting is in keeping with available ED data.[14,23] Although the rate of ED physician reporting is higher than hospital-wide MD reporting, we would like to see even higher rates, given that physicians have been noted to report distinctly different event types than other health care providers.[18,32]

Barriers to incident reporting have previously been explored and are believed to include fear of disciplinary action,[33,34] lengthy reporting forms paired with insufficient time,[35] and, the leading cause in several studies, lack of feedback to reporters.[35,36] These barriers should be addressed by strengthening systems for reporting, creating streamlined submissions that draw on the information already housed in the medical record, and developing efficient systems for meaningful feedback to reporters. Building on the work of Benn et al.,[37] where 15 requirements for the design of effective feedback systems are outlined, more work needs to be conducted to understand the most effective ways to implement strong systems.

TABLE 1. Safety Reports

	No. Coded Text (744)*	% of Total Incident Reports (750)
Delay	138	18.4
Delay in treatment	53	
Prolonged LOS	26	
Delay in performing a test	23	
Delay in consultation	13	
Delay in transportation	7	
Delay in transfer to appropriate level of care	5	
Delay in diagnosis	4	
Delay other	4	
Delay in recognizing a complication	3	
Medication related	136	18.1
Medication other	37	
Medication: wrong dose	39	
Medication: known allergy/ contraindication	17	
Medication: wrong drug	16	
Medication: inadequate documentation	15	
Medication: wrong patient	12	
Communication	110	14.7
Provider-provider (handoff)	95	
Provider-provider (conflict/ professionalism)	9	
Provider-patient	6	
Laboratory	50	6.7
Mislabeled specimen	41	
Laboratory other	8	
Lost specimen	1	
Falls	43	5.7
Patient supervision/sitter	41	5.5
Patient identification	27	3.6
Precautions	26	3.5
Misdiagnosis	20	2.7
Equipment related	17	2.3
Available equipment	9	
Equipment cleanliness	6	
Equipment other	2	
Blood products	17	2.3
Disruptive patient behavior	15	2
Technical error	15	2
Radiology related	12	1.6
Radiology: wrong patient	4	
Radiology: wrong site	4	
Radiology other	4	
ED bed/monitor availability	12	1.6
Staff safety	10	1.3
Pain management	9	1.2
Environment	8	1.1
Cleanliness	1	
Lost belonging	5	
Environment other	2	
Discharge process	8	1.1
Interpreter services	6	<1
Skin	5	<1
Registration	4	<1
Safety culture/punitive response to error	3	<1
Lost records	3	<1
Dignity, treating with kindness	3	<1
Responsiveness (MD to other staff)	2	<1
Privacy	1	<1
Perceived lack of an MD/role clarity	1	<1

LOS, length of stay.

Issues that are of great focus at the national level, including pain management, misdiagnosis, precautions, and falls, each represented less than 10% of all incident reports in our study. Some of these safety issues are more likely to be identified through other methods such as retrospective review in the case of misdiagnosis or through patient survey in the case of pain management. More study is needed, however, because this may represent a need to increase provider education around these risks and to encourage reporting. Alternately, it may be that these failure modes are simply less frequently encountered than errors related to delays, miscommunication, and medication safety and may represent an opportunity to refocus national attention on these issues.

Limitations

Given that this study looked at incident reports alone and that research suggests that incident reports capture only a fraction of adverse events,[32,38,39] we cannot draw conclusions about the overall frequency of harm or near-miss events in emergency medicine. The nature of our study means that we were relying on the information captured in the safety reporting system for qualitative coding. Although the descriptive entries in the reporting system were robust, we were not able to obtain any additional clarifying information and, as a result, themes, not mentioned in the report but contributing to the event, would have been missed. As a single-site study and the first study to look at all safety reports in emergency medicine, we are unable to compare these results with other institutions. This study is also limited in its cross-sectional design, which does not allow for identifying trend over time, Lastly, our ED operates at or over capacity frequently, which may bias the results toward more safety events relating to delays.

CONCLUSIONS

Our findings identify important themes in ED patient safety, including medication safety, delays, and communication. The themes identified through this method highlight the challenges of providing high-quality care in busy EDs and point toward opportunities to focus future research on better characterizing the risks in these areas and focus improvement efforts on improving medication safety, delays, and communication errors.

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