Reducing Unnecessary Testing in the Intensive Care Unit by Choosing Wisely

Ruth M. Kleinpell¹,², J. Christopher Farmer³, and Stephen M. Pastores⁴

¹Vanderbilt University Medical Center and School of Nursing, Nashville, TN; ²Rush University Medical Center and College of Nursing, Chicago, IL; ³Mayo Clinic, Phoenix, AZ; ⁴Critical Care Center, Department of Anesthesiology and Critical Care Medicine, Memorial Sloan Kettering Cancer Center, New York, NY, USA

Overuse of laboratory and X-ray testing is common in the intensive care unit (ICU). This review highlights focused strategies for critical care clinicians as outlined by the Critical Care Societies Collaborative (CCSC) as part of the American Board of Internal Medicine Foundation’s Choosing Wisely® campaign. The campaign aims to promote the use of judicious testing and decrease unnecessary treatment measures in the ICU. The CCSC outlines five specific recommendations for reducing unnecessary testing in the ICU. First, reduce the use of daily or regular interval diagnostic testing. Second, do not transfuse red blood cells in hemodynamically stable, non-bleeding ICU patients with a hemoglobin concentration greater than 7 mg/dl. Third, do not use parenteral nutrition in adequately nourished critically ill patients within the first 7 days of ICU stay. Fourth, do not deeply sedate mechanically ventilated patients without a specific indication and without daily attempts to lighten sedation. Finally, do not continue life support for patients at high risk of death without offering patients and their families the alternative of comfort focused care. A number of strategies can be used to reduce unnecessary testing in the ICU, including educational campaigns, audit and feedback, and implementing prompts in the electronic ordering system to allow only acceptable indications when ordering routine testing. Greater awareness of the lack of outcome benefit and associated costs can prompt clinicians to be more mindful of ordering tests and procedures in order to reduce unnecessary testing in the ICU.

Key Words: Choosing Wisely; intensive care units; laboratory testing; X-ray testing

OVERVIEW

Hospitalization in an intensive care unit (ICU) typically requires extensive diagnostic testing and procedures as a component of the management of critical illness. Daily laboratory and X-ray testing are commonly performed in the ICU for diagnosis and/or monitoring of critically ill patients as well as assessing their response to treatment. Critical care professionals fear missing important clinical changes in patient status. Despite the absence of supporting data, we commonly react by ordering frequent testing, hoping to improve detection of subtle but important physiological changes. It has been demonstrated that up to 48% of laboratory tests performed routinely in the ICU have normal results [1]. Fortunately, greater awareness of the lack of outcome benefit and increased costs associated with obtaining daily laboratory tests and chest X-rays in the ICU has prompted clinicians to be more mindful of ordering tests and procedures in order...
to reduce unnecessary testing.

**CHOOSING WISELY®**

To promote the use of judicious testing and decrease unnecessary treatment measures, the American Board of Internal Medicine Foundation established the Choosing Wisely® campaign in 2012 [2]. The Choosing Wisely® campaign tasked professional societies to develop lists of the top five medical services—test, procedures and treatments—commonly used but whose necessity should be questioned. More than eighty specialty organizations have prioritized recommendations to improve decision-making and promoted appropriate patient-centered care. Each society developed a list of five to ten tests, treatments, or services that are commonly overused [3]. Choosing Wisely® initiatives have included best practice campaigns, quality improvement projects, and formal research studies within the United States and globally. The Choosing Wisely Canada campaign has launched the 10 Million Challenge—a collective action initiative to prevent 10 million unnecessary tests and treatments across Canada by the year 2020 [4]. “Consumer Reports” is a partner in the Choosing Wisely® campaign and has collaborated with specialty societies to create patient education materials, including engaging brochures for consumers to reference for common health practices and treatments and specific questions to ask their healthcare provider [5].

**CHOOSING WISELY® AND CRITICAL CARE**

The Critical Care Societies Collaborative, composed of the four major critical care societies in the United States including the American Thoracic Society, the American College of Chest Physicians, the American Association of Critical-Care Nurses and Society of Critical Care Medicine, participated in the Choosing Wisely® campaign by developing ICU specific recommendations [6]. These recommendations include as follows. (1) Don’t order diagnostic tests at regular intervals (such as every day), but rather in response to specific clinical questions. (2) Don’t transfuse red blood cells in hemodynamically stable, non-bleeding ICU patients with a hemoglobin concentration greater than 7 mg/dl. (3) Don’t use parenteral nutrition in adequately nourished critically ill patients within the first 7 days of an ICU stay. (4) Don’t deeply sedate mechanically ventilated patients without a specific indication and without daily attempts to lighten sedation. (5) Don’t continue life support for patients at high risk for death or severely impaired functional recovery without offering patients and their families the alternative of care focused entirely on comfort. These recommendations and the rationale for targeting better care in the ICU are outlined in Figure 1.

**ICU FOCUSED CHOOSING WISELY® INITIATIVES**

In response to the Choosing Wisely® campaign, a number of reports have been published citing strategies for reducing unnecessary testing [7-9]. Unfortunately, only a limited number of these studies are specific to an ICU environment. A review of routine daily lab testing in the ICU identified five nonrandomized studies and one economic impact evaluation. Three of these studies implemented strategies to prevent long-term standing orders for routine biochemistry and hematology blood tests [10]. After implementing measures to reduce routine testing, these three studies all found that the number of routine ICU blood tests decreased significantly, resulting in less iatrogenic anemia and substantial cost savings without compromising patient outcomes. Notably, when routine ICU blood tests were performed consecutively and daily, almost 50% of the results were normal and 32% were consecutively normal. Changing our practice of ordering consecutive routine blood tests that might not affect decision-making can have a significant impact for clinical care, especially in the ICU.

In a recent survey conducted by the Society of Critical
Care Medicine of over 400 physicians, approximately 75% indicated they were familiar with the Choosing Wisely® campaign and that a number of a specific institutional initiatives targeting at least one if not more of the Critical Care Societies Collaborative’s Choosing Wisely® recommendations for critical care had been implemented to target reducing unnecessary testing in the ICU (Figures 2 and 3) [11].
Figure 2. Reports by 432 critical care physicians on implementation efforts targeting the Choosing Wisely® critical care recommendations. ICU: intensive care unit; RBC: red blood cell. Adapted from the Society of Critical Care Medicine [11].

Figure 3. Reports by 432 critical care physicians on how the Choosing Wisely® critical care recommendations had been implemented in clinical practice. Adapted from the Society of Critical Care Medicine [11].
STRATEGIES FOR DECREASING UNNECESSARY TESTING IN THE ICU

Several strategies can be used to implement the Choosing Wisely recommendations in critical care (Table 1). These include discontinuing the practice of ordering daily laboratory and chest X-ray testing, daily review of the necessity of laboratory tests and chest X-rays for each ICU patient, raising clinician awareness of the impact of unnecessary testing in the ICU, and the use of audit and feedback to promote appropriate ordering of diagnostic testing in the ICU. A recent systematic review on interventions aimed at reducing low-value care identified that the use of clinician feedback, along with education materials was effective in reducing laboratory testing, blood transfusions and imaging studies [12]. Multicomponent interventions were found to have the greatest potential to reduce low-value care including the use of clinical decision support and performance feedback. The review highlighted that further research is needed on the effectiveness of pay-for-performance, insurer restrictions, and risk-sharing contracts to reduce the use of low-value care [13]. Other studies specific to critical care have identified that measures such as clinician education and feedback, education of rotating trainees, adding a check-box to ICU rounds checklist, documenting “no routine lab work indicated for tomorrow” to inform on-call personnel of care plans, implementing a prompt in the electronic ordering system to allow only acceptable indications when ordering routine labs or X-rays, among other measures are effective at increasing clinician awareness and promoting more judicious use of testing for ICU patients [14-16].

CONCLUSIONS

Promoting high-value care has become an important concept in medical care [17,18], and has significant implications especially for critical care, where unnecessary laboratory and imaging tests can become part of daily practice in the ICU. A number of strategies can be used to reduce unnecessary testing, and to raise clinician awareness of the impact of unnecessary testing in the ICU. Implementing best practices in the ICU such as reducing unnecessary testing can have positive outcomes for patients and decrease healthcare costs.

ORCID

Ruth M. Kleinpell http://orcid.org/0000-0003-0142-7527

REFERENCES

1. Peixoto AA Jr, Meneses FA, Barbosa BP, Pessoa LF, Melo RH, Fideles GM. Laboratory routine in the ICU: a practice to be abolished? Crit Care 2013;17(Suppl 3):P12.
2. Choosing Wisely [Internet]. Philadelphia (PA): ABIM Foundation; 2018 [cited 2018 Jan 10]. Available from: www.choosingwisely.org.
3. Cassel CK, Guest JA. Choosing wisely: helping physicians and patients make smart decisions about their care. JAMA 2012;307:1801-2.
4. Choosing Wisely Canada [Internet]. Toronto (ON): University of Toronto, Canadian Medical Association, St. Michael’s Hospital; 2018 [cited 2018 Jan 10]. Avail-

Table 1. Strategies for decreasing unnecessary testing in the ICU

| Strategy | Description |
|----------|-------------|
| Discontinue daily lab and X-ray test ordering | |
| Daily review of the necessity of lab and X-ray testing for individual ICU patients | |
| Raise clinician awareness of the impact of unnecessary testing in the ICU | |
| Computerized clinician decision support | |
| Individual performance feedback | |
| Provider report cards | |
| Use of collective audit and feedback to promote appropriate ordering of diagnostic testing | |
| Pay-for-performance, insurer restrictions and risk-sharing contracts to reduce the use of low-value care | |

ICU: intensive care unit.
able from: http://www.choosingwiselycanada.org.
5. Consumer Reports [Internet]. Yonkers (NY): Consumer Reports; 2018 [cited 2018 Jan 20]. Available from: http://www.consumerreports.org/cro/health/doctors-and-hospitals/choosing-wisely/index.htm.
6. Critical Care Societies Collaborative. Choosing Wisely list for critical care: five things physicians and patients should question [Internet]. Philadelphia (PA): ABIM Foundation; [cited 2018 Jan 10]. Available from: http://ccsconline.org/images/CCSC-Choosing-Wisely.pdf.
7. Iams W, Heck J, Kapp M, Leverenz D, Vella M, Szentirmai E, et al. A multidisciplinary housestaff-led initiative to safely reduce daily laboratory testing. Acad Med 2016;91:813-20.
8. Bulger J, Nickel W, Messler J, Goldstein J, O’Callaghan J, Auron M, et al. Choosing wisely in adult hospital medicine: five opportunities for improved healthcare value. J Hosp Med 2013;8:486-92.
9. Ivers N, Jamtvedt G, Flottorp S, Young JM, Odgaard-Jensen J, French SD, et al. Audit and feedback: effects on professional practice and healthcare outcomes. Cochrane Database Syst Rev 2012;(6):CD000259.
10. Canadian Agency for Drugs and Technologies in Health. Rapid response report. Routine blood tests for patients in the intensive care unit: clinical effectiveness, cost-effectiveness, and guidelines. Ottawa (ON): Canada; 2013.
11. Society of Critical Care Medicine. National survey of ICU clinicians assessing knowledge and use of the Choosing Wisely campaign. Mount Prospect (IL): Society of Critical Care Medicine; 2017.
12. Colla CH, Mainor AJ, Hargreaves C, Sequist T, Morden N. Interventions aimed at reducing use of low-value health services: a systematic review. Med Care Res Rev 2017;74:507-50.
13. Colla CH, Morden NE, Sequist TD, Schpero WL, Rosenthal MB. Choosing Wisely: prevalence and correlates of low-value health care services in the United States. J Gen Intern Med 2015;30:221-8.
14. Goddard K, Austin SJ. Appropriate regulation of routine laboratory testing can reduce the costs associated with patient stay in intensive care. Crit Care 2011;15(Suppl 1):P133.
15. Iosfina I, Merkeley H, Cessford T, Geller G, Amiri N, Baradaran N, et al. Implementation of an on-demand strategy for routine blood testing in ICU patients. Am J Respir Crit Care Med 2013;187:A5322.
16. Pageler NM, Franzon D, Longhurst CA, Wood M, Shin AY, Adams ES, et al. Embedding time-limited laboratory orders within computerized provider order entry reduces laboratory utilization. Pediatr Crit Care Med 2013;14:413-9.
17. Pines JM, Newman D, Pilgrim R, Schuur JD. Strategies for integrating cost-consciousness into acute care should focus on rewarding high-value care. Health Aff (Millwood) 2013;32:2157-65.
18. Porter ME. What is value in health care? N Engl J Med 2010;363:2477-81.