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## Invited Commentary

## Simplicity Matters—Overengineering Feedback Can Be Counterproductive

Jeffrey A. Linder, MD, MPH; Craig R. Fox, PhD

**Overengineering is the process** of solving a problem in an unnecessarily elaborate or complicated manner. Unfortunately, quality improvement programs that give clinicians feedback are often overengineered and, as a result, are weaker than they otherwise could be.

How does this happen? Content experts invested in improving a specific clinical target—for example, decreasing inappropriate antibiotic prescribing—typically solicit input from interested stakeholders to design informational interventions. Experts and stakeholders run through many scenarios to determine feedback that they believe recipients would want. Pilot testing may engage additional persons particularly interested in the issue and lead to more scenarios and the inclusion of more information.

System leaders, understandably concerned about the impact of negative messages on workforce morale, may edit the

feedback to be vaguer, so as not to offend. Adding vagueness increases subtlety and the complexity of feedback. In the end, the overengineered, subtle feedback is often too complicated and too vague to have the desired impact on targeted individuals. Design teams often fall prey to what behavioral scientists refer to as the “curse of knowledge,” automatically assuming that naive participants will be able to cut through the complexity and vagueness to interpret the message the same way.

Decades of behavioral science research has found that humans (including physicians) act as “cognitive misers” who default to cognitive processes that minimize computational effort. This gives rise to 2 challenges for behavior change interventions. First, many behaviors are driven by habits formed by repetition of behavior (eg, antibiotic prescribing) in the presence of consistent contextual cues (eg, symptom patterns). When habits are strong, they are more resistant to explicit appeals for change. Second, explicit appeals are less potent when they are less salient or too complex to easily process and



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remember. Moreover, appeals are less apt to succeed if they fail to provide strong motivation for change or fail to identify simple actions that will achieve a desired outcome. In sum, to be effective, feedback should provide a short, specific, actionable message, with any additional details accessible in a way that does not detract from the main message.<sup>1</sup>

Applying these principles, several recent field experiments have shown that people are more likely to take desired actions if standard messages are simplified to make the most important information salient with a clear, specific, efficacious course of action. For instance, simplifying court summons documents reduced failures to appear in court,<sup>2</sup> simplifying letters to parents reduced truancy rates among school children,<sup>3</sup> and simplifying letters to patients improved rates of colorectal cancer screening.<sup>4</sup>

In this issue of *JAMA Internal Medicine*, Aghlmandi and colleagues<sup>5</sup> report on a randomized clinical trial that shows the challenges of providing effective feedback. These researchers provided feedback to board-certified primary care and pediatric clinicians who were in the top 75th percentile of antibiotic prescribers in Switzerland (n = 3426 physicians). The feedback was delivered through 8 quarterly letters from December 2017 to September 2019 that included monthly prescribing rates based on data delayed at least 6 months from 3 national health insurers. The feedback letter included encouragement to only use antibiotics appropriately; information about how many antibiotics physicians prescribed per 100 patient consultations compared with all included physicians overall and by month; prescribing of 7 antibiotic classes; and, starting with the second mailing, antibiotic resistance data and its regional distribution.

The feedback protocol resulted in no significant differences in the antibiotic prescribing rates between the groups from the baseline year to the first or second year of the intervention.<sup>5</sup> There were also no differences among almost all secondary outcomes, such as use of specific antibiotic classes, hospitalization rates, or antibiotic prescribing in age subgroups.

This was an impressive trial. The investigators aggregated data from multiple insurers (with attendant delays) and packaged and sent the data about nearly 1.3 million patients repeatedly over 2 years to thousands of physicians.<sup>5</sup> Privacy constraints were challenging. The graph of monthly antibiotic prescribing rates is notable for clearly demonstrating the trial's underlying data over time, the clinical interest of the interquartile ranges, and a depressing lack of change or differences in the antibiotic prescribing rates. The fact that the overall antibiotic prescribing rate increased in the intervention and control groups shows the importance of, for some clinical problems, having contemporaneous controls. We note that the feedback was attractive and fit to a single page, which is a big plus.

What can we learn from the lack of efficacy of this feedback intervention? First, the data were too detailed and lacked

a clear summative statement about how prescribers were doing and what they should be doing differently—the feedback depicted visually where each prescriber fell on a distribution and left it to higher prescribers to figure out that their performance was worse than average and what specific actions they should take to improve.<sup>5</sup> Moreover, these data were only provided quarterly and were lagged by several months. Second, the data referenced a large, diffuse peer group that physicians were presumably not closely identified with, keyed off average overall prescribing rates (rather than, for example, diagnosis-inappropriate prescribing relative to top-performing peers). Finally, mailings were sent from an unspecified source and without the imprimatur of a recognized authority, which would have enhanced attention to the message and the influence of its message on behavior.

Ideally, feedback should be uncomplicated and visually appealing with a clear message; include real-time (or close) data; key off of a high-performing, identifiable peer group; and come from a relevant, known, respected messenger. For example, in the successful intervention by Hallsworth and colleagues,<sup>6</sup> general practitioners were sent a simple letter from England's chief medical officer (a recognized, respected authority) that conveyed urgency (in red: "Note to practice managers: Please forward immediately to GP addressed"), concisely identified the motivating concern (antimicrobial resistance), had a salient message in bold font that emphasized a norm violation ("The great majority (80%) of practices in [NHS Area Team] prescribe fewer antibiotics per head than yours."), and listed 3 simple recommended actions.

One final consideration that may help protect against the perils of overengineering is the personnel involved in developing and implementing feedback. Although content experts and early adopters have specialized knowledge about their area of clinical interest, they usually lack knowledge about how people attend to information or what actually changes behavior. Feedback intervention development should therefore engage behavioral scientists with expertise concerning the dynamics of attention, cognition, motivation, habit formation, and behavior change.

We have previously observed that specific features of how a behavioral intervention is implemented can be critical in determining whether it succeeds or fails.<sup>7</sup> Plainly stated: details matter. In a related vein, those designing and providing systematic feedback on clinical performance—investigators, health insurers, health systems, and others—should take the cautionary lessons from the trial by Aghlmandi and colleagues<sup>5</sup> to heart. To induce behavior change, feedback messages must be distilled into their most essential elements so they command attention, are easily understood, and can be readily acted on in an efficacious way. Rather than following the path to overengineering, feedback should be designed to be as uncomplicated and clear as possible. Plainly stated, simplicity matters.

#### ARTICLE INFORMATION

**Author Affiliations:** Division of General Internal Medicine, Northwestern University Feinberg School of Medicine, Chicago, Illinois (Linder); Behavioral Decision Making Area, Anderson School of

Management, University of California, Los Angeles (Fox).

**Corresponding Author:** Jeffrey A. Linder, MD, MPH, Division of General Internal Medicine,

Northwestern University Feinberg School of Medicine, 750 N Lake Shore Dr, 10th Floor, Chicago, IL 60611 (jlinder@northwestern.edu).

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