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CASE AND COMMENTARY

How Should Clinicians' Performance Be Assessed When Health Care Organizations Implement Behavioral Architecture That Generates Negative Consequences?

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Abstract

Behavioral interventions have been shown to have powerful effects on human behavior both outside of and within the context of health care. As organizations increasingly adopt behavioral architecture, care must be taken to consider its potential negative consequences. An evidenced-based approach is best, whereby interventions that might have a significant deleterious effect on patients' health outcomes are first tested and rigorously evaluated before being systematically rolled out. In the case of clinical decision support, brief and thorough instructions should be provided for use. Physician performance when using these systems is best measured relatively, in the context of peers with similar training. Responsibility for errors must be shared with clinical team members and system designers.

Case

Dr R is an internal medicine resident physician in the medical intensive care unit (MICU) who just admitted Ms M, a 60-year-old woman, for an acute exacerbation of her chronic obstructive pulmonary disease. Based on her worsening respiratory status, Dr R determines that she needs mechanical ventilatory support. Through the hospital's electronic health management system (EHMS) and computerized physician order entry system (CPOE),[1] Dr R automates[2] Ms M's pressure support settings.

Later that night, Dr R is paged. Ms M's respiratory status has deteriorated, probably due to ventilator-induced barotrauma. Despite the MICU team's implementation of full corrective and supportive measures, Ms M is pronounced dead 8 hours after being admitted to the MICU.

Reasons for Ms M's outcome are investigated by the hospital's patient safety and oversight committee. Members of the committee suspect that Dr R selected ventilator settings that were too high for Ms M. When asked to explain, Dr R admits to feeling terrible and to only now understanding that default settings,[3] presented by the EHMS and selected by colleagues and supervisors in past cases,[1] were not appropriate for Ms M.

Committee members deliberate about how to respond.

Commentary

In this case of a physician's reliance on CPOE default settings leading to the death of his patient, the hospital's patient safety and oversight committee has a duty to respond in a way that will decrease the likelihood of similar events in the future. In order to decide on a productive response, they must consider the effect of the CPOE default settings on Dr R's behavior. The committee should address the following questions: (1) How do we evaluate physician performance and determine responsibility for errors in the context of behavioral architecture in health care? and (2) how should error events inform the design of future interventions? To address these questions, the committee must first reflect on the role of behavioral architecture in health care.

Behavioral Architecture

Behavioral architecture refers to the intentional design of systems that consider and account for the psychological, social, cognitive, and emotional factors that influence the behavior of individuals. Many insights and tools of behavioral architecture are borrowed from the field of behavioral economics. The fundamental premise of this field is that human beings do not make decisions based purely on rational calculations designed to maximize their own good. Instead, we behave in ways that are predictably irrational.[4] We can use an understanding of these tendencies to develop ways to support, encourage, and "nudge" desirable behaviors. *Nudges* are behavioral science applications that consist of "positive reinforcement and indirect suggestions which have a non-forced effect on decision making."[5] For example, a cafeteria encourages healthy food choices by putting fruit next to the cash register instead of candy bars.[5]

Health care is rapidly adopting insights from the field of behavioral economics. There is a growing body of evidence demonstrating that clinician decisions are also subject to variability based on psychological and emotional factors.[6,7,8] Rational approaches to improving clinician behavior, such as education, feedback, and financial incentives, have only been modestly successful. For example, these approaches generally reduce inappropriate antibiotic prescribing by 10%.[9,10] However, recent studies using behavioral interventions have shown exciting and promising results. For example, a large randomized controlled trial evaluating 3 behavioral interventions found that a peer comparison nudge decreased clinician antibiotic prescribing for upper respiratory infections by roughly 80% (from 19.9% to 3.7%),[11] with durable effects at 5 months.[12]

Default settings like the ones encountered by Dr R represent particularly powerful behavioral architecture tools. They take advantage of our strong desire to do nothing (status quo bias[13]) and implicitly recommend a particular action.[5] Outside of health care, default options for organ donation consent in European countries led to a 16.3% increase in organ donation.[14] At one US hospital, switching from opt-in to opt-out referral for cardiac rehabilitation increased referral rates from up to 15% to up to 90%.[15] We can expect that when a health care system puts defaults into effect, it will have a significant effect on the behavior of physicians. These effects are likely to be more pronounced for physicians in training, like Dr R, who possess less knowledge, understanding, and confidence at this stage in their careers.

Weighing the Pros and Cons

Behavioral design is most useful in situations in which people need to make decisions that are difficult, with delayed consequences, and for which they get little or no consistent feedback.[5] These types of decisions are rife throughout health care. A few

times a week, a primary care physician will decide to start a patient, with no history of heart disease, on a medicine to lower their cholesterol. This decision involves a complex calculation of that patient's 10-year risk of developing heart disease. The benefit will come much later, if at all, and, as a result, the physician will get almost no feedback on the development of heart disease in such patients many years later. Even in acute care settings, clinicians often face these types of decisions. Dr R received swift feedback on his choice of ventilator settings from the patient safety and oversight committee, but, typically, this type of mistake would not generate this level of feedback. Perhaps partly for this reason, clinicians often fail to provide evidence-based care. US citizens who've seen a clinician in the past 2 years receive only half of recommended medical care,[16] and most physicians believe that at least 15% to 30% of the care received is unnecessary.[17]

In part because of the failure to follow evidenced-based guidelines,[18] preventable harm is responsible for a third of hospital deaths,[19] and it wasted up to $425 billion in 2011.[20] The use of behavioral design in health systems is an exciting and low-cost way to close this evidence-practice gap without undermining the autonomy of clinicians. Studies have shown that even small and very low-cost cost nudges can have a meaningful impact. One study placed a simple poster with the clinician's signature committing to antibiotic stewardship in each examination room to decrease inappropriate antibiotic prescribing by 20% relative to the control group.[7] And simply changing the grouping of treatment options in the EHMS has been demonstrated to significantly affect physician prescribing behavior.[21]

As we begin to integrate behavioral psychology into health care to a greater extent, we must also consider the potential negative consequences. Some might worry that these behavioral architecture interventions undermine incentives to think critically and will usher in a new era of clinicians who are dependent on these tools. Dr R did not modify the default settings because he did not know that he needed to adjust them. Had there been no default settings, Dr R would have been prompted to think critically about how to manage Ms M. Yet the default settings arguably helped many other physicians in this MICU avoid simple input errors. These types of interventions can lead to errors and still have a net positive effect on patients.

Behavioral design also creates a challenge in ensuring transparency. The key insight of the field of behavioral economics has been compared to that of an optical illusion, in which our minds play tricks on us.[5] Normally, the human mind works incredibly well. However, there are a few instances in which it predictably fails. Behavioral design choices, or nudges, serve as a sort of cognitive illusion influencing perception below conscious awareness. This useful and powerful analogy of course begets concern. Health care systems must take responsibility for the effect of these hidden-in-plain sight interventions. For example, many academic centers now bar pharmaceutical sales representatives after studies showed that simply their presence influenced physician prescribing behavior.[22]

All systems incorporate a choice architecture. Health care systems should do so intentionally, by designing systems with the goal of providing the best care for as many patients as possible. To meet this goal, the net effect of system design choices should be measured in terms of patient outcomes. In this case, the committee must consider the net effect of the mechanical ventilator default settings on process and clinical outcomes.

Evaluating the Quality of Clinicians' Performance

The many difficulties of accurately measuring clinician performance have been detailed elsewhere.[23] Putting these issues aside, health care systems must decide on the best ways to evaluate physicians in the context of behavioral architecture. I believe clinician performance should be evaluated relative to that of other physicians at their training level who are experiencing the same behavioral architecture. With a thorough understanding of the powerful impact of defaults—and how trainees in particular can be effected by them—the committee might consider that any of Dr R's peers would be subject to making the same mistake, in which case, he should not be subject to disciplinary action.

However, Nobel Laureate Richard Thaler and Cass Sunstein, the authors of *Nudge: Improving Decisions About Health, Wealth, and Happiness*, might disagree, as they refer to the application of behavioral architecture in policy as "libertarian paternalism."[5] In this case, they use the word *libertarian* to mean liberty preserving. Clinicians still have a full range of options and, as such, should take complete responsibility for outcomes. The defaults encountered by Dr R could have easily been changed had he possessed the clinical knowledge to do so. The counterargument would be that though these interventions don't restrict physician choice, they do significantly impact behavior and often without conscious awareness. Because these tools have been shown to have strong effects on behavior, physicians can only be properly judged relative to their peers who have been presented with the same choice architecture.

Updating Foundational Principles About Clinician Responsibility

Our instincts about physician responsibility for patient safety and well-being are based on 20th-century ethical norms. Home visits that consisted of only a patient and physician progressed to hospitalized care wherein the physician was the ultimate authority and in complete control of every aspect of patient care.[24] In the 21st century, the clinician is no longer the "captain of the ship," as specialized knowledge and medical science have grown beyond the level of expertise achievable by one human being. Perhaps more importantly, medicine has become big business, as power has been transferred from physicians to complexes of medical schools and hospitals, financing and regulatory agencies, and health insurance companies. Instead of being captains of the ship, physicians are now employees and team members.

In this case, the health care team and the health system in which it functions must both share responsibility for the error that resulted in the death of Ms M. The ventilator settings placed by Dr R should have been checked by a fellow or attending physician overseeing the MICU during that shift. Dr R did not have the proper level of supervision and, as such, his senior deserves some responsibility for the error. The health care system likely deserves some responsibility as well. The CPOE system likely did not include clear instructions for use. Without these, it would not be unreasonable for a trainee to assume that the default settings should have been used for Ms M. Appropriately distributing responsibility for patient care to all members of the health care team encourages each member to provide the best care. In the case of process interventions, like the CPOE tool in this case and in clinical decision support generally, we must insist that these tools not only be well intentioned but also be proven effective in pragmatic trials.

Developing Future Behavioral Interventions and Clinical Decision Support

The vast majority of clinical decision support tools integrated into EHMS across the country have not been proven to either help or reliably not harm patients, as most

evaluations of quality come from just a few institutions across the country.[25] Our approach as a nation to integrating EHMS and all of their components has been to develop and deploy tools that simply make intuitive sense. We are just beginning to discover and describe the unforeseen negative consequences of this approach.[26,27,28] Western medicine was revolutionized with the advent and spread of the concept of evidenced-based medicine in the 1980s. The premise was simple: deemphasize intuition, clinical experience, and pathophysiological rationale in favor of hard scientific evidence.[29] This concept has not been applied to the development of EHMS and clinical decision support. Many of the tools in these systems are included simply because they made intuitive sense to the designers. There must always be some intelligent balance between our use of intuition and objective evidence to make decisions. In this case, the health care system that launched the default CPOE should have gathered more evidence about its effects before launching it in this high-risk clinical setting.

The committee can consider 2 recommendations that might decrease the likelihood of similar events in the future. First, an evidenced-based approach should be taken for behavioral interventions that might significantly and negatively impact a patient's health. For example, before a default system like this one is launched in the MICU, the hospital might first conduct a small pragmatic trial of a similar tool in a low-stakes clinical situation. With the knowledge and understanding gained from that study, developers might build a better CPOE tool for the MICU. Ideally, this new tool would be launched on a small scale and its effects closely monitored before permanent full-scale integration. Second, it is imperative that clinicians understand the basis of recommendations generated by the CPOE tool and how it should be used. Particularly relevant for clinical decision support, the 21st Century Cures Act requires that health care professionals be able to independently review the basis of recommendations of decision support systems.[30] Brief and thorough instructions for use should be provided to empower the clinician to use the tool to best care for each individual patient. Building added transparency into the development of future interventions should reduce the likelihood of negative events.

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Editor's Note

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The people and events in this case are fictional. Resemblance to real events or to names of people, living or dead, is entirely coincidental. The viewpoints expressed in this article are those of the author(s) and do not necessarily reflect the views and policies of the AMA.

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