Tools Flag Need for Intensive Care in PE Patients

BY BRUCE JANCIN

NEW ORLEANS — The best predictors of in-hospital deterioration of patients diagnosed with acute pulmonary embolism are a shock index greater than 1 and a pulmonary embolism severity index score more than 100, according to data from the EMPEROR registry.

In patients with pulmonary embolism, routinely calculate the pulmonary embolism severity index (PESI) and shock index, and strongly consider admission to an ICU for patients with elevated values, Dr. Jeffrey A. Kline advised at the annual meeting of the Society for Academic Emergency Medicine.

He analyzed data on in-hospital adverse events in 2,188 consecutive patients diagnosed with pulmonary embolism in 22 emergency departments in the landmark EMPEROR (Emergency Medicine Pulmonary Embolism in the Real World Registry) study, the first-ever large multicenter prospective observational study of pulmonary embolism in the United States.

Five predictors were selected for study inclusion: oxygen saturation (SaO_2) below 95%, an abnormal serum troponin level, a brain natriuretic peptide level greater than 90 pg/mL or pro-brain natriuretic peptide level in excess of 900 pg/mL, a shock index greater than 1, and a PESI score greater than 100, said Dr. Kline, director of research in the department of emergency medicine at Carolinas Medical Center, Charlotte, N.C.

PESI factors include age greater than 65 years, male sex, and comorbid cancer, chronic pulmonary disease, or heart failure (Am. J. Respir. Crit. Care Med. 2005;172:1,041-6).

In the EMPEROR study, death from pulmonary embolism, shock requiring vasopressors, intubation, or surgical embolectomy occurred in 3.5% of the patients. Nearly all of the adverse events happened within 48 hours; roughly two-thirds occurred within 24 hours. Death from pulmonary embolism occurred in only 0.9% of EMPEROR participants.

None of the predictors displayed good sensitivity for predicting adverse events. However, a PESI greater than 100 had outstanding specificity and conferred an 8.7-fold increased likelihood of adverse outcome. The shock index performed second best. The two vital signs proved to be slightly better predictors than the two biomarkers.

An upgrade to the ICU occurred in 1.5% of patients within 24 hours after their admission to a hospital bed.

Audience members said that they are under pressure from hospital administrators to identify patients with pulmonary embolism who can safely be discharged home. They asked whether any of the five predictors were useful for that purpose.

Dr. Kline replied that he has not looked at the EMPEROR data toward that end. However, he is aware of ongoing European studies that suggest a PESI score lower than 50 or so shows potential for such a purpose.

EMPEROR was funded in part by GlaxoSmithKline. ■

How Prognostic Tools Stacked Up in EMPEROR

Predictor	Prevalence in patients with pulmonary embolism	Sensitivity	Specificity	Positive likelihood ratio
Shock index greater than 1	12%	33%	88%	2.9
PESI greater than 100	2%	17%	98%	8.7
SaO_2 below 95%	29%	58%	73%	2.1
Troponin	33%	48%	68%	1.5
Elevated brain natriuretic peptide	32%	37%	68%	1.1

Source: Dr. Kline

ELSEVIER GLOBAL MEDICAL NEWS

CT May Predict Outcome of Acute Pulmonary Embolism

BY NEIL OSTERWEIL

BOSTON — In patients who experience an acute pulmonary embolism, CT assessment of right ventricular ejection fraction appears useful for identifying which patients are most likely to have a good clinical outcome, investigators reported at a meeting of the International Society on Thrombosis and Haemostasis.

Among 114 patients who had an acute pulmonary embolism (PE), a right ventricular ejection fraction (RVEF) lower than 47% as assessed by ECG-synchronized multidetector-row CT (MDCT) was significantly predictive of adverse cardiac events, said Dr. Frederikus A. Klok from Leiden (the Netherlands) University Medical Center. ECG-synchronized MDCT is a novel imaging technique that allows assessment of right ventricular end-diastolic and end-systolic volumes, as well as ejection fraction.

The test had a negative predictive value approaching 100%, suggesting that it may be most useful in identifying patients with very low risk for adverse outcomes following an acute PE.

The study included consecutive inpatients and outpatients with clinical suspicion of acute PE who were hemodynamically stable and who had an indication for CT pulmonary angiography. Patients with confirmed PE underwent low-radiation-dose ECG-synchronized MDCT for assessment of right ventricular function. Right ventricular failure is the primary cause of death after acute PE, Dr. Klok noted.

Right ventricular dysfunction was defined as an ejection fraction less than 47%, which was previously established as the lower limit of the 95% confidence interval of normal RVEF in a large population-based cohort. Patients were followed for 6 weeks. End points were all-cause mortality, resuscitation, admission to an ICU with mechanical ventilation requirement and/or use of inotropic agents, and thrombolytic therapy.

Of 464 patients with suspected PE, ECG-synchronized MDCT confirmed embolism in 114 and ruled it out in 350. Of those with confirmed PE, 51 (45%) had a determination of right ventricular dysfunction and 63 (55%) were deemed to have normal ventricular function.

Of the patients with acute PE, 10 (8.8%) went on to experience an adverse event. There were four deaths, four resuscitations, one ICU admission, and one thrombolytic therapy administration. By the end of the 6 weeks of follow-up, seven of these patients had died, with four of the deaths attributable to PE.

ECG-synchronized MDCT had identified right ventricular dysfunction in 9 of the 10 patients with adverse events. The remaining patient, who had an RVEF above 47%, experienced a major bleeding complication requiring admission to an ICU, but this patient eventually recovered.

Dr. Klok acknowledged that given the low positive predictive value (18%) and high negative predictive value (98%), the test would likely be more useful for predicting outcomes in low-risk patients than in high-risk patients.

Dr. Klok said he and his colleagues did not have relevant conflicts of interest. ■

Knowledge of Inhaler Use Lacking Among Physicians

BY DOUG BRUNK

SAN DIEGO — Knowledge of correct inhaler administration among hospital-based physicians is relatively poor, with pulmonologists faring no better than general medicine physicians, results from a small study in the United Kingdom showed.

The finding "highlights the need for us as doctors to be able to use the inhalers so we can identify groups of patients that may benefit from them," Dr. Aldrin Adeni said in an interview during a poster session at the annual meeting of the American Thoracic Society.

"Some devices are better for patients than others. If we don't know how the devices work, then we may prescribe an inhaler that's suboptimal for a patient," he cautioned.

Dr. Adeni and his associates at the Royal Liverpool Hospital, England, asked 42 physicians to demonstrate the correct use of commonly prescribed inhaler devices. A specialist nurse and respiratory consultant jointly assessed hospital physicians of various grades and specialties taking placebo therapy, using six different inhaler devices (the metered-dose inhaler [MDI], Easi-Breathe, Autohaler, Accuhaler, Turbohaler, and HandiHaler) and two spacer devices (the Aerochamber and the Volumatic). A structured assessment sheet was completed for each physician using each device.

All study participants saw acute general medical admissions, including patients with respiratory diseases. More than half of the participants (26) were general medicine physicians, while the rest (16) were respiratory specialists or consultants.

Dr. Adeni reported that there were no significant differences between respiratory and nonrespiratory physicians, or between senior and junior physicians in the correct use of each inhaler.

The number of physicians who knew when inhalers were empty was greatest for the MDI (60%), followed by the Accuhaler (57%), Easi-Breathe (33%), Autohaler (24%), and Turbohaler (12%).

The percentage of physicians who knew how to correctly prepare the MDI and the Accuhaler was relatively high (73% and 86%, respectively), but dropped off sharply for the Turbohaler (38%), Easi-Breathe (29%), Autohaler (26%), MDI plus Volumatic (24%), and Aerochamber (17%).

Errors that were commonly observed with all inhalers included failing to shake, double dosing, breath-holding time, and knowing when the device is empty.

"We believe our findings highlight the need for improved education of all physicians concerning inhaler devices commonly prescribed," the researchers concluded in their poster.

Dr. Adeni had no relevant conflicts to disclose. ■