Management of a Hospital Transfusion Service During a Nationwide Blood Product Shortage

To the Editor.—On June 21, 2016, our blood supplier informed the Beth Israel Deaconess Medical Center (Boston, Massachusetts) blood bank (and all customers) about a blood product shortage affecting blood centers nationwide. This notification implied that evolving regulatory requirements could impact the ability to maintain sufficient donors throughout the summer months. Steps to alleviate the shortage were outlined, including donor outreach programs and a full-scale direct appeal to all existing and lapsed donors. The communication expressed a high likelihood that the shortage would continue throughout the summer despite these efforts. On July 11, 2016, the American Red Cross, America’s Blood Centers, and the AABB issued an immediate critical appeal for blood and platelet donors. This statement described a shortage that was anticipated to continue throughout the summer at least. Specific reasons for such a shortage were not given, aside from the expected decrease in donations during the summer months due to vacations and schools being out of session. New restrictions on donations for those persons traveling to Zika virus–endemic areas and the increase of the minimum male donor hemoglobin level from 12.5 to 13.0 g/dL (as of May 2016), although not mentioned in the statement, could also have been playing a part in the shortage. Our hospital transfusion service had thus far been managing our inventory as usual, but we had noticed that our standing red blood cell (RBC) orders—particularly group O, Rh positive (OPOS)—were being incrementally cut during this time frame. Our concern for the stability of our inventory was further raised when our OPOS RBC inventory declined to 7 units above our critical level (a level established by blood bank administrative leadership) in mid-July. This prompted us to seek guidance from intrainsitutional administration regarding how to best approach blood product inventory management in this circumstance.

THE BLOOD SHORTAGE TASK FORCE

Our concern about a protracted product shortage was initially presented to the transfusion committee (a multidisciplinary group of physicians, nurses, pharmacists, and blood bank staff). At their recommendation, a presentation by the blood bank clinical manager and transfusion service medical director was made at the institution’s quality directors committee meeting. This group consists of clinicians (physicians, nurses, pharmacists) as well as nonclinicians who have trained in health care quality and regulatory affairs. They recommended creation of an interdisciplinary team known as the blood shortage task force (BSTF) consisting of transfusion medicine experts and members of hospital leadership as well as clinician stakeholders who would be impacted most should a severe or extended blood product shortage occur. The concept is analogous to our institution’s existing drug shortage task force.

The drug shortage task force is a subcommittee of the institution’s pharmacy and therapeutics committee. The director of the pharmacy may convene the task force when there is a shortage of a critical drug in which the drug is used by patients on multiple services for multiple uses and there is no therapeutic alternative. The task force has created a drug shortage management algorithm used to guide management until the shortage resolves. The task force convenes as soon as practical, when necessary, to triage the key items listed in the algorithm.

With the assistance of members of the Beth Israel Deaconess Medical Center quality services division and the transfusion committee, the transfusion service created a blood shortage management algorithm (Figure) and delineated membership of the BSTF (Table). Following the recommendations of the quality directors committee, members of the BSTF include standing members from the transfusion service and representatives from institutional quality and management departments; ad hoc members represent the interest of patients most impacted by the particular blood product shortage.

As shown in the Figure, the blood shortage management algorithm includes an operational assessment by the transfusion service whereby the details of the shortage are discussed among the medical director, manager, and lead technologists (this reflects current practice for anticipated acute and short-term product shortages); current in-house inventory and expected shipments are also reviewed. The ability to obtain the at-risk product from other blood suppliers is assessed; for instance, we have experienced short-term platelet shortages from our primary provider (for various reasons such as delays in testing or lot release), but have been able to obtain adequate product from our secondary blood supplier. The specific patient populations predicted to be affected are identified: for example, hematology oncology inpatients and outpatients when a platelet shortage is anticipated.

The decision by the transfusion service medical director to trigger the BSTF takes into account (1) whether the product is essential for patient care, (2) if long-term depletion is truly forecast, (3) if multiple services and multiple users are predicted to be affected, (4) if there is no therapeutic alternative (eg, fibrinogen concentrate could be considered a therapeutic alternative to cryoprecipitate; we do not routinely stock fibrinogen concentrate, but have the ability to bring it into inventory if required), and (5) if there is a marked transfusion medicine concern for patient safety. If any of these criteria are met, the medical director may activate the BSTF.

Once the multidisciplinary BSTF is convened, an impact analysis of the shortage is conducted, an estimate of the impact on patient care is determined, and at-risk patient populations are identified. Therapeutic differences among patient populations and different prescribing practices are discussed. Adherence to institutional guidelines is enforced and priorities for transfusion service distribution are delineated. Administration issues and financial ramifications are also considered. Once the inventory of the critical product has returned to baseline levels, the medical director of the transfusion service notifies the members of the BSTF that activities may return to normal.

The blood shortage management algorithm was used several times during the summer and early fall of 2016 when our transfusion service faced shortages of group AB plasma...
and of apheresis platelets, as well as a reduced supply of group O, Rh negative (ONEG) RBCs. We initiated daily prospective review of all planned surgeries in which the patients were ONEG and either a male or a female 50 years or older. For surgical cases in which there was the possibility of blood loss greater than 2 units, the transfusion medicine medical director had a discussion with the anesthesiologist prior to the surgery; information about the shortage was reviewed along with the fact that the patient might need to receive OPOS RBCs should blood loss be excessive. To examine more closely the use of ONEG RBCs, the blood bank also performed a retrospective audit of all ONEG units transfused in the prior 2 months and found that we had issued a concerning number of ONEG RBCs to Rh-positive (RhPOS) patients; in both July and August 2016 we issued almost 60% of our ONEG RBCs to RhPOS patients. While many of these ONEG RBC units were used to simplify management of red cell transfusion in RhPOS patients with anti-E and/or C antibodies in times of shortage, that was perhaps an unwise use of resources. In response to our impending shortage, we took action to reduce the transfusion of ONEG red cells to RhPOS patients. A concerted effort to conserve ONEG red cells led to a significant decline in the percentage of ONEG red cells transfused to RhPOS recipients during the

Management of blood product shortage algorithm.

---

Letters to the Editor

780 Arch Pathol Lab Med—Vol 142, July 2018

Letters to the Editor
ensuing 4 months, such that by November and December 2016, only 20% of ONEG RBCs were transfused to RhPOS recipients. RhPOS patients with known anti-E and/or anti-C antibodies were transfused E-negative, C-negative RhPOS units when possible. Also, RhPOS patients with sickle cell anemia were matched for Rh and Kell antigens with RhPOS units when possible.

In each circumstance detailed, it was not necessary to activate the BSTF. In the case of the ONEG RBC shortage, for instance, by limiting the use of ONEG RBCs in RhPOS patients, the blood bank was able to manage the shortage internally. The shortage actually brought to light the fact that we were inadvertently contributing to the problem. The knowledge that a multidisciplinary group could convene to assist with management if necessary was, however, reassuring.

CONCLUSIONS AND FUTURE DIRECTIONS

The previously described algorithm provides a framework for transfusion services to conduct an operational as well as a therapeutic assessment of the potential impact of a blood product shortage. Once the decision to convene the transfusion committee is made, discussions ensue as to whether to convene the institutional BSTF. A shortage impact analysis is then conducted to estimate the impact on patient care within the institution. This algorithm draws resources from within the entire institution to ensure quality patient care is maintained.

Based on our experience, there are likely opportunities for improved management of the blood supply within transfusion services nationally. For example, when faced with an impending limited supply from our blood provider, we recognized the opportunity to review long-standing institutional par levels for red cell components. Our transfusion service, in conjunction with our primary blood supplier, began working with an Internet-based inventory management system (BloodHub, Phoenix, Arizona; www.BloodHub.com, accessed January 23, 2018) in early September 2017. This program provides real-time access to critical inventory information (between the donor center and the transfusion service customer) with a goal of tightening our inventory. It is still too early to tell if this program has allowed us to reduce the amount of blood products that we carry in our blood bank, but that is the goal.

Additionally, examination of utilization practice of vulnerable components such as ONEG RBCs, AB plasma, and apheresis platelets may be called for. As we found, a close look at the distribution of ONEG RBCs revealed a surprising number of ONEG red cells issued to (1) non–Rh-negative and (2) non–group O recipients. Two recent publications suggest that this endeavor may be informative. A recent multicenter 12-year retrospective review showed an alarming increase in blood group O RBCs being transfused to non-O recipients, from 7.8% to 11.1%. Investigators from Australia recently published the findings of a similar retrospective audit of 5 weeks of data on the fate of all ONEG RBCs transfused in their country. Of the information collected (6387 units transfused), only 47% of ONEG RBC was transfused to group ONEG patients.

The volunteer nature of the US blood donor system, while absolutely necessary for a safe supply, contributes to a certain amount of unpredictability of the availability of blood products. It is our hope that the algorithm described above offers a helpful tool to assist institutions in management of blood shortages during times when demand exceeds supply, whether locally, regionally, or nationally.

Kerry L. O’Brien, MD; Monique Mohammed, MS(ASCP), SBB; Lynne Uhl, MD

Blood Bank, Department of Pathology, Beth Israel Deaconess Medical Center, Boston, Massachusetts

1. AABB. Blood FAQ. AABB Web page. http://www.aabb.org/tm/Pages/bloodfaq.aspx. Accessed July 5, 2017.
2. AABB. Significant shortages impact U.S. blood supply. AABB Web page. http://www.aabb.org/press/Pages/pr160711.aspx. Accessed July 5, 2017.
3. Electronic Code of Federal Regulations. General donor eligibility requirements. 21 CFR §630.10. http://www.ecfr.gov/cgi-bin/text-idx?SID=87b3e15113cf15d7a12c8c5531395c4&mc=true&node=ees21.7.630_110&rgn=div8. Accessed July 5, 2017.
4. Barty RL, Pai M, Liu Y, Cook RJ, Zeller MP, Heddle NM. Group O RBCs: where is universal donor blood being used? Vox Sang. 2017;112(4):336–342.
5. Hirani R, Wong J, Diaz P, et al. A national review of the clinical use of group O– red blood cell units. Transfusion. 2017;57(5):1254–1261.

Accepted for publication January 30, 2018.

The authors have no relevant financial interest in the products or companies described in this article.

doi: 10.5858/arpa.2017-0483-LE

Meningothelial-like Nodules of the Lung Show SSTR2a Immunohistochemical Staining

To the Editor.—Meningothelial-like nodules (MLNs), also known as minute pulmonary MLNs, are a common incidental finding in pulmonary wedge biopsies, lobectomies, and autopsies, present in 13.8% to 48% of cases. The underlying pathogenesis is unclear, but most authors agree that this finding is reactive and related to the presence of chronic lung disease, although there are no specific, consistent primary lung diseases known to be associated with MLNs. Some studies have suggested that a minority of MLNs may be clonal processes with shared genetic alterations with meningioma, including the characteristic loss of NF2. Their absence in children and increased frequency in older adults and those with long-standing chronic lung diseases seem to suggest that they are an acquired entity, instead of a congenital rest of meningothelial cells.1,2

Besides having a similar histologic appearance to meningiomas found in the central nervous system (CNS),