NQF #IEP-005-10
Pulmonary CT Imaging for Patients at Low Risk for Pulmonary Embolism

Measure Description

Rationale: The use of CT to evaluate patients with suspected pulmonary embolism (PE) has increased rapidly, sometimes in patients at very low-risk of PE. Clinical decision rules to identify adults at low risk of PE have been validated and incorporated into consensus clinical guidelines that define specific criteria for which CT imaging should be obtained in patients with suspected PE.

Goal: To reduce the unnecessary use of CT imaging in patients with suspected PE.

Measure – Percent of patients undergoing CT pulmonary angiogram for the evaluation of possible PE who are at low-risk for PE consistent with guidelines prior to CT imaging.

Level of Analysis: Facility / group

Organization: Partners Health Care

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Brigham & Women’s Hospital / Partners HealthCare, 2010
<table>
<thead>
<tr>
<th>Measure Title</th>
<th>Pulmonary CT Imaging for Patients at Low Risk for Pulmonary Embolism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brief description of measure</td>
<td>Percent of patients undergoing CT pulmonary angiogram for the evaluation of possible PE who are at low-risk for PE consistent with guidelines(^1) prior to CT imaging.</td>
</tr>
<tr>
<td>Numbers</td>
<td>ED-Rad-3</td>
</tr>
<tr>
<td>Numerator Statement</td>
<td>The number of denominator patients with either: a low clinical probability and any negative D-dimer, or an intermediate clinical probability and a negative high-sensitivity D-dimer, or no pretest probability documented.</td>
</tr>
</tbody>
</table>
| Numerator Details | Number of hemodynamically stable patients who receive CT pulmonary angiograms for suspected pulmonary embolism who have of either\(†\):  
1. a low clinical probability\(^*\) of PE and a negative D-Dimer  
OR  
2. a low clinical probability\(^*\) of PE and no D-Dimer performed  
OR  
3. No documentation of a pre-test probability  
\(†\)Documentation at the time of test ordering, timed prior to test initiation.  
\(^*\)clinical probability can be determined by a structured prediction tool (Wells, Revised Geneva) or implicit judgment. Specific test cutoffs will be determined by each ED or institution a priori.  
| Denominator Statement | Number of patients who have a CT pulmonary angiogram (CTPA) for the evaluation of possible pulmonary embolism |
| Denominator Inclusion | Age \(\geq\) 18  
CT pulmonary angiogram performed |
<p>| Denominator Exclusions | Hemodynamically unstable pulmonary embolism suspected by hypotension and/or shock, as defined by: Definition of Systemic Hypotension: systolic blood pressure &lt;90mm Hg or a reduction of at least 40mmHg for at least 15 min(^1) |
| Data Source | Initial sampling will be based upon patients receiving a Pulmonary Angiogram CT (based on appropriate CPT or HCPCS procedure code) in the ED. Chart review, electronic |</p>
<table>
<thead>
<tr>
<th><strong>Intended Use</strong></th>
<th>Internal quality improvement and public reporting</th>
</tr>
</thead>
</table>
| **Calculation Algorithm** | See attached data sheet  
1. identify all e.g. patients undergoing CT PA using appropriate procedure codes  
2. review available data for evidence of pretest probability. This can include the medical record, and/or computerized or paper-based physician orders,  
3. divide number of patients with CT PA and low risk or no pretest probability BY the total number of patients with CT PA. |
| **Specification Notes** | Only European guidelines are currently available and current, but these have been reviewed positively by physicians in the US such as Goldhaber. |
Emergency Department Imaging Efficiency Measures

Sample CT Ordering Form for Measure #IEP-005-10
Pulmonary CT Imaging for Patients at low risk for Pulmonary Embolism

For all ED patients (age ≥ 18) on whom a CT pulmonary angiogram is ordered:

Patient Name ______________________  Medical Record Number  ______________
Date of ED Visit: ___________________

1) Is this patient:

☐ Hemodynamically unstable (systolic blood pressure <90mm Hg or a reduction of
  at least 40mmHg for at least 15 min)

   If so, stop and order CT

2) Pretest Probability:

   Please circle this patient's pre-test probability of having a PE as determined either
   implicitly or by using a validated prediction rule (below):

   Low  Intermediate  High

   For dichotomous Wells rule:

   PE Unlikely  PE Likely

   If the pretest probability is Intermediate, High or PE Likely, stop and order CT

3) D-dimer

   For patients with a Low or PE Unlikely pretest probability, please circle the result of the
   D-dimer assay:

   Normal  Elevated

   If the D-Dimer is normal, the post-test probability is LOW and the CT is unlikely to be
   useful.
## Prediction tools

### Revised Geneva Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>Points</th>
<th>Variable</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Predisposing factors</strong></td>
<td></td>
<td><strong>Well’s Criteria for Pulmonary Embolism</strong></td>
<td></td>
</tr>
<tr>
<td>Age &gt;65 years</td>
<td>1</td>
<td>Immobilization at least 3 days, or Surgery in</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the Previous 4 weeks</td>
<td></td>
</tr>
<tr>
<td>Previous DVT or PE</td>
<td>3</td>
<td>Previous, objectively diagnosed PE or DVT?</td>
<td>1.5</td>
</tr>
<tr>
<td>Surgery (under general anesthesia)</td>
<td>2</td>
<td>Malignancy w/ Treatment within 6 mo, or</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>palliative?</td>
<td></td>
</tr>
<tr>
<td>Active malignant condition (solid or</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>hematologic, currently active or considered</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cured &lt;1 year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Symptoms</strong></td>
<td></td>
<td><strong>Clinical Signs</strong></td>
<td></td>
</tr>
<tr>
<td>Unilateral lower-limb pain</td>
<td>3</td>
<td>Heart Rate &gt; 100?</td>
<td>1.5</td>
</tr>
<tr>
<td>Hemoptysis</td>
<td>2</td>
<td>Clinical Signs and Symptoms of DVT?</td>
<td>3</td>
</tr>
<tr>
<td><strong>Clinical Signs</strong></td>
<td></td>
<td><strong>Clinical Judgment</strong></td>
<td></td>
</tr>
<tr>
<td>Heart rate 75–94 beats/ min</td>
<td>3</td>
<td>PE Is #1 Diagnosis, or</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Equally Likely</td>
<td></td>
</tr>
<tr>
<td>Heart rate &gt;94 beats/ min</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain on lower-limb deep venous palpation</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and unilateral edema</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clinical Probability</strong></td>
<td></td>
<td><strong>Clinical Probability (3 levels)</strong></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>0-3</td>
<td>Low</td>
<td>0-1</td>
</tr>
<tr>
<td>Intermediate</td>
<td>4-10</td>
<td>Intermediate</td>
<td>2-6</td>
</tr>
<tr>
<td>High</td>
<td>≥11</td>
<td>High</td>
<td>≥7</td>
</tr>
<tr>
<td><strong>Clinical Probability (2 levels)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE Likely</td>
<td>0-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE Unlikely</td>
<td>&gt;4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sample Data Collection Form for Measure #IEP-005-10
Pulmonary CT Imaging for Patients at low risk for Pulmonary Embolism

For all ED patients with CPT codes for CT angiograms:

Patient Name ______________________ Medical Record Number ______________
Date of ED Visit: ___________________

1. Exclusiona
   a. Hemodynamically unstable pulmonary embolism suspected by hypotension and/or shock prior to CT order time, (as defined by: systolic blood pressure <90mm Hg or a reduction of at least 40mmHg for at least 15 min)
      • If hemodynamically unstable Stop, circle "Exclusion" at end of form
   b. Age < 18 years
      • If < 18 years Stop, circle "Exclusion" at end of form

2. Clinical Probability (based on medical record):
   High or Intermediate Stop, circle "Appropriate" at end of form
   Low Proceed to Question 3
   Not Documented Stop, circle "Inappropriate" at end of form

3. For those with a Low Clinical Probability
   D-Dimer assay result (compared to institutions reference level):
   Elevated Stop, circle "Appropriate"
   Normal Stop, circle "Inappropriate" at end of form
   Not performed Stop, circle "Inappropriate" at end of form

Appropriate Inappropriate