Evolution of CT Critical Care:

Systems Based Management, Training & Certification Implications

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Foundation for the Advancement of CTS Care
Disclosures

• No disclosures relevant to this presentation.

• Opinions are my own, based on 20 + years of practicing CVT surgery and critical care and my interpretation of the literature.
Perspective

Cardiovascular-Thoracic Surgeon
- Georgetown University 20 years

Cardiothoracic Surgical Critical Care
- George Washington University Medical Center
- Washington Institute of Thoracic and Cardiovascular Surgery

Development and Direction of the Conferences
- *Cardiovascular-Thoracic (CVT) Critical Care* 2009, 2010

Creation & Development of Non-Profit Educational Foundation: FACTS-Care
We could not be here, if it were not for our Mentors!
Dr. John W. Kirklin
Dr. John W. Kirklin

- Pioneer and Innovator in Cardiac Surgery
- Mentor for Cardiac Surgeons Around the World
- Unique Perspective
- Cardiac Surgery
  “Morphology, Diagnostic Criteria, Natural History, Techniques, Results, and Indications”
  by
  John W. Kirklin, MD &
  Brian G. Barratt-Boyce, KBE, MB, ChM
Kirklin Sayings

• “When you think things are very good, they are never quite as good as you think they are, but when you think things are very bad, they are never quite as bad as you think they are!”

• “We try for perfection, but Perfect is the Enemy of Good!”
Dr. Eugene Blackstone
Creative Researcher & Mentor
Dr. Kirklin – The Importance of Treating Low Cardiac Output in Infants & Small Children

Figure 5-3: The relationship of early postoperative cardiac output (average of all early postoperative values) to the probability of cardiac death in infants and small children. This graph suggests that convalescence cannot be considered normal in infants and small children unless cardiac output is about 2.0–2.2 l·min⁻¹·m⁻², somewhat higher than the value for adults.

Reproduced with permission from Stark et al. and the American Heart Association, Inc.
Mixed Venous $\text{PO}_2$
Postop in Infants & Small Children
Dr. Kirklin – The Importance of Treating Low Cardiac Output – MVR 4 hrs Postop
Dr. Kirklin – The Importance of Treating Low Cardiac Output – MVR POD 1 4am
Critical Care – A Core Component of Thoracic Surgery

The emerging specialty of cardiothoracic surgical critical care: The leadership role of cardiothoracic surgeons on the multidisciplinary team

Katz

Nevin M. Katz, MD

J Thorac Cardiovasc Surg 2007; 134: 1109 - 11
Definition of Thoracic Surgery by American Board of Thoracic Surgery

- THORACIC SURGERY ENCOMPASSES THE OPERATIVE, PERIOPERATIVE, AND SURGICAL CRITICAL CARE OF PATIENTS WITH ACQUIRED AND CONGENITAL PATHOLOGIC CONDITIONS WITHIN THE CHEST. INCLUDED ARE …
CT Critical Care: An Emerging Specialty

- Unique Body of Knowledge
- Unique Therapeutic Modalities and Procedures
- Unique Complications and Associated Treatments
- Team of Professionals Dedicated to the Care of the Patients
Multi-Disciplinary Team Dedicated to the Critical Care of CT Patients

- Cardiothoracic Surgeons
- Interventionalists
- Anesthesiologists & Intensivists
- Critical Care Nurses & Nurse Practitioners
- Physician Assistants
- Perfusionists
- Pharmacists
- Respiratory Therapists
Challenges of CT Critical Care: Acuity

Trend: Increased Acuity of the Patients Treated with Major Procedures

- Older
- More Associated Medical Conditions
- More Advanced Cardiac Disease
  - Acute MI’s, CHF, Cardiomyopathies, Arrhythmias
- More Advanced Pulmonary Disease
- More Advanced Esophageal Disease
Challenges: New Monitoring Technology

- Hemodynamic Monitoring
- Bedside Echocardiography & Ultrasound
- Perfusion Monitoring
- Cerebral / Sedation Monitoring
- Point of Care Laboratory Analyses
Challenges: New Therapeutic Technology

- **Minimally Invasive Surgical Technology**
  - Peripheral Perfusion Systems
  - Off Bypass Surgery
  - Percutaneous Interventions
  - VATS / Robotic Surgery

- **Maximally Supportive Critical Care Technology**
  - Advanced Ventilation Systems
  - ECMO
  - VAD’s
  - Continuous Renal Replacement Therapy
Challenges: Advances in Pharmaceuticals

- New Agents
- Extended Applications of Standard Agents
- New Combinations of Agents to Achieve Synergistic Effects
Challenges: Advances in Pharmaceuticals

Examples - Extended Applications / New Agents:

- Amiodarone
- New Generation Antibiotics / Antifungals
- Argatroban
- Clevidipine
- Clopidogrel
- Conivaptan
- Dexmedetomidine
- Fondaparinux
- Levosimendan
- Neseritide
- Nicardipine
- Nitric Oxide
- Pantoprazole
- Sildenafil
- Vasopressin
Challenges: Coordination of the Team

Optimal Care is dependent on Members of the Multi-Disciplinary Team

• “Being on the Same Page”

• Sharing a Broad Understanding of the Inherent Complexities of the Specialty
A Growing Crisis

- Despite medical progress, there is a **growing crisis** due to a **shortage of professionals** trained in CT Critical Care

  - Surgical Resident Coverage Restricted by the 80-hour work-week
    - Predominant time spent in the OR
  - “Revolving-Door” Phenomenon
    - Rapid turnover in CVT Critical Care personnel
    - Challenge of training newly-recruited staff
Important New Trend: Merging of Specialties

Cardiovascular – Thoracic Surgery
Interventional Cardiology
Vascular Surgery
Interventional Radiology
Effect of this Merger on Critical Care

Broadening of the Field to include Care of Patients undergoing:

- Conventional Cardiac & Thoracic Surgery
- Minimally Invasive Cardiothoracic Surgery
- Percutaneous Implantation of Cardiac Valves
- Endovascular Procedures
  - Aortic and Peripheral Vascular Stenting
- Hybrid Procedures
Cardiothoracic Surgical Critical Care 2008

Multi-Disciplinary Synergy & Innovation to Increase Clinical Precision, Effectiveness, Safety and Patient Comfort
Cardiovascular-Thoracic (CVT) Critical Care 2009

Latest Protocols, Technology & Practical Pharmacology to Increase Speed of Recovery, Quality & Patient Comfort
Cardiovascular-Thoracic (CVT) Critical Care 2010

Innovative Concepts, Protocols, & Technology To Increase Speed of Recovery, Quality & Patient Comfort
Goals of CVT Critical Care

- Facilitate a Rapid Recovery
- Prevent or Effectively Treat Complications
Proactive vs Reactive Approach

Challenge of a Proactive Approach to CVT Critical Care

- Anticipate Major Changes and Complications
- Intervene Early to Minimize Effect on Outcome

Key is Monitoring, Detection, and Response
Format for CVT Critical Care

Problem Oriented Method
  • “A Basic Tool” in Medicine

Vs

System-Structured Method
Experience with 220 Patients at the MGH Reported

System-Structured Management of Acutely Ill Surgical Patients
An Alternative to the Problem-Oriented Method

Nevin M. Katz, MD, Leslie W. Ottinger, MD

The management of surgical patients requiring intensive care is complicated by abnormalities in multiple body systems. An effective method of organizing data collection and treatment is essential. The widely applied “problem-oriented” approach is not entirely satisfactory in the context of surgical intensive care.

Although the problem-oriented method is a variety of clinical setting some and inadequate for...
30 Years Later

- Expanded Challenges of Critical Care
- Explosion of Clinical Information at a Higher Velocity
- Advanced Information Technology now Available
Present Day Solution

System-Structured, Issue-Oriented Management

Using Advanced Information Technology
CVT Surgical & Interventional Procedures Potentially Affect All Body Systems

- CV
- Respiratory
- Renal
- GI
- Neurologic
- Musculoskeletal
- Dermatologic
- Hematologic
- Metabolic
- Microbiologic
System-Structured, Issue-Oriented Approach

- Data Organization:
  - "System-Structured Profile" or "SSP"
  - Flowchart or Flowcard to Define Time Course

- Definition of the Clinical Situation:
  - "Issues"

- Dx’ic and Rx Plan for Each Issue
### Critical Care Flowcard: System-Structured Profiles Over Time

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**Name**: Critical Care Flowcard

© 2005 Nevin Katz MD
Present Day Example

Patient Undergoing Heart Surgery Using Cardio-Pulmonary Bypass
Cardio-Pulmonary Bypass Affects All Body Systems

- Cardiovascular
- Respiratory
- Renal
- GI
- Neuro
- Musculoskeletal
- Dermatologic
- Hematologic
- Metabolic
- Microbiologic
Multi-System Issues Associated with Major CVT Procedures

**Cardiovascular**
- Hemodynamics / Need for Circulatory Support
- Volume Replacement / Fluid balance
- Vasomotor Changes - Rx Hypertension / Hypotension
- Arrhythmias – Atrial fibrillation, Ventricular arrhythmias, A-V Block
- Detection of Surgical Complications

**Respiratory**
- Mechanical Ventilation and Weaning from Support
- Prevention / Rx of Pulmonary Edema, Acute Lung Injury, Pneumonia

**Renal**
- Prevention / Rx of Acute Renal Failure while supporting hemodynamics and minimizing pulmonary dysfunction
- Management of Renal Replacement Therapy
Multi-System Issues Associated with Major CVT Procedures

**GI**
- Provision for Nutritional Support
- Prevention of GI Complications

**Neurologic**
- Dx / Rx Delirium, Cerebral Ischemia, CVA’s, and associated edema
- Sedation / Effect of Dysfunction on Ventilatory Management

**Musculoskeletal / Dermatologic**
- Mobility / Effect on Respiratory Function
- Integrity of Skin / Underlying Tissues
Multi-System Issues cont’d

Hematologic
- Rx of Coagulopathies
- Anticoagulation / Anti-platelet Therapy
- Decisions about Reoperation
- Blood Conservation / Decisions about Transfusion
- Prevention of Deep Venous Thrombosis / Pulmonary Emboli

Metabolic
- Glycemic Control
- Rx Electrolyte Abnormalities
- Dx / Rx Adrenal Insufficiency

Microbiologic
- Prosthetic, blood stream and wound infections
AATS/STS Postgraduate Course
Critical Care

- CV: Hemodynamic Monitoring & Targets / Hemodynamic Simulation
- CV: Arrhythmia Management
- CV: Circulatory Assist Devices / ECMO
- CV: Aortic Surgery / Hybrid Procedures / TEVAR Considerations
- Resp: Advanced Ventilator Management
- Resp: ECMO / Artificial Lung
- Resp: Lung Transplant Perioperative Care
- Renal: Acute Renal Failure / Renal Replacement Therapy
- Neuro: Sedation / Delirium
- Neuro: Neuro Complications after Cardiac & Aortic Surgery
- Hematologic: Bleeding & Management of Coagulopathy
- Metabolic: Nutritional Support & Its Impact
- Microbiologic: Infection Prophylaxis & Prevention
Training & Certification
Cardiothoracic Critical Care:

Considerations Regarding Certification by the American Board of Thoracic Surgery

Nevin M. Katz, M.D.

Chicago, June 7-8, 2008
Cardiothoracic Surgical Critical Care has Evolved into a Specialty
Earlier Model of CT Critical Care

- CT Surgeon directs the Critical Care.
- CT Surgeon, His/Her House Staff, PA’s and Critical Care Nurses perform most of the care.
- Critical Care is learned during Residency and in Clinical Practice
Today – CVT Critical Care is Performed By A Multi-Disciplinary Team

- Anesthesiologists
- Cardiothoracic Surgeons
- Critical Care Nurses
- Critical Care Physicians
- Nurse Practitioners
- Perfusionists
- Pharmacists
- Physician Assistants
- Physician Sub-Specialists
- Respiratory Therapists
CVT Critical Care – Recognized as a Specialty

- Unique Body of Knowledge
- Unique Procedures & Modalities
- Unique Complications

- Care Provided by a Multi-Disciplinary Team

- Newly formed: International Society for CTS Critical Care

- Cardiovascular - Thoracic (CVT) Critical Care Conferences
The Cardiothoracic Surgeon has a Leadership Role on the Multi-Disciplinary Team
Leadership Role of the CT Surgeon

- Critical Care is inherent to the specialty of CT surgery.

- Surgeons have the best understanding of the procedures performed and the potential complications for a particular patient.

- Physician assistants have an expanded role in the CT ICU and work closely with CT Surgeons.

- The Patient “places his/her life in the surgeon’s hands.”
Development of CVT Critical Care from Within CT Surgery

- CVT Critical Care Conferences:

- Creation of a Non-Profit Educational Organization:
  FACTS-Care

- Launch of the
  International Society for CTS Critical Care
CVT Critical Care Conferences

Endorsed by:

• American College of Chest Physicians
• Society of Critical Care Medicine

• Society of Thoracic Surgeons
  • Legislation passed in 2007 leading to
  • CTS CC 2007 being the first non-corporate conference to be endorsed.

• American Association for Thoracic Surgery
  • 2010
AATS / STS Members on Conference Faculties

- Pendleton Alexander
- Robert H. Bartlett
- Gerald D. Buckberg
- Nelson A. Burton
- Edward P. Chen
- John V. Conte
- Philip C. Corcoran
- Joseph A. Dearani
- William E. DeVries
- Mathew A. Facktor
- Farid Gharagozloo
- Bartley P. Griffith
- Jonathan W. Haft
- Keith A. Horvath
- Nevin M. Katz
- Frederick C. Lough
- John M. Luber
- Bruce W. Lytle
- Douglas J. Mathisen
- Marc Margolis
- Farzad Najam
- J. Scott Rankin
- James D. Rawn
- Gary L. Roth
- Lars G. Svensson
- Glenn Whitman
New FACTS-Care Web Site
www.facts-care.org

Building to be a “Portal to CVT Critical Care

- Links with AATS and STS Web Sites
- Online Education: FACTS-Care & Links to Other Programs
- Future FACTS-Care Events: Details & Registration
- Job Opportunities / Availabilities
- Forum
The Changing Practice of Critical Care as a Hospital Specialty:

Impact on CT Surgery
New Hospital Issues

- Role of the Patient’s CT Surgeon in the ICU
- Acceptance of CT Surgeons as Intensivists in CT ICU’s
- Need for Certification of CT Surgeons Specializing in CTS Critical Care
- Reimbursement for “Unbundled” CT Critical Care for Associated Conditions
  - By CT Surgeons
  - By Intensivists
Considerations by the American Board of Thoracic Surgery
With CT Critical Care being Recognized as a Core Component of Thoracic Surgery:

- Should the ABTS provide certification in CT Critical Care?
  - What criteria should be used?
  - For whom?
CT Critical Care Certification Criteria

Based on Educational Resources

- Clinical Experience
- Fellowships in CT Critical Care
- CT Critical Care Training Courses
- CT Critical Care Continuing Education Conferences
For Whom Should the ABTS Consider Certification in CT Critical Care?

Potential Candidates for Certification:

- New Graduates of CT Residencies
- Graduates of CT Critical Care (Subspecialty) Fellowships
- CT Surgeons Specializing in CT Critical Care
New Graduates of CT Residencies

- Residency includes Supervised ICU Experience

- Criteria to be Defined:
  - Specified Amount of Clinical Experience
  - Examinations include Questions on CT Critical Care
Graduates of CT Critical Care Fellowships

- Subspecialty Fellowship of 12 months
- Criteria to be Defined:
  - Number of Months (e.g. 6) of Dedicated Supervised CT ICU Experience
  - Number of Patients
  - Graduation from the Fellowship
  - Passing Grade on Examination
CT Surgeons Specializing in CT Critical Care

• Demonstration of Specialized Experience and Training in CT Critical Care

• Criteria to be Defined:
  • Specified Amount of Clinical Experience
  • Continuing Education Activities
    • Training Courses
    • Conferences
  • Examination on the Specialty of CT Critical Care
Summary

CVT Critical Care is a Core Component of Thoracic Surgery
- As defined by the ABTS

CVT Critical Care has Evolved into a Specialty and can be viewed as a Subspecialty of Thoracic Surgery requiring specialized training.
Summary

CVT Critical Care: An Emerging Specialty

- Unique Body of Knowledge
- Unique Therapeutic Modalities and Procedures
- Unique Complications and Associated Treatments
- A Multi-Disciplinary Team of Professionals Provides the Critical Care of CVT Patients
The CT Surgeon has a leadership role on the multi-disciplinary team.
Summary

A Useful Format for CVT Critical Care is:

System-Structured, Issue-Oriented Management Using Advanced Information Technology
Decisions about Certification by the ABTS involve:

- Defining the Curriculum or Scope of CVT Critical Care
- Determining For Whom Certification Should Be Provided
- Setting Up Criteria for the Specific Certifications
Cardiovascular-Thoracic (CVT) Critical Care 2010

Thurs Sept 30 – Sat Oct 2, 2010
Omni Shoreham Hotel
Washington, DC

www.facts-care.org