Prediction model may help determine risk of critical illness after out-of-hospital emergency care

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A prediction score that included such factors as age, blood pressure, heart and respiratory rate for patients who received out-of-hospital emergency care was associated with the development of critical illness during hospitalization such as severe sepsis, the need for mechanical ventilation or death, according to a study in the Aug. 18 issue of *JAMA*.

"Hospitals vary widely in quality of critical care. Consequently, the outcomes of critically ill patients may be improved by concentrating care at more experienced centers. By centralizing patients who are at greater risk of mortality in referral hospitals, regionalized care in critical illness may achieve improvements in outcome similar to trauma networks," the authors write. "Early identification of nontrauma patients in need of critical care services in the emergency setting may improve triage decisions and facilitate regionalization of critical care."

Christopher W. Seymour, M.D., M.Sc., of Harborview Medical Center, University of Washington, Seattle, and colleagues conducted a study to develop a tool for prediction of critical illness during out-of-hospital care in noninjured, non-cardiac arrest patients, hypothesizing that objective, out-of-hospital factors could discriminate between patients who were and were not likely to develop critical illness during hospitalization. The study included the emergency medical services (EMS) system in greater King County, Washington (excluding metropolitan Seattle), that transports to 16 receiving facilities, and data

for nontrauma, non-cardiac arrest adult patients transported to a hospital by King County EMS from 2002 through 2006. Eligible records with complete data (n = 144,913) were linked to hospital discharge data and randomly split into development (n = 87,266 [60 percent]) and validation (n = 57,647 [40 percent]) groups.

Critical illness occurred during hospitalization in 5 percent of the development (n = 4,835) and validation (n = 3,121) cohorts. Multivariable predictors of critical illness (which was defined as severe sepsis, delivery of mechanical ventilation, or death during hospitalization) included older age, lower systolic blood pressure, abnormal respiratory rate, lower Glasgow Coma Scale score, lower pulse oximetry (measurement of oxygenation of hemoglobin), and nursing home residence during out-of-hospital care. Using a score threshold of 4 or higher, sensitivity was 0.22 and specificity was 0.98.

"We demonstrate the role that simple physiologic assessment can play in risk stratification in the prehospital period among noninjured patients. The model provides an important foundation for future efforts to identify patients at greatest risk of critical illness using information from the out-of-hospital phase of emergency care," the authors write. "Although improved accuracy and external validation are required, this model provides a foundation for future efforts to identify noninjured patients who may benefit from coordinated systems that regionalize emergency care."

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