

Best Instrument in a Physician's Bag Could be a Simple Algorithm

By AUSTIN FRAKT

Can machines outperform doctors? Not yet. But in some areas of medicine, they can make the care doctors deliver better.

Humans repeatedly fail where computers — or humans behaving a little bit more like computers — can help. Even doctors, some of the smartest and best-trained professionals, can be forgetful, fallible and prone to distraction. These statistics might be disquieting for anyone scheduled for surgery: One in about 100,000 operations is on the wrong body part. In one in 10,000, a foreign object — like a surgical tool — is accidentally left inside the body.

Something as simple as a checklist — a very low tech-type of automation — can reduce such errors. For example, in a wide range of settings, surgical complications and mortality fell after implementation of a basic checklist including verification of patient identity and body part for surgery, confirmation of sterility of the surgical environment and equipment, and post-surgical accounting for all medical tools. Though simple procedures would all but eliminate certain sources of infections in hospitals, thousands of patients suffer from them in American hospitals every year.

Limits on how much information we can process and manipulate make it hard or impossible for even the smartest and most adept doctors to keep up with new evidence. In 2014 alone, more than 750,000 additional medical studies were published. Granted, a physician might need to keep up only with the evidence in her specialty, but even at a fraction of this rate, it is unrealistic to expect even the best physicians to assimilate every new de-

among the best at doing so.

Teams of physicians at Memorial Sloan Kettering Cancer Center in New York, the University of Texas MD Anderson Cancer Center in Houston and the Cleveland Clinic are helping to train Watson to apply humanity's huge store of cancer knowledge to the delivery of more personalized treatment.

At Boston Children's Hospital, Watson will help diagnose and treat a type of kidney disease. It will team up with Apple to collect health care data; with Johnson & Johnson to improve care for knee and hip replacements; with med-

bonds with their doctors and shared engagement with their care are more likely to follow their prescribed treatments. To the extent medical treatment relies on the human touch, on the trust of patients in their doctors and on physicians' embodiment of authority, a computer-delivered cure may never feel complete.

Patients also may be skeptical that a computer can deliver the best care. A 2010 study published in Health Affairs found that consumers didn't believe doctors could deliver substandard care. In contrast, they thought that care strictly based on evidence and guidelines — as any system for automating medical care would be — was tailored to the lowest common denominator, meeting only the minimum quality standards.

But algorithms can be put to good use in certain areas of medicine, as complements to, not substitutes for, clinicians. A Princeton University economics professor, Janet Currie, and colleagues developed a simple algorithm to improve care for heart attack patients. Their analysis found that about one-fifth of patients arriving in Florida hospital emergency departments with heart attacks from 1992 to 2011 received treatments not ideally suited to their condition, increasing their chances of dying in the hospital. Their algorithm based on patient characteristics could be used to indicate when treatments were not well matched to patients, potentially improving their outcomes.

Just because algorithms can assist in making decisions doesn't mean humans should check out and play no role. It is important not to over-rely on data and automation. Bob Wachter, a physician, relates a story about how

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ical equipment manufacturer Medtronic to detect when diabetes patients require adjustments to insulin doses; and with CVS to improve services for patients with chronic conditions. Another computer-assisted approach to cancer treatment is already in place in the vast majority of oncology practices. Other automated systems check for medication prescribing errors.

To many patients, the very idea of receiving a medical diagnosis or treatment from a machine is probably off-putting. Apart from the sense that it just doesn't feel right to some, there's a fundamental question of whether medicine is or can be purely data driven. If the only thing between your illness and its diagnosis and cure is the manipulation of evidence, then, in principle, a computer should one day be able to deliver care as well or better than a hu-

velopment in their fields. In cancer alone, 150,000 studies are published annually.

Computers, on the other hand, excel at searching and combining vastly more data than a human. I.B.M.'s Watson — the computer that won “Jeopardy!” — is

Austin Frakt is a health economist with several governmental and academic affiliations. He blogs at The Incidental Economist, and you can follow him on Twitter at @afrakt.

man.

But healing may rely on more than the mere processing of data. In some cases, we may lack data, and a physician's judgment might be the best available guide. A good deal of health care's benefits may also be in the human interaction between doctor and patient. Placebo effects can be real and strong. Many people engage the health system for reassurance and hope, even when no cure is available. Studies show that patients with close, personal

automated aspects of an electronic medical system contributed to the overdose of a child at the University of California San Francisco Medical Center.

Notwithstanding the cases in which reliance on automation contributes to harm, automation can improve safety, and has. Our ambition to protect us from ourselves inevitably leads to automation, even in medicine. The reason is simple: Some things humans do better than algorithms, but not all things.