

Associations between Presence of Relevant Information in Referrals to Radiology and Prevalence Rates in Patients with Suspected Pulmonary Embolism

Charlotta Hedner, MD, Pia C. Sundgren, MD, PhD, Aine Marie Kelly, MD, PhD

Rationale and Objectives: The purpose of this study was to assess if the presence of information including the pretest probability (Wells score), other known risk factors, and symptoms given on referrals for computed tomography (CT) pulmonary angiography correlated with prevalence rates for pulmonary embolism (PE). Also, to evaluate for differences between a university and a regional hospital setting regarding patient characteristics, amount of relevant information provided on referrals, and prevalence rates for pulmonary embolism.

Materials and Methods: Retrospective review of all consecutive referrals (emergency room, inpatient, and outpatient) for CT performed on children and adults for suspected PE from two sites: a tertiary (university) hospital (site 1) and a secondary (regional) hospital (site 2) over a 5-year period.

Results: The overall prevalence rate was 510/3641 or 14% of all referrals. Significantly higher number of males had a positive CT compared to women (18% versus 12%, $P < .001$). Although no statistically significant relationship between a greater amount of relevant information on the referral and the probability for positive finding existed, a slight trend was noted ($P = .09$). In two categories, “hypoxia” and “signs of deep vein thrombosis,” the presence of this information conferred a higher probability for pulmonary embolism, $P < .001$. In the categories, “chest pain,” “malaise,” and “smoker/chronic obstructive pulmonary disease”, the absence of information conferred a higher probability for pulmonary embolism.

Conclusions: The amount of relevant clinical information on the request did not correlate with prevalence rates, which may reflect a lack of documentation on the part of emergency physicians who may use a “gestalt” approach. Request forms likely did not capture all relevant patient risks and many factors may interact with each other, both positively and negatively. Pretest probability estimations were rarely performed, despite their inclusion in major society guidelines.

Key Words: Pulmonary embolism; venous thromboembolism; appropriateness rates CT pulmonary angiography; prevalence rates.

©AUR, 2013

Pulmonary embolism (PE) is a potentially life-threatening condition with a mortality rate of up to 10% in symptomatic patients within an hour of presentation and an overall mortality of 30–35% if untreated, which drops to 7% with treatment (1,2). In Sweden, 4000 patients are diagnosed with PE each year, but it is likely that

many more PE go undiscovered (3). Data from autopsy studies estimate that only 20–30% of PE is diagnosed ante mortem (4). In addition, published studies demonstrate incidence rates for PE of about 23–69 per 100,000 of the population (4). Furthermore, only about 10% of computed tomography (CT) pulmonary angiograms (CTPAs) performed because of suspected PE are positive despite the high diagnostic accuracy (sensitivity and specificity) of CTPA (5,6). These low prevalence rates may reflect the nonspecific clinical symptoms and signs, which frequently overlap with other entities such as pneumonia and aortic and cardiac disease (1). The classic triad of PE symptoms—hemoptysis, shortness of breath, and chest pain—is found in less than 20% of patients with PE (7,8). In addition, most patients that present with frequent but nonspecific symptoms such as dizziness and malaise do not have PE. Therefore, a mere evaluation of symptoms and signs is not sufficient to guide selection of

Acad Radiol 2013; 20:1115–1121

From the Center for Medical Imaging and Physiology, Skåne University Hospital, Lund University, Lund, Sweden (C.H.); Department of Diagnostic Radiology, Clinical Sciences Lund, Lund University, Center for Medical Imaging and Physiology, Skåne University Hospital, SE.221 85 Lund, Sweden (P.C.S.); Department of Radiology, University of Michigan Hospital, Ann Arbor, MI (P.C.S.); and Department of Radiology, Division of Cardiothoracic Radiology, University of Michigan Hospital, Ann Arbor, MI (A.M.K.). Received January 17, 2013; accepted May 2, 2013. **Address correspondence to:** P.C.S. e-mail: Pia.sundgren@med.lu.se

©AUR, 2013

<http://dx.doi.org/10.1016/j.acra.2013.05.010>

the appropriate imaging strategy. Many clinical decision or prediction rules exist for estimating the pretest probability of PE, including the Wells score, the Geneva Score, and the Miniati or Pisa score (9–11). There are also several recently published major society guidelines, including the European Society of Cardiology, the Fleischner Society, and the Prospective Investigation for the Diagnosis of Pulmonary Embolism investigators recommendations (5,12–14). Not only are clinical prediction rules and diagnostic algorithms helpful, it has even been shown that the lack of a validated diagnostic algorithm in the emergency department is an independent risk factor for inappropriate management of patients with a suspected PE (15). The most widely used clinical prediction rule is the Wells score, a series of criteria that in large studies have been proven to correlate with the probability of PE, the higher the given points (9,12). Factors taken into account include previous venous thromboembolism (VTE), recent surgery or immobilization, cancer, hemoptysis, tachycardia (>100 beats/min), clinical signs of deep venous thrombosis (DVT), and an alternative diagnosis less likely than PE. Scoring according to this will result in a clinical probability at two or three levels, depending on what specific version of the Wells score is used (9,16).

When the clinical probability according to the Wells score is “low/intermediate” or “PE is unlikely,” the recommendation is to proceed with a high quality D-dimer test and if the D-dimer is “negative,” PE is highly unlikely (12,17). CTPA is regarded as the diagnostic test of choice for suspected PE in most patients (5,12,13,18). Chest pain is the most frequent clinical presentation in the emergency department and in inpatients; PE is a serious diagnosis that shouldn’t be missed because the morbidity and mortality rates rise rapidly if untreated. Therefore a large number of CTPA examinations are performed to exclude PE, often in young patients, or patients in their childbearing years (19,20). Although it is important to make an accurate diagnosis early, imaging with CTPA confers several risks, which include those from iodinated contrast material, ionizing radiation to the breast tissues, chest, and the gonads (if indirect venography of the pelvis and thighs is performed) as well as the downstream effects of incidental findings (5,13,21–23). A large proportion of patients imaged with CTPA are women of childbearing age, which raises concerns for radiation exposure in these radiosensitive populations (24).

The purpose of this retrospective study was to assess if the presence of information including the pretest probability (Wells score) or other known risk factors and symptoms given on referrals for CTPA, had any correlation with the prevalence rates for PE. A secondary aim was to evaluate for any differences between a tertiary (university) hospital and a secondary (regional) hospital setting regarding patient characteristics, the amount of relevant information given on the referrals, and prevalence rates. We hypothesized that prevalence rates would be lower in the university hospital setting because of increased pressures on patient turnaround and disposition and higher bed occupancy rates.

MATERIALS AND METHODS

Study Participants

Ethics review board approval for this study was obtained and consent waiver was given because of the retrospective nature of the study. All consecutive referrals (emergency department, inpatient and outpatient) for CTPA performed on children and adults for suspected PE from two sites: at a tertiary (university) hospital (site 1) and a secondary (regional) hospital (site 2) between January 30, 2005, and December 31, 2009, were reviewed. Referrals for CTPA examinations that were subsequently cancelled; duplicate and repeat referrals were not included in the study.

From a total of 3974 referrals between 2005 and 2009 at site 1, 3641 were included. Digital records of referrals in site 2 were not introduced until late 2008; therefore, only data from 2009 were available. From a total of 3471 referrals in years 2005–2009 at site 2, 535 were included, all of which were from 2009.

In this study, only the text from included referrals for radiological examination was recorded in detail, including information on underlying risk factors, subjective symptoms, and objective clinical findings. Information and risk factors in terms of age, sex, duration of symptoms, malignant disease, immobilization, surgery within the preceding 8 weeks, prior thromboembolic disease, coagulation defects, current or prior usage of anticoagulants, including warfarin or low-molecular-weight heparin, heredity thromboembolic disease, oral contraceptive pill use or hormone treatment, pregnancy or recent childbirth, smoking, chronic obstructive pulmonary disease (COPD), and other illnesses were noted. Information regarding presence of objective clinical findings in terms of hypoxia, fever, tachycardia, syncope, cardiac arrest, positive or negative D-dimer, and signs of current DVT in terms of pain, swelling, or confirmed DVT were noted. Information regarding subjective symptoms in terms of shortness of breath, coughing, chest pain, dizziness, malaise, and pleuritic chest pain were noted. The referrals were initially collected by the first author (C.H.), a junior resident, and also reviewed by the second author (P.C.S.), a senior radiologist faculty.

The findings on CTPA were reviewed by the resident and were categorized as normal, PE, or other, including pneumonia, pleural disease (effusion, empyema, and pneumothorax), congestive heart failure, atelectasis, suspected malignant disease and/or other cause of lymph node enlargement, aortic disease, and parenchymal changes (including pulmonary masses and nodules).

Statistical Analysis

Statistical analysis was performed to assess for differences in proportions between sites 1 and 2 for age, sex, amount of relevant information in the referral text, sufficient information on the referral text to calculate a Wells score, and the percentage positive findings. Next, data from both sites were pooled and calculations were performed correlating positive findings

Download English Version:

<https://daneshyari.com/en/article/4218293>

Download Persian Version:

<https://daneshyari.com/article/4218293>

[Daneshyari.com](https://daneshyari.com)