

# Needs Assessment: Blood Management

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Blood transfusion is the most common procedure performed during hospitalizations in the United States.<sup>1</sup> According to the National Blood Collection and Utilization Survey, a total of 13.18 million blood units were transfused in the United States in 2013, equivalent to 41.7 units per 1000 population,<sup>2</sup> which is higher by at least 25% than in other developed countries, including Australia, Canada, and the United Kingdom.<sup>3</sup>

Blood transfusions can be lifesaving, but they are linked to increased risk of morbidity and mortality. Most transfusion-related adverse reactions are febrile and allergic reactions; however, severe life-threatening adverse reactions, such as acute and delayed hemolytic transfusion reactions and bacterial infections, may also occur.<sup>4</sup> Approximately 27,000 transfusion-related adverse reactions were reported in 2013,<sup>5</sup> and 41 transfusion-related fatalities were reported to the FDA in 2015.<sup>6</sup>

Blood products are also associated with a substantial financial burden.<sup>7</sup> The direct and indirect costs of blood transfusions are approximately \$10 billion annually.<sup>8</sup> These expenditures do not include those spent on managing transfusion-related adverse reactions.

The goal of this needs assessment is to identify practice gaps and barriers to adherence to evidence-based blood management guidelines by physicians in the hospital setting.

## Current Practice, Best Practice, and Barriers

“Blood use in hospitals is a high-volume, high-risk, high-cost process that is often not appropriately utilized,” says Timothy Hannon, MD, MBA, the Chief Medical Officer of Strategic Healthcare Group and faculty for the Institute for Healthcare Improvement Expedition on the Appropriate Use of Blood Products.<sup>9</sup>

Increasing evidence suggests that unnecessary transfusion of blood products is associated with increased morbidity and mortality secondary to infectious, immunologic, pulmonary, and thromboembolic complications.<sup>10</sup> Despite a decline in blood use over the last few years,<sup>2</sup> physician surveys show that notable variations in hemoglobin thresholds for red blood cell

transfusion exist in many inpatient settings, including trauma and critical care,<sup>11</sup> vascular surgery,<sup>12</sup> cardiology,<sup>13</sup> and pediatric and adult cardiac surgery.<sup>14,15</sup> These variations in clinical practices have led the Joint Commission to identify blood transfusion as one of the top five most overused medical procedures in US hospitals.<sup>16</sup> Similarly, as part of their Choosing Wisely campaigns, a number of professional medical societies, including the Critical Care Societies Collaborative,<sup>17</sup> the American Society of Anesthesiologists,<sup>18</sup> and the Society of Hospital Medicine,<sup>19</sup> have also included blood transfusion in their top five list of overused procedures.

Despite improvements in blood transfusion safety, many patients still view blood transfusions as risky. A survey examining patients' perceptions of blood transfusion during preoperative evaluations found that 20% of patients perceive blood transfusion as "very often risky" or "always risky."<sup>20</sup>

Restrictive transfusion practices (transfusion not indicated until hemoglobin level is less than 7 or 8 g/dl) are as effective and possibly superior to liberal transfusion practices. Restrictive transfusion thresholds have been evaluated in randomized clinical trials involving patients in many clinical situations, including critically ill patients in adult and pediatric intensive care units<sup>21,22</sup>; patients undergoing cardiac or orthopedic surgery<sup>23,24</sup>; and patients with gastrointestinal bleeding,<sup>25</sup> septic shock,<sup>26</sup> or traumatic brain injury.<sup>27</sup> Meta-analyses have also demonstrated that excessive transfusions do not improve clinical outcomes or reduce mortality.<sup>28,29</sup> Based on this extensive evidence, the AABB (formerly the American Association of Blood Banks)<sup>30</sup> and several other medical societies, such as the American College of Physicians<sup>31</sup> and the American Society of Anesthesiologists,<sup>32</sup> have published evidence-based guidelines that recommend restrictive blood transfusion practices.

A common theme of all guidelines is the need to balance any treatment for blood loss or anemia with the desire to avoid unnecessary and potentially harmful transfusions. According to the AABB guidelines,<sup>30</sup> transfusion decisions should be determined by symptoms and hemoglobin level of the patient. A hemoglobin threshold of 7 g/dL is recommended for the vast majority of hemodynamically stable patients, and a threshold of 8 g/dL is recommended for hemodynamically stable patients with cardiovascular disease and for those undergoing cardiac or orthopedic surgery. Single-unit red blood cell transfusions should be the standard of care for

nonbleeding patients, and additional units should be prescribed only after a reassessment of the patient's condition.

Evidence-based transfusion decisions are often highly complex and require considerable skill and acumen on part of the physicians ordering transfusions. The barriers impeding the implementation of evidence-based practices for blood management are manifold and include factors related to physician knowledge, attitudes, and behaviors.

Physicians often have very short exposure to blood management during medical school and residency, and most physicians do not receive any education on blood management afterward.<sup>33</sup> As a result, current practice is often driven by the inertia of previous practice guidelines, common misconceptions, inadequate interpretations of controversial evidence, oversimplification, and wide variations in belief.<sup>34,35</sup>

Keeping up with clinical trials and evidence-based guidelines is time-consuming and often difficult in light of the overwhelming volume of clinical responsibilities of physicians. Reports from evaluations by participants in previous educational activities confirm that many physicians have not reviewed or received any training on the new evidence-based blood management guidelines.<sup>36</sup>

Physician attitudes toward blood management have also been identified as barriers to adherence to blood management guidelines. These attitudes include lack of agreement of some physicians with the guidelines; lack of self-efficacy, or the belief that the physician may not actually be able to follow the guidelines; lack of outcome expectancy, or the belief that application of the guidelines will not lead to the desired outcome; and fear that autonomy would be eroded by the new standards.<sup>34</sup>

Changing physician behaviors in regards to blood management often require implementing an institutional Patient Blood Management (PBM) program. PBM is a multidisciplinary approach that involves representatives from many stakeholders, including clinical departments (medicine, anesthesia, surgery, critical care medicine, blood banks, etc), the hospital or institution, safety and quality, and information technology.<sup>37</sup> These stakeholders collaborate to create specific guidelines and protocols for the hospital as well as provide decision support and educational programs.<sup>38</sup> The AABB has published standards for PBM programs,<sup>39</sup> and the Joint Commission

has recently started to provide certification to hospitals with comprehensive PBM programs that comply with AABB standards.<sup>40</sup>

PBM programs enable physicians to cope with environmental barriers to adherence to blood management guidelines, such as lack of support from peers and organizational constraints. Interactive data dashboards, audits, and reports from the hospital's electronic medical records are very effective tools to bring change to physician behaviors.<sup>38,41</sup>

## **Conclusion**

Variations in clinical practice suggest that a substantial amount of blood is being transfused inappropriately in US hospitals. Unnecessary transfusions have been associated with many negative outcomes, such as morbidity, mortality, length of hospital stay, and health care costs. Better adherence to evidence-based blood management guidelines can minimize blood transfusions while improving patient outcomes and reducing costs.

Physicians receive limited training on blood management during their training. Continuing medical education (CME) activities provide clinicians with an excellent opportunity to learn about the current blood overuse in clinical practice and review the evidence behind the new restrictive transfusion guidelines.

In addition to bridging knowledge gaps, CME activities can also address physician attitudes toward blood management, thereby reducing resistance to change and increasing adherence to evidence-based guidelines.

Finally, as a component of PBM programs, CME activities are instrumental to the success of system-wide improvement initiatives,<sup>38</sup> ultimately leading to the judicious use of blood products and better patient outcomes.

**Table.** Practice gaps alignment with learning objectives, desired outcome, and ACGME core competencies.

Identified Gap	Educational Objective	Desired Outcome	Related Core Competencies
Physicians are unaware of the current blood overuse in clinical practice or the evidence behind restrictive transfusion practices	List evidence of the current blood overuse in clinical practice	Physicians will be aware of the current blood overuse and knowledgeable of the evidence behind restrictive transfusion practices <i>(Knowledge and Competence)</i>	<ul style="list-style-type: none"> <li>• Practice-based learning and improvement</li> <li>• Medical knowledge</li> <li>• Systems-based practice</li> </ul>
Significant variations in hemoglobin thresholds for blood transfusion exist among physicians in many inpatient settings	Select the most appropriate treatment option for patients with conditions that might warrant transfusion	Physicians will be able to use current evidence-based guidelines to decide whether to transfuse blood products or not <i>(Knowledge, Competence, and Performance)</i>	<ul style="list-style-type: none"> <li>• Practice-based learning and improvement</li> <li>• Patient care and procedural skills</li> <li>• Medical knowledge</li> </ul>
Physicians are unaware of the appropriate elements of a Patient Blood Management (PBM) program	Define the elements of a PBM program	Physicians will be able to explain the elements of a Patient Blood Management program and advocate for its implementation in their clinical setting <i>(Knowledge, Competence, and Performance)</i>	<ul style="list-style-type: none"> <li>• Practice-based learning and improvement</li> <li>• Patient care and procedural skills</li> <li>• Medical knowledge</li> <li>• Systems-based practice</li> </ul>

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