The
# Academy
NEWSLETTER

THE AMERICAN ACADEMY
OF
CARDIOVASCULAR PERFUSION
515A EAST MAIN STREET
ANNVILLE, PA 17003
(717) 867-1485 PHONE OR FAX
OFFICEAACP@AOL.COM
HTTP://WWW.THEAACP.COM

FALL 2017



## Inside This Issue



# Information Technology (IT) "Where does it fit in Perfusion?"


As a perfusionist for nearly thirty years, I have witnessed many somewhat subtle changes in perfusion technology. Improved pressure monitoring, level and bubble detection with flow servo-regulation, digital displays, solid state circuitry and improved metabolic parameter monitoring to name a few. Although all useful adjuncts to improve safety and patient care, these improvements pale in comparison to other industries. Take a moment and think about the leaps and bounds achieved in cell phone technology over the past 30 years. Additionally, the airline industry has embraced many safety improvements driven by innovative use of data acquisition, analysis and critical reporting to allow consistently safe operation of commercial and private aircraft. However the most glaring use of information technology and real-time feedback is the automotive industry. Onboard computers help drivers arrive safely in a variety of ways. Computer

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assisted antilock brakes, sensor systems such as park assist, blind spot monitoring and lane drift warning, automated systems like auto braking, crash avoidance and sophisticated machine learning technology like self-driving cars have certainly peaked our interest. So, what about IT in medicine and in particular, perfusion technology?

Although adoption of many IT innovations such as artificial intelligence, machine learning, deep learning and predictive analytics seem somewhat slow in the medical field, one can certainly see and feel the rapid acceleration of its use in medical devices. Examples include, innovative computer assisted imaging technologies, "Star Trek" like tricorder multifunction hand held scanning devices, interoperability between health systems to exchange patient information as well as play a large role in cost containment, robotic nurse assistants, artificial retinas, advanced prosthetics, remote patient monitoring and light bulbs that disinfect and kill bacteria to name a few. Where does IT play a role in perfusion? As most clinicians transition to electronic record keeping, necessitating automated data acquisition, one can quickly speculate that queries or data mining can provide valuable reporting tools to retrospectively assess quality and performance allowing us to establish and strive for "best practice" compliance. Personally, the last thing I need is for some reporting tool to tell me what a terrible job I did caring for a patient yesterday. I would however welcome any assistance to improve my performance, "real-time" while I can still make changes to improve the level of care we offer our patients. While it is certainly true that automated data acquisition (charting) can remove the burden and distraction of paper recording allowing us more time to focus on patient parameters and circuit performance, IT has so much more to offer. Computers can do a much better job at multi-tasking. Computers can evaluate hundreds of parameters simultaneously every second and supply the clinician valuable feedback on parameters that move outside of desired ranges. We would all have to agree that even our best visual sweep of clinical parameters on CPB, on our sharpest day, after a great nights rest, is simply not that efficient. So why not embrace this technology to help us do a better job? Alarms and alerts to notify us of potential danger before it becomes disastrous. Don't worry your job is secure. We would all agree that we will not take off or land in an aircraft without a pilot and co-pilot but we are very happy when warning systems and computer assisted technology prevent our pilot from flying into the side of a mountain on an early Monday morning following a rough weekend. Can this technology aid the equally vulnerable human perfusionist, operating almost exclusively in the critical care environment? IT in perfusion is just beginning to scratch the surface. Below the tip of this iceberg is an enormous amount of potentially useful technology. Electronic medical records, data feedback, real-time alarms and alerts, smart alarm technology, auto control systems, external data integration, coupling of alarm conditions, auto notifications, quality reporting, "Best Practice" alerts, remote monitoring and automated/ electronic checklists just to name a few.

Harvard Business Review reports, "Over the next decade, Artificial Intelligence (AI) won't replace managers, but managers who use AI will replace those who don't." I urge you to attend the January 2018 American Academy of Cardiovascular Perfusion meeting in New Orleans. Come share your thoughts and ideas with peers and industry partners while learning what's new for perfusionists now and moving forward to help us improve the quality and consistency of care we offer our patients. Remember, if you get the chance to sit it out or dance, I hope you dance.

James Beck, CCP
AACP President






# New Orleans Area Attractions

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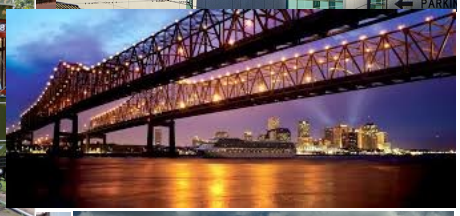



All About our Corporate Partners

# AUTOTRANSFUSION
# THE USE OF DYNAMIC CELL SALVAGE

**James Beavers**, CCP

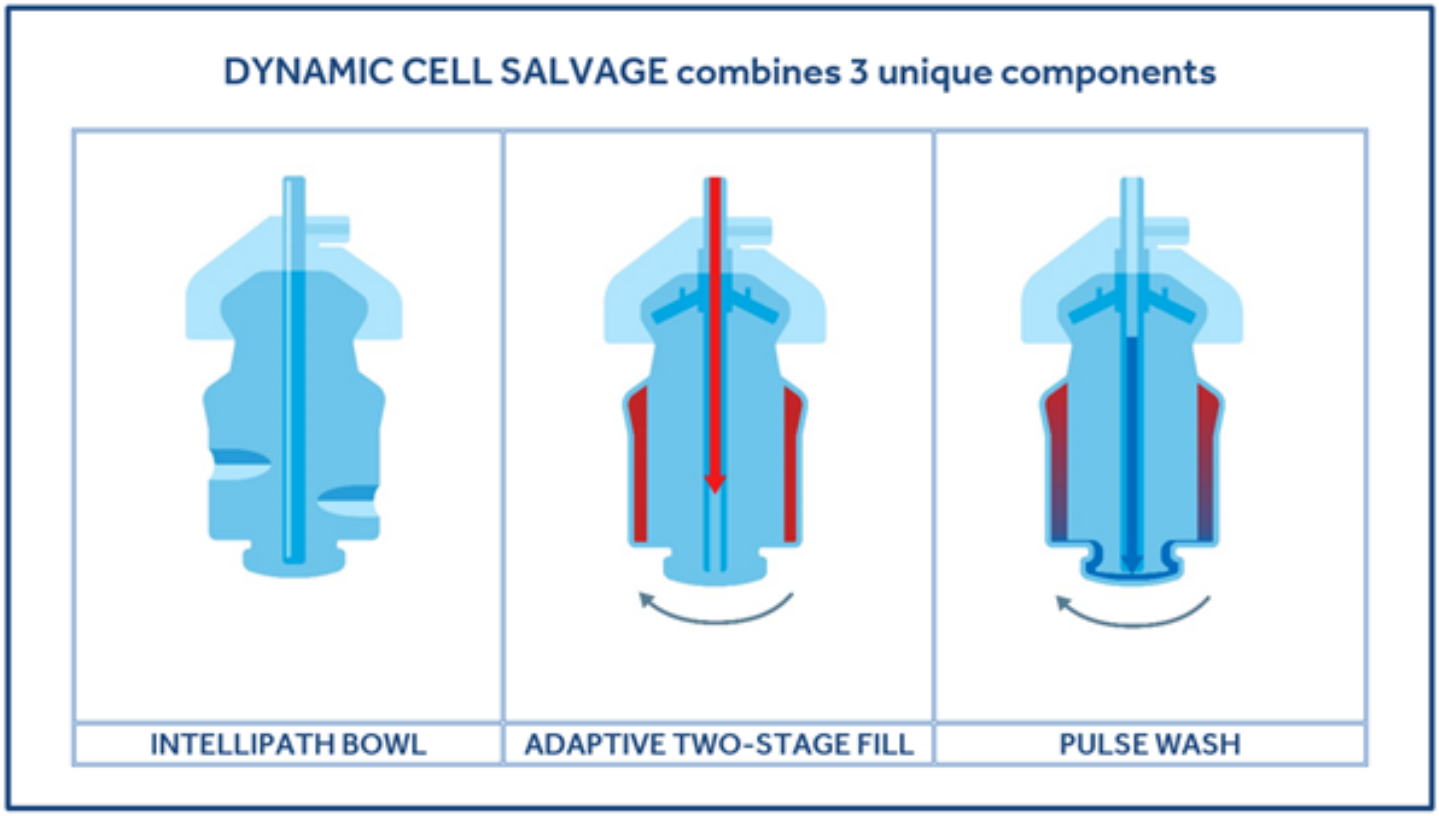
Medtronic Clinical Specialist

Autotransfusion of shed blood has been around since the late 1800s. Dr. James Blundell postulated, back in 1818, that salvaging and reinfusing shed blood during early surgical procedures might prove beneficial.[1] The concept began to be implemented in 1885, with varied results. The general acceptance of intraoperative autotransfusion throughout Europe and the United States began in the early 1900s. Modern blood banking began in the 1950s, and with it a decline in routine use of autotransfusion. The resurgence in the routine use of autotransfusion can be seen from the rise of allogeneic transfusion costs: both monetarily and in the increase in transfusion reactions and transmission of diseases. In 2007, The Society of Thoracic Surgeons (STS) along with The Society of Cardiovascular Anesthesiologists released guidelines for the reduction of administering homologous blood products following cardiac surgery.[2] The perioperative portion of these guidelines suggested that use of autotransfusion practices should be considered as part of a comprehensive plan to decrease the dependence on and usage of allogeneic bank blood (1A recommendation).

The early autotransfusion devices utilized the Latham bowl design, a centrifugal chamber borrowed from the commercialization and processing of bovine milk into various percent of milk fats. Medtronic entered the autotransfusion marketplace in late 1994 after acquiring Electromedics, Inc. In 1997 Medtronic began offering the next generation autotransfusion device, the autoLog™ autotransfusion system.

The use of the autoLog autotransfusion system offers clinicians a new paradigm in cell processing. ***Dynamic cell salvage*** encompasses three unique components — unique bowl design, adaptive two-stage fill, and variable pulse wash — to promote consistently clean, high yield, viable red cell mass available for reinfusion. This unique bowl design, high centrifuge speeds, and algorithm-driven sensors pack the red blood cells into the chamber. The autoLog uses an adaptive two-stage fill of the centrifuge bowl. After an initial fill at 600 ml/min, the system pauses to allow more compacting of the red cell mass, and then a “topping off” of the centrifuge bowl occurs based on the viscosity of the incoming blood. This allows for maximizing the hematocrit while limiting the spilling of potentially viable red cells to the waste bag. The unique bowl design, with its indentations of the bowl wall and intelligent-sensing pulse wash, utilizes only 250 ml of Normal Saline to optimize removal of damaged or activated cellular components from the viable red cell mass slated for reinfusion

The combination of the rapid filling of a 135 ml unique centrifuge chamber, high centrifuge speeds, algorithm-driven sensors, and pulsatile wash with only 250 ml of Normal Saline, makes the autoLog system a rapid processing device capable of handling most clinical procedures.[3,4] This rapid processing of shed surgical blood occurs with the press of one “start” button. The autoLog system will continue to automatically process each additional cycle until all shed blood is processed or the Normal Saline used to wash the packed, centrifuged red cell




mass is exhausted.

Today, our operating theaters are larger, modernized, more computerized, and still very over-crowded with an abundance of technology. The perfusion clinician must struggle to maintain his/her safe "operating space" without encroachment from other clinical disciplines. The physical footprint of the autoLog system fits into most overcrowded work environments. The autoLog system uses only one bowl (135 ml) and the packaging of the tubing assembly allows for ease of stack-ability and storage. Less storage is required for the perfusion/autotransfusion department since only one set of disposables needs to be maintained for any potential autotransfusion case.

The goal of any autotransfusion device is to return viable shed red blood cells back to the patient. The autoLog system meets this need by rapidly returning high quantity, high quality red cell mass while minimizing the loss of potentially viable red blood cells to the waste bag.

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**Annual Meeting Abstract Deadline October 31, 2017**

The Student Section

# Can Voluntary Incident Reporting Increase Safety in Perfusion?

**Alex Gum, Shontelle Sierer, Paul Topor**

*Medical University of South Carolina College of Health Professions*

Department of Cardiovascular Perfusion

*Charleston, SC*

## Introduction

Globally, the incidence of serious adverse events (SAEs) in perfusion appears to have plateaued [1-3]. This plateau comes after a period in which improvements in techniques and technologies used in the cardiac operating room have contributed to the reduction of SAEs, while explicit attempts to reduce errors in service of reducing SAEs have been far less utilized [4]. In healthcare and other high-risk industries, voluntary near-miss reporting (a "near miss" being an event in which a mistake or error that has potential to harm a patient does not) is a proven method that has been used to lower the incidence of SAEs by exposing "low level" issues that often precipitate more serious events [5]. Implementation of a nationwide voluntary near-miss reporting system is a yet untested method that could lead to a significant reduction in the rate of SAEs in perfusion. Furthermore, data about accidents collected through this system would provide information about the actual rates of SAEs and near-misses in perfusion in real time, rather than collection of that data being relegated to surveys.

### *The Diffuse Epidemic*

When *To Err Is Human: Building a Safer Health System* was published nearly 20 years ago, it revealed the alarming scale and cost of errors in American health systems. In two large studies discussed in the book, adverse events (actual injury to a patient caused by medical mismanagement) were found to be present in 2.9% (Colorado and Utah) to 3.7% (New York) of hospital admissions, with 6.6% and 13.6% of adverse events leading to patient death, respectively [6]. Extrapolating these percentages to the total number of hospital admissions in 1997 (33.6 million), adverse events among patients admitted to hospitals ostensibly accounted for 44,000 to 98,000 patient deaths per year, placing it as the 8th-leading cause of death in the USA at the time [6].

While *To Err Is Human* is frequently cited, many subsequent studies suggest that the death toll may be much greater, amplified by the medical community's largely ineffective action in the arena of error reduction [7]. Five years after the publication of *To Err Is Human*, an analysis of inpatient deaths associated with the Agency for Healthcare Quality and Research Patient Safety Indicators in the Medicare population alone estimated that 575,000 deaths were attributable to medical error from 2000 to 2002 [8], with an average of 195,000 deaths per year [9]. A Health and Human Services report in 2010 found that this rate had not meaningfully changed. The report found that 13.5% of Medicare beneficiaries experienced an adverse event during their stay in the hospital. Furthermore, an estimated 1.5% of Medicare beneficiaries experienced an adverse event that lead to their death. This extrapolated to 15,000 deaths per month, or 180,000 deaths per year [10]. Some studies have produced rates of adverse event leading to death that suggest over 400,000 patients die due to medical error each year [9, 11]. Some of these rates would place death due to medical error as high as the 3rd-leading cause of death in the USA today. More recently, these more extreme figures have been disputed, with estimated rates of adverse event leading to patient death closer to 25,000 [12], an estimate lower than the highest by an order of magnitude. More than anything, these estimates – while inexact – highlight the difficulty of defining the problem, while potentially indicating a growing sensitivity to med-

ical error in American medicine.

The cardiac operating room is a locus within the hospital with a relatively high rate of adverse events. Incidence of adverse events in cardiac surgery patients is 12%, significantly higher than a rate of 3% for other surgery patients [4]. More than half of these adverse events are avoidable [13]. Guru *et al.* estimate that 28,000 CABG patients experience an adverse event each year, and one third of deaths associated with the procedure may be preventable [14].

How does perfusion contribute to these adverse events in cardiac surgery? Perfusion-related adverse events are a small subset of cardiac surgery adverse events, but, rather than decreasing, the rate of perfusion-related adverse events has plateaued over several decades [3]. In 2005, Palanzo's review of perfusion surveys from 1980-2000 revealed that perfusion -related serious adverse outcomes appeared to be in decline [15], from 1:1000 perfusions in 1980 [16] to 1:1453 perfusions in 2000 [17]. Willcox noted in 2012 that serious adverse events (SAEs) in perfusion appeared to have plateaued, based on more recent perfusion safety surveys [3]. Notable indications of this plateau are a survey conducted by Groenenberg *et al.* in 2010 among perfusion practitioners in the Netherlands, which found an SAE rate of 1:1236 perfusions [1], and a survey conducted by Charriere *et al*. in 2011 among perfusion practitioners in France, which found an SAE rate of 1:1400 perfusions [2].

Interestingly, the French have achieved a similar SAE rate with a lower usage rate of safety equipment/practices compared to perfusion in the United States. Kurusz detailed some of the more striking discrepancies: "use of an arterial line filter was 70% in France vs. 98.5% in the United States; air bubble detector with automatic pump shutdown or sense only, 28% and 32% vs. 87.8% and 63%; and one-way valved left ventricular vent, 41% vs. 83%". He also noted that the rate of pre-CPB checklist usage was only 79% in the Charriere survey, versus 94.5% of respondents in the most recent United States survey [18].

What, then, accounts for the similar rates of SAEs in France and the United States considering the disparities in practice? As a possible explanation, Kurusz points to a 2005 study conducted in Sweden by Svenmarker and Appelblad, in which 15 years of perfusion incidents were captured in a single institution registration system. SAEs were shown to be in decline, while Charriere's survey indicates that the rate of reported incidents in hospitals with registration systems (33% of responding institutions) were no different than in hospitals without registration systems [2, 19]. The implication is striking: incident registration correlates with a decline in SAEs, and that registration systems can adequately capture perfusion incidents when they are properly implemented. Upon reaching this conclusion, Kurusz recommends that "prospective registries should be implemented in all cardiac surgery centers" [18].

*The Recommendations*

Kurusz's recommendation reveals a path forward toward significantly increased safety in perfusion in the United States. Increases in safety in the cardiac operating room in the United States have been mostly attributable to "refined techniques, advanced technologies, and enhanced coordination of care", while "there is little evidence that much progress has been achieved in reducing or preventing errors" [4]. As noted by retrospective surveys of perfusion practice, this assessment holds true for the perfusion industry. Increasing adoption of safety technology and techniques has correlated with fewer SAEs [15-17], but now that use of these devices has become a standard for many programs [17], the rate of SAEs has plateaued [3], and retrospective studies are revealing their limitations in reducing SAEs. Prospective study of perfusion SAEs through collection of data on near-misses is a promising and under-researched area that may allow the perfusion industry to further reduce the rate of SAEs.

The case may be that the most efficient method for reducing SAEs in perfusion is through voluntary incident/near-miss reporting. Many institutions have systems for logging SAEs and near-misses and performing root cause analyses (RCA), but many of the limitations of such systems are amplified by the small size of perfusion departments within most institutions in North America. A perfusion department that performs 700 pump runs a year can expect to experience an SAE once every 2 years on average if the current rate holds. Root cause analysis may be able to detect the cause of the problem, but the analysis produced by RCA is typically limited to a single incident and rarely disseminated outside of the institution performing the analysis [20]. The value of RCA is not in dispute, but its mechanism and scope only helps patients retrospectively and locally. Perfusion departments and interdisciplinary groups within the environment of the cardiac operating theatre are often better equipped to analyze the incident and implement relevant changes to their practice, particularly when it comes to noting and responding to near misses or "inconsequential" incidents [21].

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The fact of the matter remains that perfusion departments do not experience SAEs in isolation frequently enough to use any system at an institutional level that could reduce their occurrence. Meaningful data on SAEs that are related to perfusion must include SAEs that do not originate in a hospital's perfusion department. In order to detect trends, data on SAEs that occur anywhere in the cardiac operating room need to be shared and documented, and they need to include low level events that are typically classified as near-misses [6]. Near-misses occur between 7-100 times for every SAE [5]. Furthermore, when voluntary reporting is integrated with other institutional safety systems, it is the most effective at identifying near-misses and other low level incidents [5].

The identification of near-misses not only allows for the identification of what went wrong, but also allows investigators to detect what went right in situations in which mistakes did not reach the patient, often referred to as a "good catch" [22]. "Good catch" systems are gaining traction in medicine due to the fact that they essentially double the power of near-miss reporting systems [23, 24]. They allow industries and institutions to know how resilient their safety systems are, and what components of those systems contribute meaningfully to overall safety.

*To Err Is Human* advocated for the implementation of voluntary near-miss reporting in any area within medicine that could accommodate it. The publication went into detail comparing a hypothetical medical voluntary near-miss reporting system with the well-established and successful Aviation Safety Reporting System (ASRS). *To Err Is Human* rationalized its recommendation by noting that these systems speed up root cause analysis, which becomes a factor of the increase in analytic power provided by the scaling up of near-miss reporting, increasing the number of "rare" events reported. Taken alone by a single entity, a "rare" event may be taken as a random occurrence, rather than as a data point within a trend. Because of this mechanism, reporting systems detect emerging problems sooner and rare problems more reliably [6].

The Institute of Medicine (IOM) publication *Patient Safety: Achieving a New Standard for Care* reinforced and expanded on the IOM's recommendation of voluntary near-miss reporting systems. This publication identified three goals for a near-miss reporting system:

Modeling – report analyzers and clinical practitioners need "to gain a *qualitative insight* into how (small) failures and errors develop into near misses and sometimes into adverse events" [5]

Trending – report analyzers and clinical practitioners need "to gain a *quantitative insight* into the relative distribution of failure and recovery factors by building a database of underlying root causes of a large number of near misses" [5]

Mindfulness/alertness – report analyzers and clinical practitioners need "to maintain a certain level of alertness to danger, especially when the rates of actual injuries are already low within an organization" [5]

This publication also discussed in depth methods of organizing such a system and collecting and processing reports, as well as barriers to system implementation and how to overcome them.

In 2013, the American Heart Association (AHA) published a study that examined errors specific to the cardiac operating room and made wide-ranging recommendations based on their findings. Their recommendations may be of greater value to the perfusion industry because they are properly contextualized with respect to the unique nature of a cardiac surgical procedure. One such recommendation was the "establishment of an anonymous national multidisciplinary event-reporting system to obtain data about events and near-misses (Class IIa; Level of Evidence C)" [4].

*The Failure*

These recommendations have been made in the context of the diffuse epidemic of medical errors for nearly 20 years. In response, systems like the Perfusion Incident Reporting System (PIRS) were created, but the perfusion industry in the United States does not have a system for collecting, analyzing, and disseminating incident reports in the interest of patient safety.

While case reports and surveys currently serve vital roles in the industry, perfusion needs to grow beyond a reliance on these types of publications as a method of reducing the frequency of perfusion-related accidents. In other words, we have improved our rate of SAEs as much as we can with reactive, retrospective methodologies, and the time may be right to transition to prospective methods and perspectives [25, 26] that allow perfusionists to understand the sources of problems and the systems used to prevent them [22]. The work toward transitioning to systematic analysis of incidents can already be

seen in projects like the Failure Mode Error Analysis archive, which can serve as a template for exploring new ways to anticipate and plan for accidents in perfusion and the cardiac operating room, as well as for establishing connections between incidents [27].

**Incident Reporting Systems**

When examining voluntary near-miss reporting systems, *To Err Is Human* focused mainly on the National Aeronautics and Space Administration's (NASA) Aviation Safety Reporting System (ASRS) as a practical example [6]. The system was incepted in 1975, and is operated by NASA, rather than a regulatory body like the FAA, since the ASRS is intended to be used solely for safety and quality improvement and cannot be used for regulatory, punitive, or legal purposes [28]. In the beginning, it took in approximately 400 reports per month. Currently, it accepts over 8,000 reports per month, having accepted over one million reports since 1975 [28]. Reporters are protected by immunity policies that protect them from litigation, anonymize the data, and standardize processing [29, 30].

The ASRS near-miss data is used in several ways; the data is the backbone of aerospace safety in the United States. Based on analysis of incident reports, the ASRS issues alerts and notices to the industry on hazards it identifies. It does not provide specific solutions, nor does it enforce compliance with the alerts [28]. Near-miss data is also used to publish a monthly safety bulletin [31]. Finally, the data can be accessed for use in research. The ASRS Database Online fulfills over 1,658 queries a month, and ASRS Report Sets are downloaded an average of 4,497 times a month [28]. 64 papers using ASRS near-miss data have been published to date [32].

The success of the ASRS demonstrates the power of voluntary near-miss reporting in accumulating otherwise difficult-to-obtain error data. The ASRS has become the hub of error research and reduction in the aviation industry - all organizations within the industry intersect with it in a manner that is mutually beneficial [28]. While the ASRS cannot solely be credited, decades of study into human factors has lead the industry to "deal with errors non-punitively and proactively", and cockpit crew members have significantly different views on safety when compared to healthcare workers [33].

The ASRS model is instructive and has been used to inform near-miss reporting systems in medicine [34], but cannot be translated to the cardiac operating room readily [6]. This is due to the greater variability in expertise in the cardiac operating room, meaning that it may be more productive to cultivate an ecosystem of different albeit associated reporting systems with their own expert analyses. Analysis of incidents could be performed separately from the perspectives of perfusion, surgery, and anesthesia with input from error experts like human factors engineers and their findings synthesized for integration into the operating room or other departments their findings may affect [6].

The formation of the International Atomic Energy Agency (IAEA) Incident Reporting System (IRS) was precipitated by the Three Mile Island Accident in 1979 [35]. The partial meltdown at Three Mile Island nuclear power plant was the result of "an unrevealed fault with the power operated relief valve (PORV) [that] led operators to an inappropriate course of action" [36]. As is frequently the case, this faulty valve was not an isolated issue - the commission report following the incident found that "before the event, plants of similar design had experienced problems with the PORVs on nine separate occasions" [36].

Though the origins of the IRS are rooted in this event in American history, it has become a "global contact network and forum that enables safety experts around the world to share and review information on lessons learned from reported events" [37]. The IAEA issues safety documents that are designed to communicate hazards and concerns to the international nuclear community with a preference for over-reporting. The IAEA IRS, like other incident reporting systems, has illuminated the fact that every adverse event that occurs within the nuclear power industry is surrounded by a constellation of low-level events and near misses, which can reveal trends that may lead to the relatively rare instance of an adverse event [37].

The field of radiation oncology has benefited from the efforts of the IAEA as well. In consultation with the IAEA, radiation oncology researchers have initiated equipment safety standards, personnel training standards, and have developed a prototype voluntary safety reporting and learning tool called Safety in Radiation Oncology. The Safety in Radiation Oncology tool is designed for integration with other reporting systems in the medical industry [38, 39].

In 2007, the American College of Physicians New York Chapter (ACP-NY) started a voluntary near miss reporting program that helps physicians categorize near miss reports and provide education for physicians regarding incidents. The system was

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initially limited to internal medicine residents, but it was "expanded to include reports from all physicians in all specialties and all health related professionals" in 2010 [40]. The program is recognized as a Patient Safety Organization (PSO) by the agency for health care research and quality (AHRQ) and is protected under the Patient Safety and Quality Improvement Act of 2005 and NYS Public Health Law 206 [40]. These laws were created in part to protect incident reporters from litigation.

In a newsletter published by ACP-NY in 2011, a review of the NMR's first three years found a total of 350 reports were registered between 2007-2009. From these compiled data, it was found that two-thirds of near misses was from failure to execute a valid plan (a slip) and one-third was because the provider forgot to do something (a lapse). Miscommunication accounted for 15.7% of near-misses, incorrect patient identification accounted for 13.3% of near-misses, and drug administration events constituted 48.3% of all reports [41]. The report also found that a clear majority (97.5%) of interns and residents found it important that the surveys were done anonymously [41], revealing the indispensability of laws protecting incident reporters in systems like the ACP -NY NMR.

The Institute for Healthcare Excellence at the University of Texas M.D. Anderson Cancer Center implemented near-miss reporting by creating the University of Texas Close Call Reporting System (UTCCRS). This is a voluntary and anonymous reporting system that was initially implemented in 2005 and received nearly 26,000 reports between December 2005-July 2007. The UTCCRS was designed to facilitate friendly competition among staff, altering perceptions about near-miss reporting, renaming "near miss" to "good catch", and reframing the reporting process as "an easily understood, common, and non-threatening sporting event" [24]. The program also rewards patient safety "champions" with MVP recognition and monetary rewards.

The UTCCRS system works by allowing hospital employees to place anonymous reports that they witnessed, took part in, or heard about. Notably, the employees involved can track the progress of the report through the system. Employees can also enter suggestions on how to prevent this close call from happening in the future. This information is collected end of shift; employees are given time at the end of their shift to fill out any reports. The system also effectively showed which safety systems were working as intended, such as "Medication Administration Record (MAR) reconciliation; 8-, 12-, or 24-hour chart checks; and increasing double-checks on reported high-alert medications" [24].

The UTCCRS was developed to be a hybrid system, meaning reports it received would be confidential, but reporters are still able to view the progress of their submissions. UTCCRS is mainly web-based, due to its ease of use, time to report, and assurance of anonymity. Near-miss reporters can review their report progress using randomly generated identification numbers instead of any identifying credentials [42]. In anonymous surveys, reporters' responses to the system and its effect on safety culture to be "overwhelmingly positive" [42].

In the past two decades, the Australia & New Zealand College of Perfusionists (ANZCP) has created and iterated upon a voluntary near-miss reporting system for the perfusion industry, called the Perfusion Incident Reporting System (PIRS). Its inception was precipitated in part by the revelation that accidents in perfusion are actually more common than in related fields like anesthesia [43]. PIRS receives anonymous reports from perfusionists regarding accidents/near misses and publishes them in a de-identified form on the ANZCP website.

Recently, PIRS has integrated two new initiatives. The first is a simple shift in perspective – PIRS now uses the World Health Organization (WHO) incident definitions to more effectively delineate which incidents reached a patient and which did not. This change in perspective is in service of the goal of focusing more heavily on "good catches", like the UTCCRS system [24]. By noting the methods by which near misses did not reach the patient, the power of an incident reporting system is virtually doubled [22].

PIRS is underutilized on multiple fronts. First, in a 2014 symposium, a survey of a group of ANZCP perfusionists found that only ~25% had accessed PIRS in the past year for any reason [44]. Second, as a part of the Perfusion Down Under Database (PDUC), ANZCP perfusionists are asked to report incidents that occur in each case. Ostensibly, the incidents are under-reported to PDUC [45]. Of the incidents that are reported to PDUC, only 40% are also reported to PIRS, severely hampering the amount of data fed into the system. Furthermore, AMSECT's 2014 attempt to encapsulate PIRS in some way in order to introduce it to American perfusionists raised concerns of legal discovery of reports submitted to the system [44]. These concerns must be resolved in order to introduce a reporting system to the perfusion industry in the United States.

PIRS has been iterated on several times, and remains an under-explored and under-utilized model within perfusion and the medical community at large. The absence of a similar system in North America has not gone unnoticed as perfusionists look for more efficient ways to increase safety in the perfusion industry [26].

## The Way Forward

*Barriers & Limitations*

The greatest barrier to successful implementation of near-miss reporting systems is fear – specifically, fear of punishment and fear of litigation [6, 46-49]. Fear of litigation presents two separate obstacles: the first is encountered when an individual chooses to report to an incident reporting system, and the second is encountered when the organization attempts to share information and analysis with key stakeholders. The fear of punishment can be addressed by altering the culture surrounding incident reporting and framing the act of reporting as responsible, appropriate, and natural [24, 28, 42]. Fear of litigation is addressed in part by assuring anonymity [41]. More importantly, fear of litigation is addressed by laws designed to insulate reporters from any legal consequences associated with incidents they are involved in, such as the US Patient Safety and Quality Improvement Act of 2005 or New York State Public Health Law 206.

Another major barrier to reporting is a misunderstanding of what constitutes an error, if an error took place, or who is responsible for submitting a report [46, 47, 49, 50]. Institutions and reporting systems can address this through careful definition of errors and efforts to assign responsibility for reporting [23, 24]. The emergence of the "Just Culture" framework for maintaining safe systems and supporting clinicians has contributed greatly to the standardization of what constitutes an error and who is responsible for an error while reducing the punitive effects of defining errors and their causes [51].

The effort and time required to create and submit a report is another factor that prevents healthcare professionals from submitting [46, 49]. The specific issues here may lie in a perception that the error was too trivial to report or that the report will have no effect because the reporter does not receive feedback for it [47, 50]. Finally, in a small industry like perfusion in the United States, will there be enough reports filed to create a body of data that can be meaningfully analyzed? Furthermore, will there be enough perfusionists willing to volunteer their time to receive, organize, analyze, and disseminate reports that are received?

Finally, emotional barriers to reporting exist. Errors can negatively affect healthcare workers' self-perception, with one study finding respondents who agreed with statements like "if I admit to an error I will feel like a failure" and "it would affect my self-esteem to admit to an error" [48]. This reveals a problem with safety culture in healthcare that is difficult to resolve: while medical errors may be inevitable, the fact that they so directly and tangibly affect others' lives makes it difficult to accept them as such.

*The Future*

The presence of incident reporting systems is a hallmark of high-risk, "high-reliability" organizations that is conspicuously absent from perfusion practice in the United States. Overall safety progress in the cardiac operating room in the United States has stalled – it is time to add another slice to the "Swiss Cheese" model of accident prevention [4, 52]. The basic methods of incident report data collection, analysis, and dissemination have been developed and refined over decades in other industries that share traits with medicine and the operating room environment. The medical community is finding ways to navigate legal and organizational barriers through PSOs, and they have explored varied models that perfusionists can assess for our own purposes.

Implementation of a perfusion incident reporting system in the United States is not without barriers, but it represents an important shift in how the perfusion industry thinks about safety and accident prevention – a shift from case-based, retrospective reporting to trend-based, prospective reporting. With SAEs in the cardiac operating room plateauing, it is time to look for a new avenue by which perfusionists can pursue improved safety outcomes industry-wide.

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# Important Academy Dates

## The ACADEMY ANNUAL MEETING DEADLINES

| | |
|---|---|
| **ABSTRACT DEADLINE** | **October 31, 2017** |
| **MEMBERSHIP DEADLINE** | **November 17, 2017** |
| **PRE-REGISTRATION** | **December 17, 2017** |
| **HOTEL REGISTRATION** | **December 17, 2017** |
| **2018ANNUAL MEETING** | **January 17-20, 2018** |

### *Other Meetings*

**19th Annual Update on Perfusion Conference**
October 26 – 28, 2017
Medical University of South Carolina
Charleston, SC
Phone: 843-792-9262
Website: http://academicdepartments.musc.edu/chp/cvp-el/conference/index.htm
Contact Name: Joe Sistino
Contact Phone: 843-792-9262
Contact Email: sistinoj@musc.edu

**Pennsylvania State Perfusion Society Fall Conference 2017**
October 27 – 29, 2017
Crowne Plaza Hotel
King of Prussia, PA
Phone: 610-265-7500
Website: http://cpvalleyforge.com
Contact Name: John Haddle
Contact Phone: 215-687-9803
Contact Email: john.haddle@uphs.upenn.edu

# PRE-REGISTRATION FORM

The 2018 Annual Meeting of
The American Academy of Cardiovascular Perfusion

| | | | |
|---|---|---|---|
| **MEMBER**<br>Registration Fee<br>2018 Annual Dues<br>Guest to Induction Dinner<br>Adult Guest to Workshop | **FEE**<br>$445.00<br>$155.00<br>$100.00<br>$25.00 | **Amount**<br>_____<br>_____<br>_____<br>_____ | **FIRESIDE CHAT REGISTRATION**<br>(make your first three choices each day)<br>**Thursday Sessions**<br>1)_____<br>2)_____<br>3)_____<br>**Friday Sessions**<br>1)_____<br>2)_____<br>3)_____<br>**Saturday Sessions**<br>1)_____<br>2)_____<br>3)_____ |
| **NON-MEMBER**<br>Registration Fee<br>Guest to Induction Dinner<br>Adult Guest to Workshop | **FEE**<br>$495.00<br>$100.00<br>$25.00 | **Amount**<br>_____<br>_____<br>_____ | |
| **STUDENT PERFUSIONIST**<br>Registration Fee<br>Guest to Induction Dinner<br>Adult Guest to Workshop<br>*__MUST__ *include a letter from the school director with registration.*<br>***To take advantage of the waived Student fee, you must be a current Student Member of The Academy.* | **FEE**<br>$130.00*<br>$100.00<br>$25.00 | **Amount**<br>Waived**<br>_____<br>_____ | |
| **FELLOW or SENIOR MEMBER**<br>Registration Fee<br>2018 Annual Dues<br>Guest to Induction Dinner<br>Adult Guest to Workshop | **FEE**<br>$445.00<br>$180.00<br>$100.00<br>$25.00 | **Amount**<br>_____<br>_____<br>_____<br>_____ | |

**PRINT OR TYPE**
**NAME** _____

**HOME ADDRESS** _____

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**HOME PHONE** _____ **WORK PHONE** _____ _____

**E-MAIL ADDRESS** _____ ***(Required for confirmation)***

**ANTICIPATED ARRIVAL DATE IN NEW ORLEANS** _____

**Will you be attending the Induction Dinner on Friday evening? YES NO**
***(Dark Suit and Tie Required / Black Tie Optional)***

**Please read all instructions and information before completing this form.**
If you have questions completing this form, please call the national office. Hotel Reservations must be made separately through the hotel directly.

**Total Amount of Payment $ _____ METHOD OF PAYMENT:** Check** __ Money Order __ Credit Card __

**VISA/MasterCard #** _____ **Exp. Date** _____ **3-digit security code** __ __ __

*Credit card billing address if different from above*.

**ADDRESS** _____

**CITY** _____ **STATE** _____ **ZIP** _____

**Signature**_____

** ***There will be a $25.00 service charge for any check returned for insufficient funds.***

**INSTRUCTIONS and INFORMATION**

o Complete each appropriate section of this form by printing or typing.
o *All attendees are invited to the Induction Dinner on Friday evening. Attire is dark suit and tie required.*
o Members must pay their 2018 Annual Dues along with their registration fees by completing that portion of the form.
o You will receive acknowledgment of your pre-registration by January 5, 2018--bring it with you to the meeting.
o No pre-registration will be processed after December 17, 2017.
-- **After this date you must register at the meeting**.
o Your receipt and meeting credentials will be available for you at the Pre-Registration desk at the meeting.
o There will be **NO ADMISSION to any Fireside Chat without proper admission credentials**.
o If you are joining The Academy with your registration you must:
1) complete appropriate areas of the form;
2) you MUST INCLUDE the membership application form;
3) include the $25 filing fee;
4) include $155 for the 2018 Annual Dues;
(Your membership begins with the closing business meeting)
o ONLY VISA/MasterCard credit cards are accepted - with VISA/MasterCard you may FAX your registration to (717) 867-1485
o The AACP Federal Tax ID Number: 63-0776991 (for hospital use only)
o Refund policy: Anyone that is pre-registered for this meeting and is unable to attend will receive a full refund minus $50.00 for handling, mailing, and processing upon written request before January 5, 2018.

o **Make checks payable to AACP (US dollars). Mail completed pre-registration form and check to:**
**AACP**
**515A East Main Street**
**Annville, PA 17003**

**IF YOU HAVE QUESTIONS FILLING OUT THIS FORM, PLEASE CONTACT THE NATIONAL OFFICE (717) 867-1485.**

o **If paying by VISA/MasterCard you may FAX this form to (717) 867-1485 or mail to above address.**

# Contact Information for Our Sponsoring Partners

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# *39th* Annual Seminar of The American Academy of Cardiovascular Perfusion

New Orleans Marriott Hotel
New Orleans, Louisiana
January 17 – 20, 2018

## Wednesday, January 17, 2018

9:00 AM – 2:00 PM Council Meeting
1:00 PM – 5:00 PM REGISTRATION
3:30 PM - 4:00 PM Opening Business Meeting
*Fellow, Member, Senior and Honorary Members*

4:00 PM – 7:00 PM Breakout Rooms
8:30 PM Sights and Sounds of New Orleans Pub Crawl

## Thursday, January 18, 2018

7:00 AM REGISTRATION
7:00 AM – 8:00 AM Video Presentations
8:00 AM – 9:30 AM Scientific Paper Session:
Moderators*: Richard Chan & Christine Chan*
9:30 AM – 10:00 AM Break
10:00 AM – 12:00 PM Special Scientific Session
***Hot Topics and Current Trends***
*Moderators: Daniel Fitzgerald and David Fitzgerald*
Training and Simulation - *Dr. Marc Dickstein*
New and Emerging Technologies - *Ken Fung*
Hypobaric Perfusion - *Dr. Keith Gipson*
Complex Aortic Repair - *Christine Chan*
Updates on Heart Transplants, Lung Transplants & VADS - *Dr. Jonathan Haft*
Panel Q&A

12:00 PM – 1:30 PM Lunch

1:30 PM – 4:00 PM Special Scientific Panel
**Extracorporeal Support - In & Out of the Operating Room**
*Moderators: Dana Apsel and Harry McCarthy*
Pulmonary Medicine Perspective - *Dr. Dan Brodie*
Organization of ECMO Programs for Cardiac Failure in Adults - *Dr. Dan Brodie*
Lung Transplant Support - TBA
Shock and ECPR Use - TBA
ECMO Transport (Inter-hospital, Outside Ground and Air) - *Michael Brewer*
Interesting Cases and Lessons Learned - *Killian Patton*
Interesting Cases and Lessons Learned - *Allison Weinberg*
Panel Q&A

4:00 PM – 6:00 PM Fireside Chats
- Student only forum
- VADs and Mechanical Support
- Best practices/ Evidence based / Goal directed perfusion
- New technologies: TAVR, Angiovac, pump technology, heater coolers, circuitry & more
- Generations in the workforce, motivation, staff satisfaction, mindset and engagement

6:00 PM – 8:30 PM Sponsor's "HANDS ON" Workshop and Reception
*All Meeting Attendees and Guests*

## Friday, January 19, 2018

7:00 AM REGISTRATION

7:00 AM – 8:00 AM Video Presentations

8:00 AM – 9:30 AM Scientific Paper Session
*Moderators: William Riley & Richard Walzack*

9:30 AM – 10:00 AM Break

10:00 AM – 11:30 AM **Special Scientific Panel**
**Complex Congenital Heart Surgery**
*Moderators: Tami Rosenthal and Carmen Giacomuzzi*
- Minimizing Prime Volume and Surface Area for the 12-20kg Patient – *Kevin Charette*
- Ventricular Assist Devices for the Failing Fontan Patient - *Dr. Mascio*
- A Perfusionist's Guide for the 15kg Failing Fontan on a VAD – *Richard Melchior*
- Malignant Hyperthermia Interesting Case - *Molly Oldeen*
- Single Ventricle vs 1.5/2v Repair Dilemma - *Dr. Mascio*
- Panel Q&A (15 minutes)

11:30 AM – 1:00 PM Lunch

1:00 PM – 3:30 PM Special Scientific Session:
**Education, Communication and Collaboration with Industry Partners**
*Moderator: Giovanni Cercere*

3:30 PM – 5:30 PM Fireside Chats
- Pediatrics
- ECMO
- Computers in Perfusion, EMR, Real-time notification, alarms, alerts, connectivity
- Simulation, s#%t hits the fan, are you ready?
- Perfusion education, past, present and future

6:30 PM Induction Dinner, Awards Presentations, Live Band and Dancing
*All Meeting Attendees and Guests*

## Saturday, January 20, 2018

| | |
|---|---|
| 7:00 AM | REGISTRATION |
| 7:00 AM – 8:00 AM | Video Presentations |
| 8:00 AM – 9:30 AM | Scientific Paper Session<br>*Moderators: Fred Hill & Kenny Shann* |
| 9:30 AM – 10:00 AM | Break |
| 10:00 AM – 12:00 PM | **Special Scientific Panel**<br>**Scientific Research: Biostatistics, Epidemiology, Quality Measures, Outcomes and Reporting**<br>*Moderators: Linda Mongero and James MacDonald*<br>Update on Scientific Research - *Joseph Sistino, PhD, CCP*<br>Biostatistics - *Eric Tesdahl, PhD*<br>Quality Measures and Outcomes - *Al Stammers, MS, CCP*<br>Infection Prevention and Control - *Tom Coley, RN, CCP Emeritus*<br>Panel Q&A |
| 12:00 PM – 1:30 PM | Lunch |
| 1:30 PM – 3:30 PM | Memorial Session<br>*Charles C. Reed Memorial Lecture - James MacDonald*<br>*Thomas G. Wharton Memorial Lecture - James Beck* |
| 3:30 PM – 5:30 PM | Fireside Chats<br>ECMO<br>Perfusion accidents<br>Cardioplegia<br>Quality improvement: What are you doing?<br>Team building, leadership, engagement, what makes a satisfied workforce |
| 5:30PM | Closing Business Meeting<br>*Fellow, Senior and Honorary Members Only* |

# THE ACADEMY TO OFFER LIVE WEBCAST

**The American Academy of Cardiovascular Perfusion will again be offering a live webcast of our 2018 Annual Meeting in New Orleans. The General Sessions of the meeting will be broadcast in high quality streaming video. There will also be an opportunity for attendees to ask questions, thus qualifying for Category I CEUs from the American Board of Cardiovascular Perfusion.**

# 2018 Annual Academy Meeting
# Host Hotel

## New Orleans Marriott Hotel
## New Orleans, Louisiana

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*Please mention that you will be attending the Annual Conference of The American Academy of Cardiovascular Perfusion when making your reservations.*