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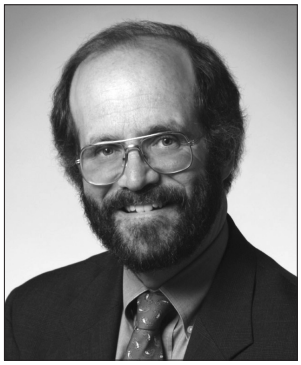

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Medical Training in the Fitbit, Google Glass and Personal Information Era

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Will advanced technologies change the way we learn and practice medicine?

There's no question that we are in the midst of an ever-expanding journey of information access. While Google and Wikipedia have changed the landscape of searchable, worldwide information on a variety of topics, Facebook, Fitbit, and Google Glass have taken things to the next level—from storage and access of information to up-close-and-personal data.

The medical profession has not been shy about joining the craze of information exchange. Most medical schools and national medical organizations have Facebook and Twitter accounts, and numerous academic medical centers use Google Glass in the operating room and training environments. Many of the currently available technologies have the potential to dramatically change the way educators teach and measure learners' expertise. The big question is: How far is the medical profession ready to go?

Recent research published in the *New England Journal of Medicine* (NEJM) noted that clinicians who use less than 10 Newtons of distributed palpation force during a simulated breast examination were 7 times more likely to miss a 2-centimeter lesion. This research project—which calls upon haptics, or the science of touch—involved the use of silicone breast molds combined with layers of simulated breast tissue, skin, and various masses in different locations. The breast molds incorporated sensor technology to capture data regarding where the clinician was palpating and the amount of palpation force he or she applied during the examination. Researchers tested more than 500 surgeons, OB/GYN physicians and family medicine physicians.

While more work is necessary to understand fully how this data relates to real-life clinical breast examinations, the implications are clear: Advanced technologies are available to provide detailed performance metrics for hands-on clinical skills.

Doctors go through many years of training to become top-notch professionals, but the intensity of their ongoing training and assessment often subsides after the completion of their residency and fellowship years. In contrast, other types of professionals often use performance data to refine their psychomotor skills on a regular basis throughout their careers.

For example, athletes rely heavily on instant replays, video reviews, and cumulative metrics to improve their performance. In some settings, their personal performance records are public knowledge. This information allows individuals to set personal goals. Athletes know where they stand compared to their peers. Coaches use the information to design training programs to maximize performance. These information resources promote continuous quality and performance improvement at the individual and team levels.

In the medical field, specialty board examinations are the most comprehensive competency assessments that are widely available. We don't have an objective test for "hands-on skills," which would be extremely helpful, especially in procedural areas of practice. It's one thing to get feedback about performance from a faculty member or peer, and another thing altogether to receive a detailed computer

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readout. To that end, we envision a time when physicians receive daily computerized feedback about their work that will allow them to improve their proficiency in areas such as palpation, instrument selection, operative time, and blood loss. Further, this type of data could be incorporated into recertification and maintenance of certification processes.

However, this scenario raises many questions. How will the data be used? Are medical professionals ready for this type of feedback?

The Achilles heel of the medical profession is that physician performance data often has been used in a punitive fashion—the opposite of how it's used with professional athletics. Many physicians have an understandable fear that performance data could be used against them, thus creating resistance to the idea of collecting such data and dampening our hopes for its availability as a strategic guide through the stages of mastery en route to performance excellence.

While it's unclear what needs to happen to change physicians' culture and outlook about personal performance data, history suggests that eventually we will adopt the technologies and communication venues of the general public. Then, rather than only asking if a physician is board certified, a patient will want to know his or her doctor's haptics scores. After all, that's what matters in the operating room.

Getting the medical profession to take full advantage of technological tools for assessment and performance improvement will require expanding the use of existing technologies for medical purposes; increasing the number of researchers, designers, and innovators who have a passion for health care; and finding a way to address the delicate legal issues that accompany the use of video review and assessment in health care settings. Meanwhile, sensor technology, simulators, and other forms of high-tech training methods have come a long way. Medical and nursing schools around the United States are embracing the concepts, with many investing in multimillion-dollar training programs and simulation centers that employ state-of-the-art technologies.

The UW Health Simulation Center offers educational opportunities for students, faculty, and staff from the University of Wisconsin School of Medicine and Public Health (UWSMPH), UW Hospital and Clinics, UW Medical Foundation, and many practitioners throughout the state and region. Capable of conducting interdisciplinary health care scenarios, the center was designed to serve myriad health care fields, from surgery and respiratory therapy to environmental services and nursing. It incorporates best practices, integrates Centers for Disease Control and Prevention protocols, and provides critical feedback.

We have taken steps to make sure the Simulation Center's policies and personnel are sensitive to everybody's fears and concerns.

For those who question whether objective assessments of psychomotor performance are related to clinical outcomes, a well-designed study has addressed that issue. In 2013, a *NEJM* article showed that a simple Likert scale rating of surgeons' operative skills correlated significantly with patient outcomes. Using blinded ratings, surgeons who scored the lowest on psychomotor skills had higher patient readmission and re-operation rates.

Examples of technology in action at the UWSMPH include:

- A US Department of Defense-funded project is using motion-tracking technology to model and understand skills decay among physicians who rarely perform certain procedures or who endure prolonged absences from practice—such as those who become ill or take maternity or paternity leave. Its goal is to understand ways in which military doctors can more smoothly make the transition back into practice after deployment.
- A National Institutes of Health-funded study is examining surgeons' decision-making skills during critical intra-operative moments. For example, as a surgical trainee performs a generic task—such as dissecting a pelvic tumor—sensor technology can capture and measure his or her movements, reaction times and decisions.

We have already embarked on the information age. Data exists, it's meaningful, and it will not go away. In fact, we believe our patients will begin to demand it.

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