



## City Research Online

### City, University of London Institutional Repository

---

**Citation:** Patey, A. M., Grimshaw, J. M. & Francis, J. J. (2023). The big six: key principles for effective use of Behavior substitution in interventions to de-implement low-value care. *JBIEvidence Implementation*, 21(2), pp. 115-119. doi: 10.1097/xeb.0000000000000351

This is the published version of the paper.

This version of the publication may differ from the final published version.

---

**Permanent repository link:** <https://openaccess.city.ac.uk/id/eprint/31837/>

**Link to published version:** <https://doi.org/10.1097/xeb.0000000000000351>

**Copyright:** City Research Online aims to make research outputs of City, University of London available to a wider audience. Copyright and Moral Rights remain with the author(s) and/or copyright holders. URLs from City Research Online may be freely distributed and linked to.

**Reuse:** Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge. Provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

---

---

---

City Research Online:

<http://openaccess.city.ac.uk/>

[publications@city.ac.uk](mailto:publications@city.ac.uk)

---

OPEN

# The big six: key principles for effective use of Behavior substitution in interventions to de-implement low-value care

Andrea M. Patey,<sup>1,2</sup> Jeremy M. Grimshaw<sup>1,3</sup> and Jill J. Francis<sup>1,2,4</sup>

<sup>1</sup>Centre for Implementation Research, Ottawa Hospital Research Institute – General Campus, Ottawa, Ontario, Canada, <sup>2</sup>School of Health Sciences, City, University of London, 10 Northampton Square, London, United Kingdom, <sup>3</sup>Faculty of Medicine, University of Ottawa, Ottawa, Ontario, Canada, and <sup>4</sup>School of Health Sciences, University of Melbourne, Melbourne, Victoria, Australia

## ABSTRACT

Healthcare professionals provide care to help patients; however, sometimes that care is of low value – at best ineffective and at worst harmful. To address this, recent frameworks provide guidance for developing and investigating de-implementation interventions; yet little attention has been devoted to identifying what strategies are most effective for de-implementation. In this paper, we discuss Behavior substitution, a strategy whereby an unwanted behavior is replaced with a wanted behavior, thereby making it hypothetically easier to reduce or stop the unwanted behavior. We discuss why Behavior substitution may be a useful de-implementation strategy, and why it may not be suitable for all circumstances. On the basis of the body of knowledge in behavioral science, we propose a list of principles to consider when selecting a substitute behavior for a de-implementation intervention. Applying these principles should increase the likelihood that this technique will be effective in reducing low-value care.

**Key words:** Behavior substitution, de-implementation, health professional behavior change, intervention design, low-value care, technique

*JBI Evid Implement* 2023; 21:115–119.

### What is known about this topic?

- Healthcare professionals provide care to help patients; however, sometimes that care is of low value – at best ineffective and at worst harmful.
- Behavior substitution has been identified as a common technique for de-implementing behavior.
- The assumption that Behavior substitution may be inherently easier to apply than other techniques for de-implementation has not been tested empirically.

### What does this article add?

- We discuss why Behavior substitution may be a useful de-implementation strategy, and why it may not be suitable for all circumstances.

- We propose a list of principles that practitioners and researchers could consider when selecting an alternative behavior to replace the behavior being de-implemented.
- The principles proposed provide researchers with a comprehensive list of questions to consider when selecting substitute behaviors. Applying these principles to de-implementation interventions that include Behavior substitution may increase the likelihood that this technique will be effective in reducing low-value care.

## Background

De-implementation initiatives have focused on reducing inappropriate healthcare.<sup>1</sup> Conceptual frameworks about de-implementation provide systematic guidance for developing and evaluating de-implementation interventions.<sup>2</sup> However, less attention has focused on identifying what strategies are best suited for de-implementation.

Behavior substitution, a behavior change technique whereby an unwanted behavior is replaced with a wanted behavior<sup>3</sup> may be an effective strategy for de-implementation. It has been noted that Behavior

**Correspondence:** Andrea M. Patey, Ottawa Hospital Research Institute – General Campus, Ottawa, ON, Canada K1H 8L6. Tel: +1 613 737 8899; e-mail: apatey@ohri.ca

This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

DOI: 10.1097/XEB.0000000000000351

substitution is a unique type of strategy for de-implementation, separate from removing or reducing a behavior, which requires minimum criteria for deciding when to use it.<sup>4,5</sup> However, there has been little discussion about how to select substitute behaviors. In this article, we discuss why and when Behavior substitution may be a useful de-implementation strategy and why it may not be suitable for all circumstances. Finally, we propose a list of principles for selecting substitute behaviors, which should be considered when considering Behavior substitution as a de-implementation strategy.

### **A technique for de-implementing low-value care**

A recent systematic review of de-implementation interventions found that Behavior substitution is commonly used to de-implement low-value care.<sup>6</sup> One benefit of using Behavior substitution is that this strategy may be more acceptable to healthcare professionals (HCPs) than current ways to reduce low-value or harmful care, which may be more punitive and extreme (e.g. financial penalties, medical practice sanctions, or restrictive measures).<sup>7</sup>

Behavior substitution makes theoretical sense. It may be attractive for HCPs who are trained to be action-oriented and are uncomfortable with the option of appearing to do nothing during patient consultations or in response to patient need. HCPs who fail to act are more likely to experience regret and blame than those who acted ineffectively. Cognitive psychology research suggests that, when previous inactions led to negative outcomes, the negative consequences of continuing to do nothing can lead to greater regret than the negative consequences associated with doing something, called the 'inaction effect'.<sup>8</sup> Behavior substitution also has a long history of being effective when used with positive reinforcement (i.e. providing a reward conditional on performance of the behavior), in the field of Applied Behavior Analysis.<sup>9,10</sup>

### **Potential challenges to using Behavior substitution**

Despite the appeal of using Behavior substitution for de-implementation, it comes with a number of challenges. First, there do not appear to be established methods for selecting appropriate substitute behaviors. Researchers may intuitively or pragmatically select a behavior within each context, without articulating a rationale, resulting in no collective learning for identifying substitute behaviors. Alternatively, HCPs could individually decide what to do in place of the undesired behavior. For example, in a trial in which general practitioners were asked to reduce prescribing of antibiotics for patients

with upper respiratory tract infections (URTI), instead of suggesting a substitute behavior, the target behavior was framed as 'manage patients with URTI without prescribing an antibiotic'.<sup>11</sup> The problem with this is that, by leaving the choice of substitute behavior vague, the clinician may perform other actions that are equally unnecessary and potentially harmful (e.g. ordering a chest x-ray to rule out pneumonia). Replacing the unwanted behavior with a different form of low-value care would not be helpful.

Behavior substitution may not be an appropriate solution for all low-value care. When there is no clear clinical behavior to substitute, it may not be helpful to ask HCPs do something else instead; this would only burden them with another behavior. An example is unnecessary test ordering. If there is no clear clinical behavior to substitute, HCPs may need to focus on the nontechnical function of the low-value behavior, such as patient reassurance. Otherwise, they may be less inclined to consider a redundant substitute behavior and continue providing the low-value care.

Using Behavior substitution with positive reinforcement<sup>10</sup> may lead to unintended consequences of reducing other desirable behaviors by prioritizing the rewarded behavior. Nonincentivized clinical activities may not receive the same attention as incentivized activities.<sup>12</sup> In the context of time constraints, when certain behaviors are rewarded, HCPs may inadvertently reduce the rate of performing unrewarded, but desirable, clinical behaviors. Hence, we suggest that reinforcement should be used with caution and the full range of potential consequences should be monitored.

### **Proposed principles for selecting substitute behaviors**

To systematically specify substitute behaviors for de-implementation interventions, we propose six principles (Table 1), derived from the Theoretical Domains Framework (TDF) of behavior change.<sup>13</sup> The principles provide a foundation for *a priori* selection of the most appropriate substitute behavior. It is not meant to be an exhaustive list as there may be unique contextual concerns in the clinical setting; rather it is a basis for addressing the more common issues that may occur. The principles proposed address 7 of the 12 domains in the TDF and may increase the likelihood the selected substitute behavior is performed.

First, the substitute behavior should have a *strong evidence-based or clinical rationale*. The evidence should suggest that the substitute behavior achieves better or equivalent patient outcomes than the undesirable behavior. If the proposed substitute behavior is neutral in its clinical effectiveness, it still may not be the best behavior to use because it potentially involves replacing

**Table 1. Principles, with questions to consider and examples, for selecting a substitute behavior for de-implementation interventions**

Themes	Principle (derived from TDF domain)	Questions for practitioner/policymaker/researcher	Example
Evidence and rationale	Identify a substitute behavior that has a clinical rationale or strong evidence base for its use ( <i>Knowledge, Memory attention and decision processes, Beliefs about consequences</i> )	Is there an evidence base that supports a different behavior to perform in place of the undesired behavior?	Using intermittent auscultation instead of electronic fetal monitoring for fetal surveillance during labor is associated with decreased caesarean sections and instrumental births and may positively impact the pregnant person's coping strategies. Intermittent auscultation may be an acceptable alternative to continuous fetal monitoring
Objective	Identify a substitute behavior that serves the clinical objective (patient outcome) and serves the practical objective (e.g. satisfy the patient that they have been taken seriously; offer symptom relief) ( <i>Beliefs about consequences, Social influences, Memory, attention and decision processes</i> )	Are patient expectations and needs likely to be met by doing the substitute behavior?	In the case of a patient with acute back pain, the HCP's outcome goal may be to reduce the patient's level of pain, whilst the behavioral goal may be to reduce the number of X-rays for acute low back pain. Instead of completing a requisition form for an X-ray, the physician may give the patient educational materials with symptom relief strategies
Ease to explain	Identify a substitute behavior that is easily explainable to patients ( <i>Beliefs about capabilities, Social influences, Beliefs about consequences</i> )	Is the HCP able to explain to the patient why they are doing 'x' instead of 'y'?	Providing a viral prescription, which is similar in format to a drug prescription, except it explains the symptoms of an upper respiratory tract infection (e.g. common cold) and also provides management strategies instead of prescribing antibiotics for sore throat, will address the patient's concern and validate their illness, whilst eliminating the use of antibiotics
Time	Identify a substitute behavior that is no more time-consuming than the undesired behavior ( <i>Environmental context and resources, Beliefs about consequences</i> )	Will the substitute behavior take up more time for the HCP; will they have to neglect other duties?	An alternative to order red blood cells (RBC) transfusion for patients with anemia in hospital is to order intravenous iron transfusions, which will likely take a similar amount of time as ordering RBC transfusion. The patient will still require the same level of monitoring, the ordering process is similar, and the HCP will follow similar duties
Fit with skills	Identify a substitute behavior that has good fit with existing skills ( <i>Skills, Beliefs about capabilities</i> )	Will HCPs have to learn a new skillset, or do they already have the skills necessary to perform the substitute behavior?	Ordering intravenous iron instead of ordering RBC transfusion will likely require a skillset the HCP already has – involving the action of identifying anemia in a patient and ordering, which are the same skills used when ordering an RBC transfusion. Therefore, the HCP is not required to learn new techniques
Cost	Identify a substitute behavior that is no more expensive to perform than the undesired behavior ( <i>Environmental context and resources, Beliefs about consequences</i> )	Will the organization accrue extra costs for the HCP to perform the substitute behavior?	For patients with anemia in hospital, ordering intravenous iron transfusions as an alternative to red blood cell transfusions can not only reduce unnecessary red blood cell unit transfusion, but also reduces hospitalization, re-transfusion, length of stay and costs. These factors may be appealing to a hospital organization as they target patient safety and likely reduce cost

HCP, health care professional; TDF, Theoretical Domains Framework.

one low-value care behavior with another low-value care behavior.

The substitute behavior should serve *both the clinical objective and practical objective*. It may be beneficial to frame the change in behavior on the outcome goal (what the behavior is likely to achieve, e.g. validate patient concerns, signaling the end of a consultation) rather than the behavior goal (e.g. decreasing the original behavior), but this is likely to be context-specific. The

substitute behavior should also share some of the superficial attributes of the original behavior (e.g. giving the patient an item, such as a leaflet that suggests strategies for symptom management). Consequently, the patient will recognize this new behavior as having the same 'social' or nontechnical function as the original behavior.

The substitute behavior should *be easily explainable to patients*. HCPs may have to consider that the patient's

goal may be different from their own goals. The patient's goal may be to be certain that their concerns are being acknowledged and addressed appropriately. Providing a tangible object (e.g. leaflet), explaining symptoms, and providing management strategies can address the patient's concern and validate their illness, whilst eliminating the use of low-value care. Additionally, if the patient has had experience of previous low-value care, they may be uncertain why the HCP is doing something different. Having an easily accessible explanation (e.g. informal 'script' to explain the rationale for a different approach that is acceptable to patients) would be helpful in maintaining a positive clinician–patient relationship.

The substitute behavior should *be no more time-consuming to perform* than the undesired behavior. The perceived time-consuming nature of a substitute behavior may lead HCPs to think they may have to neglect other tasks that are critical in the delivery of care.

A fifth point to consider is that the substitute behavior should have *a good fit with existing skills*. Substitute behaviors that align with HCPs' current skillsets would have a greater likelihood of uptake, because the HCP would not have the burden of learning new skills.

From a systems perspective, a substitute behavior should be *no more expensive to perform than the undesired behavior*. Healthcare systems continue to try to balance cost efficiencies whilst maintaining high-quality care. Clinical practices that improve quality of care and are on par with current practice may be appealing to the administrators. If substitute behavior cost is higher than the undesired behavior, and the outcomes are similar, organizations may maintain the status quo.

## Conclusion

In order to prevent the continued use of ineffective and harmful healthcare practices, effective strategies for de-implementation are needed. Behavior substitution may have practical and theoretical advantages for de-implementing low-value care but requires empirical testing. However, testing without guidance about what substitute behavior to use may be premature. The six principles we propose include a comprehensive list of questions to consider, increasing the likelihood of appropriate application of Behavior substitution, improving the care that patients receive, and advancing the science of de-implementation.

## Acknowledgements

The views expressed in this article are those of the authors and may not be shared by the funding body.

We would like to thank Dr Catherine Hurt for guidance, support, and supervision throughout the doctoral project. We would also like to thank Dr Justin Presseau and Dr Khara Sauro for comments on earlier drafts of this article.

Funding: this manuscript was part of a doctoral program of research (A.M.P.), funded by City, University of London Doctoral Scholarship. J.M.G. holds a Canada Research Chair in Health Knowledge Transfer and Uptake.

Authors' contributions: A.M.P. conceived the commentary, under the supervision of J.J.F. and J.M.G. A.M.P. wrote the manuscript and the authors commented on the sequential drafts of the article. All authors reviewed and agreed upon the final manuscript.

## Conflicts of interest

There are no conflicts of interests.

## REFERENCES

1. Born K, Patey A, Grimshaw J, Levinson W. Letter in response to: 'CJEM Debate Series: # Choosing Wisely – The Choosing Wisely campaign will not impact physician behaviour and choices'. *CJEM* 2018; 20: 1.
2. Grimshaw JM, Patey AM, Kirkham KR, et al. De-implementing wisely: developing the evidence base to reduce low-value care. *BMJ Qual Saf* 2020; 29: 409–17.
3. Michie S, Richardson M, Johnston M, et al. The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. *Ann Behav Med* 2013; 46: 81–95.
4. Working smarter not harder: coupling implementation to de-implementation. Wang V, Maciejewski ML, Helfrich CD, Weiner BJ, editors. *Healthcare*. Amsterdam, Netherlands: Elsevier, 2018.
5. Norton WE, Chambers DA. Unpacking the complexities of de-implementing inappropriate health interventions. *Implement Sci* 2020; 15: 1–7.
6. Patey AM, Grimshaw JM, Francis JJ. Changing behaviour, 'more or less': do implementation and de-implementation interventions include different behaviour change techniques? *Implementation Science* 2021; 16: 1–17.
7. DuBois JM, Anderson EA, Chibnall JT, et al. Preventing egregious ethical violations in medical practice: evidence-informed recommendations from a multidisciplinary working group. *J Med Regul* 2018; 104: 23–31.
8. Zeelenberg M, Van den Bos K, Van Dijk E, Pieters R. The inaction effect in the psychology of regret. *J Pers Soc Psychol* 2002; 82: 314.
9. Dillenburger K, Keenan M. None of the As in ABA stand for autism: dispelling the myths. *J Intellect Dev Disabil* 2009; 34: 193–5.
10. Patey AM, Hurt CS, Grimshaw JM, Francis JJ. Changing behaviour 'more or less' – do theories of behaviour inform

- strategies for implementation and de-implementation? A critical interpretive synthesis. *Implement Sci* 2018; 13: 134.
11. Eccles MP, Grimshaw JM, Johnston M, *et al.* Applying psychological theories to evidence-based clinical practice: identifying factors predictive of managing upper respiratory tract infections without antibiotics. *Implement Sci* 2007; 2: 26.
  12. Maisey S, Steel N, Marsh R, *et al.* Effects of payment for performance in primary care: qualitative interview study. *J Health Serv Res Policy* 2008; 13: 133–9.
  13. Michie S, Johnston M, Abraham C, *et al.* Making psychological theory useful for implementing evidence based practice: a consensus approach. *Qual Saf Healthc* 2005; 14: 26.