Cardiothoracic Surgery Educational Milestones: How do they Fit in with Curriculum Development

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The Arthur B. and Patricia B. Modell Endowed Chair in Thoracic Surgery
The Johns Hopkins Medical Institutions
No disclosures or conflicts
What do you mean...Milestones?
Overview

- Review Milestones Project
- Development process
- Timeline
- Assessment tools
- Hints for integrating and prep for reporting
Thinks to think about....

- IT Support
- Reporting Mechanisms
- Clinical Competency Committee
- Assessment Tools
- Timeline
Next Accreditation System (NAS) Outcome Project Timeline

1999 - Outcome Project Begins

- General Competencies Defined
- Increasing emphasis on educational outcomes (vs. process)

2001 - Quadrads (Board, PD, RRC, Res) Convened

- Translate core competencies into specialty-specific competencies

2002-2008 – Implementation of 6 Competency Domains

- Residency programs expected to develop instructional and assessment methods for integrating the competencies in their curricula
- ACGME assessment “toolbox” developed

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Milestones: The next step in the Outcome Project

Dr. Nasca’s Seminal Column in May 2008 ACGME Bulletin

- Vows to achieve outcomes-based accreditation
- Introduces concept of milestones as part of the vision
- Frames the milestone development initiative as a specialty community effort
- Charge = each specialty to identify milestones of competency development

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Next Accreditation System (NAS) Outcome Project Timeline (Continued)

1999 - Outcome Project Begins

2001 - Quadrads (Board, PD, RRC, Res) Convened

Implementation of 6 Competencies

2009 – 2012 Milestone Development

• All specialties completed by 12/2012
• Pilot testing began

2013 & Beyond

• Large scale implementation of milestones for testing
• NAS launch ~ staggered approach (e.g. 4-5 specialties at first)

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ACGME Accreditation System

- The Next Accreditation System (NAS)
  - July 2013 for 7 specialties:
    - Emergency Medicine, Internal Medicine, Pediatrics, Neurological Surgery, Orthopaedic Surgery, Diagnostic Radiology, and Urology.
- Expected to do milestone evaluations every 6 months
- [http://www.acgme-nas.org/](http://www.acgme-nas.org/)
Milestones Defined

General Definition

• Skill and knowledge-based developments that commonly occur by a specific time

Milestone Project Definition

• Specific behaviors, attributes, or outcomes in the general competency domains to be demonstrated by residents by a particular point during residency
Milestones are a cornerstone of the new system and are meant to be progressive throughout the training of a resident.
Educational Milestones

- Measurement tools to assess educational outcomes
- Close collaboration of RRC, ABTS, TSDA, JCTSE and professional societies
- Assess the attainment of competency in a logical trajectory of professional development
- Composite Milestones data submitted semiannually, representing consensus of Clinical Competency Committee

**IT IS NOT AN ASSESSMENT TOOL**
Thoracic Milestone Participants

Advisory Board
- William Baumgartner
- John Calhoon
- David Fullerton
- John Potts
- Peggy Simpson
- Doug Wood
- Peggy Simpson (ACGME)
- Laura Edgar (ACGME)

Working Group
- Carolyn Reed/
  Walter Merrill (Chair)
- Andrea J. Carpenter
- Jim Fann
- Robert Higgins
- Rick Lee
- Tom Nguyen (TSRA)
- Ara Vaporciyan
- Tom Varghese
- Ed Verrier
- Cam Wright
- Steve Yang
Milestone
Ambulate without assistance

After medical school

Novice

The 5 Dreyfus Levels

Dreyfus SE, Dreyfus HL. A five-stage model of the mental activities involved in directed skill acquisitions. February 1980
## Milestone Description: Template

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the expectations for a beginning resident?</td>
<td>What are the milestones for a resident who has advanced over entry, but is performing at a lower level than expected at mid-residency?</td>
<td>What are the key developmental milestones mid-residency?</td>
<td>What does a graduating resident look like?</td>
<td>Stretch Goals – Exceeds expectations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>What should they be able to do well in the realm of the specialty at this point?</td>
<td>What additional knowledge, skills &amp; attitudes have they obtained?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Are they ready for certification?</td>
<td></td>
</tr>
</tbody>
</table>
Milestones are progressive over time. There is no prescribed speed.

Levels do not correspond to PGY or year in program.

<table>
<thead>
<tr>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the expectations for a beginning resident?</td>
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<td></td>
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</table>

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CT Surgery Milestones:  
**Evaluation by Core Competencies**

<table>
<thead>
<tr>
<th>Patient Care and Medical Knowledge</th>
<th>Medical Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

**General Competencies**

- **Professionalism** – Ethics and Values; Personal Accountability
- **Practice Based Learning and Improvement** – Learning; Research and Teaching
- **Interpersonal and Communication Skills**
- **Systems Based Practice** – Patient Safety; Resource Allocation; Practice Management

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# CT Surgery Milestones: Evaluation by Core Competencies

<table>
<thead>
<tr>
<th><strong>Patient Care and Medical Knowledge</strong></th>
<th><strong>Medical Knowledge</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischemic Heart Disease</td>
<td>Congenital Heart Disease</td>
</tr>
<tr>
<td>Cardiopulmonary Bypass, Myocardial Protection and Temporary Circulatory Support</td>
<td>End Stage Cardiopulmonary Disease</td>
</tr>
<tr>
<td>Valvular Disease</td>
<td></td>
</tr>
<tr>
<td>Great Vessel Disease</td>
<td></td>
</tr>
<tr>
<td>Critical Care</td>
<td><strong>Professionalism</strong> – Ethics and Values; Personal Accountability</td>
</tr>
<tr>
<td>Esophagus</td>
<td><strong>Practice Based Learning and Improvement</strong> – Learning; Research and Teaching</td>
</tr>
<tr>
<td>Lung and Airway</td>
<td><strong>Interpersonal and Communication Skills</strong></td>
</tr>
<tr>
<td>Chest Wall/Pleura/Mediastinum</td>
<td><strong>Systems Based Practice</strong> – Patient Safety; Resource Allocation; Practice Management</td>
</tr>
</tbody>
</table>

*General Competencies*

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**Sample Milestone 1**

<table>
<thead>
<tr>
<th>Medical Knowledge: Esophagus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1</strong></td>
</tr>
<tr>
<td>• Knows basic anatomy and pathology (e.g., identifies gastrointestinal anatomy innervation and blood supply, endoscopic landmarks)</td>
</tr>
<tr>
<td>• Knows basic foregut physiology (e.g., basic esophageal motility)</td>
</tr>
<tr>
<td>• Lists clinical manifestations of benign and malignant disorders (e.g., heart burn, chest pain, dysphagia, odynophagia)</td>
</tr>
<tr>
<td>• Understands the impact of staging (e.g., pluses and minus of treatment options for esophageal cancer - dilation vs. myotomy for achalasia)</td>
</tr>
<tr>
<td>• Understands risks, benefits and complications of treatment modalities (e.g., slipped Nissen, anastomotic leak)</td>
</tr>
<tr>
<td><strong>Level 4</strong></td>
</tr>
<tr>
<td>• Understands complex variations in anatomy and pathology, including congenital (e.g., esophageal atresia)</td>
</tr>
<tr>
<td>• Adapts therapeutic management based on understanding of physiology for various disease states (e.g., partial vs. total fundoplication)</td>
</tr>
<tr>
<td>• Distinguishes the complex clinical manifestations and complications of benign and malignant disorders (e.g., Type IV hernias, TEF)</td>
</tr>
</tbody>
</table>

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# Sample Milestone 2

## Patient Care and Technical Skills: Valvular Disease

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Orders basic diagnostic and preoperative assessment tests for valvular heart disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Lists basic treatment options for routine valvular heart disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Demonstrates basic surgical skills (simulation vs. OR)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Performs surgical opening and closing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Performs basic intraoperative assisting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Provides a diagnostic assessment plan for patients with routine valvular heart disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Selects ideal treatment option for patient with acquired valvular disease (e.g., double valve replacement)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Manages routine operative complexity (e.g., decides to use operating room, management of arrhythmia)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Institutes and wean patient from cardiopulmonary bypass</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Performs optimal myocardial protection strategy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Performs routine valvular replacement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Forms a diagnostic and assessment plan for complex patients with valvular heart disease (e.g., mitral regurgitation on a patient scheduled for isolated coronary artery bypass)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Selects ideal treatment option for patient with complex valvular heart disease (e.g., valvular repair, congenital valve repair)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Sample Milestone 3

General Competencies

Professionalism – Ethics and Values; Personal Accountability

Practice Based Learning and Improvement – Learning; Research and Teaching

Interpersonal and Communication Skills

Systems Based Practice – Patient Safety; Resource Allocation; Practice Management

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Thoracic Surgery Milestone Project: 
Available Assessment Tools

- Review available tools for assessment
- Specific tools for CT surgery programs
- Develop future strategies for your own Institutional program and curriculum
Critical for Good Assessment

- Valid, practical, acceptable
- Has a direct educational effect
- Catalytic effect: feedback drives learning forward
- Makes professional practice more transparent
- Measures actual performance
- Identifies areas for improvement
Critical Principles of Choosing Assessment Strategies

- Decide if the strategies are:
  - Formative (monitor learning, feedback, e.g. evals))
  - Summative (evaluate learning, e.g. exams)
- How will feedback be obtained from trainees?
- How will results be provided to trainees and program directors?
- Determine the remediation strategies
## Assessment Toolbox Matrix (modified ACGME, 2000)

<table>
<thead>
<tr>
<th>COMPETENCY</th>
<th>Patient Care/Technical Skills</th>
<th>Medical Knowledge</th>
<th>Practice-Based Learning and Improvement</th>
<th>Research and Teaching</th>
<th>Interpersonal and Communication Skills</th>
<th>Professionalism</th>
<th>System-Based Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Care/Technical Skills</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Medical Knowledge</td>
<td></td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Practice-Based Learning and</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Improvement</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Evaluate care/Self-Improvement</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Research and Teaching</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Interpersonal and</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Communication Skills</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Professionalism</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Ethics and Values</td>
<td></td>
<td></td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Personal Accountability</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>System-Based Practice</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Patient Safety</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Resource Allocation</td>
<td>3</td>
<td></td>
<td>3</td>
<td></td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Practice Management</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Key:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 = most desirable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 = next best method</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 = potentially applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Adapted from Toolbox of Assessment Methods, ACGME and ABMS, v 1.1, Sept 2000

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## Cognitive Assessment: Available Content and Strategies in Thoracic Surgery

<table>
<thead>
<tr>
<th>Content</th>
<th>Assessment Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITE</td>
<td>Exam scores</td>
</tr>
<tr>
<td>SESATS</td>
<td>Performance</td>
</tr>
<tr>
<td>Mock Oral Exams</td>
<td>Performance</td>
</tr>
<tr>
<td>OSCE</td>
<td>All competencies</td>
</tr>
<tr>
<td>Moodle Rooms/Assessment Quizzes</td>
<td>Performance, participation, professionalism</td>
</tr>
<tr>
<td>Op logs</td>
<td>Reflection, professionalism, outcomes</td>
</tr>
<tr>
<td>SCORE (I6)</td>
<td>Performance</td>
</tr>
</tbody>
</table>

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ACGME Toolbox

- Record Review
- Chart Stimulation Recall
- Check List
- Global Rating
- Standardized Patients
- OSCE/ CASPE

- Simulations and Models
- 360 Global Rating
- Learning Portfolios
- ITE
- Mock Oral Exam
- Procedures and Case Logs
- Patient Survey

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Assessment Tools Specific for CT Surgery

- SESATS
- Moodle Courses
- Simulation / Video Assessment
- Database Patient Outcomes
- Senior tour

- Observation of Patient Encounters
- Presentation skills
- Patient evaluation
- QI Review
- Residents as educator
- Chart audit
<table>
<thead>
<tr>
<th>Topics</th>
<th>Core ABTS Curriculum Topic</th>
<th>Topic Editor</th>
<th>Section Editor</th>
<th>Basic Level Content</th>
<th>Relevant Milestone (Level)</th>
<th>Advanced Level Content</th>
<th>Relevant Milestone (Level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>CV 7 Ischemic Heart Disease I</td>
<td>Sun, Aldea</td>
<td>Baker</td>
<td>Protection solutions</td>
<td>MK-CPB (3)</td>
<td>Management guidelines</td>
<td>MK-IHD (3, 4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MK-IHD (1)</td>
<td>PC-IHD (1, 2, 3)</td>
<td>PC-IHD (5, 4)</td>
</tr>
<tr>
<td>16</td>
<td>CV 8 Ischemic Heart Disease II</td>
<td>Sun, Aldea</td>
<td>Baker</td>
<td>Cardiac imaging</td>
<td>MK-IHD (2, 3)</td>
<td>Combined coronary / carotid disease</td>
<td>PC-IHD (4)</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MK-IHD (1, 3, 4)</td>
<td>PC-IHD (1, 2)</td>
<td>PC-IHD (4)</td>
</tr>
<tr>
<td>18</td>
<td>CV 9 Ischemic Heart Disease III</td>
<td>Sun, Aldea</td>
<td>Baker</td>
<td>Surgical revascularization</td>
<td>PC-IHD (2)</td>
<td>Role of TMR</td>
<td>PC-IHD (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Conduits On / off pump Approaches</td>
<td></td>
<td>Repeat revascularization</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>CV 10 Ischemic Heart Disease IV</td>
<td>Sun, Aldea</td>
<td>Baker</td>
<td>Complications of IHD / MI</td>
<td>MK-IHD (3)</td>
<td>Treatment options for complications of IHD / MI</td>
<td>MK-IHD (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Presentation / Diagnosis</td>
<td></td>
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</tr>
</tbody>
</table>

**Medical Knowledge: Ischemic Heart Disease**

**Level 1**
- Knows basic anatomy and pathology (identifies coronary artery anomalies) CV1.8, CV 2.4
- Knows basic cellular and vascular physiology CV1.4
- Lists clinical manifestations of ischemic heart disease (e.g., angina, myocardial infarction) CV7.8
- Lists diagnostic tools available for evaluation of ischemic heart disease CV3.8
- Lists treatment options for ischemic heart disease (e.g., CABG, PCI) CV3.8, CV 8.8
- Knows basic complications for ischemic heart disease CV4.8

**Level 2**
- Understands common variations in anatomy and pathology (e.g., left dominant system) CV1.9, CV2.4
- Understands pathophysiology changes accompanying ischemic heart disease (e.g., ischemia, ischemic perfusion injury, infarction, revascularization) CV1.9, CV2.4

**Level 3**
- Understands complex integrations between anatomy and pathology, including congenital anomalies and related syndromes (e.g., able to identify coronary aneurysms in reoperative surgery) CV1.9, CV2.4
- Understands the role of treatment and physiology of ischemic heart disease CV1.4
- Identifies the common manifestations of ischemic heart disease (e.g., unstable angina, myocardial infarction, silent ischemia) CV10.8
- Interprets normal and common abnormalities associated with ischemic heart disease (e.g., reevaluation coronary angiography, complex EKG) CV7.8
- Identifies appropriate treatment for routine patient with ischemic heart disease CV8.8
- Identifies appropriate treatment for complex patient with ischemic heart disease CV9.8

**Level 4**
- Understands complex variations in anatomy and pathology, including congenital anomalies and related syndromes (e.g., able to identify coronary aneurysms in reoperative surgery) CV1.9, CV2.4
- Understands the role of treatment and physiology of ischemic heart disease CV1.4
- Identifies the common manifestations of ischemic heart disease (e.g., unstable angina, myocardial infarction, silent ischemia) CV10.8
- Interprets normal and common abnormalities associated with ischemic heart disease (e.g., reevaluation coronary angiography, complex EKG) CV7.8
- Identifies appropriate treatment for routine patient with ischemic heart disease CV8.8
- Identifies appropriate treatment for complex patient with ischemic heart disease CV9.8

**Level 5**
- Understands the implications of SYNTAX score
- Presents outcomes of ischemic heart disease at local, regional or national meeting

**Codes:**
- Green — Linked to JCTSDA National Curriculum
- Topic Code: CV 1.8 = Topic CV1, (B = Basic, A = Advanced)
ITS
Structured case discussion
Oral exams
Video assessment
Simulation
Moodle exams

Chart review
Case logs
Patient outcomes

Direct observation
360 assessment
Chart review
Structured case discussions
Video assessments

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Clinical Competency Committee “CCC”

- Composition
  - Core teaching faculty
  - Broad representation of
    - Disciplines
    - Institutions
- Goals
  - Assign milestone levels for each trainee biannually
- Methods
  - Review available assessment data for each trainee
  - Reach a consensus for all milestone level assignments
Thoracic Surgery Reporting Milestones Timeline

Jan-Mar 2014
- Form CCC, meet, review & selects assessment tools
- Develop new tools to fill any assessment gaps

Apr-Jun 2014
- CCC meets monthly
- Implement tools, Beta test, make adjustments

Jul - Nov 2014
Perform assessments and collect data

Nov-Dec 2013
CCC meets and assigns Milestones

We are here...

July 1, 2014
TS Milestone Begin

ACGME expects programs to implement Subspecialty Reporting Milestones for AY 2014-2015

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What does this mean to you?

Good
- No more PIFs!
- 10-yr cycle self-study and accreditation
- Stimulate innovation in education

Bad
- Enhance/record evaluation tools
- RRC still requires annual trend evaluation: Milestones, survey data, operation log, educational outcomes

Ugly
- Frequent CCC meetings
- Semiannual Milestones submission
- First submission is Jan. 2015
Milestones for CT Surgery will be implemented July 2014

Goal is to help all residents achieve Level 4 by the time they complete training

Semiannual assessment of residents by Clinical Competency Committee using Milestones

Select and implement assessment tools

Various methods in mapping assessments to the Milestones in development
Workshops Today

- Room A -- Workshop: Creating a Two-year Traditional Cardiothoracic Curriculum: 88 weeks Ed Verrier, MD / Thomas Varghese, MD
- Room B -- Workshop: Creating a Three-year Traditional Cardiothoracic Curriculum: 132 weeks Ara Vaporciyan, MD, FACS / Stephen C. Yang, MD
- Room C -- Workshop: Creating an Integrated 6-year Integrated Cardiothoracic Curriculum: 264 weeks James Fann, MD / John Ikonomidis, MD, PhD
Thank you!

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Questions?