

Project Title: Creating Learning Cultures Around Mistakes for Residents

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Abstract

Purpose: The primary goal of this study was to understand how medical residents experience and learn about medical errors in their everyday work settings.

Scope: The project examined everyday work activities in three different medical residency cultures: trauma surgery, a medical intensive care unit, and emergency medicine. Medical residency was focused upon, because it is where long-term mindsets about clinical practice and professional role behavior are formed.

Methods: Observations and interviews were conducted during 2002 and 2003 with members of the surgery, internal medicine, and emergency residency programs at a single academic medical center located in the northeast United States. The intent was to examine mistakes and near misses in their natural environments, determining which elements of a learning culture were or were not present among clinical teams and identifying the contextual features of the work environment that shaped their presence.

Results: Overall, few learning practices were found within any of the three residency settings. Over 20 mistakes were identified in each of the three settings. Most of these mistakes and near misses did not benefit from cultural practices that would be considered learning-oriented per management theory. In the surgical culture, appropriate learning best practices around errors and near misses committed were observed only 21 percent of the possible times. In the MICU culture, appropriate best practices were observed only 41 percent of the possible times. Emergency medicine fell in between the percentages for surgery and the MICU.

One major finding was that there were cultural practices associated with other “effectiveness” goals for training residents, beyond the goal of patient safety, which appeared to undermine the presence of learning practices in the everyday work environment. In addition, several important contextual features of the work environment appeared to undermine the opportunity for best practices to occur. These features involved entrenched cultural norms in residency settings that reinforced physician hierarchy and outcome over process, the nature of resident and attending responses to the act of error, the isolated nature of most near misses and errors, and the physical and psychological distance maintained in some settings between attendings and residents. Solutions for integrating learning-oriented practices around safety into residency culture include incrementally adding to existing work routines that promote other training goals, flattening training hierarchies to place attendings in greater contact with lower-level residents, and devising ways to illuminate errors that do not produce adverse events.

Key Words: medical errors, medical residency, learning organization, culture, patient safety

Purpose of Study

The primary goal of this study was to understand how medical residents experience and learn about medical errors in their everyday work settings. There have been calls to create “cultures of safety” within healthcare delivery settings in order to reduce the incidence of medical mistakes (Institute of Medicine 1999). The underlying premise of this research is that physicians, at the core of healthcare delivery, remain vital to the establishment and maintenance of such work cultures. There have been few systematic investigations of how physicians-in-training engage (or not) in learning around error (excepting studies such as Bosk 1979 and Wu et al. 1991).

Applying management theory around the learning organization philosophy, the present research sought to (a) describe and compare resident socialization dynamics around mistakes by focusing on both formal and informal work routines in the everyday practice setting, (b) identify existing points within the contemporary residency training culture that contain elements of a “learning organization” (see Senge 1994; also Argyris 1999) in relation to how mistakes are defined and processed by individual residents and the medical staff as a whole, and (c) identify barriers to and opportunities for incorporating into residency training more elements of a learning culture around mistakes.

Project Scope

Background. Medical mistakes are a central issue in US healthcare. As many as 44,000 – 98,000 individuals die each year in hospitals as a result of iatrogenic injury (Institute of Medicine 1999). The consensus is that solutions to the mistakes problem lay in systems approaches. One component of any healthcare “system” is its culture, defined as the shared ways of thinking, acting, and interacting among a group of individuals (Schein 1992). Scholars examining other industries, such as aviation and nuclear safety, identify the value of implementing “cultures of safety” that help enhance organizational learning capacity to reduce mistakes (Weick and Roberts 1993).

The organizational learning literature suggests several cultural “best practices” as important facilitators of learning (see Table 1). For physicians, engaging in these learning practices increases the chance that medical mistakes, near misses, and lapses in patient safety are identified in a timely manner, reflected upon to determine underlying causes, and corrected and that the larger system is reconfigured to lessen the probability for similar events to happen again.

Context and Participants. Arguably the most important point in a physician’s career to ingrain a knowledge and use of learning-oriented practices occurs during residency training, when long-term mindsets about clinical practice and professional role behavior are formed (Abbott 1988). There is evidence that learning cultures are not present in most residency programs, as the practices listed in Table 1 are often found lacking among both resident and attending physicians (Hoff, Pohl, and Bartfield 2004). It is important not

only to gauge the extent to which physicians in training are exposed to the practices in Table 1 but also to identify the barriers to and opportunities for injecting these types of attitudes, behaviors, and interactions into the everyday residency environment.

Table 1. Individual and group “best practices” associated with a learning-oriented environment or culture

Best practice *	Definition
Individual practices:	
Habit of inquiry	Willingness to engage surrounding individuals (superiors, peer colleagues, nonphysician coworkers) with respect to asking questions around mistakes, patient safety, and correct ways of doing work. Tendency to ask “why” in addition to “how” around the processes for identifying, investigating, and resolving mistake and near-miss situations.
Self-reflection	Extended self-examination of near misses and mistakes, in particular around how the near miss or mistake is being conceptualized by the individual and the larger lessons to be learned from it.
Personal forgiveness	Willingness to forgive oneself for committing a near miss or mistake, not excusing one’s part in the incident but not letting the event create untrue or exaggerated beliefs in the individual’s mind.
Expressions of doubt and fallibility	Willingness to reveal to one’s self and others concerns over “knowing all the right things” or “making a mistake.”
Sharing experiences	Regularly communicating to others personal stories and experiences about near misses and mistakes committed.
Empathy toward others	Expressing feelings and concern for those in the group who make mistakes and experience failure; a “there but for the grace of God go I” mentality that allows the individual to gain understanding from someone else’s experience.
Systems thinking	Thinking about or couching episodes of error or failure within the context of the total surrounding system of care as well as contextual features of the individual’s work life (e.g., fatigue) that may serve as contributory factors. Willingness to develop logics that link contextual factors to increased probability for the error or failure.
Group practices:	
Feedback	Higher levels in the training hierarchy communicating down to lower-level-specific aspects of why something is a particular mistake or error. Whether or not that communication is positive, negative, or valuable to lower levels, the communication provides information that allows the lower levels to understand the point of view and “norms” of higher levels.
Support over blame	Within the group, emphasis is placed on dealing with mistakes through a supportive rather than blaming approach, the latter defined primarily by putting the onus for a mistake or near miss either completely on the individual or completely on one or more system aspects surrounding the individual.
Collaborative inquiry	Adopting a collective approach to uncovering, examining, and resolving a mistake or near-miss problem. Employing a flattened rather than purely hierarchical approach to gaining and assessing information around the problem.

Reciprocal communication	Communication moves both top-down and bottom-up throughout the team, with less-experienced members afforded equivalent chances of injecting their views, concerns, etc.
Creative tension	Disagreements in the group are tolerated, listened to, and resolved not by fiat but by trying to reach consensus, not limited to consensus of the most experienced individuals in the team. The group tolerates debate and disagreement when uncertainty is high around a mistake or near miss, using that disagreement to generate a variety of explanatory interpretations.
Real-time experimentation	Willingness for the group as a whole, spearheaded by higher levels in the training hierarchy, to recast mistake or error events in a way that questions the underlying assumptions upon which the work leading to that error or mistake is done.
Real-time briefings	Willingness of higher levels in the training hierarchy to, at the moment a mistake is discovered or heard about, take a constructive approach to educating lower levels around ways to lessen the probability for such a mistake to happen again in the future.

* These best practices are derived either explicitly or implicitly from a variety of management writings on the topic of learning organizations from scholars such as Argyris (1999), (1996), Senge (1990), and Schein (1992).

Both attending and resident physicians play key roles in the medical residency setting. Residents function as both learners and teachers, depending upon their location in the training hierarchy (i.e. intern, junior or senior resident, or chief resident). Attending physicians serve as teachers for all residents in the hierarchy.

Methods

Study Design. The study comparatively examined three error-prone medical residency settings through a single-case, longitudinal design using multiple qualitative methods for data collection. Observations and interviews were conducted during 2002 and 2003 with members of the surgery, internal medicine, and emergency residency programs at a single academic medical center located in the northeast United States. The comparative aspect of this study extends prior research that has examined mistakes only within a single specialty framework (cf. Bosk 1979).

Data Sources/Collection. Attending and resident physicians making up a single clinical team in the area of trauma surgery were observed for 3 consecutive weeks during August and September 2002. In the case of internal medicine, an attending physician, a fellow, and resident physicians making up a single clinical team working in the hospital's medical intensive care unit (MICU) were observed for 3 consecutive weeks during January 2003. Finally, attending and resident physicians working in the emergency medicine department were observed for 2 consecutive weeks during August 2003.

The trauma surgery clinical team consisted of four on-staff attending physicians (all surgeons trained in trauma care and general surgery), a chief surgical resident, a senior surgical resident, one surgical intern, and two fourth-year medical students (n=9).

The MICU clinical team consisted of one attending physician (a pulmonologist), a senior medicine resident, a pulmonology fellow, three interns (one each from orthopedic surgery, emergency medicine, and family practice), and two fourth-year medical students (n=8). The emergency medicine environment contained approximately eight attending physicians and several residents in each of the following groupings: first, second, and third years.

Observations consisted of the author shadowing members of each team throughout the course of their work day. During the trauma surgery observations, we averaged 6-8 hours of observation per day. This resulted in approximately 125 hours of total observation. During the MICU observations, we averaged 4-6 hours of observation, resulting in approximately 90 hours of total observation. During the emergency medicine observations, we averaged 3-5 hours per day, resulting in approximately 40 hours of total observation. The goal was to observe a representative sample of major work activities constituting the resident's workday in each of the three settings. Through this strategy, we hoped to see different kinds of errors and near misses occurring within the teams. We also hoped to gain enough insight into the dominant cultural values and practices to describe them effectively.

Major work activities observed in surgery included morning "pre-rounds" consisting only of residents and students; morning teaching rounds with residents, students, and attendings; surgical procedures in the operating room; minor surgical procedures done on the inpatient floor; morbidity and mortality conferences; intern, student, and resident "scut work" duties throughout the day; and evening rounds (called the "tuck-in" by members of the team). We observed 25 surgical procedures of varying complexity performed by members of the team. Within the MICU setting, we primarily observed morning "pre-rounds" and teaching rounds. Teaching rounds in the MICU represent the primary source of daily interaction between members of the clinical team. They lasted anywhere from 3-5 hours on average per day. In addition to these rounding opportunities, we also shadowed both the attending and resident physicians as they performed individual consultations on non-MICU patients, examined diagnostic tests on a daily basis (e.g., X-rays, CT scans), and participated in coding situations (i.e., a hospital patient going into cardiac arrest). We also spent 2 overnights in the MICU.

In the emergency medicine setting, we observed shift work activities occurring during the day that involved care provided to patients entering the emergency room from outside the hospital. Care for a range of patient diagnoses was observed, including severe traumas that had been flown to the hospital from other parts of the state. Within each of the three settings, we were particularly attentive to the various ways residents were expected to do their jobs based upon their experience and place in the training hierarchy. In addition, we looked for instances when errors or near misses occurred and how the interactions between physician members shaped the learning that took place.

Later observations in all three settings were used to flesh out (e.g., clarify, disconfirm, aggregate, and compare) preliminary interpretations around the types of errors and near misses observed, the types of learning best practices more or less present in each setting

over time, and aspects of the surrounding cultures in each setting that might help shape the observed relationship between errors and the learning practices. Daily errors or near misses observed were examined each evening for the presence or absence of the best practices listed in Table 1. Table 1 served as a template for ordering our observations of these situations. A two-step process was employed to make decisions concerning (a) which best practices from those listed in Table 1 were deemed appropriate to have been present in the culture around a particular mistake or near miss and (b) whether those best practices judged to be appropriate were actually present or absent in the culture around the particular mistake or near miss.

To determine which best practices could be expected to occur around a given error or near miss, we considered the larger error category it fell into (e.g., commission, omission), the primary basis for the individual making it (e.g., carelessness, such as moving too fast during a surgical procedure and almost cutting into the wrong part of the belly on a gall bladder removal), and the situation in which the trauma surgery, MICU team, and emergency medicine physicians found themselves when it occurred.

After each observational period, interviews were conducted with as many members of each medical residency team as possible. This process resulted in a total of 20 interviews across the three teams, spread across both attending and resident physicians. The interviews served the aims of validating and gaining additional information around preliminary observational findings. We also attempted to gain from different members of the training hierarchy their perceptions around how they thought about errors in general, their expectations of each level in the training hierarchy, and what aspects about their present work settings they would change if they could, particularly centered around resident handling of mistakes and failure.

Data Analysis and Interpretation. Field notes were transcribed each night after an observational event to maximize recall. On average, a day of observation would yield between eight and 15 pages of field notes. Each day's notes were treated as separate texts that were then analyzed using the Atlas.ti qualitative analysis coding software. In addition, attending interviews were tape recorded and transcribed onto computer for analysis using Atlas.ti. Resident interviews were not tape recorded, but extensive field notes were taken and coded by hand. Preliminary analysis was done each night during the weeks of observation.

During this time, a variety of analytic memos were written, trying to flesh out codes that were emerging as primary in the data as well as drafting conceptual models of the various phenomena appearing in the data. For each setting, approximately 10-15 of these memos and models were created. Once preliminary findings for each residency setting were complete, an established group of clinical advisors within the academic medical center was convened to review and comment on the findings. This group met three times to review the preliminary findings. These advisors included the two MD co-investigators, the director of pharmacy for the hospital, the medical director of the hospital, the nursing director of the hospital, the chair of pediatric surgery, and two general internists. The advisors commented on the findings, pushing for clarification or evidence around given interpretations.

The “believability” of the interpretations was also tested on the advisors and, to the extent that they agreed with or could understand the findings, we felt that we had gotten “the story right” in important ways.

Results

Principal Findings. Overall, few of the practices identified in Table 1 as associated with a “learning culture” were found within any of the three residency settings. For example, Table 2 compares the frequency of each best practice between the surgery and MICU work environments. In the surgical culture, appropriate learning best practices around errors and near misses committed were observed only 21 percent of the possible times. In the MICU culture, appropriate best practices were observed only 41 percent of the possible times. Emergency medicine fell in between the percentages for surgery and the MICU. Individual best practices from Table 1 were found more often than group best practices in the surgical residency and emergency medicine environments. The reverse was true in the MICU environment. Group-driven best practices were more common in the MICU.

Within each of the three environments, at least 20 errors were identified during the observational periods. The errors observed varied in terms of source, seriousness, and focus. For example, over half of the surgical mistakes observed were errors of commission (e.g., performing an intended action wrong), whereas over half of the MICU mistakes were errors of omission (not performing a necessary action).

Table 2. Learning best practices observed in relation to surgery and MICU errors

Learning Best Practice	Surgery Errors * (n=24)	MICU Errors (n=27)
Individual practices:		
Habit of inquiry	0 (0/9)	33 (2/6)
Self-reflection	0 (0/8)	25 (2/8)
Personal forgiveness	100 (9/9)	89 (8/9)
Expressions of doubt and fallibility	20 (2/10)	30 (3/10)
Sharing experiences	22 (2/9)	50 (3/6)
Empathy toward others	25 (2/8)	20 (2/10)
Systems thinking	0 (0/5)	0 (0/5)
Subtotal P/P+A	26 (15/58)	37 (20/54)
Group practices:		
Feedback	27 (3/11)	100 (11/11)
Support over blame	38 (3/8)	42 (5/12)
Collaborative inquiry	0 (0/12)	15 (2/15)
Reciprocal communication	15 (2/13)	20 (3/15)
Creative tension	0 (0/10)	0 (0/7)
Real-time experimentation	0 (0/5)	0 (0/0)
Real-time briefings	31 (4/13)	83 (10/12)
Subtotal P/P+A	17 (12/72)	43 (31/72)
Total P/P+A	21 (27/130)	41 (51/126)

* The figures listed are percentages calculated by dividing the number of instances when the particular best practice was observed to be present (P) divided by the total number of instances it

was determined by observation that the best practice could have been present immediately or very soon after the error event and either was or was not present (P + A).

Mistakes in all three settings spanned across the areas of diagnosis, treatment, and prevention. Common surgical resident errors included executing specific technical steps of a surgical procedure incorrectly, getting drug dosages wrong, and missing a key step in a patient's continuum of care (e.g., notifying another surgical team after the resident transferred the patient to that team). MICU resident errors involved making incorrect treatment decisions regarding patient medications, missing key steps that would allow an accurate differential diagnosis to be performed on a patient, and not following through on diagnostic and treatment decisions in a timely manner. Emergency medicine resident errors involved not ordering appropriate tests for patients; completing paperwork incorrectly around labs, blood work, and hospital admissions; and missing key steps in a differential diagnosis on a patient.

Cultural and Contextual Reasons for A Lack of Learning Practices

The overall lack of best practices in the surgical culture and, to a lesser but still meaningful extent, in the MICU and emergency medicine cultures required some understanding of the larger cultural contexts in which residents did their everyday work. Three major findings were identified in this regard. First, it became apparent while observing that there was a diverse array of "effectiveness" (i.e., resident competency) aims pursued within each residency setting. These were associated with cultural practices and norms different from we might expect in a "learning-oriented" environment. The practices and norms were interpreted as paradoxes, helping residents to become effective physicians in one way but moving them away from taking a learning-oriented approach around mistakes in their work. The MICU and surgery cultures were examined more closely to describe some of these paradoxes.

Four major ones were identified in the two residency settings: (a) the "attending aloofness" paradox in surgery, (b) the "no surprises" paradox in both surgery and the MICU, (c) the "pimping" paradox in the MICU, and (d) the "over focus on technique training" paradox in surgery. The first two of these are described in more detail here. The aloofness paradox was defined as a taken-for-granted understanding within the surgical residency environment that there would be little attending physician presence on an everyday basis around individuals from lower levels of the surgical training hierarchy (i.e., surgery interns, junior residents, and medical students doing their clerkship in surgery). This aloofness undermined group-dependent learning best practices, such as collaborative inquiry, feedback, and sharing experiences.

Several work routines illuminated the aloofness norm. These included the sporadic nature of attending presence on morning rounds and the lack of interaction between attending surgeons and the residents assisting them before and after OR procedures occurred. Both the observations and interviews also suggested that the attending aloofness paradox facilitated resident competency in areas other than learning about and dealing with failure or error. For example, it instilled in residents an enhanced sense of responsibility during

the workday, motivating them to work hard and forcing them to make decisions on their own. Aloofness also made them feel more like “real doctors.” It seemed to infuse their work with greater meaning, in the sense of feeling that good patient care, especially for surgical patients on the hospital floor, depended most of all upon them. It gave them more direct patient care work experiences from which they could draw confidence as physicians.

A second cultural feature that undermined error learning but facilitated other forms of resident training effectiveness was labeled the “no surprises” paradox. This paradox manifested itself both in the trauma surgery and MICU residency environments. It is defined as the cultural norm or rule that a resident’s most important work requirement is to keep higher levels in the training hierarchy informed of the ongoing status of all patients. This norm placed maximum importance on residents and attending surgeons all being privy to the same clinical information for every patient. It structured how residents thought about and enacted their everyday roles, especially when taking care of patients on the hospital floor. However, it decreased the presence of specific learning best practices around error such as inquiry (both individual and group), systems thinking, creative tension, “real-time” experimentation, and empathy toward others.

The “no surprises” rule was seen in the trauma surgery and MICU environments through the use of a tool called “the list,” which directed the flow and conduct of medical work while keeping everyone on the physician team at a similar level of patient awareness. The list was a one- or two-page document updated several times a day that contained all patients under the care of each clinical service, their diagnoses, admission dates, current issues, recent test results, and other items of note. For interns and medical students who were the most inexperienced members of the clinical team, it helped routinize the work of patient care for individuals. In the trauma surgery environment especially, the list would become the focus for the remainder of the workday.

Learning best practices around error such as inquiry and systems thinking were undermined by this cultural norm. Residents placed value in their work day on those task-oriented activities that kept higher-ups in the decision making chain aware at all times. As a result, appropriate learning practices that could have been used got little opportunity to be incorporated into the work day. The “no surprises” rule also undermined learning best practices around resident errors, because adherence to the rule encouraged inexperienced members of the clinical team to structure their work days in ways that produced more fatigue and less downtime. However, both attending and resident physicians asserted that the “no surprises” rule carried with it favorable outcomes for patient care and transforming residents into independent, competent physicians. Complying with this rule kept residents perceived as honest and conscientious by those above them in the training hierarchy.

Like the “attending aloofness” paradox, the “no surprises” rule forced residents to learn how to collect and sort information independently. Complying with the “no surprises” rule afforded a low-risk training ground upon which these individuals could practice acting like “real doctors” in terms of important tasks, such as conducting a history and

physical and interpreting imaging tests and blood work. Having enough practice seemed to make these individuals better at arriving at the true, underlying patient condition. Effective conformance to the “no surprises” rule also made residents at all levels an accepted part of the clinical team. It fostered a group cohesiveness borne out of mutual reliance of physicians in the team on each other, which attending physicians believed was important for residents to learn in order to be the best possible clinical decisionmakers. Knowing “when” and “when not” to consult with your peers was, to them, a critical means of self-regulating one’s discretion as a physician. This self-regulation was ultimately good for the patient.

A second major finding helping to explain the absence of learning-oriented best practices related to the isolated or solitary nature of most resident mistake events. Regardless of setting, most errors occurred when the resident was alone. This undermined the prospects for the group-dependent best practices listed in Table 1. For example, in both the MICU and surgery settings, both resident teams offered less-than-ideal opportunities for real-time (i.e., at the moment the mistake or near miss occurs) group interaction around a mistake or near miss. In the MICU team’s case, this opportunity was almost nonexistent, as only three (12%) of 26 mistakes and near misses occurred in a group care situation (i.e., when others on the team could see the mistake or near miss as it happened). Half (50%) of the 20 surgical resident mistakes and near misses occurred in isolation (i.e., no other healthcare personnel saw the resident make the mistake---or almost make it, if a near miss). In this way, the mistakes and near misses observed were often as not solitary experiences for the particular resident.

Surprisingly, in surgery’s case, 15 (75%) of the 20 mistakes and near misses occurred on the hospital floor rather than in the operating room (OR). In interviews with surgical residents, a link was implied between the high percentages of mistakes occurring both in isolation and on the hospital floor. This link involved the perceived importance among residents, especially senior residents, of gaining operating room experience at the expense of all else in their work day. In addition, no attending surgeon ever found out about seven of the 15 floor mistakes and near misses observed. The fact that none of the mistakes and near misses occurring in isolation was associated with an adverse patient outcome might have contributed to this result.

In the MICU case, although a higher percentage of mistakes occurred in isolation, 19 of the 21 mistakes observed (near misses excluded) ultimately were privy to the MICU attending physician, usually the next day or several days later. The long duration of morning rounds in the MICU environment could account for this finding. Unlike in the surgery case, during these rounds, the attending physician had to solicit a lot of clinical information from the resident in order to fulfill the documentation requirements of the MICU work environment. In this situation, the costs of hiding a mistake for a resident was much higher, even if it did not lead to an adverse event, than in the case of surgery, where patient rounds tended to be much more abbreviated. Another reason could be the nature of the mistakes themselves (i.e., more mistakes of omission that were judgmental in nature). These types of mistakes required the resident to interact with the attending

(e.g., to obtain information on the correct course of diagnostic or treatment activities for a given patient) lest the same mistake happen again.

A third factor shaping the presence of learning practices around mistakes involved the social interactions between attending and residents when these incidents occurred as well as the immediate personal responses to mistakes. Immediate resident responses to their mistakes across all three residency settings tended to fall into one of the following categories: (a) casual (i.e., the resident did not think the mistake could happen again), (b) rationalizing (i.e., mistake is a natural event deriving from not “knowing everything” as a resident), and (c) no response (i.e., the resident neither acknowledging the mistake nor dwelling on it immediately after its occurrence). Only in the MICU did resident responses that led to group best practices occur with greater frequency, largely because mistakes were tougher to hide in the intensive care unit environment. These types of responses short-circuited the prospects for practices such as self-reflection to occur, in that mistake events were not given the attention they merited by residents as learning events.

Attending responses to resident mistakes also stifled the frequency of learning best practices, regardless of the clinical setting. In surgery, the primary attending response to mistakes was anger. In the MICU, there was a mixture of anger, neutral responses that were directive in nature, and supportive responses for which learning practices could be employed. However, in the latter case, the tendency was still to have the attending instruct the resident (i.e., one-way communication that precludes practices such as dialogue, inquiry, and creative tension). In the emergency medicine setting, most responses were supportive but also one directional (i.e., from the top to bottom of the training hierarchy), which undermined many of the best practices listed in Table 1 that depend upon bottom-up input.

No gender or racial/ethnic differences were seen in how either attending or resident physicians responded to or learned about mistakes. For example, female physicians were just as likely to exhibit the same responses as their male counterparts in relation to talking about mistakes, teaching about mistakes, and employing the types of learning practices listed in Table 1.

Discussion and Implications. This study provides valuable descriptive information on the realities of creating and maintaining “cultures of safety” in places such as hospitals and physician practices. Overall, the study findings reveal the difficulty in establishing and maintaining learning practices in error-prone, hierarchical, and culturally “rigid” organizations, such as those found in the healthcare industry. This study presents a more complicated reality, seen in the case of the three medical residency programs observed, that calls into question both the speed and extent to which necessary change in the direction of a “culture of safety” can be accomplished in healthcare organizations.

The difficulty of developing “cultures of safety” typified by the learning practices listed in Table 1 was illuminated through the medical residency work context by the programs pursuing competing effectiveness goals that go beyond the singular focus on patient safety. These other goals (e.g., getting residents skilled at accountability, honesty,

information sorting and processing, differential diagnosis, and decision making under conditions of uncertainty appear to benefit from rational, process-focused, cultural practices (see Quinn and Rohrbaugh 1983). These practices run counter to the learning practices in Table 1 that typify modes of organizing that involve open systems and human relations effectiveness goals.

Over time, an incremental approach that involves co-opting entrenched work rules and routines may enable residency programs to incorporate learning approaches to error that complement rather than conflict with other effectiveness goals. It should be noted that the types of cultural practices discussed above, undermining learning practices, were entrenched, highly valued parts of the resident socialization process. Individuals in the clinical teams saw them as helping to create a good doctor. Thus, the ability to introduce new practices and abandon these is unrealistic. This need to integrate learning cultures into existing residency work cultures means that the development of “cultures of safety” within healthcare organizations would be less complete and transformational than scholars or practitioners desire. However, if such an approach produces a heightened probability that at least some of the desired culture change will occur, then there is value in conceptualizing the idea of healthcare organizations as negotiated environments in which safety imperatives and goals are managed incrementally through an ongoing consideration of competing effectiveness criteria.

In addition, the findings in this study demonstrate that culture and context matter in thinking about the extent to which healthcare settings can become “learning oriented” around mistakes. For residency programs, it is imperative that work context and culture be assessed on a regular basis to determine if the right conditions for learning are present. There is emphasis currently placed on developing and measuring competencies for residents. However, residency programs and the places in which they are embedded have a responsibility to ensure that the right environment is provided in which these competencies can be achieved.

Overall implications of this research are as follows:

- Structural reform is needed within medical residency programs and the institutions (e.g., hospitals) that house them, and this reform should be focused on injecting more work routines and forms of physician interaction that can enhance the likelihood for learning practices to be employed but not undermine practices that facilitate physician skills for producing tasks and outcomes not involving patient safety;
- Reform should be incremental (i.e., small changes made in critical places within the resident’s work and training environment) rather than big changes that will not be readily accepted by the existing physician culture (thus leading to failure);
- Attending physician leadership is crucial to achieving reform and creating a more learning-oriented culture around safety within residencies; this study reveals that

attending physicians and their own attitudes and behaviors remain a significant barrier to change;

- Most near misses and errors within residency environments do not lead to adverse outcomes and remain known to none but the individual resident; these less “serious” events could be used, as they are in industries such as aviation, for extended learning, but they need to be more reliably revealed in the work setting;
- There are powerfully entrenched cultural practices across all residency environments that should be observed, assessed, and preserved in relation to also introducing practices (i.e., attitudes, behaviors, forms of interaction) that reflect more of the learning attributes listed in Table 1 of this report; and
- There are no significant gender or racial/ethnic differences related to how attending and resident physicians learn and teach about error; rather, it appears that the existing context and culture serve as uniform socializing forces promoting similar responses across clinical settings and individuals; and
- The ritual of Morbidity and Mortality (i.e., “M and M”) conference to pursue learning around error is limited by its staged and predictable nature (i.e., there are few surprises or creative tensions generated in M and M), regardless of clinical setting, that lead to more of the “double-loop” thinking needed to challenge existing (and perhaps incorrect) physician assumptions about safety and medical error. M and M conferences may not be capable of serving as the learning focus for mistakes and safety in residency programs.

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