Pushing big data to rapidly advance patient care

August 30 2018

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The breakneck pace of biomedical discovery is outstripping clinicians' ability to incorporate this new knowledge into practice.

Charles Friedman, Ph.D. and his colleagues recently wrote an article in the *Journal of General Internal Medicine* about a possible way to approach this problem, one that will accelerate the movement of newly-

generated evidence about the management of health and disease into practice that improves the health of patients.

Traditionally, it has taken many years, and even decades, for the knowledge produced from studies to change medical practice. For example, the authors note in the article, the use of clot-busting drugs for the treatment of heart attacks was delayed by as much as 20 years because of this inability to quickly incorporate new evidence.

"There are lots of reasons why new knowledge isn't being rapidly incorporated into practice," says Friedman. "If you have to read it in a journal, understand it, figure out what to do based on it, and fit that process into your busy day and complicated work flow, for a lot of practitioners, there's just not enough room for this."

Informing medical practice

Much of the generation of new evidence is done by groups like the federal Agency for Healthcare Quality and Research and the Cochrane Collaboration, a UK-based non-profit group designed to organize medical research into systematic reviews and meta analyses. These reviews synthesize all of the available medical research about a given topic with the hope of informing medical practice. However, that movement of this accumulated knowledge to medical practice can happen incredibly slowly, if at all.

The new article focuses on the need to harness the power of technology to enable health systems to analyze the data they generate during the process of taking care of patients to generate new "local" evidence and use this in combination with published reviewed evidence to improve health outcomes.

The key to using both types of evidence, they argue, is transforming

human readable knowledge—the words, tables and figures in a typical journal article—into computable forms of that same knowledge.

"A lot of scientific studies result in some kind of model: an equation, a guideline, a statistical relationship, or an algorithm. All of these kinds of models can be expressed as computer code that can automatically generate advice about a specific patient," Friedman explains. When both "local" models and published models are available in computable forms, it is suddenly possible to generate advice that reflects both kinds of sources.

Computable forms are key

He notes that while Michigan Medicine, along with most other health systems that use electronic health records, is using its data to continuously improve quality of care, putting this knowledge in computable forms creates many new ways to apply that knowledge to improve care.

The University of Michigan Medical School's Department of Learning Health Sciences is taking the lead in transforming biomedical knowledge into computable forms that are open and accessible to anyone. They've created a computer platform called the Knowledge Grid, that stores computable knowledge in digital libraries and then uses that knowledge to generate patient-specific advice.

"The value of Big Data is to generate Big Knowledge," says Friedman. "The power of Big Data is to provide better models. If all those models do is sit in journal articles, no one's going to be any healthier."

More information: Jeanne-Marie Guise et al, Mind the Gap: Putting Evidence into Practice in the Era of Learning Health Systems, *Journal of General Internal Medicine* (2018). DOI: 10.1007/s11606-018-4633-1

Provided by University of Michigan