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KEY ADVANCES
CLINICAL POLICY ALERT

Outpatient Treatment for Pulmonary Embolism

Reconfirmed May 2024

Based primarily on 2021 Guideline Update on Antithrombotic Therapy for Venous Thromboembolism (VTE) Disease
Stevens SM, Woller SC, Kreuziger LB, Bounameaux H, Doerschug K, Geersing GJ, Huisman MV, Kearon C, King CS, Knighton AJ, Lake E, Murin S, Vintch JRE, Wells PS, Moores LK. Antithrombotic therapy for VTE disease: second update of the CHEST Guideline and Expert Panel Report. Chest. 2021;160(6):e545-e608. doi:10.1016/j.chest.2021.07.055. PMID: 34352278. Erratum in: Chest. 2022;162(1):269. (1)

Policy Recommendations and Focus Points in bold

Clinical Question: In patients with low-risk pulmonary embolism (PE), is outpatient treatment recommended?

Patient Management Recommendation:

In patients with low-risk PE, we recommend outpatient treatment over hospitalization provided access to medications, ability to access outpatient care, and home circumstances are adequate (strong recommendation, low-certainty evidence). (1)

Key Points:

- Treatment at home is more convenient and less expensive than hospitalization and is preferred by most patients. (1)
- Treatment with direct oral anticoagulants (DOACs) (e.g., apixaban or rivaroxaban) makes outpatient therapy more accessible and less complicated. (1)
- To help identify low-risk patients suitable for home treatment, physicians may use clinical decision instruments, such as the Hestia criteria, or clinician judgment in conjunction with a simplified Pulmonary Embolism Severity Index (sPESI). (1,2)

- Patients with evidence of right ventricular (RV) strain or increased troponin/B-type natriuretic peptide (BNP) levels should be considered for hospitalization, given their higher risk for poor outcomes. (1) RV strain pattern on electrocardiogram (ECG), RV abnormality on computed tomography (CT), or elevated troponin/BNP should prompt a diagnostic echocardiogram.
- Although the evidence base supporting the guideline recommendations is considered weak, it is consistent with the results of 2 recent systematic reviews that reported no difference in outcomes among patients with low-risk PE, whether treated as inpatients or outpatients. (1,3,4)

Patient Risk Stratification

The initial disposition of patients with PE should be guided by an assessment of clinical patient risk. Risk stratification can be accomplished by classifying patients into the following three categories (5):

- High-risk: signs of shock, end-organ damage or hypoperfusion, hypotension, or cardiac arrest
- Intermediate-risk: evidence of right-heart strain on imaging (ECG, CT, echocardiogram), elevated troponin, and/or elevated BNP
- Low-risk: clinically stable without evidence of high-risk or intermediate-risk features *and* low-risk assessment using a clinical decision tool, such as the Hestia criteria or sPESI score + physician judgment (see diagram)

Patients with high- or intermediate-risk criteria should be hospitalized for inpatient treatment.

In the HOME-PE trial by Roy et al., a randomized study comparing the Hestia criteria with the sPESI, both strategies had similar safety and effectiveness, allowing more than one third of patients to be treated safely at home. Importantly, both scoring tools were considered complementary to the physician's clinical judgment. The treating physician was able to overrule the triaging tool in cases when admission was prudent for medical or social reasons.(2) The MATH-VTE trial conducted by Kline et al. demonstrated real-world efficacy and safety of monotherapy oral anticoagulation to treat patients with deep vein thrombosis and PE in the emergency care setting who are deemed low risk by either the modified Hestia criteria or sPESI plus clinical judgment. In this study, eligible patients with a variety of PE locations (including subsegmental, segmental, lobar, and main pulmonary artery) were treated successfully as outpatients. In addition, the 30-day rate of PE and VTE recurrence was low (1.0%), the rate of subsequent bleeding complications requiring hospitalization was 0.8%, and, importantly, there were no deaths. (6) These studies support the ability of these clinical decision tools to safely risk stratify patients to outpatient DOAC therapy.

If the patient has no high- or intermediate-risk criteria, evaluate the patient for low risk using Hestia criteria or clinician judgment plus sPESI:

Criteria for low-risk (adapted from Kline J, Adler D, Alanis N, et al. Study protocol for a multicentre implementation trial of monotherapy anticoagulation to expedite home treatment of patients diagnosed with venous thromboembolism in the emergency department. BMJ Open 2020;10[10]:e038078). (7)

The modified Hestia criteria (all must be true):

- Systolic blood pressure >100 mm Hg
- No thrombolysis needed
- No active bleeding
- SaO_2 >94% while breathing room air
- Not already anticoagulated
- No more than two doses of intravenous narcotics in the emergency department
- No other medical or social reasons to admit
- Creatinine clearance >30 mL/min
- Not pregnant, no severe liver disease or heparin-induced thrombocytopenia

OR

Physician judgment plus sPESI criteria
The physician opinion that a patient's overall social and medical situation is favorable for home treatment* and the patient has a zero score on the sPESI.

All of the following must be true:

- Age 18–81 years
- No history of cancer
- No history of heart failure or chronic lung disease
- Pulse <110 beats/min
- Systolic blood pressure >99 mm Hg
- O_2 saturation >89%

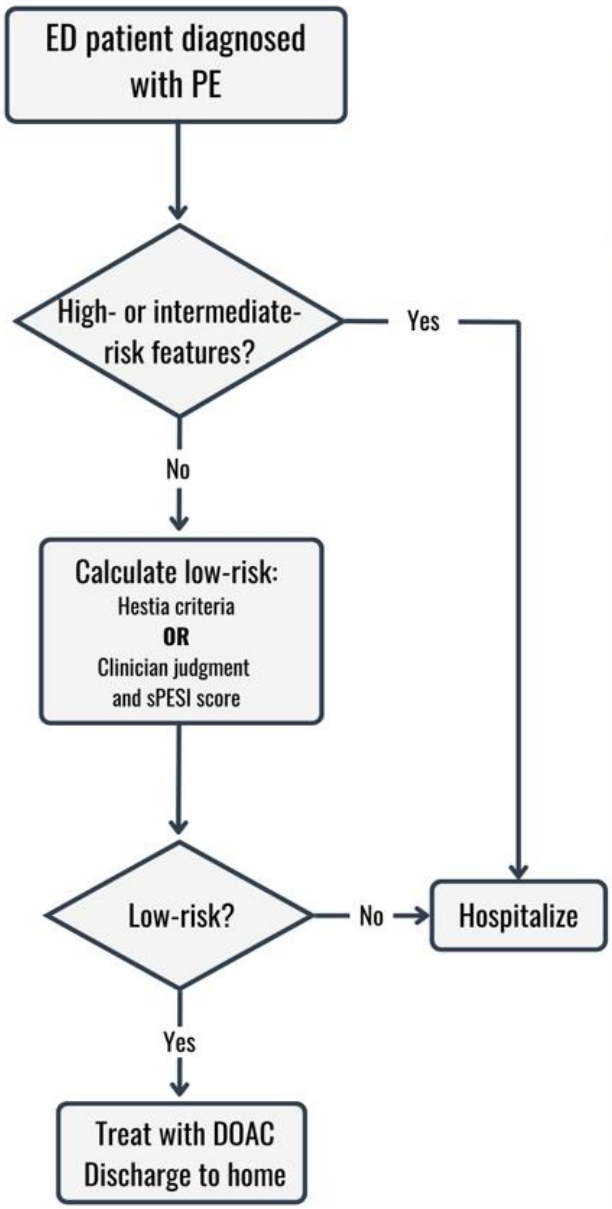
*Examples of additional social and medical factors include: Does the patient have the ability to obtain (i.e., pay for) medication? Does the patient have access to expeditious outpatient follow-up? Does the patient have adequate home circumstances (family and social support)?

Disposition Determination

Recent guidelines recommend that patients classified as low-risk PE can be started on a DOAC and managed at home. The expert panelists placed "a very high value on avoiding the potential increase in risk of harm (including much greater cost) related to hospitalization even though the magnitude of benefit is similar." (1)

Patients who are classified as low risk by Hestia criteria or clinician judgment and sPESI score, have access to DOAC medication and outpatient follow-up, and have appropriate social support can be discharged home with outpatient therapy.

PE Treatment Algorithm



Risk Stratification

High-risk: Signs of shock, end-organ damage or hypoperfusion, hypotension, or cardiac arrest.

Intermediate-risk: Evidence of right-heart strain on imaging (ECG, CT, echocardiogram), elevated troponin, and/or elevated BNP.

Low-risk:

Modified Hestia criteria (all must be true):

- Systolic blood pressure > 100 mm Hg
- No thrombolysis needed
- No active bleeding
- SaO_2 > 94% on room air
- Not already anticoagulated
- No more than two doses of intravenous narcotics in the emergency department
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References:
1. Kahn SR, de Wit K. Pulmonary embolism. N Engl J Med. 2022;387:45-57. doi:10.1056/NEJMcp2116489
2. Kline J, Adler D, Alanis N, et al. Study protocol for a multicentre implementation trial of monotherapy anticoagulation to expedite home treatment of patients diagnosed with venous thromboembolism in the emergency department. BMJ Open. 2020 Oct 1;10(10):e038078. PMID: 33004396; PMCID: PMC7534683

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1. Stevens SM, Woller SC, Kreuziger LB, Bounameaux H, Doerschug K, Geersing GJ, Huisman MV, Kearon C, King CS, Knighton AJ, Lake E, Murin S, Vintch JRE, Wells PS, Moores LK. Antithrombotic therapy for VTE disease: second update of the CHEST Guideline and Expert Panel Report. *Chest.* 2021;160(6):e545-e608. doi:10.1016/j.chest.2021.07.055. PMID: 34352278. Erratum in: *Chest.* 2022;162(1):269.

2. Roy PM, Penaloza A, Hugli O, Klok FA, Arnoux A, Elias A, Couturaud F, Joly LM, Lopez R, Faber LM, Daoud-Elias M, Planquette B, Bokobza J, Viglino D, Schmidt J, Juchet H, Mahe I, Mulder F, Bartiaux M, Cren R, Moumneh T, Quere I, Falvo N, Montaclair K, Douillet D, Steinier C, Hendriks SV, Benhamou Y, Szwebel TA, Pernod G, Dublanchet N, Lapebie FX, Javaud N, Ghuysen A, Sebbane M, Chatellier G, Meyer G, Jimenez D, Huisman MV, Sanchez O; HOME-PE Study Group. Triaging acute pulmonary embolism for home treatment by Hestia or simplified PESI criteria: the HOME-PE randomized trial. *Eur Heart J*. 2021;42(33):3146-3157. doi:10.1093/eurheartj/ehab373. PMID: 34363386; PMCID: PMC8408662.

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4. Maughan BC, Frueh L, McDonagh MS, Casciere B, Kline JA. Outpatient treatment of low-risk pulmonary embolism in the era of direct oral anticoagulants: a systematic review. *Acad Emerg Med.* 2021;28(2):226-239. doi:10.1111/acem.14108. PMID: 32779290.

5. Kahn SR, de Wit K. Pulmonary embolism. *N Engl J Med.* 2022;387:45-57. doi:10.1056/NEJMcp2116489.

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Resources for Additional Learning:

Link to full guideline: https://journal.chestnet.org/article/S0012-3692(21)01506-3/fulltext

Pulmonary Embolism Severity Index (PESI): https://www.mdcalc.com/calc/1304/pulmonary-embolism-severity-index-pesi

https://thesgem.com/2021/03/sgem323-momma-im-comin-home-for-outpatient-treatment-of-a-pulmonary-embolism/

https://emergencymedicinecases.com/best-case-ever-low-risk-pulmonary-embolism/

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Authors
Michael Brown, M.D.; Stephen Wolf, M.D. (Lead); Donald Yealy, M.D.

Editors
Christopher Carpenter, M.D.; Christopher Edwards, PharmD.; Marianne Gausche-Hill, M.D.; Stephen Hayden, M.D.; Samuel Keim, M.D., M.S.; John Marshall, M.D., M.B.A.; Ernest Wang, M.D.