Education and Training: How and who should be trained for a future in transcatheter valve therapies?

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Interventional Cardiology and Structural Heart Disease
Disclosures

Research grants: AHA, Siemens Healthcare
The CMS National Coverage Determination (NCD) outlines volume qualifications for new TAVR physicians.

### Hospital Requirements

<table>
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<tr>
<th>Requirement</th>
<th>Details</th>
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<tr>
<td>≥ 50 total AVRs</td>
<td>In the previous year prior to TAVR, including ≥ 10 high-risk patients</td>
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<tr>
<td>≥ 2 physicians</td>
<td>With cardiac surgery privileges</td>
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<tr>
<td>≥ 1,000 catheterizations/Year</td>
<td>Including ≥ 400 PCIs/Year</td>
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### Physician Requirements

#### Cardiac Surgeon

- ≥ 100 career AVRs incl. 10 high-risk patients; or
- ≥ 25 AVRs in one year; or
- ≥ 50 AVRs in 2 years, including at least 20 AVRs in the year prior to TAVR initiation

#### Interventional Cardiologist

- ≥ 100 structural heart procedures lifetime; or
- ≥ 30 left-sided structural procedures per year of which 60% should be BAV

http://www.cms.gov
The CMS NCD outlines volume qualifications for new transcatheter mitral repair physicians

**Hospital Requirements**

≥ 25 total mitral valve surgeries in the previous year, including ≥ 10 MV Repairs

+ ≥ 2 physicians with cardiac surgery privileges

≥ 1,000 catheterizations/Year including ≥400 PCIs/Year

**Physician Requirements**

**Interventional Cardiologist**

>50 structural heart procedures annually including ASD/PFO closure and trans-septal punctures

**Cardiac Surgeon**

Same?

http://www.cms.gov
Are these requirements adequate?

- Case volume may not reflect technical proficiency given the diversity of SHD procedures.
- Case volume does not provide insight into the knowledge of patient assessment/management skills.
- Skills learned from prior procedures/surgeries may not translate to readiness for transcatheter valve interventions.
- Unclear what role the criteria assume the operator will play.

Procedural volume has been the primary concern of new operators.

Have sought OUS & mini-fellowship training programs or initiated basic SHD programs to build case volume.
Structural Heart Interventions

- Device closure: ASD, VSD, PDA, PFO
- Transseptal catheterization
- Coronary sinus catheterization
- Intracardiac echocardiography
- Pulmonary artery angioplasty/stenting
- LAA occlusion
- Septal ablation
- Foreign body retrieval devices
- Wire exteriorization
- Embolization: coils, vascular plugs
- Dry pericardial entry
- Pericardiotomy / pericardial biopsy
- Large bore vascular access/ closure

- Complex ACHD catheterization
- Baffle, conduit stenting
- Aortic coarctation
- Transcatheter valve interventions
  - Valvuloplasty: Aortic, mitral, pulmonic, tricuspid
  - Transcatheter valve replacement: mitral, pulmonic, ViV
  - Transcatheter valve repair: mitral leaflet & annuloplasty, tricuspid repair
  - Paravalvular leak closure
For every structural intervention, one must understand disease-specific:

- 3D anatomic relationships
  - Normal anatomy
  - Pathologic variants
- Hemodynamics
- Noninvasive imaging
  - TTE, TEE, 3D TEE
  - Cardiac CT
  - Cardiac MR
- Clinical management options
- Surgical alternatives / techniques

- Device options
- Patient selection
  - Procedural efficacy/limitations
  - Indications for intervention
  - Surgical risk assessment: STS, frailty, anatomic concerns
  - Complications of therapeutic options
- Pre- / Post-procedure care
Who do we want doing these procedures?

- Expansion to lower risk patients
- Evolution to include more complex anatomy (mitral/pulmonic/tricuspid)
- Expanding number of devices and techniques
The ideal?

Knowledge Transfer Station

Attg CTS
Structural IC/CTS
Attg IC
TCT for Surgeons course will highlight hybrid surgical and interventional techniques

Emerging Directions for the Cardiothoracic and Vascular Surgeon' to be co-sponsored by the American Association for Thoracic Surgery

CARDIOVASCULAR RESEARCH FOUNDATION

Cardiologists should have basic surgical skills training

Ali Khavandi,¹ Stephen Hamilton,² Adam Fitzpatrick,³ David J Wright,⁴ Michael Lewis,⁵ Alun Harcombe,⁶ Edward Rowland⁷

Heart May 2010 Vol 96 No 10
The SCAI Structural Heart Disease Council: Toward Addressing Training, Credentialing, and Guidelines for Structural Heart Disease Intervention

Ted Feldman,¹ MD, FACC, FSCAI, Carlos E. Ruiz,² MD, PhD, FACC, FSCAI, and Ziyad M. Hijazi,³ MD, FACC, FSCAI

Interventional Fellowship in Structural and Congenital Heart Disease for Adults

Carlos E. Ruiz,¹ MD, PhD, FACC, FSCAI, Ted E. Feldman,² MD, FACC, FSCAI, Ziyad M. Hijazi,³ MD, FACC, FSCAI, David R. Holmes, Jr.,⁴ MD, FACC, FSCAI, John G. Webb,⁵ MD, FACC, FSCAI, E. Murat Tuzcu,⁶ FACC, FSCAI, Howard Herrmann,⁷ MD, FACC, FSCAI, and Gerard R. Martin,⁸ MD, FACC

Results of the Society of Cardiac Angiography and Interventions Survey of Physicians and Training Directors on Procedures for Structural and Valvular Heart Disease

Howard C. Herrmann,¹ MD, FACC, FSCAI, Sandra Baxter,² PhD, Carlos E. Ruiz,³ MD, PhD, FACC, FSCAI, Ted E. Feldman,⁴ MD, FACC, FSCAI, and Ziyad M. Hijazi,⁵ MD, FACC, FSCAI, on behalf of the SCAI Council on Structural Heart Disease
Structural Heart Disease Training Programs

- 86% of programs perform SHD interventions
- Most (52%) integrate structural interventions into 1 or 2 year IC fellowship programs
- Several programs with “advanced IC” training programs that focused on structural and peripheral arterial interventions
- Only 29% offer focused 1 year training in structural heart disease

- None are ACGME accredited
Structural Heart Disease Training Programs

- **Banner - University Medical Center - Phoenix, Arizona**
- Scripps Clinic - La Jolla, California
- University of California - San Diego, California
- Yale University School of Medicine - New Haven, Connecticut
- University of Miami Miller School of Medicine - Miami, Florida
- Prairie Heart Institute - Springfield, Illinois
- Ochsner Medical Center - New Orleans, Louisiana
- Johns Hopkins Hospital - Baltimore, Maryland
- University of Maryland - Baltimore, Maryland
- Massachusetts General Hospital - Boston, Massachusetts
- Henry Ford Hospital - Detroit, Michigan
- William Beaumont Hospital - Royal Oak, Michigan
- Mayo Clinic - Rochester, Minnesota
- **Minneapolis Heart Institute® at Abbott Northwestern Hospital - Minneapolis, Minnesota**
- University of Minnesota - Minneapolis, Minnesota
- Washington University - St. Louis, Missouri
- Dartmouth-Hitchcock Medical Center - Lebanon, New Hampshire
- Rutgers Robert Wood Johnson Medical School - New Brunswick, New Jersey
- Duke University - Durham, North Carolina
- **Lankenau Medical Center - Wynnewood, Pennsylvania**
- Brown Medical School - Providence, Rhode Island
- Methodist DeBakey Heart and Vascular Center - Houston, Texas
- Carilion Clinic - Roanoke, Virginia
- University of Washington - Seattle, Washington

Out of 136 ACGME-accredited IC training programs.

**BOLD denotes IC and/or surgeons accepted**
Barriers to SHD Growth

- Lack of sufficient volume of patients
- Lack of sufficient training programs
- Lack of good treatments/devices
- Reimbursement issues
- Surgeon resistance
- Lack of transseptal skills
- Lack of hybrid OR
- Lack of certification or malpractice concerns
- Lack of adjunctive imaging
Attaining Proficiency

Marmagkiolos et al. Catheterization and Cardiovascular Interventions 2012;80:706
CT Surgical Training

- CT surgical trainees face similar problems to IC
Endovascular CT Surgical Training

- Few “formal” programs
- Mini 1 to 6 month fellowships in endovascular skills
- Travel overseas to gain hands-on exposure
- Most trainees develop customized training programs that include endovascular procedures
CT Surgery Training Pathways

Currently, there are three training pathways in cardiothoracic surgery:

- **Independent Programs** (Traditional Pathway — 5 years of general surgery, plus 2-3 years of cardiothoracic surgery residency)

- **Joint Thoracic/General Surgery Track** (Fast-track Pathway — 4 years of general surgery, plus 3 years of cardiothoracic surgery residency), all completed at one institution

- **Integrated Pathway** (I-6 — 6 years of cardiothoracic surgery residency)

http://www.tsda.org
Industry Leadership

Edwards

Medtronic

Abbott
TAVR Industry Training

1. Optional Online Modules
2. Product & Procedure Training
3. Case Observation
4. On-Site Heart Team Training
5. Case Planning & Expert Case Support
6. Continuing Education & Support
TAVR Industry Training

**DAY 1**
- Patient Screening: Defining the TAVR Patient
- TF Technology Overview
- Echocardiography and MDCT Screening Workshops
- Taped Live-Case TF
- Procedural Deep-dive Complication Mgt Complex Anatomy Best Practices

**DAY 2**
- Technology Overview
- Taped Live-Case TA
- Procedural Deep-dive Complication Mgt Complex Anatomy Best Practices
Take home
Potential solutions

- Focus on developing standardized & accredited training programs with clear objectives (ACGME & COCATS)
- Design training programs to provide a foundation for lifelong learning using evolving technologies
- Establish levels of SHD competency (basic/advanced)
- Increase availability and dependence on simulators for training
- Consider shift from case volume requirements to proficiency, especially in light of the requirement for multiple operators (IC and CTS)
- Foster greater cross-pollination between IC and CTS
- Centers (“and operators”) of excellence for 1st generation devices, more complex procedures (mitral), and perhaps more complex patients
Thank you!