AmSECTODAY

QUARTER 4, 2024 • VOLUME: 27 • ISSUE 4

ADVANCEMENTS AND CHALLENGES IN NORMOTHERMIC REGIONAL PERFUSION: A GLOBAL PERSPECTIVE

President's Message
Invited Article
Little Hearts
Committee Corner

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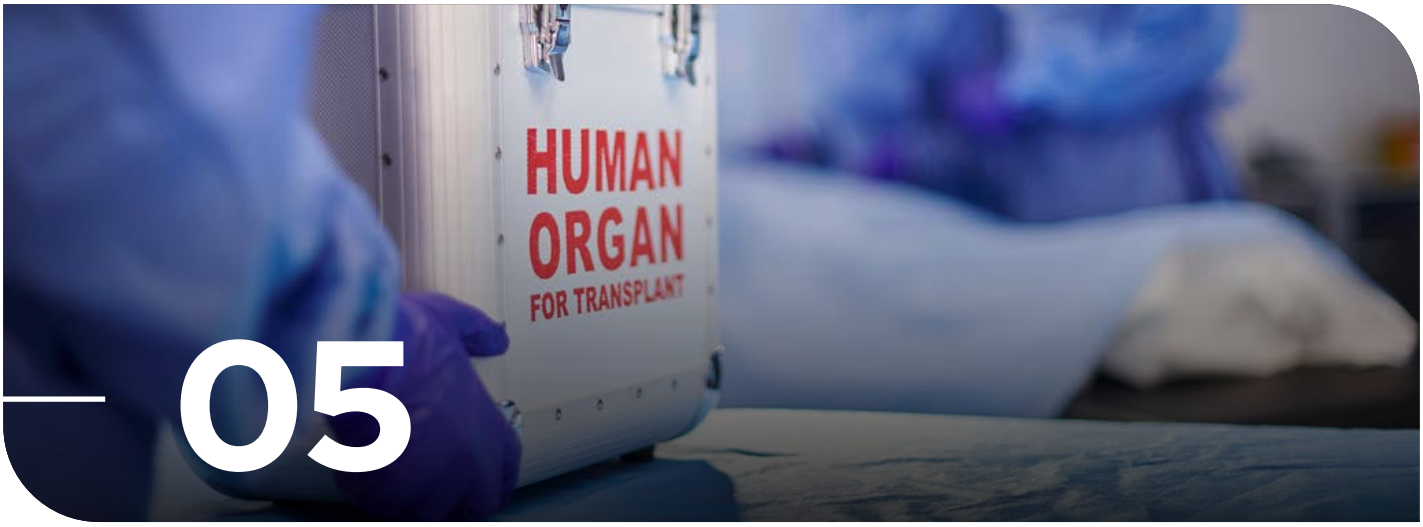

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WILLINGNESS TO SERVE

As I write this column, AmSECT is preparing to send out emails announcing our annual election cycle. Within its leadership tree, AmSECT has four elected officers: its President, President-Elect, Treasurer, and Secretary; eight elected directors representing four different zones of states within the U.S.; and four elected committees, including Achievement Recognition, Bylaws, Ethics, and Nominating. All "Active" and "Life" members in good standing are eligible to apply. After review by the Nominating Committee, applicants are presented to the membership for vote by ballot conducted by the Nominating Committee in conjunction with the Ethics Committee. Provided ten percent of the membership has cast a vote, a majority vote selects each winner.

By the time this column is printed, the next group of AmSECT's leaders will have been chosen. And I am so excited for each of them and their personal journeys! The very term we use to represent our election process is so descriptive of the environment and the intent behind volunteerism in a proud, motivated group such as ours. We call it: "Willingness to Serve." Not "Willingness To Call The Shots." Or "Willingness To Take All The Praise." In the spirit of what is called "servant leadership," AmSECT's organizational structure primarily functions to serve our members, serve our volunteers, serve our workforce, and serve our communities. Ironically or not, that opportunity to humbly serve others is what

William Scott Snider, *MHA, CCP, LP*

THE VERY TERM WE USE TO REPRESENT OUR ELECTION PROCESS IS SO DESCRIPTIVE OF THE ENVIRONMENT AND THE INTENT BEHIND VOLUNTEERISM IN A PROUD, MOTIVATED GROUP SUCH AS OURS. WE CALL IT: "WILLINGNESS TO SERVE."

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draws so many incredible, talented leaders into our fold.

Servant leadership has been described as a unique type of leadership that places most of the focus on the development and enrichment of those around us. What motivates servant leaders can only be understood as an intrinsic factor that exists outside of more basic needs. For most of us, our careers begin with the thrill of new salaries, benefits, challenges, and respect. As Maslow's memorable hierarchy suggests, these victories are only the beginning. What comes after is often a larger purpose centered on responsibility and gratitude. These goals have less to do with what you don't have and more with who you wish to be. It's been said that the hope of every servant leader is that their teammates will each rise to be leaders as well. All that's required is motivation and opportunity.

The real magic of volunteerism is that it provides that opportunity to anyone who's interested. Many decades ago, it was popularly believed that leadership traits could only be inherited; you had them, or you didn't. Today, we understand that many of those traits can be taught, and groups such as the National Center for Healthcare Leadership (NCHL) and the American College of Healthcare Executives (ACHE) exist to support motivated leaders in their quest. AmSECT's own Leadership Symposium presents a pathway to learning modern skills in leadership theory. At the same time, its committee structure invites all of our members to elevate their practice by applying those skills for the betterment of our profession. In the model of an inverted pyramid, we hope that executive officers will lead the board directors who will succeed them, board directors will support the committee chairs who will follow them, committee chairs will inspire the committee members who will replace them, and committee members will encourage their peers to join us in continuing the mission, established and maintained by so many great leaders before us, to advance our profession for the sake of our patients.

LeRoy Ferries once said, "One thing is as certain today as it was in 1964; if the perfusionist community wants something bad enough and is willing to get involved, it will come to pass." Perfusion has always been a profession of doers, motivated by inspirations far beyond their personal needs. Congratulations to our newly elected officials as they continue the tradition of pursuing excellence in the selfless support of those around them.

ADVANCEMENTS AND CHALLENGES IN NORMOTHERMIC REGIONAL PERFUSION: A GLOBAL PERSPECTIVE

Nathan Minie, MS, CCP, LP and Juan Blanco-Morillo, PhD, RN, ECCP (ICEBP NRP Subcommittee)

The International Consortium for Evidence-Based Perfusion (ICEBP) has recently created a NRP Subcommittee to evaluate and promote the evidence-based practice of organ procurement. The ICEBP is evaluating the evidence base supporting NRP and perceived barriers and facilitators of NRP as the foundations of this work. This topic will be covered at the upcoming 2025 AmSECT International Conference (March 19-23, 2025, Loews Coronado Bay Resort, San Diego, California). Here, we provide historical context and perspectives from both the United States (US) and international communities.

Historical Context

Normothermic Regional Perfusion (NRP) is an extracorporeal procedure designed to counteract the deleterious effects of warm ischemia in the context of organ donation after circulatory determination of death (DCDD). NRP is emerging in many countries to increase the availability of organs for transplantation. In the US, this concept was first discussed in the early 1960s in animal models by Thomas Marchioro, who created the basis of current practice and anticipated some expected challenges when scaling this procedure to humans.[1]

Technical and ethical challenges in organ harvesting have posed significant obstacles — initiating and stabilizing transplantation efforts needed to align with social acceptance. Given the widespread recognition of the dead donor rule (DDR) in the US, established by John Robertson in the 1960s, American society would have found the concept of donation after circulatory determination of death (DCDD) challenging to accept. The primary focus involved donations after neurologic determination of death (NDD).[2]

In previous decades, there was a direct relation between organ failure and death, with cardiorespiratory death being a common term. However, some innovative medical therapies rising in the '50s blurred the definitions between being alive, dead, and dying. While advances in mechanical ventilation and extracorporeal support were viewed as therapeutic solutions for optimizing organ procurements, they opened an ethical discussion still active in a part of society.[3]

In 1981, the US President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research provided the most frequently cited comprehensive analysis defining death. It had three principal goals: (1) to provide a conceptual basis for the new

medical practice of death determination using neurological tests; (2) to explain the relationship between determining death on a neurological and circulatory-respiratory basis; and (3) to enhance the uniformity among jurisdictions by proposing a model statute, the Uniform Determination of Death Act (UDDA).[4]

When utilizing NRP, after death is declared, the procurement team restores blood circulation using extracorporeal support. The type of NRP would dictate whether blood is recirculated through the heart and upper extremities. Currently in DCD procurements not utilizing NRP, once death is declared, circulation is not restored to the donor. If the procurement is NRP-supported, recirculation will occur after the declaration with the head vessels clamped to prevent cerebral blood flow. The Dead Donor Rule states that organs must be dead at the time of procurement, or organ procurement itself must not cause the death of the donor. Nonmaleficence is the ethical principle of doing no harm to perpetuate a transplant.[5] The early use of NRP did not commonly involve cardiovascular perfusionists. NRP was supported by individuals trained through experimental laboratories. Preliminary human harvests utilized an extracorporeal technique involving a double-balloon and triple-lumen cannula to provide cold perfusion to the abdominal organs selectively. However, this method was not highly efficient, and early loss of graft functionality, known as primary graft failure, was common.

Over the last few decades, the transplant community has experienced significant changes in the eligibility criteria for organ donation. Increasing life expectancy, advancements in modern medicine, and improvements in quality-of-life indicators have expanded the potential donor pool. More recently, transplant volumes have increased as a consequence of the US opioid overdose epidemic. This major health crisis has resulted in a growing number of drug-related deaths. In some instances, these high-risk organs may still be considered an option for critically ill patients. Conversely, increased safety standards in automobile manufacturing and workplace personal protection equipment (such as helmets) have resulted in reduced NDD donations.

International Perspective

Within some European countries, abdominal Normothermic Regional Perfusion (aNRP) emerged in the early 2000s as a suitable method to obtain viable organs from donors after ineffective resuscitation maneuvers. Considering the potential effect of this new approach and the necessity of establishing a legal framework to preserve the rights of both the donor and the recipient, many international consensus conferences focused on establishing guidance for procuring DCDD.

Although there are minor variations between centers, the process of controlled donation after circulatory determination of death (cDCDD), previously known as DCD, differed significantly from donation after neurological determination of death (NDD) before the emergence of international consensus statements. The cDCDD process has since been standardized to guarantee correct application, maintain consistency with the US legal death determination standards, and preserve the DDR.[7,8]

The NDD process begins by informing the patient and/or their relatives and obtaining informed consent. Following this, all efforts are focused on providing the best possible care to the patient in their final stage of life, regardless of the potential for organ donation, while also offering emotional support to the family. Efforts focus on providing appropriate sedation to ensure comfort and pain relief until withdrawal of life-sustaining measures (WLSM).

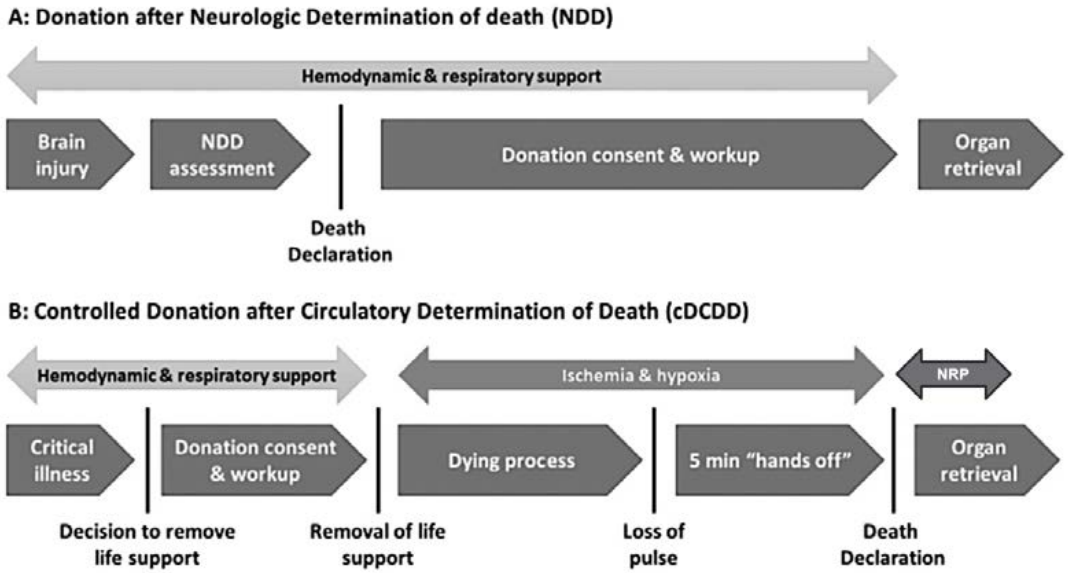
For cases of cDCDD, pre-mortem measures like systemic heparinization and the cannulation of femoral vessels may be accepted in states/countries with DCDD programs to reduce the warm ischemia time after the WLSM. In addition to the conventional arterio-venous cannulation, an additional endovascular occluder balloon is introduced, placed in the descending aorta over the celiac trunk, and maintained deflated until the moment before NRP initiation.

After circulatory death is declared, a mandatory "hands-off period" is observed, during which no actions affecting the donor are allowed. If any signs of spontaneous resuscitation occur, the donation process is

Table 1. Non-Heart-Beating Donors - Maastricht classification7

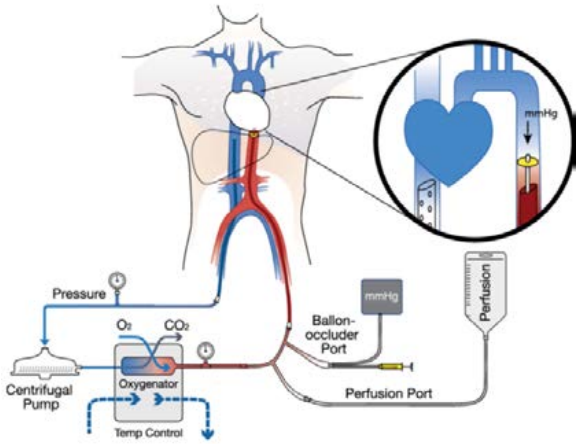
	Description	
I	Dead on arrival	Uncontrolled
II	Unsuccessful resuscitation	Uncontrolled
III	Awaiting cardiac arrest	Controlled
IV	Cardiac arrest while brain dead (death during procurement; death duringexplantation)	Controlled

Maastrich classification of types of donation after circulatory determination of death (1995). Source: Chaib E. Non Heart-Beating Donors in England. Clinics. *2008 Feb 1; 63(1):121–34.*[5]



Differences between donation processes according to the determination of death modality. Adapted from: Murphy et al. Journal of Law, Medicine & Ethics. *2021 Sep; 49(3):418–40* [7]

halted. Following the "hands-off period," the intra-aortic balloon is inflated to maintain the principle of death by avoiding the reperfusion of the upper part of the body, and NRP is initiated to restore aerobic metabolism in the organs identified for harvest. The NRP support period may range between 60-180 minutes. Following that, preserving solutions are delivered, and organs are extracted and prepared for implantation.



Normothermic Regional Perfusion procedure with an open circuit. Source: Foss et al. Transplant Direct. *2018 Jun 13; 4(7):e366.*

According to the Global Observatory on Donation and Transplantation (GODT) (https://www.transplant-observatory.org/), in the last two decades, DCDD has been increasing the pool of abdominal organs for transplantation in America, Europe, and Oceania, even surpassing the rate of DNDD in some countries like Spain or Belgium, without representing a decrease in the donations after NDD caseload. The non-linear and high volume of activity represents a challenge for staffing organ procurement teams. Thus, other professionals might sometimes cohabitate as "organ perfusionists" without a certified curriculum, despite transplant units that include clinical perfusionists when available.[11,12]

In many European countries, NRP has been recommended by professional societies as an essential part of end-stage care for some patients. In this regard, the collaboration between stakeholders in scientific societies like the European Society for Organ Transplantation and National Transplant Agencies and citizen associations has been crucial to creating a climate of trust in the different methods of organ donation. In some countries with euthanasia legislation, thoracoabdominal NRP (TA-NRP) has been expanded to include the retrieval of viable hearts and lungs. This expansion enables the delivery of high-quality organs to more patients in the final stages of their illnesses. It may also bring comfort to families who have lost loved ones by providing the gift of life to others.

Despite efforts to provide transparency and guarantee the respect of the human rights of the donor and the recipients, some concerns regarding the concepts of death, dying, and the permanent principle of death are still present in some sectors of society. Thus, in countries where DCDD is accepted, respecting the right of "conscientious objection" and personal beliefs, providing accurate and comprehensive information about the process, and demystifying misinformation are assumed to promote a safe culture around DCDD. These tenets help provide the most adequate solution to patients requiring transplantation of any thoracic or abdominal organ.[9,10]

United States Perspective

As NRP becomes a strategy in the United States, numerous questions and considerations arise, many of which lack definitive answers. How many NRP cases are performed annually? What are the outcomes? Is NRP expanding the donor pool as anticipated? Which institutions are implementing NRP, and which are not?

The American Board of Cardiovascular Perfusion (ABCP) recently released a positioning statement, recommending that "organ perfusion" should be managed by CCPs with a dedicated curriculum on that topic as the only professionals with an appropriate educational background to manage "organ perfusion." Other American perfusion societies have endorsed this statement. This statement was followed by a strength of credentialing letter, which validates the scope of practice and responsibilities that come with being credentialed by the ABCP.

View the letter here: https://www.abcp.org/UserFiles/NRPLetterw-Endorsements.pdf.

Several staffing models have been reported, ranging from in-house clinical perfusion staff for NRP coverage to contract CCP staffing companies. Dedicated organ perfusionist positions have been developed to meet the growing needs for organ procurement without negatively impacting typical clinical case volumes. Such positions may ensure clinicians have the intimate knowledge, execution, and experience of perfusionists with circuitry, electrolyte, and metabolic management of the patient during procurement.

The responsibilities of an organ procurement perfusionist may also encompass other methods, such as Organ Care Systems (OCS) and transport technologies. Although some of these technologies are clinically supported by manufacturers, the perfusion community has called for the reinstatement of perfusion involvement.

It seems necessary to take the pulse of NRP in the United States to establish collaborations between scientific societies and to define certain aspects. For example, how to adapt a curriculum to become an "organ perfusionist," "how to embrace other professionals who are currently participating in organ perfusion without a CCP certificate," or "how to redefine our perfusion and scientific societies to embrace these therapies and incoming professionals." Even though this seems to be a complex scenario, it seems mandatory to learn from the past, react faster, and use successful international programs for perspective and collaboration.

Embracing NRP requires our strict attention to the complexity of the technology, understanding the nuances of its inception, and collaborating with domestic and foreign entities that have already built a strong foundation of success.

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WHO WANTS TO BE A MILLIONAIRE?

By John Bruno RICP®, QPFC – Husband (married to a perfusionist), Father, Financial Advisor

DO, sign me up!

But before we buy our next lottery ticket and dream about hitting the jackpot, there is a more in-depth question we can ask ourselves.

Do we want to be millionaires, or do we want to experience what we believe only millions can buy?

Is it the actual million-dollar bank account that is the real goal, or is it the lifestyle of freedom that it supposedly buys? When we dive deeper into the psychology of our quest to build wealth, most of the driving force behind all the zeros we want to see in our accounts is actually the happiness that comes with the time and freedom millions could afford us to have.

Scrooge McDuck gave me my first visual concept of what being wealthy could look like. His character showed me that it was possible I could grow up one day, jump off a diving board into a vaulted Money Bin room full of shiny gold coins, and swim in it until it was time for dinner. Life would be complete, and I wouldn't have to worry about a career because my time would be preoccupied with polishing my coins and basking in wealth. *Easy, right?*

On paper (and Instagram & TikTok), it would appear this is the American Dream and worth the race to save money and build wealth. But to experience what we believe only millions can buy and sustain the happiness we tell ourselves will follow, we need to get clear on what is important to us in life. **Who are the people, the things, and the experiences that bring you the most happiness?** Take time to write down the who, what, and why behind your happiness quotient. When we begin with a clear definition of what causes us to be happy, our motivation to save money and become a millionaire increases exponentially.

If your friends want to lose weight, who do you think is more likely to follow through? Friend 1: "I am going to lose 15 lbs. this year." Friend 2: "I've realized how many of my shirts don't fit anymore and I want to get back to using all my clothes instead of donating them and starting over, so I am going to lose 15 lbs. this year."

Saving money to afford millionaire freedom and happiness is not rocket science.

The act of saving money is a glorified delayed spending strategy. The average posted pay for full-time permanent staff perfusion positions employed directly by a hospital or contract group in the last few

Age Beginning Regular and Recurring Savings	Savings per Month Required to Create $1M by Age 65	Your Total Contribution to Reach $1M	Portion of the $1M That Is Compounded Interest
25	$381/mo.	~$190,000	~$810,000
35	$820/mo.	~$300,000	~$700,000
45	$1,920/mo.	~$470,000	~$530,000
55	$5,778/mo.	~$700,000	~$300,000
**Assumes 7% annually compounded interest.*			

years is around $165,000. That means a perfusionist could earn their first million in a little over 6 years! Calculated for a 30-year career, that's an earning potential (factoring in 2.24% wage inflation) of over $6.3M. Combine that with the general rule-of-thumb to save 20% of your income and *viola*, at $1.2M (20% of $6.3M) you are a millionaire!

Let compounding interest live up to its hype as the "8th wonder of the world."

We give ourselves excuses not to save money and instead spend it on "the next thing." The phenomenon of "lifestyle creep" is the perfect example of not taking advantage of the opportunity to save money when we had it. Look back to the salary you earned right out of perfusion school and compare it to the one you have now. If you started in perfusion 20 years ago, it is not uncommon for your salary to have tripled within that timeframe, if not more. But ask yourself, are you saving more money than you were then? Have you let your lifestyle "needs" inflate at the same rate of your earned income at the sake of saving? A quick look at the power of compounding interest shows how important it is to save early and make it a priority.

Here are actionable items you can do to help yourself switch from a disciplined spender to a disciplined saver.

1. Create a Budget: understand where money is going and at what rate. Use it to identify a monthly savings rate once fixed and discretionary expenses are itemized.

2. 50% Raise Rule: when you receive a pay raise, give yourself permission to spend 50% of it and save 50% of it.

3. Four Buckets to Saving: save money in different timeframe buckets based on when you anticipate spending that money. Short-term (0-2 years), Mid-term (3-5 years), Long-term (5-15 years), and Retirement (age 59 ½ -??) This helps you identify which type of financial tool is most effective.

4. Tax Planning: pay your "fair share" of taxes without leaving an unintentional tip! CPAs do fantastic jobs at looking back 12 months and saving money on taxes. Financial Advisors can help you look forward into the future and avoid paying Uncle Sam too much.

We have the ability to become millionaires in our lifetime, especially given the profession you are in. How efficient will you be in attaining it? We only have one shot at earning a finite amount of money and enjoying the pleasures of spending it on the people and things that bring us joy in life. I encourage you to create a financial plan that aligns with your life in the sense that it is a plan that plans on the plan not going according to plan!

John Bruno RICP®, QPFC, is a financial advisor with Northwestern Mutual who is based in Greenville, South Carolina. He has an 8-year practice dedicated to serving perfusionists' financial needs and can be reached for additional questions, assessments, and dad jokes at john.bruno@nm.com.

WE HAVE THE ABILITY TO BECOME MILLIONAIRES IN OUR LIFETIME, ESPECIALLY GIVEN THE PROFESSION YOU ARE IN.

A TALE OF TWO DRIVERS: BERLIN HEART EXCOR

Erica Kreines, CCP, LP

Before the advent of the Berlin Heart EXCOR device, pediatric heart failure patients awaiting cardiac transplantation had limited options for bridge to transplant or recovery. Common options for support were limited to extracorporeal membrane oxygenation (ECMO). While ECMO is effective at supporting these patients, it is a short-term strategy due to the high incidence of bleeding and infection, making it less than ideal for patients with long wait times on the transplant list.[2] While significant developments have been made in pediatric mechanical circulatory assist devices since its introduction, the Berlin heart EXCOR has been the only steadfast option for neonatal and pediatric heart failure patients. The Berlin Group has revolutionized pulsatile VADs since the first successful pediatric bridge to transplant was performed in 1990 on an 8-year-old boy.[4] This patient's success prompted advancements, specifically miniature devices that can be used in pediatric patients.[4] The first 10ml pump was used in an infant in 1992, with 25ml and 30ml implants following in 1994. The most recent blood pump introduction came in 2012 with the addition of a 15ml blood pump.[4] From 1990 through 2013, Berlin Heart EXCOR has been implanted in 122 patients between 3 days to 17 years old.[4] During this time, the Berlin Heart was successfully used in both single- and double-ventricle patients, showing improved outcomes as bridge to transplant when compared to ECMO.[3]

The driver unit for the Berlin Heart EXCOR has long been the IKUS unit, even though it has only been FDA-approved since 2017.[5] The most significant update to the device came recently with the rollout of a new and improved driver via the 2022 Active Driver Trial. The proposed benefits of the new device will be advantageous for both the patient and the clinician.

Blood Pump Design and Drive Modes

The Berlin heart EXCOR is a paracorporeal, pneumatically driven, pulsatile diaphragm pump with polyurethane valves that come in a range of sizes, including 10ml, 15ml, 25ml, 30ml, 50ml, and 60ml pumps (50ml and 60ml pumps have mechanical valves).[4] Each pump is rated to 130 bpm when paired with the respective silicone cannula, which can be placed in the arterial, atrial, or apical position. These cannulae come in 6mm, 9mm, or 12mm sizes. The pump size is decided based on the desired cardiac output, which is calculated by multiplying the blood pump size by the rate as seen in Table 1. The rate must be at least 60 bpm; one should consider a larger pump if the rate approaches 120-130 bpm. Initially, pump exchanges were inherently common; however, the implementation of a modified anticoagulation protocol in 2000 yielded pumps that are utilized for longer durations, providing reliable, long-term support.

The Berlin Heart EXCOR can be configured as a UniVAD (RVAD, LVAD, or SVAD) or as a BiVAD. In Biventricular mode, there are several modes the clinician must decide among. Synchronous Mode causes both pumps to move at the same rate and eject at the same time. Asynchronous Mode yields both pumps pulsing at the same rate, but they take turns cycling. Finally, Separate Mode allows the left- and right-sided pumps to move at independent rates without allowing the RVAD to exceed the rate of the LVAD.

Settings

Pump settings, which are the same for the IKUS and/or Active Driver, can be found and adjusted on the attached monitor. These settings include:

- Rate: the frequency the pump beats each minute, adjustable from 30–150 bpm.
- Diastolic pressure: the pump's suction pressure, adjustable from -100–0, typically set around -20 to -70 mmHg.
- Systolic pressure: adjusts the pressure required to empty the pump, adjustable from 60–350 mmHg.
- % systole: adjusts the time the pump spends in the ejection phase of the cardiac cycle, adjustable between 20–70%.[1,6]

Driver Comparison

Until recently, the IKUS has been the sole driving unit available from Berlin Heart. It uses an internal compressor to generate pneumatic pressure changes, which provide positive and negative pressure changes causing the blood pumps to eject blood. It is compatible with all pump and cannula sizes. The benefits of the new Active Driver compared to the IKUS driver include the removal of IKUS's 2-hour warming protocol required before use.[7] The Active Driver also has a minimum battery life of 6.5 hours and can go as long as 12 hours (compared to only 30 minutes on the IKUS), which allows for better patient mobility and rehabilitation.[7] The new Active Driver also includes a 30-minute internal emergency battery. In addition to an improved battery life, the Active Driver comes with a flow probe to measure cardiac output, removing the subjectivity of estimating cardiac output seen with the IKUS driver. The flow probe also allows a flow threshold to be set which can alarm when the flow drops below the set value. Automatic and manual operating modes are also new additions that offer prescriptive care for patients in the ICU and Operating Room, respectively. Under automatic mode, the diastolic and systolic settings change to achieve the least amount of pressure needed to adequately fill and empty the pump, while manual mode gives the clinician full control over all settings, and they remain the same unless changed by the clinician.[1]

Table 1. Maximum Rates for the blood pump/cannula combinations

Cannulation		Blood Pumps					
Inflow Cannula	Outflow Cannula	10ml	15ml	25ml	30ml	50ml	60ml
5mm	5mm	130bpm					
6mm	5mm	130bpm	130bpm				
6mm	6mm	130bpm	130bpm	80bpm	65bpm		
9mm	6mm		130bpm	130bpm	90bpm		
9mm	9mm		130bpm	130bpm	130bpm	130bpm	105bpm
12mm	9mm					130bpm	105bpm
12mm	12mm					130bpm	125bpm

Limitations and Active Driver Issues

Even with the flexibility provided by using the Berlin Heart, surgical limitations still exist during implantation—which include small pericardial spaces to work with and positioning of the cannulae after reconstructive operations.[3] Common issues with the new Active Driver revolve around the flow probe. Issues seen post operatively are typically alarms for overheating or low flows. Limitations seen with the IKUS driver include portability, which makes it impossible to discharge a patient home.[5] Given these limitations, Berlin Heart has further accommodated the pediatric population by developing the new Active Driver, which has an extended battery life that allows for better mobility with

the potential for discharge home in the appropriate setting.[7]

Learning Curves

When a patient receives a transplant in the operating room, there are additional steps required compared to the IKUS driver. For the IKUS, it is as simple as inputting the password, toggling over, and pausing the VADs. For patients receiving transplants with the Active Driver, the user must log in as an expert and then switch to manual mode. Before the surgeon opens the chest, the diastolic pressure should be changed to -15 or -20 mmHg because too much negative pressure can entrain air as they open the chest. Prior to draping the patient, the flow probe must be removed from the patient's tubing because it is difficult to prep and can lead to continuous alarms. Once the flow probe is off the patient, it can be unplugged from the Active Driver. The ensuing alarm can be silenced in 30-minute increments. Once it is time to stop the VAD, simply press the pause button on the provided touch screen. Next, unplug all connections from the wall, pull the drive line from the driver, and hold the silence button on the driver until a countdown appears. Once the countdown starts, pull the batteries before the countdown ends to shut the device off. If it says "emergency batteries in use," put the batteries back in and repeat the countdown, then pull the batteries back out. Make sure everything is unplugged from the wall source. The touch screen has a power source of its own that can be turned off.

The IKUS driver is still the only one FDA approved but the active driver is available for use through the current trial. The portability and ease of use with the Active Driver has a bright future to help these small patients.

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EVOLVE YOUR CHECKLIST, MORE THAN CHECKING A BOX

Michael Arcaro, CCP

Complacency, stagnation, "that's more work," "that's the way I've always done it." These are a few terms and phrases that no medical professional should utter. While it seems inevitable to eventually become set in our ways due to longevity in a job or a repetitious surgical schedule, it is vital to continue to make advancements in our practice. As surgery techniques evolve and improve, so do the needs of the perfusionist. How do we better our careers and keep progressing with medicine in an ever-evolving field?

What can become even more challenging is the possibility of watching the rest of the OR specialties receive new equipment and updates while perfusion is stuck with equipment that is termed "end of life." While it might not be possible to get the newest heart-lung machine, cardioplegia solution, or technique implemented or accepted into your current practice due to financial or institutional restrictions, you can still be proactive and take steps to ensure you are operating as safely as possible. What can we do?

One response can be as easy as updating your checklist and ensuring you know *how to check it*. This tool can be found in every work environment where a consequential mistake could occur. The primary purpose of a checklist is to remind individuals of the areas to inspect and which details are critical for safety. Items to include on a perfusion checklist include a broad overview of alarm and device checks, practice strategies, and behaviors across any tasks with a potential risk of harm. Finding these risk areas typically comes from reviewing past failures or mistakes. It involves developing the best ways to test the system before its use and prevent events during critical operations. The checklist can be the most valuable tool in a perfusionist's arsenal to ensure they are operating safely.

AmSECT Standards and Guidelines are a great way to verify your checklist includes and meets the newest safety requirements expected of perfusionists. There is an excellent reference checklist on the AmSECT website,[1] covering items needed to ensure you operate safely. Note that because each clinician's practice and equipment is slightly different from types of CPB machines, ventilation modules, and heater coolers to electronic data management (EDM), hospital-specific techniques, and circuits — it is up to your institution and group to make sure all necessary items are present. Make sure that the items included on your checklist meet not only the needs of your equipment and safety devices but also the surgical techniques and supplies needed for your specific procedures.

Once the checklist is prepared, how do you determine if an entry has been completed and a box should be checked? Are you visually inspecting and physically touching the items, testing alarms, engaging safety devices, and making sure

your circuit can hit critical limits? What methods, techniques, or tools do you have in your arsenal to help ensure your device is working adequately? More importantly, are you checking the devices and systems correctly, or, in an effort to prevent a mistake, are you actually creating one?

Within the AmSECT-partnered Patient Safety Organization (PSO), many issues we have reviewed could have been prevented with a checklist or specifically started with one. As we review and catalog events, we also generate a collective strategy to prevent the most common errors from happening in the future. A large majority of these issues start with the checklist and, more specifically, relate to not "checking" items appropriately. A few examples listed below come from practices where the checklist item is in place but is not necessarily applied correctly.

Gas Supply: How do you check the gas flow to your circuit? Are your gas lines connected with the gas and vaporizer on, and do you then clamp the line to watch your flowmeter drop? Did you know that clamping the O_2 line with the gas and vaporizer can cause damage to the O rings inside the vaporizer? This technique can slowly degrade or break the O rings, leading to a spontaneous failure where oxygen delivery does not get past the vaporizer.

Correct Check: To determine gas flow, use an external flowmeter just prior to the oxygenator plugin. Another option is to detach the oxygen line at the oxygenator and feel for gas flow. Always make sure you reattach the line afterward. These techniques will confirm gas is flowing without causing any weaknesses within the system. A complete description is available in the 2024 report available on the AmSECT Safety page.

BACKUP: Do you have N+1 for the perfusionist?

Correct Check: N+1 for personnel and capital equipment. The backup needs to be not just for personnel but also extend to the major pieces of equipment used daily. It is necessary to have an extra cell saver, CPB machine, heater/cooler, and all other needed equipment that would result in a procedure cancellation due to lack of equipment. For example, if the hospital can run two ORs, three CBP machines should be available if one fails. If failure occurs, it is necessary to notify the surgeon and hospital administration that the equipment is out of use.

Alarm Setting Check: Are you only visually checking that the system is connected and on, or are you also confirming high and low parameters? Is the box checked if you don't?

Correct Check: Each alarm system, including air and level detection, minimum RPM setting, or detent, should be checked pre-bypass to confirm proper function and intervention, including ramp-down function ERC closure. This check should be performed by simulating the cause of the alarm and then resolving it. Visual alarms and linked alarm functions should be confirmed, including roller pump stop, centrifugal pump ramp down, and ERC clamp function. Any audible alarms should be tested to confirm they are loud enough to be heard.

All the above examples come from incidents where an error occurred with the checklist completed and most with the appropriate "box checked." In some cases, the system was tested, but in an imperfect or detrimental manner. However, in most situations, the box was "checked" without the proper testing or appropriate confirmation of safety checks.

There is a vast amount of knowledge to be gained by just looking at past mistakes and challenging the basis of the checklist. We aim to take it further by finding ways to solve the most common misses. Specifically, we want to discover the common tasks within the checklist that are being interpreted incorrectly and not checked thoroughly or adequately. Our strategy is to retrieve the information, develop a common protective strategy, and then give our findings back to the community to reduce the chance of future errors.

The perfusion checklist needs to be more than checking the box. Knowing how to check and test the items accurately is a vital step in the process. Utilizing the checklist means adequately assessing and testing each device, alarm setting, and process to make certain it works and you are truly ready.

Not only can you, as the clinician, make sure to do more than check the box, but the PSO can also serve as a basis of knowledge to ensure you are checking safely and effectively. This function will hopefully be the first of many ways the PSO can begin to allow perfusionists to grow from the knowledge we have gained.

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REMEMBERING THE STRAND OXYGENATOR

Kelly D. Hedlund, CCP Emeritus

In his classic 1955 textbook, *Surgery of the Heart*, Dr. Charles P. Bailey lauded Gibbon's vertical stationary screen oxygenator as the best of its kind in the world.[1] Filming devices were a preference of Bailey's, having experimented with several crude apparatuses himself early in his career.[2,3] Little wonder, then, that nearly two decades later, he would be part of a team that conceived and brought to market an inventive disposable film-type oxygenator. Though its existence was short-lived, the Strand oxygenator featured a novel "miniature stairstep" design using notched plastic fibers. Perhaps most notably, it preserved the look and function of Gibbon's filming screen concept at a time when most researchers were opting to perfect bubblers and membranes.

Initial Versions and Testing

Origins of the Strand oxygenator began in 1963 at St. Barnabas Hospital in New York City. Principal researcher Dr. Teruo Hirose, along with engineer Hazen Everett and Bailey, devised a prototype single-pass oxygenator that employed rotating open cellular foam discs (see Figure 1). A subsequent device was built featuring vertically oriented tubular polycarbonate strands to fulfill a desire to eliminate all moving parts. Notching these strands in an alternate pattern created openings between the ellipses (see Figure 2). As blood descended (filmed) by gravity along these strands, gas transfer occurred within the openings. Each strand measured 5 millimeters in diameter and approximately 50 centimeters in length. Fifty strands mounted within a frame could oxygenate 1,000 milliliters of blood per minute (ml/min). Built initially as a reusable device, the standard version housed five frames within a Lucite box (see Figure 3). Up to ten frames could be configured within the oxygenating chamber, and frames could be switched on or off at will during perfusion. Fifteen dog experiments proved successful, with all animals surviving a two-hour bypass time. In 1970, the researchers reported clinical use of their reusable Strand oxygenator in 50 consecutive surgical procedures.[4] All but three patients survived, leaving the operating room in stable condition. Twenty-one of the 50 patients received no blood transfusion during the bypass period, and plasma-free hemoglobin levels remained low even with the use of intracardiac suction. Average blood flow ranged from 900 ml/min in a 2-year-old child to 5000 ml/min in adults.

Disposable Version

The Med-Science Electronics Company in St. Louis, Missouri, began manufacturing heart-lung machine equipment and accessories in the late 1950s. For a time, they were the exclusive manufacturer of the reusable Mayo-Gibbon vertical screen oxygenator (see Figure 4). Given the similarities between the Strand oxygenator and the Mayo-Gibbon filming device, both in appearance and function, it made sense that Med-Science would

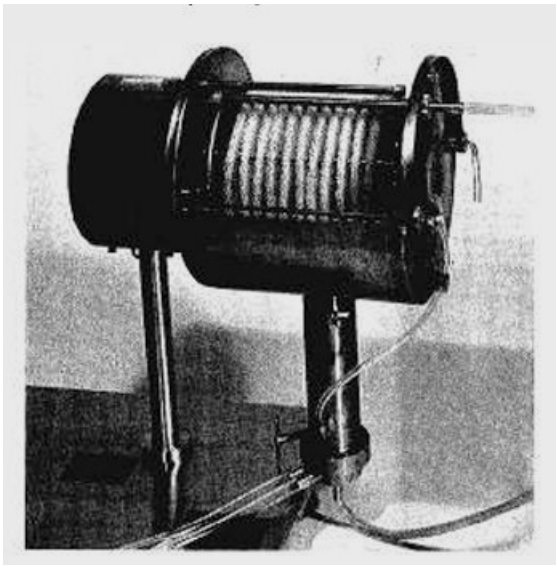

Figure 1. Prototype film oxygenator devised by Hirose, Everett, and Bailey in 1965 (reprinted with permission).

Figure 2. Notched polycarbonate strand for filming blood (photo reprinted from a Med-Science Electronics Company sales brochure dated March 1971).

be chosen to construct a market-friendly disposable version. Many perfusionists saw the disposable Strand filming design as unconventional and outdated when it was released for commercial sale in 1972 (see Figure 5). Newly released hardshell bubble oxygenators like the Harvey H-200, the Bentley Temptrol Q-200A, and the Galen/Cobe Optiflo were gaining popularity. Dr. Arnold Landé, a proponent of advancing membrane technology, stated, "The Hirose-Everett [Strand] bypass machine does not incorporate any new principle and is probably a step backward rather than forward."[5]

On the other hand, supporters like Dr. Yukihiko Nosé of the Cleveland Clinic declared the Strand oxygenator "an ingenious approach" and showcased it in his 1975 textbook, *The Oxygenator*.[6] In sales brochures, Med-Science touted the Strand filming device's low turbulence and gentleness in handling blood (see Figure 6). Within a year of its market release, over 500 clinical cases were conducted using the Strand oxygenator — mainly on the East Coast. Nearly 20% of these early cases involved a Jehovah's Witness patient. Remarkably, none of these patients received blood products during their hospital stay, and the observed mortality rate in this select group was less than 10%.

Conclusion

Despite incorporating important features such as a low-level alarm and elimination of defoaming agents, the Strand oxygenator failed to gain a loyal following within the perfusion community. Its large and bulky footprint (30"H x 24"W x 6"D for the standard five-frame version) likely contributed to its disfavor. The optional ten-frame version was even more dissuading, as it exceeded the size of a dorm room refrigerator. Modeling the Strand oxygenator after Gibbon's stationary screen device was a bold and risky move by Hirose, Everett, and Bailey. Unfortunately, their devotion to filming as the preferred oxygenation method led to a commercial downfall. Despite this, their unique device remains an important thread in the rich tapestry of blood oxygenator development.

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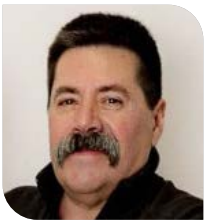

Kelly D. Hedlund, CCP Emeritus, has been a perfusionist for over 35 years and has written numerous articles on perfusion history. Hedlund has previously served on the editorial board of the *Texas Heart Institute Journal*, and has edited articles for the journal *Perfusion* and the ASAIO journal.

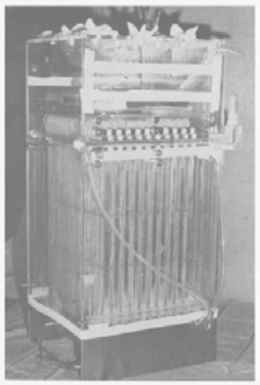

Figure 3. Reusable Strand oxygenator in 1970 (reprinted with permission).

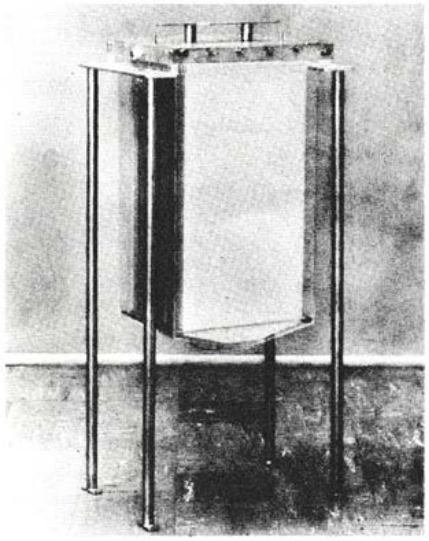

Figure 4. Mayo-Gibbon vertical screen oxygenator (photo reprinted from a Med-Science company sales catalog dated March 1968).

Figure 5. Disposable Strand oxygenator (photo reprinted from a Med-Science sales brochure dated March 1971).

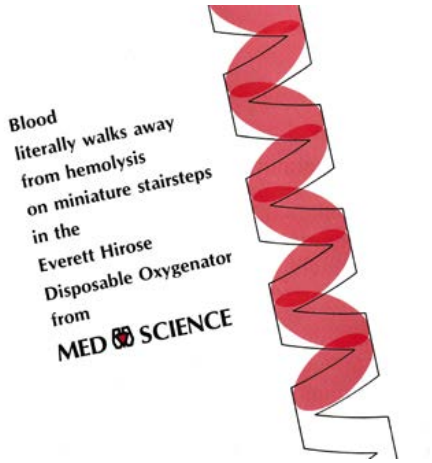

Figure 6. Front cover of a 1972 Med-Science sales brochure publicizing the Strand oxygenator's blood handling superiority.

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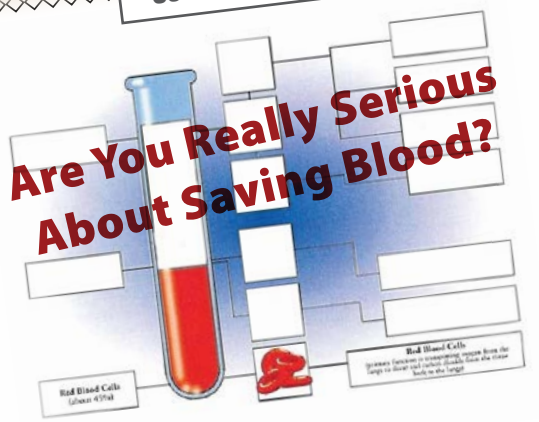

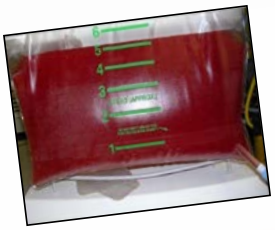

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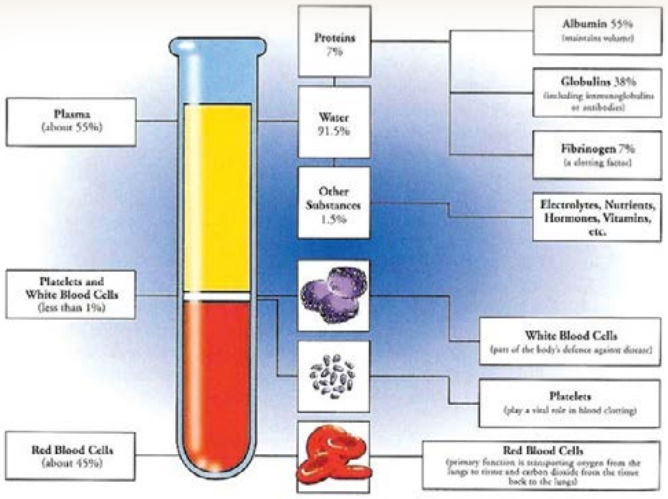

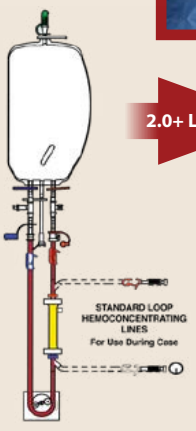

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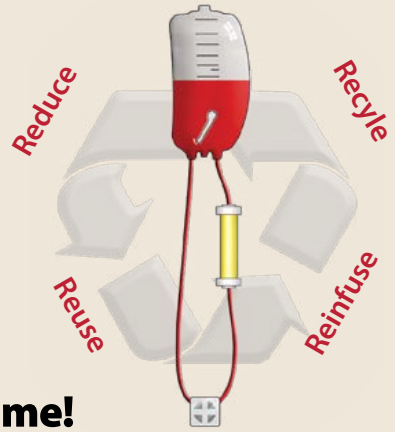

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THE BOARD REPORT

Submitted by Justin Sleasman on behalf of the AmSECT Board of Directors

AmSECT board members met with Medtronic leadership at their Brooklyn Park, Minnesota office while onsite in Minneapolis to attend the fall board meeting. We reviewed AmSECT's partnerships and member benefits in the form of our new 2025 AmSECT Membership Drive. We discussed AmSECT goals, plans, and benefits for 2025, as well as Medtronic's continuing support of the leadership symposium at AmSECT International Conference. Medtronic leadership in turn gave an overview to the board of their cardiac surgery line relevant to perfusion.

After our time together, the AmSECT board members were able to take a tour of Medtronic's manufacturing facility with their engineering team. As clinical users, it was extremely educational to see firsthand the assembly, testing, and production of the Affinity Fusion and Pixie Oxygenation Systems.

AmSECT would like to thank Medtronic for their ongoing support, our visit host Neil Nye, Sr. Global Group Marketing Manager, CS Perfusion & Blood Management and participating Medtronic staff Alex Gaudiani, Vice President Marketing, Cardiac Surgery; Nitasha Joyner, Sr. Manager Medical Education, Cardiac Surgery; Dan Miller, Sr. Manufacturing Director, Cardiac Surgery; and Gabriel Lopez, Sr. Engineering Manager, Cardiac Surgery.

ORRUM MINI-REPORT ON QUARTER 3

Event with patient harm	
237	Report describes inability to achieve adequate arrest after cross clamp placement and cardioplegia delivery.
Good catch/no harm events	
331	Report describes a gas supply failure discovered during CPB.
326	Report describes a faulty negative pressure alarm that was discovered during setup but later interfered with cardioplegia delivery.
327	Report describes the inadvertent opening of a recirculation line which caused a drop in blood pressure, leading to investigation and discovery of the shunt.
236	Report describes a partial oxygenator failure appearing during the rewarming phase of CPB.
332	Report describes a faulty sucker device which led to poor visibility on the surgical field for the duration of the procedure. The defect was discovered after testing at the conclusion of the procedure.
282	Report describes thrombus formation in the venous reservoir in the early portion of a CPB run.
339	Report describes a gas supply failure discovered during CPB.
336	Report describes the discovery of a leak in the cardioplegia system after CPB but just prior to cross clamp placement.
335	Report describes a malfunctioning heater cooler that was discovered after the chest was opened with no backup available for use.
333	Report describes the discovery of a faulty gas blender during the setup and testing of the extracorporeal circuit.
325	Report describes emergent initiation of EMCO where the quick connect was inadvertently left in-line after dividing the AV loop of the ECMO circuit.
Good catch/near miss events	
330	Report describes failure of a cardioplegia delivery system that was discovered during CPB but prior to cross clamp placement.
340	Report describes the discovery of a reversed one-way valve in the manifold line of a extracorporeal circuit, discovered during setup.
341	Report describes multiple audible alerts of unknown type and cause from the in-suite breaker panel during CPB
338	Report describes achieving adequate ACT and initating CPB, but discovering after initiation of CPB that all ACT machines in the facility were now "locked out" for unknown reasons.
Unknown impact on patient	
309	Report describes a wrong drug medication error during CPB.
337	Report describes administration of full dose protamine while still on CPB but after cross clamp removal.
334	Report describes inability to achieve adequate arrest after cross clamp placement and full dose cardioplegia administered and until cardioplegic solution(s) were exchanged.

STRATEGIC PLAN REPORT

GOAL/OBJECTIVE	COMPLETION DATE	COMPLETION STATUS
To be the leading provider for the continuing education and professional needs of the extracorporeal technology community		
Continuing Education		
Assess the current status and future expansion of AmSECT University. Review and assess current metrics for progress. Reassess sponsorship opportunities and institution-specific learning plans.	2024 Q4	
Perform an evaluation of the AmSECT conference series. Consider evaluating: • the benefits/shortcomings of re-expanding the series • partnership with other societies • advanced cross-conference registration tracking for marketing • advanced hybrid options • location (fixed/changing, regional areas, tier levels) • a la carte workshops • CEUs • expanded mobile app use/functionality • sponsor needs and desires • electronic badging for vendors • expanded student-friendly resources • student and transitional discounts • volunteer or volunteer leadership discounts • presenters reception • organized review and report of competing conferences and • breakout rooms for vendor presentations	2024 Q4	Focus Group was created. Agenda items were collected from members. Meeting was held and topics discussed. A member survey was created using the content from that meeting. Survey to be designed and released by management.
Integrate ICPC into annual conference site selection process.	2024 Q2	Completed.
Embed committee updates in the International Conference agenda.	2024 Q4	To be included in 63rd conference agenda.
Present deidentified PERForm & PediPERForm data review at the AmSECT International meeting.	2025 Q2	To be included in 63rd conference agenda.
Information		
Investigate and implement methods to advance ease of navigating AmSECT's website.		
Evaluate, expand, and consolidate online access to existing AmSECT resources and new external resources.		PERForm webpage designed and created. Orrum webpage designed, waiting on creation. Accepting content for PLN page. Clinical Resources webpage updated. Committee charters collected. Management is working on standardizing committee pages. Ethics to review Code of Ethics. Consider removing chart and checklist templates.

GOAL/OBJECTIVE	COMPLETION DATE	COMPLETION STATUS
Formally recognize the formation of the AmSECT History Committee, and its mission to collect, preserve, and disseminate historical information related to perfusion and extracorporeal circulation to foster education, scholarship, and research.	2024 Q2	Completed
Make materials collected by the AmSECT History Committee easily accessible to members.		
Continue to research year-round mobile app options.		
Research platform and design options.		
Present cost analysis to BOD.		
Support and evaluate subscription to FDA device alert platform.	2025 Q1	To be added to 2025 budget
Reassess the development of a directory of all Chief, Lead, or Directors of Perfusion Departments at every hospital in the United States performing cardiac surgery. Partner with corporate sponsors.		
Develop a manpower survey, utilizing leadership contacts.		
Evaluate the conditions for AmSECT to report as a submitting organization to NQF.		
Services		
Promote/Market AmSECT's justification letter for engaging administrators.	2024 Q2	
Evaluate options for member-only job search functions (résumé upload, auto-forward, custom job alerts).		
Evaluate the need for AmSECT products tailored to different cohorts of perfusionists (e.g., needs of women in perfusion, students).		
Consider an online Housing Registry and tools for travelers. Collaborate with Contract Group Partners.		
Consider the online creation of a maternity/nursing "support" group.	2024 Q4	Membership Committee discussed with FB Women in Perfusion Group.
Evaluate the need for a presentation of associated content at the International conference.		
To effectively communicate and collaborate with our stakeholders.		
Businesses		
Develop standardized vendor engagement.	2024 Q3	
Identify new sponsors.	2024 Q3	
Support marketing for large group memberships.		Partnership Task Force reorganized and Chair selected. Soliciting new task force members. On the agenda for Fall Board Meeting.
Schools		
Leverage AmSECT's position to engage more perfusion schools, more effectively.		
Evaluate committee willingness to take student members. Fill in students on committees accordingly.	2024 Q4	Completed. Added to new committee report format. Management to add to new charter spreadsheet.

GOAL/OBJECTIVE	COMPLETION DATE	COMPLETION STATUS
Increase the number of schools represented in the student committee.	2024 Q4 – 2026 Q4	New school liaison and transitional committee roles proposed and accepted. Management to add to student committee webpage and announce to school directors.
Members		
Create mandatory membership demographic fields, with information sharing policy.		
Improve follow-up with lapsed members.		Lapsed member follow-up in progress.
Improve welcome message, orientation materials (including society history, society programs, and volunteer opportunities) and gifts for new members.		
Create a schedule of customized 1st-year mailings tailored to benefit individual opportunities and professional development.		
Market and support website profile options and networking opportunities.		
Standardize membership surveys in line with membership renewal and for use by the biennial Strategic Planning Committee.	2025 Q2	Membership survey completed. AT survey completed. Strat plan survey completed. Conference survey in progress. Standardize survey series.
Workforce		
Evaluate a schedule of virtual, open-to-public, town hall meetings to complement the annual in-person corporate meeting.	2024 Q2	
Improve connections with state representatives.		
Partner with sponsoring vendors to fill in state contacts when necessary.		
Support the GRC in assessing state needs for licensure in unlicensed states.		
Communicate state-relevant information to zone members.		
Evaluate the design of online Guest Memberships with mandatory email contact information.		
Communicate with international perfusion societies.		
Assess needs. Examine opportunities for collaboration, including international focus articles for AT and international resources on AmSECT webpage (including society details and leadership contacts). Continue to market new restructured international membership and conference registration rates.	2025 Q4 – 2026 Q1	ICEBP International Checklist Task Force created with international members. International checklist created. Manuscript in progress. Presidential greetings sent to 20 international perfusion societies. International Partner web page to be created. MOUs to be evaluated. Added international representatives to ICPC.
To provide for the growth and continuity of our professional society		
Perform a routine review of the AmSECT Mission statement.		
Create an AmSECT Vision Statement and define AmSECT Values.		
Create policies to advance and standardize strategic planning.	2025 Q2	Completed.

GOAL/OBJECTIVE	COMPLETION DATE	COMPLETION STATUS
Incorporate scheduled meetings with committee chairs into the monthly BOD agenda (to address current goals, set and evaluate metrics, present committee needs, etc.).	2024 Q2	In progress.
Complete committee specifications for all committees including committee mission, goals, cadence of meetings, inclusivity, term limits, succession chain, and performance metrics.	2025 Q4	In progress.
Remodel yearly committee reporting system.	2026 Q2	Completed. New committee report form designed, chairs and liaisons instructed, implemented in Fall Board Meeting. Biennial "All-Committee Meeting" initiated at Fall Board Meeting.
Advance guidelines for committee Chairs regarding representation reflecting demographics of the membership.		
Advance committee support of webinar platform, newsletter, and social media.	2024 Q4	Completed. Incorporated into proposed new committee report form.
Create guidelines for formal meetings and decision-making utilizing Robert's Rules.		
Maintain a database of potential nominees for consideration using past nominees and communication with committee chairs.		
Maintain a database of potential candidates using past candidates and communication with committee chairs, and prioritizing gradual advancement through the organization. Organize communication and mentorship with potential candidates.		
Perform a routine review of the AmSECT bylaws.	2025 Q1	
Explore restructuring Achievement and Recognition, Nominations, Bylaws and Ethics (as possibly combined or ad hoc committees).	2024 Q3	Governance Committee proposed. Board approved. Completed.
Evaluate membership packages (i.e., multi-year discounts, multi-conference discounts, gamification, trial memberships).		Membership Committee/Exec/BOD meetings held. Membership objectives spreadsheet created. Membership planning on agenda for Fall Board Meeting.
Evaluate volunteer incentives (i.e., paid or discounted membership, conference, webinar, and/or symposium registration for committee chairs and/or years of service).		Membership planning on agenda for Fall Board Meeting.
Make P&P role descriptions available to the public during WTS.	2024 Q3	Completed
Support the onboarding and advance the engagement of our new management group, Ewald Consulting.		
Create performance metrics for management.	2024 Q3	
Support early identification of potential pitfalls.	2024 Q3	Focus group assigned. Collected agenda items. Selected date to meet. Report submitted. Completed.
Enhance internet exposure.		
Improve Google search indexing.		
Author Wikipedia page for AmSECT Society.		In progress.
Advance marketing on underutilized social media (e.g., Instagram, LinkedIn).		
Trial a one-year subscription to BoardSource Board Support Program.		

SELF QUIZ Q4 2024

By Shannon Barletti, BSN RN CCRN CCP

1. Describe the features of the TEG tracing above:

- **a.** R-Normal, K-Normal, MA-Normal, Angle-Normal
- **b.** R-Normal, K-Normal, MA, Angle-Decreased
- **c.** R-Normal, K-Normal, MA-Decreased
- **d.** R-Decreased, K-Decreased, MA, Angle-Increased

2. The TEG tracing above can be described as which of the following hallmark TEG tracings:

- **a.** Platelet Blockers
- **b.** Hypercoagulation
- **c.** Normal
- **d.** D.I.C.

3. A potential cause of the above tracing includes (select all that apply):

- **a.** Presence of t-PA
- **b.** Thrombocytopenia
- **c.** Factor deficiency
- **d.** Thrombocytopathy

4. Which of the following may be considered given the above tracing in the clinical setting of significant bleeding? Select all that apply.

- **a.** FFP
- **b.** Platelets
- **c.** DDAVP
- **d.** Cryoprecipitate

5. Describe the features of the TEG tracing above:

- **a.** R-Normal, MA-Continuous decrease, LY30>7.5%, LY60>15%
- **b.** R-Normal, K-Normal, MA-Normal, Angle-Normal
- **c.** R-Decreased, K-Decreased, MA, Angle-Increased
- **d.** None of the above.

6. The TEG tracing above can be described as which of the following hallmark TEG tracings:

- **a.** Platelet blockers
- **b.** Hypercoagulation
- **c.** Normal
- **d.** Fibrinolysis

7. Which of the following may be considered given the above tracing in the clinical setting of significant bleeding? Select all that apply.

- **a.** Tranexamic acid
- **b.** Aminocaproic acid
- **c.** DDAVP
- **d.** Cryoprecipitate

8. Describe the features of the TEG tracing above:

- **a.** R-Normal, K-Normal, MA-Normal, Angle-Normal
- **b.** R-Normal, K-Normal, MA, Angle-Decreased
- **c.** R-Normal, K-Prolonged, MA-Decreased
- **d.** R-Decreased, K-Decreased, MA, Angle-Increased

9. The TEG tracing above question 8 can be described as which of the following hallmark TEG tracings:

- **a.** Platelet blockers
- **b.** Hypercoagulation
- **c.** Normal
- **d.** D.I.C.

10. Describe the features of the TEG tracing above:

- **a.** R-Normal, K-Normal, MA-Normal, Angle-Normal
- **b.** R-Prolonged, K-Prolonged, MA, Angle-Decreased
- **c.** R-Normal, K-Prolonged, MA-Decreased
- **d.** R-Decreased, K-Decreased, MA, Angle-Increased

11. The TEG tracing above can be described as which of the following hallmark TEG tracings:

- **a.** Platelet blockers
- **b.** Hypercoagulation
- **c.** Anticoagulants/hemophilia
- **d.** D.I.C.

12. A potential cause of the above tracing includes (select all that apply):

- **a.** Presence of t-PA
- **b.** Thrombocytopenia
- **c.** Thrombocytopathy
- **d.** Factor deficiency

13. Which abnormal TEG parameter may guide a provider to consider giving fresh frozen plasma in the clinical setting of significant bleeding?

- **a.** Decreased alpha angle
- **b.** Decreased MA
- **c.** Increased R time
- **d.** Decreased K

14. Which abnormal TEG parameter may guide a provider to consider giving cryoprecipitate in the clinical setting of significant bleeding?

- **a.** Decreased alpha angle
- **b.** Decreased MA
- **c.** Increased R time
- **d.** Decreased K

15-18. Match the corresponding ROTEM terminology to the TEG terminology below:

___ R Value (reaction time)

___ K value and alpha angle

___ Maximum amplitude (MA)

___ LY30

- **a.** Maximum clot firmness (MCF)
- **b.** Alpha angle and clot formation time (CFT)
- **c.** Clotting time (CT)
- **d.** Clot lysis (CL)

19. Which of the following TEG parameters represents the overall strength and stability of the clot?

- **a.** R value
- **b.** Maximum amplitude (MA)
- **c.** LY30
- **d.** K value

20. Which of the following TEG parameters can be used to analyze fibrinolysis?

- **a.** R value
- **b.** Maximum amplitude (MA)
- **c.** LY30
- **d.** K value

References/Resources:

1. Thromboelastogram (TEG) • LITFL • CCC Investigations

Shannon Barletti, *BSN RN CCRN CCP*

PERFUSION CONNECTIONS GAME

By Amanda DeVilder, Nick Hittleman, Sidney Swartzbaugh, Monika Kopec, Madison DiFranco

University of Iowa Perfusion Education Program

This game is inspired by The New York Times' Connections.

Directions:

Find groups of four perfusion-related items that share something in common. Make sure to document your lists of 4 so you can check your answers later!

Category Examples

- FISH: Bass, Flounder, Salmon, Trout
- FIRE: Ant, Drill, Island, Opal

Categories are more specific than "5-LETTER WORDS", "NAMES" or "VERBS".

Each puzzle has exactly one solution. Watch out for words that seem to belong to multiple categories!

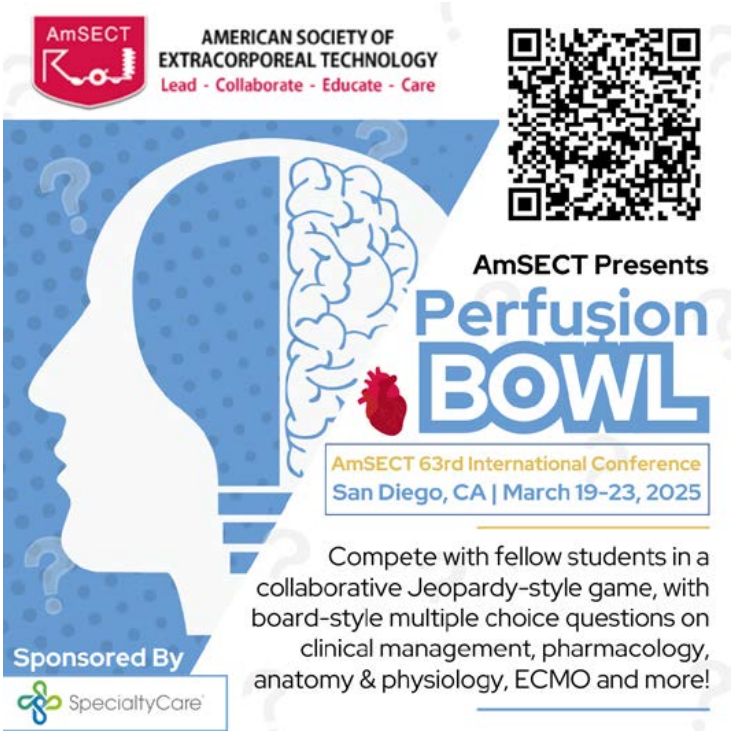
Quantum roller	Lactate ringer	Raceway	Calcium
S5	Boot	Cell saver	Cannulas
Sterile water	Roller head	Cardioplegia	Pumps
Essence	Arterial head	Irrigation saline	System 1

PERFUSION CONNECTIONS GAME ANSWERS ON PAGE 29

SELF QUIZ ANSWERS

1. C **2.** A **3.** B&D **4.** B&C **5.** A **6.** D **7.** A&B **8.** A **9.** C **10.** B **11.** C **12.** D **13.** C **14.** A **15.** C **16.** B **17.** A **18.** D **19.** B **20.** C

PERFUSION BOWL



READY TO TEST YOUR PERFUSION KNOWLEDGE?

Calling all AmSECT students! Join us for the Student Perfusion Bowl—a collaborative, Jeopardy-style competition where you'll face off against fellow students. Finalists will compete live at the annual conference in San Diego! Don't miss your chance to represent your team and showcase your skills!

GET REGISTERED!

Don't Forget to Renew Your Membership!

With each passing year, we work to strengthen the AmSECT community, provide meaningful benefits and develop education to foster growth in your career. In 2024, AmSECT plans to accomplish more than ever before. We look forward to many opportunities to lead, collaborate, educate, and care. You can look forward to the following benefits when renewing your membership:

- Discounted registration for the 63rd AmSECT INTERNATIONAL CONFERENCE.
- The weekly AmSECT Job Opportunities email to view available jobs in the perfusion field.
- An online subscription to the "JOURNAL OF EXTRACORPOREAL TECHNOLOGY," published four times per year and widely viewed as the authority in extracorporeal technology.
- Access to *AmSECToday,* the official AmSECT member publication, published four times per year.
- And so much more!

To renew your membership, click HERE.

Questions? Please contact AmSECT Headquarters at amsect@amsect.org.

PERFUSION CONNECTIONS GAME ANSWERS

Category 1: Things you find in the OR: Pumps, Cannulas, Cardioplegia, Cell saver **Category 2:** Synonyms for pumphead: Boot, Raceway, Arterial head, Roller head **Category 3:** Things you shouldn't prime with: Irrigation saline, Sterile water, Lactate ringer, Calcium **Category 4:** Types of pumps: S5, Essence, Quantum roller, System 1

Congratulations to Our Mary Hartley Scholarship Recipients

Andres Salcedo

Ian Villavicencio

What does receiving the scholarship mean to you?

ANDRES: I am deeply honored to be receiving the Mary Hartley Scholarship. This scholarship defines more than an accomplishment, it is a noteworthy juncture in my journey toward a professional career in perfusion. I am beyond thankful to be part of an exceptional program that has provided me with the skills and knowledge to be successful. I will cherish the moment and reflect on the experiences that have led me to this point. Thank you, Mary Hartley, for this opportunity.

IAN: This scholarship represents a significant moment in the early stages of my career in perfusion. It also reinforces my commitment to excelling in such an incredible field. Mrs. Hartley has made a lasting impression on me, and I am deeply appreciative of her belief in my potential to contribute to this profession.

How has the scholarship impacted your efforts or enabled you to pursue your goals?

ANDRES: The Mary Hartley Scholarship will provide me with valuable financial support and, most importantly, the opportunity to focus on my clinical rotations and studies. With the stability and resources this scholarship offers, I will be able to achieve my long-term goals of succeeding academically, professionally, and personally. I will take this opportunity to improve and make meaningful contributions to the field of perfusion. This immense support will enable me to work towards excellence in my career.

IAN: Not only does this scholarship provide financial support, but also inspires me to stay involved and hopefully one day contribute back to the field of perfusion. With the help of this amazing scholarship, I hope to strive to live up to the high standards set by those who have supported me along the way. This award is as much a reflection of the support from my loved ones, mentors, and classmates as it is of my own efforts.

Congratulations to Our Perfusions Without Borders Recipient

Zachary Roberts

Congratulations to our 2024 PWOB Award recipient, Zachary Roberts. Zach is a student at Lawrence Technological University. He is also the current vice president of the student involvement committee.

> "Medical mission trips play a vital role in providing healthcare to underserved populations, offering life-saving services that may otherwise be inaccessible. For me, participating in these trips will not only allow me to make a tangible difference in global health but also provide an invaluable opportunity for personal and professional growth, enhancing my skills and broadening my perspective as I apply my perfusion education in a diverse, resource-limited setting."
>
> ~ Zach

SpecialtyCare Mission Fund Recipients: Ly Trinh and Steven Robertson

AmSECT is proud to partner with SpecialtyCare through the SpecialtyCare Medical Mission Fund, which provides an endowment to support perfusionists traveling abroad for medical missions. We are thrilled to announce the recent recipients, Ly Trinh and Steven Robertson, who have been selected for their outstanding dedication to this cause. **Please join us in congratulating Ly and Steven on this well-deserved recognition!**

63rd AmSECT International

March 19–23, 2025

Loews Coronado Bay // San Diego