# The Year in Cardiothoracic and Vascular Anesthesia: Selected Highlights from 2012

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**Cardiothoracic and vascular critical care has emerged as a subspecialty due to procedural breakthroughs, an aging population, and a multidisciplinary collaboration. This subspecialty now has a dedicated professional society, recently published guidelines, and plans for standardized certification. This paradigm shift represents a major collaboration opportunity for our specialty. The rise of evidence-based perioperative practice has produced a culture of large trials in our specialty to search for solutions to the challenging outcome questions. Besides the growth in the development of evidence, the consensus conference format and postpublication peer review have both emerged as effective processes for identifying the most relevant high-quality evidence.**

**The quest for best perioperative practice has highlighted the importance of teamwork at all phases of care with respect to transitions in care, blood component transfusion, and research misconduct. The emergence of ultrasound as a standard for central vascular access also has been emphasized in recent multisociety guidelines.**

**There also has been a paradigm shift in the management of patients with coronary artery disease. Recent guidelines have emphasized the roles of the cardiac anesthesiologist and the interventional cardiologist as part of the heart team approach. Major recent trials in comparative effectiveness have challenged the advantages of percutaneous coronary intervention, off-pump coronary artery bypass surgery, and intra-aortic balloon counterpulsation. The year 2012 has witnessed the emergence of new paradigms of care in our specialty with the emphasis on teamwork, safety, and quality. These processes will further improve perioperative outcome.**



***KEY WORDS: cardiothoracic and vascular critical care, guidelines, evidence-based perioperative practice, patient safety, comparative effectiveness, ultrasound, perioperative protocol, transition of care, bleeding, transfusion, scientific misconduct, research fraud, vascular access, coronary artery disease, percutaneous coronary intervention, coronary artery bypass grafting, intra-aortic balloon counterpulsation, percutaneous left ventricular assist device, heart team approach, international consensus, postpublication peer review, randomized trials***

THIS ARTICLE IS THE fifth in the annual series for the Journal of Cardiothoracic and Vascular Anesthesia.[1] The authors thank the editor in chief, Dr Kaplan, for the opportu nity to continue this series, namely the research highlights of the year that pertain to the specialty of cardiothoracic and vascular anesthesia. The introduction of this article outlines the major themes selected for the year 2012, each of which is then reviewed in detail in the main body of the article.

The literature highlights in our specialty for 2012 begin with the emergence of cardiothoracic and vascular critical care as a subspecialty. This transformation has occurred due to multiple processes, including advances in surgical procedures, caring for the ageing population, and the effect of the multidisciplinary collaboration. This subspecialty now has a dedicated profes sional society, recently published guidelines, and plans for standardized certification. This paradigm shift in the periopera tive approach to the acute care of our patients represents a major collaboration opportunity for our specialty, in keeping with the heart team concept in the management approaches to coronary artery disease, transcatheter aortic valve implantation, and valve repair.

The second major theme in our specialty for 2012 has been the rise of evidence based perioperative practice. There is a move to a culture of large trials to search for solutions to the most challenging outcome questions. Besides the growth in the development of evidence, there is also growth in the processes for identifying the best evidence with respect to quality and relevance. Global discussion and review of the evidence in a consensus conference format has emerged as a novel sorting

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*1053 0770/2601 0001$36.00/0*

*http://dx.doi.org/10.1053/j.jvca.2012.10.010*

mechanism. Furthermore, cardiothoracic and vascular anesthesiologists also serve as sentinel readers for postpublication peer review services to highlight the relevant evidence for the busy clinician.

The third major theme for 2012 is the search for best perioperative practice, as highlighted by the editorial series in the Journal for this year. The importance of teamwork at all phases of perioperative care of our patients was highlighted by the clinical utility of a standardized protocol for handoff of care from the operating room to the intensive care unit. In this regard, a multimodal perioperative transfusion protocol also was shown to change team culture and significantly reduce bleeding and transfusion rates. It remains the clinician's collaborative responsibility to identify and prevent research misconduct, as it seriously erodes best practice goals. Finally, the emergence of ultrasound as a standard in the conduct of central vascular access has been highlighted in the recent multisociety guidelines.

The final theme for 2012 is the ongoing revolution in the management approaches to patients with coronary artery disease. Recent guidelines have emphasized the roles of the cardiac anesthesiologist and the interventional cardiologist as part of the heart team approach. Major recent trials in comparative effectiveness have challenged the advantages of percutaneous coronary intervention, off pump coronary artery bypass surgery, and intra aortic balloon counterpulsation (IABP).

The themes selected for this highlights article have only sampled the advances in our specialty for 2012. Many significant advances in 2012 also have been discussed in the expert review section of the journal. The past year has witnessed the emergence of new paradigms of care in our specialty with the emphasis on teamwork, safety, and quality. These processes will further improve perioperative outcome.

## 1. THE EMERGENCE OF CARDIOTHORACIC AND VASCULAR CRITICAL CARE

The postoperative care of cardiothoracic and vascular surgical patients is often characterized by unique therapeutic considerations relating to the complex pathophysiology and associated complications.[2-5] The field of cardiothoracic and vascular critical care has broadened to include not only the care of patients undergoing traditional cardiac surgical procedures but also the care of patients undergoing minimally invasive and endovascular interventional procedures.[6] These newer procedures include transcatheter aortic valve replacement, minimally invasive valve surgery, and endovascular repair of the thoracic aorta, including the aortic arch.[7-11]

Besides unique pathophysiology and novel procedures, further challenges in cardiothoracic and vascular critical care include the following: the aging population; rapid recent progress in critical care concepts, pharmacology, and technology; the requirement for multidisciplinary management; recent focus on patient safety; and, recent trends to limit staff hours, leading to manpower shortages.[2-6] In recognition of these challenges, the Foundation for the Advancement of Cardiothoracic Surgical Care was established to improve patient outcomes and comfort around the world through the training and development of professional critical care teams (full details available at www.factscare.org, last accessed on September 5, 2012).

Critical care entails the diagnosis and management of life threatening conditions that require intensive attention by a group of specially trained professionals. As such, it is a fundamental part of cardiovascular practice, including the coronary care unit.[12] In recognition of the rapidly changing care needs of patients with cardiothoracic and vascular disease, the American Heart Association recently published a scientific statement discussing the transformation of cardiovascular critical care.[12] In this important paper, an expert panel recognized the paradigm shift in cardiovascular practice due to population changes and the multiple advances in technology, medical care, training, and organization. The contemporary cardiothoracic and vascular critical care unit was defined as providing comprehensive critical care, given a population with complex disease and frequent severe comorbidities.[12] The expert panel defined 3 levels of cardiovascular care based on the following variables: patient population, monitoring technology, therapeutic technology, physician leadership, patient management, nursing personnel, education programs, and research activities. As an example, the level I cardiovascular critical care unit was characterized by a patient population with all cardiovascular conditions and most comorbidities, all invasive and noninvasive technologies, all therapeutic modalities, including mechanical cardiovascular support, leadership by a cardiac intensivist, high intensity patient management, a nursing director, and a commitment to research, training, and education.[12]

The scientific statement from the American Heart Association also explored various training model options for the future critical care of the cardiothoracic and vascular patients.[12] Furthermore, the American Board of Thoracic Surgery has announced plans to develop a critical care certification pathway for the perioperative care of cardiothoracic surgery patients.[12-14] The expert consensus document also recognized that a specialized cardiothoracic and vascular critical care unit may be integrated to care for both medical and surgical patients. This type of unit would likely be in a regional academic medical center organized in a collaborative multidisciplinary fashion, including anesthesiologists, cardiologists, cardiac surgeons, and intensivists to various degrees.[12-15] The role of cardiac anesthesiologists in the evolution of this new specialty remains controversial.[16-17] Cardiac anesthesiologists can contribute to meaningful outcome improvements in the delivery of cardiothoracic and vascular critical care.[18-19] The reality is that the train is leaving the station.[20-22] Our specialty should strongly consider maintaining and strengthening its involvement in this emerging specialty that is so integral to the optimal performance of a cardiovascular service line. Cardiothoracic and vascular anesthesia includes the perioperative care of our patients. The paradigm shift in postoperative critical care of our patients is a leadership opportunity once again for cardiac anesthesiologists, in keeping with the 'heart team concept' sweeping through our specialty, most recently in transcatheter aortic valve implantation and thoracic aortic dissection.[23-24]

## 2. THE RISE OF EVIDENCE BASED PERIOPERATIVE PRACTICE

There remains a necessity for further large randomized trials in our specialty as there are still not enough 'magic bullets', which is interventions that reduce perioperative mortality and