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# Physician Perspectives on Preventing Diagnostic Errors

By Owen W. MacDonald, Group Publisher, QuantiaMD

Foreword by Robert M. Wachter, MD, Professor and Associate Chairman, Dept. of Medicine, University of California, San Francisco

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# Foreword

The field of patient safety began with the publication of the Institute of Medicine's report, *To Err is Human*, in late 1999. Over the past decade, we have made considerable progress in attacking a number of patient safety problems, including medication errors, wrong-site surgery, and healthcare-associated infections. We've come to recognize that patient safety solutions need to be broad based—everything from checklists to computers, from teamwork training to simulation. Increasingly, healthcare providers and organizations have also realized that keeping patients safe is not only ethically important but—in an environment with public reporting of safety and quality measures and Medicare changes that tie payment to performance—mission critical from a business standpoint.

Strangely, in the midst of all this activity, one of the most common types of errors has been largely absent from the patient safety agenda: diagnostic errors. The reasons are manifold: it is harder to measure diagnostic errors than cases of MRSA; it is harder to change the way doctors think than to implement a checklist; it is harder to build a computer that can offer a helpful differential diagnosis of fever, rash, and eosinophilia in a returning traveler than one that can remind you that you shouldn't be giving ampicillin to that penicillin-allergic patient.

But the time has come to elevate the issue of diagnostic errors to its due place in the patient safety field. As part of the QuantiaMD series on preventing diagnostic errors—which brings together some of the world's leading experts to discuss a whole range of issues relevant to this key topic—we have asked the QuantiaMD physician community to weigh in on their top concerns and their deep experience with diagnostic errors. Their responses are fascinating: nearly half of the 6,400 clinician respondents see diagnostic errors monthly in their practices, and most believe that they are at least partly preventable. Their ideas on prevention make interesting reading, and serve as a useful prelude to the QuantiaMD series, in which experts offer their own answers to these very same questions. These survey results and the QuantiaMD series are useful steps on the path toward giving diagnostic errors the attention they deserve.

Sincerely,



A handwritten signature in black ink that reads "Bob Wachter". The signature is written in a cursive, flowing style.

Robert M. Wachter, MD  
Professor and Associate Chairman, Dept. of Medicine  
University of California, San Francisco

# Executive Summary

In March 2009, a commentary in *The Journal of the American Medical Association* declared diagnostic errors “the next frontier in patient safety.” In that commentary, authors David E. Newman-Toker, MD, PhD, and Peter J. Pronovost, MD, PhD, of Johns Hopkins University, wrote: “Although the science of error measurement is underdeveloped, diagnostic errors are an important source of preventable harm.”<sup>1</sup>

Although diagnostic errors’ exact place among other patient safety initiatives—medication errors and healthcare-acquired infection, for example—is still somewhat unclear, clinicians do have confidence that maturing efforts to prevent misdiagnosis will help, suggests a new study of 6,408 clinicians by QuantiaMD and Robert M. Wachter, MD, Professor and Associate Chairman, Dept. of Medicine, University of California, San Francisco.

Diagnostic errors are not uncommon, according to the survey. Nearly half (47%) of clinicians said they encounter diagnostic errors (e.g., missed, late, or wrong diagnoses) at their practice at least monthly. Clinicians in the study also identified a number of common contributors to diagnostic errors, chief among them atypical patient presentations and failure to consider other diagnoses. External pressures also contribute to diagnostic errors, respondents said. The most commonly cited was a societal “zero tolerance” attitude toward any mistake a physician makes, perhaps driving over-testing and other forms of defensive medicine that could contribute to diagnostic errors.

But, are diagnostic errors indeed a source of preventable harm? Respondents to the survey suggest that they are. The majority (64%) of those surveyed said that up to 10% of misdiagnoses they have experienced have directly resulted in patient harm. Moreover, 96% of clinicians say that they believe diagnostic errors are preventable at least some of the time, according to the survey results.

What is the solution? Perhaps unsurprisingly, efforts to prevent diagnostic errors will have to strike a balance between the science and the art of diagnosis, according to the survey results. While respondents expressed some confidence that future approaches such as computerized decision-support tools and efforts to change the way clinicians think will prevent diagnostic errors in the future, the majority (56%) was skeptical that artificial intelligence aids would ever be able to replace most of the physician’s role in diagnosis.

Diagnostic errors pose unique challenges and opportunities compared to other patient safety initiatives. Among the challenges: they are difficult to measure, they play out over time, and there is little data on incidence, outlines Wachter in his QuantiaMD Expert Practice Series, *Preventing Diagnostic Errors*.

This study details the many and various challenges clinicians face related to misdiagnosis, but also reveals key insights about proposed solutions, and clinicians’ confidence in their ultimate success.

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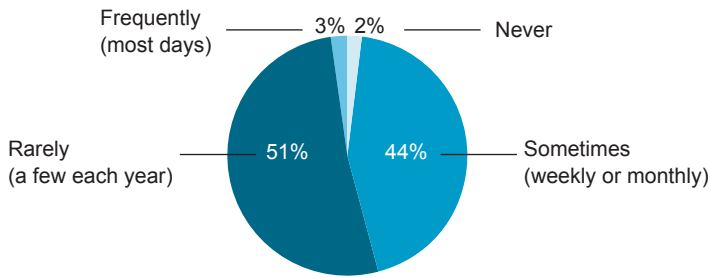
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<sup>1</sup>David E. Newman-Toker, Peter J. Pronovost, *JAMA*. 2009 Mar 11;301(10):1060-2.

# Types and Frequency of Misdiagnoses

Nearly half of respondents to our survey (47%) said they encounter diagnostic errors (e.g., missed, late, or wrong diagnoses) at their practice at least monthly, with 3% indicating that they see diagnostic errors frequently (most days). The majority (51%) of respondents said that diagnostic errors were encountered rarely (a few each year) in their practice, and just 2% said they never see these errors in their practice (Fig. 1).

**Fig. 1: How often do you encounter diagnostic errors (e.g., missed, late or wrong diagnoses) in your practice?**



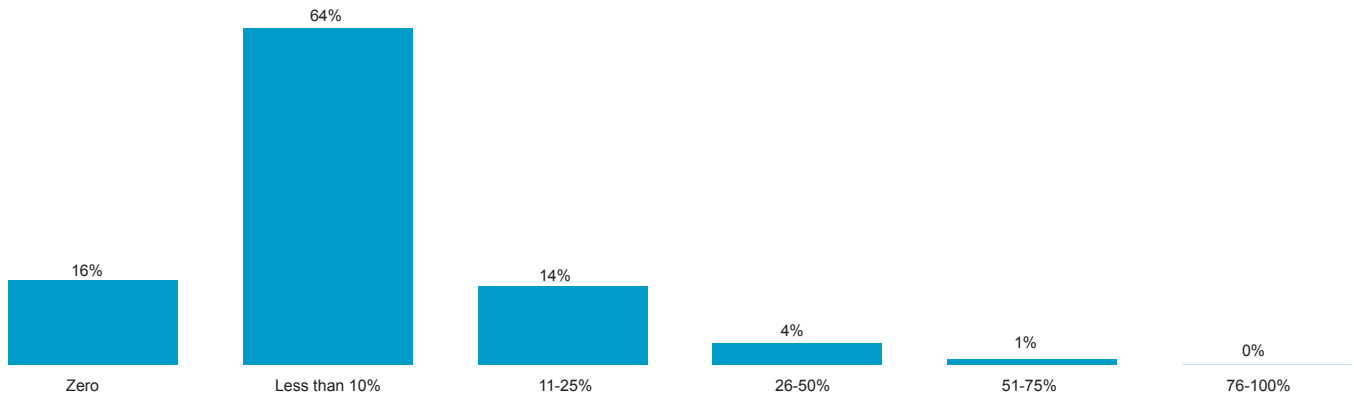
N = 6393  
Source: QuantiaResearch www.quantiamd.com

## Survey Highlights

- 47%** of clinicians said they encounter diagnostic errors (e.g., missed, late, or wrong diagnoses) at their practice at least monthly.
- 64%** of those surveyed said that up to 10% of misdiagnoses they have experienced have directly resulted in patient harm.
- 96%** of clinicians say that they believe diagnostic errors are preventable at least some of the time.

Of the diagnostic errors that respondents did encounter, less than 10% of those errors directly resulted in actual patient harm, according to the majority (64%) of respondents. Sixteen percent of respondents indicated that of the diagnostic errors they had encountered, none of them had resulted in harm (Fig. 2).

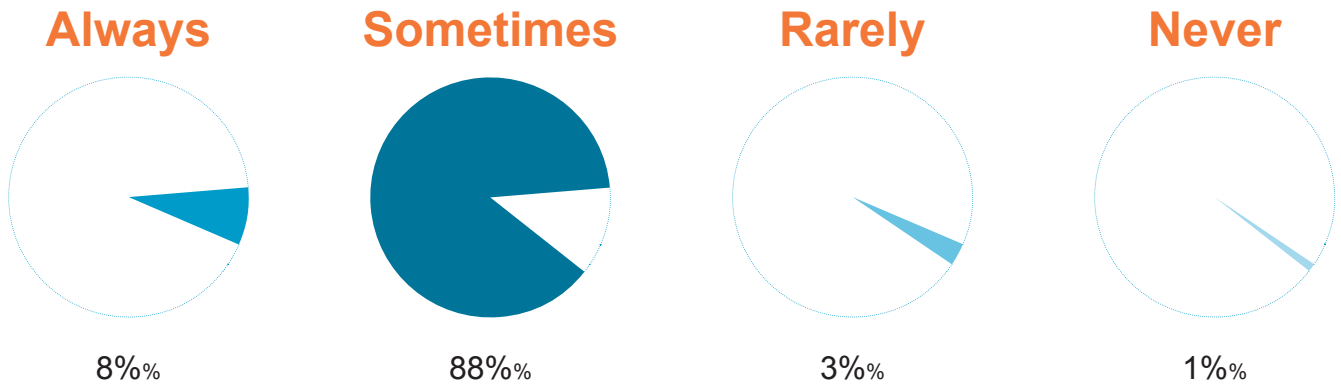
**Fig. 2: What percentage of diagnostic errors you have experienced directly have resulted in actual patient harm?**



N=6391  
Source: QuantiaResearch www.quantiamd.com

Eight percent of respondents said that diagnostic errors were always preventable, while the vast majority (88%) of respondents said such errors were “sometimes” preventable, which likely reflects the challenging nature of identifying and tracking diagnostic errors, e.g., pinpointing a root cause of such errors (Fig. 3).

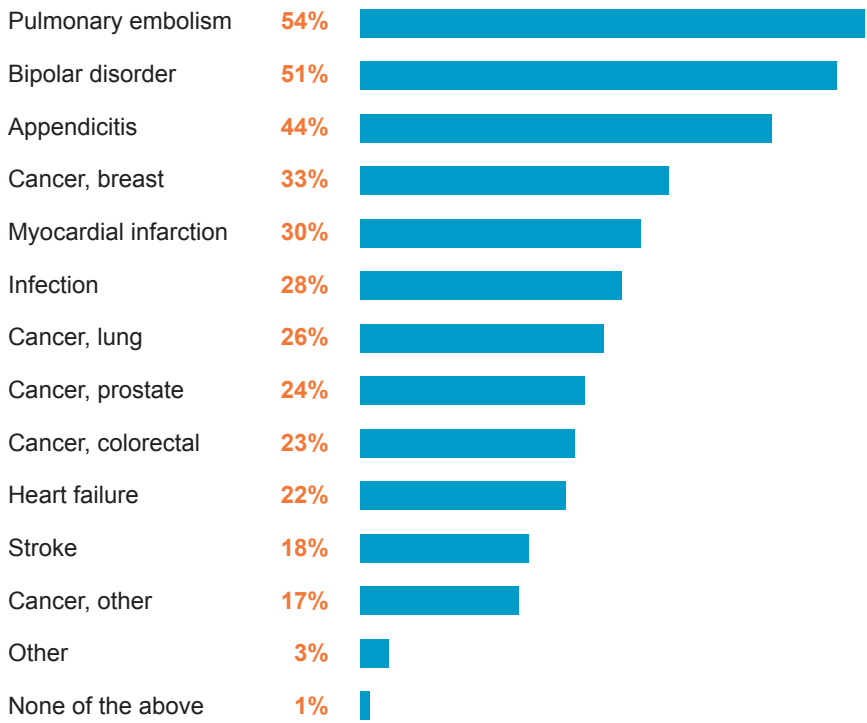
**Fig. 3: To what extent do you believe that diagnostic errors are preventable?**



N = 6394  
Source: QuantiaResearch www.quantiamd.com

Respondents also identified a number of diagnoses that are at greatest risk for misdiagnosis. The top five were pulmonary embolism, bipolar disorder, appendicitis, breast cancer, and myocardial infarction. These results are interesting, in that published studies place missed diagnoses of cancer atop the list of diagnostic errors in terms of frequency. Among the cancers, breast cancer led all other types of cancer in terms of being at greatest risk for misdiagnosis among survey respondents, significantly ahead of colorectal, prostate, lung, and other types of cancer (Fig. 4).

**Fig. 4: Which of the following diagnoses are at greatest risk for diagnostic error? (Select up to 5)**



**88%**  
of respondents think  
diagnostic errors are  
sometimes preventable

Note: N=6408  
Source: QuantiaResearch www.quantiamd.com

# Contributing Factors to Diagnostic Errors

Atypical patient presentation is the most common contributor to diagnostic errors, according to 75% of respondents, while half of respondents said the failure to consider other diagnoses was a common factor, and 40% implicated inadequate patient histories.

On the other end of the spectrum, only 16% of respondents felt that an inadequate physical examination was a common reason for diagnostic errors. Failure to refer (13%) and incorrect interpretation of test results (10%) also ranked near the bottom (Fig. 5).

**Fig. 5: What are the most common contributors to diagnostic errors? (Select up to 3)**

Atypical patient presentation .....	75%	Failure to order appropriate tests .....	21%
Failure to consider other diagnoses .....	50%	Inadequate physical examination .....	16%
Inadequate patient history .....	40%	Failure to refer .....	13%
Inadequate follow-up on test results.....	29%	Incorrect interpretation of test results .....	10%
Failure to account for a symptom .....	22%	Other.....	1%

Note: N=6394  
Source: QuantiaResearch www.quantiamd.com

**Fig. 6: Which of the following do you agree are strong contributing factors to diagnostic errors? (Select up to 3)**

A societal “zero tolerance” attitude toward any mistake a physician makes	44%
Over-testing in order to mitigate malpractice risk	39%
Prescriptive, inflexible or inadequate care pathways or protocols	38%
Increased pressure to use fixed diagnostic algorithms or decision support tools	38%
Reimbursement or liability barriers to engaging other clinical disciplines	33%
Medical school & residency training that doesn’t develop problem-solving skills	15%
Poorly constructed information technology systems	13%
Other	8%
Deteriorated self-confidence among physicians	7%
Unavailable information technology systems	7%

Note: N=6394  
Source: QuantiaResearch www.quantiamd.com

Survey respondents also said a number of external factors contributed to diagnostic errors, chief among them a societal “zero tolerance” attitude toward any mistake a physician makes (44%), while 39% said over-testing in order to mitigate malpractice risk was a contributing factor.

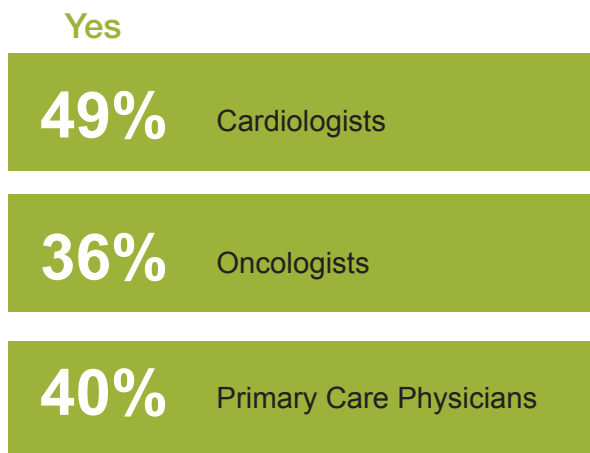
And some proposed solutions to reducing diagnostic errors may actually contribute to them, according to respondents. For example, 38% of those surveyed said prescriptive, inflexible, or inadequate care pathways or protocols can contribute to diagnostic errors, as can increased pressure to use fixed diagnostic algorithms or decision-support tools.

In general, respondents didn’t see a strong link between poorly constructed or unavailable information technology systems and diagnostic errors (13% and 7%, respectively) (Fig. 6).

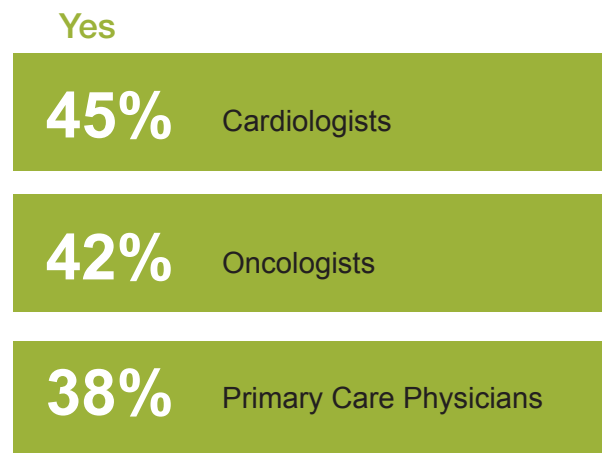
Specialty did have some impact on how a respondent viewed contributing factors. For example, cardiologists (49%) were more likely to point to over-testing than either oncologists (36%) or primary care physicians (40%). And both oncologists (42%) and cardiologists (45%) were more likely than PCPs (38%) to agree that increased pressure to use fixed diagnostic algorithms or decision-support tools can contribute to diagnostic error (Fig. 7).

**Fig. 7: Specialty did have some impact on how a respondent viewed contributing factors.**

Is over-testing in order to mitigate malpractice risk a strong contributing factor to diagnostic errors?



Is increased pressure to use fixed diagnostic algorithms or decision support tools a strong contributing factor to diagnostic errors?



In open responses, many indicated that some fundamental aspects of the doctor-patient encounter may help promote diagnostic errors.

“I once was on the faculty at a teaching hospital and I think ‘we’ generally fail to teach young docs how to do an adequate history and physical. I think most diagnostic mistakes are made by people not taking time and care to ‘get it right’ up front — and that requires taking time to do your initial history and physical properly — and using open-ended questions whenever possible,” said an internist and pulmonologist in California.

A family medicine physician in New Mexico said, “Seeing patients quickly is glorified. It takes time to do an adequate history, exam, chart review, manage incoming results, and discuss options with patients. Doing this improves outcomes, but is frequently considered poor time management.”

Said one primary care physician and internist, simply, “Too many patients, too little time.”

“Too many patients, too little time.”

Primary care physician  
California

# Art vs. Science

Is diagnosis an art or a science? The majority of respondents (74%) said it was equal parts of each, while 14% said it was more science, and 12% said it was more art (Fig. 8). When asked why they responded the way they did, many respondents described a delicate balance between the science of collecting and interpreting data, and the art of the patient interaction.

**Fig. 8: Do you feel that diagnosis is more of an art or a science?**



N = 6379  
Source: QuantiaResearch [www.quantiamd.com](http://www.quantiamd.com)

"After nearly 50 years I still surprise myself with both successes and failures in diagnosis. If it were just an art, I should be better by now. If it were just a science, the brightest members of my medical school class should have been the best diagnosticians. They weren't," responded a California-based ID/HIV specialist.

A pediatric gastroenterologist from Texas said, "At present, one can input a list of signs and symptoms into a computer and it will propose a list of possible diagnoses; that is the science part, listening to a list and matching that against what is known about all diseases. There is however an art in knowing which of those possible diagnoses fit the clinical circumstances. Also, there is art to asking the right questions to get valuable information."

"From the time of Hippocrates until well into our day the diagnostician has relied on essentially two things: subjective information versus objective data. It takes both mind and heart to carefully craft an accurate differential diagnosis." said an oncology certified nurse in New York.

A Boston-based advanced practice nurse in emergency medicine responded, "I feel that the art of diagnosis comes from listening to your patient, performing a thorough exam, considering all of the possible likely diagnoses and having the experience to develop a gestalt. The science then comes in ordering the right lab or imaging test to confirm your diagnosis. Too often we leave the science to do the diagnosing for us by ordering a battery of tests and hoping for a 'positive.' On the flip side, it is not uncommon to allow a 'negative' work-up to halt a thorough search for the right diagnosis. It is not uncommon to see a patient with chest pain discharged after 3 sets of negative enzymes and a negative stress only to be left wondering 'Well, why am I having chest pain then?'"

**“A robot can’t do it, but neither can an idiot. It takes skill and knowledge.”**

**Emergency medicine physician  
New York**

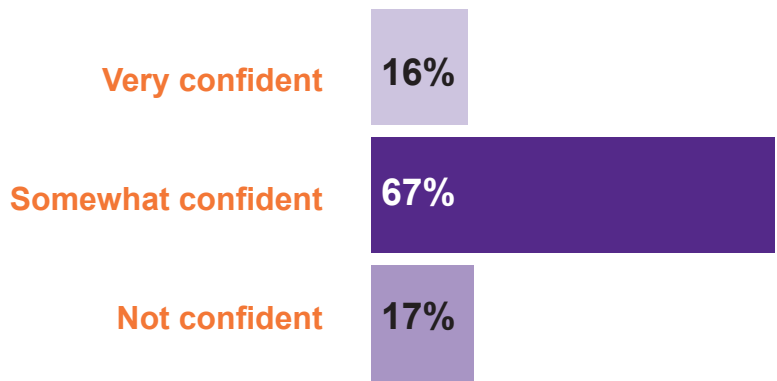


# Potential Solutions

As the patient safety field continues to mature and evolve, so too will approaches to preventing diagnostic errors. Potential solutions range from systems-based tools, such as computerized decision support, to cognitive training that aims to actually improve the way clinicians think about diagnostic challenges.

When asked about efforts to change the way doctors think, e.g., cognitive debiasing or asking themselves, “What else could this actually be?” when making a diagnosis, respondents expressed at least some degree of confidence that such efforts will help—the majority (67%) said they were somewhat confident, while 16% said they were very confident. Only 17% were not confident at all (Fig. 9).

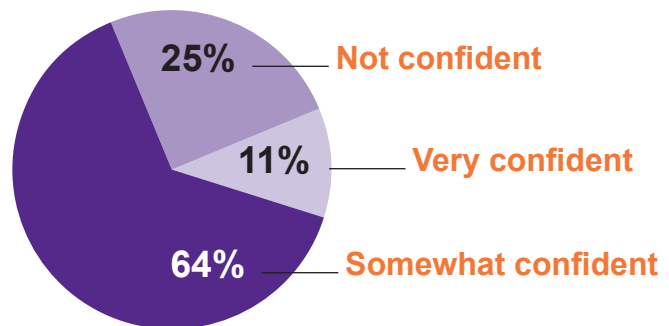
**Fig. 9:** How confident are you that efforts to change the way doctors think will help?



N = 6369  
Source: QuantiaResearch www.quantiamd.com

Clinicians were slightly less confident about decision-support tools and artificial intelligence aids—25% of respondents described themselves as “not confident.” Still, the majority (75%) were at least somewhat confident that such methods could help prevent diagnostic errors in the future (Fig. 10).

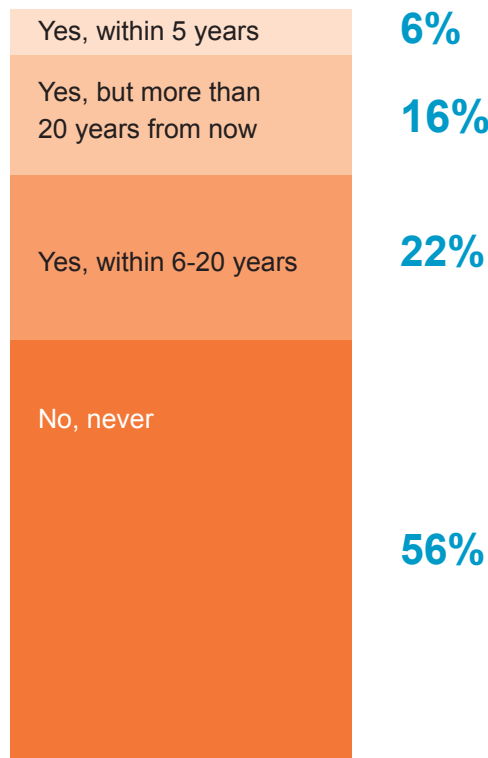
**Fig. 10:** How confident are you that new computerized decision-support tools and artificial intelligence aids will help reduce diagnostic errors?



N = 6367  
Source: QuantiaResearch www.quantiamd.com

Respondents also weighed in on whether a medical version of IBM’s artificial intelligence computer system, named Watson, could ever replace most of what a physician does in terms of medical diagnosis. Forty-four percent of respondents said yes, but varied on how long it would take for such technology to develop — of those who said “Yes,” most said it would be 5-20 years to develop such technology (Fig. 11). The majority of respondents, 56%, said such a system could never replace the physician’s role in diagnosis.

**Fig. 11: Do you believe that Watson will be able to replace most of what a physician does in terms of medical diagnoses?**



N = 6366  
Source: QuantiaResearch [www.quantiamd.com](http://www.quantiamd.com)

“**Medicine is NOT black and white. Experience is key to learning the art of medicine. Medicine is life-long learning and, as humans, we’ll make mistakes and try to improve daily.**”

**Internal medicine physician  
Florida**

“**Twenty-two years of practice brings me to the realization that computers and algorithms are not yet as suited for this as a well-trained human brain.**”

**Hospitalist  
Washington**

# Future Approaches

In the QuantiaMD series, *Preventing Diagnostic Errors*, Wachter and his expert faculty discuss the current thinking around misdiagnosis, including current and future approaches to overcome many of the challenges identified in this study and elsewhere.

In *Diagnostic Errors as a Patient Safety Issue*, Wachter makes the case for diagnostic errors to get the respect they deserve in the patient safety field, taking their place among other well-established sources of preventable harm. “Diagnostic errors are at least as important, if not more important, a problem than medication errors in the field of patient safety,” says Wachter.

David Bates, MD, MSc, Chief of General Internal Medicine at Brigham and Women’s Hospital in Boston, discusses the importance of creating more reliable systems in *Diagnostic Errors and Systems in Health Care*. “Too often we’ve had this notion

of someone like Marcus Welby or House who comes in and makes a heroic diagnosis. That’s not the way things should work. It should be something that is done routinely, and I believe that that’s possible with changes in the systems of care that we deliver.”

The full list of topics and faculty for QuantiaMD’s Expert Practice Series, *Preventing Diagnostic Errors*, includes:

- ▶ **Diagnostic Errors as a Patient Safety Issue**—Robert M. Wachter, MD, Professor and Associate Chairman, Dept. of Medicine, University of California, San Francisco
- ▶ **The Many Faces of Diagnostic Errors**—Gordon Schiff, MD, Associate Director of the Brigham Center for Patient Safety Research and Practice, Associate Professor of Medicine, Harvard Medical School
- ▶ **Diagnostic Error and Systems in Healthcare**—David W. Bates, MD, MSc, Chief, Division of General Internal Medicine, Brigham and Women’s Hospital
- ▶ **Ambulatory Misdiagnosis: Challenges and Opportunities**—Tejal Gandhi, MD, Director of Patient Safety, Partners Healthcare, Associate Professor of Medicine, Harvard Medical School
- ▶ **Cognitive Errors and Misdiagnosis**—Patrick Croskerry, MD, PhD, Professor, Department of Emergency Medicine, and Division of Medical Education, Faculty of Medicine, Dalhousie University
- ▶ **Improving Diagnostic Reasoning**—Gurpreet Dhaliwal, MD, Associate Professor of Clinical Medicine, University of California San Francisco
- ▶ **Artificial Intelligence and the Future of Diagnostics**—Herbert S. Chase, MD, Professor of Clinical Medicine in Biomedical Informatics, Columbia University, College of Physicians and Surgeons, New York, NY
- ▶ **Policy Approaches to Diagnostic Errors**—Robert M. Wachter, MD, Professor and Associate Chairman, Dept. of Medicine, University of California, San Francisco

Join thousands of your colleagues and learn about Preventing Diagnostic Errors on QuantiaMD or visit <http://quantiamd.com/home/diagnosticerrors>.



# Methodology & Demographics

“Physician Perspectives on Preventing Diagnostic Errors” is an independent study. Our survey was fielded between June 14, 2011 and July 22, 2011 on QuantiaMD, the leading mobile and online physician community. Physicians were invited via email to participate in the study. Among our 6,408 respondents, a majority (72%) were MDs or DOs, 16% were nurse practitioners, and 8% were physician assistants. Our respondents represent a mix of practice types in both inpatient and outpatient settings, representing a cross-section of U.S. geography (Fig. 12).

Fig. 12: Demographics of Clinician Respondents

## Primary practice setting (% of respondents)



## Geography (% of respondents)



## Clinician type (% of respondents)



N=6408  
Source: QuantiaResearch www.quantiamd.com

“The time has come to elevate the issue of diagnostic errors to its due place in the patient safety field.”

Robert M. Wachter, MD



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