



# Acute pulmonary embolism: mortality prediction by the 2014 European Society of Cardiology risk stratification model

To the Editor:

I eagerly read the recent article by BECATTINI *et al.* [1] entitled “Acute pulmonary embolism: mortality prediction by the 2014 European Society of Cardiology risk stratification model”. Those authors compared the prognosis of acute pulmonary thromboembolism in 906 patients according to the European Society of Cardiology (ESC) guidelines published in 2008 and 2014.

I would like to draw attention to a point in table 2 of the article. The authors reported that 59 patients were positive for troponin in the group composed of 196 patients with low risk levels. The 2014 ESC guidelines recommend that patients in Pulmonary Embolism Severity Index (PESI) class I–II or with a Simplified PESI score of 0, and elevated cardiac biomarkers or signs of right ventricular dysfunction (RVD) on imaging tests should also be classified into the intermediate–low-risk category [2]. Thus, ~30% of patients in this group were classified incorrectly. These 59 patients with low–intermediate risk group, when added to the total number of patients, will make 392, of whom 151 will be troponin positive. Thus, 30-day mortality will be decreased to 5.1% instead of 6% in this group (20 out of 392). However, there will be no significant difference in mortality between low risk and intermediate–high risk (5.1% versus 7%,  $p=0.16$ ).

In my opinion, another contradiction in the increase in troponin level in 59 of the 196 low-risk patients (increased by 30%). In this study, mortality was one (0.5%) patient in the low-risk group. May be misclassified one patient who did in low risk group if had high troponin level this patient? Mortality rate is 10% in patients with high troponin levels [3], so among 59 patients with positive troponin (which are classified as low risk) 5–6 patients would be expected to die.

Another problem is that of the 59 patients who will be classified as intermediate–high risk in the case of the presence of RVD on echocardiography or computed tomography. As a result, patients with increased levels of troponin alone should be in intermediate risk groups according to the ESC 2014 guidelines.



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**Patients with increased troponin alone are at intermediate risk according to ESC 2014 guidelines**  
<http://ow.ly/v2Jh304ovTw>

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*From the authors:*

The correspondence by S. Ozsü concerns several issues. The first issue is the identification of low-risk patients with acute pulmonary embolism. According to the 2014 European Society of Cardiology (ESC) guidelines, a Simplified Pulmonary Embolism Severity Index (sPESI) score of zero efficiently identifies patients at low risk for death; assessment of right ventricle dysfunction by imaging or biomarkers is optional in patients with sPESI 0 [1]. Our study reports a simulation of what would happen in clinical practice by adopting the risk stratification model proposed by the 2014 ESC guidelines (see table 2 of our article) [2]. Patients at low risk (sPESI 0) would not undergo assessment of right ventricle dysfunction by imaging or biomarkers. The warning here is that ~40% of these patients have right ventricle dysfunction at imaging and ~30% of them have increased troponin levels [2]. Are these abnormalities of clinical value? It depends on the clinical relevance of the 0.5% observed 30-day mortality. In our opinion, 0.5% mortality at 30 days does not justify the mandatory assessment of right ventricle dysfunction and biomarkers in all patients with sPESI 0. However, we believe that right to left ventricle dimension ratio should be evaluated and reported for all patients who have computed tomography angiography for the diagnosis of pulmonary embolism [3]. This assessment will help clinicians to properly select low-risk patients (sPESI 0 and no right ventricle dilation) without performing any additional test.

The criteria used for the identification of low-risk patients, of course, influence the characteristics of the intermediate-risk group. Having patients with sPESI of 0 and right ventricle dysfunction at imaging or increased levels of biomarkers in the low-risk category will probably lead to select an intermediate-risk category with a high risk for death. This could make difficult to further stratify intermediate-risk patients into low and high risk. Further studies should address the issue of the identification of an intermediate-high-risk category.

Concerning the role of troponin in risk stratification, its positive predictive value is higher than that of right ventricle dysfunction [4]. However, the high-sensitivity troponin tests that are currently in use worldwide could have diluted the prognostic role of this marker.

In conclusion, our study represents what would happen in risk stratification of patients with acute pulmonary embolism if the 2014 ESC guidelines were followed in a cohort of patients with pulmonary embolism from several European countries. Further studies are needed to improve risk stratification mainly in patients with acute pulmonary embolism at intermediate risk for death.



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**Further studies are needed to improve risk stratification in acute pulmonary embolism at intermediate risk for death** <http://ow.ly/BYZo304vmUy>

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