The revised Geneva score predicted pulmonary embolism in patients with shortness of breath or chest pain

Le Gal G, Righini M, Roy PM, et al. **Prediction of pulmonary embolism in the emergency department: the revised Geneva score.** Ann Intern Med. 2006;144:165-71.

Clinical impact ratings: Emergency Med ★★★★★★☆ Hospitalists ★★★★★☆☆ Cardiology ★★★★★☆☆ Hematol/Thrombo ★★★★★★☆ Pulmonology ★★★★★★☆

QUESTION

In patients with acute onset of new or worsening shortness of breath or chest pain with no other obvious cause, how well does the revised Geneva score predict pulmonary embolism (PE)?

METHODS

Design: 2 cohort studies, 1 for derivation and 1 for validation.

Setting: Emergency departments in 4 university teaching hospitals in Geneva and Lausanne, Switzerland, and Angers and Paris, France.

Patients: 965 patients (mean age 61 y, 58% women) for derivation and 756 patients for validation were followed for 3 months. Exclusion criteria were anticoagulant treatment, contraindication to computed tomography (CT) (e.g., allergies to contrast iodine agents, creatinine clearance < 0.5 mL/s calculated by the Cockcroft-Gault formula, or pregnancy), suspected massive PE with shock, or estimated life expectancy < 3 months.

Description of prediction guide: The revised Geneva score (range 0 to 25) categorized patients into 3 risk groups. High-risk patients had scores ≥ 11, intermediate-risk patients had a score range of 4 to 11, and low-risk patients had a score range of 0 to 3. Regression analysis of risk factors in the derivation cohort found 8 independent clinical variables that predicted PE. The risk score was a summation of age (> 65 y = 1), risk factors (surgery under general anesthesia or fracture of the lower limbs within 1 mo = 2, active malignant condition [currently active or considered cured for < 1 y] = 2, and previous deep venous thrombosis [DVT] or PE = 3), symptoms (hemoptysis = 2, unilateral lower limb pain = 3), heart rate (75 to 94 beats/min = 3, ≥ 95 beats/min = 5), and clinical features (pain on lower limb deep venous palpation and unilateral edema = 4). Patients were diagnosed with PE by ultrasonography to detect proximal DVT of the lower limb, a positive helical CT scan, a positive pulmonary angiogram, or a high-probability ventilation–perfusion lung scan.

Outcomes: Diagnosis of PE.

MAIN RESULTS

23% of patients in the derivation cohort and 26% of patients in the validation cohort were diagnosed with PE. The derivation and validation cohorts did not differ for incidence of PE within risk groups or in operating characteristics of the score (Table). The area under the receiver-operating characteristic curve was 0.74 (95% CI 0.70 to 0.78) in both derivation and validation cohorts.

CONCLUSION

In patients with acute onset of new or worsening shortness of breath or chest pain with no other obvious cause, the revised Geneva score predicted pulmonary embolism.

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Prevalence and likelihood ratios (LRs) for pulmonary embolism in the derivation and validation cohorts using the revised Geneva score*

Risk group (revised Geneva score)	Derivation cohort		Validation cohort	
	Prevalence	+LR	Prevalence	+LR
Low (0 to 3)	9.0%	0.3	7.9%	0.3
Intermediate (4 to 11)	28%	1.3	29%	1.2
High (≥ 11)	72%	8.4	74%	8.1

*LR defined in Glossary and calculated from data in article.

COMMENTARY

Several diagnostic strategies that incorporate pretest probability for the diagnosis of PE are clinically helpful (1). Assessment of pretest probability, however, can be challenging and often leads to widely disparate assessments by physicians (2). Even though clinical prediction guides (CPGs) can standardize the assessment, previous CPGs for PE required subjective information (e.g., judgments of alternative diagnoses), or information that may not be readily available (e.g., arterial blood gas [ABG] analysis). The CPG developed by Le Gal and colleagues is a potentially important advance because only routinely obtained, objective factors are required.

The CPG accurately categorized patients into low-, intermediate-, or high-risk groups for PE. However, several limitations prevent its immediate widespread application. First, although derived and validated from prospective studies, the validation was based on data that had been previously collected as part of a similar investigation. Second, because only 5% to 7% of patients were categorized as high risk, the CPG may have little effect on management of those most likely to have PE. Third, ABG analysis was not included in this CPG; however, this is unlikely to be crucial because previous CPGs showed no increased accuracy when ABG analysis was included (3). Most important, the study showed the accuracy of the CPG but it was not designed to assess effects on outcomes or resource utilization.

If validated, how can this CPG improve management? Combining it with a sensitive D-dimer assay holds the promise of identifying a low-risk group that does not require further testing. Conversely, high-risk patients should be considered for treatment while awaiting confirmatory testing. Thus, the CPG by Le Gal may improve the accuracy of PE diagnosis, decrease testing and costs, and enhance patient care. A prospective study of patient management that incorporates the CPG and examines outcomes is needed.

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