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### A COMPARISON OF THE SIMPLIFIED PULMONARY EMBOLISM SEVERITY INDEX WITH THE EUROPEAN SOCIETY OF CARDIOLOGY SEVERITY SCORE FOR ACUTE PE

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**Introduction** Risk stratification in acute pulmonary embolism (PE) is useful in identifying low risk patients suitable for ambulatory care and those at high risk in need of intensive monitoring.

In this study we compared two of the most well used scoring systems, the European Society of Cardiology (ESC) criteria and the simplified pulmonary embolism severity index (sPESI).

**Methods** We retrospectively identified patients admitted to NHS Tayside over a 4 year period with radiologically confirmed PE and calculated their ESC and sPESI scores.

RV dysfunction was defined by RV/LV ratio >1 on CTPA or by echocardiography. As per the ECS criteria, patients with shock (defined as SBP<90mmHg) and RV dysfunction or myocardial injury (defined as troponin I >0.045) were classified as high risk, RV dysfunction or myocardial injury without shock as intermediate risk and patients with none of the above criteria classified as low risk.

**Patients** with any one of the six sPESI risk factors (age>80, cancer, chronic lung disease, SpO<sub>2</sub> <90%, SBP<90mmHg, HR>110) were classified as high risk.

The primary outcome was 30-day mortality or requirement for thrombolysis.

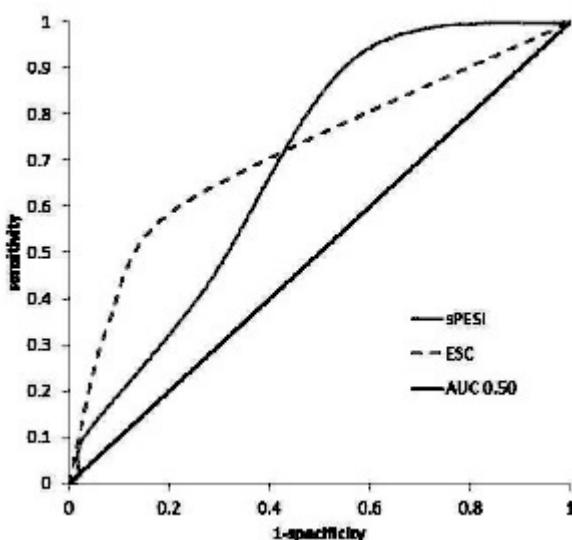
**Results** 291 patients (45.8% male) were identified with a median age of 67 years (interquartile range 54–78 years).

Low risk sPESI patients had a 2.2% risk of mortality or requirement for thrombolysis, in high risk patients (1 or more risk factors) the rate was 15.2%. Using ESC criteria, low risk patients had a 7.0% risk or mortality or thrombolysis with high risk patients having a risk of 21.2%.

The positive likelihood ratio for ESC was 2.2 vs 1.6 for sPESI. The negative likelihood ratio was 0.18 for sPESI compared to 0.7 for ESC.

The area under the receiver operator characteristic curves for both scores is shown in Figure 1. Both had moderate overall predictive value (AUC 0.68, 95% CI 0.63–0.73) for both scores, p<0.0001.

**Conclusion** The sPESI score is superior to the ESC score in identifying patients with acute PE who are at low risk of poor outcome, while ESC is superior to sPESI at identifying high risk patients.



Abstract P142 Figure 1

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### A RETROSPECTIVE STUDY OF ECHOCARDIOGRAPHY AND FOLLOW-UP AFTER ACUTE PULMONARY EMBOLISM – ARE WE MISSING CHRONIC THROMBOEMBOLIC PULMONARY HYPERTENSION?

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**Introduction** Pulmonary Hypertension (PH) is defined as raised Pulmonary Arterial Systolic Pressure ≥25mmHg at rest on Right Heart Catheterisation.<sup>1</sup> Chronic Thromboembolic Pulmonary Hypertension (CTEPH) is a recognised complication of pulmonary embolism (PE), with a reported annual cumulative incidence of 3.1%.<sup>2</sup> Patients with evidence of PH or Right Ventricular Dysfunction (RVD) during admission should be referred for echocardiography usually 3–6 months after discharge to establish PH resolution.<sup>1</sup>

**Objective** To identify patients at risk of CTEPH, evaluate their follow-up plans and establish the proportion with evidence of acute RVD/PH who are investigated for persistent PH.

**Methods** Retrospective analysis of all diagnoses of PE on Computed Tomography Pulmonary Angiography (CTPA) in 2010 in a single Trust. Patients were stratified according to size and location of PE, and any reported radiological evidence of RVD. Echocardiography reports were reviewed for evidence of PH.

**Results** 19.3%(329/1702) of CTPA scans revealed PE: Massive (28.6%); Submassive (28.0%); Peripheral (44.4%). Only 17.6%(58/329) had inpatient echocardiography, with 55.1%(32/58) suggesting PH (PASP≥ 36 mmHg). 78.1%(25/32) of these patients survived to 6 months and follow-up echocardiography was performed within 6 months for 40%(10/25) of this subset.

Overall, 80.9% (266/329) of patients with confirmed PE survived past 6 months. Follow-up echocardiogram was performed within 6 months on 20.3% (54/266) of survivors; PH was demonstrated in 18.5%(10/54).

RV strain was reported in 15.2% (50/329) of CTPA scans. Follow-up echocardiogram was performed within 6 months on 19.5% (8/41) of those alive at 6 months.

84.2%(154/183) of individuals diagnosed with a massive or submassive PE survived to 6 months. Respiratory or cardiology follow-up was planned for 23% (36/154).

**Conclusions** Our findings suggest follow-up after acute PE is suboptimal, potentially missing early PH due to a low number of early echocardiograms. The relatively high percentage of PH on echocardiography compared to reported rates is likely due to selection bias. The results suggest there may be a missed cohort at risk of developing PH, i.e. those with RV strain on CTPA or high thrombus load, being denied early or more aggressive interventions such as pulmonary endarterectomy.

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### CASE SERIES: CHOOSING THROMBOLYSIS IN ACUTE PULMONARY EMBOLISM (PE) – MASSIVENESS OR INSTABILITY?

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**Background** PE has significant mortality risk particularly in “PE with haemodynamic instability” or “massive PE” where blood pressure, attributable to PE, is sustained below 90mmHg.<sup>[1,2]</sup> Thrombolysis in this patient group is associated with reduced mortality and faster restoration of lung perfusion with approval by NICE.<sup>[1,2]</sup> Another important group of patients with apparent haemodynamic stability but documented right ventricular (RV) compromise or

myocardial injury (e.g. echocardiogram evidence of RV strain or raised Troponin) is recognised ("sub-massive" PE) where considerable debate remains as to reliable prognostication and appropriateness of thrombolysis.

**Aims** Recognising a tendency in our district general hospital to treat PE aggressively, we sought to assess our own practise with regards to thrombolytic therapy in PE to better understand our interpretation of NICE guidance and the wider literature.

**Objective** Assess routine quantification of haemodynamic instability of the acutely unwell patient in the clinical environment and the extent with which knowledge of right ventricular compromise and cardiac biomarkers influenced decision to thrombolysis.

**Methods** Retrospective review of case records. Data was extracted from the medical records by one of the authors followed by joint scrutiny by all authors.

**Results** From June 2010 over 24 months, 17 patients (6 males, 11 females) have been thrombolysed. Median age 62 (range 24–90). Of these one patient died 4 days later of sepsis and multi organ failure, and one developed a haematoma in her arm which resolved with conservative management.

Of these patients only two Massive i.e. haemodynamically unstable with one thrombolysed on the ITU. In the submassive PEs, supporting evidence for thrombolysis was CT in 5 cases, and echo 5, both in 2, and lab (troponin rise) in 9 cases.

**Conclusion** Thrombolysis in PE especially in submassive PEs remains an area of controversy and clinically a dilemma at times. Our case series shows that patient selection supported by relevant investigations, appropriate patients can benefit without any untoward events.

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### P145 THROMBOLYSIS OF ACUTE PE PATIENTS REDUCES SUBSEQUENT DEVELOPMENT OF CTEPH

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**Introduction** Pulmonary Embolism (PE) is a frequent diagnosis and the incidence of Chronic Thromboembolic pulmonary hypertension (CTEPH) after a single acute episode of PE is higher than expected – in one prospective long-term study 3.8% at 2 years (*Pengo et al 2004*). A diagnosis of CTEPH carries a 30% 5 year mortality and early diagnosis is vital if treatment is to be of success although successful treatment options remain limited.

We hypothesized that by following up all new diagnoses of PE we would pick up early cases of CTEPH and identify risk factors for those developing CTEPH. We also hypothesized that thrombolysis as per the BTS guidelines would reduce the subsequent incidence of CTEPH.

**Methods** A retrospective study of all patients referred to a PE clinic over a 2 year period was performed. Initial and follow up echocardiograms were examined, provoking factors and treatment identified with a primary end point of development of CTEPH at 2 years.

**Results** Of the first 50 patients presenting with an acute PE 12% (n=6) had evidence of CTEPH on echocardiogram after 2 years. The major risk factor for the development of CTEPH was an initial echocardiogram demonstrating a RVSP>50mmHg which conferred a 5-fold increase in persistent pulmonary hypertension on echocardiogram at 2 years (36% versus 7%).

None of the thrombolysed patients went on to develop CTEPH despite having in 50% an RVSP>50mmHg and all had a normal early (within six months) repeat echocardiogram.

**Conclusions** Patients who present with an acute PE and have an initial RVSP of >50mmHg on echocardiogram have a 5 fold increase in developing persistent pulmonary hypertension at 2 years. However patients who had a RVSP>50mmHg at diagnosis and are thrombolysed do not appear to develop CTEPH and have normal echocardiography at 2 years. Bearing in mind the mortality CTEPH carries and the difficulty in treating it, patients presenting with an acute significant PE and a RVSP>50mmHg should be considered for thrombolysis regardless of haemodynamic compromise.

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### CAN RAISING THE D-DIMER THRESHOLD SAFELY REDUCE THE NUMBER OF CT PULMONARY ANGIOGRAMS PERFORMED IN SUSPECTED PULMONARY EMBOLISM?

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**Introduction** CT Pulmonary Angiography (CTPA) is the gold standard investigation for suspected pulmonary embolism (PE). Low or intermediate probability clinical prediction (e.g. Wells score) combined with a negative D-dimer effectively rules out PE in over 97% of cases, avoiding the need for CTPA and its inherent risks (radiation exposure and contrast induced nephropathy). This is the recommendation of the BTS guidelines. We undertook a study to examine if the BTS guidelines were being adhered to in our Trust, and whether increasing the D-dimer threshold may safely reduce the need for CTPA.

**Methods** We obtained a list of CTPAs performed within the Trust between September 2009 and September 2011 and searched our pathology system for a contemporary D-dimer result (HemosIL latex immuno-assay). For all patients with a negative D-dimer (<230ng/mL), we looked for a documented pre-test probability score in the clinical notes or calculated a Wells score if not documented. We then analysed CTPA results with D-dimer between 230–500ng/mL.

**Results** There were 1645 CTPAs performed during the study period, of which 15% had confirmed PE 903(54.9%) had a contemporary D-dimer result, and of these 57(6.3%) had a negative D-dimer, and 193(21.4%) were between 230–500ng/mL. In the negative D-dimer group, 3 (5.3%) had confirmed PE's on CTPA. One was on tranexamic acid, which can falsely lower D-dimer, and 2 had prolonged admissions in whom D-dimer testing was not appropriate. We were able to examine the notes of 39/57 cases and only 3 (8%) had a pre-test probability documented. On review 31/39 (79.5%) had a low to intermediate Wells score and should not have had a CTPA.

In the 230–500ng/mL D-dimer group, there were only 4/193 (2.1%) positive CTPAs with a negative predictive value 98%.

**Conclusions** In our Trust, the lack of pre-test probability scoring combined with D-dimer is leading to inappropriate CTPAs. The rate of PE in the patients with a D-dimer between 230–500ng/mL is also very low. A protocol recommending initial treatment pending an urgent respiratory team review prior to CTPA, could safely reduce the number performed in this group, if combined with a low to intermediate pre-test probability score.

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### THE WELLS PE SCORE – AN EFFECTIVE PRE-TEST PROBABILITY TOOL?

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**Introduction and Objectives** British Thoracic Society guidelines advise all patients with possible PE should have pre-test clinical