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Default options in the ICU: widely used but insufficiently understood

Joanna Hart^a and Scott D. Halpern^{a,b}

^aDivision of Pulmonary, Allergy and Critical Care Medicine, Leonard Davis Institute of Health Economics and Fostering Improvement in End-of-Life Decision Science (FIELDS) Program at the Perelman School of Medicine, Philadelphia, Pennsylvania, USA

^bCenter for Epidemiology and Biostatistics and Department of Medical Ethics and Health Policy, University of Pennsylvania, Philadelphia, Pennsylvania, USA

Abstract

Purpose of review—Default options dramatically influence the behavior of decision makers and may serve as effective decision support tools in the ICU. Their use in medicine has increased in an effort to improve efficiency, reduce errors, and harness the potential of healthcare technology.

Recent findings—Defaults often fall short of their predicted influence when employed in critical care settings as quality improvement interventions. Investigations reporting the use of defaults are often limited by variations in the relative effect across sites. Preimplementation experiments and long-term monitoring studies are lacking.

Summary—Defaults in the ICU may help or harm patients and clinical efficiency depending on their format and use. When constructing and encountering defaults, providers should be aware of their powerful and complex influences on decision making. Additional evaluations of the appropriate creation of healthcare defaults and their resulting intended and unintended consequences are needed.

Keywords

behavioral economics; choice behavior; communication; critical care; decision making

INTRODUCTION

Caring for critically ill patients requires nearly constant decision making. Ideally, decision makers carefully consider the risks and benefits of each choice before settling on the option that maximizes the patient's well-being. However, the emotions and time pressures of the ICU may exacerbate social and contextual barriers to rational choice [1]. Using a default

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Correspondence to Joanna Hart, Gates Building, 5044, 3400 Spruce Street, Philadelphia, PA 19104, USA. Tel: +1 215 662 2845; Joanna.Hart@uphs.upenn.edu.

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option, or a set of 'events or conditions that will be set in place if no alternatives are actively chosen' [2], may help decision makers overcome these barriers. When defaults are set, decision makers remain free to choose an alternative. However, evidence from predominantly nonmedical contexts suggests that far more individuals will stick with the preselected choice than would have opted for that choice without the default [3–7].

Although defaults can benefit decision makers and patients when used appropriately, they may also have unintended consequences. Thus, persons in positions to set defaults in the ICU should understand the mechanisms by which defaults exert their influence. We will review how defaults influence decisions, suggest important considerations before using defaults, and summarize the current use of defaults in the ICU and related settings.

THE POWER OF THE DEFAULT OPTION

Default options dramatically influence the behavior of decision makers, particularly in the absence of strong preferences. Across many domains, individuals are far more likely to choose the default option, even when confronted with decisions that seem highly dependent on personal values such as end-of-life care.

The 'pull' of the default may be mechanical, belief-based, or psychological (Table 1) (U. Simonsohn, 8 April 2014, personal communication with J.L. Hart). Default options reduce the effort required to make decisions by allowing individuals to avoid actively choosing; indeed, in the presence of defaults, individuals need not even attend to the fact that a decision is being made. The amount of effort saved is dependent on the decision itself. With increasing complexity, the default option further reduces the cost of the decision making. Similarly, remaining with the default is more likely when choosing an alternative would require a significant amount of effort.

Belief-based phenomena also contribute to the disproportionate preference for the default option. The preselected choice may appear to be a recommendation, which is particularly true when the person or organization providing the default option is thought to be trustworthy. Additionally, decision makers may believe the default option reflects social or prescriptive norms.

Remaining with the default may also protect decision makers from future psychological harm. By choosing an alternative, the decision maker assumes more personal responsibility for future outcomes. Therefore, people who are particularly averse to risk or regret may seek the protection of the default option as they anticipate potential negative outcomes.

CONSIDERATIONS PRIOR TO USE

In critical care, there are many potential 'choice architects,' or parties responsible for influencing choice. These include medical directors of the ICU, nurse managers, directors of respiratory or physical therapy, and individual clinicians. In the ICU, the choice architects who set defaults should aim to maximize the welfare of the majority of patients to whom the default would apply, and assume responsibility for negative outcomes of 'defaulted' choices. Default options exert strong influence over a decision maker's choice, which may be

concerning in healthcare settings. To preserve choice and autonomy, all options should be clearly presented and equally available.

Assuming the role of choice architect

Because any manner of framing a choice (with or without default options) has consequences, the choice architect must evaluate the risks and benefits of encouraging choices that decision makers might not prefer, with those of failing to encourage choices that decision makers would prefer. For example, cardiopulmonary resuscitation (CPR) may be justified as the default approach for patients suffering in-hospital cardiac arrest because overall the frequency and magnitude of harms of providing unwanted CPR may be small relative to those associated with failing to provide desired CPR. In cases where individual patients' health states and preferences may influence the propriety of the default, choice architects should also ensure that ample opportunities exist for patients to opt away from the default.

Choosing appropriate settings

Most critical care decisions require careful deliberation, which a default option may truncate or bypass. When one option provides clear benefits for a large majority of patients, offering a default option may effectively and efficiently guide behavior. In contrast, when the optimal choice is uncertain, providing a default option may lead to suboptimal decision making. Defaults in healthcare may be especially problematic, as the 'best choice' may depend on the patient's individual characteristics, such as clinical condition or values.

Customized defaults may overcome this by modifying the option set on the basis of patient-specific information [8]. But it may be preferable to try to avoid defaults altogether when the very process of engaging in decision making is important. For example, when CPR carries a high likelihood of harm and negligible opportunity for benefit, offering a care plan that does not include CPR as the default may decrease burdens on decision makers and improve the overall quality of care. But when both a transition to comfort-based care and a time-limited trial of aggressive critical care are reasonable options, avoiding defaults entirely may engage patients or surrogates in expressing their values, thereby enabling clinicians to provide more individualized guidance on which care plans may best promote those values.

Presenting the default

Responsible use of defaults requires a carefully constructed presentation of the decision that includes all available choices. Because a default option results in a particular action without any active participation by the decision maker, individuals encountering a default may be unaware of the decision or perceive that they have no choice. To preserve autonomy, it is important that decision makers readily appreciate that they are engaging in decision making, and that multiple options exist. Based largely on this reasoning, the Institute of Medicine concluded in 2006 that to change the organ donation default in the United States from an opt-in to an opt-out system, a massive public education campaign would be required to ensure adequate awareness that decisions were being made [9].

Additionally, selecting an alternative choice should not be prohibitively difficult. Although deviating from the default will always require additional action, the effort and persistence required to make an alternative choice should be proportional to the degree to which other choices may be preferable for some patients. A nearly costless deviation from the default option, such as unselecting venous thromboembolism prophylaxis (VTEP) from a default admission order set, may be minimally paternalistic [8]. By contrast, a procedural or substantive barrier – such as requiring that physicians type an explanation to unselect such prophylaxis – may be used to ensure that the alternative is selected wisely and not because of decision making errors. These barriers require more significant effort to overcome the ‘pull’ of the default when the choice architect anticipates that such deviation may result in harm for most patients.

RECENTLY EXAMINED USE OF DEFAULTS IN CRITICAL CARE MEDICINE

In the past decade, the healthcare community has embraced tools intended to increase efficiency and decrease errors, including defaults [10]. Unfortunately, formal evaluations of these defaults prior to implementation and following use have been limited. Therefore, the intended and unintended consequences of most default options in the ICU have not been fully examined. Here, we review recent studies of defaults in the ICU, including order sets and protocolized care, technological prompts, and communication strategies.

Order sets and protocols

Diagnosis-specific order sets and care protocols are intended to streamline the decision making process and reduce errors. Rather than identifying each individual care component, providers rely on order sets or ‘bundles.’ ICUs may make these available for a variety of clinical situations including septic shock [11,12], diabetic ketoacidosis [13–16], alcohol withdrawal [17,18], VTEP [19], sedation management [20–23], and ventilator management [22,24–29]. Such protocolized care may also create a standard unit-based practice that bedside professionals (e.g., nurse or respiratory therapist) implement or override as needed. These have been used in the prevention of device-related infections [25–34] and nutrition management [35–37].

In an effort to reduce catheter-associated urinary tract infections, Parry *et al.* [38] implemented an order set for physicians that linked initial catheter orders, nursing protocols, and daily forced active choices to maintain or discontinue the catheter. With accompanying educational efforts, catheter use and catheter-associated urinary tract infections decreased significantly over a 36-month period, although the authors detected wide differences in the effect across care units.

By contrast, a cluster randomized trial in 18 ICUs that changed the default enteral nutrition provided to 1059 mechanically ventilated patients found no substantial increase in the proportion of patients achieving goal nutrition delivery [37]. Similarly, despite promising evidence in adult populations, a recent systematic review of the use of protocolized mechanical ventilation weaning in children found no improvements in patient outcomes [39].

Together, these data suggest that simply implementing protocols that change defaults may be insufficient to overcome practice patterns. When choice architecture is neglected, defaults may lose power [19,40,41]. Therefore, for defaults to exert their maximal and intended effects, they must be created and implemented with clear attention to exactly how they may change behaviors.

Order sets may also lead to unintended consequences on patient care and medical education [17,19,42–45,46■,47,48■]. For example, Khanna *et al.* [46■] recently showed that a standard admission order set increased inappropriate VTEP use. Additionally, Yu *et al.* [48■] found that implementation of standard admission order sets did not improve short-term knowledge of best practices among 39 trainees, raising concerns that such changes might have adverse impacts on long-term knowledge by decreasing trainees' engagement in clinical decision making. As defaults in the form of order sets and protocols proliferate in the ICU, effects on both patient outcomes and provider competence will be needed.

Technological prompts

Critical care defaults reach decision makers quickly through the use of computerized provider order entry and electronic health record technologies. In addition to order sets and protocols that make use of these systems, individual medication and diagnostic orders and ICU alarms often rely on defaults. Increasing attention to 'alert fatigue' has highlighted the need for thoughtful design.

For example, despite long-standing efforts to implement defaults wisely into computerized provider order entry systems, Stultz and Nahata [49■] recently concluded that design flaws persist [49■,50–53]. The authors found that among 3774 medication alerts for pediatric inpatients at a single center, nearly 90% were inappropriately alerted due to an inaccurate default dosing range [49■]. Similarly, electronic monitoring alarms used in the ICU are often based on default settings that are too sensitive, resulting in many false alarms. In a thoughtful but small study, Inokuchi *et al.* [54■] recently observed that with guideline-based default settings, an ICU nurse hears approximately two out of 32 clinically important alarms over an 8-h shift. On the basis of their observations, the authors estimated that adjusting the default alarm-triggering settings could decrease irrelevant alarms by over 20%.

Rather than harnessing the potential power of technology, ICUs may become victim to poorly designed defaults. Improved customization of defaults would include patients' characteristics (e.g., weight and renal function) and patient-specific trends. Additionally, although choice architects often match defaults to published guidelines, this may not translate well into their use as decision support tools. Particularly given the clear unintended consequences of frequent alarms and alerts [55], these types of defaults should either first be evaluated in an experimental setting or at the very least systematically evaluated as a quality-improvement initiative following implementation.

Communication strategies

Defaults may be used as decision support tools for patients and their surrogate decision makers considering complex choices. When used in this setting, defaults often take the form

of ‘informed non-dissent’ [56]. Such defaults have altered choices for organ donation [3,57] and end-of-life care [56,58[■],59–61] when formally implemented.

Decision makers rely on the clear presentation of options to understand a choice is at hand. One particularly unsettling example of a policy in which decision makers were not aware that a choice was being made regards the previously widespread practice of establishing default DNR order for all nursing home residents. The Centers for Medicare and Medicaid statement prohibited the practice in 2013 when it became clear that many residents were not aware of the default DNR order policy, the alternatives available to them, or the relative risks and benefits of these important choices [62–64].

By contrast, our research group recently published the results of a randomized controlled trial of 132 seriously ill patients presented with an advanced directive that did or did not incorporate a default option [58[■]]. We not only found that default options for comfort-oriented care greatly increased the proportions of patients who chose such a care strategy, but that this effect persisted even when we specifically alerted patients to the default intervention. These results suggest that default options may be powerful even in such presumably value-sensitive decisions as end-of-life care, and that the potential effects of defaults may be maintained even by actively promoting awareness of the default setting.

There is also evidence that providers’ communication styles include default options about end-of-life care and that these defaults influence option selection. Last year, Lu *et al.* [65[■]] presented the results of a systematic comparison of the language used by academic physicians in a high-fidelity simulation. Among 106 physicians who discussed life-sustaining treatment, 64% presented aggressive therapy as the default, whereas 36% elicited a preference or offered such treatment as an option. In contrast, only 45% of the 86 physicians who discussed palliative care framed it as the default choice. A randomized simulation experiment of potential surrogate decision makers yielded complementary results, with 64% of surrogates choosing CPR when framed as the norm by a standardized physician, compared with 48% when the physician framed do-not-resuscitate as the norm [66[■]].

Because providers often cannot avoid setting default options, they should at least be aware of their role as choice architect and frame their discussions with patients and families mindfully. Future work evaluating how default options in physician–patient and physician–surrogate communications impact patients’ outcomes would help physicians use defaults in more appropriate manners.

Practice patterns

ICU care may include ‘hidden’ defaults that are harmful if they are not recognized, regularly evaluated in light of new evidence, and eliminated when found to be inappropriate. Indeed, of the five practices recently questioned by the Critical Care Societies Collaborative’s Choosing Wisely Task Force, at least three reflect potentially harmful default care practices in modern ICUs. These include daily laboratory tests or other diagnostics without clinical indications, sedating all mechanically ventilated patients, often deeply, and continuing life support for patients with poor prognoses [67]. The other two items on the Top 5 List may

also represent default practices in certain ICUs: liberal use of blood transfusions and of parenteral nutrition. These practice patterns each appear to be harmful on the basis of current evidence, and yet exist as routine care in ICUs, in part, because they function as hidden defaults.

CONCLUSION

Decision makers in the ICU need support given the number and complexity of decisions made in a pressured and emotional environment. Defaults have potential to improve efficiency and protect against systematic errors in decision making. Yet appropriate use demands foresight and intention as well as additional study. Preimplementation experimental data may lead to more effective defaults, and postimplementation monitoring will provide additional insight into the implications of their use.

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REFERENCES AND RECOMMENDED READING

Papers of particular interest, published within the annual period of review, have been highlighted as:

■ of special interest

■ ■ of outstanding interest

1. Simon HA. A behavioral model of rational choice. *Q J Econ.* 1955; 69:493–513.
2. Halpern SD, Ubel P, Asch DA. Harnessing the power of default options to improve healthcare. *N Engl J Med.* 2007; 357:1340–1344. [PubMed: 17898105]
3. Abadie A, Gay S. The impact of presumed consent legislation on cadaveric organ donation: a cross-country study. *J Health Econ.* 2006; 25:599–620. [PubMed: 16490267]
4. Madrian BC, Shea DF. The power of suggestion: inertia in 401 (k) participation and savings behavior. *Q J Econ.* 2001; 116:1149–1187.
5. Johnson, EJ.; Hershey, J.; Meszaros, J.; Kunreuther, H. Framing, probability distortions, and insurance decisions. Springer; 1993.
6. Carroll G, Choi J, Laibson D, et al. Optimal defaults and active decisions. *Q J Econ.* 2009; 124:1639–1674. [PubMed: 20041043]
7. Schweitzer M. Multiple reference points, framing, and the status quo bias in healthcare financing decisions. *Organ Behav Hum Decis Process.* 1995; 63:69–72.
8. Smith NC, Goldstein D, Johnson EJ. Smart defaults: from hidden persuaders to adaptive helpers. INSEAD Business School Research Paper. 2009
9. Institute of Medicine. Organ donation: opportunities for action. Washington, DC: 2006.
10. Institute of Medicine. Health IT and patient safety: building safer systems for better care. Washington, DC: 2012.
11. Micek ST, Roubinian N, Heuring T, et al. Before-after study of a standardized hospital order set for the management of septic shock. *Crit Care Med.* 2006; 34:2707–2713. [PubMed: 16943733]
12. Thiel SW, Asghar MF, Micek ST, et al. Hospital-wide impact of a standardized order set for the management of bacteremic severe sepsis. *Crit Care Med.* 2009; 37:819–824. [PubMed: 19237883]
13. Bull SV, Douglas IS, Foster M, Albert RK. Mandatory protocol for treating adult patients with diabetic ketoacidosis decreases intensive care unit and hospital lengths of stay: results of a nonrandomized trial. *Crit Care Med.* 2007; 35:41–46. [PubMed: 17095944]

14. Gershengorn HB, Iwashyna TJ, Cooke CR, et al. Variation in use of intensive care for adults with diabetic ketoacidosis. *Crit Care Med*. 2012; 40:2009–2015. [PubMed: 22564962]
15. Hara JS, Rahbar AJ, Jeffres MN, Izuora KE. Impact of a hyperglycemic crises protocol. *Endocr Pract*. 2013; 19:953–962. [PubMed: 23807521]
16. Thuzar M, Malabu UH, Tisdell B, Sangla KS. Use of a standardised diabetic ketoacidosis management protocol improved clinical outcomes. *Diabetes Res Clin Pract*. 2014; 104:e8–e11. [PubMed: 24507867]
17. Hecksel K, Bostwick J, Jaeger T, Cha S. Inappropriate use of symptom-triggered therapy for alcohol withdrawal in the general hospital. *Mayo Clin Proc*. 2008; 83:274–279. [PubMed: 18315992]
18. DeCarolus D, Rice K, Ho L, et al. Symptom-driven lorazepam protocol for treatment of severe alcohol withdrawal delirium in the intensive care unit. *Pharmacotherapy*. 2007; 27:510–518. [PubMed: 17381377]
19. Maynard G, Stein J. Designing and implementing effective venous thromboembolism prevention protocols: lessons from collaborative efforts. *J Thromb Thrombolysis*. 2010; 29:159–166. [PubMed: 19902150]
20. Bucknall TK, Manias E, Presneill JJ. A randomized trial of protocol-directed sedation management for mechanical ventilation in an Australian intensive care unit. *Crit Care Med*. 2008; 36:1444–1450. [PubMed: 18434914]
21. De Jonghe B, Bastuji-Garin S, Fangio P, et al. Sedation algorithm in critically ill patients without acute brain injury. *Crit Care Med*. 2005; 33:120–127. [PubMed: 15644658]
22. Quenot J-P, Ladoire S, Devoucoux F, et al. Effect of a nurse-implemented sedation protocol on the incidence of ventilator-associated pneumonia. *Crit Care Med*. 2007; 35:2031–2036. [PubMed: 17855817]
23. Shehabi Y, Bellomo R, Mehta S, et al. Intensive care sedation: the past, present and the future. *Crit Care*. 2013; 17:322. [PubMed: 23758942]
24. Burns K, Lellouche F, Lessard M, Friedrich J. Automated weaning and spontaneous breathing trial systems versus nonautomated weaning strategies for discontinuation time in invasively ventilated postoperative adults. *Cochrane Library*. 2014; 2014
25. Burns KE, Meade MO, Lessard MR, et al. Wean earlier and automatically with new technology (the WEAN study). A multicenter, pilot randomized controlled trial. *Am J Respir Crit Care Med*. 2013; 187:1203–1211. [PubMed: 23525929]
26. Danckers M, Grosu H, Jean R, et al. Nurse-driven, protocol-directed weaning from mechanical ventilation improves clinical outcomes and is well accepted by intensive care unit physicians. *J Crit Care*. 2013; 28:433–441. [PubMed: 23265291]
27. Morris AC, Hay AW, Swann DG, et al. Reducing ventilator-associated pneumonia in intensive care: impact of implementing a care bundle. *Crit Care Med*. 2011; 39:2218–2224. [PubMed: 21666444]
28. Resar R, Pronovost P, Haraden C, et al. Using a bundle approach to improve ventilator care processes and reduce ventilator-associated pneumonia. *J Qual Patient Saf*. 2005; 31:243–248.
29. Roh JH, Synn A, Lim CM, et al. A weaning protocol administered by critical care nurses for the weaning of patients from mechanical ventilation. *J Crit Care*. 2012; 27:549–555. [PubMed: 22227086]
30. Cason CL, Tyner T, Saunders S, Broome L. Nurses' implementation of guidelines for ventilator-associated pneumonia from the Centers for Disease Control and Prevention. *Am J Crit Care*. 2007; 16:28–37. [PubMed: 17192524]
31. Flodgren G, Conterno L, Mayhew A, et al. Interventions to improve professional adherence to guidelines for prevention of device-related infections. *Cochrane Library*. 2013; 2014.
32. Ricart M, Lorente C, Diaz E, et al. Nursing adherence with evidence-based guidelines for preventing ventilator-associated pneumonia. *Crit Care Med*. 2003; 31:2693–2696. [PubMed: 14605543]
33. Smulders CA, van Gestel JP, Bos AP. Are central line bundles and ventilator bundles effective in critically ill neonates and children? *Intensive Care Med*. 2013; 39:1352–1358. [PubMed: 23615702]

34. Ely E, Bennett P, Bowton D, et al. Large scale implementation of a respiratory therapist-driven protocol for ventilator weaning. *Am J Respir Crit Care Med*. 1999; 159:439–446. [PubMed: 9927355]
35. Friesecke S, Schwabe A, Stecher SS, Abel P. Improvement of enteral nutrition in intensive care unit patients by a nurse-driven feeding protocol. *Nurs Crit Care*. 2014; 19:204–210. [PubMed: 24602046]
36. Mackenzie SL, Zygun DA, Whitmore BL, et al. Implementation of a nutrition support protocol increases the proportion of mechanically ventilated patients reaching enteral nutrition targets in the adult intensive care unit. *J Parenter Enteral Nutr*. 2005; 29:74–80.
37. Heyland DK, Murch L, Cahill N, et al. Enhanced protein-energy provision via the enteral route feeding protocol in critically ill patients: results of a cluster randomized trial. *Crit Care Med*. 2013; 41:2743–2753. [PubMed: 23982032]
38. Parry MF, Grant B, Sestovic M. Successful reduction in catheter-associated urinary tract infections: focus on nurse-directed catheter removal. *Am J Infect Control*. 2013; 41:1178–1181. [PubMed: 23768439] This study is an example of an intervention that manipulates the choice architecture for clinicians and demonstrates varied results by unit.
39. Blackwood B, Murray M, Chisakuta A, et al. Protocolized versus nonprotocolized weaning for reducing the duration of invasive mechanical ventilation in critically ill paediatric patients. *Cochrane Library*. 2013:2013.
40. Bourdeaux CP, Davies KJ, Thomas MJ, et al. Using 'nudge' principles for order set design: a before and after evaluation of an electronic prescribing template in critical care. *BMJ Qual Saf*. 2014; 23:382–388.
41. Maynard G. Medical admission order sets to improve deep vein thrombosis prevention: a model for others or a prescription for mediocrity? *J Hosp Med*. 2009; 4:77–80. [PubMed: 19219911]
42. Chang S, Sevransky J, Martin G. Protocols in the management of critical illness. *Crit Care*. 2012; 16:306. [PubMed: 22424130]
43. Diringier E, Yende S. Protocol-directed care in the ICU: making a future generation of intensivists less knowledgeable? *Crit Care*. 2012; 16:307. [PubMed: 22494787]
44. Prasad M, Holmboe E, Lipner R, et al. Clinical protocols and trainee knowledge about mechanical ventilation. *JAMA*. 2011; 306:935–941. [PubMed: 21900133]
45. Chatburn R, Deem S. Should weaning protocols be used with all patients who receive mechanical ventilation? *Respir Care*. 2007; 52:609–619. [PubMed: 17484792]
46. Khanna R, Vittinghoff E, Maselli J, Auerbach A. Unintended consequences of a standard admission order set on venous thromboembolism prophylaxis and patient outcomes. *J Gen Intern Med*. 2012; 27:318–324. [PubMed: 21948203] Although this study was published more than 18 months ago, it highlights the potential for unintended consequences associated with default options in the clinical setting, an aspect of default-based quality improvement interventions that is often neglected.
47. Chia JY, Clay AS. Effects of respiratory-therapist driven protocols on house-staff knowledge and education of mechanical ventilation. *Clin Chest Med*. 2008; 29:313–321. [PubMed: 18440439]
48. Yu C, Stephenson A, Gupta S. The effect of patient care order sets on medical resident education: a prospective before-after study. *BMC Med Educ*. 2013; 13:146. [PubMed: 24195667] These authors explore the potential for unintended educational effects of reducing clinician engagement in decision making through the use of defaults.
49. Stultz JS, Nahata MC. Appropriateness of commercially available and partially customized medication dosing alerts among pediatric patients. *J Am Med Inform Assoc*. 2014; 21:e35–e42. [PubMed: 23813540] This study demonstrates that inaccurate default settings in a computer-based ordering system may lead to inappropriate electronic alerts.
50. Horsky J, Phansalkar S, Desai A, et al. Design of decision support interventions for medication prescribing. *Int J Med Inform*. 2013; 82:492–503. [PubMed: 23490305]
51. Khajouei R, Jaspers M. The impact of CPOE medication systems' design aspects on usability, workflow and medication orders: a systematic review. *Methods Inf Med*. 2010; 49:3–19. [PubMed: 19582333]

52. Koppel R, Metlay J, Cohen A, et al. Role of computerized physician order entry systems in facilitating medication errors. *JAMA*. 2005; 293:1197–1203. [PubMed: 15755942]
53. Perlman SL, Fabrizio L, Shaha SH, Magid SK. Response to medication dosing alerts for pediatric inpatients using a computerized provider order entry system. *Appl Clin Inform*. 2011; 2:522–533. [PubMed: 23616893]
54. Inokuchi R, Sato H, Nanjo Y, et al. The proportion of clinically relevant alarms decreases as patient clinical severity decreases in intensive care units: a pilot study. *BMJ Open*. 2013; 3:e003354. This is a thoughtfully designed but small observational study of the implications of default alert settings on the workflow for bedside nurses.
55. Cvach M. Monitor alarm fatigue: an integrative review. *Biomed Instrum Technol*. 2012; 46:268–277. [PubMed: 22839984]
56. Kon AA. The window of opportunity: helping parents make the most difficult decision they will ever face using an informed nondissent model. *Am J Bioethics*. 2009; 9:55–56.
57. Shepherd L, O'Carroll R. When do next-of-kin opt-in? anticipated regret, affective attitudes and donating deceased family member's organs. *J Health Psychol*. 2013 PubMed PMID: 23864075. [Epub ahead of print].
58. Halpern SD, Loewenstein G, Volpp KG, et al. Default options in advance directives influence how patients set goals for end-of-life care. *Health Aff*. 2013; 32:408–417. This study by our research group applies behavioral economics to clinical care through the use of default options on advance care planning forms.
59. Haward MF, Murphy RO, Lorenz JM. Default options and neonatal resuscitation decisions. *J Med Ethics*. 2012; 38:713–718. [PubMed: 23180252]
60. Kressel LM, Chapman GB. The default effect in end-of-life medical treatment preferences. *Med Decis Making*. 2007; 27:299–310. [PubMed: 17545499]
61. Kressel LM, Chapman GB, Leventhal E. The influence of default options on the expression of end-of-life treatment preferences in advance directives. *J Gen Intern Med*. 2007; 22:1007–1010. [PubMed: 17447099]
62. Kane R, Burns E. Cardiopulmonary resuscitation policies in long-term care facilities. *J Am Geriatr Society*. 1997; 45:154–157.
63. Choudhry N, Ma J, Rasooly I, Singer P. Long-term care facility policies on life-sustaining treatments and advance directives in Canada. *J Am Geriatr Soc*. 1994; 42:1150–1153. [PubMed: 7963200]
64. Centers for Medicare and Medicaid. Cardiopulmonary resuscitation (CPR) in nursing homes. 2013
65. Lu A, Mohan D, Barnato AE. The rhetoric of palliative care. *Am J Respir Crit Care Med*. 2013; 187:A4965. This abstract reports on the language physicians use when discussing goals of care with surrogate decision makers in the critical care setting, showing the inadvertent use of potentially powerful defaults in communication.
66. Barnato AE, Arnold RM. The effect of emotion and physician communication behaviors on surrogates' life-sustaining treatment decisions: a randomized simulation experiment. *Crit Care Med*. 2013; 41:1686–1691. [PubMed: 23660727] A component of this multifaceted simulation study demonstrated the powerful effects of default framing on clinical choices made by surrogate decision makers.
67. Halpern S, Becker D, Curtis J, et al. An Official American Thoracic Society/American Association of Critical Care Nurses/American College of Chest Physicians/Society of Critical Care Medicine Policy Statement: the Choosing Wisely® Top 5 List in Critical Care Medicine. (in press).

KEY POINTS

- A default option is the set of events or conditions that will occur if no action is taken.
- Defaults may be used in the ICU to implement guidelines, improve efficiency, and protect patients, but there may be unintended consequences from defaults, such as decreased engagement in decision making and lack of individualization of care.
- Current ICU defaults include care protocols and order sets, technology-based presets, communication strategies, and defaults hidden in common care patterns.
- Published research has failed to show conclusive evidence for or against the use of defaults in critical care, which may be due to heterogeneity across environments and preimplementation care patterns.
- When creating defaults, their power as behavior change and decision support tools should be used to maximize their potential impact with preimplementation and postimplementation experiments and studies used to reveal intended and unintended consequences.

Table 1

Ways in which default options influence decision making

Type of influence	Explanation	Examples in critical care ^a
Mechanical	Additional effort is required to select an alternative option	Cardiopulmonary resuscitation provided in the event of cardiac arrest unless a 'do-not-resuscitate' order is placed
		Providers may not electronically order a medication dose outside the typical range without speaking directly to a pharmacist for approval
Belief-based	Individuals perceive the default as a recommendation from an authority	Providers order venous thromboembolism prophylaxis for a patient when electronically prompted to do so
		Respiratory therapists initiate lung-protective ventilation in all patients unless otherwise instructed
Psychological	Risk-averse or regret-averse individuals assume less personal responsibility by remaining with the default choice	Family members of a terminally ill patient agree to intubation when it is presented as standard care for respiratory failure
		Physicians agree to have nurses or phlebotomists draw daily labs on clinically stable patients

^aThese examples may incorporate multiple mechanisms.