Index Helps Select Which PE Patients Go Home

Eleven clinical findings predict mortality in pulmonary embolism patients.

BY PATRICE WENDLING
Chicago Bureau

CHICAGO — The Pulmonary Embolism Severity Index provides clinicians with a useful tool for selecting patients with acute pulmonary embolism for outpatient therapy, Col. Lisa K. Moores, MC, USA, said.

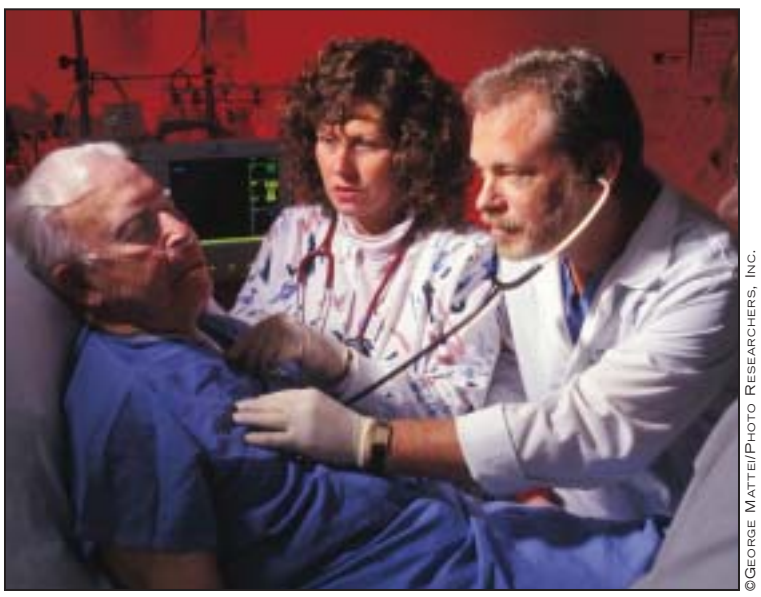
Recent evidence suggests that many patients presenting in the emergency department with nonmassive pulmonary embolism (PE) can be safely treated as outpatients using low-molecular-weight heparins, or discharged early. Based on this growing body of evidence, the British Thoracic Society now recommends outpatient treatment for clinically stable patients with PE.

The Pulmonary Embolism Severity Index (PESI) and Geneva score are two standardized prognostic models that have been recently developed to identify patients at low risk for PE. The PESI uses 11 clinical findings routinely available at presentation that were previously shown to be associated with mortality in patients with PE or other acute diseases, said Dr. Moores, assistant dean for clinical sciences at the Uniformed Services University of the Health Sciences, Bethesda, Md.

These variables include demographics (age and male sex); comorbid conditions (cancer, chronic heart failure, and chronic lung disease); and six signs, including a heart rate of 110 bpm or more; systolic blood pressure less than 100 mm Hg; respiratory rate of 30 bpm or more; temperature less than 36° C; altered mental state; and oxygen saturation less than 90%.

A score is calculated by using age, then adding points based on the various factors present. Patients are then stratified by their score into five severity classes of increasing risk of death and other adverse outcomes.

A validation study demonstrated that patients in PESI class I (no more than 65 points) and class II (66-85 points) had a 30-day mortality of 1.6% or less and 3.5% or less, respectively (Am. J. Respir. Crit. Care Med. 2005;172:1041-6). Nonfatal cardiogenic shock or cardiorespiratory arrest occurred in 1% or less in class I and 1.3% or less in class II, and no patient in these two classes had nonfatal bleeding or recurrent venous thromboembolism, Dr. Moores said at the annual meeting of the American College of Chest Physicians (ACCP).



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Patients are stratified by their score into five severity classes of increasing risk for adverse outcomes and death.

The Geneva score has been validated in two studies and uses six factors to stratify patients as low risk (up to 2 points) or high risk (3 points or more). Those factors are cancer, heart failure, previous deep vein thrombosis, systolic BP less than 100 mm Hg, arterial oxygen pressure less than 60 mm Hg, and deep vein thrombosis on ultrasound. Of 180 low-risk patients, only 4 (2%) had an adverse outcome, compared with 23 of 88 (26%) high-risk patients (Thromb. Haemost. 2000;84:548-52).

Dr. Moores acknowledged that the PESI model is "harder to get your hands around" than the Geneva model, but said some of the most intriguing data of 2007 suggest that the PESI is "more accurate and clinically useful." An independent, head-to-head comparison in which the models were retrospectively applied to a cohort of 599 patients with objectively confirmed PE indicated a 30-day mortality in Geneva low-risk patients of 5.6%, compared with a mortality in PESI low-risk (class I and class II) patients of 0.9% (Chest 2007;132:24-30). The PESI classified significantly fewer patients as low risk than did the Geneva model (36% vs. 84%), but the area under the receiver operating characteristic curve was higher for the PESI (0.76 vs. 0.61).

"More patients can be classified via Geneva as low risk, but the difference in mortality rates between the two systems suggests doing it more safely with the PESI," Dr. Moores said.

Dr. Moores suggests that patients with a higher PESI class (class III-IV) should be observed in the ICU or a telemetry unit for the first 24 hours. In addition, clinicians should consider evaluating biomarkers in these patients such as troponin, brain natriuretic peptide, and N-terminal pro–brain natriuretic peptide levels, which when elevated have been correlated with PE death.

An audience member asked if the PESI or Geneva models can be used to select patients for thrombolysis, but Dr. Moores said the predictive values drop off in higher-risk patients. "Where the crossover point is to say a patient needs thrombolysis is not yet available," she said.

Dr. Moores said in an interview that she was unaware of an American Thoracic Society recommendation for outpatient therapy for patients with PE, and that the new ACCP guidelines mention potential outpatient therapy, but do not review the PESI or make a recommendation about outpatient therapy. ■

Higher Lung Ventilation Doesn't Lower Mortality Rates

BY HEIDI SPLETE
Senior Writer

A strategy of high positive-end expiratory pressure combined with low tidal volume ventilation failed to improve mortality rates, although it improved oxygenation and reduced the need for rescue actions in patients with acute lung conditions, based on results from a randomized, controlled trial.

Although mechanical ventilation is essential to keep lung injury patients alive, the ventilation process can worsen their injuries, and previous studies have explored the effectiveness of various mechanical ventilation protocols. In patients with acute lung injury and acute respiratory distress syndrome (ARDS) who have increased lung weight due to edema, studies have shown that a higher positive-end expiratory pressure (PEEP) can help keep the lung from collapsing, but at the risk of further damage. Conversely, a PEEP that is too low can increase the risk for hypoxemia and the need for rescue procedures.

In the multicenter study, Dr. Maureen O. Meade of McMaster University in Hamilton, Ont., and her colleagues enrolled 985 adult patients with acute lung injury and ARDS at 30 intensive care units in Canada, Australia, and Saudi Arabia to receive two PEEP protocols to evaluate the impact on all-cause hospital mortality (JAMA 2008;299:637-45).

The experimental group was treated with a "lung open ventilation" strategy, which included recruitment maneuvers, a target tidal volume of 6 mL/kg of predicted body weight, and plateau airway pressure not to exceed 40 cm H_2O. The control group was treated with a target tidal volume of 6 mL/kg of predicted body weight and plateau airway pressure not exceeding 30 cm H_2O. Recruitment maneuvers were not used in the control group.

A total of 475 patients who received the experimental ventilation and 508 who received the control ventilation were included in the primary analysis. One patient in each group withdrew consent. The average age of experimental group patients was 55 years, and of control group patients was 57 years. There were no significant demographic differences between the groups.

All-cause hospital mortality was lower in the experimental group than in the control group (36% vs. 40%), but the difference was not significant. The researchers found no association between baseline injury severity and response to either treatment.

A total of 53 experimental patients and 47 controls developed barotrauma, and this difference was not significant.

But the experimental group's rates of refractory hypoxemia and death with refractory hypoxemia were half those of the control group: 5% vs. 10%, and 4% vs. 9%, respectively. The differences were statistically significant.

A total of 366 patients in the experimental group received at least one recruitment maneuver, and 81 of these (22%) developed a complication as a result. The most common complications were a mean arterial pressure lower than 60 mm Hg (4.5%), oxygen saturation less than 85% (4.2%), and brachycardia or tachycardia (1.8%).

The use of cointerventions was similar in both groups, and the most common interventions were sedative or narcotic infusion, vasopressors, and neuromuscular blockades. Overall use of rescue therapies was significantly lower in the experimental group than in controls (8% vs. 12%).

The study might have been limited by insufficient power to show a small mortality reduction, the researchers noted, and by the fact that the greatest benefits of the higher PEEP strategy might have been to an undefined subgroup.

They added, however, that the absence of significant harm or increased barotrauma in this study supports findings from previous research that justify a higher PEEP for the benefits of better oxygenation in patients with acute lung injury and ARDS. "The 'open-lung' strategy appeared to improve oxygenation, with fewer hypoxemia-related deaths and a lower use of rescue therapies by clinicians," the investigators said. But the best choice of PEEP protocol remains controversial.

A higher level of PEEP will be useless if edema is not present in an injured lung, Dr. Luciano Gattinoni and Dr. Pietro Caironi of the University of Milan wrote in an accompanying editorial (JAMA 2008;299:691-3).

"Ideally, the direct assessment of lung recruitability by a dynamic lung imaging technique would allow the best physiological titration of PEEP," they said. The lack of benefit from higher PEEP in this study and other clinical trials contrasts with findings from several experimental studies, they added, and suggests that future studies should take care to identify patients with greater lung injury and lung edema.

Until such a technique becomes widely available, results from the current study suggest that PEEP "at the highest level compatible with a plateau pressure of 28 to 30 cm H_2O and a tidal volume of 6 mL/kg of predicted body weight seems to be a reasonable alternative," they noted.

None of the investigators disclosed any financial conflicts. ■