



## EDUCATION

### Another Milestone: A Special Issue

By Paul L. Epner, MBA, MEd

The Society to Improve Diagnosis in Medicine is known for actions that belie its small size. Whether catalyzing and funding an Institute of Medicine report,<sup>1</sup> building a coalition of 34 major organizations, driving national health-care policy, engaging with the World Health Organization, or hosting events across the world, the list goes on.

SIDM’s Board of Directors has established strategic priorities that include research, education, practice improvement, and patient engagement, and the organization has active, volunteer committees working in each of those domains. Additionally, as of January 1, 2017, SIDM has had staff members engaged in each of those areas.

The energy of this community of volunteers and staff members and their dedication to SIDM’s mission is remarkable. That mission is to create a world where no patients are harmed by diagnostic error. But doing is not enough; we must share what we and others are doing to yield greater impact. In 2017, SIDM adopted the publication *Diagnosis* as its peer-reviewed journal. We are increasing our presence on social media. And we are expanding our newsletter, *ImproveDx*, to include information from our partners in the Coalition to Improve Diagnosis,

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## Reforming Medical Education and Improving Diagnosis

By Michael H. Kanter, MD, and Jung G. Kim, MPH, CPH

In *Improving Diagnosis in Healthcare*, the Institute of Medicine (IOM; now the National Academy of Medicine) reported the frequent occurrence of misdiagnosis and patient harm, which escalated calls to improve clinical reasoning in practice.<sup>1</sup> A key recommendation from the book is to improve diagnosis during healthcare professional training. Preliminary evidence suggests that physicians tend to practice

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in a style similar to how they were trained.<sup>2</sup> Regardless of the content of their formal education, they pick up the culture of the institution. Research suggests that physicians are not deficient

in their knowledge of objective clinical information but rather their clinical decision-making skills in the practice setting.<sup>2</sup> The implications of this finding highlight the fact that clinical practice imprints characteristics outside of the formal curriculum. Moreover, although much of a physician’s diagnostic skill is acquired in residency and ongoing practice, undergraduate medical education (UME) plays a vital role in developing diagnostic competence. It contributes to each physician’s understanding science that is foundational to developing cognition capacity for reliable diagnosis, fostering habits of lifelong learning with respect to diagnostic errors, and learning just culture and systems thinking.

Efforts to reform UME curricula to better prepare future physicians to practice in the demanding US healthcare system have escalated in recent years.<sup>3</sup> Reforms seek to address fragmentation, a key characteristic of UME. Academic institutions and healthcare systems continue to grow and become more complex, but curricular fragmentation can be attributed primarily to the 1910 Flexner Report that separated foundational sciences from clinical experience.<sup>4</sup> The American Medical Association has created the Accelerating Change in Medical Education Consortium, a 32-medical school collaboration working on designing the “medical school of the future.”<sup>5</sup> Some members include newly founded schools not tied to historically entrenched patterns of fragmentation in educational experiences that have persisted for years.

### Kaiser Permanente School of Medicine

The Kaiser Permanente School of Medicine (KPSOM), scheduled to admit its first class in 2019, is one such school.<sup>6</sup> The KPSOM will be embedded in the Kaiser

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Permanente (KP) integrated healthcare delivery system, offering students continuous learning experiences that simultaneously teach foundational sciences and the clinical microsystem while connected and informed by the broader healthcare macrosystem. The school's curriculum architecture is designed to prepare students for graduate medical education (GME) in a way that reduces diagnostic errors via 4 key features:

- mitigating the hidden curriculum
- teaching competency-based health systems science
- teaching systems innovations
- delivering education via a longitudinal, integrated curriculum

Existence of a “hidden curriculum”—when what students learn is different from what is taught—consistently challenges medical education.<sup>7</sup> Students may master didactic learning, including the components of cognitive errors—creating complete differential diagnosis, utilizing checklists, leveraging the healthcare team, and understanding the consequences of premature closure of the patient encounter—but in most UME settings, the clinical microsystem conflicts with what students are learning in the classroom.<sup>8</sup>

Thus, students may “unlearn” by observing clinical supervisors practicing in ways that conflict with the student's didactic learning.

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A key advantage of a medical school that incorporates a medical group within an integrated delivery system is self-governance, where the faculty and medical group administration are integrated and aligned. Implementing improvements in the delivery system fosters alignment between the formal UME curriculum and practice. And the commitment of the delivery system to reducing diagnostic errors and improving the reliability of clinical reasoning will be more aligned with a curriculum designed to teach diagnostic reasoning. Hence, at the KPSOM, clinical experience practice sites and their associated faculty will be more concordant with students' didactic learning, reduce fragmentation, and imprint practice behavior that aligns with the formal curriculum.

## Health Systems Science

Another important way medical schools can improve diagnostic precision and reliability is to use health systems science (HSS) to align

learning components to the larger healthcare system. In what is traditionally known as systems-based practice, medical education has struggled to teach the competencies of health systems science due to its heterogeneous definition and lack of experiential opportunities.<sup>9</sup> As a result, healthcare systems often miss opportunities to mitigate diagnostic errors and improve the quality of their practice.<sup>1</sup> It becomes imperative that medical schools teach students about performance improvement and elements of practice transformation, such as patient safety fundamentals, rapid cycle improvement, quality measurement, and multidisciplinary teamwork. Robust HSS learning experiences are a key design feature of the KPSOM curriculum. HSS content will be taught as a third science, interwoven with foundational science and clinical experience over 4 years of training, culminating in a required HSS/quality improvement capstone project.

No delivery system has solved the issue of diagnostic error; nonetheless, medical students immersed in practice will be able to observe and participate in quality improvement projects related to decreasing diagnostic error. The advantage of this will be to expose students to system innovations that support the diagnostic process and improve patient outcomes. KP has developed robust systems to address care gaps. Those efforts include addressing failure to follow-up abnormal test results, leveraging the health system and technology to generally address diagnostic reliability, and creating a centralized reading center for diabetic retinal imaging, which reduces interpretation variation and improves accuracy.<sup>10-13</sup> Ensuring that medical students participate in systematic efforts to reduce diagnostic error will increase their understanding of the importance of a systematic approach and how it is modeled in practice. That will also usher in a critical component that facilitates modern education theories, such as adult learning.<sup>14</sup>

Consistent with modern education theories that emphasize continuity, immersing students in an integrated healthcare system also informs the design of the KPSOM learning experiences.<sup>15</sup> While most medical schools have a time-based block curriculum that fragments learning and prevents continuity of instructors or mentors, the KPSOM will have individual faculty members who mentor each student on their progress, including their diagnostic reasoning skills. Students will also have continuity with patients across the training period, observing and learning how symptoms evolve over time, how a diagnosis

***There is no magic bullet that will radically change the way future physicians practice***

and related diagnostic tests require follow-up, and how misdiagnosis impacts patients. There is no magic bullet that will radically change the way future physicians practice. That will require a learning health system committed to patient safety and reducing diagnostic errors. The health system must also be aligned with formal UME teaching designed to improve diagnostic processes and reasoning over the medical education continuum.

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*Jung Kim is a member of the Kaiser Permanente School of Medicine Planning Committee.*

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# Dx: Diagnostic Excellence

## *Improving Diagnostic Safety Through Medical Education*

*By Andrew P.J. Olson, MD, FACP, FAAP*

Diagnostic errors are common, costly, and deadly. However, most practicing clinicians only learn about diagnostic errors when they encounter errors in practice, not during their formal medical education. To address this education gap, the Society to Improve Diagnosis in Medicine (SIDM) partnered with MedU, a non-profit consortium of medical educators committed to innovation through virtual learning, to create the Dx: Diagnostic Excellence Project. The project is a series of 6 online virtual patient cases that address the foundational aspects of diagnostic

error and safety, including the definition of diagnostic error, its causes and effects, and strategies to improve diagnostic accuracy and safety. Given that this initiative was specifically designed to address the aforementioned gap, an entirely new curriculum was developed and is now freely available for public use.

When the project began, Drs. Gurpreet Dhaliwal, Robert Trowbridge and I obtained a pilot grant from the Alliance for Academic *continued on page 6*

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# Multi-year Collaborative Develops Curriculum for Diagnosis

By Mark L. Graber, MD,  
and Diana Rusz, MPH

The 2015 report *Improving Diagnosis in Health Care*<sup>1</sup> concluded that most people will experience at least one diagnostic error in their lifetime, sometimes with devastating consequences. Improving diagnostic safety will require changes to medical practice and the collaboration and commitment of healthcare professionals and organizations, as well as patients and their families to address the problem. One key recommendation from the report is to focus on education, so that the next generation of health professionals will be better able to steer clear of diagnostic errors.

The Society to Improve Diagnosis in Medicine (SIDM) accepted the challenge to develop new

*With funding from the Josiah Macy Jr Foundation, SIDM is developing a set of curriculum competencies focused on diagnosis and diagnostic error.*

educational programs aimed at improving the diagnostic process. With funding from the Josiah Macy Jr Foundation, SIDM is developing a set of curriculum competencies focused on diagnosis and diagnostic

error. This effort is being conducted in collaboration with 4 medical schools, the American Association of Medical Colleges, and a number of medical professional boards and societies, including the American Medical Association, the Alliance for Academic Internal Medicine, the American Board of Internal Medicine, the American Board of Medical Specialties, the American Board of Emergency Medicine, the Accreditation Council for Graduate Medical Education, the American College of Osteopathic Medicine, and the American Association of Colleges of Nursing.

In this first of 3 years of the grant, SIDM is working with the partner schools and with expert advisors in medicine, nursing, dentistry, and other clinical fields to determine what competencies are needed for safe and effective diagnosis.

In year 2, the project team will develop recommendations on how to incorporate the new curriculum in both undergraduate and postgraduate training and how to evaluate competency. In year 3, the project will pilot the curriculum at each of the 4 participating medical colleges: The University of Minnesota, University of Texas Medical Branch at Galveston,

the University of North Carolina, and the Dell Medical School (University of Texas at Austin).

The curriculum will include new content for the classroom and in clinical teaching settings. For example, new tools, resources, and learning experiences will help trainees recognize situations that are predisposed to diagnostic error. The training will have an interprofessional focus, so that everyone who touches the patient understands his or her role in promoting diagnostic quality and safety and the advantages of working as a team.

This project is unique because currently, most schools do not offer a course that focuses on diagnosis. Students learn by observing and working with faculty members. The new curriculum will be designed to complement this apprenticeship type of training by specific teaching on how diagnostic errors arise, how they can be prevented, how to work and communicate more effectively with other health professionals, and how to get better feedback on diagnostic performance. The curriculum will address both the cognitive shortcomings associated with diagnostic error, as well as the system-related flaws that are so commonly identified, such as breakdowns in communication and care coordination.

The curriculum will also focus on including the patient as an effective partner in the diagnostic process. In the end, this is all about the patient. If we can help health professionals recognize that errors occur and learn how to avoid them in the future, patient safety and outcomes will ultimately improve.

The new curriculum will also complement the efforts of the SIDM Education Committee, which has focused on improving education on clinical reasoning. The Clinical Reasoning Toolkit on the SIDM website (<http://www.improvediagnosis.org/page/ClinicalReasoning>) provides a number of valuable resources for clinical educators.

*Mark Graber is president of the Society to Improve Diagnosis in Medicine, senior fellow at RTI International, and professor emeritus at Stony Brook University.*

*Diana Rusz is a research associate at the Society to Improve Diagnosis in Medicine.*

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## Subcommittees Develop and Refine Resources and Tools

The Education Committee of the Society to Improve Diagnosis in Medicine (SIDM) continues to actively and productively engage in improving education about diagnostic safety across the continuum of medical education. The committee, which I co-chair with Gurpreet Dhaliwal, is comprised of 5 subcommittees (each with a chairperson) focused on specific initiatives. The subcommittees work semi-autonomously, under the umbrella of the Education Committee and the guidance of the co-chairs. An update about each of the subcommittees' work follows.

The **Assessment of Reasoning Tool Subcommittee**, led by Satid Thammasitboon, is developing and validating a tool to reliably assess residents' clinical reasoning skills through their oral presentations. Oral presentations, typically given during rounds in the hospital or during or after a clinic visit, are an opportunity to assess how a resident gathers, analyzes, and synthesizes clinical information in order to arrive at a high-value diagnostic and treatment plan. For the tool to be effective, Thammasitboon's team is in the process of developing 5 faculty development videos that briefly describe the concepts assessed in the tool as well as the characteristic behaviors of high-performing learners. The tool has been developed, and the videos will be ready for release at the 10th Diagnostic Error in Medicine conference in October 2017. Frontline educators and educational organizations will find the tool to be an important next step in the assessment of clinical reasoning.

The **Maintenance of Certification (MOC) Subcommittee** is led by James Reilly and is partnering with the American College of Physicians to develop 5 educational modules about diagnostic safety and error. The modules are designed for practicing clinicians who want to learn more about this important topic while earning credit toward MOC. Many efforts focus on undergraduate and graduate medical education. This initiative for clinicians already in practice fills an important gap and has the potential for far-reaching impact. The modules are currently in the final stages of editing and will be available for public use later in 2017.

The **Fellowship Subcommittee** is led by Karen Cosby and is focused on developing the next generation of experts in diagnostic safety, including researchers, clinicians, and educators. The inaugural class of fellows included Janice Kwan, Ava Lieberman, and Benji Mathews. Each fellow participates in a series of interactive webinars with international experts in key realms of diagnostic safety, including education, practice, and research. They are also paired with an expert mentor to design and conduct a project in their area of interest and are expected to participate in the SIDM Research Summit at the annual DEM conference. All three current fellows have been successful in their projects and are well-positioned to continue productive academic careers in diagnostic safety. Fellows for the 2017-2018 academic year—Paul Bergl, Najlla Nassery, and Thilan Wijesekera—are currently being paired with SIDM mentors and beginning to select projects.

Led by Geeta Singhal, the **Toolkit Subcommittee** is working to refine and renew the Clinical Reasoning Toolkit currently

available (with other resources) on SIDM's website (<http://www.improvediagnosis.org/page/ClinicalReasoning>). The subcommittee's goal is for the Clinical Reasoning Toolkit to be the "go-to" home for medical educators and other interested individuals looking for foundational and advanced information about diagnostic reasoning. The toolkit is designed to offer practical curricular resources and empower educators to be local champions for diagnostic safety. The subcommittee has analyzed existing resources and is currently creating a new format that will allow the toolkit to be easily accessed and updated as new resources become available. The toolkit update should be unveiled later this year.

With these projects, plus the **Dx: Diagnostic Excellence** project (page 3), SIDM's Education Committee is impacting diagnostic safety across the continuum of medical education.

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## Another Milestone: A Special Issue

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showcasing what they are doing to move our mission forward.

This issue of *ImproveDx* marks another milestone: our first special issue. In addition to 6 bimonthly issues, we will publish occasional special issues focused on a specific topic. Where better to start than with education? Led by co-chairs Gurpreet Dhaliwal and Andrew Olson and immediate past-chair Bob Trowbridge, SIDM's Education Committee has put tremendous energy into delivering substantive achievements, such as 6 online courses now available on the Med-U website (see page 3).

Through his "day job," Michael Kanter, chair of SIDM's Practice Improvement Committee, has been engaged in envisioning how principles of diagnostic safety will inform the creation of the new medical school at Kaiser Permanente (see page 1).

With funding from the Josiah Macy Jr Foundation, SIDM is developing a curriculum focused on competencies in diagnosis and improving diagnostic error. As Mark Graber and Diana Ruzs report (page 4), 4 medical schools and numerous medical professional boards and societies are collaborating with SIDM on that effort.

So much is happening; we are excited to be sharing just a small part of it in this special issue. We look forward to your comments and hope you will join us by becoming a member, attending a conference, or participating on social media. Please visit [www.improvediagnosis.org](http://www.improvediagnosis.org) to learn more.

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# Dx: Diagnostic Excellence

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Internal Medicine to develop the first prototype case. This online virtual patient case engages learners in the care of a patient with a missed diagnosis of colon cancer, inviting learners to consider why such errors occur and how clinicians may miscalibrate in response to diagnostic errors.

Next, SIDM and MedU obtained a grant from The Doctors Company Foundation to develop, implement, and evaluate the remainder of this innovative curriculum. A writing conference was held at the University of Minnesota in July 2015 during which experts in diagnostic error and medical education collaborated to develop relevant, high-quality case scenarios based on learning objectives previously developed by the SIDM Education Committee. Subsequently, the cases were refined and multimedia elements, including audio and video recordings as well as still images, were created. A pilot study focusing on student perceptions of the cases' content and relevance was conducted in internal medicine clerkships at the University of California, San Francisco;

Maine Medical Center/Tufts University; and the University of Minnesota. The findings of this pilot study were presented at the 9th Diagnostic Error in Medicine conference in poster form<sup>1</sup> as well as in an oral presentation by Rabih Geha, resident in internal medicine at the University of California, San Francisco. This pilot study determined that students find education about diagnostic error relevant and important and also that nearly all students are able to identify situations similar to the virtual patient case in their own—still limited—experience.

The next phase of the project was to implement the entire curriculum, including the 6 main cases as well as multiple accompanying mini-cases designed to emphasize each cases' learning points at 6 medical schools and 1 nurse practitioner program in the context of a prospective educational study. It became clear early in this phase of the project that the success of educational materials focused on improving diagnostic safety requires high-quality, accessible accompanying materials that allow local educators to integrate the content

into their existing educational programs. Educators implemented the curriculum at different points in medical education, including pre-clinical education, as part of longitudinal integrated clerkships, and as part of longitudinal courses during students' clinical years. The results of this study, including changes in learners' knowledge and attitudes, as well as faculty perceptions of the program, will be available this fall.

Each of the virtual patient cases describes the diagnostic journey of a patient and how diagnostic errors affect patients and families, the healthcare system, and healthcare providers. The diagnoses in the cases are intentionally neither rare nor elusive, and the clinical situations portrayed are relevant for all clinicians in practice.

The cases are freely available for use by students, educators, and clinicians. More information can be found at <https://www.med-u.org/diagnostic-excellence>.

*Andrew Olson is co-chair of the SIDM Education Committee. He is assistant professor at the University of Minnesota Medical School and the director of the Subinternship in Critical Care Clerkship as well as the Becoming a Doctor Course. Olson may be contacted at [olso5714@umn.edu](mailto:olso5714@umn.edu).*

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**SOCIETY TO IMPROVE DIAGNOSIS IN MEDICINE**

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