

# Performance of an Augmented Pulmonary Embolism Severity Index in Identifying ED Patients at Low Risk for Major 5-day Adverse Events

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## Background

- The Pulmonary Embolism (PE) Severity Index (PESI) identifies ED patients (pts) at low risk of 30-day mortality and has been extensively validated.
- Two retrospective studies found that up to 8% of low-risk PESI patients experienced at least 1 adverse event at 5 days (5d).
- We hypothesized that the PESI would perform better if augmented by standard outpatient (outpt) ineligibility criteria.

## Objectives

To compare 5d event rates among low-risk PESI pts without and with outpt ineligibility criteria.

## Methods

We conducted a retrospective cohort study of ED pts with acute PE and low-risk PESI scores (Class I and II;  $\leq 85$  points) at 3 community hospitals from 2010 to 2012. Adults were included if they had symptomatic PE, objectively-confirmed by pulmonary imaging. We reviewed the electronic health records for outpt ineligibility criteria and 5d adverse events, defined from the PE literature. We also compared ED dispositions and 30d outcomes between groups without and with any outpt ineligibility criteria.

## Study Cohort

Of the 327 pts, 200 (61.2%) were female; mean age was  $51.4 \pm 15.8$  yrs (range 18-85). 125 pts (38.2%) had  $\geq 1$  outpt ineligibility criteria, listed in Table 1.

**Table 1. Outpt Ineligibility Criteria\***

	n=327 No (%)
<b>PE-related Factors</b>	
Right heart strain (diagnosed on echocardiogram or CT) or elevated cardiac biomarkers (troponin $>0.09$ ng/mL or brain natriuretic peptide $>500$ pg/mL)	35 (10.7)
Syncope or presyncope	26 (8.0)
Hypotension (SBP $<100$ mm/Hg)	16 (4.9)
Hypoxemia (oxygen sat $< 90\%$ )	11 (3.4)
Saddle embolus	11 (3.4)
Co-existing major deep vein thrombosis (DVT) (high segment femoral, bilateral, iliac, or phlegmasia cerulea/alba dolens)	10 (3.1)
INR $\geq 2.0$ or already taking therapeutic doses of anticoagulants	4 (1.2)
<b>Comorbidities</b>	
Major surgery $<14$ days	14 (4.3)
Non-PE diagnosis that requires inpt care	9 (2.8)
Active bleeding or need for transfusion	6 (1.8)
<b>Barriers to Treatment Adherence</b>	
Worrisome alcohol or illicit drug use	10 (3.1)
Social issues (e.g., lack of phone, transport)	7 (2.1)
Psychosis or dementia	7 (2.1)

\* Events are included in the table if they occurred in at least 1% of the cases

## Comparing the Two Groups

ED pts without outpt ineligibility criteria were:

- Scored lower on PESI (62.3 vs 66.3;  $P < .05$ )
- More commonly discharged home (10.4% vs 1.6%; diff. 8.8%; 95% CI, 3.4 to 13.9%)
- Less commonly admitted to the ICU (0.5% vs 8.0%; diff. 7.5%; 95% CI, 3.3 to 13.6%).

Only 2 pts had 5d adverse events (below).

**Table 2. Pts with 5d Adverse Events**

Adverse Events	Outpt Ineligibility Criteria (n=327)	
	None n=202	$\geq 1$ n=125
<b>Total</b>	<b>0</b>	<b>2</b>
PE clot extraction or thrombolysis	0	1*
Respiratory support (NRB mask, non-invasive ventilation, or intubation)	0	1†
New cardiac dysrhythmia (treated)	0	0
IV vasopressors or inotropics	0	1†
Defibrillation or CPR	0	0
Recurrent PE	0	0
Major hemorrhage ‡	0	1*
Death	0	0

\* † Both in one pt ‡ Defined by location (retroperitoneal, pericardial, intra-cranial/spinal/ocular/articular, IM c compartment syndrome), transfusion  $\geq 2$  units PRBCs, or hgb drop  $\geq 2$  gm/dL

## 5d Adverse Events

There was no statistically significant difference between the groups in 5d adverse event rate ( $P = .14$ ). The 2 pts with 5d events had these during their initial hospitalization. No events occurred in the cohort during a return ED visit or second inpt stay.

## Major 30d Outcomes

Overall, 316 (96.6%) had complete follow-up through 30d, with 12 total outcomes (3.8%), as follows:

- Recurrent DVT/PE: 4 pts (1.3%)
- Major hemorrhage: 6 pts (1.9%)
- Death: 2 pts (0.6%), neither attributed to PE

Major 30d outcomes trended to lower rates in the group without outpt ineligibility criteria: 4/196 (2.0%) vs 8/120 (6.7%),  $P = 0.06$ .

## Limitations

Retrospective design, only 3 EDs in Northern CA, small sample size, rare outcomes

## Conclusions

- Outpt ineligibility criteria are common in pts with acute PE classified as low-risk on the PESI.
- The absence of these criteria is associated with ED discharge to home and low ICU admission rates.
- They identified a subset of pts with no 5d events.
- Our low rate of 30d outcomes in low-risk PESI pts is similar to published rates.
- An augmented PESI identifies a very low risk group.