

PROFESSION

Brain scans yield clues to physician decision-making

Imaging finds that those who pay less attention to their mistakes than their successes are more likely to make poor treatment choices.

By KEVIN B. O'REILLY, *amednews staff*. Posted Dec. 14, 2011.

Functional magnetic resonance imaging of doctors' brains could help physicians learn to avoid diagnostic and treatment mistakes. Doctors who pay as much attention when they make the wrong call as when they get it right are likelier to deliver better care, say the authors of a new study.

The rate of diagnostic errors is difficult to measure. But previous research shows about 5% of autopsies reveal a missed diagnosis that, coupled with the right intervention, could have saved the person's life.

Even with the right diagnosis, choosing the right treatment can be tricky, because there is often no gold-standard evidence to rely upon, said Jonathan Downar, MD, PhD, assistant professor of psychiatry at the University of Toronto Faculty of Medicine in Ontario, Canada.

"If you drew out all of medical decision-making as a decision tree, there would be thousands of branches and tens of thousands of decision points," said Dr. Downar, a neuropsychiatrist at Toronto Western Hospital. "With every new drug, there are more branches popping up, and it's impossible to make every decision based on a randomized, controlled trial."

So how good are physicians at figuring out when a medication is effective in a patient, and what is going on in their brains as they process the information and make treatment choices? That is what Dr. Downar and his colleagues set out to discover.

They asked 35 nonsurgical physician specialists affiliated with Baylor College of Medicine in Houston to try to determine when two fictional drugs would be effective at preventing a heart attack in patients with different characteristics such as age, sex and whether they smoked or had diabetes. All the while, the doctors' brains were scanned using fMRI machines.

Seeking rewards means more mistakes

First, the doctors went through 64 patient scenarios in a training round, then another 64 tries in a testing phase. Diabetes status was the only patient characteristic that determined the effectiveness of the hypothetical drugs, but physicians struggled to rule out irrelevant factors. Overall, they got the treatment right 64% of the time, said the study, published Nov. 23 in the peer-reviewed journal *PLoS One* (www.ncbi.nlm.nih.gov/pubmed/22132137).

But not all physicians scored well. High-performing physicians who selected the right drug more than 75% of the time paid just as much attention to when they erred as when they chose correctly, scans showed. But the low performers paid greater attention to their successes, with the so-called reward center of their brains -- the nucleus accumbens -- lighting up on the scans more when they picked the right drug and in the seconds before making that choice.

"In the nucleus accumbens, in tests with monkeys if you give them squirts of juice, this is the area that will activate," Dr. Downar said. "In some of the doctors we studied, this area is activating and it is happening in the ones who are the success chasers. ... That turns out to be the strategy that lands you solidly in the low performers."

The problem with chasing success is the phenomenon known as confirmation bias, in which people look for information that lines up with their beliefs regardless of whether the beliefs are correct. Physicians, like many other people studied, appear vulnerable to this mistake in thinking. Medical educators should consider adding formal training on how to use an approach called disconfirmation learning, Dr. Downar said.

"That means that when you think you have the answer to what's going on with a patient, you may then want to ask not only what tests you would use to prove yourself right, but what tests would you use to prove yourself wrong," he said.

Further research using real-time fMRI would determine whether disconfirmation learning can help physicians perform better, ultimately improving patient care. Though success-chasing may be a problematic problem-solving strategy, it is indicative of physicians' approach to care, Dr. Downar said.

"Doctors want to help people, so they get caught up in the reward value of being right," he said.

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