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0894-9115/04/8308-0575/0
American Journal of Physical Medicine & Rehabilitation
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DOI: 10.1097/01.PHM.0000136527.35046.0C

Rapid Communication: Accepted June 9

Review and Commentary

Physiatry: Medical Errors, Patient Safety, Patient Injury, and Quality of Care

ABSTRACT

DeLisa JA: Physiatry: Medical errors, patient safety, patient injury, and quality of care. *Am J Phys Med Rehabil* 2004;83:575–583.

Key Words: Physiatry, Medical Errors, Patient Safety, Patient Injury, Quality Care

The 1999 report of the Institution of Medicine (IOM), entitled *To Err Is Human: Building A Safer Health System*, indicated that as many as 44,000–98,000 patients die in American hospitals annually as the result of medical errors.¹ These numbers were derived from the Harvard Medical Practice Study and a similar analysis of Utah and Colorado hospitals.^{2,3} To put these figures in perspective, the estimated number of deaths resulting from medical errors exceed the number of deaths attributable annually to AIDS, motor vehicle accidents, or breast cancer.¹ Subsequent critiques suggest that this estimate might be inaccurate. Some of the deaths documented in the original studies may not have been attributable to adverse events or have been preventable, the definition of errors used was overly broad, and the estimates were based on reviews of medical records.^{4–7} The actual number is less important than the reality that errors occur, some deaths occur, and some of those deaths and errors are preventable.⁸ This IOM report caught the public's attention and called for far-reaching safety improvements in our healthcare system.

There is little in the physiatry literature to indicate that this problem is being addressed in rehabilitative medicine, although an article by Lee and Bryant,⁹ entitled “Medical Errors during Transfer to a Freestanding Rehabilitation Hospital,” did win the American Physiatric Education Council Award at the 2004 Association of Academic Physiatrists annual meeting. It is the authors' goal to increase awareness about medical errors and patient safety to the physiatry community by defining the terminology in the safety literature, suggesting models for understanding the nature of error and for improving safety and quality, and introducing agencies and organizations that are active

in investigating and improving quality and safety and the that for the basis for a training curriculum.

IOM defines medical errors as “the failure to complete a planned action as intended or the use of a wrong plan to achieve an aim.”¹ Medical errors do not necessarily result in harm. An adverse event is defined as “an unintentional injury caused by medical management rather than by the underlying disease or condition of the patient.”¹ It can include physical or emotional harm, increased length of stay, or additional costs to treat the injury. In cases in which an error causes an adverse event, the event is considered a preventable adverse event. Some types of errors are listed in Table 1. IOM emphasized that most medical errors are systems related (i.e., they are not attributable to individual negligence or misconduct). This is an important consideration when developing preventive measures. The key to reducing errors under the IOM framework is improving the systems of care delivery rather than seeking to blame individuals. To establish realistic goals, we must acknowledge that mistakes caused by human error cannot be completely eradicated from health care. IOM estimates that medical errors cost the nation approximately \$37.6 billion each year; about \$17 billion of those costs are associated with preventable errors.¹ In addition to economic impact, medical errors

corrode the accountability and quality of the healthcare system. Clearly, the scope of the problem cannot be ignored.

Errors occur not only in hospitals but in other healthcare settings as well, such as physicians’ offices, nursing homes, pharmacies, urgent care centers, and the home. An article by Gandhi et al.¹⁰ showed that adverse drug events are more common, though less severe, in outpatient settings than in inpatient settings. Unfortunately, very few data exist on the extent of the problem outside of hospitals.

APPROACHES TO PATIENT SAFETY

Many attempts have recently been made to launch a unified effort to address the problem of medical errors and their effect on patient safety and patient quality of care, and awareness of the issue has been growing in the broader medical community. McGlynn et al.¹¹ indicated that 46% of the patients surveyed failed to receive the recommended care and 11% received potentially harmful care. These substantial rates of deficiency sharpen the focus on the issue of safety. Patient safety is defined as the freedom from accidental or preventable injuries produced by patient care.¹² To effectively control errors, knowledge of patient safety, quality improvement, and systems of care need to move to the “center stage” within medicine. Another important consideration is outcomes measures. One indicator of higher quality is lower error rates.⁸ However, other valid indicators may deal with patient satisfaction, access, cost, and comfort.

The literature on medical injury discusses two approaches to improve patient safety: the error-oriented approach and the injury-oriented approach. The error-oriented approach includes mistakes that do not harm

patients, such as “near misses.”¹³ A near miss or “close call” is an event or situation in which an error occurred, but did not produce injury because of luck or because of corrective measures taken “downstream” in the system. The injury-oriented approach includes patient harm arising from a diagnostic or therapeutic intervention, including injuries that are not associated with any identifiable error.¹⁴ Negligence exists when there has been a failure to adhere to a standard of care set by an expectation of reasonable care in the surrounding medical community. Most of the literature advocates for the error-oriented approach. However, in actual practice, most of our attention is on injuries.

To judge the effect of any healthcare intervention on patient outcomes, the benefits must be weighed against the risk of injury.¹⁴ The injury may be due to an egregious error, or it may occur in the absence of clinician negligence. Error and harm are not always linked.¹⁴ The Harvard Medical Practice Study, a landmark study in the patient safety field, attempted to identify both adverse events and negligence.² That study, a review of 30,121 medical records from 51 acute care, nonpsychiatric hospitals in New York, found adverse events in 3.7% of hospitalizations and adverse events due to negligence in 1.0% of hospitalizations. The percentage of the adverse events that was attributed to negligence was 27.6% (95% confidence interval, 22.5–32.6%). Thus, >70% of these medical injuries were not the result of negligent care.

The IOM report highlighted the problem of medical errors and called for establishment of a national patient safety center.¹ A centerpiece of the IOM report was the call for mandatory medical error reporting systems. Initially, hospitals, and eventually physicians’ offices and other healthcare settings, would be required to report to state governments

TABLE 1

Types of medical errors

Blood transfusion—related injuries
Diagnostic failure
Equipment failure
Errors in treatment
Medication errors
Mishandled surgeries (e.g., amputation of the wrong limb)
Misinterpretation of other medical orders
Nosocomial infections

adverse events that resulted in death or serious harm. To encourage collection, reporting, and analysis of data for the purpose of improving safety and quality, the report also called for voluntary reporting of all medical errors and recommended federal legislation to protect the confidentiality of data on medical mistakes that result in no serious patient harm.¹ Such proposals for wider disclosures of errors and incidents involving patient care would parallel reporting practices that are widely used in other industries such as transportation and construction; however, mandatory reporting would require enactment of controversial legislation.

Fear of legal discovery is not the only barrier to reporting errors in healthcare delivery. Unless reporting was entirely anonymous, hospitals and physicians that fully disclose errors might be shunned by the public and experience economic consequences as severe as malpractice damages. In addition to economic deterrents to reporting, pride and insecurity may be impediments to admission of any human foible or frailty, including medical errors. Fears of admitting error or being accused of negligence may lead to secretiveness, defensiveness, and resistance to change that may actually create an environment that discourages mitigation of the error-prone system.¹⁴

As indicated earlier, one of the central statements in the IOM is that errors should be viewed as due primarily to failures of institutional systems rather than failures of individuals. This is not a premise that the public embraces.¹⁵ The public believes that persons perceived as responsible for errors with serious consequences should be sued, fined, and subject to suspension of their professional licenses. Nor do physicians seem to believe that individual health professionals are blameless. A majority of physicians believe that individual health professionals are more likely to be responsible for pre-

ventable medical errors than are institutions.¹⁵ Thus, one sees the classical tension between accountability *vs.* improvement, individual needs *vs.* societal benefit, and production goals *vs.* safety.^{16,17} It is unclear how well physicians understand, accept, and want to work within the systems approach.

In *Health Affairs*, Becher and Chassin¹⁷ provided an excellent discussion of the interface between quality and error, which they categorize as slips, lapses, and mistakes. Slips are observable actions that deviate from what was planned; they often occur when there is a break in the routine and when attention is diverted. Slips are usually easy to observe because they are errors of commission. Lapses are usually failures of memory that result in planned actions not being carried out. Lapses are usually errors of omission, but they are more difficult to detect than slips. Mistakes are failures of reasoning that result in the choice of a plan that is inadequate to achieve the intended objective.¹⁸

These authors also outline three kinds of overall quality problems: overuse (when health services are provided, although the risk exceeds the benefit and does harm directly), underuse (failure to provide health services that would improve outcomes and the failure to convey the full potential benefit), and misuse (provision of healthcare services without the requisite skill, thereby increasing the risk of complications).¹⁷ Linking quality and error, Becher and Chassin¹⁹ indicate that “although the United States may have the capacity to produce the finest health care in the world, it fails to do so with a regularity that is shocking.”

PHYSICIANS' RESPONSIBILITY FOR IMPROVING QUALITY

In relation to their involvement with medical errors, two fundamentally different categories of medical

errors committed by physicians need to be described. Some physicians are impaired, corrupt, inattentive, or clinically incompetent and make errors repeatedly, despite remediation. The other group consists of highly trained, conscientious, and proficient individuals who occasionally make mistakes. The improvement strategies with respect to these two groups are different. In reality, there is probably a continuum of practitioner type who fall between the two extremes. This perspective in the dual role that individual practitioners can play in medical errors differs from the IOM philosophy, which holds that most errors are not related to negligence or misconduct. If one could build a guideline system that physicians could not override, even those who are impaired would practice better.

Physicians must take ownership of all aspects of the problem, developing a full-spectrum quality improvement effort, one that addresses important overuse, underuse, and misuse issues.¹⁹ These efforts should focus on clinical quality topics, but they should also include critical aspects of how patients experience their care. We need to improve both individual performance and the systems of care, as these components are complementary. This is a tremendous physician leadership opportunity at the individual practice and hospital level or at the organization level of medicine, such as our professional societies, licensure, and certification boards.

According to the second IOM report, *Crossing the Quality Chasm*,²⁰ a first step to widespread quality improvement is for the healthcare industry to sharpen its focus on developing evidence-based approaches to the most chronic conditions, including diabetes, cancer, hypertension, and asthma. Teaching medical students and residents how to evaluate evidence-based medicine, how to establish and use information systems to track decision making, and how to

facilitate team-based care can improve the quality and consistency of care.²¹⁻²³ Medical schools and residencies need to teach students how to access relevant databases, the databases need to be more accessible, and students need to be taught how to question their own decision making and how to document the occasions when they choose to follow a course of treatment that varies from the guidelines. According to Leape et al.,²¹ reducing reliance on memory and improving information access both lead to reduced error.

Unexplained variation in clinical care has contributed to the lack of quality of care and also contributes to medical error. Wennberg and Gittelsohn²⁴ and others have established that significant variations in care occur across the nation, regions, and even within individual communities. Rates of mammography, standard immunizations, cesarean sections, use of beta-blockers after myocardial infarction, and mortality after coronary by-pass surgery vary considerably across the country. One way to reduce variation is for physicians to understand and consistently follow appropriate evidence-based standards of care. However, many aspects of clinical care lack this evidential support.

Quality of care was defined by the IOM in 1990 as the "degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are con-

sistent with current professional knowledge."²⁰ In 1996, Blumenthal,²³ in a series on quality in the *New England Journal of Medicine*, defined quality as physicians "doing the right thing right." Quality has many definitions, but by knowing the technical definition, we can develop measurement tools. The first steps toward improved quality come with defining and measuring and then refining decision making in response to the measurement. Teaching students how to establish desired outcomes, measure effectiveness in reaching those outcomes, and then modify actions to improve the outcomes will provide students with the skill set for reducing error, anticipating potential sources of error, and improving quality. For those of us concerned about improving the care provided within our faculty practices, it is also important to listen to the views of our students and residents.

An excellent article by Volpp and Grande²⁵ presents residents' suggestions for reducing errors in teaching hospitals by addressing various human factors, environmental factors, and barriers. The areas of concern are noted in Table 2. Information transfer is called haphazard, and they find no system of organized communication among the healthcare team members. The residents also indicate that the presence of senior faculty members in clinical conferences often inhibits frank discussions among

house staff about the possible role of errors.

To improve the safety of patients in United States teaching hospitals, specific attention must be paid to the work environment of house staff.²⁵ Addressing errors that are rooted in organizational design requires a systems approach rather than a focus on particular persons considered to be at fault.²⁵ However, concern has been expressed that if errors are attributed primarily to systemic causes, residents may not learn from their errors. A balance must be achieved that allows residents to take personal responsibility for their errors and to discuss them constructively as a means of facilitating collective learning and improving clinical practice.²⁶

Implementing measures aimed at reducing errors requires educating all members of the healthcare team.²⁷ The Department of Veterans Affairs was one of the first healthcare systems in the United States to address patient safety across an entire system. In 1999, the Department of Veterans Affairs became the country's first healthcare system to require that all permanent employees complete 30 hrs of continuing education each year, with ten of those hours focused in quality improvement and ten in patient safety. The Department of Veterans Affairs learned that you cannot mandate cultural change but, rather, that support for change must be won. The training and "buy in" of

TABLE 2

Changes that can be made to reduce error in teaching hospitals²⁴

Category	Problem and action
Using technology	Frequent interruptions with paging: use electronic prioritization to minimize unnecessary work interruptions Orders and medical records: use EMR to minimize handwriting issues Sign-out procedures: standardize using computers to provide better continuity of care
Improving the work environment	Hours of work: optimize work hours and patterns to avoid fatigue Locations of medical charts and equipment: standardize from unit to unit
Changing the academic culture	Reporting of errors: trainees need to be encouraged to report their errors Training in procedures: need proficiency measures Leadership: more formalized interaction among team members

middle through top management is essential. Communication is the key to a successful program, but it must be personal, not via e-mail. The objective of this program is to identify areas of vulnerability, not to count reports/errors. The key is analysis, action, and feedback based on prevention and not punishment. Some process design lessons learned are: reduce reliance on memory, simplify, standardize, use checklists, and eliminate look-alike and sound-alike terms.

ANALYSIS OF ACCIDENTS

In most high-risk industries, learning from accidents and near misses is a long-established practice and a cornerstone of safety analysis and improvement.²⁸ Aviation accidents, for instance, are exhaustively investigated, and the lessons learned are disseminated widely, with important changes made mandatory by regulatory authorities. Many industries use the six-sigma statistical measurement for quality. Six sigma represents a limit of 3–4 defects per million on the number of tolerable defects in their product. In contrast, learning about errors within the healthcare sector, with some notable exceptions, has generally been fragmentary and uncertain.¹⁸ Accidents and safety-related problems that lead to patient harm are generally treated with strict confidentiality by the practitioners and institutions involved. Although a climate of secrecy may protect the short-term legal position of the parties directly involved in a medical error, when imposed over decades on an industry-wide basis, it can only suppress awareness and learning by the thousands of providers and institutions who are not directly involved. The healthcare system cannot address its own safety issues with the insight and effectiveness that other industries have demonstrated until the “bias for secrecy” is put to rest.

In the United States, the most familiar is the approach of root-cause analysis, advocated by the Joint Commission on Accreditation of Healthcare Organizations, an intensive process with origins in “total quality management” approaches to healthcare improvement.²⁸ Root-cause analysis is a structured process performed by a multidisciplinary hospital committee for identifying the causal or contributing factors underlying the adverse events and focuses on system design rather than individual performance.

The method consists of examining the chain of events that led to an accident or adverse outcome, considering the actions involved, and then critically looking back at the conditions under which the staff were working and the organizational context in which the incident occurred. Human decisions and actions play a major role in most accidents; they contribute in two main ways, through active and latent failure.²⁹ Active failures (errors of individuals) are unsafe acts or commissions with immediate adverse consequences and include the following.²⁹

- Action slips or failures, such as picking up the wrong syringe
- Cognitive failures, such as memory lapses and mistakes through ignorance or misreading a situation
- Violations—deviations from safe operating practices, procedures, or standards

Latent failure (system flaws) provides the conditions within which unsafe acts are more likely to occur. It deals with the adequacy of training or adequacy of supervision. These working conditions include the following.²⁹

- A stressful environment
- Fatigue
- Heavy workloads
- Inadequate knowledge or experience
- Inadequate maintenance of equipment and buildings

- Inadequate supervision
- Inadequate systems of communication
- Inadequate training
- Incomplete goals (for example, conflict between finance and clinical need)
- Low morale
- Rapid change within an organization

The framework of factors influencing clinical practice and contributing to adverse events is detailed in Table 3.²⁹ The root-cause analysis investigations can be conducted prospectively to identify and prioritize changes in procedures that may prevent adverse events in the future.

AGENCIES/ORGANIZATIONS AND PATIENT QUALITY OF CARE

Many organizations have helped define and focus on areas in which patient safety may be improved. The Agency for Health Care Research and Quality (Table 4) defines part of its mission to support research designed to improve the outcomes and quality of health care and to promote patient safety and reduce medical errors.¹² In 1999, the Agency for Health Care Research and Quality released an analysis of the evidentiary support of >70 practices that, if performed correctly, would reduce the number of preventable adverse events in hospitals³⁰ Most safety practices recommended in this report are considered to be the practices that medical science has shown to be most beneficial. Some examples are appropriate deployment of: venous thrombosis prophylaxis, informed consent, patient self-management of anticoagulation, nutritional support strategies, advanced planning for end-of-life care, prevention of falls in hospitalized and institutionalized older patients, prevention of pressure ulcers in older patients, multidisciplinary geriatric consultation services, and prevention of nosocomial urinary tract infec-

TABLE 3*Framework of factors influencing clinical practice and contributing to adverse events*²⁶

Framework Contributory Factors	Examples of Problems that Contribute to Errors
Institutional	
Regulatory context	Insufficient priority given by regulators to safety issues; legal pressures against open discussions, preventing the opportunity to learn from adverse events
Organization and management	
Financial resources and constraints	Lack of awareness of safety issues on the part of senior management; policies leading to inadequate staffing levels
Policy standards and goals	
Safety culture and priorities	
Work environment	
Staffing levels and mix of skills	Heavy workloads leading to fatigue; limited access to essential equipment; inadequate administrative support, leading to reduced time with patients
Patterns in workload and shift	
Design, availability, and maintenance of equipment	
Administrative and managerial support	
Team	
Verbal communication	
Written communication	Poor supervision of junior staff; poor communication among different professions; unwillingness of junior staff to seek assistance
Supervision and willingness to seek help	
Team leadership	
Individual staff members	
Knowledge and skills	Lack of knowledge or experience; long-term fatigue and stress
Motivation and attitude	
Physical and mental health	
Task	
Availability and use of protocols	Unavailability of test results or delay in obtaining them; lack of clear protocols and guidelines
Availability and accuracy of test results	
Patient	
Complexity and seriousness of condition	Distress; language barriers between patients and caregivers
Language and communication	
Personality and social factors	

tions. Other material is a *Guide for Patients and Families: Improving Health Care Quality* and a patient fact sheet entitled “20 Tips to Prevent Medical Errors.”

The National Quality Forum (Table 4) is a not-for-profit organization with both public and private representation, including healthcare consumers, purchasers, and providers, created to develop and implement a national strategy for healthcare quality measurement and improvement. Their mission is to improve American healthcare through endorsement of consumer-based national standards for measurement and public reporting of healthcare performance data that provide meaningful information about whether care is safe, timely, beneficial, patient-centered, equitable, and efficient.³¹ They have produced safe practices that provide a

mix of medical decision making and process-based improvement. Their safe practice report includes items such as creating a culture of safety, using computerized physician order entry, and ensuring clear documentation of patient preference for life-sustaining treatment

The LeapFrog Group (Table 4) is a coalition of >145 public and private organizations and companies that was formed for the purpose of helping save lives and reducing preventable medical mistakes by mobilizing their healthcare purchasing power as employers. They are calling for greater attention to quality. Currently, they are not focusing on obtaining performance data but on providing surrogate measures. The three patient safety standards or “safety leaps” chosen by LeapFrog are: computerized physician order entry, the

referral of patients for high-risk treatment to centers with the lowest rate of adverse outcomes, and the staffing of intensive care units with intensivists.³²

The Joint Commission on Accreditation of Healthcare Organizations (Table 4) has viewed the continuous improvement of safety and quality of care as part of its mission. Some of its patient safety goals for 2004 are improving the accuracy of patient identification, improving the effectiveness of communication among caregivers, improving the effectiveness of clinical alarm systems, and reducing the risk of care-acquired infections.³³

The National Patient Safety Foundation (Table 4) promotes safer medical care through prevention of medical error and improving the healthcare system for all patients. It

TABLE 4*Patient safety, medical error Websites*

Organization	Website
Joint Commission on Accreditation of Health Care Organizations (JCAHO)	www.jcaho.org/about+us/index.htm http://www.jcaho.org/accredited+organizations/patient+safety/04+npsg/index.htm
Agency for Healthcare Research and Quality (AHRQ)	www.ahrq.gov www.qualitytools.ahrq.gov
National Quality Forum (NQF)	http://www.qualityforum.org/mission/home.htm
National Patient Safety Foundation (NPSF)	www.npsf.org
The LeapFrog Group	http://www.leapfroggroup.org/safety.htm

believes that continued improvement in patient safety is attainable only through establishing a culture of trust, honesty, integrity, and open communication and that patient involvement between care givers, organizations, and the general public will improve patient safety. It has developed an initial strategy for developing a patient-centered culture of patient safety in healthcare.³⁴

Curriculum Components

Curriculum components include education, systems theory, communication, simulators and technology, and the team concept. These often work best in a workshop format.

Education. The role of medical education in understanding the complexity of errors and in modifying systems to reduce errors needs to be emphasized. Undergraduate and graduate medical education represent the fundamental opportunity to teach physicians about systems of care, methods to reduce errors, and a nonpunitive approach to error reporting. Students need to be taught how to evaluate evidence-based medicine, how to develop and access databases, and how to use information systems to aid in decision making. However, in saying this, egregious errors that do harm should lead to retraining or discipline.

Systems Theory and Its Application to Medicine. Systems theory is a way of analyzing phenomena, whether

they be organizational, human, conceptual, or scientific, by developing a model linking inputs, processes, outputs, feedback, and controls. The components within a system are interdependent and interact with one another in a way that is often more important in determining the final outcome than the characteristics of the individual components themselves. Insights from systems theory often center on how individual components interact and how such interaction affects the desired outcome. Part of curriculum should be devoted to the concepts of patient safety, human-factors engineering, and exercises using the root-cause analysis methodology.

Communication. One of the most important challenges of medical education and graduate medical education training is teaching and learning effective communication skills. According to Veltman,³⁵ evidence shows that a physician's style of communication and ability to establish rapport are important components of the perceptions that patients form about the quality of care they receive. Furthermore, evidence shows that establishing good rapport with patients reduces the number of liability suits directed at physicians, even when an accident occurs. Also, better communication between healthcare professionals must be improved. This is one of the most important areas for improving patient safety.

Teaching students how to communicate with patients is imperative. Teaching them specifically how to deal with bad outcomes is important. If an adverse outcome occurs, the patient or the family should be told what is known, the facts, what is being done to investigate, and that they will be kept informed as the investigation proceeds. Verbal communication skills should also emphasize communication between physicians and other members of the healthcare team. Communication cases make excellent objective structural clinical examination cases that can be used for both education and evaluation.³⁶ Another aspect of communication is written communication. Teaching good documentation is essential. Legibility of handwriting can decrease errors, especially medication errors. Abbreviations can also be misinterpreted and should be avoided.

Simulators and New Technology. Simulators allow doctors and nurses to practice procedures and emergency drills before performing them on real patients. This allows them to learn from mistakes without harm to patients. It is also an excellent method to become proficient in procedures. Realistic simulation provides an opportunity to analyze physician response to critical incidents and learn from mistakes without risking harm to patients. Experience based on simulators can prepare physicians to effectively manage critical

incidents. Repeated practice of critical management skills is necessary.³⁷ Simulation is an important option for preparing professionals to think critically and work as a team to effectively use resources in high-risk situations.

Team Concept. Teamwork is the ability to recognize the expertise of others and work with them in the patient's best interest. Rehabilitation invented the team concept in health-care. Other specialists of medicine have discussed the team concept, although they usually do not function at the interdisciplinary level. Adding a pharmacist to the team should reduce medication errors. Each staff member is part of a team and should have input in the patient's care. However, the team adds an extra layer of complexity with respect to patient care. If the team communicates well and is in harmony, it can be a very effective tool for detecting errors.

CONCLUSION

Medical errors and patient safety are essential issues in health care and medical education. Discussions of errors and how to reduce error are often met with denial or a cosmetic fix. Berwick³⁸ does not find evidence that health care in the United States is becoming safer. Improvement is clearly needed, and we in rehabilitation should actively develop these programs. Measurement is an important component of patient safety and of quality improvement. Measuring adverse event rates, assessing frequency and types of errors, and evaluating compliance with standards of care are key to improving quality and safety. However, these measurements must be meaningful and taken over time. Physical medicine and rehabilitation often entails caring for patients with complex medical issues over long periods of time. A wide range of pharmacologic and therapeutic interventions is employed in

caring for these individuals, creating the potential for errors and adverse events. Moreover, diagnostic testing, surveillance, and preventive screening may be more difficult to perform and interpret in individuals with certain types of chronic disability, increasing the likelihood of delayed diagnoses. Because of the national attention focused on medical errors, physiatrists should be prepared to examine their practices with a critical eye. The first step is to become knowledgeable about common types of errors, the potential for their occurrence in rehabilitation, and effective measures to reduce the likelihood of errors and any subsequent harm.

Patient safety must be taught as a routine part of undergraduate and graduate medical education. Our residency programs must begin a dialogue with their housestaff about patient safety and quality and institute measures aimed at reducing errors. Educators need to develop an effective curriculum for our students; this is the stage at which we can have the greatest impact. We need to increase the public's demand for higher quality and fewer healthcare errors. Purchasers of health care need to develop payment methods that reward excellence in quality. An effective quality improvement program needs solid support from the hospital administration, strong physician leadership, and shared goals to improve quality.

REFERENCES

1. Kohn LT, Corrigan J, Donaldson MS (eds): *To Err Is Human: Building a Safer Health System*. Washington, DC, National Academy Press, 2000
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
3. 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

4. McDonald CJ, Weiner M, Hui SL: Deaths due to medical errors are exaggerated in Institute of Medicine report. *JAMA* 2000;284:93-5
5. Sox HC Jr, Woloshin S: How many deaths are due to medical error? Getting the number right. *Eff Clin Pract* 2000;3:277-83
6. Hofer TP, Kerr EA, Hayward RA: What is an error? *Eff Clin Pract* 2000;3:261-9
7. Richardson WC, Berwick DM, Bisgard JC, et al: The Institute of Medicine report on medical errors. *N Engl J Med* 2000;343:663-5
8. Dickey NW: Patient safety and medical education: A partnership for the future. *Tex Med* 2002;98:55-9
9. Lee LW, Bryant MG: Medical errors during transfer to a freestanding rehabilitation hospital. *Am J Phys Med Rehabil* 2004;88:226
10. Gandhi TK, Weingart SN, Borus J, et al: Adverse drug events in ambulatory care. *N Engl J Med* 2003;348:1556-64
11. McGlynn EA, Asch SM, Adams J, et al: The quality of health care delivered to adults in the United States. *N Engl J Med* 2003;348:2635-45
12. *AHRQ Quality Indicators: Guide to Patient Safety Indicators*. Rockville, MD, Agency for Healthcare Research and Quality, 2003, AHRQ Publication 03-R203
13. McNutt RA, Abrams R, Arons DC: Patient safety efforts should focus on medical errors. *JAMA* 2002;287:1997-2001
14. Layde PM, Cortes LM, Teret SP, et al: Patient safety efforts should focus on medical injuries. *JAMA* 2002;287:1993-7
15. Blendon RJ, DesRoches CM, Brodie M, et al: Views of practicing physicians and the public on medical errors. *N Engl J Med* 2002;347:1933-40
16. Barach P, Berwick DM: Patient safety and the reliability of health care systems. *Ann Intern Med* 2003;138:997-8
17. Becher EC, Chassin MR: Improving quality, minimizing error: Making it happen. *Health Aff (Millwood)* 2001;20:68-81
18. Reason JT: *Human Error*. New York, Cambridge University Press, 1990
19. Becher EC, Chassin MR: Taking health care back: The physician's role in quality improvement. *Acad Med* 2002;77:953-62
20. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Institute of Medicine Committee on Quality

of *Healthcare in America*. Washington, DC, National Academy Press, 2001

21. Leape LL, Berwick DM, Bates DW: What practices will most improve safety? Evidence-based medicine meets patient safety. *JAMA* 2002;288:501-7

22. Bates DW, Gawande AA: Improving safety with information technology. *N Engl J Med* 2003;348:2526-34

23. Blumenthal D: Quality of care: What is it? *N Engl J Med* 1996;335:891-4

24. Wennberg J, Gittelsohn A: Small area variations in health care delivery. *Science* 1973;182:1102-8

25. Volpp KG, Grande D: Residents' suggestions for reducing errors in teaching hospitals. *N Engl J Med* 2003;348:851-5

26. Wu AW, Folkman S, McPhee SJ, et al: Do house officers learn from their mistakes? *JAMA* 1991;265:2089-94

27. Vincent C: Understanding and responding to adverse events. *N Engl J Med* 2003;348:1051-6

28. Spath PL (ed): *Error Reduction in Health Care: A Systems Approach to Improving Patient Safety*. Chicago, AHA Press, 2000

29. Vincent C, Taylor-Adams S, Stanhope N: Framework for analyzing risk and safety in clinical medicine. *BMJ* 1998;316:1154-7

30. Shojania KG, Duncan BW, McDonald KM, et al (eds): *Making Health Care Safer: A Critical Analysis of Patient Safety Practices. Evidence Report/Technology Assessment Number 43*. Rockville, MD, Agency for Health Care Research and Quality, 2001, AHRQ Publication 01-E058

31. National Quality Forum: *National Quality Forum Mission*. Available at: <http://www.qualityforum.org/mission/home.htm>. Accessed June 15, 2004

32. The LeapFrog Group: *Patient Safety*. Available at: <http://www.leapfroggroup.org/safety.htm>. Accessed June 15, 2004

33. Joint Commission on Accreditation

of Health Care Organizations: *2004 National Patient Safety Goals*. Available at: <http://www.jcaho.org/accredited+organizations/patient+safety/04+npsg/index.htm>. Accessed June 15, 2004

34. National Patient Safety Foundation (Website). Available at: <http://www.npsf.org/>. Accessed June 15, 2004

35. Veltman LL: Managing bad news. *Group Pract J* 1997;26-32

36. Millis SR, Jain SS, Eyles M, et al: Assessing physicians' interpersonal skills: Do patients and physicians see eye-to-eye? *Am J Phys Med Rehabil* 2002;81:946-51

37. Gaba DM, DeAnda A: The response of anesthesia trainees to simulated critical incidents. *Anesth Analg* 1989;68:444-51

38. Berwick DM: Errors today and errors tomorrow. *N Engl J Med* 2003;348:2570-2