Cost Analysis of Pulmonary Embolism Treatment: Time-Driven Activity-Based Cost Determination and Variability Amongst Catheter-Based Pulmonary Embolism Interventions

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Introduction

- Pulmonary embolisms (PE) are one of the leading cardiovascular causes of death in the United States, with an estimated 900,000 yearly cases of PE and 100,000 deaths\textsuperscript{1,2}
- Treatment plans for PE can vary based on embolus size and location, and can include CDT or LBAT interventions\textsuperscript{1,2}
- Catheter-directed thrombolysis (CDT) relies on navigation of a percutaneous transcatheter and infusion of a thrombolytic agent adjacent to the clot\textsuperscript{2}
- Large-bore aspiration thrombectomy (LBAT) using the FlowTriever system from Inari medical relies on navigation of a catheter to the clot and application of aspirational force via a large bore syringe\textsuperscript{1}
Purpose

• To use time-driven activity-based costing to characterize and compare costs of large-bore aspiration thrombectomy (LBAT) and catheter-directed thrombolysis (CDT) for acute pulmonary embolism (PE) intervention
Methods and Material

- Retrospective study
- All patients who underwent acute pulmonary embolism intervention by Interventional Radiology from January 2017 to June 2021 were identified via electronic medical records and radiology department databases
  - 24 patients who underwent LBAT for acute PE
  - 20 patients who underwent CDT for acute PE
- Retrospective data were reviewed on each patient, intervention and hospitalization including demographics, equipment and personnel utilization, and clinical outcomes
- Bottom-up cost approach using TDABC was used to estimate facility costs of each PE intervention
Results

- Average procedural costs:
  - CDT intervention $3,429.76 (p< 0.001)
  - LBAT intervention $11,796.79 (p< 0.001)

Figure 1. Average total procedural cost for acute pulmonary embolism intervention
Results

- The largest component of each intervention procedural cost was equipment for LBAT (89% of total costs) and tissue plasminogen activator medication administration for CDT (62% of total costs).
- For LBAT, personnel costs accounted for 14% of total costs when anesthesia (ANS) was utilized compared to 5% of total costs for cases conducted with moderate sedation nursing monitoring (MSN).
- Personnel costs of CDT interventions, which were conducted with moderate sedation nursing monitoring, were 26% of total costs.

Figure 2. Percentage of each procedural component to total cost.
Results

• Intensive care unit length of stay for LBAT and CDT interventions were 1.8 and 3.1 days respectively (p=0.18)

Figure 3. Average length of stay in ICU by pulmonary embolism intervention with standard error
Conclusion

- Facility costs were significantly lower for CDT interventions compared to LBAT interventions, with a non-significant trend towards shorter ICU length of stay with LBAT interventions.

- These cost measurements may help with the cost-effectiveness analysis and cost reduction strategies for acute PE treatment decision making.
References
