Letters to the Editor

Treatment for Patients With Acute Pulmonary Embolism Diagnosed in Primary Care

To the Editor: Evidence shows that patients with acute pulmonary embolism (PE) can be treated as outpatients effectively and safely.[1] Guidelines recommend outpatient treatment for patients who meet low-risk criteria; however, eligibility criteria vary.[2,3] The American College of Chest Physicians recommends outpatient care for adults who meet the following criteria: "(1) clinically stable with good cardiopulmonary reserve; (2) no contraindications such as recent bleeding, severe renal or liver disease, or severe thrombocytopenia (i.e., < 50,000 per mm^3); (3) expected to be compliant with treatment; and (4) the patient feels well enough to be treated at home."[2] The patient must also have access to treatment and follow-up care.

The definition of outpatient care varies in the literature.[4] PE is most commonly diagnosed in the emergency department, but some studies include patients diagnosed in outpatient clinics.[1] Another point of variation besides diagnostic location is the location and duration of medical observation between diagnosis and discharge. Most studies include an observation period involving prolonged emergency department monitoring and at least one night in an observation unit or inpatient ward.[4] Until recently, only case reports described patients treated in the primary care setting without referral to a more specialized level of care.[1,5]

We recently published a retrospective multicenter cohort study describing the characteristics, treatment, and outcomes of adult patients diagnosed with acute PE in the primary care setting.[6] From 2013 to 2019, investigators identified 652 patients whose community-based primary care clinicians (98% family medicine or internal medicine physicians) secured a diagnosis using computed tomographic pulmonary angiography or ventilation-perfusion scintigraphy. Outcomes of patients treated without hospitalization included seven-day hospitalization with symptoms related to PE and 30-day serious outcomes (i.e., major bleeding, recurrent venous thromboembolism, or all-cause mortality).

One-third of these patients were treated with a direct oral anticoagulant, and 20.5% (n = 134) went home from the clinic. Of the 79.5% (n = 518) who were referred to the emergency department, 196 (30% of the entire cohort) were discharged home after a brief evaluation (median = 3 hours). Of the 50.5% (n = 330) of total patients treated without hospitalization, 1.8% (n = 6) required hospitalization within seven days for symptoms related to PE, and 0.3% (n = 1) experienced a 30-day outcome (nonfatal worsening PE). This study is the first to demonstrate that outpatient treatment of patients in the primary care setting with acute PE can be feasible and safe *(Table 1[1])*.[6]

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This series is coordinated by Kenny Lin, MD, MPH, deputy editor.

TABLE 1

Resources for Primary Care–Based Treatment of Ambulatory Adults With Acute PE

Elements	Resources	Examples
Diagnostic evaluation of patients with signs and symptoms suggestive of acute PE	Validated risk scores	PERC (pulmonary embolism rule-out criteria), Wells criteria, YEARS criteria, 4PEP (4-level pulmonary embolism clinical probability score)
	Electrocardiography	12-lead electrocardiogram
	Laboratory	Hemoglobin, troponin, D-dimer, B-type natriuretic peptide
	Radiography	Chest radiograph, computed tomographic pulmonary angiography, compression ultrasound; may require radiologist to discuss findings
	Nuclear medicine	Ventilation-perfusion scintigraphy
Determination of outpatient eligibility for patients with confirmed PE	Vital signs	Systolic blood pressure, pulse, respiratory rate, peripheral cutaneous oxygen saturation, temperature
	Laboratory	Biomarkers of right ventricular dysfunction (e.g., troponin)
	Radiology	Compression ultrasonography to evaluate for concurrent deep venous thrombosis; assessment of right ventricular dysfunction (e.g., using computed tomographic pulmonary angiography or echocardiography if deemed appropriate); may require radiologist to discuss findings
	Validated risk scores	PESI (pulmonary embolism severity index), Hestia clinical decision rule
	Additional consultants	Thrombosis specialist (e.g., pulmonologist, hematologist); radiologist (e.g., to confirm diagnosis of subsegmental PE)
Anticoagulation	Laboratory	Complete blood count, estimated glomerular filtration rate (or serum creatinine), alanine transaminase
	In-office medications	Initiate treatment before pulmonary imaging or discharge patient to pharmacy, depending on risk assessment
	Pharmacy	Direct oral anticoagulants, low-molecular-weight heparins, or warfarin (Coumadin)
Education of patient and family or caregivers	Information on the disease and treatment, including what to expect and what to watch for	Clinician: conversation supplemented with printed or electronic discharge instructions; pharmacist may supplement education on proper medication use, adverse effects, and complications
Arrangement for close follow-up	Appointment access	Primary or specialty care; telephone-based anticoagulation management service, if available

PE = pulmonary embolism.

Note: Resource availability and clinical application vary significantly by patient, clinician, and practice setting. We report common examples, which may or may not be indicated or available for every patient.

Adapted with permission from Vinson DR, Aujesky D, Geersing GJ, et al. Comprehensive outpatient management of low-risk pulmonary embolism: can primary care do this? A narrative review. Perm J. *2020;24:19.163.*