AUC for Coronary Revascularization

**APPROPRIATE USE CRITERIA**

**ACCF/SCAI/STS/AATS/AHA/ASNC/HFSA/SCCT 2012 Appropriate Use Criteria for Coronary Revascularization Focused Update**


_Endorsed by the American Society of Echocardiography and the Heart Rhythm Society_

**Coronary Revascularization Writing Group**

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Coronary revascularization is appropriate when the expected benefits, in terms of survival or health outcomes (symptoms, functional status, and/or quality of life) exceed the expected negative consequences of the procedure.
Developing the Appropriateness Use Criteria

The Writing Committee

Define “appropriateness”

Literature search

Assumptions & definitions

Develop clinical scenarios

• Sobering realization as to how complex our daily decisions really are
  - ~4000 possible combinations

• Needed an understandable framework built upon known data and clinical practice

How are we going to do this?
Framework for Decision Making

- AUC for Coronary Revascularization – describe the intersection of four variables to guide decision making for PCI and CABG (JACC, Jan 2009)
  - Symptom Status
  - Medical management of angina
  - Ischemia burden on non-invasive testing
  - Anatomy
- Evaluated 180 clinical scenarios
### Clinical Scenarios

<table>
<thead>
<tr>
<th>CCS Angina Class</th>
<th>Asymptomatic</th>
<th>I or II</th>
<th>III or IV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patients Without Coronary Bypass Grafts</strong></td>
<td><strong>Appropriateness Score (1-9)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- One or two vessel coronary artery disease without involvement of proximal LAD</td>
<td></td>
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<td></td>
<td>- Low-risk findings on non-invasive testing</td>
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<td></td>
<td>- Receiving no or minimal anti-ischemic medical therapy</td>
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<td>2.</td>
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<td></td>
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<tr>
<td></td>
<td>- Receiving a course of maximal anti-ischemic medical therapy</td>
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</tbody>
</table>
### Appropriate Care

**Scored by a Technical Panel**

4 interventional cardiologists; 4 CT surgeons; 8 cardiologists; 1 Health plan officer

<table>
<thead>
<tr>
<th>Number 17</th>
<th>Stable patients without prior CABG</th>
<th>CCS Angina Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><a href="#">Checklist</a></td>
<td>ASx</td>
</tr>
</tbody>
</table>

- One- or 2-vessel CAD without involvement of proximal LAD
- High-risk findings on noninvasive testing
- Receiving a course of maximal anti-ischemic medical therapy

**Appropriateness Score**

- (7-9) Appropriate
- (4-6) Possibly Appropriate/Uncertain
- (1-3) Inappropriate

**Independent 1st round ratings**

- Ratings tabulated – agreement determined
- Face-to-face meeting – ratings discussed

**Independent 2nd and final round ratings**

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**The Technical Panel**

DCRI
High Correlation between Guidelines and AUC
13. Asymptomatic
   - I2
   - I or II: U5
   - III or IV: A7
   - One or two vessel coronary artery disease without involvement of proximal LAD
   - Low-risk findings on non-invasive testing
   - Receiving a course of maximal anti-ischemic medical Rx

Chronic Stable Angina (p. 77-78)
Recommendations for Revascularization With PCI (or Other Catheter-Based Techniques) and CABG in Patients With Stable Angina

Class I
Coronary artery bypass grafting for patients with one- or two-vessel CAD without significant proximal LAD CAD who have survived sudden cardiac death or sustained ventricular tachycardia. (Level of Evidence: C)

Class III
Use of PCI or CABG for patients with one- or two vessel CAD without significant proximal LAD CAD, who have mild symptoms that are unlikely due to myocardial ischemia, or who have not received an adequate trial of medical therapy and
   a. have only a small area of viable myocardium or
   b. have no demonstrable ischemia on noninvasive testing. (Level of Evidence: C)

Chronic Stable Angina (p. 90-91)
Recommendations for Revascularization with PCI and CABG in Asymptomatic Patients

Class III
- Use of PCI or CABG for patients with one- or two-vessel CAD without significant proximal LAD CAD and
  a. only a small area of viable myocardium or
  b. no demonstrable ischemia on noninvasive testing. (Level of Evidence: C)
- Use of PCI or CABG for patients with borderline coronary stenoses (50% to 60% diameter in locations other than the left main coronary artery) and no demonstrable ischemia on noninvasive testing. (Level of Evidence: C)
### Clinical Scenarios - Patients without prior CABG

**Class I or II, high risk findings regardless of med Rx**
**Intermediate risk findings, severe Sx or max Rx**

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#### Intermediate Risk Findings on Noninvasive Study

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Med. Rx</th>
<th>CCS Class I or II Angina</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>High Risk Med. Rx</td>
</tr>
<tr>
<td>Class III or IV Max Rx</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Class I or II Max Rx</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>Asymptomatic Max Rx</td>
<td>U</td>
<td>U</td>
</tr>
<tr>
<td>Class III or IV No/min Rx</td>
<td>U</td>
<td>U</td>
</tr>
<tr>
<td>Class I or II No/min Rx</td>
<td>U</td>
<td>U</td>
</tr>
<tr>
<td>Asymptomatic No/min Rx</td>
<td>I</td>
<td>I</td>
</tr>
</tbody>
</table>

#### Coronary Anatomy

<table>
<thead>
<tr>
<th>Coronary Anatomy</th>
<th>CTO of 1 vz.; no other disease</th>
<th>1-2 vz. disease; no Prox. LAD</th>
<th>1 vz. disease of Prox. LAD</th>
<th>2 vz. disease with Prox. LAD</th>
<th>3 vz. disease; no Left Main</th>
<th>Coronary Anatomy</th>
<th>CTO of 1 vz.; no other disease</th>
<th>1-2 vz. disease; no Prox. LAD</th>
<th>1 vz. disease of Prox. LAD</th>
<th>2 vz. disease with Prox. LAD</th>
<th>3 vz. disease; no Left Main</th>
</tr>
</thead>
</table>
Framework for Decision Making
Five Core Variables

- **STEMI**
  - Stable angina

- **Class IV**
  - Class I ASx

- **High risk**
  - None Low risk

- **Max**
  - None

- **LM + 3v CAD**
  - No sig. CAD
How Good are the Methods?
Angina at 12-months by Appropriateness of PTCA or CABG
Moderate Reproducibility – Better for Overuse than Underuse
Reproducibility of Appropriateness Ratings in Cardiovascular Imaging

- 2 Independent Panels (15 multi-speciality physicians)
  - Stress Echo Panel and TTE/TEE panel
- Rated the same 19 clinical indications
  - (Mixture of Stress and TTE/TEE)
  - 8 (42%) Inappropriate, 9 (47%) Appropriate, 2 (11%) Uncertain
- Agreement between panels for overall appropriateness group (A,I,U) was 100%
Retrospective Cohort Confirmation of Outcomes with AUC for Revascularization
Outline – Appropriate Use Criteria

• Why do we have them or need them?
• How are they developed?
• **How are they and how will they be used?**
• Conclusion
AUC - “The Preface”

1. AUC blends evidence-base and clinical experience and is concordant with Clinical Practice Guidelines.
2. We recognize that some ambiguity is intrinsic to clinical decision making and that AUC is not a substitute for sound clinical judgment nor patient preference.
3. Where practice patterns of individuals, groups or hospitals routinely conflict with AUC ratings, further evaluation and education, with tracking and feedback, should be considered.
4. AUC facilitates reimbursement for “appropriate” and “uncertain” indications.
Measuring Appropriateness

Appropriateness of Percutaneous Coronary Intervention

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Gregory J. Dehmer, MD
Kevin Kennedy, MS
Brahmajee K. Nallamothu, MD, MPH
W. Douglas Weaver, MD
Frederick A. Masoudi, MD, MSPH
John S. Rumsfeld, MD, PhD
Ralph G. Brindis, MD, MPH
John A. Spertus, MD, MPH

Context  Despite the widespread use of percutaneous coronary intervention (PCI), the appropriateness of these procedures in contemporary practice is unknown.

Objective  To assess the appropriateness of PCI in the United States.

Design, Setting, and Patients  Multicenter, prospective study of patients within the National Cardiovascular Data Registry undergoing PCI between July 1, 2009, and September 30, 2010, at 1091 US hospitals. The appropriateness of PCI was adjudicated using the appropriate use criteria for coronary revascularization. Results were stratified by whether the procedure was performed for an acute (ST-segment elevation myocardial infarction, non–ST-segment elevation myocardial infarction, or unstable angina with high-risk features) or nonacute indication.

Main Outcome Measures  Proportion of acute and nonacute PCIs classified as appropriate, uncertain, or inappropriate; extent of hospital-level variation in inappropriate procedures.

Results  Of 500 154 PCIs, 355 417 (71.1%) were for acute indications (ST-segment elevation myocardial infarction, 103 245 [20.6%]; non–ST-segment elevation myocardial infarction, 149 342 [30.8%]; unstable angina with high-risk features, 0.6%); 144 737 (29.0%) were for nonacute indications. The overall proportion of inappropriate procedures was 12.3%.

Conclusions  In this large contemporary US cohort, nearly all acute PCIs were classified as appropriate. For nonacute indications, however, 12% were classified as inappropriate, with substantial variation across hospitals.

Hospital variation in non-acute PCI - inappropriate rates

Chan PS et al. JAMA 2011;306:53-61
## Non-acute PCIs

<table>
<thead>
<tr>
<th>Angina class, %</th>
<th>Total (N = 144,737)</th>
<th>Procedural Appropriateness</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Appropriate (N = 72,911)</td>
<td>Uncertain (N = 54,988)</td>
</tr>
<tr>
<td>No symptoms</td>
<td>14.2</td>
<td>5.9</td>
<td>13.2</td>
</tr>
<tr>
<td>CCS I</td>
<td>12.2</td>
<td>6.0</td>
<td>20.3</td>
</tr>
<tr>
<td>CCS II</td>
<td>33.8</td>
<td>18.7</td>
<td>54.4</td>
</tr>
<tr>
<td>CCS III</td>
<td>31.4</td>
<td>54.4</td>
<td>10.3</td>
</tr>
<tr>
<td>CCS IV</td>
<td>8.3</td>
<td>15.0</td>
<td>1.9</td>
</tr>
<tr>
<td>Noninvasive ischemia evaluation, %</td>
<td></td>
<td>35.3</td>
<td>14.0</td>
</tr>
<tr>
<td>Low-risk</td>
<td></td>
<td>41.4</td>
<td>34.0</td>
</tr>
<tr>
<td>Intermediate risk</td>
<td></td>
<td>23.4</td>
<td>52.1</td>
</tr>
<tr>
<td>High-risk</td>
<td></td>
<td>35.3</td>
<td>14.0</td>
</tr>
</tbody>
</table>
STAFF REPORT ON CARDIAC STENT USAGE
AT ST. JOSEPH MEDICAL CENTER

PREPARED BY THE STAFF OF THE
COMMITTEE ON FINANCE
UNITED STATES SENATE

MAX BAUCUS, Chairman
CHUCK GRASSLEY, Ranking Member

DECEMBER 2010
Outline

• What is the current work up and evidence for evaluation of chest pain patients?
• What are Appropriateness Criteria?
  – Coronary Revascularization Criteria
• Where are we going?
  – What should we measure to improve care in patients undergoing chest pain and possible angiography and revascularization (percutaneous)
FAME study: Event-free Survival

The benefits of FFR do not diminish/vulnerable plaque and better to stent
### FAME study: Adverse Events at 1 year

<table>
<thead>
<tr>
<th></th>
<th>ANGIO-group N=496</th>
<th>FFR-group N=509</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Events at 1 year, No (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death, MI, CABG, or repeat-PCI</td>
<td>91 (18.4)</td>
<td>67 (13.2)</td>
<td>0.02</td>
</tr>
<tr>
<td>Death</td>
<td>15 (3.0)</td>
<td>9 (1.8)</td>
<td>0.19</td>
</tr>
<tr>
<td>Death or myocardial infarction</td>
<td>55 (11.1)</td>
<td>37 (7.3)</td>
<td>0.04</td>
</tr>
<tr>
<td>CABG or repeat PCI</td>
<td>47 (9.5)</td>
<td>33 (6.5)</td>
<td>0.08</td>
</tr>
<tr>
<td><strong>Total no. of MACE</strong></td>
<td>113</td>
<td>76</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Myocardial infarction, specified</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All myocardial infarctions</td>
<td>43 (8.7)</td>
<td>29 (5.7)</td>
<td>0.07</td>
</tr>
<tr>
<td>Small periprocedural CK-MB 3-5 x N</td>
<td>16</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Other infarctions (“late or large”)</td>
<td>27</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>
Fractional Flow Reserve–Guided PCI versus Medical Therapy in Stable Coronary Disease

FAME 2

Clinicaltrials.gov NCT01132495

Bernard De Bruyne, Nico H.J. Pijls, William F Fearon, Peter Juni, Emanuele Barbato, Pim Tonino, for the FAME 2 study group
FAME 2: FFR-Guided PCI versus Medical Therapy in Stable CAD

Primary Outcomes

- PCI+MT vs. MT: HR 0.32 (0.19-0.53); p<0.001
- PCI+MT vs. Registry: HR 1.29 (0.49-3.39); p=0.61
- MT vs. Registry: HR 4.32 (1.75-10.7); p<0.001

No. at risk

<table>
<thead>
<tr>
<th></th>
<th>Months after randomization</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT</td>
<td>441 414 370 322 283 253 220 192 162 127 100 70 37</td>
</tr>
<tr>
<td>PCI+MT</td>
<td>447 414 388 351 308 277 243 212 175 155 117 92 53</td>
</tr>
<tr>
<td>Registry</td>
<td>166 156 145 133 117 106 93 74 64 52 41 25 13</td>
</tr>
</tbody>
</table>
Call to Action?

• To preserve our specialty’s autonomy the ACC needs to provide direction and leadership with GL’s, PM’s and AUC to achieve the “Triple Aim”

  – improve the quality and safety of care
  – improve the health of populations
  – lower overall/unit cost
POST ACUTE MANAGEMENT:
1. Cardiac Rehab (CR/APP)
2. Additional appointments scheduled (Clinic/HC Comms)
3. 30-60-90 Calls
4. ER Triage Protocol

ACUTE TRANSITION: (C% readmission reduction or $D)
1. Risk Assessment (PRM and Rounding Team)
2. Follow-Up Phone Call (Transition Team)
3. 7-day Follow-up Appointment

PROPOSED BUNDLE PROCESS CHANGES

OVERALL COST/PRICE REDUCTION:
1. Cath Lab Device Wastage Reduction for $A savings (Cath Lab/Finance Team)
2. Cath Device Pricing Renegotiation to $B savings (Procurement/Smart Team)
Prioritizing take-aways from resource utilization based on cost analyses

<table>
<thead>
<tr>
<th>Category</th>
<th>Contribution &amp; Next Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Cath</td>
<td>Medication contribution is low. <strong>Next steps</strong>: clarify during interviews which agent or agents are preferred, may incorporate into checklist/order set.</td>
</tr>
<tr>
<td>Peri-Cath</td>
<td>Cath services contribution to overall cost is high. <strong>Next steps</strong>: clarify factors contributing to variability in duration and device through additional analyses, refine strategy to address approach.</td>
</tr>
<tr>
<td>Post-Cath</td>
<td>Medication contribution to cost is low, LOS is high. <strong>Next steps</strong>: analyze outliers to identify common categories and develop mitigation plans for top categories.</td>
</tr>
<tr>
<td>Post-Acute</td>
<td>Variability in 90-day utilization likely to influence cost variability. <strong>Next steps</strong>: heighten interaction with post-acute team to align roles of care-coordinator with strategy for appropriate utilization.</td>
</tr>
</tbody>
</table>
The Hope -

**User Input**
- Enter Patient Data
- Symptom Data
- Non-invasive findings
- Mark Coronary Tree

**Patient Input:**
- General Ideas of Choices

**Output:**
1. Guideline and AUC criteria
2. Syntax Risk Score
3. PCI – ACC/NCDR Risk Score
4. STS Risk Score
Conclusions

“The future ain’t what it used to be….”
Yogi Berra
Leading Cardiovascular Specialist – Pop Culture and Reality

THE MOST UNNECESSARY HEART PROCEDURE: THE DANGER OF STENTS

50%
Cardiovascular Disease and the Baby Boom

- 10,000 people become Medicare eligible every day
- Cardiovascular Care accounts for 43 cents of every Medicare Dollar
- Successful Health Care systems will have to focus on high quality and efficient heart care that is measurable
Do you have a Framework for thinking about all cardiovascular procedures that occur at your hospital?
High Quality Cardiovascular Procedures

Value equation for cardiovascular procedures – was the right procedure done in the right way with the right outcome in a timely fashion? Measures (AUC / Outcome Measures)
Conclusions

- Cost of imaging in medicine will not be sustainable (Medicare 14 billion dollars)

- Cardiovascular imaging - currently being controlled by third party groups (revenue benefit managers)
  
  Diagnostic Cath and PCI are likely to follow shortly!!

- ACC-ACR working on trying to get together for AC criteria

- Clinical trials for common indications needed –
  - PROMISE
  - ? FFR diagnostic cath studies
Conclusions:

- Appropriate Use Criteria - meant for clinicians, patients, and payers
  - Reasonable care
  - Evaluate pattern of care

- CAD burden, Ischemia, High burden of symptoms - revascularization warranted

- Functional PCI and Revascularization will be central to the care of cardiovascular patients
Inherent in the doctor–patient relationship is the desire for physicians to use available knowledge and judgment to provide the best possible care to their patients. In return, physicians hope to earn the trust and respect of their patients and community. Physicians have the historical opportunity of autonomy in their practice and with that comes the responsibility and privilege of self-regulation (1,2). Unfortunately, as health care costs continue to spiral
Conclusions

• Imperative for innovation with patients undergoing PCI
  – Important innovations will need to be around the delivery of care, patient decision making, and long-term care

• Demonstrating quality will be important, but successful systems will demonstrate value
“Every system is perfectly designed to get the results it gets”

Dr. Paul Batalden
Dartmouth College

“Can we improve the system?”
Thank You - Questions

● Acknowledgements