

CLINICAL PRACTICE

Patient Concerns about Medical Errors in Emergency Departments

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Abstract

Objective: Despite large numbers of emergency encounters, little is known about how emergency department (ED) patients conceptualize their risk of medical errors. This study examines how safe ED patients feel from medical errors, which errors are of greatest concern, how concerns differ by patient and hospital characteristics, and the relationship between concerns and willingness to return for future care. **Methods:** Multiwave telephone interviews of 767 patients from 12 EDs were conducted. Patients were asked about their medical safety, concern about eight types of medical errors, and satisfaction with care. **Results:** Eighty-eight percent of patients believed that their safety from medical errors had been good, very good, or excellent; 38% of patients reported experiencing at least one specific error-related concern, most commonly misdiagnosis (22% of all patients), physician errors (16%), medication errors (16%), nursing errors (12%), and wrong test/procedure (10%). Concerns were associated

with gender ($p < 0.01$), age ($p < 0.0001$), ethnicity ($p < 0.001$), length of stay ($p < 0.001$), ED volume ($p < 0.0001$), day of week ($p < 0.0001$), and hospital type ($p < 0.0001$). Concerns were highly related to a patient's willingness to return to the ED. **Conclusions:** The majority of ED patients felt relatively safe from medical errors, yet a significant percentage of patients experienced concern about a specific error during their emergency encounter. Concerns varied by both patient and hospital characteristics and were highly linked to patient satisfaction. The selective nature of concerns may suggest that patients are attuned to cues they perceive to be linked to specific medical errors, but efforts to involve patients in error detection/prevention programs will be challenging given the stressful and intimidating nature of ED encounters. **Key words:** medical errors; patient safety; patient concerns; emergency department. *ACADEMIC EMERGENCY MEDICINE* 2005; 12:57-64.

Emergency department (ED) encounters may be among the most stressful and intimidating health care experiences for patients. With little time to psychologically prepare for the experience, patients often enter a fast-paced environment typified by high volume, high acuity, emotional patients, visible injuries, multiple handoffs, and staff shortages, characteristics that may make EDs prone to medical errors.¹ The intense nature of these experiences is exacerbated by the

dramatic increase in patient volumes in U.S. EDs, with the National Center for Health Statistics reporting that ED utilization increased by 14%, from 89.8 million to 102.8 million visits annually, from 1992 to 1999.^{2,3}

At the same time, concern about medical errors in the general public has been elevated⁴⁻⁶ by national media coverage of the two Institute of Medicine reports suggesting that preventable adverse events in American hospitals are a leading cause of death in the United States.^{7,8} The Harvard Medical Practice Study found that more than 70% of adverse events were judged to be secondary to negligence and more than 90% were judged to be "preventable."^{9,10} Several recent opinion polls have found that the general public believes that health care is only moderately safe, with approximately 75% of respondents indicating that they would be very concerned about a medical error if hospitalized^{4-6,11} and with more than 42% reporting that they or a close friend or relative had personally experienced a medical error.^{5,12} Further, our recent study of hospitalized patients found that 51% believed their medical safety was less than excellent during their hospitalization, and another 39% reported experiencing at least one error-related concern during their hospitalization. Unaddressed patient concerns may be linked to subsequent unwillingness to return to and

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recommend the hospital,³ unwillingness to follow medical advice,¹³⁻¹⁵ and an increase in malpractice claims.¹⁶⁻¹⁹

Although much of the attention on medical errors has focused on inpatient care, researchers have found safety concerns with emergency care, such as missed myocardial infarctions, missed appendicitis, misreading of radiographs, misdiagnosis, and medication dosing and administration errors.²⁰⁻²³ Research has also suggested that overcrowding, availability of providers, poor teamwork, availability of inpatient beds, and availability of alternative sources of medical care may be further contributing to medical errors in EDs.²⁴⁻²⁷

Despite the recent research examining medical errors, little is known about how patients themselves feel about their medical safety during an ED experience. With the federal government and numerous other organizations recommending that patients become actively involved in the detection and prevention of medical errors,^{4,28-33} a clear understanding of how patients conceptualize medical errors and of the specific error-related concerns they experience during ED encounters is needed. This information would help health care institutions and, in particular, EDs determine the most appropriate and effective ways of educating patients about potential errors, disclosing errors to patients, and potentially engaging patients in the detection and prevention of potential medical errors, thus adding an additional layer of protection against such errors.^{34,35}

We surveyed 767 patients from 12 midwestern hospital EDs to address three research questions: 1) How safe do patients in EDs feel from medical errors and what types of errors are of greatest concern? 2) How are these medical safety concerns related to patient and hospital characteristics? 3) What is the relationship between patient concern about medical errors and outcomes such as satisfaction and willingness to return for future care?

METHODS

Study Design. Telephone interviews were conducted with randomly selected patients seen in the EDs of 12 acute care hospitals of BJC Health Care between June and September 2002. The sample was stratified by facility, patient age, gender, and payer type. Patients admitted to inpatient status and those discharged home were eligible for participation. Patients discharged to a nursing home and those who had been surveyed in the previous 12 months were ineligible for participation. For patients younger than 18 years of age, the parent or responsible party completed the interview. The Washington University Human Studies Committee approved this study.

Study Setting and Population. Hospital EDs included those from one large adult academic hospital

(67,000 ED encounters/Level 1 trauma designation), three large metropolitan hospitals (28,000-75,000 ED encounters/no trauma designation), three midsize metropolitan hospitals (7,000-27,000 ED encounters/no trauma designation), four rural hospitals (7,500-17,400 ED encounters/no trauma designation), and one children's hospital (50,000 ED encounters/Level 1 trauma designation).

Study Protocol. Patients were contacted by a telephone representative from an independent research firm at their homes seven to ten days following the ED stay. The interviewer informed the participant about the purpose of the call and, if the subject agreed to participate, administered the instrument. Patients were asked to think back specifically to the time that they spent in the ED and to base their ratings only on that emergency experience and not on any previous or subsequent health care experiences. Interviewers were all extensively trained and utilized computer-assisted telephone interviewing systems to ensure data integrity and accuracy. No remuneration was given for participation.

Measurements. A structured process was utilized to develop the survey instrument used in this study. First, a series of nine focus groups and 27 one-on-one interviews were conducted with patients to identify how patients view their risk of medical errors and to understand the specific medical errors that they feared during their ED experience.³⁶ This process yielded eight specific types of concerns about medical errors that are described in detail below. Following cognitive interviews with 24 patients and pilot testing with 28 patients to refine the wording and flow of the items, the questions were added to an ongoing patient satisfaction measurement system that includes 23 items assessing satisfaction with multiple components of an ED experience (e.g., arrival, triage care, staff care delivery, physician care delivery, compassion to patients, compassion to family/visitors, environment, discharge, overall quality, advocacy, and perceived medical safety). This satisfaction instrument has been used in numerous studies and has been shown to have excellent reliability and validity.³⁷⁻³⁹

Based on these identified concerns, we augmented the patient satisfaction measurement instrument by asking patients to rate the overall level of medical safety (defined as "freedom from any medical error or mistake") they felt during their ED stay on a five-point scale (coded as excellent = 100, very good = 75, good = 50, fair = 25, poor = 0). Patients were also asked "whether there was a specific time during your emergency department stay you were concerned that the following medical error or problem would happen to you (coded as Yes/No)": 1) falling and being injured, 2) a mistake or error with medications, 3) problems with medical equipment, 4) a mistake by

nurses, 5) a mistake by physicians, 6) being mistaken for another patient, 7) wrong test/procedure, and 8) would be misdiagnosed. It is important to note that these concerns were from patients' conceptualization of medical errors, which differs somewhat from the traditional medical definition of a medical error.²¹

Information on patient's age, gender, ethnicity, type of insurance coverage, length of stay (in hours), day of week, and time of day was obtained through billing data. Patients seen between 7 AM and 3 PM were designated as day shift, those seen between 3 PM and 11 PM were designated as evening shift, and those seen between 11 PM and 7 AM were designated as night shift.

Data Analysis. Analysis was conducted to address three specific research questions: 1) How safe do patients in EDs feel from medical errors, and what types of errors are of greatest concern? 2) How are these concerns related to patient and hospital characteristics? 3) What is the relationship between patient concern about medical errors and outcomes such as satisfaction and willingness to return for future care?

Before formal data analysis, data-weighting techniques were applied to survey responses to adjust for disproportionate sampling at two levels: 1) individual patient level and 2) facility level. At the demographic level, the samples of respondents were stratified into eight age and gender groups. At the facility level, the samples were stratified into the 12 participating health care facilities and an identical process was used to create facility-level weights. In each case, weights were calculated to adjust for any overrepresentation or underrepresentation of these groups in the sample compared with the entire population. The product of the two weights (individual and facility) was applied in comparative analyses of satisfaction scores.

Analyses were conducted on the eight individual concerns and on two summary variables: 1) average number of the eight medical concerns experienced by each patient and 2) overall perception of freedom from medical error (rated on the five-point Likert scale described earlier). One-way analysis of variance was used to determine whether overall perceived medical safety and the average number of concerns differed by key patient and hospital characteristics. Chi-square tests of independence were used to determine whether the occurrence of individual concerns differed by these key characteristics.

A two-stage process was used to establish multivariate models to identify the factors contributing to overall perceived medical safety and average number of concerns. In the first stage, we used analysis of variance (one-way and multivariable) to examine simple associations between patient and hospital characteristics and safety concern outcomes in the full sample. In the second stage, we conducted individual analyses of variance for the various types of hospital facilities

(academic, children's, large metropolitan, midsize metropolitan, and rural) to examine how patient characteristics predict safety concerns differently within the various facility types. These results were consistent with those obtained in the analysis of all EDs aggregated together and as a result are not presented in this report. Bivariate correlations were calculated next to quantify the relationship between the safety concern variables and patient willingness to return to the hospital and to recommend it to family and friends. Finally, multiple linear regression was used to examine predictors of advocacy in the overall patient sample and within each hospital subsample.

Again, results were consistent across the hospital subsamples and overall patient sample. All assumptions for analysis of variance and multiple regression, including multicollinearity, were tested, and no assumption violations were found.

RESULTS

Participant Characteristics. A total of 767 of 1,262 ED patients (60.7%) who were contacted completed telephone interviews. Table 1 shows the age, gender, and ethnicity distributions, along with type of hospital, length of stay, and payer type.

Patients' Perceptions of Their Risk of Medical Errors. Eighty-eight percent of patients reported that their safety from medical errors had been good, very good, or excellent (Table 2). Further, 38% of patients reported that they had experienced at least one of the eight concerns during their ED stay, with the most common being misdiagnosis (22% of all patients), mistakes by physicians (16%), medication errors (16%), mistakes by nurses (12%), having the wrong test/procedure (10%), errors with medical equipment (9%), being mistaken for another patient (8%), and injury due to falling (6%). Although the number of error-related concerns reported by patients ranged from zero to eight, the median was only one concern, suggesting that the majority of patients did not experience global concerns about their medical safety but instead had very focused concerns about one or two specific potential medical errors during their stay.

Associations between Patient/hospital Characteristics and Error-related Concerns. Concerns about medical errors were also significantly linked to individual patient and hospital characteristics. The frequency of error-related concerns differed significantly by age ($p < 0.0001$), ethnicity ($p < 0.001$), type of health insurance coverage ($p < 0.01$), type of hospital ($p < 0.0001$), length of stay ($p < 0.001$), admitted to inpatient floor ($p < 0.001$), day of the week ($p < 0.003$), and volume of patients present in the ED ($p < 0.001$). Concerns were more frequent for patients in their 20s, with concerns dropping significantly for each

TABLE 1. Characteristics of Interviewed Patients (N = 767)

Age	36.38*	21.26†
Gender		
Female	482	62%
Male	285	38%
Ethnicity		
Asian	4	<1%
African American	399	52%
Other	4	<1%
White	360	47%
Facility		
Academic	234	30%
Children's	59	8%
Large metropolitan	157	20%
Midsize metropolitan	213	28%
Rural	104	14%
Payer		
Commercial	25	3%
Health maintenance organization	273	36%
Medicaid	116	15%
Medicare	91	12%
No insurance	57	7%
Preferred provider organization	23	3%
Workers compensation	24	3%
Unknown	158	21%
Shift		
Day	353	46%
Night	307	40%
Unknown	107	14%

Values are expressed as numbers and percentages unless otherwise indicated.

*Mean.

†SD.

increasing decade of age (see Figure 1). Error-related concerns were also highest for African American patients, followed respectively by white, Hispanic, and Asian patients. Patients without medical insurance coverage experienced the most concerns about medical errors, followed by those with health maintenance organization/preferred provider organization (PPO) coverage, while the fewest concerns were experienced by patients with Medicare and Medicaid coverage, respectively. The frequency of concerns also differed by the patient's length of stay in the ED, such that overall perceptions of medical safety ($p < 0.0001$) were highest and the frequency of individual concerns ($p < 0.04$) lowest for those patients with shorter lengths of stay and for those patients discharged to home rather than admitted to an inpatient floor. Overall perceptions of medical safety and frequency of error-related concerns were both significantly better whenever the ED had

TABLE 2. Overall Perceived Level of Medical Safety

Level of Perceived Overall Safety	n (%)
Excellent	325 (43)
Very good	189 (25)
Good	154 (20)
Fair	59 (8)
Poor	29 (4)

lower patient volumes. Patients experienced more specific concerns about potential medical errors on Fridays and Thursdays, followed respectively by Monday, Tuesday, and Wednesday, while concerns were lowest for Sunday and Saturday ED encounters.

In examining differences across the various hospital types, perceived safety was lowest at the academic hospital, followed respectively by the rural hospitals, midsize metropolitan hospitals, large urban hospitals, and the children's hospital ($p < 0.001$). The frequency of individual safety concerns was also highest at the academic hospital, followed respectively by the large metropolitan hospitals, rural hospitals, the children's hospital, and midsize metropolitan hospitals ($p < 0.0001$) (shown in Table 3).

Multivariate Models of Patient and Hospital Characteristics. The next step was to build multivariate models to examine the joint impact of hospital type, day of week, shift, ED volume, length of stay, and patient characteristics (age, gender, race, payer type) on perceptions of medical safety and on error-related concerns.

Error-related Concerns. The model predicting error-related concerns was significant ($p < 0.0001$, $R^2 = 0.22$), with hospital type ($p < 0.0001$), patient age ($p < 0.001$), race ($p < 0.001$), day of week ($p < 0.01$), and payer type ($p < 0.0001$) reaching significance. As found in the univariate analysis, error-related concerns were most frequent for younger patients, African Americans, those with commercial or PPO coverage, those going to the ED on Thursday or Friday, and those being seen at a large academic or rural ED.

Overall Medical Safety Perceptions. The model predicting overall perceptions of medical safety was also significant ($p < 0.0001$, $R^2 = 0.19$), with hospital type ($p < 0.0001$), payer type ($p < 0.0001$), shift ($p < 0.05$), day of week ($p < 0.05$), and length of stay ($p < 0.05$) reaching significance. Similar to the results for error-related concerns, low feelings of overall safety were linked to longer lengths of stay, having commercial or PPO coverage, going to the ED on Thursday or Friday nights, and going to a large academic or rural ED.

Impact of Patient Concerns on Willingness to Recommend the ED to Family and Friends. The final analysis examined the relationship between error-related concerns and patient willingness to return to and recommend the hospital for future care. Overall perceptions of safety ($p < 0.0001$) and the overall frequency of safety concerns ($p < 0.01$) were significantly correlated with patient satisfaction with each component of their care delivery process and with patient willingness to return to the hospital and recommend it to family and friends for their health care needs. As shown in Table 4, the strongest relationships

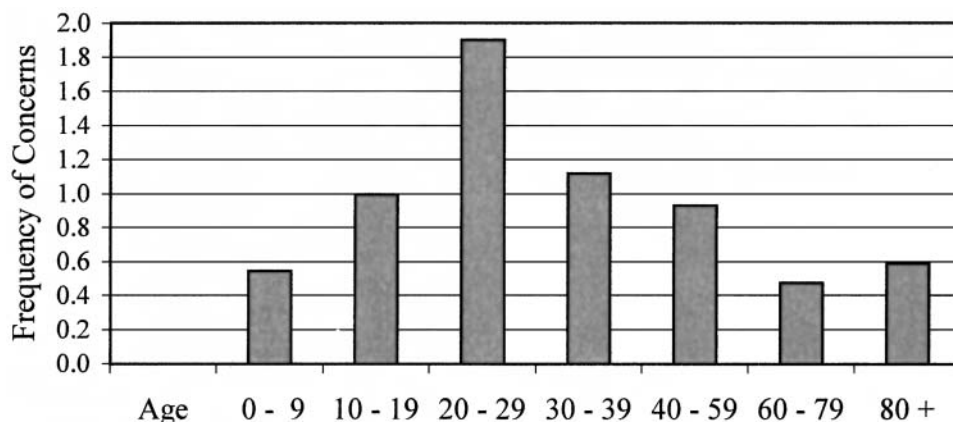


Figure 1. Medical safety concerns by patient age (years).

were found for compassionate care delivery to patients and to family, whereas the weakest relationships were found for registration and physician care delivery. In addition, regression analysis tested the joint impact of the individual safety concerns on patient willingness to recommend and return to the hospital. The model was again highly significant ($p < 0.0001$, $R^2 = 0.57$), with concerns about misdiagnosis ($p < 0.0001$), physician errors ($p < 0.0001$), nursing errors ($p < 0.001$), falling ($p < 0.001$), problems with medical equipment ($p < 0.001$), and being mistaken for another patient ($p < 0.001$) showing the greatest negative impact on willingness to recommend and return to the hospital.

DISCUSSION

For patients with unexpected and potentially serious medical problems, ED encounters can be highly stressful and intimidating. Despite this, our results suggest that the majority of ED patients felt very safe from medical errors during their encounters, a result that is somewhat surprising given the amount of media exposure given to medical errors. There were, however, 38% of patients who experienced a specific concern about a potential medical error during their stay. The majority of patients experienced concern about a single error rather than a global level of concern about multiple potential errors. The selective nature of these concerns may suggest that patients are attuned to environmental cues perceived to be associated with medical errors, perhaps making these patients ready candidates for active error detection/prevention programs. At the same time, other research has shown that ED patients have a heightened anxiety about their condition and experience.^{40,41} The process of educating them to watch for specific error-related cues may serve only to elevate this anxiety to an undesirable level, posing a formidable challenge for national calls to engage ED patients in such error-detection programs.

Despite the heightened anxiety associated with an emergency encounter,^{40,41} patients in this environment reported nearly identical levels of error-related concerns and overall perceptions of medical safety, as did the patients in our recent study of the inpatient experience. This is somewhat surprising, because it has previously been found that patients in the ED have significantly heightened levels of anxiety about their situation and experience.⁴⁰ For the ED patient, the reported higher levels of anxiety may be caused by other factors such as acuity, physical pain, long wait times, unclear diagnosis, unknown treatment, potential hospitalization, and questionable health outcomes, factors that have been shown in previous research to be strongly linked to subsequent satisfaction with care.⁴²⁻⁵⁰

There were certain types of patients who experienced significantly more error-related concerns, most notably younger patients, African Americans, those with longer lengths of stay, and those presenting to a large academic or rural ED. Interestingly, the elevated concerns among younger patients is opposite to the results of our recent inpatient study in which patients in their 20s and 30s had the fewest concerns about medical safety, perhaps due to the perceived invulnerability to negative outcomes.³ In addition, we found that the frequency of concerns nearly doubles for patients staying more than four hours. Although length of stay is confounded with critical factors such as illness severity and patient volumes, our findings still suggest that patients who stay longer in the ED have a significantly increased risk of experiencing error-related concerns. Understanding which patients are most likely to experience error-related concerns can help health care organizations design targeted educational materials and educate staff about how to best relieve these concerns.

One of our most interesting findings was that patients at the community and children's hospitals experienced significantly fewer concerns than those at the

TABLE 3. Frequency of Emergency Concerns by Hospital Type

Concerns	Academic Hospital (67,000 Encounters/ Level 1 Status)	Large Metropolitan Hospitals (28,000– 75,000 Encounters)	Midsized Metropolitan Hospitals (7,000– 27,000 Encounters)	Rural Hospitals (7,500–17,400 Encounters)	Children's Hospital (50,000 Encounters/ Level 1 Status)
No.	234	157	213	104	59
Overall perceived safety	68	79	74	73	84
Average frequency of concerns	1.40	0.76	0.59	0.67	0.61
Errors with your medications* (%)	58 (25)	26 (16)	19 (9)	5 (5)	4 (7)
Mistakes by nurses* (%)	49 (21)	16 (10)	17 (8)	7 (7)	6 (10)
Falling and getting hurt (%)	21 (9)	6 (4)	13 (6)	6 (5)	4 (6)
Errors with medical equipment† (%)	30 (13)	14 (9)	13 (6)	6 (6)	4 (7)
Mistakes by physicians*(%)	63 (27)	23 (15)	19 (9)	17 (16)	6 (10)
Being misdiagnosed* (%)	78 (33)	28 (18)	37 (17)	17 (16)	8 (13)
Having wrong test/ procedure done† (%)	37 (16)	10 (7)	21 (10)	9 (8)	3 (4)
Being mistaken for another patient* (%)	32 (14)	11 (7)	6 (3)	5 (5)	4 (7)

Chi-square test of association: * $p < 0.001$; † $p < 0.01$.

large academic hospital or rural hospitals. The EDs at the large academic hospitals, by their very nature, may have the most serious medical injuries, highest volumes, most technologically advanced equipment, and most medical specialists, all of which may invoke fear and concern in patients. The rural locations, in contrast, do not always have the technology or medical specialists needed for serious medical conditions, again a situation that may make patients concerned for their medical safety. The community and children's hospitals, in contrast, may be seen as providing a more comfortable blend of technology and specialists without being as overwhelming as the large academic hospitals. Regardless of the underlying explanation, these findings provide information that hospital management at each type of facility can use to address

patient concerns through redesign of existing processes and improved communication to patients about how their medical safety is being protected.

Lastly, this study suggests a very strong link between the number of safety concerns and the level of satisfaction patients reported with their experience. As one might expect, greater levels of concern were directly related to lower levels of patient satisfaction, particularly satisfaction with nursing care delivery and with the compassion provided to the patient and visitors. It is worth noting that the relationship between concern and satisfaction was not limited to nursing and compassion, however. Concerns were significantly linked to every aspect of patient satisfaction, suggesting that patients who experience a concern about a potential medical error during their care will have a bleaker retrospective view of their entire hospital experience, not just the aspects of their experience tied to the concern. This finding is nearly identical to that found in our earlier inpatient research.³

These results have important implications for local and national programs seeking to actively engage patients in the real-time detection and prevention of potential medical errors.^{4,28–33} Our finding that patients experienced very specific, rather than global, concerns about medical errors may suggest that patients are already attuned to environmental cues that they perceive to be linked to errors. While most research suggests that patients welcome the opportunity to be more involved in their care,^{51–53} organizations should still recognize that educating patients about how to watch for errors may be anxiety provoking, especially for already anxious ED patients, and that asking them

TABLE 4. Correlations among Safety Ratings and Patient Satisfaction Dimensions

Satisfaction Dimension	Overall Safety	Frequency of Concerns
Registration	0.629	–0.184
Nursing care delivery	0.633	–0.157
Physician care delivery	0.576	–0.207
Compassionate care to patients	0.823	–0.172
Compassionate care to family	0.705	–0.196
Discharge process and information	0.714	–0.230
Overall rating of quality	0.647	–0.246
Advocation (willingness to recommend and return)	0.685	–0.257
Frequency of concerns	–0.281	

Each correlation significant at $p < 0.01$.

to alert their physician or nurse about potential errors may still be uncomfortable to patients.⁵⁴ Despite these challenges, actively engaging patients in such programs can provide another layer of valuable protection against a number of potential medical errors.

This study also has implications for those individuals providing direct patient care in an emergency environment as well as those individuals overseeing the development and deployment of patient safety programs. First, it is important to recognize that many patients experience specific error-related concerns during their hospitalization, the most common being fears of misdiagnosis, problems with care deliverers, and medication errors. In addition, specific groups of patients appear to be the most vulnerable to safety concerns. This information can be used to tailor the communication between care delivery staff and patients in a way that openly addresses potential concerns and to develop communication vehicles such as brochures and signage that deliver key messages to patients at key times in their care delivery experience. While hospitals launch initiatives to improve the medical safety of patients, it is critically important to let patients know about these initiatives and to put mechanisms in place to directly address for patients the concerns that they are experiencing.

LIMITATIONS

The current study provides valuable information about how patients view their emergency experience, but there are several limitations that should be noted. First, participants in this study were limited to patients from a single system of 12 hospitals in the Midwest, which may have unique characteristics that limit its generalizability. Future research should examine patient concerns using a randomized national sample to determine whether our findings differ from those from other hospitals in other geographic locations in the United States. Second, although we used carefully designed multiwave sampling methods and response bias weighting, it is possible that response and selection biases may have influenced our findings. Third, patient and hospital characteristics, while statistically significant, only explained 19%–22% of the variation in error-related concerns and perceptions of medical safety, leaving a significant portion of variation unexplained. It is possible that other clinical and psychological characteristics may do a better job of discriminating which patients are likely to encounter the highest levels of fears and concerns. In particular, we did not have any data on patient acuity, which may be a strong predictor of error-related concerns. Fourth, it is possible that our list of eight specific medical safety concerns missed medical safety issues of key importance to ED patients. Additional qualitative research should examine the fears and concerns that ED patients experience to ensure that universe of issues is comprehensively

captured. Lastly, it is critically important to recognize that this study deals with concerns about “perceived” medical errors, not “actual” medical errors. The extent to which patient perceptions corresponded to actual medical issues was impossible to ascertain. This remains an important area for future researchers.

CONCLUSIONS

This study provides insight into how patients in emergency encounters view their risk of specific medical errors. The results suggest that the vast majority of patients feel very safe from medical errors, even though 38% of patients reported experiencing concern about a potential medical error during their encounter. Importantly, most patients experienced only a single concern, not a global sense of concern about multiple medical errors. The number and nature of these concerns varied significantly by both patient and hospital characteristics and were highly linked to patient satisfaction. The results of this study have important implications for providers and hospitals as they educate patients and family members about medical errors, disclose errors to patients, and design programs to actively engage patients in the prevention of medical errors.

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