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Patient Blood Management: A Brief Overview with Focus on Implementation and Certification

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Abstract

Patient Blood Management (PBM) programs are a growing need in healthcare to stem overutilization of blood products. Aside from the fact that blood transfusions are associated with infectious and noninfectious risks, there are further pressures driving key reasons to control overutilization, including a narrowing gap between blood donor collections and transfusions, an association of reduced transfusions with improved patient outcomes, and the need to reduce healthcare costs associated with blood product transfusions. Implementation of a PBM program involves different stages of development that can lead to a successful program, eligible for certification. Maintenance of the program requires active oversight and surveillance to ensure peak performance.

Keywords: Blood transfusion • Certification • Patient blood management

Introduction

The Joint Commission (TJC) has recognized that blood transfusion is the most commonly performed procedure in United States (U.S.) hospitals [1]. Yet, although transfusions have historically played a vital role in patient care, over time, it has become increasingly apparent that many transfusions do not benefit the patient and may in fact be harmful [2]. In fact, use of restrictive transfusion thresholds for Red Blood Cell (RBC) transfusions (i.e., transfusion when the hemoglobin level drops below 7 g/dL) have been advocated for dating back to the landmark multicenter, randomized, controlled trial of RBC transfusions in critical care patients a quarter century ago and further supported by guidelines that are more recent, including newly published international RBC transfusion guidelines this past year [3]. Thus, TJC has also recognized that blood transfusion is one of the most overused procedures and five physician specialty societies include reduction of unnecessary transfusions in their Choosing Wisely campaign [4].While risks are a main driver for reducing excess transfusions, focus on the traditional risks associated with transmissible diseases (i.e., Human Immunodeficiency Virus (HIV) and viral hepatitis) have given way to more intense study of noninfectious risks, including leading causes of transfusion-related fatalities reported to the U.S. Food and Drug Administration (FDA), such as ABO acute hemolytic transfusion reactions secondary to patient misidentification, Transfusion-Related Acute Lung Injury (TRALI), and Transfusion-Associated Volume Overload (TACO), as transmissible disease risks have declined due to improved screening of donors and, increased viral testing sensitivity [5]. In addition beyond the transfusion risks, the narrowing gap between donor collections and transfusions that has resulted from the impact of a U.S. blood supply, becoming more reliant on an aging volunteer donor population as well as the impact of natural disasters, including major weather events and the historic Corona Virus Disease 2019 (COVID-19) pandemic, as well as acts of terrorism (i.e., 9/11), has further necessitated actions to reduce unnecessary transfusions [6]. Finally, the cost burden of excessive blood transfusions to the healthcare system is yet another major driver for reducing excessive blood transfusions [7]. Therefore, this brief review will discuss the importance of PBM, its definitions, importance to healthcare, implementation, certification, and maintenance [8].

Definition

PBM is a comprehensive, patient-centered, and evidence-based approach to improving patient outcomes by managing and preserving a patient's own blood while prioritizing patient safety and empowerment [9]. The World Health Organization (WHO), as well as organizations that foster PBM, including the Association for the Advancement of Blood and Biotherapies (AABB) and the Society for the Advancement of Patient Blood Management (SABM), among others, all very similarly define PBM [10]. The essence of PBM is to focus on patient-specific interventions aimed at preventing and managing anemia, optimizing hemostasis, and minimizing blood loss, thereby reducing the need for allogeneic blood transfusions and promoting patient safety [11].

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Literature Review

It is of essence to understand that PBM philosophy has largely shifted away from solely focusing on transfusion avoidance to patient-centered care with a focus on management of anemia and hemorrhage control as well as on patient outcomes. In its urgent call to implement PBM, the WHO highlighted the global magnitude of anemia, blood loss and bleeding, and bleeding disorders, and cited findings from the largest study on PBM outcomes from Western Australia [12]. The results from this six-year study conducted between 2008 and 2014, which included over 600,000 patients, showed that reductions in blood product transfusions were associated with marked reductions in patient mortality, infection rates, thromboembolic events (i.e., acute myocardial infarction and stroke), and length of hospital stay. Furthermore, there were improvements in key indicators showing reduced preoperative anemia rates, pre-transfusion hemoglobin levels, and increased percentage of single-unit RBC transfusions. The PBM program reduced blood product acquisition costs by $18.5 million (Australian Dollars [AUD]) and activity based costs (i.e., the overall cost of administering a blood transfusion) by $80-$100 million AUD. Yet not all aspects of PBM are so clear cut. A recent trial of liberal vs. restrictive transfusion practices in patients with Acute Myocardial Infarction (AMI), for example, concluded that while a liberal transfusion strategy (i.e., transfusion threshold of hemoglobin <10 g/dL) did not significantly reduce the risk of primary outcomes (i.e., recurrent AMI or death at 30 days), the potential harms of a restrictive transfusion strategy could not be excluded based on a higher, though not statistically-significant, incidence of the primary outcomes in the restrictive study arm [13].

Development and implementation

Successful establishment and implementation of a PBM program requires thoughtful planning through its various stages of development [14]. To begin, a business plan is essential to set goals and to outline ways to achieve them. The business plan defines the stakeholders, expected costs and resources, and establishes milestones to measure success and achievements. A structured business plan starts with an executive summary that describes the problem and proposes potential solutions to the problem. Regarding PBM, the most significant problem is non-evidence-based and unnecessary transfusions, resulting in blood product overutilization, the potential for adverse events leading to undesirable patient outcomes, and increased healthcare costs. The business plan must further identify all key stakeholders since PBM is a multidisciplinary process. Stakeholders may be primary, such as patients, healthcare providers, hospital administrators, and transfusion medicine specialists, or secondary, such as government and professional organizations, media outlets, and medical journalists. A business plan should also include a financial statement. Although a well-developed PBM program will result in long-term cost savings, there are significant upfront costs that are necessary to establish the program. These costs may include, but are not limited to, dedicated PBM personnel (e.g., transfusion safety officer, PBM coordinator), Information Technology (IT) staff and PBM software, clinical services, and equipment needed for specialized laboratory testing, such as thromboelastography. Finally, a comprehensive business plan also will include a market analysis that may provide an assessment of other PBM programs with comparison of their strengths and weaknesses. Such an assessment can potentially help to avoid costly mistakes while focusing on successful achievable and measurable interventions.

No PBM program can be successfully established without education and training. Given the risks associated with blood components and advantages of PBM, a significant effort should be put forth to ensure that all clinical staff working with blood products are aware of the risks and guiding principles and that they manage transfusion practices safely and efficiently. To improve PBM practice inside of a healthcare service, the staff must first develop the knowledge and leadership abilities required, necessitating ongoing and reinforced training and education. Although educational lectures (e.g., Grand Rounds) are traditionally used to disseminate important PBM principles, the effectiveness of more personalized training in the form of small group or one-to-one discussions, or via web-based training, should not be overlooked. Notably, staff members like residents and nursing officers play critical roles in supporting patients and caregivers by providing them with information about the risks, benefits, and options involved in transfusion practice [15].

Once established maintenance of a PBM program requires measurement and reporting of key metrics. PBM metrics and analytics, though, extend beyond the number of blood products transfused and are useful for identifying opportunities for improvement and validating program outcomes. Meaningful metrics include, but are not limited to, transfusion rate (i.e., percentage of patients transfused), blood product case-mix index weighted by patient days or discharges, single-unit RBC orders, average RBC dose (i.e., number of RBC units per patient), and percentage of single-unit plasma transfusions, among others [16]. Generally, three or four well-developed metrics can effectively meet the needs of a program. However, it is important that key metrics be periodically reviewed to ensure that they continue to meet the goals of the PBM program. When necessary, metrics should be added to reflect ongoing needs of the program through development or expansion while removing those that are no longer relevant.

Certification

PBM certification is a 2-year voluntary certification offered jointly through the AABB and TJC and provides a third-party evaluation of PBM programs. There are three levels of certification, which depend upon the degree of program activities involved. Level I certification encompasses all activities, including the most advanced processes such as management of preoperative anemia, an approach to patients who refuse blood, transfusions strategies to decrease blood loss, processes for rapid decision-making in regard to anemia, and coagulation management. Level II and level III program certification require fewer activities to attain, though the level of certification should not detract from the quality of the program as they merely reflect the extent of activities [17]. A gap analysis is a useful tool for evaluating the level of certification that a healthcare facility may initially achieve based on current activities and available resources. Yet, programs can certainly add resources and activities to attain higher certification levels as the PBM program matures over time. While there is an upfront cost to attain and maintain certification, downstream reductions in transfusion rates will result in net savings.

Maintenance

Upon implementation, a PBM program requires oversight and surveillance to maintain peak performance and to ensure that the goals of the program are being continuously achieved. Invariably, there will be outliers to the program because of clinicians who stray from good PBM practices over time, others who are noncompliant and resistant to change their practice, and because of staff turnover with new clinical personnel onboarding (such as incoming residents) who are not familiar with PBM practices. Computer-Physician Order Entry (CPOE) with Clinical Decision Support (CDS) is one important tool that can send Best Practice Alerts (BPAs) and guide clinicians when they are ordering blood products in the Electronic Health Record (EHR). Enabling the EHR to send out BPAs empowers the system to remind clinicians to adhere to established transfusion guidelines. For example, an alert may appear upon entry of an order for an RBC transfusion that the patient's most recent hemoglobin value is above a certain threshold (often, this will be set at 7 g/dL). Audits are another important tool to assess transfusion practices, and particularly when used prospectively to intervene prior to blood product administration, can serve as a guide to effect appropriate transfusion practices [18]. Yet, prospective audits are quite labor intensive given that Transfusion Medicine (TM) specialists must be readily available to discuss the case with the ordering provider and can lead to confrontation if there is disagreement in regard to patient management vis-à-vis blood product transfusion. Thus, it behooves TM specialists to be prepared to make sound, evidence-based recommendations and to find other means of influencing the clinician when they choose to disregard the recommendations, such as benchmarking of the individual provider's transfusion practices against other providers within the same specialty and healthcare system. Retrospective audits, occurring days to weeks after the transfusion, tend to be less efficient given that transfusion documentation is often sparse and clinicians may become defensive in regard to their transfusion decision after the facts.

Conclusion

PBM represents a paradigm shift in healthcare, moving beyond transfusion as a first line treatment for anemia. A successfully implemented and maintained PBM program is desirable to achieve optimal patient care, avoiding unnecessary usage of blood products and reducing the cost burden to the healthcare infrastructure. Despite studies which document the effectiveness of PBM, many healthcare facilities are still lagging in its implementation. Lack of awareness, resistance to change current practices, and knowledge gaps of healthcare providers regarding transfusion practices present major hurdles in the worldwide adoption and implementation of PBM. Successful development and implementation of PBM programs require thorough planning and stakeholder engagement, as well as education and training of the healthcare providers. Apart from strategies such as treatment of anemia and blood conservation techniques, other strategies including, but not limited to, informed consent and patient participation in the decision-making process also play an important role in the effective implementation of PBM. Once implemented, the PBM program should be maintained by periodic monitoring of the key metric parameters, which can be modified over time to match the ongoing needs of the program. The PBM program should also undergo continuous supervision to ensure that the goals of the program are being achieved and sustained. Certification and maintenance ensure continued adherence to best practices, with tools like CPOE and audits playing vital roles in guiding clinicians and assessing transfusion practices. Thus, by prioritizing PBM, healthcare systems can enhance patient care, reduce healthcare costs, and mitigate the risks associated with unnecessary blood transfusions.

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