Emergency Medicine Resident Errors: Identification and Educational Utilization

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__Abstract.__ **Objectives:** To evaluate the error management systems emergency medicine residency directors (EMRDs) use to identify and report clinical errors made by emergency medicine residents and their satisfaction with error-based teaching as an educational tool. **Methods:** All 112 EMRDs listed by the Accreditation Council for Graduate Medical Education in 1996 were sent a 15-item survey. Five areas of error evaluation and management were assessed: 1) systems for tracking and reporting clinical errors; 2) resident participation in the systems; 3) resident remediation; 4) EMRD-perceived satisfaction with current error-reporting mechanisms, their educational value, and their ability to identify and prevent errors; and 5) EMRDs' perceptions of faculty and resident satisfaction with the systems. **Results:** The response rate was 86%. All EMRDs indicated that methods are in place to track and report errors at their institutions. These include morbidity and mortality conference (94%), quality assurance case review conference (76%), and continuous quality improvement audits (60%). A majority of programs (58%) present resident cases anonymously in order to enhance teaching (39%), to avoid embarrassment (28%), and to avoid individual blame (24%). While mandated resident remediation is not required at 48% of the programs, 24% require lectures, 17% require written reports, and 6% require extra clinical shifts. The EMRDs rated the educational value of morbidity and mortality conference as outstanding (11%) or excellent (53%), and rated their systems for identifying key resident errors as outstanding (0%), excellent (14%), or good (47%). **Conclusions:** All emergency medicine residency programs have systems to track and report resident errors. Resident participation varies widely, as does resident remediation processes. Most EMRDs are satisfied with their systems but few EMRDs rate them as excellent in the detection or prevention of clinical errors. **Key words:** education; quality assurance; clinical operations. ACADEMIC EMERGENCY MEDICINE 2000; 7:1317–1320

C LINICAL error in medical practice is a well-recognized phenomenon. Previous studies of inpatient services in major teaching hospitals suggest that 3.7% to 38% of hospitalized patients suffer from an adverse iatrogenic event or illness.[1–3] Many of these iatrogenic events were caused by preventable errors.[1,2] Although much has been written on errors in medicine,[1–17] most studies have focused on adverse patient outcomes,[1–5] increased medical cost,[6,7] and the legal implications of such error.[8] Little attention has focused specifically on resident error educational systems.[9] For resident physicians in training, errors can become a source of emotional distress as well as learning opportunities.[10] Resident errors provide skillful medical educators with a unique teaching tool; however, little is know about how these errors are used in an educational format. To the best of our knowledge, no previous study has investigated how emergency medicine (EM) residency programs track and report clinical errors made by their residents.

The objective of this study was to determine how error management systems varied between EM residency programs and to what degree EM residency directors (EMRDs) were satisfied with their systems' performance.

METHODS

__Study Design.__ The survey instrument was developed by the investigators to assess five areas of EM resident clinical error management. Prototype surveys were used to refine questions. The 15-item survey was sent to all EMRDs (available on request). The medical center's institutional review board approved the study protocol.

__Study Setting and Population.__ All 112 EMRDs listed by the Accreditation Council for Graduate Medical Education in 1996 were enlisted to partic-

TABLE 1. Reasons for Reporting Errors to Emergency Medicine Residents

Reason for Reporting Errors	Percentage of Residency Programs
Improve performance	66.75%
Change behavior	55.9%
Enhance responsibility	31.2%
Improve compliance	30.1%
Residency review committee	24.7%
Joint Commission on Accreditation of Healthcare Organizations	14.0%
Other	2.2%

ipate in the study. Nonresponders were mailed a second identical survey. The EMRDs were assured that their responses to the questionnaire would be held in strict confidence and the data would be compiled anonymously. We surveyed EMRDs because of their unique educational role with the EM residency program and departmental error management systems.

Survey Content. The survey instrument evaluated five areas of EM resident clinical error management: 1) methods for tracking and reporting resident errors; 2) resident participation in error management; 3) resident remediation; 4) satisfaction of EMRDs with the current error reporting mechanisms, their educational value, and their ability to identify and prevent errors; and 5) EMRDs' perceptions of faculty and resident satisfaction with their current error management systems.

Data Analysis. Results were tabulated anonymously. Percentage of positive responses were tabulated for each possible response and data were reported as percentages.

RESULTS

The response rate was 86% (96/112). Three programs responded but were unable to complete the survey because their programs had not yet enrolled a class. These three respondents were excluded from further analysis.

All of the responding residency programs had error management systems in place to track and report clinical errors by residents. These consisted of morbidity and mortality conference (94%), quality assurance (QA) audit review conference (76%), and radiographic and electrocardiogram (ECG) overread conferences (4%). Sixty-four percent of the programs used QA audits and 60% of the programs performed continuous quality improvement (CQI) on emergency department (ED) cases to identify and track errors. Errors were verbally communicated to residents at 83% of programs,

with 49% of programs formally following up verbally communicated errors with written documentation.

Morbidity and mortality conference was the most used error-based teaching conference (94% of programs). Morbidity and mortality conference was performed monthly at 62% of the programs and weekly at 20% of the programs.

Quality assurance programs varied widely. Although 76% of the programs had a QA case review conference, only 44% of the programs provided written individual reports of QA deficits. Twenty-five percent of the programs provided a written group QA report and 39% of the programs provided only a verbal report. The QA deficits were followed up by re-auditing individuals at 39% of the programs and re-auditing group performance at 61% of the programs. Seventeen percent of the programs had no mechanism in place for following up errors detected by the QA process. The EMRDs noted a number of different reasons why errors were reported to residents (Table 1).

Resident participation in error management systems varied. The involved resident presented his or her case at morbidity and mortality conference at 39% of the programs; cases were solely presented by faculty at 48% of programs. When faculty were involved with morbidity and mortality conference case presentations, the presenting faculty member was the EMRD at 20% of the programs. Morbidity and mortality conference case presentations were performed anonymously at 58% of the programs. The three most common reasons cited for this presentation style were to enhance teaching (39%), to avoid embarrassment (28%), and to avoid individual blame (24%). When the involved resident was identified, the two most common reasons cited for this method were to enhance teaching (39%) and to enforce personal responsibility for committing the error (16%).

Resident participation in QA tracking and reporting systems also varied. At 46% of the programs, residents developed and performed QA audits, while 40% of the programs required residents to perform predeveloped audits. Twenty-three percent of the programs did not require residents to participate in the QA process.

For methods of resident remediation, 49% of the EMRDs reported that no resident remediation was required after committing a clinical error. For the programs that required remediation, the various methods used by EMRDs are listed in Table 2.

For the overall satisfaction of EMRDs with their error management systems, 58% reported their systems to be "good" and 13% reported their systems to be "excellent" or "outstanding." The EMRDs rated the educational value of morbidity and mortality conference to be "outstanding" (11%) or "excellent" (53%). In rating their current error

management systems to detect key errors or assist in preventing future errors, none of the EMRDs reported their systems to be "outstanding"; 14% of EMRDs believed their systems were "excellent" and 47% reported them to be "good."

More EMRDs perceived that other faculty (47%) and residents (54%) shared their satisfaction with the overall error management systems. The EMRDs also believed faculty (44%) and residents (51%) perceived morbidity and mortality conference to be a significant educational tool. Of the EMRDs, 15% perceived that their fellow faculty believed their current error management systems were "excellent" or "outstanding" for detecting key errors.

DISCUSSION

"Above all do no harm." This principle from the Hippocratic oath defines the cultural standard for physicians in the delivery of health care.[4] This admonition, often interpreted to mean error-free performance, is socialized early in medical school and residency training. The general expectation is clear: physicians should never make errors while providing patient care.[4,5,8] Any error is perceived as a failure on the part of the involved physician.[4,8,11]

A direct outgrowth of this cultural standard is the reluctance among physicians to acknowledge their mistakes. Numerous studies have demonstrated that physicians are uniformly reluctant to discuss their errors, even though physicians acknowledge that they do occur.[4,10,12] These studies suggest that fear of criticism and personal embarrassment are the primary reasons for this behavior. Many physicians seem to fear that if they acknowledge an error, peers will regard them as incompetent or inadequate.[4,5,11] In addition, the overall public perception mandates that health care delivery be free of error.[4,8,10] When errors do occur, physicians often fear retribution through the legal system. This further enhances the fear of open reporting of errors.[8,9]

The industrial quality management community views errors as inevitable.[4,9] While individuals are not absolved of responsibility for error, systems have been developed to identify errors, and all errors are tracked.[13] Using this technique, many industries have developed and incorporated sophisticated error detection systems that allow for early error correction or prevention. All of these systems have been predicated upon the principle that human error will occur and systems must be designed to incorporate methods to detect and track their occurrence. Each of these events, when identified, provides an opportunity for improvement.[4,9,13] Implementation of these systems in medicine has proven difficult because of the lack of open reporting. This has been postulated to be a result of the

TABLE 2. Methods of Remediation for Emergency Medicine (EM) Residents

Method of Remediation	Percentage of Residency Programs
None	48.9%
Lectures	24.7%
Written reports	17.2%
Extra clinical duties	8.6%
Dependent on error	7.5%
Conference with EM residency director	7.5%

ingrained attitudes of physicians regarding accountability and blame, which tends to suppress open error reporting.[8,9]

The purpose of this study was to investigate the systems EMRDs use to identify and report clinical errors made by EM residents and their satisfaction with error-based teaching as an educational tool. Our data revealed that all EM residency programs provided a format for discussion of errors, either individually or in a conference format. Overall, the EMRDs rated morbidity and mortality conference to be an excellent educational tool and perceived that other faculty and residents also valued its educational benefits.

In 1991, Wu et al. demonstrated that a houseofficer who accepted responsibility for an error was more likely to undergo a beneficial change in practice. This acceptance of responsibility for error was strongly associated with emotional stress, with houseofficers reporting remorse, anger, guilt, and feelings of inadequacy. Despite these feelings, houseofficers were uniformly reluctant to inform or discuss mistakes with supervising physicians.[10] The results of this study demonstrated that morbidity and mortality conference cases are presented anonymously in almost 60% of programs, with the remaining programs identifying the resident involved in the case. The fact that many EM residency programs incorporate open discussion of errors may serve to educate residents that evaluating errors can be performed in an open manner.

While our results demonstrated that most EMRDs are pleased with the educational value of their error-based teaching conferences, very few believed that their error management systems were outstanding or excellent in assisting to identify key clinical errors or preventing future errors. This perceived weakness may serve as a marker for ED clinical operations directors to address with novel error management systems and studies in the future.

The Joint Commission on Accreditation of Healthcare Organizations has initiated a broad-based process to improve the health care system's ability to detect and prevent error.[9,13] This change, however, may take time to develop. A 1990 study reported that only 28% of U.S. medical schools of-

fered medical students or physician residents didactic education on QA.[13] Thus, future physicians may be inadequately trained to approach organizational problems in error management, further perpetuating the culture of not openly discussing errors.[9,13,14]

In 1998, the President's Advisory Commission on Consumer Protection and Quality in the Health Care Industry ranked error prevention as a top priority for the industry.[9] Increasingly, regulatory agencies and credentialing committees are requiring physician participation in medical systems revision.[13] Because of these requirements, the Accreditation Council for Graduate Medical Education has recommended that training programs ensure graduates understand the principles of quality improvement (QI).[14] This has been reinforced by the Pew Health Professions Commission, who recommended that all medical trainees participate in QI projects at some point during their medical training.[15] These mandates will require broader resident education in the principles of QI and the development of more effective error management systems.

In the aviation industry, teamwork training has been documented to decrease in-flight error.[16] Standard teamwork training skills are now routinely taught to all pilots and crews. Recent analysis of EM practices suggest teamwork training could result in error reduction in the ED.[16] Application of innovative educational systems, such as teamwork training, will be required to meet the mandates of the Joint Commission and the general public.[16,17]

LIMITATIONS AND FUTURE QUESTIONS

This study has several limitations. First, only EMRDs were surveyed; as a result, the data reflect only their perceptions and viewpoints on residency error management systems. Thus, the results are biased toward the perspective of EMRDs. Additionally, in most institutions, the clinical director of the ED is responsible for error detection systems. By surveying only EMRDs, we may have received an underassessment of EM resident clinical error management systems. Second, sample bias was a small limitation of this investigation since 14% of the EMRDs did not return the questionnaire. Third, the terms "clinical error," "quality assurance (QA)," and "continuous quality improvement (CQI)" were not specifically defined; thus, we could not ensure that all respondents used the same definitions when formulating their responses. Finally, it is incorrect to assume that all resident errors are identified and tracked. Although it is widely assumed that QA and CQI techniques accurately detect baseline error occurrence, to the best of our knowledge this has never been documented. These methods could have error detection capacities that vary widely both within and between institutions.

Future studies should be directed toward examining the impact of behavior modification on EM residents who have undergone a training program in QI and open acknowledgment of clinical errors. In addition, future research should assess the effect of teamwork training on EM residents.

CONCLUSIONS

All EM residency programs have systems to track and report resident errors. Resident participation varies widely between systems, as does resident remediation processes. Most EMRDs are satisfied with their systems but few EMRDs rate them as excellent in the detection or prevention of error.

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