R-SCAN Story to Share: Improvement in Emergency Department Utilization of Appropriate Use Criteria for CT Pulmonary Embolism

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A prospective study was conducted in collaboration with emergency department (ED) physicians to evaluate imaging appropriateness of patients with suspected pulmonary embolism (PE).
A prospective three phase study was conducted utilizing ACR R-SCAN guidelines and ACR Appropriateness Criteria for CT PE studies, a shared Choose Wisely goal of the American College of Emergency Physicians.
MATERIALS/METHODS

- Phase one: reviewing medical record of 110 consecutive ED CT PE studies for appropriateness criteria.
- Phase two: formal presentation of results to ED staff followed by multidisciplinary development of Hospital Practice Guideline for PE.
- Phase three: reviewing medical record of 110 consecutive ED CT PE studies, post-intervention 6 months following educational implementation.
Data review including Modified Wells Score, Simplified Geneva Score and D-Dimer values:

- A score of 9 assigned for positive Wells or Geneva scores (high clinical suspicion) or positive D-Dimer.
- A score of 3 assigned for negative Wells and Geneva scores (low clinical suspicion) in which no D-Dimer was performed.
- A score of 1 assigned for no documented clinical suspicion for PE or for low clinical suspicion and negative D-Dimer.

Scores \( \leq 6 \) considered inappropriate. Scores \( \geq 7 \) considered appropriate.
Phase 1:

- 110 consecutive studies were included:
  - Score 1 for 28 studies (25.5%) including 17 studies (15.5%) with absent clinical suspicion and 11 studies (10%) with low clinical suspicion and negative D-Dimer.
  - Score 3 for 16 studies (14.5%).
  - Score 9 for 66 studies (60%) including 47 studies (42.7%) with high clinical suspicion and 19 (17.3%) studies with low clinical suspicion and positive D-Dimer.
RESULT

Phase 2:

- Sharing of results and educational intervention
  - Formal PowerPoint presentation of Phase 1 results to the ER team.
  - Multidisciplinary creation of algorithm for evaluation of PE based on appropriateness criteria.
  - 6 months allowed for ER integration of established protocol.
Phase 3:

- 110 consecutive studies were included post intervention:
  - Score 1 for 17 studies (15.5%) with absent clinical suspicion (0 studies for low clinical suspicion and negative D-Dimer).
  - Score 3 for 5 studies (4.5%).
  - Score 9 for 88 studies (80%) including 74 studies (67.3%) with high clinical suspicion and 14 studies (12.7%) with low clinical suspicion and positive D-Dimer.
<table>
<thead>
<tr>
<th>ACR Appropriateness</th>
<th>Pre Intervention</th>
<th>Post Intervention</th>
<th>Total (%)</th>
<th>Pre Intervention</th>
<th>Post Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Score 9</strong></td>
<td></td>
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<tr>
<td>(Appropriate)</td>
<td>High clinical suspicion</td>
<td>47 (42.7%)</td>
<td>74 (67.3%)</td>
<td>66 (60%)</td>
<td>88 (80%)</td>
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<td></td>
<td>Low clinical suspicion but Positive D-Dimer</td>
<td>19 (17.3%)</td>
<td>14 (12.7)</td>
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<tr>
<td><strong>Score 3</strong></td>
<td>Low clinical suspicion with No D-Dimer performed</td>
<td>16 (14.5%)</td>
<td>5 (4.5%)</td>
<td>16 (14.5%)</td>
<td>5 (4.5%)</td>
</tr>
<tr>
<td>(Inappropriate)</td>
<td></td>
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<tr>
<td><strong>Score 1</strong></td>
<td>Low clinical suspicion and Negative D-Dimer</td>
<td>17 (15.5%)</td>
<td>17 (15.5%)</td>
<td>28 (25.5%)</td>
<td>17 (15.5%)</td>
</tr>
<tr>
<td>(Inappropriate)</td>
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RESULTS

Pre and Post Intervention

- ACR Appropriate: Pre Intervention 60%, Post Intervention 80%
- ACR Inappropriate (Total): Pre Intervention 40%, Post Intervention 20%
- ACR Inappropriate (Low Clinical Suspicion and Negative D-Dimer): Pre Intervention 10%, Post Intervention 0%
CONCLUSION

- Positive impact of multidisciplinary collaborative educational intervention.

- Significant improvement in ED utilization of appropriateness criteria when utilizing CT for PE.
  - No post intervention CTs ordered for low clinical suspicion and negative D-Dimer.
    - Decrease from 10% to 0%.
  - Opportunity for improvement incidentally found in ER chart documentation when ordering PE CTs.
    - 20% no documentation of suspicion for PE.