Who Should Perform ECMO?

I work in a large academic medical center in Boston. We are in the planning stages for an ECMO Program. There is a multidisciplinary working group, which consists of a cardiac surgeon, a thoracic surgeon, a pulmonologist/intensivist, a nurse administrator, the Director of Respiratory Therapy, several hospital administrators and me, making projections on potential volume, decisions concerning patient location and the structure of the service itself. The development of protocols and guidelines were being left to subsequent clinical meetings. The discussion of who would care for ECMO patients became the dominant topic of this and several meetings that followed.

There were several members of the group who advocated for respiratory therapists to “sit” ECMO. The model proposed would require one-to-one care, in addition to an ICU nurse 24/7. The model I suggested was that when a patient was stable on the support, in the care of a trained ICU nurse a perfusionist would regularly round. The model also would require the ability to remotely monitor the support utilizing a technology such as the Spectrum Medical Viper Vision Live Vue.

It was my sense from the feedback from several group members that the respiratory therapy model was favored and the rationale was centered on the costs associated with perfusion coverage. I began to perform my due diligence as to which health care professional is best qualified to be engaged in ECMO. In the Commonwealth of Massachusetts both respiratory therapists and perfusionists are licensed and it just so happens that I am the Chair of the Board of Registration of Perfusion. I therefore consulted the regulations of each profession, especially the sections that define the scope of practice. The perfusion regulations were comprehensive and specifically articulated the role of the perfusionist and named ECMO and ECCOR as functions performed by perfusionists. This is as I thought it should be because perfusionists are the only health care professionals who by education, training, certification, licensing and practice are truly qualified for the task.

I then consulted the respiratory therapy regulations governing state licensure in Massachusetts. The section defining the scope of practice was also comprehensive, however nowhere did it state that ECMO was a service or function to be performed by a licensee. I subsequently learned that when queried the Respiratory Board in Massachusetts deemed it appropriate for respiratory therapists to be engaged in providing this service. Their justification was the last sentence of the description of a respiratory therapist in their regulations which reads “Respiratory Care is a changing and evolving profession and shall also include procedures described by the Clinical Practice Guidelines of the AARC, and duties consistent with the training and education of respiratory care personnel or related to the practice of respiratory care, as approved by the Board.” Note that AARC is the American Association of Respiratory Care, a professional organiza-
33rd Annual Seminar of The American Academy of Cardiovascular Perfusion
Omni Royal Orleans Hotel
New Orleans, Louisiana
January 26-29, 2012

Thursday, January 26, 2012
9:00 AM – 1:00 PM  Council Meeting
10:00 AM – 3:00 PM  REGISTRATION
2:30 PM – 4:30 PM  Fireside Chats

Computers in Perfusion, Simulation
Managing Perfusion, Leadership, Dealing with Administration
Perfusion Safety How to Prevent, React and Deal with Perfusion Accidents
“Students Only” Forum

4:30 PM – 5:30 PM  REGISTRATION
5:00 PM  Opening Business Meeting
Fellow, Member, Senior and Honorary Members
5:30 PM – 8:00 PM  Sponsor’s Hands-On Workshop & Reception

Friday, January 27, 2012
7:00 AM  REGISTRATION
8:00 AM – 9:30 AM  Scientific Session
9:30 AM – 10:00 AM  Break
10:00 AM – 11:30 PM  Scientific Session
11:30 PM – 1:00 PM  Lunch
1:00 PM – 3:30 PM  Special Scientific Session (Panel)
Perfusion Mythology- the Fables, Folklore and Facts of the Fundamentals of Cardiopulmonary Bypass

Moderator: Giovanni Cecere, MS, CCP
Speakers to include:
James Beck, CCP
Edward Darling, MS, CCP
Joel Davis, CP
Kevin Lilly, CCP
Linda Mongero, CCP
Jeffrey Riley, MHPE, CCT, CCP
William Riley, CCP
Ian Shearer, BS, CCP
Joseph Sistino, MS, MPA, CCP
John Toomasian, MS, CCP

3:30 PM – 5:30 PM  Fireside Chats
Budget Management Techniques, Cost Savings, Administration
Future of Perfusion
Hemostasis Management, "What's Hot, What's Clot"
Mechanical Therapies, VADs and More
Pediatrics, Cutting Edge, Are We There?
6:30 PM Induction Dinner
   Fellow, Senior, Honorary Members & Guests

Saturday, January 28, 2012
7:00 AM REGISTRATION
8:00 AM – 9:30 AM Scientific Session
9:30 AM – 10:00 AM Break
10:00 AM – 11:30 AM Memorial Session
   Navigating the Changing Healthcare Landscape: Opportunities for Perfusionists to Impact Institutional Strategy
   Denise Steinbring
   Medtronic Structural Heart
   Charles C. Reed Memorial Lecture
   Professor Chuen Neng Lee
   National University of Singapore
   Thomas G. Wharton Memorial Lecture
   Daniel J. FitzGerald, CCP, LP—President, AACP
   Brigham and Women's Hospital, Boston, Massachusetts

11:30 PM – 1:00 PM Lunch
1:00 PM – 3:30 PM Special Scientific Session (Panel)
   The Protected Heart - The History, Techniques and Controversies of Myocardial Protection
   Searching For The Holy Grail: Intrinsic Myocardial Protection - Andrew Wechsler, MD
   Cardioplegia: Past, Present and Future - Richard Weisel, MD
   Novel Targets For Metabolic Optimization And Resolution Of Inflammation In Cardioprotection: Lessons From Natural Hibernators And Other Comparative Biology Studies - Mihai Podgoreanu, MD

3:30 PM – 5:30 PM Fireside Chats
   Ask the Experts
   Expanding the Role of Perfusion, Cath Lab, EP Lab, ER, etc.
   Myocardial Protection Strategies
   New Approaches to Old Surgery, "Adapt, Re-Engineer or Retire"
   Women in Perfusion

5:30 PM Closing Business Meeting
   Fellow, Senior and Honorary Members Only

Sunday, January 29, 2012
8:00 AM – 10:00 AM Scientific Session
10:00 AM – 12:00 PM Fireside Chats
   Computers in Perfusion, Assisted Bypass, Electronic Records
   New Devices, "A Time to Embrace Change", Spectrum Medical, Cardiohelp, HLMs, VADs and More
   Patient Management, "What Pressure, Flow, Temperature, etc., Are We Good?"
   Perfusion Safety: How to Prevent, React and Deal with Accidents
There is an unfortunate growing gap between the number of available donor organs and the increasing population of qualified recipients. As of September 2011, there were 112,565 individuals awaiting transplants while only 10,558 donors were made available. (United Network for Organ Sharing). Each year, majority of those that need a transplant will be left untreated, or expire before the opportunity arises. As health care providers, we must look to embrace new utility of already accessible technology in an effort to minimize the casualties of the "donor to recipient disparity."

One innovative technique that may help to increase the donor pool is the use of Extra-Corporeal Membrane Oxygenation (ECMO) system to help to revive and salvage organs that may have been deemed unfit for transplantation. The new application on donation after cardiac death (DCD) patients has already helped several centers salvage marginalized organs and revived them into viable organs for transplantation. Study of the technique used at some pioneer centers in addition to a team embracement of the concepts/ techniques will help guide us toward refining protocols and bridge the gap between donors organ availability and potential recipients. Ethical concerns for the procedure, however, should always be under careful institutional scrutiny. As ECMO circuit experts, perfusionists play a critical role in shaping the future use of the technology in transplantation protocols.

DCD donors on ECMO are generally considered "controlled" donors, in which a timed withdrawal of support provides control over the donation process. The most common donors are patients who have experienced irreversible brain damage and have been declared brain dead, but are on continued support until recipients are matched, then the support is withdrawn, and organs are harvested. For this process, multiple organ ischemia is minimal compared to traditional DCD donors that are on support, but not clinically brain dead. These patients are deemed to have undergone irreversible damage to vital organ systems and will not benefit from continued support. Once these patients have experienced cardiac death and the family and/or patient decides on withdrawal of support (if the patient is on support), the onset of ischemic insult begins until the time of the organ is transplanted. DCD with ECMO attempts to attenuate the injuries afflicted on organs caused by the ischemic period by initiating ECMO from the time of total cardiac arrest following consent to donate until the time of harvest. ECMO provides the lower organs reperfusion therapy. During this time, the arterial blood gasses are monitored and adjusted. Other institutional markers for organ viability are measured as well. After stabilization of pertinent parameters, the organs (usually pancreas, kidneys and/or liver) are excised and normal protocol for transplantation ensues.
Several hospital centers have tested the use of ECMO circuits with their DCD donors and produced promising results. Studying their success will allow us to educate others and pilot studies in an effort to reproduce the promising data and integrate such protocols within our own institutions. At the University of Wisconsin, the potential organ donor pool increased by 33% overall by implementing DCD with ECMO. (Magliocca, J.) The study included a comparison with their traditional donors (donation after brain death [DBD] kidney patients). DBD donor organs, however, had poorer outcomes after implantation than the DCD with ECMO donors. At the University of Michigan, they were able to transplant 20 kidneys from 13 DCD with ECMO supported donors with only one failure (it was due to a surgical complication) (Gravel, M.) This group also concluded that the use of ECMO circuits with their DCD protocol increased their donor organ availability without a compromise in organ graft function or quality. The United States of America is not alone in these pioneer efforts. At the University of Barcelona, DCD with ECMO has been adopted as an accepted technique for organ donation and harvest (Fondevila, C.). Publication of these successful results has inspired other centers to revisit organ donation.

Ethical concerns regarding this procedure are valid and require attention. It is necessary to form a proper protocol with strict guidelines for organ donation. Without consensus of a carefully thought out medical community guideline, it has the potential serious legal and moral conflicts of interest. The protocol should not leave room for creative interpretation or allow lapse in judgment by anyone involved in the decision processes. Common concerns for this procedure include the ethical validity for machine use (ECMO circuit) or drug administration (Heparin) to donor patients when it is clearly not indicated in their best interest. Another commonly raised concern is whether the withdrawal of support deprives a patient of a opportunity to recover in case of misdiagnoses or incorrect assumptions of the patient's ability or likelihood to survive. Protocols must also clearly state the necessity for the separation between the palliative care team and the harvest/transplant team. This is especially critical when the two teams are in the same institution. Protocols must also clearly state the necessity for the separation between the palliative care team and the harvest/transplant team. This is especially critical when the two teams that are in the same institution. Another ethical concern has surfaced in multiple institutions in which, during a DCD with ECMO case the donor patient's heart spontaneously restarted during the 60-90 minute clinical window for establishing cardiac arrest and in some cases, during the ECMO reperfusion time window with wrongly placed cannulas. Such critical moral and ethical concerns have the potential to hold the DCD with ECMO programs until complete and thorough protocols are established. These concerns are only a few of the many that may arise to such a sensitive procedure and will require careful and serious institutional planning groundwork. These concerns are only a few of the many that may arise and will require careful and serious institutional planning ground work. DCD with ECMO donation has proven to be successful at some leading institutions and as perfusionists we should be prepared to be educated and educate others at our institutions. As experts in extracorporeal circulation science, this is an opportunity to utilize our knowledge and promote new procedures to improve quality of patient care and in this instance, to save lives that would have been lost to the severe donor organ shortage.

References:
New Orleans Dining and Attractions
Compiled by New Orlean’s Own William Harris

Excellent Tourism Web Sites- A what to do?

http://www.neworleansonline.com
www.NOLA.com

Newspaper must read on entertainment
Lagniappe Section of every Friday’s Times-Picayune

Some Favorite Attractions:
French Quarter
French Market
Audubon Aquarium of the Americas
Audubon Zoo
Audubon Insectarium
City Park - Botanical Gardens, Golf, Boat and Bike rentals, Tennis, New Orleans Museum of Art
Lake Pontchartrain
Contemporary Arts Center
Harrahs New Orleans Casino
Louisiana’s Civil War Museum
National World War II Museum
Audubon Park- including Tulane and Loyola Universities
Louisiana Superdome
Many of the old Cemeteries- truly works of art
Steamboat Natchez

Dining
NOMenu.com
Tom Fitzmorris’s ultimate food critic web site for most 1400 restaurants in and around New Orleans. Referenced by neighborhoods, cuisine, and whether dinner, lunch or breakfast.

Some of my favorites although I know I am cheating MANY by only including these names:

Dinners
Stellas
August
Dragos
Bistro Daisy
Commanders Palace
Palace Café
Bourbon House
Jacque - Imos
Gallatois
Bayona
Irenes
Who Should Perform ECMO?

Continued from Page 1

tion and the spelling of consistent is how it appears in the original document. Indeed, the AARC does have a position statement endorsing the use of respiratory therapists in this role. I, however, wondered if either AmSECT or the Academy generated a position statement deeming perfusionist qualified to perform surgery if that also might be acceptable.

In this context I think it is important to reflect and accept the fact that in many hospitals throughout the country respiratory therapists have been involved in this field for a long time and many have been performing the task safely, affording those patients in their care excellent outcomes. The Extracorporeal Life Support Organization (ELSO) endorses the role of properly trained respiratory therapists (certification through ELSO) in their staffing guidelines. The precedent is well established. But, are all precedents correct? ECMO is cardiopulmonary bypass; perfusionists are uniquely qualified to perform this task, so why are respiratory therapists doing our job? It could be that it was historically a matter of necessity, not enough perfusionists to meet the demand. It is also possible that perfusionists didn’t want to get involved, too much on their plate already, too many all nighters, too boring. It might be that hospitals were/are looking for a less expensive option, in most regions a perfusionist salary is significantly more than that of a respiratory therapist.

The more I thought about the issue, the more convinced I became that this is OUR job and those of us who love and promote our profession should be committed to insuring that all ECMO patients have the benefit of a perfusionist involved in their care.

Daniel J. FitzGerald, CCP, LP
President, AACP
2012 Annual Seminar

New Orleans, Louisiana
January 26-29, 2012

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From the perspective of the clinical specialties, there are two ways that the adoption of electronic charting of a patient’s medical record is typically defined and justified.

First of all, it is a hospital wide implementation and therefore it is a top down strategic initiative driven by the incentives as defined within the 2009 HITECH Act.

Secondly, it is the means to a new world of improved patient safety, a process of quality and outcomes improvement and a culture of compliance and tools for self-regulation.

Without doubt, there is value in having immediate access to a centralized record of patient information, whether it’s the latest lab results or a history of past procedures. However, it is probably timely to ask the question, does this by itself justify the many hundreds of millions of dollars currently being spent on health related IT?

To answer this question we need to consider our customers, i.e. patients. As a consequence of all this expenditure, will your customers be safer in your care, will they enjoy an improved outcome, will patient satisfaction levels be higher, and will you get paid more for being the best at what you do?

Obviously, as with all things in life, there is not one single silver bullet! But in many respects the facts are quite simple; the clinical specialties are in the front line. How these specialties deliver the product, i.e. patient care, will determine the success and the standing of the hospital they work for.

Many providers of IT systems do not seem to understand that in the specialty environment the interface between the hospital and its customer is often stressful, time critical, with the potential for life changing and expensive consequences. The balance between obtaining benefits from electronic data collection and the increased expenditure, along with the possible loss of staff efficiency during the adoption process, is a constant consideration especially in the clinical specialty areas.

“Meaningful Use” as a concept has been discussed extensively as being one of key objectives of the EMR system. When considering this and other objectives of the EMR we must recognize that the actual record, whatever the format it is stored, is a bi-product of the data captured during the interface between the hospital and its patient. The actual data collected and the pro-active use of this data will ultimately determine whether these objectives are met.

Data is a simple word and yet it describes a valuable resource with so many uses. Data can be used for quality improvement, for improving patient safety, and for self-regulation. Whether these are considerations for present or future needs, it is essential that the core EMR technology provide solutions for the following requirements:

- It is important that the simple function of recording information is as “back ground” as possible in the care providing process. In others words the process must be easy to use, highly intuitive and equivalent to, if not quicker, than current paper systems.
- Access to information: Can your clinical database search complex queries, e.g. all patients within a certain age range, with certain outcomes that had consecutive periods with a MAP below 60?
- Will you be able to construct and
constantly improve “Care Profiles” based on regulatory requirements and internal quality control processes?

- Will the EMR system allow access to real-time information from multiple and simultaneous locations?
- Will the EMR system allow your facility to regulate compliance strategies in real time, at the end of the case, and over time?

Having access to data is of little use if you are not prepared to use it in a quality improvement process. Linking patient data with patient outcomes will lead to the introduction of new and improved Care Protocols and/or the revision of existing Care Protocols.

Collecting this clinical data and then having the ability to link and subsequently analyze post procedure and post discharge outcomes is an important first step. However that is what it is “just the first step”. Quite simply, your EMR system must also have the capability to support implementation.

Implementation tools are not simply add-on functions to the existing and more conventional EMR systems. Implementation tools represent the embedded culture of the software vendor and form the core of the entire program. As with your hospital, your EMR vendor either has the culture of outcomes improvement designed within its software or it does not.

At Spectrum Medical we have a number of implementation tools that are fully integrated, easy to implement and operate in real time. More importantly they allow you to grow with your quality improvement process.

As an example, Care Profiles, which can either be Patient, Procedure or Physician centric, are the embodiment of the outcome of a quality improvement process. Care Profiles should detail how care is to be monitored e.g. from the alarm management of vital signs to the routine management of check lists and nursing care. Care Profiles are integrated into every day care and therefore support the quality improvement process at the bedside and in real time.

As another example, an often overlooked feature within the EMR system is the importance and management of check lists. Ask yourself this: Who in their right mind would willingly travel on a plane knowing the pilot never followed a formalized check list procedure? Check list procedures are a vital part of any Care Profile. Deciding what is to be checked before the commencement of care, during care and as care ends can significantly affect both patient outcomes and patient safety.

As discussed before, within the specialty area events occur in real time. Real time response is often essential and having an EMR system that can distribute important clinical information to any location in real-time is essential and should not be viewed as a luxury.

Finally, we need to consider compliance and self-regulation. Compliance is often seen as a retrospective analysis of past performance and normally covers a standard reporting period. This simple and outdated view of compliance is no longer appropriate in today’s healthcare climate. Compliance needs to be active, monitored, and measured in real-time and as close to the patient as possible. The EMR system should also support the self-regulation process. The system should allow the specialty area to self-regulate the compliance performance of Care Profiles, departments, and individuals within a clinical area. Without self-regulation there is no knowledge of improvement.

In summary, with budgetary and economic concerns there will always be the debate as to whether the adoption of new technologies outweighs the expenditure. The adoption of a full EMR system is no different. What we do know is that combining the collection of data and accessibility to data in real-time within a clinical culture of quality and process improvement will ultimately lead to a substantially improved return on investment for both the hospital and its patients.

(Steve Turner has been involved in the development of EMR systems for clinical specialties for 5 years and has been an advocate for the development of products that are easy to use, intuitive, and require minimal training. He has personally worked extensively in the field with clinicians to ensure that Spectrum Medical’s products add value to the patient care process.)
The Academy Returns To The Royal Orleans Hotel

The very first meeting of The Academy was held at the Royal Orleans Hotel in New Orleans in January 1980. The Academy now returns to the Omni Royal Orleans Hotel for the 33rd Annual Seminar.

*Taken from A Brief History of the American Academy of Cardiovascular Perfusion*

One cannot talk about the beginnings of The Academy without mentioning Thomas G. Wharton. Thomas Wharton was not a perfusionist but a friend of perfusion in the true sense of the word. He worked for Travenol Laboratories for sixteen years starting in 1958. Tom then started his own company, Human Resources, Inc. During this time he served as the first Executive Director of the Journal of Extracorporeal Technology, the Executive Director of the American Society of Extracorporeal Technology (1977) since the organization was given over to full time management from the outstanding volunteer work done by Ed and Audrey Berger and the Executive Director of the American Board of Cardiovascular Perfusion. In 1978, Tom moved to California accepting the position of Product Manager of tubing packs for William Harvey Research Corporation.

Thomas Wharton believed in perfusion as a career and a profession. He also believed in formal education for the perfusionist. In the summer of 1979, Tom handed Earl Lawrence from Birmingham, Alabama, $2000.00 and told him to "go out and start that organization of professional perfusionists that we all need." That is how this Academy was founded.

Tom was a person that was truly dedicated to perfusion education and the perfusion profession. He understood the needs and desires of the perfusion community. Unfortunately while driving to work that fall, Tom had a heart attack and died. He never witnessed the formation or attended the first meeting of this society he was so instrumental in forming.

Many individuals, not just Tom, had worked hard for many years to try to focus a professional organization toward the single goal of education. The creation of The American Academy of Cardiovascular Perfusion was the culmination of those efforts.

Charlie Reed somewhat plagiarized the Constitution and By-Laws of the AATS and the Society of Anesthesiology, with a few modifications, to develop a Constitution that would hold all members accountable to the single purpose of The Academy –

ARTICLE II. PURPOSE
Section 1. The purpose of The Academy shall be to encourage and stimulate investigation and study which will increase the knowledge of cardiovascular perfusion, to correlate and disseminate such knowledge.

Section 2. To attain this purpose, The Academy shall hold at least one scientific meeting every year in which free discussion shall be featured;
shall conduct a Journal for the publication of presentations presented at the meeting, and other acceptable articles; and shall undertake such other activities as the Council or The Academy as a whole may decide.

In less than six months in 1979: The Academy was incorporated; established its 24 Charter Members; appointed interim officers and Council; developed sponsorship; established a financial structure; secured a hotel and arrangements for a meeting; secured papers for presentations; developed panel discussions; and very successfully held its’ first meeting at the Royal Orleans Hotel in New Orleans in January, 1980. We also recorded all discussion during the meeting for later transcription and inclusion in The Proceedings. Joanie Vance, a part time secretary, transcribed all of the discussion word by word from the tapes – what an unbelievable effort. The only discussion not published by design was probably one of the very best panel discussions we have ever had – Perfusion Accidents. We swept the hotel for lawyers, locked the doors to the meeting room, and had a fabulously frank discussion about disasters. This set the tone for all future programs, and the ability to deal with any and all topics necessary.

AACP Charter Members

Billy Joe Applegate  
Jarman Baxter  
Richard Berryessa  
Michael Burgess  
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Albert S. Dearing  
Frank S. Delgado  
Jeri L. Dobbs  
J. Crockett English  
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Charles C. Reed  
Jerry W. Richmond  
Rick Russell  
Ronald J. Slaugh  
Dennis R. Williams
Scientific Papers to be Presented at the 33rd Annual Seminar

Women in Perfusion Survey 2011
Brewer ST, Mongero LB

The Heparin Recall Of 2008
Kelly D. Hedlund, D. Michael Sanford

A Systematic Evaluation Of The Core Communication Skills Expected Of A Perfusionist
Melchior RW, Rosenthal T, Schiavo K, Frey T, Rogers D, Patel J, Holt DW

Donation After Cardiac Death: New Application For Extracorporeal Membrane Oxygenation
S. Riazati , R. Chan

First US Experience With Cardiohelp: Miniature Heart-Lung Machine, ECMO Transport To Operating Room Conversion
Brewer M, Lopez H, Beck JR, Mongero LB, Bacchetta M

Case Series: Unique Portable Heart Lung Machine For Transport And Long Term Extracorporeal Life Support

Case Report: Separate Circulation Patterns With Femoral-Femoral Cannulation Technique In VA ECMO Resulting In Severe Metabolic Alkalosis
Apsel D, Beck J, Takayama H, Mongero LB

Thromboelastography During Extracorporeal Membrane Oxygenation: Case Patterns
Jeffrey B. Riley

Intraoperative Washing Of Stored Red Blood Cells
Trevor Smith, William Riley, Richard Kaufman, Daniel FitzGerald

Coagulation Factors And Platelet Function In The Final Product Of A Novel Modified Ultrafiltration Device For Recovering Extracorporeal Circuit Residual Blood
Mark H. Yazer

Clinical and Biochemical Outcomes for Additional Mesenteric and Lower Body Perfusion During Hypothermic Arrest for Complex Total Aortic Arch Replacement Surgery
Philip Fernandes, Andrew Cleland , Corey Adams , Michael W. A. Chu

Cardiac Power Output, Its Role In Defining Heart Failure For Future Mechanical Circulatory Support
Seana G. Hall, Douglas Larson

Intimal Hyperplasia
Benjamin Mills, Douglas Larson

Clinical Concepts And Treatment For Cold Agglutinin On Cardiopulmonary Bypass
Stephen Miklas, William DeBois, Richard Chan

Development Of A Training Video For Massive Air Embolism
Joseph J. Sistino

Sub-Atmospheric Venous Line Pressure Leads To Degassing And Resultant Arterial Gaseous Microemboli: An In Vitro Study
Antoine P. Simons, YM Ganushchak, R van den Hazel, PW Weerwind, JG Maessen

A Clinical Evaluation Of The Maquet Quadrox-I Neonatal Oxygenator With Integrated Arterial Line Filter
Richard M. Ginther, Jr., Ronald Gorney, Roger Cruz

Clinical Evaluation Of Air Handling In Pediatric Cardiac Surgery
Serdar Gunaydin, Yusuf Yalcinbas, Tayyar Sarioglu

Air Bubble Detector Placement In The CPB Circuit: A 2011 Cross Sectional Analysis Of Certified Clinical Perfusionists
Tyler Kelting, Edward Darling
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Important Academy Dates

The ACADEMY ANNUAL MEETING DEADLINES

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Others Meetings

Cardiology 2012
Loews Portofino Bay Hotel at Universal Orlando
Orlando, Florida
February 22-26, 2012
Website: www.chop.edu/cardiology2012
Contact: Tami Rosenthal 267-425-6588

19th Annual WPS Spring Conference of the Wisconsin Perfusion Society
Glacier Canyon Lodge, Wisconsin Dells, WI
April 20-22, 2012
Website: www.wisperfusion.org
Abstracts to: wisperfusion@gmail.com