

**What Can We Learn From Medical Student Narratives on Medical Error?**

**An Analysis of 172 Anonymously Written Reports**

by

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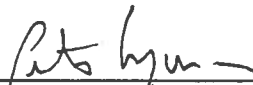
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## **BACKGROUND**

### **Opening**

Medical errors, which occur in approximately 2% of hospitalizations, are an inevitable part of practicing medicine.<sup>1</sup> At this rate, most medical students and residents will observe or commit a significant medical error during the course of their clinical training. When an error occurs students and residents are faced with a host of issues. They must decide whether, how, and to whom to disclose the error. Errors can be sources of severe emotional distress<sup>2-4</sup> and trainees must find ways to cope. Errors may be especially distressing to students who are still in a very formative part of their careers. Likewise, trainees may be particularly sensitive to the actions of others in response to error. In addition, students and residents must consider how their actions will impact their superiors, their reputation, their careers, and their relationships with other team members. Finally, students must identify the causes of the error if they are to avoid it in the future. How students respond to these issues may be influenced by the responses of senior physicians to errors and by the climate of the learning environment in which students train.

### **Distress**

Medical errors can be distressing for those who commit them, evoking strong feelings of shame, guilt, anxiety, and sadness.<sup>2-5</sup> In his 1984 New England Journal of Medicine article, family physician, Dr. David Hilfiker, described the personal “agony” and the devastating emotional impact of mistakes.<sup>3</sup> Similarly, Albert Wu and colleagues,<sup>4</sup> found that residents experienced considerable emotional distress in response to their errors.

Although the emotional impact of errors on medical students is unknown, it is likely similar.

### **Coping & Learning**

When an error occurs and distress follows, trainees must discover ways to cope. However, not all coping strategies are equal. Some forms of coping are adaptive while others may be maladaptive. With regard to medical errors, adaptive strategies may be those that lead to constructive changes in practice and psychological well-being.<sup>5</sup>

In his three-year ethnographic study of house officers, Mizrahi<sup>6</sup> found three major strategies were employed by housestaff in response to errors: (1) denial (e.g., not acknowledging the event as an “error”) (2) discounting (e.g., externalizing the blame), and (3) distancing (e.g., attempts to justify or normalize their actions). In general, Mizrahi<sup>6</sup> found these coping strategies to be maladaptive noting that distressing feelings of inadequacy and guilt remained long after the event and many house officers never obtained closure.

Wu and colleagues<sup>5</sup> examined the association between coping strategies and house officer’s subsequent changes in practice and emotional well-being and found that house officers who utilized escape-avoidance strategies were more likely to report defensive changes in practice such as not discussing their errors with their attendings and avoiding similar patients or procedures. In contrast, house officers who accepted responsibility for their mistakes were more likely to report constructive changes in practice such as

increased vigilance and seeking more training or knowledge, but this same group was also more likely to report greater emotional distress.<sup>5</sup> Thus, the same behavior may be both adaptive and maladaptive. Based on these results, Wu<sup>5</sup> concluded that the context in which a coping strategy is employed is therefore critical. In the presence of supportive clinical faculty who encourage accountability and also provide emotional support, accepting responsibility may become a more purely adaptive response. However, this sort of supportive climate may be rare on the wards,<sup>2-4</sup> and as many as half of all house officers may never discuss a serious error with their attending physician.<sup>4</sup> Additionally, Hilfiker<sup>3</sup> and Christensen<sup>2</sup> have stressed the importance of disclosure to patients in achieving a sense of absolution on the part of the physician; however, in one study, only a quarter of house officers reported disclosing a serious error to patients.<sup>4</sup>

### **Disclosure**

Evidence suggests that patients want to know about errors in their care,<sup>7-9</sup> and several authors have argued that patients have a right to such information.<sup>7, 10, 11</sup> Numerous ethical guidelines now state that physicians should disclose errors to patients or families.<sup>12, 13</sup> In 2001, the Joint Commission on Accreditation of Healthcare Organizations began requiring hospitals to inform patients, and where appropriate, families “about the outcomes of care, including unanticipated outcomes.”<sup>14</sup> However, the applicability and proper interpretation of these guidelines for trainees is unclear.

In particular, medical students may lack the knowledge and experience to disclose errors properly or to accurately distinguish poor outcomes from errors. Moreover, trainees may

have conflicting roles with regard to patients and superiors. On the one hand, students, like nurses, act to facilitate the therapeutic alliance between the doctor and patient by relaying concerns to the attendings or housestaff.<sup>15, 16</sup> On the other hand, both faculty and housestaff often ask students to assume the role of “doctor.”<sup>17</sup> These conditions set students apart from residents. As a facilitator of the doctor-patient relationship, students do not have a clear obligation to ensure disclosure, though they should act to promote it since disclosure is essential to maintaining the fiduciary relationship between doctors and patients. However, as “doctors,” students are asked to assume the responsibilities and ethical obligations of physicians and would therefore be bound by the ethical and regulatory standards previously mentioned.

In addition, students and residents may face a host of complicating factors when deciding whether to disclose an error to a patient or family. If they observe an error being concealed, students and residents may be hesitant to blow the whistle, particularly on attending physicians who regularly evaluate them and whom many trainees hold in high regard. Some trainees may feel the need to shield their teams and attendings from blame in order to demonstrate their loyalty. Trainees may also fear retaliation from the accused physician(s). Students, lowest in medical hierarchy, are particularly susceptible to retaliation. Students are regular recipients of abuse on the wards<sup>18-22</sup> and may fear coming forward with information on errors whether committed or observed.

While attending physicians may ultimately be responsible for disclosing errors to patients and/or families, ethicists have recently argued that trainees are required to ensure that this

disclosure takes place.<sup>15, 16</sup> As mentioned, in practice, few residents disclose errors to patients and only half discuss their errors with attending physicians.<sup>4</sup> Presumably many of the issues discussed above play a key role in these decisions. While much is known about residents' disclosure practices,<sup>4, 6, 16</sup> little is known about how medical students handle the disclosure of errors.

### **Morbidity & Mortality Conference**

To avoid repeating the errors of the past, it is critical for trainees, as well as senior physicians, to learn from their mistakes and the mistakes of others.<sup>23</sup> Historically, Morbidity and Mortality Conferences have served as a forum for the discussion of errors and adverse events.<sup>24</sup> These conferences are viewed as powerful teaching tools, particularly by faculty,<sup>25</sup> and their role in medical education is well recognized. Indeed, in 1983, the Accreditation Council for Graduate Medical Education began requiring weekly Morbidity and Mortality Conferences as part of its accreditation of surgical residencies.<sup>26</sup> However, studies suggest the open discussion of errors at these conferences is limited.<sup>27-</sup><sup>29</sup> Medical students often attend these conferences as part of clerkship training, yet the content and impact of their experiences is unknown.

### **Patient Safety**

Medical errors can result in considerable harm to patients.<sup>1, 30, 31</sup> Therefore it is critical that health professionals attempt to identify their causes and reduce their frequency and severity.<sup>23</sup> There is increasing attention on the flaws in healthcare systems that lead to errors.<sup>23, 31-38</sup> The systems approach to error focuses our attention on provider fatigue,

understaffing, poor training, equipment failures, overbooking, discontinuity, financial pressures, etc. as “latent” or “root” causes of errors. Although the systems approach has already begun to show results in terms of improving patient safety,<sup>39-41</sup> evidence suggests that residents that attribute errors to systems rather than individual causes may be less likely to learn from their mistakes.<sup>4</sup> Thus, trainees must also learn to identify individual causes of error such as lack of knowledge, faulty reasoning, and inattention. As Dr. Sherwin Nuland<sup>42</sup> reminds us, “[I]ndividual people will always be our best resource against error.” The competency of physicians to identify both systems and individual contributions to error is vital to improving patient safety.<sup>23</sup> Still, information regarding this competency among trainees is limited. Wu and colleagues<sup>4</sup> found that residents attributed their errors to a combination of systems and individual causes that fell into three categories: inexperience, job overload, and faulty judgment in a complex case. Another study of emergency medicine residents similarly reported that residents often deemed some combination of themselves, their teams, their lack of training, and their long nights and heavy patient loads as responsible for their errors.<sup>43</sup> Mizrahi<sup>6</sup> studied internal medicine residents for three years noting their tendency to “blame the system” for their errors. However, these studies do not indicate how many residents attributed errors solely to individual or systems causes or some combination thereof.

### **Professionalism, Role Modeling, and the “Hidden Curriculum”**

How students ultimately respond to errors may be shaped by their perception of how faculty and housestaff manage errors and students’ perceptions of what is expected of them. Students may internalize the values and attitudes they see modeled by senior

physicians in response to errors. These values and attitudes transferred unconsciously or half consciously by faculty and housestaff to students comprise a “hidden curriculum.”<sup>44</sup>

<sup>46</sup> Several authors have noted the influence of the “hidden curriculum” and role modeling by faculty and housestaff on students attitudes and behaviors.<sup>45-52</sup> Unfortunately, studies have also shown that students who witness unethical conduct are more likely to act improperly themselves.<sup>53, 54</sup> With regard to error, this may lead to students, who witness senior physicians conceal errors and avoid their discussion, perpetuating medicine’s “wall of silence.”<sup>55</sup>

On the other hand, medical errors may also provide an opportunity for faculty to model various elements of professionalism for students. Moreover, the modeling of error disclosure in a nonjudgmental environment may help trainees develop the professionalism competencies established by numerous organizations in medical education.<sup>56-59</sup> The management of medical errors (e.g., coping, disclosure, causal attribution, and changes in practice) provides an excellent setting for faculty to demonstrate the importance of accountability, compassion, respect, duty, honor and integrity to students.

### **Summary**

In summary, although much attention has been focused on the impact of medical errors on patients and physicians,<sup>1-5, 8, 9, 30, 31, 60-62</sup> little is known about their impact on medical students. Medical students are in a critical stage of their professional development and their experience with medical errors, whether witnessed or committed, may have a

powerful formative influence. Medical errors can be distressing, invoking strong emotions of fear, guilt, anger, remorse, and inadequacy.<sup>2-4</sup> If handled appropriately, medical errors can be powerful teaching tools. Evidence suggests that those who accept responsibility for their errors are more likely to learn from their mistakes.<sup>4</sup> Errors may present an opportunity for faculty to model ethical and professional behaviors including candid disclosure to patients. Through their attitudes and behaviors, faculty and residents unconsciously or half-consciously pass on a “hidden curriculum” of values to students.<sup>44-</sup>  
<sup>46</sup> Accountability, integrity, respect, compassion, and lifelong learning are seen as the essences of professionalism in medicine and their importance is widely recognized.<sup>56-59</sup> Because medical errors may have a unique influence over the development of these attributes, further research is needed to closely examine the nature of students’ experiences with mistakes. Moreover, it is important for medical educators to understand how students’ experiences with errors may impact their professional development and emotional well-being. Through such understanding, medical educators can develop effective strategies that address the impact of medical errors on students and maximize their potential as constructive formative experiences.



## **OBJECTIVE**

### **Present Research Opportunity**

With this in mind, we set out to conduct a qualitative content analysis of anonymously written student narratives on medical errors in order to:

- 1) Determine the nature of medical students' experiences with medical errors and their perspectives on the medical errors they have witnessed or committed during their clinical clerkships.
- 2) Explore the role medical errors play in medical students' professional development, emotional well-being, and the "hidden curriculum" in medical schools.

## **METHODS**

### **Design, Setting, Participants**

In February of 2001 and March of 2002, 94 and 98 fourth-year medical students, respectively, participated in a required course in medical ethics at a major urban medical school. Students were asked to provide an anonymous written description of a significant medical error they either committed or observed during their clinical clerkships. A total of 172 responses (90% response rate) were collected over the two years. The course instructor made these anonymous narratives available to the authors. Of the 172 responses, 25 were excluded because they did not describe an error that occurred during the students' clinical clerkships or they described multiple cases of medical errors rather than one case. One hundred forty-seven narratives, representing 77% of students enrolled in the course over two years, remained and were analyzed.

### **Measures**

Using specialized qualitative research computer software, QSR NVivo® version 2.0, and methods developed by Strauss and Corbin<sup>63</sup> and consistent with grounded theory developed by Glaser and Strauss,<sup>64</sup> these narratives were qualitatively analyzed and inductively coded for themes. The themes were continuously reevaluated for fit and power. In addition, the surfacing of new themes or subthemes was evaluated and codes revised accordingly. A codebook (Appendix 1) was developed to provide clear operational definitions for each code and individual codes were organized into eleven thematic categories. These thematic categories were rooted in a conceptual framework developed through a review of the literature<sup>2-7, 11, 15, 16, 23, 28, 29, 31, 34, 65</sup> and inductively

drawn from an initial examination of the narratives. An outline of the final coding scheme is shown in Figure 1.

**Figure 1. Outline of Final Coding Scheme\***

1. **STUDENT'S ROLE IN ERROR**
  - 1.1. Witnessed Error
  - 1.2. Error Committed
  - 1.3. Indeterminable
2. **CLERKSHIP SPECIALTY**
  - 2.1. Medicine
  - 2.2. Obstetrics & Gynecology
  - 2.3. Surgery
  - 2.4. Family Practice
  - 2.5. Pediatrics
  - 2.6. Other
  - 2.7. Indeterminable
3. **TYPE OF ERROR†**
  - 3.1. Diagnosis Error
  - 3.2. Medical Decision Making Error
  - 3.3. Treatment Error
  - 3.4. Evaluation Error
  - 3.5. Faulty Communication
  - 3.6. Procedural Error
  - 3.7. Medication Error
  - 3.8. Violations
4. **PRESENCE OF PERCEIVED ADVERSE CONSEQUENCES FOR PATIENT OR FAMILY**
  - 4.1. Omitted
  - 4.2. Yes Consequences
  - 4.3. No Consequences
  - 4.4. Student Unsure/Patient Placed at Risk
5. **TYPES OF PERCEIVED ADVERSE CONSEQUENCES FOR PATIENT OR FAMILY**
  - 5.1. Prolonged or Additional Hospitalization
  - 5.2. More Extensive or Additional Therapy or Studies
  - 5.3. Compromised Patient Condition
  - 5.4. Death
6. **DISCLOSURE OF ERROR TO PATIENT OR FAMILY**
  - 6.1. Disclosed
  - 6.2. Not Disclosed
  - 6.3. Unsure/Omitted
7. **DISCLOSURE OF ERROR TO TEAM MEMBER(S) OR INSTITUTION**
  - 7.1. Disclosed
  - 7.2. Not Disclosed
  - 7.3. Unsure/Omitted
8. **MEDICAL STUDENT'S RESPONSE**
  - 8.1. Conclusions Drawn
  - 8.2. Distress
  - 8.3. Lasting Impact
  - 8.4. Did Error Occur?
9. **HEALTHCARE PROFESSIONALS' RESPONSE**
  - 9.1. Corrective Action
  - 9.2. Accepting Personal Responsibility

- 9.3. Instructive
- 9.4. Distress
- 9.5. Deception
- 9.6. Blame
- 9.7. Discussion
- 10. **STUDENT'S RESPONSE TO HEALTHCARE TEAM'S RESPONSE**
  - 10.1. Positive
  - 10.2. Negative
  - 10.3. Neutral
- 11. **STUDENT'S CAUSAL ATTRIBUTION‡**
  - 11.1. To Individual(s)
  - 11.2. To Team(s)
  - 11.3. To System(s)
  - 11.4. Not Attributed

\* Coding instructions and operative definitions of each code are contained in the codebook (Appendix 1).

† *Type of Error* taxonomy based in part on Wu A, et. al. Do House Officers Learn From Their Mistakes? *JAMA* 1991;265(16):2089-94.

‡ *Attribution* taxonomy and assessment based in part on Pierluissi E, et. al. Discussion of Medical Errors in Morbidity and Mortality Conferences. *JAMA* 2003;290(21):2838-42.

We determined the reliability of codes within each thematic category in two phases by measuring intercoder agreement between the primary coder (WM) and a second coder, both of whom were medical students. In the first phase, each coder independently coded a random 20% sample of the narratives. The kappa statistic was used to measure the overall reliability of each thematic category and percent agreement on presence was used to measure the reliability of individual codes within each thematic category. Thematic categories with a kappa value of less than 0.70 and individual codes that had been used at least twice by either coder with percent agreement on presence less than 75% were revised or eliminated. Disagreements between coders for the remaining thematic categories were discussed with a faculty expert on medical error and resolved by consensus. In the second phase, each coder independently coded a random 10% sample of the narratives with coding limited only to the thematic categories that had undergone revision. After the second phase, kappa values and percent agreement on presence for each thematic category was greater than or equal to 0.75 and 80%, respectively (Table 1),

and percent agreement on presence was above 75% for individual codes with greater than two counts. The primary coder (WM) then coded all the remaining data in accordance with the final coding scheme.

**Table 1. Reliability of Thematic Categories**

Thematic Category	Kappa* (95% CI)	Agreement†
1. Student's Role In Error	0.88 (0.76-1.00)	94%
2. Specialty	0.89 (0.79-0.99)	91%
3. Type Of Error	0.93 (0.81-1.00)	94%
4. Disclosure To Patient Or Family	0.81 (0.71-0.92)	88%
5. Disclosure To Team Member(s) Or Institution	0.82 (0.72-0.92)	91%
6. Presence Of Perceived Consequences For Patient Or Family	0.82 (0.71-0.94)	94%
7. Types Of Perceived Consequences For Patient Or Family	0.79 (0.61-0.97)	85%
8. Medical Student's Response	0.77 (0.64-0.91)	80%
9. Healthcare Professionals' Response	0.85 (0.73-0.96)	87%
10. Student's Response To Healthcare Team's Response	0.85 (0.73-0.97)	86%
11. Student's Causal Attribution	0.75 (0.57-0.94)	83%

\* Kappa = (percent agreement observed – percent agreement expected by chance)/(1 - percent agreement expected by chance).

† Percent agreement on presence = 2 x (number of times both coders agreed on presence of a code within the category)/(number of times coder A saw a code within the category present + number of times coder B saw a code within the category present)

## Analysis

The frequencies, interrelationships, and patterns within and across codes of each thematic category were examined to generate a conceptual model of medical students' experiences with medical error. Patterns and hypotheses were iteratively tested by within–case and cross–case comparisons. Representative excerpts from the narratives, edited slightly for grammar and spelling, were selected to illustrate our findings.

We used the  $\chi^2$  statistic to compare the proportion of narratives within two groups, disclosed errors and undisclosed errors, coded with *Yes Consequences* (see Figure 1) to narratives that lacked such coding and reported the results in Table 4. Because of the

lower number of cases, the Fisher exact test was used to compare the proportion of narratives within two groups, disclosed errors and undisclosed errors, coded with each particular code in the thematic category, *Types of Perceived Adverse Consequences* (see Figure 1), to all other narratives that lacked such coding, and the results are reported in Table 5. Likewise, the Fisher exact test was used to compare the proportion of narratives within two groups, committed errors and observed errors, coded with each particular code in the thematic category, *Student's Causal Attribution* (see Figure 1), to all other narratives that lacked coding for that particular level of causal attribution, and the results are reported in Table 10.  $P < 0.05$  was considered significant. These comparisons were performed using SPSS® version 12.0 (SPSS Inc., Chicago, Illinois).

### **Protection of Human Subjects**

The Committees for Protection of Human Subjects at the University of California, Berkeley and the University of California, San Francisco approved this research protocol. Because the narratives were anonymous, the informed consent of the study participants (i.e., the medical students participated in the course) was not required. Despite the narratives' lack of obvious identifiers such as names of individuals or institutions, which makes it highly unlikely, if not impossible, for someone to identify a particular student from the quotes provided in this article, it remains possible that students may recognize themselves through quotes from their own narratives.

Recently ethicists have become increasingly concerned with the harm that can occur to patients when they recognize themselves in published case studies in which patients are

sometimes portrayed in ways they perceive to be unflattering or false.<sup>66, 67</sup> This has raised the question of whether or not there is a need for authors of some “anonymized” case studies to obtain patients’ informed consent.<sup>67</sup>

Likewise, some students in this study may have intended their narratives for use solely within the course and may become upset should they recognize a quote from their narratives appearing in this published work. However, unlike a clinical case study, where the subject’s identity is known to the author/researcher and therefore, presumably the author has a way of contacting the subject to seek his or her consent prior to publication, the narratives in this study were submitted anonymously and the research project was conceived of only after the course had ended and the students had graduated. Therefore, it would have been extremely burdensome, if not impossible, to seek the informed consent of particular students for the use of their particular narratives in this study. In addition, unlike clinical case studies where the author may offend the subject through her written representation of the subject, the experiences of students in this study are described in the students’ own words, which decreases the risk this particular harm. Furthermore, the expectation of privacy, regulatory requirements protecting privacy, and the risk of harm from breaches of privacy are all much greater with regard to personal medical information than the information obtained from students in this study. Still, the potential for harm is real and these issues are important to consider and worthy of further exploration.

Ultimately, it is necessary to weigh the benefits that come from the knowledge gained through this type of research against the potential harms and the rights of research subjects. We are hopeful that any students who recognize themselves, through published quotes, as subjects in this study will be pleased, rather than upset, that their work is being used toward improving medical education and the way medicine deals with error.



## **RESULTS**

### **Student's Role**

Students reported a committed error in 26 (18%) of the total narratives and a witnessed error in 112 (76%) of the total narratives. The student's role in the error (i.e., witnessed or committed) could not be determined in 9 (6%) of the total narratives.

### **Clerkship Setting**

Errors reported on the students' surgery clerkships were most common (31%) followed by medicine (24%). Errors reported on the students' obstetrics/gynecology and pediatrics clerkships were similar and less frequent, 12% and 11%, respectively. While errors reported on family practice (4%) and other specialties (6%) were rare.

### **Types of Errors**

Types of errors and their frequencies are shown in Table 2 along with summary examples from the narratives that illustrate each type. Procedural errors (23%) were most frequently reported while evaluation errors (7%) were least frequently reported.

Violations of safe operating practices, protocols, or medical standards, although generally distinguished from errors in the academic literature,<sup>34</sup> were reported and presumably perceived as errors by students in 14 (10%) of the total narratives. These included violations of ethical standards in 9 (6%) of the total narratives. As examples of this latter group, a student reported, "As the family gathered around to be with the man as his ventilator was stopped, I realized he was still heavily sedated and paralyzed. When I asked the nurse whether a patient should still be sedated and paralyzed when taken off of

a ventilator, she said ‘No, but he's going to die anyways.’” Another student described an ethical violation she experienced in the operating room:

[The resident] lifted up a nerve and pimped me as to what it was. I, having been pimped this question many times in theoretical examples, stated that it was the Accessory nerve. He then snipped it in two and asked, "Would I have done that if it was?" I replied no, and he then explained that it was the Greater Auricular and not vital to protect. [...] The attending finally returned [...] then asked where the Accessory nerve was, and seeing a cut nerve, yelled for a nerve stimulator. He attached the leads and provided a pulse; the patient's right shoulder shrugged powerfully upwards.

**Table 2.** Types of Errors Described in Narratives

<b>Type of Error</b>	<b>No. (%) of total narratives</b>	<b>Summary of Error</b>
Diagnosis Error	17 (12)	<p>The pathologist misread a biopsy of a suspicious lesion on a patient’s ovary. Six months later a review of the biopsy revealed the error, but because of the delay, the patient's cancer was more advanced and her prognosis was now poor.</p> <p>-----</p> <p>A boy underwent a computerized topography and exploratory laparotomy following a motor vehicle accident. The surgeon and radiologist both failed to notice a liver laceration. The boy developed liver abscesses and became septic. He was referred to another institution for treatment and evaluation.</p>
Medical Decision Making Error	19 (13)	<p>Despite worsening renal function, it was decided to keep a surgical patient on a potassium protocol, and the patient became dangerously hyperkalemic.</p> <p>-----</p> <p>A 50-year-old man with trauma to the chest wall was discharged prematurely with a residual hemothorax. The patient presented to the Emergency Department eight days later with pneumonia.</p>
Treatment Error	14 (10)	<p>No orders for ambulation or chemoprophylaxis were placed on a postoperative patient at high risk for thrombotic complications. Upon ambulating for the first time late in the evening the patient suffered a pulmonary embolism and died.</p> <p>-----</p> <p>A medical student irrigated an open wound with hydrogen peroxide and was later informed that it can</p>

		cause tissue damage and does not promote healing.
Evaluation Error	10 (7)	A pediatrician failed to evaluate the cause of cyanosis in an infant during multiple outpatient visits. The child was eventually brought to the Emergency Department and discovered to have a ventricular septal defect. A pregnant woman at 35 weeks gestation with a history of anxiety attacks presented with chest pain and was not evaluated for 30 minutes. Upon evaluation the patient was found to be suffering a massive myocardial infarction.
Faulty Communication	18 (12)	A medical student unknowingly revealed the diagnosis of ovarian cancer to the patient despite the family's wishes to have the patient hear it from the surgeon first. The nurse had recorded the weight in pounds, not kilograms, though she labeled it in kilograms. The erroneous weight was used to calculate the dose for acetaminophen and the patient received an inappropriately high dose but the patient suffered no adverse effects.
Procedural Error	34 (23)	The peritoneal cavity was punctured while attempting to place a femoral central line. The patient developed a large retroperitoneal blood clot that had to be evacuated. The cord to a light source used during a laparoscopic procedure was in contact with the patient's skin for the entire duration of the procedure resulting in a severe burn.
Medication Error	21 (14)	A five-day-old baby with narcotic withdrawal was discharged on tincture of opium, the pharmacy failed to dilute the new bottle, so it was 100x the strength ordered on the discharge medication list. The child became unresponsive and returned to the Emergency Department and recovered. A patient with suspected cholangitis following an endoscopic stent placement was given metronidazole while also on warfarin. The patient's INR came back elevated as a result of the drug interaction. There were no bleeding complications but the patient's stay was prolonged by one or two days.
Violation	14 (10)	A gynecologist instructed students to do pelvic exams on women anesthetized for surgery without their consent. A woman who stated she was menstruating was knowingly sent for elective surgery and general anesthesia was administered before her preoperative pregnancy test results came back. The pregnancy test later came back positive.

### Perceived Adverse Consequences

Students perceived consequences for the patient or family that they attributed to the error in 89 (61%) of the total narratives. Many of the errors, both witnessed and committed,

involved serious consequences including patient deaths. Students explicitly noted the lack of consequences for the patient or family in 25 (17%) of the total narratives and were unsure whether the error had any attributable consequences beyond placing the patient at risk for harm in 18 (12%) of the total narratives. As an example of this latter group, one student, described the failure to confirm lower extremity pulses in a burn patient with a history of severe peripheral vascular disease and status post a prosthetic abdominal aortic graft. He went on to write, “Given the hypermetabolic state of this patient with its associated hyperproteinemia and hypercoagulability, it was unclear if any early vascular surgical intervention would have prevented this patient's death.”

When students included what they perceived as consequences for the patient or family that were attributable to the error, they most commonly noted the error as compromising the patient's condition in 60 (41%) of the total narratives. These cases showed a wide range in severity. On the one end, a woman with chronic renal failure given temazepam, which is renally cleared, suffered a “very restful sleep” lasting into “the following day as well” but “was not permanently harmed.” On the other end, a trauma patient, whose liver laceration was “missed” by the radiologist on the abdominal computerized topography and by the surgeon during an exploratory laparotomy, “underwent numerous surgeries over the next three months and spent two of them in the shock-trauma intensive care unit.” Students attributed more extensive or additional treatment and/or diagnostic studies to the error in 39 (27%) of the total narratives, prolonged or additional hospitalization in 19 (13%) of the total narratives, and the patient's death in 9 (6%) of the total narratives. Examples of these consequences are provided in Table 3.

**Table 3. Types of Perceived Adverse Consequences for Patients/Families**

Types of Consequences	No. (%) of total narratives	Examples
Prolonged or Additional Hospitalization	19 (13)	<p>“The surgeon on the case nicked the bladder. As a result the woman had to remain in the hospital for an extra 4 days.”</p> <p>-----</p> <p>“Multiple studies were performed on a very high risk individual [for radiocontrast induced nephrotoxicity] in order to rule out a diagnosis that wasn't very likely to begin with. Due to this action, the patient became extremely ill, was readmitted for an additional six days and eventually had to undergo dialysis.”</p>
More Extensive or Additional Treatment and/or Studies	39 (27)	<p>“The new nurse did not know that the other ankle was to be done and threw away the half of the bone graft that was left. Consequently the surgeon had to take more bone requiring a new incision on the opposite hip.”</p> <p>-----</p> <p>“Because of the gross contamination [from the bowel perforation], her wound was packed and left open after surgery, and she subsequently underwent two additional surgeries to drain abscesses that formed within her peritoneal cavity.”</p>
Compromised Patient Condition	60 (41)	<p>“She presented two days later with an acute abdomen and was rushed back to the operating room where a severe posterior pouch abscess was discovered secondary to a punctured duodenum.”</p> <p>-----</p> <p>“As the tube was being resected, the ligament that supports the ovary was inadvertently torn. As a result, the woman's ovary was also removed.”</p>
Death	9 (6)	<p>“One night, a nurse went to change [the patient's] IV bag and accidentally hung a bag containing heparin. When she went to do a neurologic check a little later, she discovered that both pupils were blown, and [the patient] died a short time after from brainstem herniation.”</p> <p>-----</p> <p>“[I]f the pathology report had been correct the first time, he could have treated her early in the disease and she would have lived.”</p>

### Disclosure to Patients/Families

Seventy-nine narratives (54% of the total narratives) discussed whether or not the error was disclosed to the patient or family. The error was reported as not disclosed to the patient or family in 36 (46%) of these 79 narratives and disclosed to the patient or family in 43 (54%) of these 79 narratives. Six (8%) of these 79 narratives described vague or

limited disclosure. For example, during a laparoscopic appendectomy a surgeon perforated the bladder requiring urologic repair. The attending surgeon told the family that the bladder wall was ‘nicked’ during the surgery and never apologized for the mistake.” In another case of limited disclosure, during a cholecystectomy, it was discovered that the patient lacked a gallbladder; it had been removed during a previous surgery. Unfortunately, the surgeon initially misidentified the hepatic vein for the cystic duct and stapled it. “The patient was of course told that he lacked a gallbladder, but not about the damage to the hepatic vasculature” despite having elevated liver enzymes. Because these cases clearly fail to meet the ethical and regulatory standards for disclosure of errors to patients,<sup>7, 10-14, 68, 69</sup> these cases of limited disclosure were grouped together with nondisclosure cases and coded as such.

Disclosed errors were not more likely than undisclosed errors to have perceived adverse consequences for the patient and/or family ( $P=0.61$ , see Table 4). Disclosed errors also did not differ significantly from undisclosed errors regarding the particular types of perceived adverse consequences (see Table 5), with several of the undisclosed errors having severe consequences. One undisclosed error involved a child who suffered a bowel perforation during surgery that went unnoticed. The child “subsequently underwent two additional surgeries to drain abscesses that formed within her peritoneal cavity. She was ultimately hospitalized for over five weeks.” Another undisclosed error involved a surgical patient who did not receive adequate prophylaxis against thrombosis despite being at high risk and subsequently died from a pulmonary embolism. The patient was “presented at surgical Morbidity and Mortality Conference where it was

determined that [the case] was a preventable death.” As one student concluded, “It appeared to me physicians are in a position to disclose or not disclose any information they desire. This is a pretty powerful position to be in.”

**Table 4.** Presence of Perceived Adverse Consequences for Patients/Families in Disclosed and Undisclosed Errors

Presence of Perceived Adverse Consequences	No. (%) of Narratives		Chi-Square; P Value
	Disclosed*	Not Disclosed†	
Yes Consequences	31 (72)	23 (64)	0.61; P=0.43
Other‡	12 (28)	13 (36)	

\* In the 43 narratives in which the error was disclosed to the patient and/or family.

† In the 36 narratives in which the error was not disclosed to the patient and/or family.

‡ Includes: *No Consequences*, *Student Unsure/Patient Placed at Risk*, and *Omitted* (see Figure 1).

**Table 5.** Types of Perceived Adverse Consequences for Patients/Families in Disclosed and Undisclosed Errors

Type of Perceived Adverse Consequences	No. (%) of Narratives		P Value‡
	Disclosed*	Not Disclosed†	
Prolonged or Additional Hospitalization	7 (16)	6 (17)	1.00
More Extensive or Additional Tx or Studies	11 (23)	11 (31)	0.80
Compromised Patient Condition	21 (49)	16 (44)	0.82
Death	3 (7)	1 (3)	0.62

\* In the 43 narratives in which the error was disclosed to the patient and/or family.

† In the 36 narratives in which the error was not disclosed to the patient and/or family.

‡ Two-tailed P value calculated using the Fisher exact test. In each row, the proportion of narratives within the two groups (i.e., disclosed and undisclosed) coded that particular *Type of Perceived Adverse Consequence* is compared to all other narratives that lacked such coding.

### Students' Disclosure Dilemmas

Students who witnessed errors that went undisclosed commented on the dilemmas they faced. One student framed it this way, “Should we tell patients the truth of what we know, when we are not their physicians and others will be held liable?” Despite empathizing with patients, students rarely intervened. One student wrote, “The travesty of this story is that I am not entirely sure that this patient realized that the complications were not normal for a transvaginal hysterectomy. The sicker she became the less she was

told until eventually I was her only source of information.” The error in this case was never revealed.

One student however did decide to cautiously intervene. The student wrote,

Each time we took the patient in for surgery, the surgeon would complain that the original surgeon should never have attempted to fix the laceration via laparoscopy in the first place and then delayed referring him. [...] [I]f he was correct in his criticism then the original radiologist and surgeon engaged in malpractice and yet no one was ever notified. So, after about three weeks of following this boy, I told his parents, (who had no insurance) what the surgeon had been saying but told them I would deny I had ever said anything if they brought my name up.

Housestaff and faculty sometimes silenced students who desired to disclose errors to patients. When one student asked if someone was going to inform a patient about an error, the student was told to “keep [her] mouth shut.” According to the student, this patient “was never told [of the error] before leaving the hospital.” Another student attributed her silence to the hostile environment on her first clerkship,

I felt like she deserved to know that there was a good likelihood that sterilization was not achieved by that sloppy [tubal ligation] I had just witnessed, not to mention the real possibility of infection occurring after the field was so obviously contaminated. It was my first rotation and I was already tired of being abused by attendings and housestaff, so of course, I said nothing.



Dealing with these dilemmas can be morally distressing and their impact long lasting. As one student commented, “I still grapple with whether or not we should have disclosed the mistake to the parents.” Moreover, undisclosed errors may be missed opportunities to model disclosure and desirable professional values such as honesty and integrity for students.

### **Disclosure to Colleagues and Institutions**

Whether or not the error was disclosed to other team members who did not directly witness the error or to the institution (e.g., presenting the case during Morbidity and Mortality Conference or filing an incident report) was discussed in 52 (35%) of the total narratives. The error was reported as disclosed in 37 (71%) of these 52 narratives and not disclosed to other team members or the institution in 15 (29%) of these 52 narratives. Three (6%) of these 52 narratives described limited disclosure or selective disclosure (e.g., disclosing the error to some individuals and not others). Because these narratives constitute “cover-ups,” they were grouped with nondisclosure cases. In addition, three of the 15 undisclosed cases also involved overt acts of deception. In one such case, the student wrote, “I began writing the operative note and, under the heading ‘Complications’, I wrote ‘perforation of the small bowel and repair’. When the resident and attending both reviewed my note to sign off on it, they scratched off what I had written under ‘Complications’ and wrote ‘none’ instead.” More examples of disclosures and nondisclosures to the healthcare team or institution are shown in Table 6.

**Table 6. Disclosure to Team/Institution**

Disclosure	No. (%) of narratives*	Examples
Disclosed	37 (71)	<p>“The fellow spoke up and said that he took full responsibility for what happened. He went on to say how I had brought up the issue with him and was concerned about the renal function, and that he had made the final decision [to continue the potassium protocol].”</p> <p>“The patient had received twice the regular dose. So, the resident called the pharmacy and luckily they informed him that the dose was not on a toxic level. The resident filled out an incidence report and informed the family what had happened.</p>
Not Disclosed	15 (29)	<p>“Nothing was disclosed to anyone. [...] The incident was kept only between the attending, the resident and myself.”</p> <p>“On two patients, I accidentally placed Cyclogyl instead of Mydriacyl. Cyclogyl has a dilation and cycloplegic effect of about 24 hours instead of the usual 6 hours for Mydriacyl [...] I elected not to inform the patients or my superiors of the error and followed up with the patients and let them know their eyes would return to normal the following day.”</p>

\* In the 52 narratives that discussed whether or not the error was disclosed to other team members who did not directly witness the error or to the institution.

### Students' Responses to Error

Students included a description of their response to the error in 70 (48%) of the total narratives. Table 7 gives examples of the most common types of responses and their frequencies.

### Conclusions Drawn

When the student's response was included, students most frequently reported conclusions or lessons they drew from the experience in 33 (22%) of the total narratives. The lessons drawn fell into three general areas: clinical medicine, professionalism, and personal.

### Clinical Lessons

Many students drew clinical lessons from the errors. In one case, a patient's repeated complaints of abdominal pain were attributed to delirium secondary to hyponatremia without further evaluation; however, the patient was ultimately found to have a perforated bowel. The student "learned that any patient complaint should not be dismissed if there is an element of doubt. Of course there are psychotic, delirious, or other patients that might be ranting and raving. Without working up these complaints to ensure that there isn't an underlying cause that needs to be addressed, incidents like [this] can become commonplace."

### Lessons in Professionalism

Many students also extracted lessons in professionalism from the responses of some housestaff and faculty to the errors. Several students who witnessed senior physicians candidly disclose errors to patients, concluded that it is important to be "open and honest" with patients when errors occur and that empathetic and honest communication "conveys 'good care' to patients." For example, students wrote:

[The physician] was candid and thorough with his explanation, which, I believe, diffused the situation nicely. This case reinforced in me the concept of treating patients in a manner, as I would wish to be treated.

The mistake was fully disclosed to her, and last I am aware she was handling the situation well. [...] I learned that mistakes do happen, sometimes significant ones,

and that it is important to be as open and honest with patients as possible when they occur.

I felt that she was grateful for the openness and honesty of the physician. The patient was able to see the human side of the physician, which helped her understand that mistakes can happen and physicians are not perfect. I learned from this experience that openness and honesty are very important in dealing with mistakes in medicine.

As illustrated above, students appreciated the professional values embedded in the behavior of senior physicians and recognized that embodying these particular values (i.e., honesty, respect, and integrity) may have a positive effect on the doctor-patient relationship.

#### Personal Lessons

Finally, for a few students, the error conveyed a lesson about the impact and importance of their personal behavior, actions, and abilities. As one student, who prematurely removed the staples from a patient recovering from a hysterectomy, expressed,

[This was] the first gut realization that my lack of attention could cause real harm [...] I learned in a visceral way some things that I already knew intellectually - that it is up to me understand why I do the things I do as a doctor instead of just following orders, and it is my duty to seek supervision when I feel I need it, even when it is annoying, embarrassing, or inconvenient.

### Student Distress

Students reported feelings of distress in 23 (16%) of the total narratives. In addition to the moral distress associated with the disclosure dilemmas previously mentioned, students also experienced emotional distress, and in some of these cases, this distress was severe. One student, who lacerated the top of a baby's head during a delivery exposing the child to infection from her Hepatitis C infected mother, wrote, "I was worthless for nearly two days after because I felt so bad and I went home each day and cried [...] Even today it really still bothers me." While distress was reported more often for committed errors (12/26 or 46%) than witnessed errors (11/112 or 10%); we found witnessed errors still caused considerable distress for students in some cases.

### Lasting Impact

Students described the error as have a lasting emotional or behavioral impact in 14 (10%) of the total narratives. Several students indicated that they have continued to think about the error that they committed or witnessed since the error occurred. For example, one student wrote, "If I had not been afraid to bother the attending, worried about disappointing the patient or being late to conference and if I had not relied on the resident to perform labs and contact the attending with my questions about anticoagulation, would this woman be alive? This case will always haunt me." Other students commented on the lasting impact of the error on their behavior. For example, a student wrote, "This experience caused me to commit to be much more conscientious of my responsibilities to my patients. Because I do not want to neglect important points of a patient's care again, I

have become much more systematic in my clinical duties. By being aware of my mistake it has had a positive effect on me.”

### Did Error Occur?

Students were unsure if what they experienced was truly an error in 13 (9%) of the total narratives. One student contemplated the daily deception that occurred during his obstetrics/gynecology rotation.

[The] mistake had more to do with a doctor’s style rather than an *actual* mistake [...] [M]y outpatient preceptor would introduce me to his patients as a medical student on my final exam, therefore I had to do the pelvic as part of my final test. This happened on my first day and continued into my final days there. It was good in that I was able to practice [...] but it was not my final exam. [...] The fact that it was "my final exam" was only told to the patients who agreed to the presence of a student and therefore probably would have allowed the exam anyway.

In another case, the student’s uncertainty was distressing and long lasting.

My mind was swimming with the dynamics of the situation. Did we actually kill this patient, or was this a natural part of his medical course? Or, was this simply a potential risk of pain management, a risk that he was taking by requesting such management. I was baffled that as a medical team we had not further discussion of the patient. Were we just sweeping this under the carpet? And if we were to address it, is it even true that a medical error did occur? All these questions raced in my head, and have risen in my thoughts since.

This excerpt also illustrates the missed opportunities to help students learn from mistakes.

**Table 7. Types of Medical Students' Responses to the Error**

<b>Response</b>	<b>No. (%) of total narratives</b>	<b>Examples</b>
Conclusions/Lessons Drawn	33 (22)	<p>"I have learned [...] from this experience [...] I am probably going to make more mistakes and I need to learn how to chastise myself quickly and seriously and then go on with new knowledge and forgive myself so that I can continue caring for patients."</p> <p>"Residents will often tell us not to trust anybody and that lesson was learned first hand [...] I should have gotten the verbal report from at least the radiologist. Never trust anyone."</p> <p>"But it seemed as though we weren't totally positive that it was the narcotics [...] Therefore I recall thinking "I guess we won't say that it is our fault if we don't know for sure that it is."</p> <p>"I learned that the pressure to be perfect, and thus the perception that not knowing something is a sign of weakness, is absolute lunacy. Surgical services are the principal offenders in this regard and I will try not to sustain this approach to teaching in the future."</p>
Distress	23 (16)	<p>"I admit to being scared at first to go in and talk with the patient because I was worried she would be furious about what had happened."</p> <p>"The consequence for me was feeling like the sky was falling when I returned that page - overwhelming guilt and shame and the first gut realization that my lack of attention could cause real harm."</p>
Lasting Impact	14 (10)	<p>"Even though this error turned out to be harmless, I came away with several lessons that continue to shape my medical perspectives."</p>
Did Error Occur?	13 (9)	<p>"Was a mistake made? I guess that we assumed his condition was worse than it turned out to be, at least in the short-term."</p> <p>"Were there mistakes made with Mr. D? Most likely lots of them. Were any of them ever addressed? Not to the MS-III or the R-I."</p>

**Students' Perceptions of the Healthcare Teams' Responses to Error**

Students included a description of other healthcare professionals' responses to the error in 79 (54%) of the total narratives. Examples and frequencies of these responses are shown in Table 8. In 18 of these 79 narratives, students reported their response to the response of others to the error. Students responded positively to the responses of other healthcare

professionals about equally as often as they responded negatively, 8/18 (44%) narratives and 7/18 (39%) in each category. Three of the 18 responses (17%) were neutral.

#### Corrective Action

When included, the perceived response of other health professionals most frequently noted was corrective action aimed at preventing, reducing, or alleviating harm to the patient as a result of the error (45 narratives, 31% of total).

#### Accepting Personal Responsibility

A physician accepting personal responsibility for the error was reported in 8 (5%) of the total narratives and students consistently perceived these responses positively and drew lessons from these experiences. In one illustrative example, “the fellow spoke up and said that he took full responsibility for what happened,” the student went on to comment, “I remain impressed with that fellow. To me, he showed amazing integrity. It would have been so easy for him to blame others. Instead, he stepped forward and dealt with the situation. I hope to be as honest and forthright in all my work as he was.” Another student “was impressed that the attending surgeon went to the patient and explained everything that had happened [and] apologized to the man for *his* mistake.” [Emphasis added.] The student went on to comment, “I learned the importance of communicating honestly with patients, even when mistakes are involved.”



### Instructive

Instructive responses were reported in 8 (5%) of the total narratives. At least one such response was instructive both clinically and professionally.

Instead of chastising me in the manner in which I expected and deserved, [the chief resident] made a teaching moment of the entire situation and helped me to pull the correct drain. [...] I now appreciate the right way to respond to medical mistakes in general. Instead of crucifying the offender, I will try to create an atmosphere of no retribution in which my colleagues can confess their sins without fear.

### Missed Opportunities

However, we also identified several instances of missed teaching opportunities where students were left with unanswered questions about the appropriateness of their actions or the actions of others and what or how things should have been done differently. In one typical example a student wrote,

Were there mistakes made? MS-3 really has no idea. Probably. Nobody ever said a word so MS-3 (now an MS-4) is really not sure. [...] Could something have been learned from this case? I'm sure there is lots of stuff the MS-3 could learn as well as the R-1, R-3 and maybe even the hematology/oncology fellow. As it was, MS-3 and R-1 are still unsure what should have been done differently.

Yet another student commented,

I felt fairly certain that the use of the larger needle led to the pneumothorax and subsequent chest tube. Nothing was ever said [...] and there was never any review

of the exact process [...] used in placing the central line. I was unsure enough of myself that I said nothing, and still probably wouldn't given the fact that there appear to be many different methods for placing an internal jugular line.

In addition, some of the excerpts, discussed previously, under *Disclosure, Student's Response/Did Error Occur?* and in Table 7 provide more examples of missed teaching opportunities.

#### Healthcare Team Distress

The distress of healthcare team members was noted in 15 (10%) of the total narratives. As with student distress, the distress of healthcare professionals noted was occasionally severe and not limited to those who committed the error. When one physician discovered that original pathology report was erroneous and that the patient now had advanced ovarian cancer, “the doctor, although not the one at fault, was extremely saddened by the experience.” Four students noted faculty who became “irate” or “furious” after learning of an error. One attending physician “started screaming and swearing and demanding to know who was responsible for almost killing the patient.”

In addition, students critically noted the failure of faculty and housestaff to address the distress of others. Regarding a resident that failed to realize she had perforated the patient's duodenum during a cholecystectomy, a student wrote, “The resident of course felt horrible about the whole issue, but no one ever said anything openly to help assuage her guilt. They assigned her to present in Morbidity and Mortality Conference, but even then, it was hushed faces. No one said, [...] ‘How do you feel about this.’ [...] [T]his

young resident never was confronted in a way that would allow her to process.”

Similarly when the previously mentioned medical student, who lacerated the top of a baby’s head during a delivery exposing the child to infection from her Hepatitis C infected mother, approached her resident to tell “her how awful [she] felt, the resident *blew it off* saying if that's the only mistake you make as a doctor, consider yourself blessed.” [Emphasis added.]

### Deception & Blame

Healthcare team members’ responses to errors included deception, blame, and discussion with similar frequency, each appearing in 7% of the total narratives. Cases of deception and blame were perceived negatively and frequently distressed students. For example, one student reported,

My chief resident told me in a matter of fact manner that we would not be using a diuretic and that we would initiate water restriction that night. The next morning on rounds my attending physician asked me why I had not placed this patient on a diuretic. I looked at my chief resident and his response was ‘yeah why didn't you start a diuretic.’ I wanted to say I was going to last night but you would not let me. Instead I was silent and accepted the reprimand from my chief with a smile. Latter that morning our patient's sodium dropped to 86 and she died. [...] Because of [their] *arrogance*, [the attending and chief resident] neglected warnings in the chart concerned with previous attempts at water restriction. [Emphasis added.]

### Morbidity & Mortality Conferences and Discussion of Error

Six of the 11 reported discussions of the error amongst healthcare team members took place in Morbidity and Mortality Conferences. However, at one such conference, a student noted that the error that led to the patient’s poor outcome was never disclosed as “neither the resident or the attending could recall any [complications or aberrant conditions].” While a student at another Morbidity and Mortality Conference, perceived a hesitancy to use the word “mistake” to describe a resident’s failure to recognize that she had perforated a patient’s bowel during a laparoscopic surgery. “What was interesting to me about the whole story was [...] during the conference, this attending never addressed it as a *mistake*,” the student commented. [Emphasis added.]

**Table 8.** Types of Healthcare Teams’ Responses to the Error

Response	No. (%) of total narratives	Examples
Deception	11 (7)	<p>“My resident had to justify her actions, and when she did she exaggerated her patient-physician relationship with this man, implying that she was in tune with his emotional state. <i>She had only talked to the patient once before!</i> She never did acknowledge our disagreement over this patient's discharge.” [Emphasis added.]</p> <p>-----</p> <p>“Looking back at the original order as written, it was apparent that it had been re-marked with a large decimal point by an unknown person.”</p>
Taking Responsibility	8 (5)	<p>“The pediatrician admitted to the parents that it was her fault that the patient was not worked up earlier and apologized to them for the error.”</p> <p>-----</p> <p>“[A]ll those involved took partial responsibility for the error, no one was blamed specifically for the mistake.”</p>
Blame	11 (7)	<p>“‘Damn them!’ screamed the attending as he slammed his fist on the counter. ‘What the hell do they think they are doing writing orders on my patient! Marfan’s patients are already at risk for obstructive apnea due to the tenting of their palate. Adding additional narcotics just increases the risk!’”</p> <p>-----</p> <p>“There was a lot of blame cast toward the orthopedic team, and toward the surgical intensive care unit nurses, who ‘should have been doing neurologic checks more frequently than they did.’”</p>

Discussion	11 (7)	<p>“At Morbidity and Mortality Conference, much was made of how to cooperate better with the anesthesiologists. One attending recommended combining the Morbidity and Mortality Conferences of the two departments. This was not done because they go by different schedules for discussing cases.”</p> <p>“On discussion, the team decided that, while it had technically resected for the wrong reason, it nevertheless had acted correctly because the abnormal findings in the proximal colon were probably due to bowel ischemia – a condition that very well could have caused the patient’s symptoms.”</p>
Distress	15 (10)	<p>“The resident was horrified at his mistake, and when the patient finally woke up, he told her exactly what had happened.”</p> <p>“[T]hose involved in the code felt they had erred. Particularly, one physician, who when he learned of the [do not resuscitate] order and the simultaneous appearance of the family, gave me a look that expressed both guilt and fear and then he quickly left the room.”</p>
Instructive	8 (5)	<p>“The residents and attendings all reviewed the circumstances and reviewed the contraindications for class III antiarrhythmics. All involved concluded that they would be hesitant to use the drug in the future because of the negative potential.”</p> <p>“It was made known to the medical student that hydrogen peroxide is not to be used in an open wound because it causes tissue damage and it does not promote healing.”</p>
Corrective Action	45 (31)	<p>“Because of the perforated bowel wall, a urologist was called in to do the repair.”</p> <p>“The order was corrected and the patient was treated with diphenhydramine to prevent the development of extrapyramidal reactions secondary to the high-dose phenothiazine anti-emetic therapy.”</p>

### Causal Attribution

Students attributed errors (excluding violations) to an individual, team, and/or system in 88 (66%) of the 133 non-violation cases. Violations were excluded because by definition violations tend to be willful acts attributable to individuals or teams. The frequencies and examples of each type of attribution are shown in Table 9. Errors, whether witnessed or committed, were most often attributed only to individuals. There was no significant difference between witnessed and committed errors in the proportion of cases attributed only to individuals ( $P=0.22$ ). In all cases, committed errors attributed only to individuals

were self-attributed as opposed to blamed on or attributed to someone else. Errors were second most frequently attributed to a combination of individuals and systems in 23/133 (17%) of the narratives. Few errors (8/133 or 6%) were attributed only to systems.

**Table 9.** Medical Students' Causal Attribution of Errors

<b>Error Attribution</b>	<b>No. (%) of total narratives*</b>	<b>Examples</b>
Individual(s) Only	44 (33)	<p>“When I was a third year medical student on the internal medicine service I made a mistake in writing down the dosage of a chemotherapy drug.”</p> <p>-----</p> <p>“I felt it was unfortunate this incident had taken place as a result of an attending not wanting to stand around doing nothing as well as ‘showboating.’”</p>
Team(s) Only	10 (8)	<p>“After several minutes, it became apparent that the operating room staff had inadvertently scrubbed off the markings during the surgical prep.”</p> <p>-----</p> <p>“The pharmacy failed to dilute the new bottle, so it was 100x the strength ordered on the discharge medication list.”</p>
System(s) Only	8 (6)	<p>“The order for the barium study was cancelled on the computer, but due to a computer glitch, was not cancelled on the radiology schedule.”</p>
Individual(s) and Team(s) Only	1 (1)	<p>“The surgical team failed to recognize a patient with extensive risk factors for deep vein thrombosis/pulmonary embolism [...] Finally, the patient should have had aggressive and early ambulation, and these orders were not placed by the medical student and/or intern.”</p>
Individual(s) and System(s) Only	23 (17)	<p>“Thus, we had unnecessarily kept a patient in the hospital away from his wife and family for nearly three weeks because his management had switched from different people and was left in the hands of an unknowing third year medical student who was following rather than taking responsibility.”</p> <p>-----</p> <p>“Why did this happen? I was disoriented, I lacked supervision, and I was in a rush; but most importantly I did not stop to make sure that the instructions I was following made sense to me, and fit with what I already knew.”</p>
Team(s) and System(s) Only	1 (1)	<p>“We [the team] were lulled into a false sense of security and therefore did not take appropriate measures in case his condition should worsen [...] He was found to be inadequately anticoagulated on his current heparin dosing. The patient was redosed with a higher dosing protocol specific for acute pulmonary embolism and used in the intensive care unit. This protocol had not been available on the floor.”</p>
Individual(s), Team(s), and System(s)	1 (1)	<p>“I believe that I as a medical student sub-intern charged as the primary caregiver for this patient had a responsibility to have been following up on this patient much sooner than I had done, rather than just assuming the orders were being</p>

		followed speedily. Certainly the nursing staff also shares some responsibility for this as well, as they went several hours without checking a flagged order from us. But, in their defense, that day was incredibly busy on the floor and they were somewhat short-staffed that day.”
Not Attributed	45 (34)	

\* In 133 narratives not coded as *Violations*. Thirteen narratives coded as *Violations* were excluded from the 147 total narratives because by definition violations tend to be willful acts attributable to individuals or teams.

**Table 10.** Students’ Causal Attributions of Committed vs. Witnessed Errors

Level of Care	No. (%) of Narratives*		P Value§
	Committed†	Witnessed‡	
Individual(s) Only	14 (64)	28 (47)	0.22
Team(s) Only	0 (0)	7 (12)	0.18
System(s) Only	0 (0)	8 (13)	0.10
Individual(s) and Team(s) Only	0 (0)	0 (0)	n/a
Individual(s) and System(s) Only	7 (32)	16 (26)	0.78
Team(s) and System(s) Only	0 (0)	1 (2)	1.00
Individual(s), Team(s), and System(s)	1 (4)	0 (0)	0.27

\* *Violations* were excluded because by definition violations tend to be willful acts attributable to individuals or teams.

† Of the 26 narratives coded *Committed* and not coded as *Violations*, 22 were attributed.

‡ Of the 112 narratives coded *Witnessed* and not coded as *Violations*, 60 were attributed.

§ Two-tailed *P* value calculated using the Fisher exact test. In each row, the proportion of narratives within the two groups (i.e., committed and witnesses) coded that particular *Level of Care* is compared to all other narratives that lacked such coding.

## **DISCUSSION**

### **Study Limitations**

Our study has several important limitations. First, the generalizability of the research is limited by focusing on one medical school. Second, because the writing assignment was open-ended and not designed for research purposes, our data is incomplete with regard to certain variables. For example, there are many narratives for which we do not know if the error was or was not disclosed to the patient and the anonymity of the narratives precluded follow-up with students. However, we have no reason to believe that the frequency of disclosure in these narratives would differ substantially from narratives in which disclosure to patients was discussed. Third, because these narratives were anonymous we had no way of confirming what was reported, and since the narratives were a medical school course assignment, there is always the risk that students wrote what they believed faculty wanted to hear (i.e., social desirability bias); although with regard to the latter, the anonymity of the narratives may reduce that tendency. Fourth, the retrospective nature of the narratives makes them subject to recall bias. In addition, medical errors can be difficult to identify. Students may not always clearly recognize a medical error or may have misperceived an event and falsely labeled it an error. However, the students' perceptions are most important, since they impact their professional development and emotional well-being regardless of whether a true error occurred. As American sociologist W. I. Thomas wrote, "[T]hings perceived as real are real in their consequences." Finally, the narratives were relatively short (one to two pages) limiting the depth of the conclusions that can be drawn. However, the number of participants and the response rate are high for a qualitative study and adds confidence to



the conclusions drawn. The internal validity of our data and conclusions is supported by the high intercoder reliability.

### **Clinical Context**

We found that medical students are exposed to a variety of medical errors in a diversity of clinical settings. Few students had trouble describing at least one significant error they had experienced during their clinical clerkships, and several students noted in their narratives having seen many errors during their time on the wards.

### **Witnessed vs. Committed**

Students frequently reported errors that they witnessed rather than committed by a ratio of about 4:1. Although their narratives were anonymous, students may still have been hesitant to divulge an error they themselves committed since these narratives were to be discussed anonymously in class. Alternatively, these findings may be because senior physicians supervise students and students' would-be-errors are discovered or prevented before they actualize. In addition, students, as opposed to residents and attendings, are not frequently given the type of patient care responsibilities with high risk of error or harm to patients, and therefore are less likely to commit a significant error than to witness one.

### **Student Distress**

Previous authors have noted that medical errors can produce considerable emotional distress in the physicians who commit them.<sup>2-4</sup> Our study adds to these findings and is the

first to our knowledge to document that students make significant errors and experience distress when they do. In addition, we find that the distress caused by errors extends beyond those who commit them to the students who witness them. Moreover, students experienced two different types of distress, moral and emotional. In the literature, moral distress is a concept commonly associated with the nursing profession and refers to the painful feelings associated with an inability to do what one believes is morally right or necessary.<sup>70</sup> Emotional distress is a more generic term used to describe the feelings of sadness, guilt, shame, fear, anger, etc. associated with a painful experience.

Regardless of its type, the distress caused by errors is often unaddressed. As Hilfiker<sup>3</sup> noted with regard to physicians, “We see the horror of our own mistakes, yet we are given no permission to deal with their emotional impact[.]” This appears to be true for students as well, and we found that students responded negatively when the distress caused by errors was ignored or dismissed by others.

### **Disclosure**

Despite ethical standards that generally require physicians to disclose errors to patients and/or families,<sup>7, 10-14, 68</sup> we found that error went undisclosed to patient in 36 (46%) of the 79 narratives in which disclosure was discussed and the ratio of disclosed to undisclosed errors was nearly 1:1. This is consistent with another study of residents in which 76% of house officers had not disclosed a serious error to a patient<sup>4</sup> and with other studies that noted the general reluctance of physicians to disclose errors to patients.<sup>61, 71</sup>

It has been suggested that physicians may not be obligated to inform patients of errors that do not cause significant harm or increase the risk of future harms,<sup>7, 12-14, 72</sup> however we found that the presence, type, or severity of the consequences for patients resulting from the errors did not account for differences in disclosure (See Tables 3 and 4). Moreover, several errors that had considerable consequences for the patients involved went undisclosed.

Undisclosed errors posed considerable dilemmas for students who often felt patients were entitled to know about the error and its impact on their health. However, intimidation by faculty and housestaff, fear of retribution, and their subordinate position in the medical hierarchy kept students from speaking up. These experiences were morally distressing for students, and they continued to struggle with these issues well beyond the initial event.

### **Professionalism, Role Modeling, and the “Hidden Curriculum”**

Role modeling seems to play an important part in shaping students’ attitudes and values.<sup>48, 50, 73-77</sup> Previous studies have demonstrated that physician role modeling may affect students’ attitudes toward caring for the chronically ill<sup>74</sup> and career choice.<sup>48, 73, 75</sup> Similarly, our findings indicate that the way in which senior physicians handle medical errors has a powerful formative influence on students. Medical errors offered an opportunity for faculty and housestaff to model many of the attributes of professionalism promoted by several organizations in medical education,<sup>56-59</sup> and these attributes were often recognized and appreciated by students. In particular, students who witnessed senior physicians candidly and apologetically disclose errors to patients or colleagues

often recognized the importance of honesty, integrity, accountability, and compassion in professional life. Modeling candid disclosure to patients and colleagues and encouraging learning from mistakes may assist students to develop the attributes of professionalism, outlined by the Association of American Medical Colleges, National Board of Medical Examiners, and American Board of Internal Medicine, as essential to graduating medical students (e.g., accountability, duty, respect for others, and integrity).<sup>56, 78, 79</sup>

However, we also found that the way in which some faculty and housestaff responded to errors sometimes worked directly against the professionalism that medical education espouses. The behavior of some faculty and housestaff conveyed a “hidden curriculum” about errors in which errors, and the feelings they evoke, are unacceptable and not to be discussed or disclosed. We found several instances where students’ superiors enforced the importance of medical hierarchy, self-interest, and loyalty to colleagues over patients’ safety and rights. In response students chose not to advocate for patients they perceived as being harmed or violated. Students also remained silent in part because they perceived themselves as vulnerable or ignorant (i.e., unsure whether an error had truly occurred or what should have been done differently). Students who perceive themselves to be technically ignorant may come to perceive themselves as ethically ignorant.<sup>80</sup> As a result, they may interpret what is expected of them as also being morally preferable.<sup>45</sup> Take, for example, the student mentioned previously who questioned whether his preceptor’s deception (i.e., telling every patient it was the student’s final exam and that the student needed to do a pelvic exam) was “an *actual* mistake.” [Emphasis added.] Moreover, the high number of ethical violations that students described as either the error itself or in

response the error (e.g., deception) is particularly troubling given evidence that suggests the students who witness unethical behavior may suffer ethical erosion.<sup>53, 54</sup>

### **Morbidity & Mortality Conferences**

Historically, morbidity and mortality conferences were established as a forum in which physicians could learn from mistakes.<sup>29</sup> Our limited findings on the discussion of medical errors in morbidity and mortality conferences corroborate that these conferences often fail to include candid discussions of medical errors.<sup>4, 27, 28, 65</sup> Open discussion of errors may lead to constructive changes in practice<sup>4</sup> and promotes patient safety.<sup>81</sup> However, we found several instances of missed opportunities to discuss errors with trainees, both inside and outside of these conferences, and as a result students were left with unanswered questions and unclear as to how to prevent the error in the future.

### **Causal Attribution**

Errors were attributed to a particular level of care (i.e., individual, team, or system), or a combination thereof, in close to two-thirds of the narratives. Errors were disproportionately attributed to individuals over systems regardless of whether the error was witnessed or committed (See Tables 9 and 10). Our findings contrast a previous study of residents that demonstrated a tendency to “blame the system” among trainees.<sup>6</sup> Attributing errors to individuals rather than systems may be beneficial since those who attribute their errors to systems are less likely to learn from their mistakes.<sup>7</sup> However, the vast majority of errors are attributable, at least in part, to system failures<sup>23, 34, 35</sup> and a physician’s ability to identify systems contributions to errors is essential to patient

safety.<sup>23</sup> Our findings demonstrate a need to assist medical students in assessing system contributions to error. This must be done with careful attention to the delicate balance of “systems thinking” and personal accountability. Otherwise, it may become too easy for students to look for external systems causes and errors may lose their powerful teaching potential.

### **Implications**

Medical school curriculums should address medical errors. Because negative role models were common, relying on student’s experience for the acquisition of knowledge, skills, and attitudes relevant to medical errors may lead to undesirable conduct. Therefore, organized teaching about medical errors may increase the likelihood that students will learn how to appropriately handle mistakes.

Faculty and residents must take seriously the powerful influence their behavior can have on students. Improved role modeling is needed to ensure that students assimilate desirable professional values and begin to appreciate proper ways to respond to errors. One way to improve role modeling might be to structure it directly into clerkships. At the beginning of a clerkship, the attending may schedule to meet with students to disclose and discuss an error the attending made in the past. In this way, faculty may send a clear and early message regarding accountability, disclosure, coping, and life-long learning and may set the stage for disclosure and discussion of errors as they occur on the clerkship. Given the larger number of errors reported on surgery and medicine clerkships, it might be appropriate for these clerkships to lead the way.

When a medical error (or an adverse event which may be perceived as an error) occurs faculty and housestaff should, wherever possible, reinforce earlier messages by modeling disclosure to patients and colleagues in the presence of students and by encouraging students to learn from mistakes. Furthermore, our study found that students sometimes had unresolved feelings and/or questions (e.g., Was it an error? What should have been done differently?) about the event, and desired to debrief with housestaff or attendings. Well-organized, faculty-led debriefing sessions following adverse events may be emotionally and educationally beneficial to students. To maximize effectiveness, debriefing sessions should be structured to provide a safe environment in which students may feel comfortable raising difficult issues.

However, debriefing sessions may be insufficient to deal with the severe and long-lasting distress caused by some errors. This, along with the struggle to find support in some cases, underscores the need for institutional mechanisms to help students cope. Well-trained physicians should lead confidential programs to assist students to cope with errors, and appropriate mental health services should be available to address the psychiatric morbidity that may follow errors.<sup>82</sup> These programs should be promoted to students who may commit errors or silently bear witness to errors and struggle with conflicting duties to patients and their teams. Clerkship orientations should explicitly address errors and available resources should be made known to students.

Finally, students may benefit from writing about and discussing errors with their colleagues. When asked on the course evaluations to write-in the discussion group exercise(s) that were most/useful, one-third of the students who responded mentioned the mistakes assignment, which was more than for any of the other nine exercises. Narrative medicine classes and “parallel charts” in which medical students reflect, write, and then discuss their personal and emotional reactions to their patient care experiences are becoming increasingly popular.<sup>83, 84</sup> Dr. Rita Charon, a leading scholar in the field of Narrative Medicine, suggests that writing about patients assists students achieve greater insight into their experiences and the experiences of their patients.<sup>83-85</sup> With regard to medical errors, reflective writing and discussion, even weeks or months after the event, may help students gain insights into the underlying cause(s) of the errors and thus may facilitate learning from mistakes and promote patient safety. Furthermore, some commentators suggest that writing about emotionally and/or morally difficult experiences may help with coping and attaining a sense of resolution.<sup>80, 83</sup> Comments from students support these claims. One student in this study wrote in her course evaluation, “I thought these writing exercises were valuable to sort through our own thoughts on the subject.”

## **Conclusion**

Students’ narratives provided valuable insights into their experiences with medical errors. Moreover, despite the limitations of the study design, our findings serve to illustrate the importance of student experiences with medical error on their emotional well-being and professional development and serve as a springboard into a largely unexplored area.



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**APPENDIX**

**Codebook For The  
Medical Student Narratives On Medical Errors Study**

Created by:

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### **General Instructions:**

- When coding, use the most specific category or subcategory code applicable.
- The numbered items in ALL CAPS are the titles of thematic categories. They should not be used to code the text. Only title case subheadings, which constitute themes (a.k.a. codes), should be used to code text.
- Unless otherwise noted in the category's definition, the codes should be applied to complete sentences (i.e., the unit of analysis is the sentence). The periods contained in the text demarcate the beginning and ending of sentences.

### **Coding Structure and Operational Definitions:**

#### **1. STUDENT'S ROLE IN ERROR**

Thematic category that describe the degree of involvement of the student in the error.

These codes are labels applied to individual student narratives not individual sentences. Every individual narrative should be labeled with one, and only one, of the following codes.

##### **1.1. Witnessed Error**

The medical student (narrator) witnessed or has firsthand knowledge of the primary error being described in the narrative (i.e., the medical student was a member of the healthcare team whose member(s) committed the error or the medical student was assigned to the care of patient at or around the time error occurred). However, there is NO causal link between the student and the error.

1.2. **Error Committed**

The medical student (narrator) committed the primary error being discussed in the narrative (e.g., *I caused a pneumothorax while attempting to place central line*; or *I wrote the order for 10x the appropriate dose*). The student describes a causal link between herself and the error. INCLUDES the student committing an error even if an underlying cause might have been a lack of supervision. EXCLUDES the student failing to take appropriate action after witnessing an error (e.g., reporting it) even though that itself may be an error. EXCLUDES third person accounts of a medical student committing an error (e.g., the medical student caused the pneumothorax) since they could be the narrator committing the error or the narrator observing another medical student making the error.

1.3. **Indeterminable**

The medical student's (narrator) role in the error (i.e., witnessed vs. committed) cannot be definitively determined from the text of the narrative. INCLUDES descriptions of more than one health care team caring for the patient with no clear indication which team the student (narrator) is on, the team that committed the error or the team that did not OR descriptions in written in third person of the medical student committing the primary error being discussed in the narrative when it is unclear if the narrator and the medical student committing the error are one in the same.

## 2. CLERKSHIP SPECIALTY

Thematic category that describes the specialty of the rotation the medical student (narrator) was on when the error occurred. These codes are labels applied to individual student narratives not individual sentences. Every individual narrative should be labeled with one, and only one, of the following codes.

### 2.1. **Medicine**

There is strong evidence that the medical student (narrator) is on an internal medicine or internal medicine subspecialty rotation at the time of the error. INCLUDES the medical student (narrator) described as being on a hospital team or service AND the patient having a typical internal medicine diagnosis (e.g., chronic obstructive pulmonary disease, congestive heart failure, pneumonia, etc.) that is being treated medically. EXCLUDES mere descriptions of the medical student (narrator) as caring for a patient having a typical internal medicine diagnosis (e.g., chronic obstructive pulmonary disease, congestive heart failure, pneumonia, etc.) that is being treated medically since the student may be on a family medicine rotation, and these cases should be coded as *Indeterminable*.

### 2.2. **Ob/Gyn**

There is strong evidence that the medical student (narrator) is on an obstetrics and gynecology rotation at the time of the error. INCLUDES the medical student (narrator) described as being on a hospital team or service AND the patient having a typical Obstetrics & Gynecology diagnosis or intervention (e.g., ectopic pregnancy, pelvic surgery). EXCLUDES mere descriptions of

the medical student (narrator) as caring for a patient having a typical Ob/Gyn diagnosis since the student may be on a family medicine rotation; these cases should be coded as *Indeterminable*.

**2.3. Surgery**

There is strong evidence that the medical student (narrator) is on a surgery or surgical subspecialty rotation at the time of the error. INCLUDES the medical student (narrator) described as being on a hospital team or service AND the patient undergoing a surgical procedure (e.g., cholecystectomy, appendectomy). INCLUDES cases where the medical student is part of a pediatric surgery team, rather than a pediatric medical team. EXCLUDES mere descriptions of the medical student (narrator) as caring for a patient undergoing a surgical procedure since the student may be on a family medicine rotation; these cases should be coded as *Indeterminable*. EXCLUDES female pelvic surgery generally done by Ob/Gyn physicians.

**2.4. Family Practice**

There is strong evidence that the medical student (narrator) is on a family medicine rotation at the time of the error. The student must explicitly state being on this rotation OR must describe an outpatient setting highly descriptive of family practice (e.g., an outpatient clinic that performs minor surgical procedures and sees adults and children/infants)

**2.5. Pediatrics**

There is strong evidence that the medical student (narrator) is on a pediatrics or pediatrics subspecialty rotation at the time of the error. INCLUDES the

medical student (narrator) described as being on a hospital team or service AND the patient having a typical pediatric diagnosis (e.g., cystic fibrosis, phenylketonuria, etc.). EXCLUDES cases where the medical student is part of a pediatric surgery team and not a pediatric medical team, which should be coded as *Surgery*. EXCLUDES mere descriptions of the medical student (narrator) as caring for a patient having a typical pediatrics diagnosis since the student may be on a family medicine rotation; these cases should be coded as *Indeterminable*.

**2.6. Other**

The medical student (narrator) is described as being on a rotation in a specialty or subspecialty not included in the above categories (e.g., neurology, psychiatry, pathology, etc.)

**2.7. Indeterminable**

Not enough information is provided to determine the specific rotation the medical student (narrator) was on at the time of the error. INCLUDES descriptions of more than one health care team from different or unknown specialties caring for the patient with no clear indication of which team the medical student (narrator) is on.

**3. TYPE OF ERROR**

Thematic category that describes the type of error being reported by the medical student (narrator). If the student reports more than one error or a chain of errors in a single case, for example an incorrect diagnosis results in incorrect treatment, the



document is labeled according to the primary error (diagnosis error in this example).

These codes are labels applied to individual student narratives not individual sentences. Every individual narrative should be labeled with one, and only one, of the following codes:

### 3.1. **Diagnosis Error**

The error is primarily a failure to diagnosis, a misdiagnosis, or inappropriately delay in diagnosis. INCLUDES not recognizing the signs and symptoms of a patient's compromised condition or the severity of their condition (e.g., failure to recognize the signs of tuberculosis, misdiagnose an ectopic pregnancy as an ulcer disease, misinterpreting a radiologic study or laboratory values).

EXCLUDES a misdiagnosis, delay in diagnosis, or failure to diagnosis due to a failure to evaluate a patient's problems which should be coded an *Evaluation Error*. A diagnosis error occurs when the relevant clinical data is collected but the explanation of the clinical data provided by the clinician is flawed.

### 3.2. **Medical Decision Making Error**

The error is primarily a failure in judgment or clinical decision-making (e.g., failure to obtain an expert consultation, leaving a patient at risk of falls inappropriately unattended, etc.) EXCLUDES decisions or poor judgment regarding communication, which should be coded *Faulty Communication* and excludes the choosing an inappropriate treatment which should be coded *Treatment Error*. INCLUDES inappropriately continuing or discontinuing an indicated therapeutic intervention (e.g., premature discharge, deciding on a

longer course of the proper therapy than necessary, inappropriate or premature transfer, etc.)

**3.3. Treatment Error**

The error is primarily a failure to treat, inappropriate treatment, or inappropriate delay in treatment of the patient's problem(s). INCLUDES not treating a problem, using the wrong treatment for the problem, using a contraindicated treatment. EXCLUDES surgical/procedural errors, medication errors, and inappropriate continuation or discontinuation of therapy that was initially indicated (i.e., *Medical Decision Making Error*) which are distinct categories.

**3.4. Evaluation Error**

The error is primarily a failure to evaluate, inappropriate or incomplete evaluation, or inappropriate delay in evaluating the status of a patient's problem(s) (e.g., Slow to respond to a call to see a patient, schedule treadmill test for patient before ruling out a myocardial infarction, failed to evaluate cause for decreased urine output, inappropriately skipping relevant parts of the physical exam to save time). EXCLUDES a failure to recognize or misinterpretation of signs or symptoms present on evaluation (i.e., *Diagnosis Error*).

**3.5. Faulty Communication**

The error is primarily a failure to effectively or accurately communicate where such communication, or lack thereof, is reasonably required or expected (e.g., forget to obtain patient consent for treatment, misinform

someone regarding lab values or radiologic findings, fail to effectively communicate diagnosis to patient, inappropriately disclose a diagnosis, breach confidentiality, etc.)

3.6. **Procedural Error**

The error is primarily a failure to properly execute a medical procedure (e.g., causing a pneumothorax during central line placement or perforating the bowel during paracentesis). **INCLUDES** surgical errors and errors made in minor procedures like blood draws, etc.

3.7. **Medication Error**

The error is primarily a failure to properly prescribe or dose a medication (e.g., ordering the wrong drug to treat the problem, ordering the right drug at the wrong dose) or process a medication order (e.g., dispensing the wrong drug, delayed dispensing of the drug ordered, incorrectly compounding or preparing the drug, not diluting properly) or administer of a medication (e.g., giving the medication to the wrong person, failure or delay in administering the drug, administering a drug or dosage other than the one ordered).

3.8. **Violation**

The error is primarily a deviation from commonly held safe operating practices, procedures, standards, or rules including ethical standards. This applies almost entirely to deliberate actions, though not necessarily that any bad consequences were intended. **INCLUDES** routine violations that entail cutting corners to achieve a task related goal (e.g., making important medical decision before completing assessment, skipping “unnecessary” steps in order

to accomplish a task) or optimizing violations to further personal rather than strictly task related goals (e.g., violations that are just for "kicks" or to alleviate boredom, violations for personal gain or to help one's reputation) or ethical violations that entail failure to act in accordance the established ethical standards (e.g., performing a necessary procedure without adequately informed consent, deceiving a patient in order to practice a procedure.)  
EXCLUDES most case of unintentionally deviating from standard practice due to forgetfulness, rushing, or inexperience.

**4. PRESENCE OF PERCEIVED ADVERSE CONSEQUENCES FOR PATIENT/FAMILY**

Thematic category that describes the perceived personal, social, economic, and/or medical consequences (or lack or omission thereof) of the error and its related events (e.g., disclosure) for either the patient and/or family. These codes are applied to individual student narratives not individual sentences. Every individual narrative should be labeled with one, and only one, of the following three codes.

**4.1. Omitted**

The medical student (narrator) omits any description of the error having or not having adverse consequences for the patient and/or family. INCLUDES narratives that describe social, economic, and/or medical outcomes for the patient or family, which the student does not attribute to the error. *This code is applied to individual student narratives not individual sentences.*

4.2. **Yes Adverse Consequences**

The medical student (narrator) describes the error as having adverse personal, social, economic, and/or medical consequences for the patient and/or family. EXCLUDES social, economic, and/or medical outcomes that the student does not attribute to the error.

4.3. **No Adverse Consequences**

The medical student (narrator) explicitly describes the error as having no adverse personal, social, economic, and/or medical consequences. INCLUDES cases in which the patient is placed at risk but the risks are explicitly described as not actualizing.

4.4. **Unsure/Patient Placed at Risk**

The medical student (narrator) explicitly describes herself as unsure whether the error had any adverse consequences for the patient and/or family, OR the medical student (narrator) explicitly describes the error as resulting in or leading to placing the patient at higher risk for harm (e.g., death, pain, disability, exacerbation of disease, an arrest, electrolyte imbalances, changes in mental status, transfer to a intense case unit, fever, infection, etc.) AND none of these harms are described as actualizing or the narrator is unsure if any of these harms have actualized or the narrator is unsure that the harms that have actualized are attributable to the error.

## 5. TYPES OF PERCEIVED ADVERSE CONSEQUENCES FOR PATIENT/FAMILY

For narratives coded with 6.2 *Yes Adverse Consequences*, this thematic category describes the specific types of perceived personal, social, economic, and/or medical consequences of the error and its related events (e.g., disclosure) for either the patient and/or family. Some, but not necessarily all, of the consequences can be further categorized into the following codes. With the exception of the codes *Death* and *Compromised Patient Condition*, these codes are NOT mutually exclusive.

### 5.1. Increased Healthcare Costs

The medical student (narrator) explicitly describes the error as resulting in increased healthcare costs. INCLUDE increased cost covered by the patient's insurance.

### 5.2. Prolonged or Additional Hospitalization

The medical student (narrator) explicitly describes the error as resulting in a prolonged hospital stay (i.e., a longer stay than would have been expected if not for the error) or additional hospitalizations.

### 5.3. More Extensive or Additional Therapy or Studies

The medical student (narrator) describes the error as resulting in more extensive or additional medical or surgical therapy (e.g., additional antibiotics or a necessary longer course, a more invasive surgery, etc.) or diagnostic studies (e.g., additional x-rays or lab work, etc.)

### 5.4. Compromised Patient Condition

The medical student (narrator) describes the error as compromising the

patient's condition relative to what would be expected had the error not occurred. INCLUDES descriptions of the error resulting or leading to pain, disability, exacerbation of disease, an arrest, electrolyte imbalances, changes in mental status, transfer to a intense case unit, fever, infection, etc. EXCLUDES description of the error directly contributing to the patient's death (i.e. cases that meet the definition of the code, *Death*, below).

5.5. **Death**

The medical student (narrator) describes the error as directly contributing to the patient's death. The error need not be the only contributing factor described. EXCLUDES cases in which the patient dies but the medical student (narrator) does not attribute the error to the patient's death or is not sure whether the error contributed to the patient's death.

6. **DISCLOSURE OF ERROR TO PATIENT/FAMILY**

Thematic category pertaining to the disclosure (or lack thereof) of the error to the patient/family. Every individual narrative should be labeled with one, and only one, of the following codes.

6.1. **Disclosed**

The disclosure of the error by any member or members of the healthcare team to the patient and/or the family.

6.2. **Not Disclosed**

The medical student (narrator) explicitly describes the error not being disclosed to the patient and/or family. INCLUDES cases of limited disclosure (e.g.,

mischaracterizing the severity of the error, disclosing only part of the error, providing only vague information about the error, etc.) that constitute as “cover-ups.”

**6.3. Omitted/Unsure**

The medical student (narrator) omits discussion of the disclosure or nondisclosure of the error OR describes herself as unsure whether the error was disclosed to the patient and/or family.

**7. DISCLOSURE OF ERROR TO TEAM AND/OR INSTITUTION**

Thematic category pertaining to the disclosure (or lack thereof) of the error by any member or members of the healthcare team who committed the error or directly witnessed the error to the institution or to other member(s) of the healthcare team (e.g., intern, resident, nurse, attending) who did not commit or directly witnessed the error. Every individual narrative should be labeled with one, and only one, of the following codes.

**7.1. Disclosed**

The disclosure of the error by any member or members of the healthcare team who committed the error or directly witnessed the error to the institution or to other member(s) of the healthcare team (e.g., intern, resident, nurse, attending) who did not. The former INCLUDES disclosing the error by verbal or written communication with other team member(s) including writing a note disclosing the error in the chart. The latter INCLUDES filing a incident report, notifying



risk management, presenting the case at morbidity and mortality conference, presenting the case to department faculty or hospital administration, etc.

#### 7.2. **Not Disclosed**

The medical student (narrator) explicitly describes the error not being disclosed to other member(s) of the healthcare team (e.g., intern, resident, nurse, attending) or to the institution. The later INCLUDES NOT filing a incident report, NOT notifying risk management, NOT presenting the case at morbidity and mortality conference or WITHHOLDING information at morbidity and mortality conference, etc. INCLUDES cases of limited disclosure (e.g., mischaracterizing the severity of the error, disclosing only part of the error, providing only vague information about the error, etc.) that constitute as “cover-ups.” In addition, errors explicitly described as disclosed to particular healthcare team members but not others, should be coded as *Not Disclosed*.

#### 7.3. **Omitted or Unsure**

The medical student (narrator) omits discussion of the disclosure or nondisclosure of the error as defined above OR describes herself as unsure whether the error was disclosed to other member(s) of the healthcare team (e.g., intern, resident, nurse, attending) or to the institution.

### 8. **MEDICAL STUDENT’S RESPONSE TO ERROR**

Thematic category pertaining to the medical student’s (narrator’s) response to the error. This category involves the student’s subjective reactions to the error or impressions of the error and/or its related events (e.g., disclosure). The medical

student (narrator) describes their response to the error and/or its related events (e.g., disclosure). Some, but not necessary all, of the student's responses can be grouped into the following codes. These codes are NOT mutually exclusive.

**8.1. Conclusions Drawn**

The medical student (narrator) explicitly draws a conclusion, including identifying values or "rules" of conduct within medicine, from her experience with the medical error and/or its related events (e.g., disclosure). This also **INCLUDES** things "learned" from the error.

**8.2. Distress**

The medical student (narrator) describes experiencing emotional or moral distress (e.g. morally conflicted or unable act in accordance with their moral intuitions) in response to the error and/or related its events (e.g., disclosure or lack thereof). **INCLUDES** descriptions of the medical student (narrator) feeling frustrated, sad, stressed, guilt, regret, irritated, angry, worried, etc.

**8.3. Lasting Impact**

The medical student (narrator) describes the medical error or its related events (e.g., its disclosure) as having a lasting impact or greater than a transient impact on them (e.g., *I will never forget what happened; I cried for days; I think about it all the time.*) **EXCLUDES** simple statements of having "learned" something from the error **UNLESS** it is accompanied by a statement that the lesson learned is not transient or perceived to be long-lasting (e.g., *I always remember to check the patient's name when reading an x-ray.*)

#### 8.4. **Did Error Occur?**

The medical student (narrator) contemplates whether an error actually occurred or whether others would consider a particular event an error or describes herself as unsure whether or not the events or action described should be truly considered a medical error. The contemplation may be in reference to the main error being discussed in the narrative BUT is not limited to it.

### 9. **HEALTHCARE PROFESSIONALS' RESPONSE TO ERROR**

Thematic category pertaining to the an individual healthcare professional's or group of the healthcare professionals' response --*other than the medical student narrator's response*-- to the error and/or its related events (e.g., disclosure). This INCLUDES, but is not limited to, the response of a healthcare team(s), department(s), hospital administration, risk management, attendings, nurses, and residents. EXCLUDES healthcare professionals merely disclosing the error to the patient, to the institution, or to other healthcare workers UNLESS the disclosure or nondisclosure involves an overt act of deception OR the disclosure involves the healthcare professional(s) taking personal responsibility for the error as described in the subgroups below. Otherwise, DISCLOSURE OF ERROR is a separate thematic category. Some, but not necessary all, of the responses can be categorized into the following codes. These codes are NOT mutually exclusive.

#### 9.1. **Corrective Action**

The healthcare professional(s) respond to the error and/or its related events

(e.g., disclosure) by attempting to correct the error and/or prevent, reverse, or alleviate its adverse effects on the patient. Indicated regardless of whether this attempt is successful.

9.2. **Accepting Personal Responsibility**

The healthcare professional(s) respond to the error and/or its related events (e.g., disclosure) by taking or accepting personal responsibility for the error to at least some degree (e.g., *The fellow admitted he committed the error; The team took responsibility for the error*).

9.3. **Instructive**

The healthcare professional(s) respond to the error and/or its related events (e.g., disclosure) by teaching, instructing, or lecturing others regarding how to properly execute the activity erroneously performed. This code is NOT indicated by mere condemnation of erroneous actions (i.e., reprimand) UNLESS it accompanied by a constructive element.

9.4. **Distress**

The healthcare professional(s) are described as experiencing emotional or moral distress (e.g. morally conflicted or unable act in accordance with their moral intuitions) in response to the error and/or its related events (e.g., disclosure or lack thereof). INCLUDES descriptions of the healthcare professional(s) feeling frustrated, sad, stressed, conflicted, guilt, regret, irritated, angry, worried, etc.

9.5. **Deception**

The response of the healthcare professional(s) to the error and/or its related

events (e.g., disclosure) is deceptive (i.e., leads others to believe what is false). For example, blaming someone else for *your* mistake, or falsely altering or entering information in the medical record.

9.6. **Blame**

The healthcare professional(s) respond to the error and/or its related events (e.g., disclosure) by blaming (i.e., assigning responsibility) others, at least in part, for the error. This code is indicated regardless of whether the person(s) blamed bears any responsibility for the error. Examples include: “*They should have been doing X.*” “*The chief blamed the intern for not placing the order.*”

9.7. **Discussion**

The healthcare professional(s) respond to the error and/or its related events (e.g., disclosure) by openly discussing the error among themselves including what went wrong, who was responsible, what could have been done differently, or what changes could prevent it in the future, etc. (e.g., *The team discussed what went wrong to prevent future errors; The error was discussed in M&M rounds*). This code is NOT indicated by mere disclosure or presenting of the error to another healthcare professional(s) alone UNLESS it is described as being accompanied by a *meaningful exchange* between the individuals.

## 10. MEDICAL STUDENT’S RESPONSE TO HEALTHCARE TEAM’S RESPONSE

Thematic category pertaining to the medical student's (narrator's) response to the

response of other member(s) of the healthcare team (or team as a whole) to the error and/or its related events (e.g., disclosure). Beyond a mere description of the response of others, the text must include some element of the medical student's (narrator's) impression, judgment, or assessment of the response to the error. This applies to statements such as, "The attending's honest disclosure to the patient was *helpful* in reducing tensions." It does NOT apply to, "The attending honestly disclosed the error to the patient." The former contains an assessment of the attending's response as *helpful* while the later is purely descriptive and includes less of a value judgment of the attending's response. All of these responses should be categorized into one, and only one, of the following codes.

**10.1. Positive**

The medical student's (narrator's) response to others on the healthcare team's response to the error and/or its related events (e.g., its disclosure) is affirmative, favorable, satisfying, welcoming, or constructive in nature.

**10.2. Negative**

The medical student's (narrator's) response to the response others on the healthcare team to the error and/or its related events (e.g., its disclosure) is critical, unfavorable, dissatisfying, dismissive, or detrimental in nature.

**10.3. Neutral/Other**

The medical student's (narrator's) response to the response others on the healthcare team to the error and/or its related events (e.g., its disclosure) cannot be clearly classified as positive nor negative in nature as defined above.

## 11. CAUSAL ATTRIBUTION

Thematic category that pertains to the medical student's attribution of the error to a particular level of organization (e.g., individual, team, and/or system). Consider what type of error is being reported (e.g., medication error) and to what, if any, level of organization the student narrator attributes the error. Students may attribute the error to more than one level of organization and thus more than one of these codes may be applied to an individual narrative (i.e., the codes are NOT mutually exclusive).

### 11.1. To Individual

The medical student (narrator) attributes the error to an individual(s) or an individual's characteristic(s) (e.g., laziness, forgetfulness, lack of knowledge).

Includes self attribution (e.g., I should have been more thorough.)

Indicators of attribution include:

- Statements that an individual should have acted different (e.g., He *should* have checked the label before administering the drug; I *failed* to check his vitals signs. He *missed* the warning signs)
- Statements that are critical of an individual's acts or omissions that comprise the error (e.g., He did a *poor job* assessing the patient.)
- Statements describing an individual's acts or omissions as erroneous (e.g., I was *wrong* not to have evaluated the patient more thoroughly; It was a *mistake* for the attending to have discharged the patient; He made an error.)

- Statements assigning ownership of the error to an individual(s) (e.g., *my* mistake, *her* error).
- Causal statements that refer to the individual as the cause of: the error OR the resulting harm associated with error (e.g., *Because* of his forgetfulness, the antibiotic orders were delayed and the patient got worse; The error resulted from the resident's carelessness).

INCLUDES attribution to the pronoun, *we* and *our* and *their*, when these pronouns are used to refer to a group of specific individuals and NOT a team, service, institution, hospital, etc. (e.g., We [the intern and I] failed to evaluate his chest pain.) EXCLUDES mere descriptions of an action (e.g., I nicked the bladder, He chose not to order the test.)

#### 11.2 To Team

The medical student (narrator) attributes the error to a healthcare team(s)/hospital service or their characteristic(s) (e.g., laziness, forgetfulness, incompetent). Indicators of attribution include:

- Statements that a team should have acted different (e.g., Our team *should* have checked the label before administering the drug; The nursing team *missed* the warning signs.)
- Statements that are critical of a team's actions or omissions that comprise the error (e.g., The medicine team did a *poor job* assessing the patient.)
- Statements describing an team's acts or omissions as erroneous (e.g., The ID service was *wrong* not to have evaluated the patient more thoroughly;



It was a *mistake* for our team have to discharged the patient; The nursing staff made a mistake.)

- Statements assigning ownership of the error to an individual(s) (e.g., it was *their [the team's]* mistake).
- Causal statements that refer to the team as the cause of the error OR of the resulting harm associated with error (e.g., *Because* of our [the team's] forgetfulness, the antibiotic orders were delayed and the patient got worse; The error resulted from the GI team's carelessness).

INCLUDES attribution to the pronouns, *we* and *our* and *their*, when these pronouns refer NOT to a group of specific individuals but a healthcare team or hospital service (e.g., We [the GI team] failed to evaluate his chest pain.)

EXCLUDES mere descriptions of an action (e.g., The team chose not to order the test.)

### 11.3 To System

The medical student (narrator) attributes the error to a system(s) or external condition(s) (e.g., hospital procedures, practices, or protocols; communication between subordinates and superiors; communication between departments; supervision of subordinates by superiors; computer networks, inadequate equipment, scheduling schemes, staffing, training systems, job overload, patient's anatomic abnormalities, atypical presentation of disease).

Indicators of attribution include:

- Statements that system(s) or external conditions should have been different (e.g., The computer *failed* to catch the error. The resident *should*

have checked my order before signing it. There *should* have been more nurses on the floor.)

- Statements that are critical of system(s) or external conditions that are directly related to the error (e.g., It was a *flawed* protocol and the patient did not improve. The instructions on the bottle were *vague* resulting in a large overdose.)
- Statements describing system(s) or external conditions as erroneous (e.g., The patient list was wrong so I examined the wrong patient; It was a *mistake* for our team to have discharged the patient; The cardiology service made a mistake.)
- Causal statements that refer to a system(s) or external condition(s) as the cause of the error or its resulting harms (e.g., *Because* of the adhesions, visibility was poor and he cut a artery. The error *resulted* from the patient's atypical presentation).
- Statements that *clearly imply* that system(s) or external condition(s) directly contributed to the error. (e.g., "The physician was overbooked that day and three urgent patients were waiting. She quickly calculated the dose and ended up off by a factor of 10x."). INCLUDES statements in which the words like, *therefore* or *thus* or *because*, between sentences is *clearly implied* but not explicitly stated.

EXCLUDES descriptions of a systems flaws that may be interpreted as coincidental to the error, and not causally related, and where the medical student narrator does not provide an overriding sense that she perceives the

system flaw to be causally related to the error (e.g., I could not log on to the computer after morning rounds. Later that afternoon when I successfully logged on, I ordered the wrong dose.)

#### 11.4 **Not Attributed**

The medical student (narrator) does not attribute the error to any specific organization level or omits her attribution from the narrative (e.g., “The bowel was perforated.” with no indication of by who or why provided.)

