

# Sensory simulators give doctors a better feel for performance improvement

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It's long been said that medicine is part science, part art. The science tells you so much, but while you may have one way of performing a procedure or exam, a colleague down the hall approaches it in a slightly different way.

For example, when performing a breast exam: how much pressure do you use? Do you use a rubbing technique, a patting technique or a piano fingers technique? Is one better than another? In a complex surgery, what are the differences in decisions and technical approaches? Does that affect the outcome of the surgery?

By using sensor-enabled simulations, physicians are getting closer to having measurable data to answer the question of which techniques produce the best patient outcomes in the most efficient way, said Carla M. Pugh, MD, PhD. She is director of the Technology Enabled Clinical Improvement Center at Stanford Medicine and spoke at a recent event at the AMA's Chicago headquarters.

The answers Dr. Pugh and her team uncover in their research can have a direct impact on medical education and clinical skills assessment. And biometric data may even be able to help address physician anxiety and burnout in high-performance settings.

"This is my dream: To create a database that is used for data sharing. This can help resident training and self-assessment of practitioners, and help to raise awareness and change behavior," said Dr. Pugh, a professor of surgery at Stanford University School of Medicine. "Obviously, the goal is to improve quality of care. This is new data, so there is a wide variety" of ways in which it can be used.

## Aiming for gold-medal performance

Dr. Pugh first started working with force sensors nearly two decades ago when she was earning her PhD in education.

Now, she and fellow researchers also use sensors to determine which motions physicians use in a given exam or procedure, electroencephalography (EEG) monitoring to capture the cognitive process a physician is using at different points in a procedure, and video and audio to help tell the story of the decisions that physicians and others make.

Dr. Pugh has worked with a number of medical specialty societies to set up sensor-enabled simulators at conferences and physicians have been eager to participate. For example, physicians lined up at meetings of the American Society of Breast Surgeons, American Academy of Family Physicians and American College of Obstetricians and Gynecologists to determine how accurate their technique was in finding tumors in a sensor-enabled breast exam simulator.

Individually, physicians found out how accurate their method was. Collectively, the data showed that the "Olympians"—those who had an efficient and accurate exam—used a certain amount of force. In addition, many of them used a rubbing technique and all covered the tissue in a linear fashion. Very few physicians who used a piano fingers technique when searching for tumors made it into the Olympic category.

Dr. Pugh has set up simulators to quantify clinical procedural skills in cardiac surgery, intubation and ventral hernia, among other areas. Through a partnership with the American College of Surgeons, Dr. Pugh in late October set up a Surgical Metrics Project booth in the College's conference exhibit hall to build a database of surgical decision-making and technical approaches during the repair of a small bowel enterotomy.

"Digital health care is here and there are a lot of groups collecting data at the point of care. We want physicians to have a voice regarding how the data is used and what it means," Dr. Pugh said. "Everyone wants to be the best they can be. Sharing data will help us get there."