Pulmonary Emboli Clinical Care Pathway Algorithm by Simplified Wells Criteria

Diagnosis – Patients with suspected PE

Pulmonary Embolism (PE) Care Pathway Algorithm 1: Patient with suspected PE

- Suspected PE
  - PE Unlikely (Simplified Wells < 2)
    - Negative
    - Age-adjusted D-dimer
      - Positive
      - Negative
      - CT PA/VQ scan (40% < 30)
        - Positive
        - Refer to ISSPE Algorithm (PE Care Pathway Algorithm 2)
      - Negative
      - PE ruled out
  - PE Likely (Simplified Wells ≥ 2)
    - Calculate Simplified Wells Score
    - PE Likely

Simplified Wells Score

- Previous PE or DVT
- Heart rate ≥ 100 bpm
- Surgery or immobilization (> 72 hrs) within the past 4 weeks
- Hemolysis
- Active cancer
-received treatment within past 6 months
- Clinical signs of DVT
- Alternative diagnosis less likely than PE

- PE Unlikely ≥ 0 points
- PE Likely ≥ 2 points

Pulmonary Emboli Treatment Care Pathways by PESI

Pulmonary Embolism (PE) Care Pathway Algorithm 2: Recommended Treatment Location by PESI Class

**PESI Score**

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Points</th>
<th>Age in yrs</th>
<th>Male sex</th>
<th>Cancer</th>
<th>Heart Failure</th>
<th>Chronic Lung Dz</th>
<th>Pulse &gt; 110</th>
<th>Systolic BP &lt; 100</th>
<th>Resp Rate &gt; 30</th>
<th>Temp &lt; 36 C</th>
<th>Altered Mentation</th>
<th>Oxygen Sat &lt; 90%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td>Age in yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male sex</td>
<td>+10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer</td>
<td>+10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart Failure</td>
<td>+10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic Lung Dz</td>
<td>+10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse &gt; 110</td>
<td>+20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic BP &lt; 100</td>
<td>+30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resp Rate &gt; 30</td>
<td>+20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temp &lt; 36 C</td>
<td>+20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Altered Mentation</td>
<td>+60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxygen Sat &lt; 90%</td>
<td>+20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PESI Class**

- I: <65
- II: 66-85
- III: 86-105
- IV: 106-125
- V: >125

**Considerations for Outpatient Treatment**

- Low risk (PESI Class I or II)
- PE did not occur while on anticoagulation
- Hemodynamically stable
- No oxygen requirement
- No significant comorbidities
- Low bleeding risk
- Good social support
- Ready access to medical care
- Reliable follow-up
- Feel well enough to go home
- Not pregnant

**Calculate PESI Score**

- Low Risk (Class I-II)
  - Initiate Antithrombotic Therapy (TSOAC/LMWH)
  - Consider Outpatient Treatment (checklist)
  - Thrombosis Service Referral

- Intermediate to High Risk (Class III-V)
  - Initiate Antithrombotic Therapy (TSOAC/LMWH)
  - PE Admission Required (PE Care Pathway Algorithm 3)

Pulmonary Embolism (PE) Care Pathway Algorithm 3: Admission by PESI classification and hypotension

Admission Recommended (PESI Class III-V)

Acute PE w/o hypotension (SBP > 90) → PE Care Pathway Algorithm 4

Acute PE w/ hypotension (SBP < 90) → Admit to MICU → See Massive PE Protocol

Imaging AUC of CTPA for PE

You have ordered a CTPA study. While important for certain conditions, this test can also increase cost and radiation exposure without improving patient outcomes. It is important that we follow PE care pathway algorithm using the Simplified Wells Score:

- Previous PE or DVT
- Heart rate \(-100\) BPM
- Surgery or immobilization \(<72\) hours within the past 4 weeks
- Hemoptysis
- Active cancer (received treatment in the past 6 months)
- Alternative diagnosis less likely than PE

PE unlikely = 0-1 points
PE likely => 2 points

If PE is unlikely, then order Age-adjusted D-dimer (AA D-dimer)

- If AA D-dimer is negative, NO CTPA is necessary
- If AA D-dimer is positive, Proceed with CT-PE

If PE is likely, then skip AA D-dimer and get CT-PE study
If CTPA is positive, Calculate PESI score and follow PE Care Pathway algorithm 2

If a patient is pregnant without signs of lower extremity DVT, then obtain chest radiograph first.
If CXR is normal, consider nuclear medicine perfusion scan with perfusion only using Tc-MAA 1mCi.

If CXR is abnormal or non-diagnostic nuclear perfusion scan, suggest CTPA study with low dose technique.

References:


Age-Adjusted D-Dimer Cutoff Levels to Rule Out Pulmonary Embolism


University of Utah Value Driven Imaging – Imaging AUC for Pulmonary Emboli Task Force

Stacy Johnson, MD (Thrombosis Center Director, Internal Medicine)
Fred Welt, MD (Cardiology, Internal Medicine)
Joe Tonna, MD (General Surgery, Emergency Department)
Mike Flynn, MD (General Internal Medicine, Community Physician Group Clinic)
Howard Mann, MD (Thoracic Radiology)
Bhasker Koppula, MD (Department of Radiology, Nuclear Medicine)
Kensaku Kawamoto (Biomedical Informatics, Associate Chief Information Officer)
Yoshimi Anzai (Radiology, Associate Chief Medical Quality Officer)