Acute Pulmonary Embolism: A System Approach

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PE Incidence / Mortality

- Third most common CV disease after CAD and Stroke
- Incidence estimated at 60-70 per 100,000
- Diagnosis often unrecognized
- Significant mortality (~30%) if untreated
- Improved mortality (~8%) if treated
- Most prevalent in older population (>60yo)
- Sudden death occurs in 10% of cases (second leading cause after cardiac)
- 2/3 patients who die succumb < 2 hrs of presentation

PE Diagnosis is Challenging

- 10 yr. retrospective study
- 982 Autopsies
- PE cause of death in 108 (11%)
- 29/108 treatment eligible (27%)
- 9 cases, PE in differential Dx
- Only 3 received thrombolytics
- 66% PE diagnosis MISSED
The OSU Experience: PE Program

PE response was incorporated into OSU’s Level One Heart and Vascular Emergencies Program in June 2013

Program Goals:
- Provide rapid access to consultation and transfer acceptance
- Quickly mobilize internal resources for rapid interdisciplinary collaboration and intervention

Pulmonary Embolism Response Team: “PERT”

- Rapid in-hospital response to PE management
- Treatment decisions are guided by standardized evidence-based protocols, rapid activation of resources and interdisciplinary collaboration

OSU has an active PERT program and is a Founding Member of the National PERT Consortium
Rationale for a Systems Approach

- PE patients are cared for and discharged from all business units and over 50 different services

- Applying a standardized approach to PE diagnosis and treatment may:
  - Decrease length of stay
  - Improve compliance with guideline directed therapy
  - Assure standardized follow up: timing of appointments, testing, education about disease state
  - Decrease readmission rates
  - Improve survival / outcomes
PERT Mission

- **Mission**
  - Advance the diagnosis, treatment, and outcomes of patients with PE

- **Goal**
  - Improve patient outcomes through the use of a standardized, collaborative, multidisciplinary, team-based urgent consult to treat massive and submassive PE
PERT Activation

Suspected PE

- Massive or Sub-massive

Outside Hospital Call with PE

- Call Center Page Level I Attending

Transfer Accepted

- Page to Cardio, Pulm, and Pharm

- Bedside Evaluation

Determine Stability and Risk

- Staff with PERT Attending

- Write PERT Note

- Use PERT Order Set

Admit

- Initiate Anticoagulation

- Activate Pharmacy

- Activate Cath Lab

- Activate OHS

Adm or Txf

Pulmonary Embolism Transfer Guideline

After PE Diagnosis is Confirmed

Stable or Unstable?

- RV strain on Echo or CT?
- Elevated Troponin or BNP?

Stable

- SBP > 100
- No Syncope

Initiate Anticoagulation

Unstable

- SBP < 100
- Syncope
- Respiratory Distress

Call Transfer Hotline for immediate PE triage consult 614-366-8111

Obtain Simplified PESI Score

<table>
<thead>
<tr>
<th>Simplified PESI</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Age &gt; 65</td>
<td>1</td>
</tr>
<tr>
<td>History of disease</td>
<td>1</td>
</tr>
<tr>
<td>History of chronic pulmonary disease</td>
<td>1</td>
</tr>
<tr>
<td>HR &gt; 110 bpm</td>
<td>1</td>
</tr>
<tr>
<td>SBP &lt; 100 (mmHg)</td>
<td>1</td>
</tr>
<tr>
<td>DVT, VTE, PE</td>
<td>1</td>
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</tbody>
</table>

- PESI = 0
  - Routine Care
  - Consult as needed

- PESI > 1
  - Call Transfer Hotline for immediate PE triage consult 614-366-8111

Treatment Options Include:

- Immediate transfer for intervention (ultrasound assisted thrombolysis, surgical thrombectomy, catheter assisted thrombectomy)
- Systemic thrombolysis with subsequent transfer
Treatment Options

- **Systemic Thrombolysis**
- **ECMO** (bridge to other treatment options)
- **Catheter Directed Thrombolysis (EKOS)**
- **Catheter Based Thrombectomy**
- **Surgical Thrombectomy**
- **Anticoagulation Therapy**
**PERT Inpatient Follow-Up**

- Admit
  - Provide inpatient education on PE

- Discharge
  - Call Outside Provider to discuss details of tx and follow-up
  - Set-up 7-14 day follow-up with Pharm and 3 month follow-up with PE clinic

- Monitoring of Vital Signs and anticoagulation

- Concerning Change in Vitals
  - Yes
    - Notify Primary Team or PERT
  - Anticoag Appropriately?
    - Yes
      - Pharmacist Coordinate Discharge Anticoag
    - Pharmacist to offer Bedside Delivery
    - Pharmacist to Coordinate Follow up with Case Manager

- Review Initial PERT Note

**PERT Outpatient Follow-Up**

- Discharge
  - Call Outside Provider to discuss details of tx and follow-up
  - 7 - 14 day Pharmacy follow-up Anticoag, visit/call

- 3 month phone call from nurse navigator

- Nurse navigator verify follow-up testing/labs

- D/C From PERT

- D/C From PERT

- Call Outside Provider to discuss details of treatment and follow-up

- D/C From PERT

- Refer to: Pulm HTN, Heme, etc

- Determine Hypercoag Testing
  - Need for Repeat ECHO
  - Duration of Anticoag

- 3 month follow-up with PE Clinic/nurse navigator

- 3 month follow-up with PERT

- Medication Therapy Management Concerns

- Internal F/U

- Outside F/U
Take Home Points: Pulmonary Embolism

- Diagnosis can be challenging
- Time critical condition / high mortality
- Treatment decisions can be complex
- Outpatient management is an essential component of care

Using a **Systems Approach** to manage PE will improve compliance with guideline directed therapy and lead to improved patient outcomes