Original Article

Knowledge of the diagnostic algorithm for pulmonary embolism in primary care

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B. Planquette [a,b,c,*], D. Maurice [a], J. Peron [d,e,f], G. Mourin [a,b], A. Ferre [a,b], O. Sanchez [a,b,c], G. Meyer [a,b,c]

[a] Service de pneumologie et de soins intensifs, Hôpital Européen Georges Pompidou, Assistance Publique Hôpitaux de Paris, Paris, France
[b] Université Paris Descartes, Sorbonne Paris Cité, France
[c] ISERM U970-PARCC, Paris, France
[d] Hospices Civils de Lyon, Service de Biostatistique, F-69003 Lyon, France
[e] CNRS UMR 5558, Laboratoire de Biométrie et Biologie Evolutive, Equipe Biostatistique-Santé, Villeurbanne, France
[f] Université de Lyon, F-69622, Lyon, France

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ABSTRACT

Background: Diagnostic algorithms for pulmonary embolism (PE) have been validated in patients attending hospital emergency departments. However, general practitioners (GPs) are often the professionals of first resort for the majority of non-critical cases of PE.
Aim: To evaluate the knowledge of the diagnostic algorithm for PE among GPs in France.
Design and setting: Questionnaire-based survey of GPs with a private practice.
Method: All GPs in the study area were sent a questionnaire including several questions on the diagnosis of PE and two clinical cases scenario with suspected PE. Factors associated with knowledge of the diagnostic algorithm were analysed by univariate and multivariate analyses.
Results: Five-hundred and eight questionnaires were distributed and 155 (30.5%) were available for analysis. Only 55% of the GPs did know about clinical scores for the assessment of clinical probability of PE and 42% of the GPs were aware that clinical probability is needed to interpret the result of D-dimer testing. Forty GPs (26%) gave valid responses to both clinical cases, 54 GPs (35%) had one valid case out of the two and 61 (39%) gave invalid responses to both clinical cases. Participation in specific training on PE was significantly associated with valid responses to the two clinical cases in multivariate analysis (p < 0.017).
Conclusion: The majority of GPs were unaware of the diagnostic algorithm for PE. Clinical probability was rarely assessed and knowledge about D-dimers was poor. Specific training on PE and greater awareness of clinical probability scores may promote knowledge of PE algorithm diagnosis.

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1. Introduction

Pulmonary embolism (PE) is a common and potentially fatal disease. Significant improvements have been achieved in the diagnostic approach to PE over the past 20 years and this ended-up with diagnostic algorithms endorsed by international guidelines [1]. These diagnostic algorithms have been developed and validated in outpatients referred to emergency departments, and are thus applicable in general medicine. A low clinical probability combined with a negative D-dimer test excludes the diagnosis of PE in primary care with a sensitivity of 97.3% [2]. About three-quarters of venous thromboembolic events take place in the community, thus, general practitioners (GPs) are often the health professionals of first recourse for clinically stable patients with suspected PE [3]. The opportunity for outpatient treatment is currently under evaluation in patients with low-risk PE [4,5]. This new perspective

of ambulatory treatment may lead to GPs becoming major players in the initial management of PE. Since non-adherence to guidelines in the diagnosis of PE has been associated with a significant increase in the risk of adverse events, the knowledge of diagnostic guidelines by GPs is of great importance for the care of patients with suspected PE [6]. The aim of this study is to evaluate the state of knowledge of the diagnostic algorithm for PE among GPs in the south of Paris and its suburb.

2. Method

2.1. Study population

This study was carried out among GPs with a private practice. The study area was defined choosing districts and towns around our hospital where GPs usually refer their patients in case of PE suspicion. The area included the 15th and 16th districts of Paris and two towns in the near suburb of Paris: Vanves and Issy-Les-Moulineaux. The addresses of GPs with a private practice in the study area were obtained via the website http://ameli-direct.ameli.fr. The data from this site were

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* Corresponding author at: Service de Pneumologie et de soins intensifs, Hôpital Européen Georges Pompidou, 20 rue Leblanc, F-75015 Paris, France. Tel.: +33 1 56 09 34 62; fax: +33 1 56 09 32 55.
E-mail address: benjamin.planquette@egp.aphp.fr (B. Planquette).

Table 1
Questionnaire (general practitioners characteristics).

1) You are
 a. Female
 b. Male
2) How many years have you been in practice?
 a. Between 1 and 10
 b. Between 11 and 20
 c. More than 20
3) Do you have any hospital activity in addition to your private practice?
 (Emergency, outpatients clinics at hospital …)
 a. Yes
 b. No
4) Do you have continuing medical education (CME) activities? (Several answers
 possible)
 a. Subscription to French medical journals
 b. Subscription to international journals
 c. Affiliation to associations of doctors for CME
5) Have you already taken part in training concerning PE?
 a. Yes
 b. No
6) Have you already suspected a PE since setting up your practice?
 a. Yes
 b. No

crossed referenced with the directory of GPs available on the Conseil National de l'Ordre des Médecins (CNOM) website (http://www.conseil-national.medecin.fr). A questionnaire and two simulated clinical case scenarios were sent to the GPs by post (see supplementary appendix). A stamped-addressed return envelope was included with these documents.

2.2. Questionnaire

The survey consisted of 11 questions (Tables 1, 3 and 4) covering different subjects: demographic characteristics and professional situation, continuing medical education sessions on PE (CME) knowledge about risk factors, clinical symptoms of PE and clinical probability scores, and use of D-dimer testing in case of suspected PE.

2.3. Simulated clinical cases scenario

Two clinical cases describing patients with suspected PE were distributed to the GPs (Table 2). The clinical probability of PE was intermediate for case 1 and high for case 2. Each clinical case included two questions; the first question concerned the clinical probability of PE and the second was about the choice of a first-line diagnostic test.

For a clinical case to be considered valid, it was necessary to have estimated the correct clinical probability and chosen an appropriate first-line diagnostic test.

The questionnaire and clinical cases were tested on five GPs practising in the study area before the final versions were produced. The aim of this pre-test was to insure the clarity of the questions and to enable modifications to be made depending on the different responses. This pre-test was also performed to confirm that the test could be completed in a limited time period (mean time between 5 and 6 min) in order to increase the response rate. The questionnaires were sent by post between the 1st and the 15th of February 2013. The time allowed for the responses lasted two months. No reminder was sent, either by telephone or by email.

2.4. Statistical analysis

The responses to the survey are described as number and percentage for qualitative variables.

Two populations of GPs were defined: (i) GPs with valid responses to at least one clinical case and (ii) GPs with no valid answer to the two clinical cases.

Factors associated with knowledge of the diagnostic algorithm were analysed by univariate analysis. $p < 0.05$ was considered statistically significant. A multivariate logistic regression was used to assess the factors associated with two valid responses to clinical cases. All factors of interest and potential confounding factors were included in the multivariate models. The added value of each covariate was evaluated using a likelihood ratio test. Statistical significance was set a priori at $\alpha \leq 0.05$ (2-tailed). All statistical analyses were performed using "R" statistical software (version 2.14.1; http://www.R-project.org/).

3. Results

3.1. Study population

The study questionnaires were sent to 508 GPs. One-hundred and fifty-nine responses were received but four of these questionnaires were unusable because they were incomplete. One hundred and fifty-five questionnaires were analysed (30.5%).

Among the responders, 86 (55%) were males and 118 (76%) had been in practice for >20 years. Only 25 (16%) had additional hospital activity and 18 (12%) subscribed to international medical journals. Among the responders, 105 (68%) underwent CME via doctors' associations or French medical journals and 45 (29%) had participated in

Table 2
Clinical cases scenario.

Clinical case no. 1

A 66-year-old female complaining of unusual dyspnoea evolving over several days. She is a former hairdresser, recently retired with no medical history except for post-partum deep vein thrombosis. She is an active smoker. Her last biological examination <3 months ago was normal. Clinically: she has no fever, no thoracic pain, no cough, no sputum production. Normal cardio-pulmonary auscultation. Pulse 98/min, blood pressure 135/80, respiration rate 18/min. No oedema or pain in the lower limbs.

Question 1. What is the clinical probability that the patient has a PE?	Expected answer: Low, or medium, or unlikely, or not strong, or intermediate; or expressed as a percentage: ≤40%
Question 2 Which first-line diagnostic examination would you propose?	Expected answer: D-dimer measurement

Clinical case no. 2

A 72-year-old hypertensive patient, who underwent radical prostatectomy 21 days ago for prostate cancer. His current treatment includes amlodipin and triptoreline. He complains of pleuritic chest pain. On examination: no fever, pulse 78/min, blood pressure 145/65, respiratory rate 19/min, normal chest sounds and he has a painful right calf, without oedema. His renal function is normal.

Question 1. What is the clinical probability that the patient has a PE?	Expected answer: Strong, probable, high Expressed as a percentage: ≥70%
Question 2. Which first-line diagnostic examination would you propose?	Expected answer: Chest computed tomography angiography, or compression ultrasonography of the lower limbs, or ventilation-perfusion lung-scan