



Research Week 2023

Mean perfusion pressure independently predicts mortality in patients with undifferentiated shock

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Keywords

Central Venous Pressure, Retrospective Studies, Hemodynamics, Intensive Care Units

Abstract

Background

Mean arterial pressure (MAP) and central venous pressure (CVP) are important hemodynamic parameters in patients with shock. Mean perfusion pressure (MPP), the difference between MAP and CVP is a key determinant of blood flow to various organs. It is currently unknown if MPP is an independent predictor of mortality in volume-resuscitated patients with shock.

Methods

Our retrospective observational cohort study used the Medical Information Mart for Intensive Care III (MIMIC III) database. Adequately volume-resuscitated patients (CVP > 8 mm Hg) adult patients with evidence of end-organ dysfunction and requiring vasoactive agents within the first 24 hours of admission to the intensive care unit were included in the analysis. Multivariate cox proportional hazard regression was performed with all-cause mortality at 90 days as the primary outcome. Additionally, the entire cohort was resampled into subgroups with matched CVP, MPP, and MAP to illustrate the association between these individual hemodynamic parameters and mortality.

Results

8093 patients with a median (IQR) age of 68 (58-77) years were included. CVP median (IQR), MAP mean (SD), and MPP mean (SD) were 12.1 (10.1-14.8), 73.4 (7.5) and 60.5 (8.6) mm Hg, respectively. By 90 days, 1641 (20.3%) patients had died. In the multivariate cox regression model, each 1 mm Hg increase in MPP was independently associated with a decrease in mortality; Hazard ratio (HR 95% CI) 0.98(0.97-0.98); $p < 0.01$. Additionally, the association between MAP or CVP and mortality were observed only if such changes were associated with a concomitant change in MPP.

Conclusions

An increase in Mean perfusion pressure (MPP) is independently associated with reduced mortality in patients with shock requiring hemodynamic support.