

THE NEAR MISS RESIDENT CONFERENCE: UNDERSTANDING THE BARRIERS TO CONFRONTING MEDICAL ERRORS

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The recent Institute of Medicine (IOM) report, *To Err is Human* [1], highlighted the problem of medical errors in U.S. hospitals and focused attention on reducing error rates. The report estimated that 44,000 to 98,000 people die each year from medical errors, capturing the public's attention and creating an initiative for patient safety. Some have challenged both the magnitude of the medical error problem and the methodology of the report [2–4]. Nevertheless, prevention of medical errors remains a high priority in academic medicine [5], public policy [6], legislation [7], and even the business community [8,9].

One barrier to reducing errors concerns physician attitudes and habits. Too often errors go unreported or unmentioned because of the stigma historically attached to such events [10,11]. The IOM asserts that a comprehensive strategy is needed to improve patient safety, a key element of which is the creation of a culture that encourages organizations to identify errors and exploit them as an opportunity to learn [1]. Similar principles were set forth in the final report of the Bristol Inquiry [12], which investigated the quality of cardiac surgery for pediatric patients at the Bristol Royal Infirmary in Great Britain. This report articulated principles to guide sweeping quality changes at Britain's National Health Service, including the belief that "systems of care and facilities . . . affect the quality of health care" and that "learning from error must be a priority" [12].

One IOM recommendation for learning from errors is to establish voluntary, confidential reporting systems that seek to reveal system defects and weaknesses as well as *near miss events* [1]. Voluntary systems for reporting near miss events have been instituted in several industries outside medicine [13]. This approach to error reduction has been particularly successful in the airline industry, which a generation ago faced the same error problems medicine faces today. In 1975, the Federal Aviation Administration instituted a confidential reporting system, which now collects over 30,000 reports of unsafe incidents annually [14]. For example, pilots report near miss midair collisions, among other events [15]. This incident-reporting system forms the basis for a continuous quality improvement program in airline safety that has resulted in no domestic midair collisions in more than a decade [15]. Several leaders within the medical field have urged that, like the airline industry, medicine should embrace recognition and discussion of unsafe medical practices as a crucial, initial step toward error reduction [11,16,17].

Motivated by the IOM report and recommendations, we developed a near miss resident conference at our institution. We defined a *near miss* as an event or error that does not harm a patient but, occurring again, could easily lead to patient injury. In contrast, we defined an *adverse event* as an event representing a patient injury due to medical management (not the disease process). We believed that a resident conference held as part of morning report and centered on near misses would offer our residents a chance to discuss and better understand such events. Further, we felt that engaging residents in an open, blame-free discussion of near miss events would encourage communication about potential patient harm and learning from errors—a key recommendation from the IOM report [1]. By focusing discussion on fixing the system rather than finding fault, we hoped to foster a change in attitude from one of blame to one of discovery and problem solving. We also wished to supplement standard pathophysiologic knowledge with analysis of how institutional processes could induce or mitigate errors. We hoped this approach would inaugurate a change in

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resident attitudes toward acknowledging and analyzing errors.

In this report, we describe the implementation of a near miss conference at our institution and the barriers we encountered. The lessons learned from our experience should be helpful to others as they begin to address these issues in their own institutions.

Background

Setting

Thomas Jefferson University Hospital (TJUH) is a 637-bed tertiary care university teaching hospital with an internal medicine residency program that trains 119 categorical internal medicine residents. The residency experience includes rotations at TJUH, a Veterans Affairs hospital, and a community hospital in an urban neighborhood, as well as rotations in a university-based clinic, university-affiliated practice sites, and private physician offices.

Morning report begins each weekday at 7:30 AM and lasts 1 hour. One or two cases selected by the residents are presented, with a chief resident leading the discussion. Attendance for residents based at TJUH is mandatory; 40 second and third year residents attend along with 5 to 10 faculty members.

The Near Miss Conference

The authors were the key players involved in planning and implementing the near miss conference. This team consists of the faculty advisor to the conference (RS), the residency program director (GCK), the chief residents (JLC), and the Senior Vice President for Clinical Affairs (JEG). Beginning in February 2000 we designated one morning report per month to serve as a near miss conference. Since that time, the conferences have been held monthly as part of the regular morning report schedule within our residency program.

A general e-mail invitation reminds faculty of the near miss morning report and is sent 2 to 3 weeks prior to each conference. In addition to all TJUH residents and chief residents, attendees include the faculty advisor to the near miss conference, physician faculty from medical and nonmedical specialties, and representatives from the hospital administration (eg, Senior Vice President for Clinical Affairs), nursing staff, and pharmacy staff. Subspecialty attendees vary according to the nature of the case. In addition, key members of the faculty are invited by the chief residents or the faculty advisor for each case presented. For example, a pulmonologist and a cardiothoracic surgeon were invited to attend the discussion of a case involving a delay in tapping an empyema.

We generally plan two separate 30-minute case-

based discussions for each near miss conference. The faculty advisor assumes responsibility for helping the chief residents identify cases and plan each conference. All cases include an inpatient admission, although occasionally the near miss event may occur prior to the hospitalization. The chief residents discuss each potential case with the resident who cared for the patient involved to determine whether the resident is willing and available to present the case at the next scheduled near miss conference. One week prior to the conference, the resident analyzes the clinical questions embedded in the circumstances of the case with both the chief residents and the faculty advisor. The resident then searches the literature and prepares information (typically in slide form) to address the predictable concerns. The goal of the conference is to use a blame-free, case-based discussion to review details of the near miss event and to uncover contributing factors that might be addressed to prevent a recurrence. This goal is described for all participants before each conference.

Description of an Actual Conference

Highlights from one of our past near miss conferences are provided to illustrate the type of case and discussion typical of this conference. [Table 1](#) offers further examples of selected cases and illustrates the breadth of issues raised during their discussion at past near miss conferences.

Selected Near Miss Case

One near miss selected for discussion involved a more than 4-year delay in the evaluation and treatment of an identified cardiac anomaly in a 25-year-old woman who was seen at the resident's medical clinic. The patient initially presented to the clinic for a routine annual physical examination. A systolic murmur was appreciated and echocardiography was subsequently performed, which revealed a ventricular septal defect (VSD). The resident who saw the patient on her initial visit recommended a cardiology consultation; however, the patient never scheduled the appointment. She returned to the clinic for an annual examination the next 3 years. Each time, despite the notation of a systolic murmur, there was no documented discussion of the echocardiography results, endocarditis prophylaxis, or the neglected cardiology consultation. Four years after initially presenting with a systolic murmur and still feeling well, the patient again sought a routine physical examination, this time from a private physician. The physician heard a diastolic murmur in addition to the systolic murmur, sent the patient for another echocardiogram, and subsequently referred her to a cardiologist who advised surgical repair. A

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Table 1. Summary of Several Cases Presented at Near Miss Conference

Case Synopsis	Near Miss Event	Statements of Blame
A systolic murmur is noted in a 25-year-old woman ECHO shows VSD but 4 years elapse before cardiac consultation and surgical repair	Delay in cardiology consultation Delay in surgical repair	Physician missed significance of murmur Physician neglected to ensure consultation
A 60-year-old man with hemodynamically significant GI bleed and many units transfused has fever, falling hemoglobin, and develops renal failure attributed to hypotension in the setting of the GI bleed He recovers fully after a week in the ICU and only then is it discovered that the blood was ABO incompatible	Delay in identifying ABO incompatible blood transfusion Delay in identifying major blood transfusion reaction, with hemolysis and renal failure	Nurse should have matched blood type with patient's blood type Physicians should have recognized hemolytic reaction
A 60-year-old ICU patient has catheter inserted in carotid artery during CVP attempt; catheter is removed without adverse event to patient	Potential injury from inadvertent arterial catheterization	Physician should "know how" to insert a central line catheter and avoid carotid artery
A 50-year-old patient on enoxaparin receives diagnostic lumbar puncture while anticoagulated without complication	Potential epidural hematoma from procedure in anticoagulated patient	Physician should check medication list before performing procedure Physician should understand drug's mechanism of action
A 60-year-old patient with hepatic disease is supposed to receive IV calcium infusion after a verbal order The infusion was given to his roommate The roommate tolerated the infusion without incident; the patient tolerated the 1-day delay in his infusion without incident	Potential harm from unintended exposure to medications Potential harm from not receiving necessary medications	Nurse did not check patient name when taking verbal order Resident did not spell patient's name and confirm it when giving verbal order

CVP = central venous pressure; ECHO = echocardiogram; GI = gastrointestinal; ICU = intensive care unit; IV = intravenous; PT = prothrombin time; PTT = partial thromboplastin time; VSD = ventricular septal defect.

*A note in this patient's chart documented normal PT, PTT, and platelets.

successful cardiothoracic procedure was performed 4.5 years after the patient's initial presentation.

Course of Discussion

At all near miss conferences, the treating resident presents the history in a standard fashion, beginning with the chief complaint and concluding with the hospital course. The chief resident then poses an open-ended question to jump-start the discussion. For example,

in the VSD case, the chief resident asked, "What went wrong?" Interspersed throughout the ensuing 30-minute discussion is important didactic information that has been prepared in advance, such as indications for surgical repair of a VSD in the example case. Residents' comments dominate the discussion, with faculty adding observations at times.

The first thoughts expressed usually involve individual failures of knowledge or vigilance. In the VSD case,

Key Problems Identified

Poor teaching of cardiac auscultation
 Noisy clinic
 Rushed pace of patients
 No system to identify neglected tests
 No problem lists
 Poor continuity of care

Need targeted education on major blood transfusion reactions, despite their rare occurrence
 Pretreating patients with acetaminophen and diphenhydramine hinders diagnosis of reactions; nurses and physicians need education on proper use of pretreatment
 Confusion on how to separate major from minor reactions
 Poor understanding of how to treat minor reactions
 Lack of awareness of blood bank's transfusion reporting forms

Need formalized training and increased supervision on central line insertion
 Need to use a pressure transducer for correct central line placement
 Consider Doppler ultrasound in ICU, as patients often present with low systolic pressure and no pulsatile blood flow

Since low molecular weight heparins do not affect PT, PTT, and platelet count, need to revise standard preprocedure notes*
 Lack of system to notify all caretakers of coagulation status
 Knowledge deficit in pharmacology of new anticoagulant

Verbal orders increase error risks
 Residents working in a large hospital on many floors may need to place verbal orders; if patients were geographically closer, verbal orders would decline
 Need computer order entry system to help prevent this problem
 Patients with difficult foreign names may be easily confused

residents argued that their colleagues “should have” looked for the report on the patient’s initial echocardiogram and “should have” heard the diastolic component to the murmur. The chief resident then redirects as necessary, controlling the flow of the discussion and stimulating the group to identify key points relevant to the case, which typically arise from the residents’ comments. Key points include the underlying organizational weaknesses and structural problems that contribute

to a near miss—what some analysts call the “dull end” [18] or system vulnerability factors or latent errors that contribute to a near miss or an accident [10,17].

In the VSD case, residents observed that the clinic is busy and noisy, inhibiting accurate cardiac auscultation. Furthermore, they delineated weaknesses in teaching cardiac auscultation, particularly too few formal training sessions, and they advocated more structured learning experiences. Other residents noted that clinic charts lack problem lists, making identification of untended problems difficult. Still, others pointed out that failing to complete a cardiology consultation does not trigger any warning mechanisms. Another important point raised in the discussion of the VSD case was lack of resident provider continuity. Residents rotate to outside hospitals and may not always be available in clinic to provide care. In fact, this patient never saw the same resident twice. Thus, the relationship between residency program organization and the care a patient receives in clinic was elucidated.

Instinctively, residents proposed solutions. They considered the value of a charting mechanism to formally list pending studies. They also considered whether attending teams might foster continuity. Thus, the dialogue in this conference centered on problems such as knowledge deficit, poor clinic chart organization, lack of provider continuity, absence of a care flow sheet, and failure to establish a mechanism to track patient compliance.

Conducting a Successful Near Miss Conference: Barriers and Lessons Learned

The formula for the near miss conference is deceptively simple: find two cases with a near miss, review the relevant literature, invite appropriate faculty, and scrutinize the details of each case to reveal inherent infrastructure problems at morning report. We discovered, however, that openly probing near misses and medical errors stimulates many anxieties and is, in itself, a process filled with pitfalls. Following is a discussion of how we handled the inevitable difficulties surrounding a conference on medical errors.

Legal Concerns

Malpractice litigation creates strong incentives against disclosing mistakes [10]. Indeed, many hospitals conceive of risk management and quality improvement as substantially different enterprises [19] and, thus, have separate departments for these activities. We encountered worries that discussing near misses would expose problems, imply negligence, and increase legal risk in the event of a future adverse outcome for a patient. We discussed these concerns with our hospital’s legal

counsel, as we did not wish to summarily increase our legal liability. After understanding the conference's goals, our legal department decided the conference fell under protected peer review activity.

The legal department also was reluctant to have legal risks inhibit such an important potential enhancement to patient care. As a result, we do not keep written records or minutes for the conferences. However, when the conference members suggest system changes, appropriate committees and individuals are informed whenever possible of the recommendations for their action. For example, the medical clinic director was notified of the suggestions made by residents during the VSD case discussion.

Public Relations Concerns

Revealing medical errors risks portraying a hospital as dangerous [20]. In the months preceding the launch of the conference, *The Philadelphia Inquirer* published a scathing four-part series on medical errors and malpractice cases at another Philadelphia academic institution [21]. The TJUH marketing department voiced concerns that the disclosure of errors could reflect poorly on the hospital if publicized in local news media. Furthermore, the department indicated that the title, "near miss conference," implied a nagging quality issue, which would harm our institution's reputation. In retrospect, the fear of retaliation in the form of either costly lawsuits or patients choosing another care site seems misplaced. The Harvard Medical Practice Study found that less than 2% of negligent adverse events ever led to actual malpractice claims [22]. Additionally, one large Veterans Affairs medical center that has a policy of active disclosure to patients has not experienced any increase in liability payments [23]. We, however, compromised with the marketing department by translating the term *near miss* into Latin (*propinquus casus*) and used that title formally for the first several conferences.

Reluctance to Confront Errors

A major barrier to a near miss conference is a reluctance to confront errors. In a classic report by Wu and colleagues [24], only 54% of house officers who completed an anonymous questionnaire describing their most significant mistake said they had discussed the mistake with their attending physician, and only 24% said they had told the patients or families. Medical professionals at all levels carry high expectations for themselves and not surprisingly find it difficult to acknowledge their errors openly before patients and colleagues [25]. In the current atmosphere in which medicine is practiced, errors may represent more a challenge to a doctor's competence and less an opportunity to learn [1]. Resi-

dents worried that if they presented cases at morning report attendings would retaliate with weak fellowship recommendations. They also worried that their own reputation for excellence would suffer; physicians risk the potential for personal harm to their reputation when they disclose their mistakes [26]. Thus, we debated whether involved residents should present the cases. However, experts suggest that innovative ideas are more likely to originate from the actual caregivers [27]. We ultimately determined that the conference would have the greatest impact if the residents and attendings involved actively participated.

We recognized, however, the importance of establishing an atmosphere of trust in the nonpunitive and constructive nature of the conference. Chief residents always privately approached a resident about a potential near miss case and never mandated participation in a conference. We decided an informal request made without faculty involvement allowed residents to freely decline. Some residents did decline, and the chief residents then selected another case. More often, however, after discussion and reflection, residents mastered their fears and went on to participate as presenters at near miss conference. One resident, who was involved in a challenging case in which a diagnosis was delayed, found it cathartic to discover how many individuals had missed the subtle diagnosis.

Difficulty Identifying Cases

Studies suggest that 2.6% to 3.7% of hospitalized patients experience an adverse event [28,29], with the incidence of iatrogenic complications on the medical service reported to be as high as 33% [30–32]. In the literature on adverse drug events (ADEs), the ratio of near misses (prescribing errors) to actual ADEs has been as high as 100:1 [33]. Thus, near misses are likely to occur frequently on the medical service. Despite these data, residents often struggled to find cases and asserted that no near miss events had occurred on their service during a given month. As a result, particularly at the beginning, most cases were identified by attendings. The faculty advisor polled colleagues in the hallway for cases and telephoned interested faculty, some of whom became steady sources identifying two to three cases at any time. Eventually, attending staff and residents spontaneously suggested potential topics and cases. We felt this enthusiasm and openness reflected changing attitudes.

Dismissing Cases from Other Disciplines

Many clinical scenarios span the surgical and medical disciplines, and general and trauma surgeons have become regular and devoted attendees at our near miss

conference. However, when the surgeons and risk management staff began to suggest topics, typically recent cases, the suggestions were often dismissed. It was alleged that “the cases did not include interesting medical issues,” or “the errors did not involve the house staff and, thus, house officers could do nothing about it.” For example, our risk management team once recommended that we dissect a case involving a patient who received the wrong type of blood. The patient’s febrile reaction and falling hemoglobin were attributed to a gastrointestinal bleed; the true cause (ABO incompatible blood) was discovered inadvertently many days later. By then, the patient had recovered and it took months to convince everyone of the importance of examining what went wrong. The resistance to consider a case involving a system breakdown was surprising and entrenched. In addition, the notion that quality concerns raised by any member of the health care team deserve attention is apparently a learned attitude [1,34] and requires nurturing.

Tendency to Blame

First comments after presentation of a near miss case often target staff deficiencies. For example, in one case, a diagnosis of empyema was delayed for several days. First comments, typical of our near miss conference, included “radiology never wants to perform emergency CT [computed tomography] in the emergency room” and “the weekend coverage is never as thorough.” Given the propensity to blame services that were not represented, we felt it crucial to involve all relevant disciplines and to secure their attendance at conferences. In the previously mentioned empyema case (*see page 13*), the cardiothoracic surgeon reviewed the value of the lateral decubiti films, and the pulmonologist reiterated the need to immediately tap any suspicious effusion. The general surgeon noted the importance of obtaining a CT scan in the emergency room only when another study would not suffice, to ensure that the CT scanner would be readily available for trauma patients.

The importance of a blame-free environment was emphasized in private conversations with all faculty prior to the conference and was regularly discussed among the chief residents, the residency program director, and the faculty advisor. Some faculty members are particularly skillful at directing blame-free discussion and adding constructive and objective comments. We were fortunate that several such individuals committed their time to the conferences and attended regularly. All regular faculty and the chief residents assumed responsibility for helping to create a blame-free environment.

Knowledge Deficits

We discovered a significant knowledge deficit among residents. Only 27% of medical school course work includes training in quality assurance [35] and, thus, many residents lack formal education in medical errors, cognitive processes, or organization analysis. Fortunately, review articles summarize relevant theories [10,13]. In particular, Leape’s review [10] is an excellent resource, which we provided to all residents during an early near miss conference. Quickly, residents moved beyond blaming an individual (themselves, the nurse, the technician) and, instead, struggled to identify infrastructure problems. Residents have intimate knowledge of the details of hospital functioning. As the VSD case delineates, we found residents discussed issues of supervision, overwork, poor documentation, and poor chart organization once they understood that problem solving was the goal.

Barriers to a Multidisciplinary Conference

The industrial and aviation literature note that a culture of safety requires that all voices on a team be heard [1], yet achieving a multidisciplinary conference is challenging. First, the conference may conflict with other established divisional teaching rounds. We solved this problem by alternating between Tuesday and Wednesday mornings. In addition, timing is crucial, as some hours of the day are devoted to sign out rounds, surgical cases, clinical responsibility, or shift changes, making attendance by all disciplines difficult. We were fortunate that resident morning report occurs daily at 7:30 AM, a time that could work for internists, surgeons, and nurses. Although nurses are invited, they have not attended regularly and do not yet feel comfortable contributing to the discussion, particularly when a physician or nursing error is the focus. Thus, we are still working to achieve a multidisciplinary conference.

Desire to Discuss Adverse Patient Events

Errors indicate a system breakdown, whether or not a patient is harmed [36]; the same patterns may precede both near misses and adverse events [13]. Thus, a near miss conference can easily evolve into a morbidity and mortality conference. The temptation to discuss adverse events is strong. At times, the chief residents wanted to examine adverse events in the blame-free forum of a near miss conference, particularly when they believed improved management might have prevented catastrophic outcomes. We did periodically present such cases. For example, in one conference we discussed a cardiac care unit (CCU) patient who experienced a pulseless electrical activity code. The code was perhaps due in

Table 2. Criteria for a Successful Near Miss Conference

Voluntary participation by all levels of the health care team
Multidisciplinary representation
Protected, confidential incident reporting
Nonpunitive learning atmosphere
Case selection that targets system faults and eschews individual blame
Leadership support and commitment in the form of the presence of clinical faculty and hospital administration
Adequate resources allocated for the development of appropriate quality improvement efforts
Feedback regarding the instituted changes from earlier conferences

part to a wide pH swing, secondary to the overcorrection of a postintubation respiratory acidosis. It was felt that a protocol for timing postintubation arterial blood gases at appropriate intervals, even if house staff were otherwise occupied, might have prevented this incident.

The challenge to maintain a blame-free environment in cases with serious adverse patient outcomes is enormous. However, contemplating system causes of major iatrogenic complications also is a laudable exercise. During this near miss conference, our residents discussed the nature of the support and orientation provided to residents on call on their first day in the CCU. We found these cases can help all residents think about issues beyond individual knowledge, responsibility, and technique. These cases also can help challenge the belief that mistakes are best prevented by individual vigilance and competence—a belief that the medical culture asserts in many aspects of training [10].

Recruiting Season

We encountered an unexpected barrier during recruiting season. Normally, residency candidates observe morning report on their interview day. This provides applicants with a clear picture of our residents' ability to elaborate a differential diagnosis, interpret radiographs, and analyze evidence. Yet the near miss conference supersedes our formal morning report. Many members of the residency recruiting team felt strongly that the near miss conference might deter candidates from selecting our program. Thus, we weighed the educational potential of the near miss conference against the recruitment team's concerns, particularly in view of the fact that candidates receive only a snapshot of a residency training program during a 1-day visit. We compromised, agreeing to suspend near miss conferences

between December and January, when interviewing is in full swing. Although regular faculty attendees thought the near miss conference would attract residency candidates, the conference organizers decided to respect the recruitment team's concerns.

Outcome and Future Directions

We faced formidable educational barriers in implementing a monthly near miss conference at our institution, which have demanded our continued effort to overcome. From this experience we learned that several criteria are essential for a near miss conference to become an effective educational tool (Table 2).

We did not perform surveys to document changes in attitudes and, thus, cannot prove we changed beliefs. There was, however, a marked shift in the ease with which cases were identified over time. Initially we had to aggressively search for cases to fill our monthly near miss conference and it took much time and energy to identify them. Now, with little effort, we could fill a weekly near miss conference. It is not clear whether this shift indicates a change in house staff and attending attitudes, but in the final analysis, recognizing a problem is the critical first step toward its solution. Gradually, we also have noted a successful shift from an emphasis on culpability to analysis of structural faults and redesign. The near miss conference has served as a reminder of the inevitability of human errors and the power we have to build and modify systems to contain them. By increasing awareness, the near miss conference has helped us create the culture of learning, trust, and curiosity needed as we focus on medical errors [11].

Medical educators have a responsibility to create a culture of safety in which residents can learn from errors. Unless the barriers of fear and ignorance are diminished, error rates will not abate. Furthermore, we will grasp the magnitude of iatrogenic injury only when a generation of physicians expects to report all errors. We can begin with honest discussion of the events all clinicians know occur. We believe this conference is a successful first step. However, reducing the risks of medical errors will require well-established reporting systems as well as targeted interventions. Thus, the second step is to convert suggestions into mandates for change and to develop improved medical practices. These tasks were beyond the scope of an educational conference. We did, however, become progressively more specific and aggressive in our recommendations to committees and administrators. We did not collect data on whether error rates declined or patients benefited from institutional changes.

We believe that, when handled well, a near miss conference can create an atmosphere that allows recognition

of errors and can teach residents a nonpunitive, constructive approach to improving performance.

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References

- Kohn LT, Corrigan JM, Donaldson MS, editors. To err is human: building a safer health system. Washington (DC): National Academy Press; 2000.
- Sox Jr HC, Woloshin S. How many deaths are due to medical error? Getting the number right. *Eff Clin Pract* 2000;3:277-83.
- McDonald CJ, Weiner M, Hui SL. Deaths due to medical errors are exaggerated in the Institute of Medicine report. *JAMA* 2000;284:93-5.
- Hayward RA, Hofer TP. Estimating hospital deaths due to medical errors: preventability is in the eye of the reviewer. *JAMA* 2001;286:415-20.
- Battles JB, Shea CE. A system of analyzing medical errors to improve GME curricula and programs. *Acad Med* 2001;76:125-33.
- Jencks S. Public reporting of serious medical errors. *Eff Clin Pract* 2000;3:299-301.
- Parsons DW. Federal legislation to improve patient safety. *Eff Clin Pract* 2000;3:309-12.
- Milstein A, Galvin RS, Delbanco SF, et al. Improving the safety of health care: the leapfrog initiative. *Eff Clin Pract* 2000;3:313-6.
- Freudenheim M. Big companies lead effort to reduce medical errors. *The New York Times* 2000 Nov 16: Sect. C:19 (col. 5).
- Leape LL. Error in medicine. *JAMA* 1994;272:1851-7.
- Leape LL, Berwick DM. Safe health care: are we up to it? *BMJ* 2000;320:725-6.
- The Bristol Royal Infirmary Inquiry. The final report summary. Bristol (UK): The Bristol Royal Infirmary Inquiry; 2001. Available at http://www.bristol-inquiry.org.uk/final_report/report/Summary9.htm. Accessed 10 Jan 2002.
- Barach P, Small SD. Reporting and preventing medical mishaps: lessons from non-medical near miss reporting systems. *BMJ* 2000;320:759-63.
- Spencer FC. Human error in hospitals and industrial accidents: current concepts. *J Am Coll Surg* 2000;191:410-8.
- Federal Aviation Administration. Aviation safety data: learn about the databases. Available at http://nasdac.faa.gov/internet/fw_learn.htm. Accessed 23 Jan 2002.
- Helmreich RL. On error management: lessons from aviation. *BMJ* 2000;320:781-5.
- Bates DW, Gawande AA. Error in medicine: what have we learned? *Ann Intern Med* 2000;132:763-7.
- Cook R, Woods D. Operating at the sharp end: the complexity of human error. In: Bogner MS, editor. *Human error in medicine*. Hillsdale (NJ): L. Erlbaum Associates; 1994:255-310.
- Brennan TA, Berwick DM. New rules: regulations, markets, and the quality of American health care. San Francisco (CA): Jossey-Bass Publishers; 1996.
- Schenkel S. Promoting patient safety and preventing medical error in emergency departments. *Acad Emerg Med* 2000;7:1204-22.
- Gerlin A. Health care's deadly secret: accidents routinely happen. The chance of errors occurring during treatment may be far greater than you had imagined. *The Philadelphia Inquirer* 1999 Sept 12: Sect. A:1.
- Localio AR, Lawthers AG, Brennan TA, et al. Relation between malpractice claims and adverse events due to negligence. Results of the Harvard Medical Practice Study III. *N Engl J Med* 1991;325:245-51.
- Kraman SS, Hamm G. Risk management: extreme honesty may be the best policy. *Ann Intern Med* 1999;131:963-7.
- Wu AW, Folkman S, McPhee SJ, Lo B. Do house officers learn from their mistakes? *JAMA* 1991;265:2089-94.
- Finkelstein D, Wu AW, Holtzman NA, Smith MK. When a physician harms a patient by a medical error: ethical, legal, and risk-management considerations. *J Clin Ethics* 1997;8:330-5.
- Wu AW, Cavanaugh TA, McPhee SJ, et al. To tell the truth: ethical and practical issues in disclosing medical mistakes to patients. *J Gen Intern Med* 1997;12:770-5.
- Kelley MA, Tucci JM. Bridging the quality chasm. *BMJ* 2001;323:61-2.
- Brennan TA, Leape LL, Laird NM, et al. Incidence of adverse events and negligence in hospitalized patients. Results of the Harvard Medical Practice Study I. *N Engl J Med* 1991;324:370-6.
- Thomas EJ, Studdert DM, Burstin HR, et al. Incidence and types of adverse events and negligent care in Utah and Colorado. *Med Care* 2000;38:261-71.
- Steel K, Gertman PM, Crescenzi C, Anderson J. Iatrogenic illness on a general medical service at a university hospital. *N Engl J Med* 1981;304:638-42.
- Becker PM, McVey LJ, Saltz CC, et al. Hospital-acquired complications in a randomized controlled clinical trial of a geriatric consultation team. *JAMA* 1987;257:2313-7.
- Welsh CH, Pedot R, Anderson RJ. Use of morning report to enhance adverse event detection. *J Gen Intern Med* 1996;11:454-60.
- Bates DW, Boyle DL, Vander Vliet MB, et al. Relationship between medication errors and adverse drug events. *J Gen Intern Med* 1995;10:199-205.
- Sexton JB, Thomas EJ, Helmreich RL. Error, stress, and teamwork in medicine and aviation: cross sectional surveys. *BMJ* 2000;320:745-9.
- Ackerman FK 3rd, Nash DB. Teaching the tenets of quality: a survey of medical schools and programs in health administration. *QRB Qual Rev Bull* 1991;17:200-3.
- Alberti KG. Medical errors: a common problem. *BMJ* 2001;322:501-2.

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