VIEWPOINT

The Evolution of the Master Diagnostician

Gurpreet Dhaliwal, MD
Department of Medicine, University of California, San Francisco; and Medical Service, San Francisco Veterans Affairs Medical Center.

Allan S. Detsky, MD, PhD
Institute of Health Policy, Management and Evaluation, Department of Medicine, University of Toronto, Toronto, Ontario, Canada; and Department of Medicine, Mount Sinai Hospital and University Health Network, Toronto.

Patients seek answers to 3 basic questions. What (if anything) is wrong with me? Is there any treatment that might make me better? Will I recover? A physician's ability to answer these questions requires skills as a diagnostician, therapist, and prognosticator. Excellent performance across all 3 domains separates great physicians from good ones, but among the triad, diagnosis is foundational. Without the correct diagnosis, proper therapy and accurate prognosis are rarely possible.

The crucible of cost-conscious, quality-oriented, and evidence-based care lies in the mind of the diagnostician who collects clinical data, orders tests, and interprets results. If educators overlook the central role that diagnostic expertise plays in making physicians choose wisely,[1] there is a real risk that diagnostic accuracy may be shuffled to the bottom of the deck in medical training, resulting in worse patient care. This Viewpoint draws inspiration from characterizations of the master diagnostician of the past, present,[2,3] and future and considers the ways in which medical care has, is, and will be structured to help physicians develop and optimize this fundamental skill.

The Master Diagnostician of the Past

This physician followed his large patient panel longitudinally for decades, in both the inpatient and outpatient settings, practicing both general medicine and a subspecialty. He had encyclopedic knowledge, with a knack for speaking about uncommon conditions—usually extemporaneously, without need to reference a text. His filing system for important articles was legendary, as was his ability to quickly retrieve just the right reference. He was frequently correct in his diagnostic hunches and was adroit at solving cases of fever of unknown origin or discerning myriad manifestations of tuberculosis and syphilis. His bedside teaching rounds were always a cognitive tour de force. He was the widely recognized doctor's doctor.

The Expert Diagnostician of Today

This physician is a pediatric hospitalist in practice for 12 years. She has superb communication skills with patients, families, and colleagues. When their own children are hospitalized, colleagues invariably request that she be the physician of record. She sees few patients again and seldom learns what happens following hospital discharge. She is able to explain her diagnostic reasoning to parents and trainees with alacrity. She can also quote likelihood ratios, relative risks, and numbers-needed-to-treat for a wide variety of physical findings, diagnostic tests, and therapies. She is facile in consulting Internet resources during busy clinical days to check and augment her knowledge, helping her diagnose newly recognized conditions such as anti-NMDA (*N*-methyl D-aspartate) receptor encephalitis or infrequently encountered diseases such as hemophagocytic syndrome. She finds the current literature on heuristics and biases interesting and recognizes these patterns of thought in other physicians and her trainees, but she does not identify these pitfalls in her own thinking.

The Diagnostician of the Future

This mid-career physician works in the emergency department of an urban hospital. Like the master diagnostician of the past, he has extensive experience and attuned pattern recognition. Like the skilled diagnostician of today, he is adept at quickly searching for information and understanding probabilistic data. However, unlike his predecessors, he has the ability to use the electronic health record (EHR) to avidly track his patients' outcomes and final diagnoses. He measures his diagnostic error rate and regularly examines his mistakes, seeking to understand if they were "no fault" or were borne of an oversight, knowledge gap, or cognitive misstep. He particularly scrutinizes patient presentations for which rapid accurate recognition leads to therapeutic consequences that have a major effect on patient outcomes, such as aortic dissection or sepsis. After having "tried harder" to not make mistakes earlier in his career, he recognized that memory is often faulty when busy and the quest to "be thorough" is equally fruitless. He now uses diagnostic checklists for the most common signs and symptoms, such as fever and chest pain, which has reduced his diagnostic error rate, and he frequently reaches for a computer-based diagnostic support tool for complex cases.

Principles of Diagnostic Expertise

Expert diagnosticians of every era are the product of personal traits and environmental conditions. Reflections on the prototypical expert diagnostician across the ages provide insights that can help training programs and health systems consider how the foundational skill of diagnosis can be developed effectively, not by platitudes such as "be thorough" or "always listen to the patient," but rather through constant attention to the following principles.

Centrality of Knowledge

The exceptional skill of the master diagnostician of the past derived from extensive information about medical conditions internalized through study and direct patient care experience. This remains as true today as ever. It has become fashionable to state that memorization of a large body of factual knowledge is no longer necessary in an era when clinicians are adept at quickly accessing recommendations and guidelines online. This supposition mistakes infinite access with infinite knowledge.[4] The human mind has to grapple with a

Corresponding Author: Allan S. Detsky, MD, PhD, Mount Sinai Hospital, 600 University Ave, Room 429, Toronto, Ontario, M5G 1X5, Canada (adetsky@mtsinai.on.ca).

problem (eg, pneumonia) many times over to become facile with the territory and to recognize and tackle the innumerable variations that appear in the real world. Physicians should never accept the phrase "you can always look it up"—that is neither true nor pragmatic. Rapid access to information is undoubtedly important, but great diagnosticians will always be adding to an extensive database, not simply spending their time trying to access one.[5]

Know Your Limits

The master diagnostician of the past was rarely questioned, because few could prove him wrong. Cognitive psychology has demonstrated that the human mind is indeed skillful at handing complex problems but that it does so with a demonstrably high error rate. Kahneman[6] outlines the interplay between 2 dueling reasoning systems—system 1 (intuitive) and system 2 (analytical)—and the many cognitive errors that clinicians can experience while navigating between them, including premature closure, anchoring, and search satisfaction. The excellent diagnosticians of today have heightened awareness of these forces but are not yet metacognitive practioners, ie, those who routinely think about their own thinking and recognizing these traps in their own thought patterns. In many corners, overconfidence still prevails. Studies show that physicians are not wired to catch themselves on the precipice of a cognitive error and require external systems to do so. The 17th-century French author François de La Rochefoucauld quipped, "Everyone complains of his memory, and no one complains of his judgment." The diagnostician of the future will embrace any opportunity to improve the latter.

Feedback

Osler was celebrated for his clinicopathologic correlations—seeing patients on the wards and then learning from their autopsies. The close correlation between admission and autopsy has disappeared, but the need for the brain to learn through direct and tightly coupled feedback has not.[7] The modern diagnostician's version of the pathology laboratory is the diligent stalking of the electronic health record (EHR), where open loops from patients never to be seen again can be closed. Were the results of the stress test positive? Did the jaundice resolve? Did the results of polymerase chain reaction testing come back negative? The modern clinician, however, must make do with clunky information systems offering reports about hemoglobin A_{1C} and low-density lipoprotein levels but little to optimize learning around complex diagnostic problems. The future expert diagnostician will be able to easily access the EHR; in fact, the intelligent EHR will seek to access the diagnostician, providing data for efficient monitoring of results and outcomes. Patrick Walsh, a urologist at Johns Hopkins, is legendary for the way in which he optimized the radical prostatectomy by reviewing videos of his operations, making adjustments and relentlessly correlating techniques with patient outcomes.[8] The future expert diagnostician will likewise habitually review his or her diagnoses and outcomes to refine knowledge and thought processes in preparation for future patients.

Offloading

Cognitive demands and medical facts have expanded exponentially, but the brain's ability to keep track of them has not. The diagnostician of today recognizes that it is impossible to know it all and difficult to attend to the multiple demands that compete with direct patient care but is unable to find ways to reduce the cognitive load in daily practice. The diagnostician of the future addresses this dilemma by routinely using checklists and decision supports to address the cognitive limits of the human mind and to free up mental bandwidth for more complex matters.[9] He or she is happy to use a checklist to avoid premature closure and other predictable pitfalls. This diagnostician resembles a pilot who uses a checklist instead of relying on memory for takeoff and landing.

Conclusions

The 3 core questions that patients ask of physicians remain immutable over time, as does the primacy of accurate diagnosis. Although the clinical environment has changed tremendously in the past 50 years, the way the mind reasons and learns has not. The challenge has always been to structure training and work environments that care for patients but to also tend to the lifelong learning of the clinicians. In different eras, physicians have gotten the different parts of that puzzle right. Medical educators, administrators, and policy makers should take the best of the past and present to structure future training and practice that makes the master diagnostician the norm rather than the exception.

ARTICLE INFORMATION

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