

LESS IS MORE IN ICU



De-implementing low value care in critically ill patients: a call for action—less is more

Henry T. Stelfox^{1,2,3,4*} , Annette M. Bourgault^{5,6} and Daniel J. Niven^{1,2,3,4}

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“More care is not always better [1].” As clinicians we are tasked with caring for patients while doing no harm. The pursuit of our mission has historically been driven by iteratively implementing new innovations designed to improve healthcare. Patients have benefited from this approach; however, an unintended consequence has been an increased number of clinical practices, some of which are low-value. A low-value practice is a practice for “which evidence suggests it confers no or very little benefit for patients, or the risk of harm exceeds probable benefit, or, more broadly, the added costs of the intervention do not provide proportional added benefits [2].” The use of low-value practices compromises healthcare by increasing the complexity of care, exposing patients to unnecessary risks and adverse events, misallocating valuable resources, and potentially delaying treatment for other patients [3, 4]. These challenges are increasingly recognized in the care of critically ill patients whose management is often resource intensive.

Reducing low-value care should be integrated into evidence-based practice and facilitated by implementation science. However, data suggest that reducing use of an engrained clinical practice is more difficult than increasing the use of a new effective practice [5, 6]. Clinicians subjectively assign value to clinical practices and experience cognitive biases (e.g., recall bias—the last patient I

treated did well) both of which create psychological barriers that require active unlearning [7]. This is especially likely within intensive care units (ICU) wherein owing to high risk of patient death, the physiologic and technophilic nature of critical care clinicians, the interdisciplinary care that permits multiple opinions to influence decision-making, and the visceral approach of ‘doing everything’ may provide a unique barrier to reducing low-value care [8]. For example, the use of pulmonary artery catheters in critically ill patients did not decrease until several randomized clinical trials (RCTs) reported a lack of efficacy [9, 10]. Perhaps more illustrative is the negligible change in glycemic control practices following NICE-SUGAR that reported tight glycemic control to increase 90-day mortality [5]. Additional studies evaluating changes in low-value care are summarized in Table 1. Although these studies do not permit distillation of a ‘one size fits all’ approach, it is increasingly clear that to reduce low-value care in critical care, initiatives need robust, objective methods that systematically consider and adapt to available evidence, actively work to change clinician behaviour, and build upon implementation science.

Compared to conventional implementation science, where many conceptual models and frameworks exist to facilitate implementation, few models have been proposed to facilitate de-implementation (also described as de-adoption) [11]. Norton et al. proposed a five-level model that includes the level of evidence defining a practice as low-value, whether the practice is harmful or ineffective, the de-implementation intervention goal (reduce, replace, remove, restrict), specific barriers and facilitators, and the intervention target (patient, clinician, etc.) [12]. Niven et al. used data from a scoping review to adapt a contemporary implementation science model to

*Correspondence: tstelfox@ucalgary.ca

¹ Department of Critical Care Medicine, Cumming School of Medicine, McCaig Tower, University of Calgary, 3134 Hospital Drive NW, Calgary, AB T2N 5A1, Canada

Full author information is available at the end of the article

Table 1 Example studies that have examined or facilitated the de-implementation of low-value care among critically ill adults

Low-value clinical critical care practice	Studies examining de-implementation of low-value practice	De-implementation mechanism	Main result
Passive diffusion of knowledge			
Daily chest radiographs among mechanically ventilated patients	Gershengorn et al. [19]	Passive diffusion of RCT evidence	3% relative decrease in daily chest radiograph following updated guidelines in 2011
Inhaled nitric oxide for ARDS	Munshi et al. [20]	Passive diffusion of RCT evidence	No significant decrease in use of inhaled nitric oxide between 2008–2013
Pulmonary artery catheter	Wfener et al. [10]	Passive diffusion of RCT evidence	65% relative decrease in PAC utilization between 1993 and 2004
	Koo et al. [9]	Passive diffusion of RCT evidence	60% relative decrease in PAC utilization between 2002 and 2006
	Gershengorn and Wunsch [21]	Passive diffusion of RCT evidence	43% relative decrease in PAC utilization between 2002 and 2006
Tight glycemic control			
	Niven et al. [5]	Passive diffusion of RCT evidence	No significant decrease in tight glycemic control following publication of NICE-SUGAR
Active interventions			
Albumin for fluid resuscitation	Lyu et al. [15]	Multi-component de-implementation intervention: (1) audit/feedback; (2) financial disincentives; (3) guideline update; (4) order process change	42% relative decrease in albumin utilization 2011–2014; \$2.5 M cost savings
Drotrecogin alfa for severe sepsis	Kahn and Le [14]	Multiple: (1) passive diffusion of RCT evidence and guidelines; (2) financial disincentives; (3) market withdrawal of drotrecogin alfa	Prior to market withdrawal (2011), the end of a technology add-on payment was associated with greatest reduction in use of drotrecogin alfa
Urinary catheters	Menegueti et al. [22]	Multi-faceted interdisciplinary approach: (1) education; (2) checklists	Decrease from 14.9 to 1.1 catheter-associated urinary tract infections per 1000 catheter-days, over a 12-year period, 2005–2016.

RCT randomized controlled trial, ARDS acute respiratory distress syndrome

propose a model for facilitating de-implementation [13]. In addition to suggesting users adapt typical steps in a behaviour change cycle to de-implementation, this model emphasizes early stakeholder engagement, and objective identification and prioritization of low-value practices. Active behavioural change interventions in critical care have resulted in a reduction in low-value care. An extreme example is the market withdrawal of drotrecogin alfa following the PROWESS-SHOCK trial that demonstrated no survival benefit and increased bleeding risk [14]. A less extreme example is the de-implementation intervention used to reduce albumin for fluid resuscitation [15]. A multi-faceted intervention consisting of audit-and-feedback, financial incentives, guidelines, and order process changes resulted in significant decreases in albumin utilization and an estimated cost savings of nearly 2.5 million USD.

The care of critically ill patients provides additional considerations for de-implementation. Critically ill patients typically receive care from a wide variety of inter-professional teams, which implies that interprofessional de-implementation efforts may be the most beneficial. For example, would initiatives to de-implement low-value medications be more effective if coordinated across those who prescribe (i.e., physicians, nurse practitioners, physician assistants), those who advise prescribers (i.e., pharmacists) and those who administer medications (i.e., bedside nurses) [16]. Evidence beyond the ICU suggests that engaging patients through direct education, shared decision-making, and media campaigns may be effective strategies for reducing low-value care. This may not be feasible for critically ill patients; however, it does raise questions regarding the role of patients and/or their surrogate decision-makers in avoiding exposure to low-value care. Finally, consideration should be given to how de-implementation can be incorporated into increasingly complex healthcare systems. Intensive care units are at the forefront of learning healthcare systems because of their organizational structures, focus on quality improvement, and advanced state of clinical information systems. Can de-implementation be incorporated as a natural by-product of healthcare's evolution towards learning healthcare systems?

Low-value care represents an important challenge to the quality of care we provide critically ill patients. It is common, embedded within our established clinical practices, changes over time and has potentially important impacts on patient care, patient health and costs. To complicate matters current financial incentives in research and clinical care are primarily designed to encourage "more care". Science has demonstrated that passive diffusion of knowledge is ineffective in changing care practices. Rather, we need structured approaches

that include periodic evaluations of our care practices, the science underpinning those practices and implementation science methods tailored to local contexts. Conversely, by being mindful of what practices we implement into care and our confidence in the science underpinning them (i.e., ideally reproducible studies at low risk of bias), we can reduce the frequency with which we need to de-implement low-value care practices that were once thought to be high-value [17]. Not only does oscillating between implementation and de-implementation adversely affect patient care, it risks disengaging clinicians from quality improvement—a risk we cannot afford. Historically we have focused on what else we can do to help our patients. Now is the time to recognize that "more care is not always better" and to ensure that the practices we implement are intended to be high-value and to stop doing things that we have learned are low-value [1, 2, 18].

Author details

¹ Department of Critical Care Medicine, Cumming School of Medicine, McCaig Tower, University of Calgary, 3134 Hospital Drive NW, Calgary, AB T2N 5A1, Canada. ² Department of Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, Canada. ³ O'Brien Institute for Public Health, Cumming School of Medicine, University of Calgary, Calgary, Canada. ⁴ Alberta Health Services, Alberta, Canada. ⁵ College of Nursing, Academic Health Sciences Center, University of Central Florida, Orlando, FL, USA. ⁶ Orlando Health, Orlando, FL, USA.

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