INTRODUCTION

The purpose of this project was to evaluate the highest grade evidence in the literature pertaining to the utility of coronary CTA in outpatients and emergency department patients with suspected coronary artery disease (CAD) focusing on patient outcomes and costs, in keeping with high-value practice.

LITERATURE REVIEW

Coronary Artery Disease Literature Review
Conducted Feb. 11, 2019

Katie Lobner, Welch informationist, in cooperation with subject specialists performed a broad search of the literature from 1990 to present to identify research investigations, systematic reviews and meta-analyses measuring the utility of advanced imaging (CT, MRI or nuclear medicine) in CAD and/or chest pain.

Inclusion Criteria

- Primary diagnosis of CAD (pre-intervention)
- Randomized controlled trial, systematic review or meta-analysis
- Evaluated effectiveness of cardiac imaging for diagnosis, management and outcomes in CAD
- Adult patients
- CT: 64 slice or higher
- MRI: 1.5 T or higher
- Nuclear medicine: standard cardiac tests
- Search for studies focused on women and underrepresented minorities

Exclusion Criteria

- Pediatric
- Pathology other than CAD; e.g., cardiomyopathy
- Post-treatment CAD
- Less common diseases such as lupus
- Experimental imaging protocols (i.e., comparison of contrast doses, novel radionuclide agents, MRI protocols, etc.)
- No studies evaluating utility of premedication for CT, MRI or nuclear medicine
- Abstract detailing the protocol design prior to performing the randomized controlled trial

Additionally, clinical practice guidelines & consensus statements were identified using this search:

LITERATURE SEARCH RESULTS

Results from the search strategy were uploaded to Covidence and screened in duplicate by two radiology faculty with subspecialty training in body imaging, with disagreements resolved by consensus, followed by the same process for full text review.

PRISMA of Investigation Review

- 606 references imported for screening
  - 0 duplicates
- 606 studies screened against title and abstract
  - 423 studies excluded
- 183 studies assessed for full-text eligibility
  - 37 excluded
- 146 studies total (some papers fit in more than one category)

Clinical Practice Guidelines Review

- 40 guidelines
  - 0 duplicates
- 40 studies screened against title and abstract

Published Dec. 19. 2019
Literature Review Results

Investigations that only evaluated patients with **stable chest pain** (N=22) included:

- One meta analysis
- One systematic review
- 15 randomized controlled trials
- Five prospective studies

Strength of evidence for stable chest pain

- 17 studies with Oxford Grade 1 evidence
- Five studies with Oxford Grade 2 evidence

Evidence tables are found separately on the Johns Hopkins Medicine’s Appropriate Use Criteria [website](#).
# APPROPRIATE USE CRITERIA

<table>
<thead>
<tr>
<th>Title</th>
<th>Clinical Scenario 1: Low pretest probability and able to perform ETT</th>
<th>Clinical Scenario 2: Intermediate pretest probability and able to perform ETT</th>
<th>Clinical Scenario 3: High pretest probability and able to perform ETT</th>
<th>Clinical Scenario 4: Low pretest probability and unable to perform ETT</th>
<th>Clinical Scenario 5: Intermediate pretest probability and unable to perform ETT</th>
<th>Clinical Scenario 6: High pretest probability and unable to perform ETT</th>
</tr>
</thead>
</table>
| Definition | All of the following  
- able to exercise  
- EKG interpretable  
- low pretest probability of CAD | All of the following  
- able to exercise  
- EKG interpretable  
- intermediate pretest probability of CAD | All of the following  
- able to exercise  
- EKG interpretable  
- high pretest probability of CAD | All of the following  
- unable to exercise OR EKG interpretable or abnormal  
- intermediate pretest probability of CAD | All of the following  
- unable to exercise OR EKG interpretable or abnormal  
- high pretest probability of CAD |
| AUC Rules |  |  |  |  |  |  |
| **Consistent with AUC** | • Coronary CTA  
• SPECT (Nuclear medicine perfusion)  
• Stress MRI  
• Stress echocardiography | • Coronary CTA  
• SPECT (Nuclear medicine perfusion)  
• Stress MRI  
• Stress echocardiography | • Coronary CTA  
• SPECT (Nuclear medicine perfusion)  
• Stress MRI  
• Stress echocardiography | • Coronary CTA  
• SPECT (Nuclear medicine perfusion)  
• Stress MRI  
• Stress echocardiography | • SPECT (Nuclear medicine perfusion)  
• Stress MRI  
• Stress echocardiography |
| **Allowable by AUC** | • Coronary artery calcium screening  
• PET/CT | • Coronary CTA  
• PET/CT | • Coronary artery calcium screening  
• SPECT (Nuclear medicine perfusion)  
• Stress MRI | • PET/CT | • Coronary CTA  
• PET/CT |
### Johns Hopkins University School of Medicine

**Appropriate Use Criteria**

**Priority Clinical Area:** Stable Chest Pain

**Setting:** Ambulatory and Emergency Department

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<table>
<thead>
<tr>
<th>Does not meet AUC</th>
<th>• SPECT (Nuclear medicine perfusion)</th>
<th>• Coronary artery calcium screening</th>
<th>• Coronary artery calcium screening</th>
<th>• Coronary artery calcium screening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable (No AUC)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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### MULTIDISCIPLINARY TEAM

A multidisciplinary team with autonomous governance, decision-making and accountability for developing or modifying AUC was empaneled to develop AUC for patients with stable chest pain. The multidisciplinary team developing these AUC includes seven or more practicing physician members and more than one practicing physician with expertise in the clinical topic related to the AUC being developed or modified. Specifically, each team includes at least one practicing physician in the nonradiology specialty or specialties related to the AUC and at least one practicing physician in the radiology subspecialty related to the AUC. For acute chest pain, the relevant specialties and subspecialties are:

- Cardiovascular radiology
- Cardiology
- Internal medicine

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Published Dec. 19. 2019
The Johns Hopkins University School of Medicine requires that all practicing physicians participating in the development of AUC disclose any conflicts of interest using the International Committee of Medical Journal Editors conflict of interest form. This information is publicly available in a timely fashion upon request, for a period of not less than five years after the most recent published update of the relevant appropriate use criteria. The members of the CAD/Stable Chest Pain AUC development team are listed here:

Coronary Artery Disease:

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Jon Resar  Cardiology, The Johns Hopkins Hospital
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Andrew Weiss  Cardiology, Johns Hopkins Community Physicians
Marlene Williams  Cardiology, Johns Hopkins Bayview Medical Center
Armin Zadeh. (Chair)  Cardiology, The Johns Hopkins Hospital

Published Dec. 19. 2019
TRANSPARENT AND TIMELY UPDATING OF CRITERIA

A literature search for each AUC will be repeated and reviewed annually, and AUC will be updated if sufficient strong evidence is identified to necessitate revision.