

## From the Editor

### Variation is Opportunity!

Wide variation in cardiopulmonary bypass (CPB) practice exists across cardiac centers. This variation, to some extent, may be related to cultural attributes such as local practice patterns, the practices at the institution where clinicians obtained their training, and historical preference. New techniques, although of varying effect and quality of investigation, are reported in the peer-reviewed literature frequently. The pace with which effective techniques are adopted is variable. Clinicians have a moral obligation to examine the care that they provide to patients and determine how well that care compares to the current best and available evidence. Such evidence may be in the form of meta analyses, randomized trials, and well designed cohort studies. The clinical community may benefit from the summarization of such evidence in the form of clinical practice guidelines.

Pronovost and colleagues (1) showed the tremendous value of implementing a simple bundle of proven practices related to central line placement that produced a significant reduction in infections, reduced costs, and mortality. According to Peter Pronovost, *“The fundamental problem with the quality of American medicine is that we’ve failed to view delivery of health care as a science. The tasks of medical science fall into three buckets. One is understanding disease biology. One is finding effective therapies. And one is ensuring those therapies are delivered effectively. That third bucket has been almost totally ignored by research funders, government, and academia. It’s viewed as the art of medicine. That’s a mistake, a huge mistake. And from a taxpayer’s perspective it’s outrageous”* (2).

Published guidelines, in part, address this need by providing a synopsis of a critical appraisal by experts of the peer-reviewed literature. Berry and colleagues (3) used the American Heart Association coronary artery bypass graft (CABG) guidelines, in a novel way, to drive out variation in their system by translating 20 evidence based guidelines related to CABG surgery into 40 measureable process variables in their cardiac program. This work resulted in improved trends: patient readmissions to the intensive care unit decreased from 2.9% to 0.9%, blood products usage decreased from 23.4% to 16.2%, and mean hospital charges were reduced by 5%. In 2007, the Society of Thoracic Surgeons (STS) and the Society of Cardiovascular Anesthesiologists (SCA) published a Clinical Practice Guideline for Perioperative Blood Transfusion and Blood Conservation in Cardiac Surgery. Their report was extensive and resulted in a number of specific recommendations. In this issue of the Journal we are pleased to publish a survey by Simon Body and colleagues, whose aim was to determine the impact of the STS/SCA guideline on local practice and how such guidelines might best be used locally to improve clinical practice. These sobering findings reflect a number of relevant aspects of the current practice, shedding light on: variable interpretation, lack of effective clinical microsystems, and disagreement with the finding summarized in the guidelines.



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Registries provide a useful means to measure care within one’s medical center, and may help to decrease the natural variation that exists across centers through appropriate and routine feedback to clinical units. Such examination may be used to validate or dismiss recent innovations. Measurement of both process variables and patient outcomes should be considered, as well as pre-operative patient and disease characteristics for risk adjustment. A registry may also be used to measure local adherence to published guidelines. Variation in outcomes across centers may be used to discover positive deviance that may be used to discover attributes of local practices that may be associated with superior care. In 2008 perfusionists from the Northern New England Cardiovascular Disease Study Group (NNECDSG) reported the rate of compliance to published guidelines from Shann and colleagues. The NNECDSG regional perfusion group has committed to track performance longitudinally around published recommendations and feed the information back to the centers (4). In areas where practice deviates from the evidence base, regional quality improvement projects are developed and implemented to reduce this gap. Regular reports are generated to examine this gap and to document improvement in performance and to also determine if the improvement is sustained. Such a registry and use of data has proven valuable for the assessment and improvement of care. The perfusion registry has been used to study the relationship between anemia and low cardiac output failure and mortality (5,6), for temperature management during CPB and adverse outcomes (7), and to assess the effectiveness of a regional quality improvement effort around temperature management during CPB (8).

Other prospective registries exist such as The New York State Department of Health (9) and the Society of Thoracic Surgeons (10). Historically, these registries have been invaluable tools for local performance improvement by providing participating centers with benchmarks for many outcome and process measures. Reports generated from these registries over the last two decades and subsequent performance improvement work are largely credited for the reduction in mortality secondary to CABG surgery. Unfortunately these registries do not contain specific information related to CPB

techniques. Recently the STS congenital database has been updated to include more variables related to CPB complications and CPB process variables (11).

The International Consortium of Evidence Based Perfusion (ICEBP) is piloting a perfusion registry in the state of Michigan with support from industry, Blue Cross and Blue Shield of Michigan, and the Michigan Society of Thoracic and Cardiovascular Surgeons. These data intend to be shared back to frontline clinicians in the form of reports to provide insight regarding a center's practice and outcomes while providing benchmark comparisons to identify best practices. The registry would lend to more of a sense of community within the perfusion profession and allow centers and individuals to learn from one another. At the outset, the ICEBP is choosing to concentrate the registry's data collection reporting on five areas of focus:

1. Patient demographics (to adjust for potential patient-level confounders)
2. Compliance with guidelines/recommendations on the practice of cardiopulmonary bypass (amend list as the ICEBP publishes guidelines)
3. Shed blood processing and filtration
4. Renal management
5. Factors influencing patients having low cardiac output subsequent to surgery

The registry's standard reports are being designed to answer three user questions:

1. How am I doing?
2. How do I compare to my colleagues (regionally, nationally, or internationally)?
3. Has my performance changed over time?

Once the registry matures, it will be possible to compare the effectiveness of various CPB systems. A registry of this scope will provide new knowledge about the science of healthcare delivery.

Also in this issue of the Journal, we are pleased to publish an invited editorial by Poullis and colleagues on a new standard reporting system for clinical trials that involve cardiopulmonary bypass, PERFSORT (Perfusion Standards of Reporting Trials). The aim of PERFSORT is to provide a means of standardizing the reporting of scientific studies in the literature that use CPB. Authors may register details related to their trials on PERFSORT. After such a submission, investigators will be provided with a statement of compliance akin to Consort (<http://www.consort-statement.org/>). The original data from the study will then be registered on the website and may be accessed electronically by readers. PERFSORT provides a standard method for authors to report the methods of their study ensuring uniformity in publications, clearly identifying variation in study methods, which could cause misinterpretation by readers.

Last September we published an invited editorial from Mongero and Palmer, *A Conversation with the Richmonds on their 30 Years of Service with the American Board of Cardiovascular Perfusion*. We were sad to learn of Mark Richmond's passing on December 20, 2009. Mark and Beth Richmond's work with the American Board of Cardiovascular

Perfusion established a standard, the Certified Clinical Perfusionist, that has reduced variation in the clinical competency of perfusionists. We are pleased to publish an "In Memoriam" in this issue of the Journal.

So then, how should we respond to the unwarranted variation that seems so prevalent in our field? Gerald T. O'Connor, an epidemiologist and professor at the The Dartmouth Institute of Health Policy and Clinical Practice, teaches that variation may be perceived as opportunity. According to Dr. O'Connor we should view this diversity of practice as opportunity, as natural experiments regarding the effectiveness of one's practice relative to another's.

The common thread, of the important work cited in this editorial, each investigator recognized the variation in their area of focus and seized the opportunity. Few understood variation as an opportunity better than Ernest Amory Codman who once wrote:

*"Every hospital should follow every patient it treats long enough to determine whether the treatment has been successful, and then to inquire 'if not, why not' with a view to preventing similar failures in the future"- Ernest Amory Codman 1914*

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## REFERENCES

1. Pronovost P, Needham D, Berenholtz S, Sinopoli D. An intervention to decrease catheter-related bloodstream infections in the ICU. *N Engl J Med*. 2006;355:2725-32.
2. Gwande, A. Annals of medicine: Reporting & essays. *The New Yorker*, December 10, 2007.
3. Berry SA, Doll MC, McKinley KE, Casale AS, Bothe A Jr. ProvenCare: Quality improvement model for designing highly reliable care in cardiac surgery. *Qual Saf Health Care*. 2009;18:360-8.
4. DioDato CP, Likosky DS, DeFoe GR, et al. Cardiopulmonary bypass recommendations in adults: The northern New England experience. *J Extra Corpor Technol*. 2008;40:16-20.
5. DeFoe GR, Ross CS, Olmstead EM, et al. Lowest hematocrit on bypass and adverse outcomes associated with coronary artery bypass grafting. *Ann Thorac Surg*. 2001;71:769-76.
6. Surgenor SD, DeFoe GR, Fillingier MP, et al. Intraoperative red blood cell transfusion during coronary artery bypass graft surgery increases the risk of postoperative low-output heart failure. *Circulation*. 2006;114:I43-8.
7. DeFoe GR, Krumholz CF, DioDato CP, et al. Lowest core body temperature and adverse outcomes associated with coronary artery bypass surgery. *Perfusion*. 2003;18:127-33.
8. Craig S, Warren MS, CCP. Variation in Arterial In-flow Temperature—A Regional Quality Improvement Project. Presented at the International Consortium for Evidence Based Perfusion Conference, October 4-6, 2007, Montreal, Quebec, Canada.
9. New York State Department of Health. Adult cardiac surgery in New York State 2003-2005. March 2007. Available at: [http://www.health.state.ny.us/statistics/diseases/cardiovascular/heart\\_disease/docs/2003-2005\\_adult\\_cardiac\\_surgery.pdf](http://www.health.state.ny.us/statistics/diseases/cardiovascular/heart_disease/docs/2003-2005_adult_cardiac_surgery.pdf). Accessed May 25, 2010.
10. Grover FL. The Society of Thoracic Surgeons National Database: Current status and future directions. *Ann Thorac Surg*. 1999;68:367-73.
11. Shann KG, Giacomuzzi CR, Harness L, et al. Complications relating to perfusion and extracorporeal circulation associated with the treatment of patients with congenital cardiac disease: Consensus Definitions from the Multi-Societal Database Committee for Pediatric and Congenital Heart Disease. *Cardiol Young*. 2008;18:206-14.