



COALITION TO IMPROVE DIAGNOSIS

## Redesigning Radiology to Improve Diagnostic Safety

The Agency for Healthcare Research and Quality (AHRQ), a government partner to the Coalition to Improve Diagnosis, is the lead federal agency investing in research to improve diagnostic safety. It has been an early supporter of, and provided conference grants to, the Society to Improve Diagnosis in Medicine. More broadly, the Agency invests in research to advance the knowledge of diagnostic accuracy and timeliness and to develop practical tools and resources to improve diagnostic safety.

As part of its work in improving diagnosis, AHRQ is funding Patient Safety Learning Laboratories, which are using a systems engineering approach to evaluate clinical processes and information flow to improve patient safety. One of these projects is the Patient Imaging Quality and Safety Laboratory, or PIQS Lab, which brings together clinicians in the Departments of Population Health, Radiology, Emergency Medicine, Medicine, Orthopedics, Surgery, and Oncology at New York University (NYU) with operation, human factors, and management experts at NYU Langone Medical Center, NYU Wagner School of Public Policy, and NYU Stern School of Business.

PIQS Lab has 3 primary goals:

- Redesign the radiology ordering process in the outpatient setting to minimize inappropriate or unnecessary radiology tests.

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## Diagnostic Error: Learning From the Past and the Present

By Susan Carr  
Editor, ImproveDx

Learning what causes patient harm and figuring out how to prevent it has been an essential patient safety tactic for nearly 20 years. When something bad happens that shouldn't have—*preventable harm*—or nearly happens—*close call or near miss*—people work hard to figure out why and take action to avoid recurrence. Learning in that way, from past experience, has value but should not be relied on alone to improve the safety of healthcare, including diagnosis.<sup>1,2,3</sup>

Learning is fundamental to patient safety. In addition to learning from past events, experts recommend health systems become “learning organizations” to look forward, to continually improve safety and performance.<sup>4,5</sup> Reporting and analyzing adverse events, however, remains the primary way that organizations address medical errors and attempt to improve practice and make care safer.

*Despite significant gains, many involved in patient safety express disappointment and frustration with the slow pace of progress.*

Despite significant gains, many involved in patient safety express disappointment and frustration with the slow pace of progress.<sup>6,7,8</sup> Well-known, accepted tactics for improving patient safety, such as incident reporting, root cause analysis (RCA), and implementing Just Culture fall short of expectations.<sup>2,6,9</sup> Failing to learn from

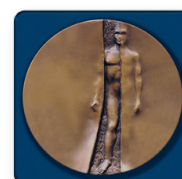
adverse events or to spread lessons learned are especially frustrating.

Members of SIDM's Listserv recently discussed pathology errors reported in the media and thought the hospital's analysis and response seemed shallow. SIDM President Mark Graber, MD, commented, “The news is juicy, but the learning is nil” (SIDM Listserv, May 1, 2018). Later

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# Diagnostic Error: Learning From the Past and the Present

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he observed that opportunities for physicians to learn from adverse events in their own organizations are limited, and there is little learning shared among organizations. He applauds The Joint Commission's series of *Sentinel Event Alerts* as a "bright spot" of learning although the alerts rarely address diagnostic issues (written communication, June 2018).

Diagnosis suffers from learning gaps that are common in patient safety. However, it offers unique opportunities and challenges, given the need to understand the cognitive contributions to the process, in addition to system-related, organizational causative factors.<sup>10</sup>

## Incident Reporting — Required but not Sufficient

The presence of an incident reporting system implies an organization's willingness to learn. As reports come in and databases grow over time, reporting systems also provide trends and benchmarks for safety across organizations and the industry.

But the lessons learned from incident reports are limited and skewed. Reporting systems, even at the most enlightened organizations, capture only a small fraction of the events that happen and cannot accurately reflect the range of events that occur.<sup>1,2,11</sup> Some events—falls, for example—are more likely to be reported than others, such as diagnostic error.<sup>2</sup> Nurses are more likely to report than physicians.<sup>2</sup> Speaking at the IHI/NPSF Patient Safety Congress, Kaveh Shojania, MD, revisited the fable that describes blind men experiencing an elephant—each in his own way, according to his limited experience—as a metaphor for the fragmented and partial information afforded by incident reporting.<sup>11,12</sup>

The investigation process, including RCA, that follows incident reporting is another potentially valuable learning tool not always used to best effect.<sup>3</sup> Too often, the lessons learned are applied with ineffective techniques,<sup>13</sup> and analysis of past events is always vulnerable to hindsight bias. Commenting on the effect of learning from past failures, Kerm Henriksen, PhD, and Jeff Brady, MD, observe that "close the barn door" appears on the checklist once the horse has bolted.<sup>10(pii4)</sup>

## Feedback and Reporting

Relaying information back to a physician or team

that delivered an incorrect diagnosis or missed one entirely is another form of learning, one that rarely occurs. Patients don't return to the original physician, time has passed, everyone is busy and people feel awkward are among the reasons why physicians don't get the feedback they need to learn from their mistakes.<sup>14</sup>

Feedback about diagnoses tends to be more personal in both the giving and receiving and, unlike incident reporting, falls within the concept of professional performance:

*As professionals, clinicians must be supported in fulfilling their duty to self-regulate by receiving effective feedback and endorsement for practice-based learning.*<sup>14(np)</sup>

Done correctly, this kind of reporting and feedback should happen "in parallel with systems-levels processes to reduce the risk of future errors,"<sup>15(np)</sup> and become a routine source of learning.

Another chance to discover misdiagnoses—autopsies—has virtually disappeared.<sup>16</sup> Reflecting on the unique power of an autopsy, Graber says,

*There was no lesson more powerful about the ever-present risk of diagnostic error than to discover one when your patient went to autopsy; nothing has replaced that kind of learning (written communication, June 2018).*

## Learning From Experience, in Real Time

There are other ways to learn from experience. In some industries, safety experts examine processes that go well, looking for lessons about performance and safety. Studying what contributes to successful operations may be more fruitful than traditional "find and fix,"<sup>17(p10),18(p443)</sup> methods that focus on past failures, especially when applied to complex, dynamic processes such as diagnosis. This more proactive approach is used in resilience engineering,<sup>17</sup> high reliability,<sup>18</sup> and Safety-II<sup>15</sup> (referred to here collectively as Safety-II).

Clinicians and educators in Scotland were attracted to this perspective, "...a new way of thinking about safety...which moves beyond viewing safety through the lens of problems, error and failure."<sup>18(p443)</sup> Hoping to achieve safety rather than find and fix problems, they applied Safety II to primary care practice. They offer driving a car as example of humans performing

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	Safety-I	Safety-II
Definition of safety	That as few things as possible go wrong.	That as many things as possible go right.
Safety management principle	Reactive, respond when something happens or is categorized as an unacceptable risk.	Proactive, continuously trying to anticipate developments and events.
View of the human factor in safety management	Humans are predominantly seen as a liability or hazard. They are a problem to be fixed.	Humans are seen as a resource necessary for system flexibility and resilience. They provide flexible solutions to many potential problems.
Accident investigation	Accidents are caused by failures and malfunctions. The purpose of an investigation is to identify the causes.	Things basically happen in the same way, regardless of the outcome. The purpose of an investigation is to understand how things usually go right as a basis for explaining how things occasionally go wrong.
Risk assessment	Accidents are caused by failures and malfunctions. The purpose of an investigation is to identify causes and contributory factors.	To understand the conditions where performance variability can become difficult or impossible to monitor and control.

**Table 1.** Overview of Safety-I and Safety-II<sup>17(np)</sup>

in another complex, adaptive system. Writing a precise script for driving safely through traffic, weather, detours, time pressures, and so on would be nearly impossible:

*Constant adjustment is required to adapt performance to the changing and unexpected conditions... [drivers] learn from these experiences and so in future find it easier to monitor, anticipate and adapt.*<sup>18(p445)</sup>

Safety-II recognizes that humans both make mistakes and, much more commonly, adjust their actions to perform safely in systems that are hazardous and constantly changing. In addition to generating errors, humans generate safety by evaluating and adapting their work to immediate conditions and current information. Understanding that both the circumstances and workers are fluid components in systems, Safety-II emphasizes learning about and from work as actually performed vs work as imagined; work in the messy real world vs work in an ideal environment.

In the film *Safety Differently* (<http://www.safedifferently.com/safety-differently-the-movie/>), Sidney Dekker, PhD, describes a counter-intuitive approach to improving the operation and safety of a busy square in the Netherlands. Traffic was controlled by barriers, stop lights and other traditional

tools of traffic control, but the square continued to have a high rate of accidents. After a traffic management professional removed all of those controls, drivers had to rely on situational awareness and experience (plus perhaps a bit of luck), and safety improved. Dekker observes, “You make things look riskier, and you actually get safer behavior.” That approach to safety may not translate seamlessly to medicine, but it seems clear that trying to constrain and regulate medicine into safe practice may also limit learning.

## Safety I + II

Safety-II complements rather than replaces Safety-I and shares with Safety-I a commitment to learning from adverse events<sup>17</sup> (Table 1). Safety-II emphasizes the value of frequent, reports about even apparently inconsequential events, looking for trends and patterns that may foretell ominous events to come. In Safety-II, timely incident reports provide surveillance of systems in addition to information about events in the past. This approach to surveillance and reporting is consistent with the high-reliability principle of “preoccupation with failure,”<sup>20</sup> which encourages continual curiosity and learning. Weick & Sutcliffe upend a commonly used phrase and apply it to high reliability, saying, “No news is bad news. All news is good news.”<sup>20(p152)</sup> News and reports in the context of diagnosis become feedback for clinicians about their own performance as well as that of their colleagues and the system.

## Learning on the Front Line

Applying the principles of Safety-II to diagnostic error begins in a familiar way. The organization’s culture must foster honesty, openness, and trust across all members of the professional and support staff. The focus, however, shifts from using that openness to explore the past to include discovery of the circumstances and processes of current work. Focusing on how work is done now and what contributes to its success may help avoid the common Safety-I problem of looking for someone to blame for past failures. Similarly, simulation can be used to explore variability in performance in positive as well as negative ways and to learn how to accept and manage uncertainty.<sup>18</sup>

The shift to Safety-II, which Graber describes as a “breath of fresh air” (written communication, June 2018), is both subtle and deep. Using safety in drug manufacturing as an example,



Gordon Schiff and Elise Ruan describe a similar re-focusing of attention to the front line. Until recently, drugs were inspected after manufacturing to ensure the final product “conformed to strict standards”<sup>21(np)</sup> A newer approach, continuous process verification, monitors the manufacturing process and catches deviations in real time. Applied to clinical care,

... this concept of ensuring quality by creating a culture where front line staff, rather than external inspection or metrics, [are] the key to safe diagnosis.<sup>21(np)</sup>

Consistent with Safety-II, Schiff and Ruan describe a front-line culture that recognizes the value of understanding work as it is actually done and the resilience and resourcefulness of a workforce that learns in real time.

Safety II remains largely aspirational in that few if any hospitals and practices have employed this approach to learning. As the safety movement matures past current frustrations and deepens its commitment to improving diagnosis, Safety II may prove to be a useful approach.

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Mark your calendar, and plan to attend the **Diagnostic Error in Medicine 11th Annual International Conference** in New Orleans, LA. The Diagnostic Error in Medicine International Conference will provide the latest data, research and information to support our collective efforts to improve the diagnostic process. This year's program will continue to reflect our commitment to bring together all involved in diagnosis — physicians, healthcare team members, administrators and patients — with a special emphasis on the trends and quality improvement activities that are driving innovation.

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# Redesigning Radiology to Improve Diagnostic Safety

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- Redesign the inpatient interventional radiology process to improve patient safety.
- Enhance the follow-up of radiology test results to improve patient outcomes.

Leora Horwitz, MD, associate professor of population health and medicine, and director of the Center for Healthcare Innovation and Delivery Science at NYU Langone, is the principal investigator on the project. She explained that the 3 components are designed to rethink how physicians and radiology services work with each other across the continuum, from ordering to testing to follow-up. For example, the PIQS lab is looking at the process of ordering CT scans for pulmonary embolism in the emergency room.

Horwitz says that to help clinicians better assess patient risk, the PIQS Lab developed an automated scoring system that pulls together relevant information to categorize and communicate patient risk. The system both frees clinicians from having to re-input chart data and pops up with additional suggestions for alternative actions (eg, try this blood test) when a CT scan isn't recommended. Clinicians who disagree with the score can then input the reason for ordering a test anyway (eg, family history) so the PIQS Lab team can understand clinicians' thinking and why certain scans are being ordered.

In addition to the automated scoring system, PIQS Lab built a dashboard that compares individual physician performance to that of their peers. Horwitz describes the dashboard as a "behavioral economics intervention" that provides both peer pressure and concrete recommendations for clinicians who may be either ordering too many or too few procedures.

Horwitz also highlighted the team's work in standardizing interventional radiology protocols to help clinicians better prep their patients pre-test and provide the appropriate care post-test. The team discovered, for example, that while interventional radiologists were often writing good notes about what they did, none of it was helping physicians understand what they should do next. Unanswered questions remained, such as "Can my patient eat?" "When can my patient go home?" Standardizing the protocols and adding a consultation service have helped clinicians provide better pre- and post-procedural care for their patients.

In addition, the PIQS Lab is exploring how to make sure any recommended follow-up procedures from a radiology report are completed. As an example, Horwitz notes that a CT scan might find no blood clot but could instead discover a nodule that requires follow-up in 6 months.

## Every Voice Counts

Improving patient safety often demands multidisciplinary input (i.e., physicians, nurses, lab techs, transporters, front desk staff, patients, and families). Horwitz says that one of the PIQS Lab's early implementation failures occurred because an idea originated from only one clinician discipline, an observation that highlights the importance of taking into account a more complete representation of all clinicians affected by changes that are being considered.

In addition to direct observations, chart reviews, and interviews with clinicians and patients, the PIQS Team holds regular multidisciplinary design sessions. Each brainstorming session has resulted in dozens of ideas, and those ranked with the highest feasibility and impact are then piloted. The process of testing, iterating, and retesting continues as Horwitz and her colleagues look to improve diagnosis and patient safety. ■

*AHRQ has funding opportunities available to researchers working on understanding and improving diagnostic safety in ambulatory care. These include calls for research demonstration and dissemination projects on [strategies and interventions](#) and research project grants on [incidence and contributing factors](#) in diagnostic safety.*

The Society to Improve Diagnosis in Medicine recognizes corporate members and organizations that support the society and its mission of attaining better outcomes through better diagnosis.

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## SIDM Hosts Briefing for Congressional Staffers on Federal Funding for Research

By Lorie Slass  
Vice President, Marketing  
and Communications  
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*More than 40 Capitol Hill staffers attended the briefing; for many, it was the first time they were made aware of the significant harms and costs related to diagnostic error.*

Despite the fact that diagnostic error likely accounts for more patient harms than all other medical errors *combined*, federal investment in research to improve diagnosis amounts to about \$7 million per year, or just .02% of the total \$35 billion federal health research budget. The need for a more proportionate and robust response from the nation's health agencies was the topic of a briefing for congressional staffers on June 6, 2018. The briefing was co-sponsored by Senators Orrin Hatch (R-UT) and Sheldon Whitehouse (D-RI) and hosted by the Society

to Improve Diagnosis in Medicine (SIDM). More than 40 Capitol Hill staffers attended the briefing; for many, it was the first time they were made aware of the significant harms and costs related to diagnostic error.

The briefing was moderated by *New York Times* columnist Lisa Sanders, MD, who is also an assistant professor of medicine at Yale University School of Medicine. SIDM's CEO, Paul Epner, MBA, MEd, provided background on the importance of improving diagnosis and shared information about the scope and scale of diagnostic error in terms of lives lost and cost to the healthcare system. Helen Burstin, MD, CEO of the Council of

Medical Specialty Societies, discussed the significance of the broad-based Coalition to Improve Diagnosis, of which the Council is a member. Burstin provided examples of how physicians, patients, and healthcare leaders are becoming aware of this problem and are coming together to say, "We need to do more to prevent diagnostic errors and support clinicians and patients in coming to an accurate and timely diagnosis."

David-Newman Toker, MD, president-elect of SIDM, outlined a portfolio of opportunities to strengthen diagnostic research, including growing the number of fellowship opportunities, developing measures to drive both research and improvement, and specific areas where more study could bring promising solutions to scale.

### Briefing Highlighted Family Stories

Compelling stories from 3 families whose lives have been forever changed as a result of diagnostic errors formed the heart of the briefing. Sue Sheridan, director of patient engagement at SIDM, shared the [story](#) of how the failure to communicate her husband Pat's malignant pathology resulted in a deadly delay in his cancer diagnosis. Ciaran Staunton discussed how the red flags for his late son Rory's [sepsis](#) were missed on multiple occasions. Mick Night's son, John Michael, suffered nearly total debilitation from a [stroke](#), which could have been prevented with timely administration of a 1-cent aspirin. Too often, the signs of stroke are missed in young people.

The National Academy of Medicine has estimated that diagnostic errors likely will touch every American in their lifetime, sometimes with devastating consequences. Because research to improve diagnostic quality and safety is currently so underfunded, every dollar spent will produce huge returns on investment. According to the SIDM/Coalition Policy Committee's report, [RoadMap for Research: Policy Action](#), congressional action to fund and assure coordinated research activities across federal agencies could potentially save hundreds of thousands of lives and reduce healthcare costs by more than \$100 billion per year. ■

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