Commentary: De-implementation Science: A Virtuous Cycle of Ceasing and Desisting Low-Value Care Before Implementing New High Value Care

Karina W. Davidson, PhD, MASc[1,2];
Siqin Ye, MD, MS[1];
George A. Mensah, MD[3]

Implementation science has traditionally focused on increasing the delivery of evidence-based care. The science of systematically stopping low-value and wasteful care is substantially under-recognized, and if successful, may decrease the workload of clinicians. De-implementation science identifies problem areas of low-value and wasteful practice, carries out rigorous scientific examination of the factors that initiate and maintain such behaviors, and then employs evidence-based interventions to cease these practices. In this commentary, we describe how this approach for de-implementation might require a different set of health systems supports, economic and non-economic levers, and behavior change techniques that can lead to a virtuous cycle, ie, a complex chain of events that positively reinforce themselves through a feedback loop of removing low-value care to make room for high quality care. *Ethn Dis*. 2017;27(4):463-468; doi:10.18865/ed.27.4.463.

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[1]Center for Behavioral Cardiovascular Health, Department of Medicine, Columbia University Medical Center, New York, New York
[2]New York Presbyterian Hospital, New York, New York
[3]Center for Translation Research and Implementation Science, National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland

Address correspondence to Karina W. Davidson, PhD; Center for Behavioral Cardiovascular Health, Department of Medicine, Columbia University Medical Center, 622 W. 168th Street, PH-9, New York, NY, 10032; kd2124@cumc.columbia.edu

Introduction

Something has gone awry in the practice of medicine.[1,2] Physicians are spending more and more time away from meaningful patient care, leading to more burnout and depression.[1,2] The still largely fee-for-service health care system pushes physicians to see more patients and order more tests and procedures, even as overtreatment and waste is thought to account for $200 billion of the $750 billion that the US spends annually on health care.[3] Although all may agree that high-quality health care is to provide care that is "the right thing, for the right patient" delivered "at the right time, in the right way to achieve the best results," science and methodology advances have surged for implementation to attain the goal of high-quality health care. On the other hand, the science of de-implementation is almost non-existent, and may be key to successful attainment of this goal.

While there are likely multiple causes to the problem of overtreatment,[4,5] an under-recognized cause may be the inability to effectively and in an evidence-based manner stop habitual behaviors and care practices that consume time but have low-value.[6] Examples of this might include routine electrocardiograms for check-ups in asymptomatic patients, or imaging for low-risk lower backpain. Simply urging or informing health care providers to abandon these kinds of outdated and low-value clinical practices often fails to extinguish unwanted habits.

Although implementation science has traditionally focused on increasing the delivery of evidence-based care, what is needed is the science for how to systematically encourage doing less of low-value and wasteful care. De-implementation science, as it might be called, would appropriately recognize and identify problem areas of low-value and wasteful practice, carry out rigorous scientific examina-

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tions of the factors that initiate and maintain such practices, and then employ evidence-based interventions to extinguish these practices.

In this commentary, we describe how this approach for de-implementation might require a different set of health systems supports, economic and non-economic levers, and behavior change techniques. A virtuous cycle is a complex set of events that are reinforced through a positive feedback loop, leading to an overall positive outcome. This dynamic cycle is the opposite of a vicious cycle, in which the complex chain of negatively reinforcing events leads to a negative outcome. Aspirationally, a cycle of removing or reducing low-value care to make room for high-quality care could then become a virtuous cycle of quality improvement that would help us all achieve high-value, high-quality health care, in harmony with the current efforts of implementation science.

A Behavioral Change Framework for De-Implementation

When we start viewing low-value care through the lens of a behavioral change framework, new insights can be gained into novel de-implementation interventions. A framework is a network of interlinked concepts, ideas, theories, and/or scientific knowledge that together can provide a comprehensive understanding of a phenomenon.[7] Behavioral change theory and science has provided decades of progress, and have identified basic behavioral mechanisms and processes[8] whereby behavior, whether of a patient, a provider, an organization, or a society, can be analyzed and altered.[9] A useful, comprehensive behavioral change science framework is provided by Kane and others.[10] In this framework, 14 domains were determined to be useful to consider or review before contemplating any behavior change: Knowledge; Skills; Social/Professional Role and Identity; Beliefs about Capabilities; Optimism; Beliefs about Consequences; Reinforcement; Intentions; Goals; Memory, Attention and Decision Processes; Environmental Context and Resources; Social Influences; Emotions; and Behavioral Regulation. Although all can be reviewed for their application to de-implementation science, we provide illustrative examples in the following sections from the domains of Reinforcement and Behavioral Regulation.

It is already well-accepted that behavioral regulation interventions can guide implementation of new protocols, such as instilling a habit of routine hand-washing when entering a patient's room. Behavior regulation implementation interventions focus on entraining behaviors that become habitual and automated for tasks that clinicians have the motivation and intention to perform, but often fail to enact consistently (eg, hand-washing or routinely evaluating gaps in guideline-concordant care). To implement a behavior, consistent and constant reinforcement is frequently recommended. To maintain a behavior, intermittent reinforcement is sometimes considered a better option, as it leaves the behavior less vulnerable to extinction, that is, less vulnerable to actually stopping. Thus, insight into the reinforcement used to start a habitual behavior may inform how hardy or resilient it will be to stopping that same behavior, if it is no longer indicated. For de-implementation, however, the challenge is to extinguish habitual behavior that emerged and was maintained because of ingrained training, convenience or alignment with institutional or payer incentives.

Currently, de-implementation practice has mainly focused on education and awareness, such as the Choosing Wisely Campaign[11] or appropriate use criteria advocated by professional societies and consumer organizations. Other de-implementation efforts have sought to link incentives to reductions in low-value care (eg, by rewarding providers who are less likely to prescribe antibiotics for upper respiratory infections). While these are important first steps, a more nuanced understanding of the evidence-based behavioral underpinnings of low-value care may lead to more effective interventions.

One behavioral change theory, classical conditioning[12] postulates that extinction does not remove previously learned habits, but instead requires new learning in specific contexts.[13] In other words, although a physician might read an article about over-prescription of antibiotics at lunch, the extinction lapses when he/she is facing that patient during an encounter later that afternoon, and he/she lapses into a return of the low-value behavior. An approach might then be to provide

the cue for the extinction behavior at the point of care. An example of this would be displaying an office poster, committing to not prescribing unnecessary antibiotics, to publicly remind the physician of his/her commitment to this new practice.[14]

Counter-conditioning is another way to increase the probability of de-implementation. Reinforcing with a monetary incentive for the lack of a behavior (eg, payment for not prescribing an unnecessary antibiotic) would be an example of counter-conditioning. As accountable care organizations replace fee-for-service models, there may be more opportunities for such counter-conditioning.

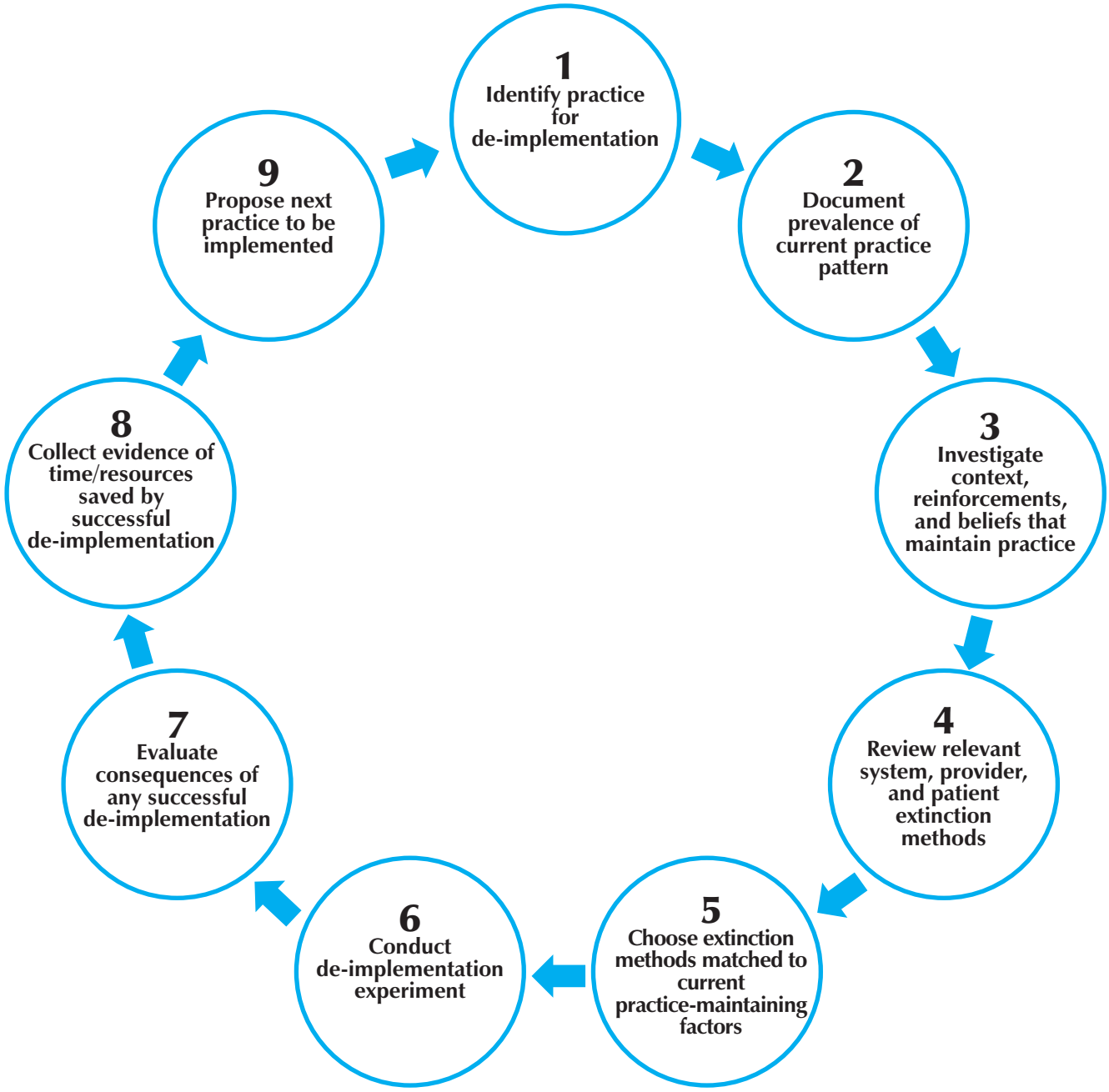

Figure 1. A positive feedback loop or virtuous cycle of de-implementation prior to implementation

Yet another option is to change the entire contingency schedule, ie, providing a fixed salary alters the way providers spend their time. However, there are clearly unforeseen negative consequences to some versions of this option, as was seen in health care maintenance organizations in the 1990s that presumed that paying a fixed amount would incentivize providers to do much less. Substitution is yet another way to successfully accomplish extinction of low-value practices or behaviors. For example, requesting that residents or other allied health care professionals conduct the differential diagnoses based on evidence, thus removing the possibility of ordering unnecessary lab or radiology tests, eliminates the possibility of habitually ordering stress tests on all patients presenting with chest pain. Finally, an interference paradigm is a fourth way to accomplish extinction. Hard stops with clinical reminders embedded in electronic health records, or context-driven decision support that steers clinicians away from low-value practices could overtime reinforce the correct behavior, and may play an especially important role during the education and training of young physicians.

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A more systematic approach to de-implementation will leverage such insights from behavior sciences, but will also incorporate current best practices for organizational change. We therefore provide a schema for a virtuous cycle of de-implementing prior to or while implementing, in the following phases. (Figure 1).

A Virtuous Cycle of De-Implementation Prior to Implementation

Phase 1. Identify Practice for De-implementation

A literature review of best evidence for low-value services and procedures, in consensus with practice guidelines, will aid in identifying the practice most in need of de-implementation. Focus groups with leaders and other key stakeholders will enrich the attention on the practices that are most feasible for de-implementation.

Phase 2. Document Prevalence of Current Practice Pattern

Empiric assessment, such as time-motion studies, direct observation, or modeling, will provide evidence that a possible behavior, identified as in need of de-implementation, is sufficiently prevalent and costly to be tested for de-implementation.

Phase 3. Investigate Context, Reinforcements, and Beliefs that Maintain Practice

Identify key drivers for maintaining low-value clinical activities, such as lack of up-to-date knowledge, clinical inertia, habit, or medical legal fears. Investigate the specific clinical contexts where the low-value clinical activities take place.

Phase 4. Review Relevant System, Provider, and Patient Practice Extinction Methods

Review relevant and feasible behavioral change mechanisms, including altering or removing reinforcements to the behavior, engaging in extinction techniques, or providing appropriate nudges, such as better aligned incentives, decision support, or judiciously placed reminders or educational materials.

Phase 5. Choose Extinction Methods Matched to Current Practice-Maintaining Factors

Depending on key drivers, and the above review of behavioral change techniques, select the best behavioral change intervention(s) to be tested, and design an experiment appropriate to rigorously test if the practice can be effectively removed or de-implemented from current practices.

Phase 6. Conduct De-implementation Experiment

Leverage insights from implementation science, such as how to best engage stakeholders, how to identify barriers and facilitators, and

how to best design an experiment on a large scale to test the intervention to eliminate low-value care.

Phase 7. Evaluate Consequences of Successful De-implementation

Evaluate impact and outcome of de-implementation experiment by measuring changes in low-value care and estimates of time/cost analyses that could help to determine the potential of de-implementation. The results of the experiment will generate further impetus for de-implementation.

Phase 8. Collect Evidence of Time/Resources Saved by the Successful De-implementation

To include any resources that could be saved by successful de-implementation.

Phase 9. Propose Next Practice to Be Implemented

Align de-implementation initiatives withconcurrentinterventionstoadaptevidence-based, high-quality clinical care.

Conclusions

We advise clinicians to stop clinical practices that are contraindicated, unproven or based on insufficient scientific evidence, but we rarely apply a scientific approach to this admonition.[15,16] In this commentary, we offer the radical idea that we should take something away from the workload of clinicians, employing empirically supported approaches for de-implementation, before asking clinicians to add something new to their workload. The behavioral change framework and virtuous cycle presented here provide an opportunity to advance de-implementation science. They highlight the importance of first identifying the large amount and quantity of low-value care that is provided, then systematically examining the myriad factors at the patient, provider and health care system levels that exist to maintain low-value care. The framework also elucidates the fundamental behavioral change techniques that can be tested to promote elimination of low-value clinical behavior, thereby making room for implementation of evidence-based practices.

We believe that a new focus on de-implementation science can have a substantial impact on the health care system. Health care delivery has become increasingly complex, in part due to advances in medical science and technology. Yet scant attention has been paid to how we might eliminate or retire outdated practices that are no longer clinically relevant. At the population level, a deliberate, thoughtful effort to engage in de-implementation could improve patient outcomes, reduce health care costs, and improve provider job satisfaction while decreasing burnout. More evidence-based approaches, based on sound research, is needed to further advance the science and practice of de-implementation. In this way, a thoughtful, virtuous cycle of de-implementation might finally allow us to re-engage with the physicians at the frontlines, who all too often have been admonished for doing too much in too little time.

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Conflict of Interest

No conflicts of interest to report.

Author Contributions

Research concept and design: Davidson, Ye; Manuscript draft: Davidson, Ye, Mensah; Administrative: Davidson, Ye, Mensah

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