

## VIEWPOINT

# Enhancing Physicians' Use of Clinical Guidelines

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**A dozen years ago**, investigators identified adherence barriers to help guideline developers and other stakeholders design strategies to increase guideline use.<sup>1</sup> Today, adherence to guidelines often remains low, causing omission of therapies recommended in the guidelines and contributing to preventable harm, suboptimal patient outcomes or experiences, or waste of resources. In part because of inadequate adherence to guidelines, preventable harm is the third leading cause of patient death, and one-third of health care spending—estimated at nearly \$1 trillion, or \$9000 per household—is for therapies that do not improve patients' health.<sup>2</sup> One estimate suggests that each year, 200 000 patients die from sepsis, 120 000 from teamwork failures, 100 000 from health care-acquired infections, 100 000 from venous thromboembolism and pulmonary embolus, 80 000 from diagnostic errors, and 68 000 from decubitus ulcers.<sup>3</sup> Not all of these deaths are preventable, but many could be avoided if clinicians reliably used evidence-based therapies, many of which are included in guidelines. Increasing evidence suggests that harms once deemed inevitable, such as central line-associated bloodstream infections, are

therapies are most important. Although this scholarly summary is important, it should not be the final product. Rather, the guideline should include a prioritized checklist of important interventions with the greatest evidence for benefit to patients at the lowest risks and costs. The level of evidence supporting each intervention must be transparently defined. Each intervention on the checklist should be described as an unambiguous behavior and the behaviors organized in time and space as to when the intervention should occur. Checklist developers could obtain input from a diverse group of clinicians, adding insight to areas in which empirical evidence is uncertain. These checklists would fill a gap between practice guidelines, which often lack detailed specifications, and performance measures, which include detailed specifications.

Second, guideline developers, with implementation scientists, could help clinicians identify and mitigate barriers to guideline use and share successful implementation strategies. This approach is not a common current practice. Barriers include lack of knowledge or awareness of the guidelines, disagreement (clinicians disagree with the checklist items), ambiguity (clinicians are unclear who is supposed to do what, where, when, and how), ability (clinicians want to comply but are limited by skill, self-efficacy, or system barriers), and inertia (clinicians maintain the status quo). Each barrier requires a separate intervention: awareness requires education, agreement requires conversation, ambiguity requires revision of the checklist,

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largely preventable. The Centers for Disease Control and Prevention (CDC) estimated that 100 000 to 200 000 fewer of these infections occurred in intensive care units (ICUs) between 1990 and 2010.<sup>4</sup> One in five patients who develop these infections will die, and each infection costs approximately \$40 000.<sup>5</sup>

Clinicians have profound individual accountability, yet they only sometimes follow published guidelines. Guideline developers should rethink their goal. In addition to summarizing the evidence, developers, perhaps in partnership with implementation scientists, should consider barriers, explore theories of change, and suggest ways to implement guidelines at the bedside. Five strategies could help increase adherence to guidelines.

First, a guideline could include an unambiguous checklist with interventions linked in time and space (eg, on admission or at clinic discharge). This checklist would provide key practices supported by empirical evidence, rather than detailed critical pathways for nursing care. Guideline developers generally review and summarize the available evidence in a scholarly document—which can exceed 100 pages—and recommend scores of interventions, generally without prioritizing which

ability requires system changes along with audit and feedback, and inertia requires influencing skills to motivate change. Clinicians and researchers can investigate barriers and target interventions to mitigate them. They can identify what is required to adhere to the checklist, observe clinicians attempting to adhere to the checklist, seek to understand where they struggle, and talk with clinicians to understand their concerns. Guideline developers can summarize the barriers, pilot test interventions to overcome them, and share this information, allowing health care organizations to select strategies that will work for them.

Third, various guideline developers could collaborate to integrate guidelines for conditions that commonly coexist. Outpatients often have multiple chronic diseases, and inpatients often are at risk for multiple preventable harms. Yet current guidelines often address a single chronic disease or complication. Funding agencies or professional societies could re-create common scenarios and work to integrate guidelines. For example, an ICU patient is at risk for more than a dozen harms, such as health care-acquired infections, venous thromboembolism, delirium, and ventilator-induced in-

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jury. Each harm type has its own checklist that includes multiple recommended care practices, and some practices occur multiple times a day, adding scores of interventions. However, these checklists have not been collated and integrated into a care plan or daily workflow to reliably ensure delivery of the practices.<sup>6</sup>

Fourth, guideline developers could rely on systems, rather than the actions of individual clinicians, to ensure patients receive recommended therapies. A patient in the ICU or with multiple chronic diseases may require 80 to 200 evidence-based interventions daily. These interventions have never been compiled, and health care organizations largely rely on clinicians to ensure these interventions occur. For example, elevating the head of the bed at least 30° is one intervention to prevent ventilator-associated pneumonia. Nurses often make paper protractors to measure the bed angle, when technology could quickly measure and display the angle. Another example is the National Institutes of Health's \$2 billion, 2-decade investment in research to reduce mortality among patients with acute lung injury (and all patients receiving mechanical ventilation). Researchers discovered that low-tidal-volume ventilation—giving breaths based on patient height—reduced mortality. However, patients only receive this ventilation 20% to 40% of the time.<sup>7</sup> Although clinicians should remember to give patients small breaths, a more effective strategy is to leverage technology. The patient's height cannot be programmed in the ventilator, and the electronic medical record (EMR), which does include height data, does not share information with the ventilator or any other devices. Guideline developers must develop ways to use technology to ensure patients reliably receive the recommended therapies.

Health care has invested billions in the EMR, believing it will improve care and reduce costs. This is a lofty expectation. The EMR is just one source of data in an information ecosystem that includes, for ex-

ample, infusion pumps, ventilators, and an ever-growing list of home diagnostic devices. None of these technologies communicate and share data. Rather than being the solution to providing better quality and achieving lower costs, the EMR can be the documentation tool for the information ecosystem. The enhancement of the ecosystem will be software applications, written on an interface platform, linking the EMR to multiple devices, creating an information ecosystem.

An information ecosystem could help predict which patients are at risk of harm, recommend evidence-based therapies, ensure patients receive those therapies, and evaluate whether patients respond. Most health care organizations, however, have not pressed vendors to link EMRs to other medical devices, nor insisted that EMR or other health information technology companies share data.

Fifth, guideline developers could create transdisciplinary teams and pool expertise from clinical epidemiology (evidence synthesis), implementation science, and systems engineering to develop scholarly guidelines with practice strategies. The National Institutes of Health has invested in interdisciplinary basic science programs; perhaps the next step is to invest in transdisciplinary applied research teams.

Too many patients experience preventable harm, suboptimal outcomes, and unnecessary costs. One important contributor to these challenges is the lack of adherence to evidence-based therapies. The current approach to guideline development will likely not reduce harm or improve patient outcomes. The 5 strategies outlined in this article could help ensure guidelines are used and patients benefit. It is unlikely that guideline developers, typically experts in clinical epidemiology, have expertise in implementation science or systems engineering. This expertise is needed to identify and automate the use of guidelines and, by doing so, help reduce the morbidity and mortality associated with preventable harm.

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