

Are you **IN** or **OUT**?

Outpatient Management of Low-Risk Pulmonary Embolism (LRPE) Patients

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Agenda

- ▶ Prevalence of pulmonary embolism in the US
- ▶ Examples of low-risk PE protocols/algorithms
- ▶ Scoring tools for risk stratification
- ▶ Potential barriers to outpatient protocol development



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Prevalence and Economic Burden of Pulmonary Embolism^{1,2}



PE = pulmonary embolism; VTE = venous thromboembolism.

1. CDC. VTE Data and Statistics. 2015. 2. Schissler AJ et al. *Respir Res.* 2015;16:44.

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Case

- ▶ 20-year old African American college junior presents to her institution's health services with two days of progressive right calf pain
- ▶ Pain so severe it is hard to walk
- ▶ Patient is told it is a muscle pull
 - ▶ use heat and ibuprofen, made follow-up for 3 days later
- ▶ The following evening patient became acutely short of breath
- ▶ Called back health services who advised she follow-up on her planned visit

Case continued

- ▶ Called her mother → ER
- ▶ She had started oral contraceptive 2 months prior
- ▶ She had family history of blood clots
- ▶ CT scan chest showed pulmonary embolus

Can she be treated as an outpatient?

ER – emergency room

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Do all patients with DVT or PE
need to be admitted?

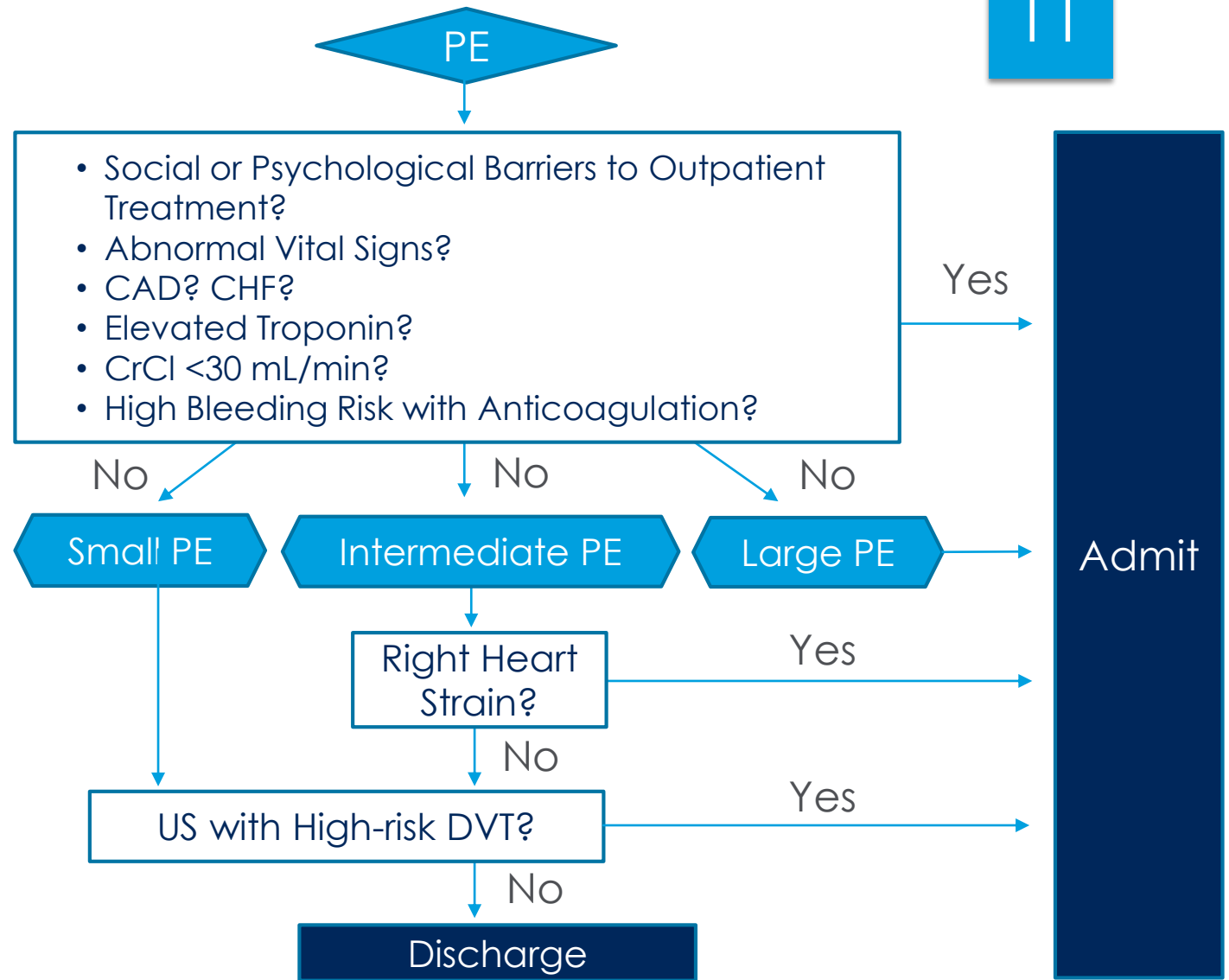
Data behind outpatient treatment

Guideline Evidence for Outpatient Treatment of VTE

***20. In patients with low-risk PE and whose home circumstances are adequate, we suggest treatment at home or early discharge over standard discharge (eg, after the first 5 days of treatment) (Grade 2B).**

- ▶ Clinically stable
- ▶ No contraindications
- ▶ Expected to be compliant with treatment
- ▶ Patient feels well enough to be treated at home and has support
- ▶ No presence of right ventricular dysfunction or increased cardiac biomarker levels

Protocol Example



CAD = coronary artery disease;
CHF = congestive heart failure; US = ultrasound.
Kabrhel et al. *Acad Emerg Med.* 2019;26:657-669.

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Outpatient treatment of DVT/PE

Timely follow up is most important component

- 2,212 patients

Kabrhel et al. *Acad Emerg Med.* 2019;26:657-669

Table 2
Outpatient VTE Treatment

	Before Protocol	After Protocol	Absolute Difference (95% CI)	Risk Ratio (95% CI)
Total				
PE (with or without identified DVT)	12% 79/661	18% 120/663	6% (2% to 10%)	1.51 (1.16 to 1.97)
Low-risk PE*	18% 65/365	28% 101/355	11% (5% to 17%)	1.60 (1.21 to 2.10)
DVT (without identified PE)	49% 207/420	60% 279/468	10% (4% to 17%)	1.21 (1.07 to 1.37)
All VTE	26% 286/1,081	35% 399/1131	9% (5% to 13%)	1.33 (1.17 to 1.51)
MGH				
PE (with or without identified DVT)	15% (51/344)	24% 78/325	9% (3% to 15%)	1.62 (1.18 to 2.23)
Low-risk PE*	22% (45/202)	37% 70/190	15% (6% to 24%)	1.65 (1.2 to 2.27)
DVT (without identified PE)	53% (135/255)	62% 183/293	10% (1% to 18%)	1.18 (1.02 to 1.37)
All VTE	31% 186/599	42% 261/618	11% (6% to 17%)	1.36 (1.17 to 1.58)
BWH				
PE (with or without identified DVT)	9% 28/317	12% 42/338	4% (-1% to 8%)	1.41 (0.89 to 2.21)
Low-risk PE*	12% 20/163	19% 31/165	7% (-1% to 14%)	1.53 (0.91 to 2.57)
DVT (without identified PE)	44% 72/165	55% 96/175	11% (1% to 22%)	1.26 (1.01 to 1.57)
All VTE	21% 100/482	27% 138/513	6% (1% to 11%)	1.30 (1.04 to 1.62)

Low-risk PE is defined as PE distal to main pulmonary arteries, no right ventricular dilatation, hypokinesis or septal bowing on echocardiogram, no evidence of right heart strain on computed tomography, troponin T negative. If echocardiographic data were unavailable or not performed, they were assumed to be negative.

BWH = Brigham and Women's Hospital; DVT = deep vein thrombosis; MGH = Massachusetts General Hospital; PE = pulmonary embolism; VTE = venous thromboembolism.

Follow-Up Clinic: Key Considerations



**Every clinic is different.
What will work for you?**

- ✓ **Needs**
- ✓ **Resources**
- ✓ **Existing clinic or new**
- ✓ **Multidisciplinary**

Logistics

- ▶ Leader
- ▶ Administrative support
- ▶ Funding
- ▶ Schedule regular meetings to evaluate clinic
- ▶ Set up goals up front and readdress regularly

Structure

- ▶ How often
- ▶ Where
- ▶ Who
- ▶ When
- ▶ What

Follow-Up Clinic: Actions

Follow-Up Care

- ▶ Review clinical course
- ▶ Further work up
 - ▶ Inquiry into etiology of PE
- ▶ Address treatment
 - ▶ IVC filter; compression stockings
 - ▶ Anticoagulation
- ▶ Assess for new symptoms; screen for long-term complications

IVC = inferior vena cava

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Follow-Up Clinic: Lesson Learned

- ▶ Schedule follow up clinic before discharge from ER; put in patient's discharge summary
- ▶ Description of follow up in discharge summary
- ▶ Case manager check insurance if covered and if not, set up with local specialists (start with PCP)
- ▶ Letter to patient prior to appointment
- ▶ Call to patient prior to appointment
- ▶ Follow-up testing before clinic

Case Follow-Up

Take Home Message

- ▶ PE is a major cause of morbidity and mortality worldwide
- ▶ Evidence supports the treatment of low-risk PE in an outpatient setting
- ▶ Having a comprehensive and robust follow-up system for these patients is essential

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Risk Stratification Tools

- ▶ PESI
- ▶ sPESI
- ▶ HESTIA



Pulmonary Embolism Severity Index (PESI)

	Points assigned		Points assigned
Age	Age in years	Pulse ≥ 110 min	+20
Male sex	+10	SBP < 100 mm Hg	+30
Cancer	+30	Resp rate ≥ 30	+20
Heart failure	+10	Temp $< 36^{\circ}\text{C}$	+20
Chronic lung disease	+10	Altered mental status	+60
		O ₂ sat $< 90\%$	+20

PESI score	Class	Low vs high risk
≤ 65	I	Low
66-85	II	Low
86-105	III	High
106-125	IV	High
> 125	V	High

Simplified PESI (sPESI)

0, low risk. 1 or more, high risk.

- ▶ Age >80 years
- ▶ **History of cancer**
- ▶ History of heart failure or chronic lung disease
- ▶ Pulse >110 beats/min
- ▶ SBP <100 mm Hg
- ▶ **O₂ sat <90%**



HESTIA

Identifies low-risk PE if

- ▶ Not hemodynamically unstable
- ▶ No thrombolysis or embolectomy necessary
- ▶ Not actively bleeding or at high risk of bleeding
- ▶ O₂ saturation >90%*
- ▶ No PE diagnosed during anticoagulation
- ▶ No pain requiring IV meds for >24 hours
- ▶ No medical or social reason for treatment in the hospital for >24 hours
- ▶ Creatinine clearance ≥30 mL/min
- ▶ No severe liver impairment
- ▶ No pregnancy
- ▶ No documented history of HIT

* Not requiring >24 hours on supplemental oxygen to maintain. HIT = heparin-induced thrombocytopenia. Zondag et al. *J Thromb Haemos*. 2011;9:1500-1507.

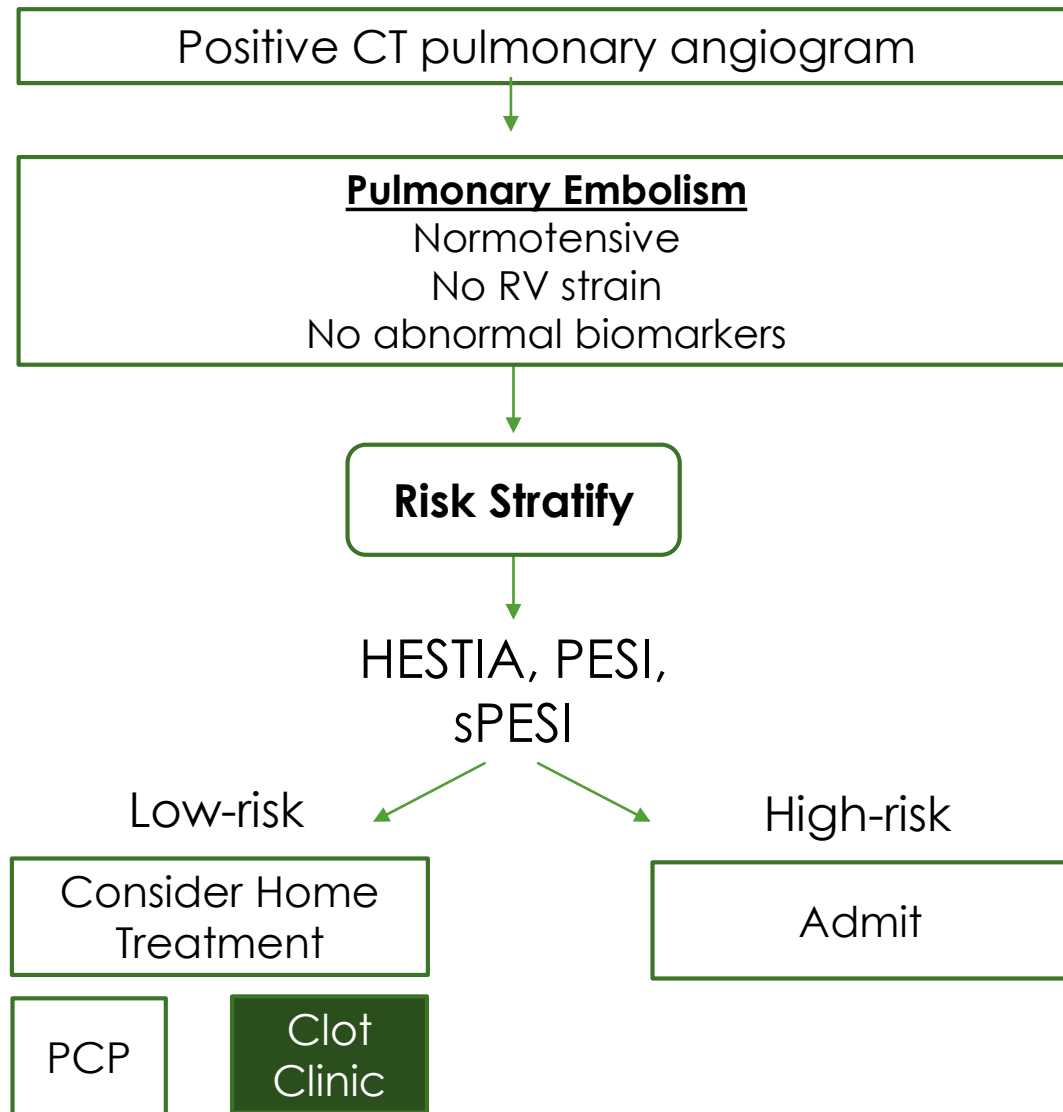
Top Concerns for Immediate Discharge

A survey of IU Health faculty showed:

- ▶ 42% Follow up*
- ▶ 40% I've never done it before/too unfamiliar
- ▶ 33% A DOAC might be too expensive
- ▶ 24% I'm worried about medico-legal liability*
- ▶ 21% I still feel more comfortable if they are hospitalized
- ▶ 21% It's easier to admit them than discharge



* Percentages are rounded to the nearest whole number.
Kline et al. *Patient Prefer Adherence*. 2016;10:561-569.



How is a patient referred to the Clot Clinic?

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Embolism (Clot) Clinic

Metrics

- >700 patients seen (354 Methodist alone)
- ~25% pulmonary embolism
- If determined life-long anticoagulation, patient transitioned to primary care

- ▶ Operated at two hospitals
- ▶ Referral clinic from area EDs
- ▶ One operated by Nurse Practitioners and one operated by Pharmacists
- ▶ Patients seen 2-5 weeks after diagnosis



Key Learnings at IU

- ▶ Outpatient treatment is now feasible
- ▶ Safety has already been demonstrated
- ▶ Patient satisfaction is increased
- ▶ Costs are lower



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Multidisciplinary Teams Are A Must

- ▶ Emergency Department was main driver, but it took a multidisciplinary team to make it work
 - ▶ Hematology
 - ▶ Pharmacy
 - ▶ Transition (Outpatient) Clinic
 - ▶ Internal Medicine

Outpatient PE Protocol Example



POWER PLAN ACTIVATES:

- Pharmacy: generates a 30-day prescription and free trial card
- Transition Clinic: Prompts staff to make call within 72 hours to schedule patient for follow-up appointment

MED DELIVERY ENSURES:

- Patient can leave ED with 30-days worth of medication*: Outpatient pharmacy delivers within 1 hour to ED or patient given To-Go Pack
- Patient gets same level of care regardless of hospital site

*Unless picking up at retail pharmacy upon discharge.

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Patient Case – LM

History of Present Illness

LM is a 57 y/o male who presents to the ED with chest pain and shortness of breath

Vital Signs

BP: 125/82
HR: 95
RR: 16
O₂ sat: 96% RA

Labs

No abnormal biomarkers
Scr: 0.7
No elevated LFTs
Platelets: $175 \times 10^9/L$

Imaging

Positive CTPA



Patient Case - LM

If LM presents to a
main hospital ED...



Patient discharged with

30-day supply
filled and
delivered
within 1 hour
to ED

If LM presents to a
freestanding ED...



Patient discharged with

To-Go Packs
from ED
Omniceils

Protocol Outcomes

- ▶ Protocol is active at 15 Emergency Departments within the health system
- ▶ Approximately 1,000 patients have been treated
- ▶ Extremely low rates of recurrent VTE and bleeding episodes requiring hospitalization*

*Of 947 patients treated, 9 experienced recurrent VTE and 11 experienced bleeding that required hospitalization.

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Thank You!