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INFECTIONS ON ECMO

Laura Dell'Aerea, BS CCP

Why tolerate greater mortality risk from infections in ECMO patients?

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President’s Message

A CHANGE IN LEADERSHIP

PREPARING FOR THE AMSECT PRESIDENCY IN 2020

Please let me begin this president’s message by saying thank you to all of you who take time out of your personal lives to serve our professional community. Whether you serve on a committee or board of a local, state, or national society, spend time sharing your experience through presentations, invited articles, or publications, or simply take the time to respond to a colleague’s perfusion related email, phone call, or text message, thank you. You have all served to improve our community and impact the care of our patients.

This year, more than any other in my time on the Board, more candidates ran for office than I can ever remember. From the office of President-Elect to the elected committees, all positions had candidates, and many positions had multiple contenders. In total, almost thirty highly qualified candidates, passionate about our profession, offered to serve AmSECT’s members and our profession by volunteering in elected positions. Those of you who did not get elected should not be discouraged but continue to look for ways to serve. There is a great deal of opportunities within our society to volunteer including committee membership, special projects, government relations, and much more. The lifeblood of our society is volunteerism and every member has the chance to participate.

Amazing things are happening within AmSECT and our profession. Initiatives such as, protocol creation, data registry associations, Centers of Excellence, best practice recommendations, and improved educational opportunities are just a few of the ongoing and future strategic initiatives. Collaborations with other national and international societies are a key focus to advance our society’s continued commitment to the practicing perfusionist, improving outcomes, and uniting our profession as one voice.

As I have stated before, the Presidency and the elected AmSECT Board positions are not positions of power but of service. AmSECT exists to serve its members and provide a voice on a national level which echoes all the way to the halls of your very own institutions. Serving the members of the largest society of perfusionists in the world is the paramount opportunity to aid AmSECT’s strategic initiatives developed to support our society’s continued commitment to the practicing perfusionist, improving outcomes, and uniting our profession.

In a situation such as this one, the infectious disease and crisis control centers of your hospital should be your primary source of public health information and mandates. Please adhere to their guidance and mandated protocols to ensure your patients and staff maintain optimal health to contain the dissemination of this virus. This is a rapidly evolving public health situation. Stay focused, alert, and informed in order to be an educated resource. Finally, protect yourself. You are very much valued, as your contributions positively impact the lives of so many patients.

RESPONSE TO COVID-19

On behalf of the AmSECT Board of Directors and Safety Committee, we extend our deepest concern, astute public health surveillance, and ongoing association support for our members, colleagues, and partners who are impacted by the outbreak of the COVID19 (Coronavirus) pandemic. Monitoring and improving the quality of life for our patients, their families, and extracorporeal technology professionals is at the core of our mission at AmSECT.

AmSECT continues to monitor the developments of COVID-19 and its impact on our community. We are committed to providing you with the tools, resources, and most up-to-date information to care for your patients, their families, your community, and you. To that end, AmSECT is participating in the Joint Perfusion COVID-19 Task Force which includes representatives from the American Board of Cardiovascular Perfusion, the American Academy of Cardiovascular Perfusion, Australian and New Zealand College of Perfusionists, Comprehensive Care Services, the Michigan Society of Thoracic and Cardiovascular Surgeons, Perfusion.com, and SpecialtyCare. This joint effort is monitoring the recent coronavirus outbreak and its impact on the perfusionists.

Combining the strengths of all organizations, the goal is to disseminate information and resolve questions related to perfusionists and COVID-19.

In a situation such as this one, the infectious disease and crisis control centers of your hospital should be your primary source of public health information and mandates. Please adhere to their guidance and mandated protocols to ensure your patients and staff maintain optimal health to contain the dissemination of this virus. This is a rapidly evolving public health situation. Stay focused, alert, and informed in order to be an educated resource. Finally, protect yourself. You are very much valued, as your contributions positively impact the lives of so many patients.

Resources:

- Interim Clinical Guidance for Management of Patients with Confirmed Coronavirus Disease
- Interim Infection Prevention and Control Recommendations
- Interim U.S. Guidance for Risk Assessment
- Healthcare Professionals: FAQ

Please contact AmSECT Headquarters with any questions or concerns.
Why is it that the intolerance of infection in ECMO patients is not nearly as firm as that of surgical site infections?
As perfusionists we often hear OR chatter about rates of surgical site infections and the occasional celebrations after a reduction. We typically find ourselves on the periphery of such conversations and are grateful to fly under the radar. After spending ample time in the OR, you understand that the celebrations are a fleeting event as compared to the investigations following an increase in infection rates. While we are all happy to avoid the pointed finger, we do understand that such concern and diligence is important and necessary in proper patient care. Deep sternal wound infections (DSW) will markedly increase your patient’s risk of mortality if they happen to be one of the rare unlucky few. A DSW, while occurring in a range of 0.2% to 8% of cases, can increase mortality by up to 45% (Pan et al., 2017).

With such attention turned to an event that in many places occurs in less than 1% of cases, one would logically assume that a similar event happening in 65% of cases would have the attention and resources of an army. However, that is not the case. Infections in ECMO patients have been reported to be as high as 85%, increasing the risk of mortality by 38-63% (Biffi et al., 2017).

Why is it that the intolerance of infection in ECMO patients stands as a recommendation and section, I found the information to be this time with the intention to compare and contrast the chapter on recommendations made by the task force, must have changed as well!

At 7.9% (ELSO, 2010). Infection rates also increased as the length of ECMO therapy increased. Naturally, the authors questioned the causal element here. The ELSO data collected in 2010 was not specific enough to identify whether patients were acquiring infections due to long term ECMO therapy, or it their acquired infections were prolonging their ECMO courses (ELSO, 2010).

Authors of the ELSO document in 2010 also make strong recommendations about accessing the ECMO circuit. While they recognize that it may be necessary to draw the occasional sample from the circuit, they urge the users to use the highest caution. The suggestion is for the user to treat the ECMO circuit just as a protected central line. Proper preparation of the access hubs must be taken very seriously, and it is noted that the preferred prep solution is chlorhexidine. Whichever possible, drawing samples and placing infusions should be done at a direct patient site rather than on the ECMO circuit (ELSO, 2010).

Based specifically on available data in 2010, the Infectious Disease Task Force discourages the surprisingly prevalent practice of administering prophylactic antibiotics. According to available research, patients who received prophylactic antibiotics were just as likely to obtain an infection while on ECMO support. In fact, the concern was that those who received antibiotic therapy without proper indication were more likely to develop a resistant strain of infection (ELSO, 2010).

Further, although they may serve as a safety net, any extra access lines should be removed from the patient after ECMO is initiated and stabilized. This is encouraged even in systemically anticoagulated patients. The risk of bleeding from a properly removed line is felt to be less severe than that of an infection caused by its presence (ELSO, 2010).

Infection rates at that institution dropped from 29.3/1000 ECMO days to 20.1/1000 ECMO days. This suggests that the circuit built and primed in a controlled non-emergent fashion ahead of its need, is less likely to cause infection than a circuit built and primed emergently (ELSO, 2010).

The final task force recommendation was that the ELSO database be expanded to include more specific data. Culture sites and dates were pieces of information they felt would be helpful in infection evaluation. Additionally, further research to understand ECMO sources of infections and treatments would be necessary to combat this serious complication (ELSO, 2010).

By a stroke of luck, I was able to locate a publication from 2017 with a compilation of the current literature on ECMO and infections. Biffi and colleagues compiled a report in much the same way that the Infectious Disease Task Force had in 2010. It was my intention to make a direct comparison of the 2010 data to the 2017 data. There was clearly more research conducted between the two publications with more information in order to make informed recommendations. Much of this research was conducted in the pediatric and neonatal population and may not translate well into the adult population (Biffi et al., 2017).

Amazingly, as a whole, the 2017 paper made no different recommendations than the 2010 paper. The rates of infection and mortality in today’s population is unchanged, the most at risk populations have not changed, and cause of infection is still difficult to identify. The avoidance of prophylactic antibiotics due to lack of evidence supporting the practice was explained very clearly in the same manner and stands as a recommendation. Item by item, Biffi walked through each recommendation and with the addition of a few new pieces of supporting data, made the same recommendations as the ELSO Infectious Disease Task Force in 2010. Closing statements included the need for more specific data collection and more extensive research (Biffi et al., 2017).

Along this journey I have answered some questions but also left with more unanswered questions than I had hoped. What are the obstacles to progress in this area? Why have we not improved over the last decade in our recommendations or rates of infection? My parting words for each of you come in the form of a charge. First, read the ELSO document of recommendations. There exists much more information than what could be covered here. Second, and most importantly, we as a profession need to move this area forward with new research and process improvement. We must strive for the next decade to show a drastically different report of incidence and mortality. As a community, let’s be intolerant of infections in ECMO.

REFERENCES


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THE IMPORTANCE OF PRE-TRANSFUSION TESTING

EVALUATING BLOOD QUANTITY NEEDS IN PREOPERATIVE PROCEDURES

ABSTRACT
Withdrawal of a patient’s blood for autologous use is standard preoperative practice during cardiothoracic surgery, utilized as a safe method to provide the patient’s own blood for oxygen transport and coagulation factors when needed, as well as limiting their exposure to foreign blood products. However, when indicated, homologous banked donor blood products may be used following completion of several analytic factors prior to administering the most-safe donor blood product, as well as to perfuse the patient without causing harm during Cardiopulmonary Bypass Surgeries (CPB). This clinical review highlights pre-transfusion testing, emphasizing the importance of clerical checks and potential issues posed without following proper standard operating procedures by Cardiopulmonary Perfusionists, Transfusion Medicine Technologists and all individuals involved prior to transfusion.

INTRO
The quantity of blood components ordered preoperatively is determined based on the physician’s judgement of expected surgical blood loss for a given procedure, the patient’s preoperative hemoglobin concentration, or on an institution’s maximum surgical blood order schedule (MSBOS). The MSBOS serves as a guideline in directing pre-transfusion testing along with blood and blood component orders based on the patient’s preoperative condition (1). Pre-transfusion testing is a multistep process covering pre-analytical to post-analytical phases. Failure to consider any factors constitute error and may be detrimental to the patient. Variables of the pre-analytical phase include patient identification during time of draw, labeling of the specimen, and proper specimen handling prior to laboratory testing. Analytic testing is the second phase, taking place in the laboratory from the moment the specimen is received and ends when the test result is interpreted and verified. The post-analytical phase includes all necessary steps taken after laboratory testing results are obtained. This includes transcription and reporting of results to report forms, assessment of clinically significant results, making sure proper labeling and issuing of a blood product is completed for the correct patient, as well as performing clerical checks by the Perfusionist prior to component transfusion during the procedure. Serious and potentially fatal patient consequences may occur if any variables throughout pre-transfusion testing are overlooked.

BLOOD GROUP ANTIGEN AND ANTIBODY TESTING
The Blood Bank Laboratory’s testing of a patient’s ABO Rh blood group antigens and antibody screen during the analytic phase is an important routine preoperative test aiding in clinical and medical determinations made prior to transfusion or perfusion of blood. Blood and/or blood components may be selected and cross-matched for the safest possible transfusion, while also detecting significant antibodies that may pose a risk during transfusion with subsequent consequences for the recipient.

PRE-TRANSFUSION TESTING: ERRORS AND OUTCOMES
A preoperative misdraw occurs as a pre-analytical error, demonstrating failure in performing proper patient identification. If the wrong patient is drawn for a Type and Screen test along with an ABO Rh confirmation sample under the information of the correct patient, a Transfusion Medicine Technologist is able to dispense a false-negative compatible blood product at the time of request without the knowledge of any discrepancies. This is particularly important in the case of any patient lacking historical blood type information. The transfusion of the incorrect blood product may cause serious harm if the blood type of the incorrectly drawn patient is not compatible with that of the recipient. In the case of a mis-match of Rh Blood Cell (RBC) units, a recipient who lacks the Rh blood group antigen “D” on their RBCs will receive an anti-D antibody if they encounter the D antigen on RBCs during a transfusion, causing a hemolytic transfusion reaction (5). A prospective study conducted by the Department of Transfusion Medicine of Shri Mahantganj Gulab Singh Hospital (Jammu, India) reported a total of 2,229 errors identified over a period of one year, from 346,955 samples drawn and cross-matched of blood and blood components for transfusion over a period of 1 year. Pre-analytical errors related to sample collection and labeling of samples comprised 793 (35.5%) and were the most common of all errors in the pre-analytical phase. ABO Rh incompatible hemolytic reactions were the most frequent harmful event with the frequency of 2.2/10,000 transfusions (6).

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5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4782498/

Michelle Machala, MLS ASCP, graduated from The University of Maine, where she received a baccalaureate in Medical Laboratory Sciences. She currently works as a Medical Technologist in Transfusion Medicine at New York-Presbyterian Hospital. All of Michelle’s efforts and successes within the clinical field have landed her as an awarded student by the Clinical Laboratory Management Association and Co-Chair of a hospital based laboratory organization. She looks forward to continuing her education and enhancing her scope of knowledge in extracorporeal technology.
Many decades ago, I walked into the new hospital operating room where I was just hired as a perfusionist and a scrub nurse. Two of the first things I saw were the OR locker room labels; “Doctors” and “Nurses”. I immediately thought that this was going to be an interesting place to work. Since I was a scrub nurse I assumed I would be in the “Nurses” locker room. I was one of the very few male nurses in the hospital and the only one in the OR. But I was directed to the “Doctors” locker room. The signs should rightly be interpreted as “Men” and “Women”. I was told by my supervisor, who apparently did not recognize the offensive nuance of the labels. In fact, there were no female physicians working in the OR, neither surgeons nor anesthesiologists. However, there were two excellent nurse anesthetists who bunked on the “Nurses” side.

That wasn’t it at all. Both locker rooms had the same number of lockers, which seemed fair at first sight. Except that there were four times more “Nurses” than “Doctors”. So each physician got his own locker but the nurses had to double up or even triple up. Also, the “Doctors” had a shower and the “Nurses” did not. Whoever designed these locker rooms apparently did not think that OR nurses would get sweaty and bloody during the work day and might want to shower off before going home. Apparently, getting sweaty and bloody only applied to “Doctors”.

“Doctors” wore the typical scrubs that we all wear today, a pullover shirt and pants with a cord waist tie. The “Nurses”, however, were REQUIRED to wear these horrible short sleeve scrub dresses. They hated them for too many reasons to expand upon here. The hospital did not even supply them with warm up jackets. The nurses could buy their own jackets, but they were required to be freshly laundered every day. The nurses were not allowed to wash the jackets at home. They must use the hospital’s outside laundry service where they could be properly sanitized. After two or three runs through the outside laundry, each nurses’ own jacket was usually lost (or maybe stolen) by the outside contractor. When they were not scrubbing many of the nurses took to wearing our re-useable, sterile cloth (yes, I said cloth) scrub gowns for warmth and arm protection. This was frowned upon by the powers-that-be because it used the sterile gowns for a non-sterile purpose causing the labor to repair (patch holes), launder and sterilize these gowns to go to waste. (Was it wasteful to want stay warm and clean from patient detritus? I didn’t think so.) Even though I was a scrub nurse, I was also a perfusionist. So, I guess it was OK for me to wear pants and shirt.

These are just some of the examples of what the nurses had to put up with in the late 70’s and early 80’s. Actually, things had improved some since I started working in the late 60’s. Back then, floor nurses were REQUIRED to wear their nursing caps, as well as white dresses or white skirts and blouses with white hose and white shoes. As I remember, “Doctors” had no dress code. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons. The 60’s was a time in American medical culture when doctors were treated like gods and nurses like handmaidens. And, the most godly of them all were the heart surgeons.

At least, in the late 70’s and early 80’s, nurses no longer had to stand when a doctor (particularly a surgeon) entered the room. And it was a lot harder for doctors to have a nurse who they did not like fired. Nurses still showed physicians respect, but they no longer showed the deference of a servile handmaiden **. As one popular cigarette commercial of the time said, “You’ve come a long way, baby!”

That brings me to Brenda. Brenda was a scrub nurse (RN) who scrubbed mostly hearts. I worked with her most days. When not scrubbing hearts, she scrubbed every other thing that came down the pike; ortho, ENT, neuro, eyes, etc. Brenda was absolutely dedicated, as most of the OR nurses were, to helping sick kids in any way she could. Even if it meant putting up with the abusive and disrespectful nuances within the OR enviorns. One day a severe trauma patient arrived. This was a girl about 10-12 years old who had been in an auto accident. Her pelvis was crushed when the whole child was ejected from the miracle. Brenda kneeled at the foot of the shortened bed, still pressing the lap sponges against the torrent of blood. The surgeons and two scrub nurses quickly gowned and gloved (there was no time for a proper hand scrub). They threw some betadine on the child’s lower abdomen and hips followed by the positioning of a large sterile surgical drape which covered the whole child, the entire table … and Brenda. They then proceeded to do something I had never seen before or since. They used hand drills to make holes on either sides of the child’s pelvis. Then they endeavored to feed a rigid steel rod through the hole on one
side, trying to avoid other vital pelvic organs and structures, through to the other side. The idea was that once the rod was through-and-through the pelvis, they could apply washers and nuts on each end of the rod. As the nuts were tightened, the squeeze from the washers compressed the pelvis and its ruptured bony sutures together and, hopefully, stop the bleeding. What was everybody else doing? The anesthesiologist was busy establishing a secure airway, starting large bore IV access, giving anesthetic medications, monitoring and charting vital signs (this was well before computer charting, automated blood pressure cuffs and even pulse-oximeters) and reversing the shock that was rapidly developing.

The scrub nurses were trying to pass the surgical instruments and keep their Mayo stands organized as the surgeons kept lobbing instruments back at them in a frenzy. My job was to pump blood in. There was no cell salvage in those days. There were no packed cells then either. We used whole blood. I went through the first few units of cross-matched, type specific blood that we had. That was gone in about 5 minutes. Then I began to give just type specific blood. When we ran out of that, I started pumping in type compatible blood. We rapidly depleted most of the blood in our in-house blood bank. The community blood bank was resting more units out to our hospital. I don’t remember exactly, but I think I eventually pumped in about 50 units of whole blood during the procedure.

The circulators were charting and running for supplies, particularly large lap sponges. Then I suddenly thought, “Hey! Where’s Brenda?” The last time I saw her, she was kneeling at the foot of the bed still trying to stem the flood of blood with a lap sponge. She was still there, throwing out blood soaked (and I mean soaked) sponges and yelling for more! She remained there out the course, on her bare knees, in that leasy scrub dress. The only protection she had was her bourbon hat, paper face mask and rubber gloves. No gown and no eye protection. What happened to Brenda? She went back to school and became an excellent and well respected nurse anesthetist specializing in pediatrics. Perhaps she wanted to work at the head of the table rather than under it! This article can also be found on my free educational, non-commercial website <Perfusiantheory.com>.

Gary Gritz, BS RN CCP, Emeritus, was a perfusionist from 1968 through 2004 and is now retired. His career highlights include winning the AmSIGHT Perfusionist of the Year award in 2002, the AmSIGHT Research Award in 2003, the AmSIGHT Perfusionist of the Year 2002 and the Excellence in Nursing Award in 1995 from The Children's Mercy Hospital in Kansas City, Mo.

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INTRODUCTION

Blood conservation has captured the attention of our profession for myriad reasons, from transfusion reactions, infection risks and cost to negatively impacting our profession for myriad reasons, from transfusion reactions, infection risks and cost to negatively impacting our profession for myriad reasons. We have been conducting the subject on the role of FFP in pediatric cardiac surgery focus on the timing of FFP administration. Use of FFP as a CPB prime component has been a key element in perioperative care for decades. The timing of FFP administration for maximal effects or using alternative products could help our compacted efforts of avoiding unnecessary blood transfusions.

PLASMA DERIVATIVES

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CURRENT PRACTICES

At Duke University Hospital, half a unit of FFP is added to a unit of packed red blood cells (PRBC) as well as 12.5 grams of 25% albumin to coat the circuit and help maintain colloid osmotic pressure for neonates and small infants with high-pressure suture lines. Pre-bypass ultrafiltration (pre-BUF) is performed on the sanguineous prime. The other half of the FFP unit is given if volume is needed throughout the CPB run or during the rewarming phase of CPB. We may give FFP, platelets and/or cryoprecipitate during modified ultrafiltration based on the results of laboratory values drawn during CPB. Our anesthesiologist may administer additional products after the termination of CPB.

FIGURE 1: PLASMA DERIVATIVES

LITERATURE REVIEW

Large, randomized studies researching the use of FFP in neonate, infant, and pediatric CPB cases are limited. Most publications are smaller, institution-specific and sometimes had contradicting conclusions regarding the outcome. Unfortunately, the lack of randomized clinical trials concerning the use of FFP in pediatrics undergoing cardiac surgery hinders our ability to improve our practice in this realm. Recent studies have been conducted on the subject of FFP in pediatric cardiac surgery focus on the timing of FFP treatment, using FFP as a CPB prime component and potential alternatives to FFP.

A study by P. Bianchi et al. looked at the optimal timing of periparative FFP administration, using 73 infants weighing less than 10kg randomly divided into two study arms with differentiation of FFP transfusion timing: receive FFP in the CPB prime with PRBCs or a 5% albumin and RBC prime with FFP administration immediately after CPB. In the 24-hour postoperative period, the chest tube drainage was significantly greater in patients in the late FFP arm (mean of 33.1mL/kg) in comparison to patients that received FFP in the CPB circuit prime (mean of 24.1mL/kg). In addition, at the 24 and 48-hour postoperative marks, fibrinogen levels were significantly higher in the early FFP arm. There were no significant differences in laboratory tests including: platelet count, platelet dysfunction, aPTT, INR, and EXTREM clotting times. Furthermore, there weren’t significant differences in PRBC transfusion rates, mechanical ventilation time, or postoperative length of stay.7 The authors conclude by identifying the clinical implications of low fibrinogen levels postoperatively, as the direct correlation to postoperative bleeding.8 Similarly, a double-blind study by Dieu et al. investigated the role of FFP as a CPB prime component. This randomized study included 56 patients weighing 7 to 15kg to receive either 35mL/kg of PlasmaLyte-A or FFP in the CPB prime in addition to PRBCs. All patients received tranexamic acid prior to CPB initiation. This study also showed there was not a significant difference in allogenic blood transfusions between the arms of the trial when products in the CPB prime were excluded. Furthermore, there was not a statistical difference in perioperative blood loss per kilogram. Interestingly, the FFP arm had more than twice the number of redo-sternotomy patients (n=14) in comparison to the crystalloid arm (n=6).9 This study shows a different conclusion than that reached by P. Bianchi et al., suggesting there is no

BLOOD CONSERVATION CAPTURING THE ATTENTION OF THE PERFUSION PROFESSION

Although our efforts to minimize circuit size for cardiopulmonary bypass (CPB), the administration of allogeneic blood products is often required in neonates and small infants due to the effects of hemodilution. Moreover, neonates and small infants present a unique challenge to the pediatric perfusionist due to their immature coagulation system which manifests with fluctuating levels of coagulation factors and anti-coagulation proteins.2 In an effort to use blood products responsibly and in a streamlined manner amongst institutional teams, transfusion algorithms and protocols have been developed to guide the clinician. However, there seems to be a variation in the timing of periparative fresh frozen plasma (FFP) administration in the neonate and small infant population as well as the role of factor concentrates. Perhaps, optimizing the timing of FFP administration for maximal effects or using alternative products could help our concerted efforts of avoiding unnecessary blood transfusions.

LARGE, RANDOMIZED STUDIES RESEARCHING THE USE OF FFP IN NEONATE, INFANT, AND PEDIATRIC CPB CASES ARE LIMITED.

FIGURE 2: AMERICAN SOCIETY OF EXTRACORPOREAL TECHNOLOGY

Similarly, when I was a student at MUSC Children’s Hospital, for patients less than 8kg FFP was utilized in the same fashion: half of a unit in the CPB prime and the other half infused during rewarm. For patients greater than 8kg, a calculated amount of 25% albumin is added to achieve a target post-dilutional colloid osmotic pressure of 10mMhg. The AnSCECT pediatric standards and guidelines (Figure 2) provide an outline for blood management with the priming techniques mentioned above, as well as efforts to avoid hemodilution. However, the role of FFP in pediatric perfusion is not delineated. As we strive to stay abreast of the latest research and techniques, the question of how we can optimize and/or change our current practice is inevitable.

 Standards and Guidelines For Pediatric and Congenital Perfusion Practice (5/31/2019)

Large, randomized studies researching the use of FFP in neonate, infant, and pediatric CPB cases are limited. Most publications are smaller, institution-specific and sometimes had contradicting conclusions regarding the outcome. Unfortunately, the lack of randomized clinical trials concerning the use of FFP in pediatrics undergoing cardiac surgery hinders our ability to improve our practice in this realm. Recent studies that have been conducted on the subject of FFP in pediatric cardiac surgery focus on the timing of FFP treatment, using FFP as a CPB prime component and potential alternatives to FFP.

A study by P. Bianchi et al. looked at the optimal timing of periparative FFP administration, using 73 infants weighing less than 10kg randomly divided into two study arms with differentiation of FFP transfusion timing: receive FFP in the CPB prime with PRBCs or a 5% albumin and RBC prime with FFP administration immediately after CPB. In the 24-hour postoperative period, the chest tube drainage was significantly greater in patients in the late FFP arm (mean of 33.1mL/kg) in comparison to patients that received FFP in the CPB circuit prime (mean of 24.1mL/kg). In addition, at the 24 and 48-hour postoperative marks, fibrinogen levels were significantly higher in the early FFP arm. There were no significant differences in laboratory tests including: platelet count, platelet dysfunction, aPTT, INR, and EXTREM clotting time. Furthermore, there weren’t significant differences in PRBC transfusion rates, mechanical ventilation time, or postoperative length of stay.7 The authors conclude by identifying the clinical implications of low fibrinogen levels postoperatively, as the direct correlation to postoperative bleeding.8 Similarly, a double-blind study by Dieu et al. investigated the role of FFP as a CPB prime component. This randomized study included 56 patients weighing 7 to 15kg to receive either 35mL/kg of PlasmaLyte-A or FFP in the CPB prime in addition to PRBCs. All patients received tranexamic acid prior to CPB initiation. This study also showed there was not a significant difference in allogenic blood transfusions between the arms of the trial when products in the CPB prime were excluded. Furthermore, there was not a statistical difference in perioperative blood loss per kilogram. Interestingly, the FFP arm had more than twice the number of redo-sternotomy patients (n=14) in comparison to the crystalloid arm (n=6).9 This study shows a different conclusion than that reached by P. Bianchi et al., suggesting there is no...
substantial evidence to support including FFP in the CPB prime.

The development of alternatives to FFP may also help reduce the risks of transfusions and conserve resources. For example, OctaplasLG is a “commercially produced plasma prepared from single-donor units with the same blood group which is filtered, treated with a solvent detergent to inactivate viruses and reduce bacteria and prior transmission.” A retrospective study comparing FFP to OctaplasLG used intra-operatively was conducted over ten years in 105 pediatric patients <10kg undergoing tetralogy of Fallot repair. It should be noted that 27 patients in the FFP group received aprotinin prior to the drug being discontinued. Thus, these patients received more heparin in the CPB prime. The FFP group received significantly more PRBCs than the HFC group. The FFP group received more heparin in the CPB prime, from the anesthesiologist after CPB and overall. However, the HFC treated group received more cell saver blood. This team uses ROTEM to guide their transfusion team and they use aprotinin in their practice. The team uses ROTEM to guide their transfusion decisions and aim to correct coagulation values by hemodilution shortly before separating from CPB. There was no difference in blood loss or factor VII administration. But also results in increased blood product administration and has been linked to increased mortality in infants after CPB.13 Post-operative bleeding in neonates and small infants is inevitable in cardiac surgery. Unfortunately, we don’t have enough evidence to answer the pivotal question of how we may go about optimizing our resources and timing of FFP administration. While the use of commercially available alternatives to FFP may evolve within the pediatric cardiac setting to the point of becoming a standard of care, we should strive to identify common ground on intra-operative FFP administration. A consensus amongst pediatric cardiac surgery institutions regarding FFP transfusion triggers and their prophylactic role is a worthwhile endeavor. This will require more randomized trials with substantial cohort sizes to allow our profession to confidently make clinical decisions and potentially, changes to our current practice. Not only would this serve as a benefit to our patients in a variety of ways, but it would serve our profession well by helping to facilitate future studies. Our goal should be to ensure we are providing the best evidence-based care to our patients.

REFERENCES:


1. All of the following applies to storage of red blood cells except______.
   a. Decreased 2-3 DPG levels
   b. Decreased nitric oxide – Hgb
   c. Decreases aggregability (pro-thrombotic effects)
   d. Impairs RBC deformability
   e. B and C

2. The “storage lesion” phenomena states that transfusing a RBC’s will increase your hemoglobin, but it may not increase oxygen delivery.
   a. True
   b. False

3. Administration of Anti-Thrombin III (AT-III) supplement is probably more desirable than transfusion with homologous fresh frozen plasma for all of the following reasons except
   a. FFP does not reliably restore the ACT for patients with Heparin Resistance
   b. ATIII helps to avoid the risk of TRALI
   c. Use of AT-III is therapeutically more effective than FFP to treat AT-III deficiency
   d. Compare to AT-III supplement less volume of FFP is enough to treat AT-III deficiency
   e. None of the above

4. Which of the following is/are ways to safely avoid a blood transfusion?
   a. Optimize oxygenation
   b. Optimize hemodynamics
   c. Reduce metabolic demand
   d. A and B
   e. All of the above

5. Transfusion is associated with_______.
   a. No change in hospital acquired infections
   b. An increase in most hospital acquired infections
   c. An increase in deep mediatinal wound infections only
   d. A decrease in hospital acquired infections
   e. None of the above

6. Which of the following is/are required to perform acute normovolemic hemodilution?
   a. Patient’s baseline Hematocrit
   b. Arterial or venous access to collect blood with adequate anticagulation for intended volume

7. Platelets is/are required for
   a. Adhesion and aggregation
   b. Thrombin Formation
   c. To increase platelet number and function
   d. A and C
   e. All of the above

8. Which of the following organizations continues to guide and advance transfusion systems?
   a. American Red Cross
   b. American Society of Hematology
   c. AABB
   d. A and C
   e. All of the above

9. ________ is a common transfusion reaction in which pulmonary edema develops primarily due to volume excess or circulatory overload.
   a. TACO
   b. NACHO
   c. TRALI
   d. TRIM
   e. None of the above

10. Which of the following is/are tested on all blood donations?
    a. CMV
    b. Zika Virus
    c. Bacterial Contamination
    d. A and B
    e. All of the above

11. ________ reactions are the most common reaction reported after a transfusion.
    a. Acute hemolytic
    b. Delayed hemolytic transfusion
    c. Febrile non-hemolytic transfusion
    d. Hypotensive transfusion
    e. B and D

12. Which of the following is a serious but rare reaction that occurs when fluid builds up in the lungs, but is not related to excessive volume of blood or blood products transfused?
    a. TACO
    b. NACHO
    c. TRALI
    d. TRIM
    e. None of the above

13. Which of the following is/are associated with increased risk of cardiac surgical site infection?
    a. Obesity
    b. Diabetes mellitus
    c. Kidney disease
    d. A and B
    e. All of the above

14. Which of the following test(s) is/are less sensitive to the effects of non-heparin factors than ACT or aPTT and is considered a more accurate measure of residual heparin activity.
    a. Bleeding time
    b. Thrombin time
    c. Anticardiolipin time
    d. Anti-Xa
    e. A and C

15. The TEG and ROTEM devices have limited ability to discriminate between platelet dysfunction and defects in fibrin generation and are often complemented by platforms that can detect specific defects in platelet function.
    a. True
    b. False

**Self-Quiz Answers**
AmSeCT would like to thank those who donated in 2019-2020 to the AmSeCT Foundation Donations.

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To see the complete list of foundation donors, visit AMSECT.ORG.

AmSeCT Membership Transition

The recent AmSeCT Bylaws Amendment vote to update the language describing the timing of membership dues payments was approved by the AmSeCT membership in 2019. Based on the approval, AmSeCT will implement annual dues instead of anniversary dues beginning in January 2020 and rolled out with full dues payment for January renewals, and then reduced rates per month for the rest of 2020. By 2021, everyone will renew in January at their standard dues payment, and everyone will have a membership expiration of 12/31/2021. For more information on the change, please visit WWW.AMSECT.ORG/AMMEMBERSHIPTRANSITION.

Journal of ExtraCorporal Technology: 2020 Digital Transition

As a reminder, starting with the March 2020 issue, JECT is going digital! All members will receive issues of JECT emailed directly to their email inbox in addition to having access to the JECT archives on the AmSeCT website. Active, Transitional, Retired, and Lifetime Members that would like print copies of JECT can still purchase a subscription for an annual rate of $50. Additional details about the transition can be found on the AMSECT WEBSITE HERE.

Volunteer Appreciation Month: THANK YOU AmSeCT VOLUNTEERS!

Our society would like to extend a heartfelt thank you to all those who dedicate their time and expertise to AmSeCT year in and year out. Their tireless effort to improve patient care and safety by providing for the continuing education and professional needs is invaluable to the profession of perfusion. View all of our outstanding volunteers on our website HERE!

AmSeCT WELCOMES NEW MEMBERS

AmSeCT would like to welcome the following new members who have recently joined the society:

- Ruben Arce
- Laurie Baldwin
- Alyssa Barker
- Kacie Baungartner
- Kali Begum
- David Becher
- John Bennett
- Anna Bissette
- Daniel Blackwell
- Deborah Brasurewll
- Elisea Bray
- Michelle Bushmire
- Kelly Cadigan
- Stephanie Carchola
- Joseph Catrala
- Rebecca Dixon
- Jodi Dobson
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- Kevin Grady
- Justine Graham
- Stuart Grant-Coons
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- Michael Martin
- Lynn Masinick
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- Colleen Morrow
- Emily Morrow
- Jack Morrow
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- Can Nguyen
- Michael Nicotra
- Isaac Paccheco
- Stetley Roger
- Shaun Rainey
- Gustavo Ribero
- Jenny Richy
- Alexis Ripic
- Lori Robertson
- Ryan Schmer
- Sydney Severin
- Macie Stevenson
- Justin Stone
- Jill Sukovieff
- Dusty Talley
- Maciej Turtek
- Kefen Trimwila
- Emily Todd
- Min Hsuan Tsai
- Juan Carlos Tu
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- Adam Tazopoulos
- Joseph Valaxenas
- Mariah Varghe
- Jason Vargo
- Francesco Vitali
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- Robert Wise
- Leo Wiwax
- Christopher Yann
- Garrett Yanfas
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- Adam Young
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MEMORIAL HEALTH SYSTEM CAREERS

MEMORIAL HEALTH SYSTEM CAREERS
AmSECT 2020 ELECTION RESULTS

The new members of the AmSECT Board of Directors were elected in early 2020. Thank you to all AmSECT Members who participated in this election cycle. Final results are listed below. Terms for newly elected representatives began at the conclusion of the Annual Corporate Membership Meeting at the 2020 AmSECT International Conference.

Board of Directors: Officer Positions

- **James A. Reagor**, CCP MBA FPP
  President-Elect

- **William Scott Snider**, CCP LP
  Treasurer

- **Theron Paugh**, BS CCP
  Secretary

Board of Directors: Zone Director Positions

- **Molly Dreher**, CCP FPP
  Zone 4 Director

- **Jennifer Mottern Porembski**, MS CCP
  Zone 4 Director

- **Renee L. Axdorff-Dickey**, CCP MBA
  Zone 1 Director

Elected Committee Positions

- **Al Stammers**, MSA CCP
  Achievement Recognition Committee

- **Krysta L. Gleeson**, MBA MS CCP
  Bylaws Committee

- **Elon M. Trager**, CCP
  Nominating Committee

Board of Directors: Beginning March 8, 2020

- **James A. Reagor**, CCP MBA FPP
  President

- **Tami Rosenthal**, CCP MBA FPP
  President-Elect

- **William Scott Snider**, CCP LP
  Treasurer

- **Theron Paugh**, BS CCP
  Secretary

- **Cory M. Alwardt**, PhD CCP
  Zone 1 Director

- **Renee L. Axdorff-Dickey**, CCP MBA
  Zone 1 Director

- **Ben Swanson**, MPS CCP
  Zone 2 Director

- **Gregory A. Monk**, BA LP CCP
  Zone 2 Director

- **Karim Jabr**, CCP LP CSSBB
  Zone 3 Director

- **Issac R.K. Chinnappan**, MS CCP LCP FPP CPBMT
  Zone 3 Director

- **Molly Dreher**, CCP FPP
  Zone 4 Director

- **Jennifer Mottern Porembski**, MS CCP
  Zone 4 Director

AmSECT & IBBM Announce New CES-A Exam

The American Society of ExtraCorporeal Technology (AmSECT) and the International Board of Blood Management (IBBM) are pleased to announce the first Adult ECMO Specialist Certification Exam. The exam is intended for RNs, RRTs, and other allied health professionals monitoring adult ECMO procedures and circuits.

The exam will be offered three times online in 2020. For more information, visit the IBBM website at [http://intbbm.org/ces-certification/](http://intbbm.org/ces-certification/)

Exam Registration Dates
- **March 20 - April 20, 2020**
- **June 19 - July 20, 2020**
- **September 21 - October 21, 2020**

Exam Dates
- **May 13 - May 15, 2020**
- **August 19 - August 21, 2020**
- **November 18 - November 20, 2020**

Learn more at [http://intbbm.org/ces-certification/](http://intbbm.org/ces-certification/)

Is there any way to continue receiving a print copy of JECT?

For AmSECT members who want a printed copy of JECT, AmSECT will offer an annual subscription rate of $50 for active, transitional, lifetime, and retired members. Associate member subscription rates will remain at $100. This will ensure continued quarterly mailings of the journal to your home or institution. To purchase a printed subscription for 2020, please visit the AmSECT website below:

[www.amsect.org/printedjECT](http://www.amsect.org/printedjECT)