Activities of the THOR-AABB Working Party

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ABSTRACT: The AABB (formerly the American Association of Blood Banks) is an international authority on transfusion medicine and tissue banking. The Trauma, Hemostasis and Oxygenation Research (THOR) Network is an international multidisciplinary network of civilian and military providers ranging from first responders and medics to critical care physicians and from basic scientists to clinical trialists. The THOR Network's vision is to improve outcomes from traumatic hemorrhagic shock by optimizing the acute phase of resuscitation. Its mission is to develop and implement best practices for prehospital care through to the completion of the acute phase of hemorrhagic shock resuscitation. Thus, there is significant overlap between the missions of these two groups. To this end, the joint THOR-AABB Working Party (WP) was created in the summer of 2016 with a view to improving patient outcomes by the establishment of a formal collaboration between these two groups. The WP has been engaged in many different endeavors, from successfully changing the AABB's standards for the administration of whole blood, to writing commentaries on the safety of unncrossmatched red blood cells and antibody titer methods and thresholds in potentially incompatible plasma products, to hosting a daylong symposium on blood product resuscitation of massively bleeding patients in conjunction with the AABB annual meeting. This review details the activities of the WP and indicates some future activities. (*J Trauma Acute Care Surg.* 2018;84: S18–S20.

The AABB (formerly the American Association of Blood Banks) is an international authority on transfusion medicine and tissue banking. The AABB issues a variety of standards in different areas of transfusion medicine and blood banking against which hospital transfusion services and blood collectors can be audited and certified. Many hospital-based transfusion services and blood collectors both in the United States and internationally have voluntarily requested inspection and certification. The AABB also hosts the largest annual meeting of transfusion medicine professionals, provides continuing medical education throughout the year, and publishes several textbook that are targeted at the transfusion medicine community. The Trauma, Hemostasis and Oxygenation Research (THOR) Network is an international multidisciplinary network of civilian and military providers ranging from first responders and medics to critical care physicians, and from basic scientists to clinical trialists. The THOR Network's vision is to improve outcomes from traumatic hemorrhagic shock by optimizing the acute phase of resuscitation. Its mission is to develop and implement best practices for prehospital care through to the completion of the acute phase of hemorrhagic shock resuscitation. The THOR Network hosts an annual meeting where the latest research in trauma and massively bleeding patient care is presented and discussed.

It was therefore logical that these two organizations with overlapping interests should create a joint working party (WP) to explore and utilize their complementary specialized skills, knowledge, and resources to advance the field of trauma and massive bleeding resuscitation. The THOR-AABB joint WP was created in the summer of 2016, after then AABB chief executive officer Miriam Markowitz had attended the annual THOR meeting and realized the potential for improved patient outcomes by the establishment of a formal collaboration between the two groups. The THOR-AABB WP is cochaired by Drs. Mark Yazer from the University of Pittsburgh and Philip Spinella from Washington University in St. Louis, MO. All of the WP's members are listed in Table 1. These individuals were chosen from each organization because of their clinical and research interests in the management of bleeding patients and transfusion medicine. The first in-person meeting of the WP was held on the sideline of the AABB annual meeting in Orlando, FL, in 2016.

The WP is tasked with identifying and helping to remove barriers to improved patient care, being a liaison with regulatory agencies vis-à-vis blood product use in massive bleeding, identifying areas for novel research in bleeding patients, and with promulgating the best practice for the care of these patients. The WP reports to the AABB's clinical, scientific, and research council. The clinical, scientific, and research council helps to refine the WP's ideas and proposals and then submits them to the AABB's board of directors for further discussion and execution of actionable items. In this way, the WP leverages the expertise and resources of both the AABB and THOR.

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TABLE 1. Membership of the THOR-AABB WP

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Individuals other than the WP's members may be recruited for projects where their specialized knowledge will be helpful. It is important to note that the WP's mandate covers not only traumatically injured patients but also any patient with life-threatening hemorrhage.

To date, the WP has identified several opportunities for practice improvements and education about its mandate. The remainder of this article describes the current projects of the WP, with a short rationale for each project.

EDUCATIONAL OPPORTUNITIES

In order to help disseminate the best practice for treating massively bleeding patients, the WP, along with the support of the AABB's annual meeting planning committee, held a symposium on current topics in the management of massively bleeding patients in conjunction with the AABB's annual meeting in San Diego. This well-attended, daylong symposium was held on Friday, October 6, 2017, and featured speakers from both THOR and the AABB, as well as others who are experienced in managing massively bleeding patients. The feedback from the attendees was excellent, and the WP hopes to stage another daylong symposium in 2018, again in conjunction with the AABB annual meeting. The WP was also successful in having a 3-hour program on prehospital blood product resuscitation in patients with life-threatening hemorrhage accepted for presentation during the AABB's annual meeting itself, and it featured many of the speakers from the daylong symposium.

PRACTICE IMPROVEMENT FOR TRAUMATICALLY INJURED PATIENTS

It would be desirable to use group O whole blood (WB) early in the resuscitation of massively bleeding patients; patients would receive balanced resuscitation in the crucial early phase of their resuscitation, the cold-stored platelets might confer extra hemostatic properties compared with their conventional warm stored counterparts, and the logistics of the resuscitation will be greatly simplified by transfusing the contents of one bag instead of up to three bags that all have to be separately stored and procured from the blood bank. However, the 30th edition of the AABB's Standards for Blood Banks and Transfusion Services required that WB units be ABO identical with the recipient (Standard 5.15.1).[1] That is, for example, a group A patient can receive only group A WB, even though the red blood cells (RBCs) in group O WB would be compatible with a group A recipient (and in fact with all recipients). In the latter situation, the plasma component of the group O WB unit would be incompatible with the group A recipient's RBCs because the plasma component of the group O WB would contain anti-A. This is known as a "minor incompatibility" as the transfused product contains a smaller volume of plasma relative to the recipient's total blood volume. There is a theoretical concern that a minor incompatible plasma transfusion could lead to hemolysis of the recipient's RBCs. However, a subsequent standard permits the transfusion of minor incompatible plasma so long as the transfusion service has a policy for guiding this practice (Standard 5.15.4).[1] Therefore, there is a circularity in the AABB standards: a transfusion service is permitted to transfuse the minor incompatible plasma in the form of platelets and plasma units, but not from WB.

The serological safety of transfusing WB in the military setting has been well documented.[2–4] More recently, the safety of using cold-stored, low-titer (<50 anti-A and -B by manual saline tube immediate spin without enhancements) WB in traumatically injured civilian patients has also been demonstrated.[5,6]

The prohibition of transfusing WB to a recipient of unknown ABO group is likely retarding the implementation of civilian prehospital and early in-hospital WB transfusion programs. In an effort to change the standards to permit the use of WB in this setting, the WP collected the signatures of 217 transfusion and trauma medicine professionals from 24 countries who endorsed the following statement: "Do you agree that unncrossmatched, low-titer, group O WB should be permitted for use in the resuscitation of massively bleeding patients whose ABO group might not be known at the time of WB transfusion?" (http://rdcr.org/thor-aabb-working-group/). A background document with detailed information on the historical use of WB and the relative serological safety of transfusing minor incompatible plasma, along with the aforementioned petition and additional evidence of the safety of transfusing minor incompatible plasma from the literature, was considered by the AABB's standards committee, and indeed Standard 5.15.1 in the 31st edition of the standards will now feature wording that will permit the use of group O, low-titer WB for recipients of known or unknown ABO group as follows: Recipients shall receive ABO group-compatible RBC components, ABO group-specific WB, or low-titer group O WB (for non–group O or for recipients whose ABO group is unknown). This edition of the standards goes on to indicate that the definition of "low titer" shall be made locally by each transfusion service and that the transfusion service must have a policy specifying which patients are eligible to receive WB, the maximum quantity of WB per patient, and how to monitor for potential adverse events posttransfusion (Standard 5.27.1). With the regulatory impediments removed, the determination of the efficacy of cold-stored, low-titer WB in civilian patients with massive hemorrhage should now begin in earnest.

STANDARDIZING ANTI-A AND ANTI-B TITER METHODS

With the increasing interest in and use of products that could result in a minor incompatible plasma transfusion in bleeding patients, such as WB and group A plasma, the debate over whether the potentially incompatible antibody(ies) titers in these products should be determined has been renewed. However, there are many different methods for performing an antibody titer, and perhaps different results will be obtained from the same sample depending on the method used.[7] Furthermore, there has been renewed interest in a "safe" antibody titer for products that could be transfused in a minor incompatible manner. However, making recommendations on a safe antibody titer depends on the method used to determine the titer, so the WP is working with the AABB to convene a consensus conference to establish the reference method for performing anti-A and -B titers. However, until that conference is held, the WP is preparing a commentary for the journal *Transfusion* based on evidence from the literature and expert opinion. The commentary will contend that because the risk of hemolysis from minor incompatible transfusions is low to begin with, performing a titer using any method and selecting products that are below any reasonable antibody titer threshold (e.g., <256) will prevent units with very high antibody titers from being transfused in a minor incompatible manner. While these interventions might not eliminate all cases of hemolysis, determining the antibody titer is the most widely available and well-recognized test for predicting the safety of products that could be transfused in a minor incompatible manner.

DISASTER PREPAREDNESS SIMULATIONS AND DATA COLLECTION EXERCISES

With an increase in mass casualty terrorist events both in the United States and abroad, it behooves the transfusion community to have well-designed and well-rehearsed disaster plans should a mass casualty event occur in their service area. While many blood collectors and transfusion services have local disaster plans in place, such as how to recover from a burst water pipe that floods an area of the blood bank or what to do should a vital piece of equipment fail, many centers have not considered minimum blood product inventory levels and resupply arrangements should they be called upon to respond to a mass casualty event. The WP will be conducting an "on paper" disaster recreation exercise where the number and severity of casualties will be modeled using Israeli data on blood product utilization in terrorist attacks and the available inventories from hospitals and blood collectors in various American cities. These data not only will help individual blood banks plan for emergencies, but should help inform minimum inventory levels, communication pathways, and resupply arrangements between the hospital transfusion services and their blood suppliers across entire cities.

In addition, the WP is working with the AABB to participate in their annual data collection survey of AABB member hospitals. The WP will contribute questions related to disaster preparedness to obtain a snapshot of the level of preparedness of American hospitals and to help inform regional and local emergency planning.

The WP is also planning to liaise with regulators regarding the licensing criteria needed for cold-stored platelet products and potentially novel storage solutions for WB. The WP has also submitted a commentary to the journal *Anesthesiology* describing the safety of using uncrossmatched RBCs, a commentary on the current state of antibody titer methods and titer thresholds for potentially incompatible plasma products to the journal *Transfusion*, and continues to advocate for the best practice of blood components in the resuscitation of massively bleeding patients.

AUTHORSHIP

M.H.Y. performed literature review, wrote the manuscript, and approved the final version of the manuscript. P.C.S. performed literature review, critically appraised the manuscript, and approved the final version of the manuscript.

DISCLOSURE

The authors declare no conflicts of interest.

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