Review: clinical gestalt strategies and clinical prediction rules have similar discriminate pretest probabilities of pulmonary embolism

Chunilal SD, Eikelboom JW, Attia J, *et al*. Does this patient have pulmonary embolism? *JAMA* 2003;**290**:2849–58.

Clinical impact ratings GP/FP/Primary care ★★★★★☆☆ IM/Ambulatory care ★★★★★☆☆
Cardiology ★★★★★☆☆ Internal medicine ★★★★★★☆ Respirology ★★★★★★☆

Additional information is provided on the Evidence-Based Medicine website (http://ebm.bmjjournals.com).

Q In patients with suspected pulmonary embolism, how do clinical prediction rules (using explicit features of clinical examination) compare with clinical impression based on routine data (the clinical gestalt) for determining the pretest probability of pulmonary embolism?

METHODS

Data sources: Medline (1966 to March 2003) and reference lists.

Study selection and assessment: English language studies were selected if patients with suspected pulmonary embolism were included; clinical assessment was done blinded to the results of diagnostic testing; pretest probability of pulmonary embolism was estimated using the clinical gestalt or a clinical prediction rule; and assessments were compared with validated diagnostic methods for confirming or refuting pulmonary embolism. Studies that derived a clinical prediction rule had to systematically collect clinical data from consecutive patients and have >50 patients with confirmed pulmonary embolism. Clinical gestalts must have been based on patient history and physical examination data without predetermined elements or a standardised score and must have been assessed before other diagnostic testing.

Outcomes: accuracy of pretest probability assessments for pulmonary embolism using clinical gestalt strategies and clinical prediction guides.

MAIN RESULTS

16 studies (8306 patients) met the selection criteria. 7 studies used clinical gestalt strategies and 10 studies used clinical prediction rules. The table lists the accuracy of pretest probability assessments for pulmonary embolism using clinical gestalt strategies and clinical prediction guides for distinguishing among patients who have a low, moderate, or high pretest probability.

CONCLUSION

Clinical gestalt strategies of experienced physicians and clinical prediction rules used by inexperienced physicians have similar accuracy for discriminating among patients who have a low, moderate, or high pretest probability of pulmonary embolism.

For correspondence: Dr J S Ginsberg, McMaster University, Hamilton, Ontario, Canada. ginsbrgj@mcmaster.ca

Source of funding: Heart and Stroke Foundation.

Commentary

The presence of clinical prediction rules can serve to allow translation of a standard approach and perhaps improve the diagnostic accuracy. Even within the context of various trials for the diagnosis of pulmonary embolism, the gap between pretest likelihood is greatly variable and dependent upon the completeness of clinical information presented. Thus, a clinical characteristic alone (eg, dyspnoea following prolonged immobilisation) in the absence of such data as arterial blood gases (hypoxaemia and hypocapnoea) decreases the clinical sensitivity for the diagnosis.

How are busy clinicians to use such information in a timely, meaningful, and more standardised format? Clinical prediction rules are a step in the right direction but they must be simple in their construction and easy to apply in a busy practice setting. Furthermore, they make the interpretation of the diagnostic accuracy of various emerging confirmatory markers all the more applicable and would likely lead to less clinical bias of misinterpretation. The clinical prediction criteria proposed by Wells *et al*[1] meet the criteria of simplicity to derive a probability estimate for pulmonary embolism.

Although the evidence reviewed by Chunilal *et al* does not seem to offer a clear advantage for prediction rules over gestalt, it should be recognised that such information is gathered in controlled environments where the power of suggestion plays an integrative role in the clinician's response. Although it is my own ''gestalt'' that suggests that the time may be here to embrace a clinical prediction rule to assist in the diagnosis of pulmonary embolism in the real world, more research is needed to support the use of such clinical prediction rules.

Mandeep R Mehra, MD, FACC, FACP
Ochsner Clinic Foundation
New Orleans, Louisiana, USA

1 Wells PS, Anderson DR, Rodger M, *et al*. Excluding pulmonary embolism at the bedside without diagnostic imaging: management of patients with suspected pulmonary embolism presenting to the emergency department by using a simple clinical model and d-dimer. *Ann Intern Med* 2001;**135**:98–107.

Accuracy of pretest probability assessments for pulmonary embolism

Assessment types	Pretest categories	Range of pulmonary embolism rates (%)	Range of likelihood ratios
Clinical Gestalt (7 studies)	Low	8% to 19%	0.13 to 0.53
	Moderate	26% to 47%	0.67 to 1.1
	High	46% to 91%	1.9 to 12
Clinical prediction guide (10 studies)	Low	3% to 28%	0.05 to 0.93
	Moderate	16% to 46%	0.72 to 2.0
	High	38% to 98%	1.4 to 66

Review: clinical gestalt strategies and clinical prediction rules have similar discriminate pretest probabilities of pulmonary embolism

Chunilal SD, Eikelboom JW, Attia J, *et al*. Does this patient have pulmonary embolism? *JAMA* 2003;**290**:2849–58. [PMID: 14657070]

Details on Clinical Prediction Guides (CPGs)

1. PISA-PED rule

- Clinical variables were divided into categories of signs and symptoms, results of routine tests, and evidence of an obvious alternative diagnosis.

Accuracy of CPG for assessing pretest probability of pulmonary embolism in derivative study

Pretest probability category	Likelihood ratio (95% CI)
Unlikely	0.05 (0.03 to 0.10)
Possible	0.99 (0.75 to 1.3)
Very likely	47 (23 to 98)
High	8.6 (5.7 to 13)

Miniati M, Prediletto R, Formichi B, *et al*. Accuracy of clinical assessment in the diagnosis of pulmonary embolism. *Am J Respir Crit Care Med* 1999;**159**:864-71.

2. PISA-PED II rule

- 15 variables including male sex, age, preexisting disease, thrombophlebitis, symptoms, temperature >38˚C, electrocardiogram signs of acute right ventricular overload, and chest radiograph findings.

Accuracy of CPG for assessing pretest probability of pulmonary embolism in derivative study

Pretest probability category	Likelihood ratio (95% CI)
Low	0.07 (0.04 to 0.11)
Moderate	0.72 (0.6 to 0.87)
High	66 (31 to 137)

Miniati M, Monti S, Bottai M. A structured clinical model for predicting the probability of pulmonary embolism. *Am J Med* 2003;**114**:173-9.

3. Wells *et al*. extended rule

- 40 variables including items on physical history and examination, chest radiography, arterial blood gases, electrocardiographic findings, signs and symptoms, risk factors, and alternate diagnoses.

Wells PS, Ginsberg JS, Anderson D, et al. Use of a clinical model for safe management of patients with suspected pulmonary embolism. *Ann Intern Med* 1998;**129**:997-1005.

Accuracy of CPG for pulmonary embolism when tested prospectively

Pretest probability category	Likelihood ratio (95% CI)
Low	0.15 (0.07 to 0.33)
Moderate	1.5 (1.01 to 2.2)
High	5.85 (3.51 to 9.74)

Kruip MJ, Slob MJ, Schijen JH, et al. Use of a clinical decision rule in combination with D-dimer concentration in diagnostic workup of patients with suspected pulmonary embolism: a prospective management study. *Arch Intern Med* 2002;**162:**1631-5.

4. Wells *et al*. simplified rule

- 7 variables (clinical signs and symptoms, no alternate diagnosis likely or more likely than pulmonary emboli, heart rate >100/min, immobilisation or surgery in last 4 weeks, previous history of deep venous thrombosis or pulmonary emboli, hemoptysis, and cancer actively treated within last 6 months)

Accuracy of CPG for pulmonary embolism when tested prospectively

Pretest probability category	Likelihood ratio (95% CI)
Low	0.13 (0.06 to 0.26)
Moderate	1.9 (1.6 to 2.3)
High	5.9 (3.7 to 9.3)

Wells PS, Anderson DR, Rodger M, et al. Derivation of a simple clinical model to categorize patients' probability of pulmonary embolism: increasing the models utility with the SimpliRED D-dimer. *Thromb Haemost*. 2000;**83**:416-20.

Wells PS, Anderson DR, Rodger M, et al. Excluding pulmonary embolism at the bedside without diagnostic imaging: management of patients with suspected pulmonary embolism presenting to the emergency department by using a simple clinical model and d-dimer. *Ann Intern Med* 2001;**135**:98-107.

5. Geneva rule

- 7 variables (age, previous pulmonary emboli or deep venous thrombosis, recent surgery, pulse rate >100/min, $PaCO_2$, PaO_2, and chest radiographic appearance).

Wicki J, Perneger TV, Junod AF, et al. Assessing clinical probability of pulmonary embolism in the emergency ward. *Arch Intern Med* 2001;**161**:92-7.

Accuracy of CPG for pulmonary embolism when tested prospectively

Pretest probability category	Likelihood ratio (95% CI)
Low	0.44 (0.30 to 0.65)
Moderate	1.8 (1.4 to 2.3)
High	5.8 (1.8 to 19)

Chagnon I, Bounameaux H, Aujesky D, et al. Comparison of two clinical prediction rules and implicit assessment among patients with suspected pulmonary embolism. *Am J Med* 2002;**113**:269-75.