

Bringing Diagnosis Into the Quality and Safety Equations

Mark L. Graber, MD

Robert M. Wachter, MD

Christine K. Cassel, MD, MSc

CASES OF DELAYED, MISSED, AND INCORRECT diagnosis are common, with an incidence in the range of 10% to 20%.¹ Some errors in diagnosis stem from mistakes in the interpretation of diagnostic tests. For example, pathology, radiology, and the clinical laboratory each have error rates of 2% to 5%. Superimposed on these testing errors are the ubiquitous system-related errors encountered in every health care organization, as well as cognitive errors caused by faulty clinical reasoning. Diagnostic errors do not occur only in connection with unusual conditions but span the breadth of clinical medicine, from rare disorders to commonplace ones like anemia and asthma.^{2,3}

Most diagnostic errors are either inconsequential or discovered in time, but others are not. Based on the findings from large autopsy series, Leape et al⁴ estimated that diagnostic error accounts for 40 000 to 80 000 deaths per year, and the number of patients who are injured must be substantially higher. In a recent survey of more than 6000 physicians, 96% felt that diagnostic errors were preventable.⁵

How is it then that improving diagnosis goes largely unrepresented in the current quality framework? The recently proposed National Quality Strategy focuses almost exclusively on management, as do the proposed “pay-for-performance” measures and those presently being publicly reported. As Nuland observed, diagnosis is “. . . the most critical of a physician’s skills. It is every doctor’s measure of his abilities; it is the most important ingredient in his professional self image.”⁶ Patients undoubtedly want their physicians to be accurate diagnosticians too. Yet diagnosis has been omitted from the quality and safety equations.

Diagnosis apparently gets overlooked in most efforts to ensure quality and safety. In the seminal Institute of Medicine report *To Err Is Human*, the phrase medication error is used 70 times while diagnostic error occurs twice. Although there are many reasons for this omission, difficulty understanding and measuring diagnostic errors is certainly part of the answer. Another major factor involves

the absence of ownership: in the quality and safety family, diagnostic error is essentially an orphan. Health care leaders assume their physicians should be responsible for ensuring reliable diagnoses, but most physicians seem to believe they are doing just fine. Through malpractice suits, physicians are well aware of diagnostic error, but there is a general tendency to perceive that such errors are made by someone else, someone less careful or skillful. Moreover, whereas errors such as wrong-site surgery and wrong-dose medication errors seem amenable to systems solutions (time-outs, computerized order entry, etc), diagnostic errors seem intensely personal: the “system” appears to be the physician, and his or her own knowledge, skills, values, and behaviors.

The absence of diagnosis-related quality measures has had several consequences. The lack of interest and emphasis has translated into a similar level of apathy within health care organizations. We are unaware of any health care organization that is currently collecting specific data on diagnostic error or engaged in a system-wide campaign to decrease the frequency or consequences of diagnostic error. Without data on such errors, there is no clear motivation to improve the diagnostic process and no way to measure progress. Moreover, with so much focus being placed on improving quality and safety in treatment-related areas, the relative inattention to diagnosis has consequences: resources and attention that could be used to improve diagnosis are devoted instead to the already-overrepresented management issues.

Not only is diagnosis critically important to patients, but improving diagnostic skill lies at the heart of efforts to rein in escalating costs of health care. Costs related to diagnostic testing are increasing faster than any other component of health care expenditures. The ABIM Foundation’s recently launched “Choosing Wisely” campaign focuses on using the most appropriate diagnostic strategies, an effort that could save billions of dollars.⁷ Additional savings could be found in reducing the harm caused by diagnostic errors; the magnitude of these costs must be substantial but have never been estimated.

Author Affiliations: RTI International, St James, New York (Dr Graber); Department of Medicine, University of California at San Francisco (Dr Wachter); and American Board of Internal Medicine, Philadelphia, Pennsylvania (Dr Cassel).

Corresponding Author: Mark L. Graber, MD, RTI International, 1 Breezy Hollow, St James, NY 11780 (mgraber@rti.org).

Apathy about diagnosis also translates into a tacit acceptance of the status quo in medical education. Most training programs have no special curriculum on diagnosis, assuming that the skill will be passed down from the senior staff to the trainees by the time-honored apprenticeship model. Before information on the Internet became so ubiquitous, a mark of a brilliant student or resident was the ability to memorize and recite long lists of differential diagnoses. But in the current world, being facile at locating and using electronic information is now at least as crucial. Excessive reliance on electronic data, however, carries a cost; today's great diagnostician combines his or her Internet skills with a strong reservoir of foundational information and experience. Knowledge and judgment still count.

Diagnosis and treatment need equal emphasis in defining quality and safety in health care. A new emphasis on diagnosis should begin in medical school. The science of cognition and decision making has advanced substantially and should be included in every curriculum. Trainees should be fluent in the dual-process model of clinical reasoning and how this can go astray to cause diagnostic errors. The science of expertise and human error (including how individuals progress from novice to expert in their profession and common biases and sources of cognitive mistakes) should be studied and presented from the perspective of understanding the roots of diagnostic error. Simulation should be incorporated as a way to build experience with unusual presentations of common diseases and to introduce trainees to rare diseases they may not see in their clinical training years. Moreover, curricula should emphasize common and particularly serious ("do-not-miss") diagnoses. Using diagnostic checklists can help guide clinicians to consider such diagnoses more systematically, and trainees and practicing clinicians should be exposed to such adjunctive tools.

Medical training must also include, if not center on, working in the age of digital information. New decision support tools (for example, DXplain, Isabel, or maybe someday IBM's Watson) make it easier for physicians to construct a complete differential diagnosis, the key challenge in deriving the correct diagnosis. As evidence supporting the benefits of such tools grows, organizations should ensure that they are universally available. It is telling that hospitals and physicians' offices now have financial incentives to implement computerized order entry systems (under national meaningful use standards) but not these helpful and relatively inexpensive diagnostic support tools.

Evaluation should evolve in parallel, with research on identifying the best ways to evaluate competency in diagnosis, including its cost considerations. For high-quality care, being "well calibrated"—which includes physicians knowing their limits and accurately assessing their own degree of certainty with a diagnosis—may be just as important as being right. Examinations that test content knowledge should also

assess the students' confidence in their test answers, introducing trainees to this critical concept. Currently the one evaluation tool that simulates diagnostic reasoning is the cognitive knowledge testing done by some specialty boards, which focuses on reasoning through a clinical scenario rather than purely on questions of fact. Such tools need to be continuously refined based on new research. The American Board of Internal Medicine, for example, is currently considering whether to allow focused Internet searches during a portion of its secure cognitive assessment.

In the policy arena, oversight agencies need to balance their standards by including performance evaluations focusing on diagnosis. These measures should evaluate both the efficiency and accuracy of diagnosis. Diagnosis is increasingly an outpatient event, so these measures need to include data from both ambulatory and inpatient care settings. Professional societies could play an important role by establishing standards for timely and efficient workup of diseases in their specialty areas and helping define acceptable error rates. Research is needed to develop consensus criteria for defining diagnostic error, understand its origins, learn how best to identify problems with diagnosis, and evaluate prevention strategies.

The centuries-old debate over whether diagnosis or treatment is more important cannot ever be answered, but no one debates that the **right treatment depends on the correct diagnosis.** The time has come for the health care quality and safety communities to give these twin pillars of medical care equal consideration in matters of training, research, and policy.

Conflict of Interest Disclosures: All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dr Wachter reported serving as the chair of the American Board of Internal Medicine (for which he receives a stipend) and receiving a grant to his institution from the Agency for Healthcare Research and Quality; receiving honoraria from more than 100 health care organizations for lectures on patient safety, health care quality, and hospitalists; receiving royalties from Lippincott Williams & Wilkins and McGraw-Hill; receiving fees for development of educational presentations from QuantiaMD and also from IPC—The Hospitalist Company; serving on the scientific advisory boards of Patient-Safe Solutions, EarlySense, and CRISI (for which he receives stock options); receiving compensation from John Wiley & Sons for blog writing; holding the Benioff endowed chair in hospital medicine from Marc and Lynne Benioff; and receiving funding for sabbatical at Imperial College from the US-UK Fulbright Commission. No other disclosures were reported.

REFERENCES

1. Berner ES, Graber ML. Overconfidence as a cause of diagnostic error in medicine. *Am J Med.* 2008;121(5)(suppl):S2-S23.
2. Kostopoulou O, Delaney BC, Munro CW. Diagnostic difficulty and error in primary care: a systematic review. *Fam Pract.* 2008;25(6):400-413.
3. Flesh-eating bacteria victim Aimee Copeland's condition upgraded to "good." The Daily Mail. MailOnline. <http://www.dailymail.co.uk/news/article-2164616/Aimee-Copeland-Flesh-eating-bacteria-victims-condition-upgraded-good.html>. Accessed September 4, 2012.
4. Leape L, Berwick D, Bates D. **Counting deaths from medical errors** [letter reply]. *JAMA.* 2002;288(19):2405.
5. McDonald O. Physician perspectives on preventing diagnostic errors. <http://www.quantiamd.com>. Accessed September 4, 2012.
6. Nuland S. *How We Die: Reflections on Life's Final Chapter*. New York, NY: Knopf; 1994.
7. Cassel CK, Guest JA. Choosing wisely: helping physicians and patients make smart decisions about their care. *JAMA.* 2012;307(17):1801-1802.