

**Washington University Emergency Medicine Journal Club**  
**Prevalence of PE in Syncope**

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**Vignette**

You're working a TCC shift with Dr. Cohn, sitting right beside you. He's drinking a Diet Coke, having not offered you one. You decide to go see your next patient, a 78 year old female, complaining of "feeling woozy". She endorses syncope, shortness of breath, and leg pain. She is saturating 89% on room air, tachycardic to 104, and BP 117/76. She has many other reasons other than a pulmonary embolism to be feeling this way, but the syncope has you thinking. You remember reading an article that was all the rage a few months ago regarding syncope as a presenting complaint for PE. It was fake news, you said. So vague. But here you are. You've got a minute, and Dr. Cohn by your side. You search the literature and gently fall into the rabbit hole...

**PICO Question**

**Population:** Adult patients presenting to the ED with syncope and those patients who were admitted to the hospital for syncope.

**Intervention:** Routine testing for pulmonary embolism (PE)

**Comparison:** Standard of care with PE workup based on clinical gestalt

**Outcome:** Prevalence of PE among these patients, mortality, development of CTEPH, adverse reaction to IV contrast, cancer rates.

**Search Strategy**

PubMed was searched using the terms "pulmonary embolism" AND prevalence AND syncope (<https://tinyurl.com/y7x4gs2u>). This resulted in 93 citations, from which 4 relevant articles were chosen.

**Article 1:** [Prandoni P, Lensing AW, Prins MH, et al; PESIT Investigators. Prevalence of Pulmonary Embolism among Patients Hospitalized for Syncope. N Engl J Med. 2016 Oct 20;375\(16\):1524-1531. \[Answer Key\]\(#\).](#)

**Article 2:** [Costantino G, Ruwald MH, Quinn J, et al. Prevalence of Pulmonary Embolism in Patients With Syncope. JAMA Intern Med. 2018 Jan 29. \[Answer Key\]\(#\).](#)

**Article 3:** [Frizell A, Fogel N, Steenblik J, Carlson M, Bledsoe J, Madsen T. Prevalence of pulmonary embolism in patients presenting to the emergency department with syncope. Am J Emerg Med. 2018 Feb;36\(2\):253-256. \[Answer Key\]\(#\).](#)

**Article 4:** [Oqab Z, Ganshorn H, Sheldon R. Prevalence of pulmonary embolism in patients presenting with syncope. A systematic review and meta-analysis. Am J Emerg Med. 2017 Sep 14. pii: S0735-6757\(17\)30740-4. \[Answer Key\]\(#\).](#)

## Bottom Line

In 2016, the PESIT study from Italy, published in the New England Journal of Medicine, demonstrated an extremely high prevalence of pulmonary embolism (PE) among patients admitted to the hospital for syncope ([Prandoni et al](#)). The 17.3% prevalence observed in this study was shocking, and several editorials attempted to rationalize these findings ([EPMonthly](#), [R.E.B.E.L.E.M](#), [NUEMBlog](#)). As a result, several studies have been published in the interim attempting to either replicate or refute these findings. We looked not only at the PESIT study, but two of these additional studies and a meta-analysis of data in an attempt to place these results in a broader context.

Two retrospective studies were identified, one involving patients from five separate longitudinal administrative databases from Canada, Denmark, Italy, and the United States ([Costantino 2018](#)), the other involving patients prospectively enrolled in a syncope database at the University of Utah Hospital ([Frizell 2018](#)). Both studies failed to demonstrate such a high prevalence of PE. In the former study, the rate of PE diagnosis among all ED patients ranged from 0.06% to 0.55% in the different databases, while the rate among hospitalized patients ranged from 0.15% to 2.10%. In the latter study, the prevalence of PE among all ED patients with syncope was 0.6%, while the rate among admitted patients was 2.3% (including 2 patients presumably diagnosed with PE within 30 days after hospital discharge, both of whom had a negative CT scan for PE while in the ED).

The meta-analysis we reviewed ([Oqab 2017](#)) included 9 studies involving 6608 ED patients and 3 studies involving 975 admitted patients, and demonstrated a similarly low prevalence of PE. The prevalence among all ED patients was 0.8%, and the prevalence among patients hospitalized for syncope was 1.0%. Interestingly, this study specifically excluded the PESIT trial from its meta-analysis. Inclusion of the PESIT study would likely increase the pooled prevalence, though likely not by a significant amount.

The PESIT study itself is the only prospective study of its kind in which all patients being admitted to the hospital for syncope were evaluated for PE. They used an algorithm in which a [simplified Well's score for PE](#) was calculated and a d-dimer was drawn in all patients. Those with a low-risk Well's score and a negative D-dimer underwent no further testing, while anyone with a high-risk Well's score or a positive D-dimer underwent either CT pulmonary angiography (CTPA) or ventilation-perfusion testing (V/Q). Interestingly, the enrolled population seems to be a very high-risk cohort. Nearly 11% of patients had cancer, 7% had recent prolonged immobility, and 5% had recent trauma or surgery. Of those patients diagnosed with PE, 45% were tachypneic, a third were tachycardic, a third were hypotensive, and 40% had clinical signs of DVT.

The authors note that 24 patients diagnosed with PE had no clinical manifestations of the diagnosis, including tachypnea, tachycardia, hypotension, or clinical signs or symptoms of DVT. Excluding patients with signs concerning for thromboembolic

disease, the rate of PE among remaining patients was only around 5%. If you further excluded patients at high risk of PE (i.e. those with cancer, recent immobilization, or recent surgery) this number would likely be even lower. Previous calculations have estimated the [test threshold](#) for PE as low as 1.8% ([Kline 2004](#)), or [as high as 5.5%](#). Based on this study, even excluding patients with obvious signs of PE or DVT, the prevalence of disease is still likely above the test threshold.

However, all of the other evidence suggests that the actual prevalence of PE among patients in the ED, or even being admitted to the hospital, is much lower, and is very likely to be below this threshold. For now, PE should certainly be considered in the differential for any patient presenting with syncope, but routine testing is not likely to benefit patients. Rather, patients with clinical signs or symptoms concern for PE, or significant risk factors, should undergo risk stratification via the [PERC rule](#), [modified Well's score](#), or [Geneva score](#), with additional testing based on pre-test probability.