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Review

The critical care literature 2016

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ABSTRACT

An emergency physician (EP) is often the first health care provider to evaluate, resuscitate, and manage a critically ill patient. Between 2001 and 2009, the annual hours of critical care delivered in emergency departments (EDs) across the United States increased >200%! (Herring et al., 2013). This trend has persisted since then. In addition to seeing more critically ill patients, EPs are often tasked with providing critical care long beyond the initial resuscitation period. In fact, >33% of critically ill patients who are brought to an ED remain there for >6 h (Herring et al., 2013). During these crucial early hours of illness, detrimental pathophysiologic processes begin to take hold. During this time, lives can be saved or lost. Therefore, it is important for the EP to be knowledgeable about recent developments in critical care medicine. This review summarizes important articles published in 2016 pertaining to the care of select critically ill patients in the ED. The following topics are covered: intracerebral hemorrhage, traumatic brain injury, anti-arrhythmic therapy in cardiac arrest, therapeutic hypothermia, mechanical ventilation, sepsis, and septic shock.

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1. Introduction

An emergency physician (EP) is often the first health care provider to evaluate, resuscitate, and manage a critically ill patient. Between 2001 and 2009, the annual hours of critical care delivered in emergency departments (EDs) across the United States increased >200%! [1]. This trend has persisted since then. In addition to seeing more critically ill patients, EPs are often tasked with providing critical care long beyond the initial resuscitation period. In fact, >33% of critically ill patients who are brought to an ED remain there for >6 h [1]. During these crucial early hours of illness, detrimental pathophysiologic processes begin to take hold. During this time, lives can be saved or lost. Therefore, it is important for the EP to be knowledgeable about recent developments in critical care medicine. This review summarizes important articles published in 2016 pertaining to the care of select critically ill patients in the ED. We selected these articles based on our opinion of the importance of study findings and the immediate application to clinical care. The following topics are covered: intracerebral hemorrhage, traumatic brain injury, anti-arrhythmic therapy in cardiac arrest, intra-arrest therapeutic hypothermia, mechanical ventilation, sepsis, and septic shock.

2. Neurocritical care

2.1. Qureshi AI, Palesch YY, Barsan WG, et al. Intensive blood-pressure lowering in patients with acute cerebral hemorrhage. N Engl J Med 2016;375(11):1033–43

The management of ED patients with acute intracerebral hemorrhage (ICH) is complex and challenging. Current guidelines for the management of spontaneous ICH emphasize the calculation of a baseline severity score (i.e., ICH score), rapid performance of neuroimaging, blood pressure management, reversal of coagulopathy, surgical therapy when appropriate, and admission to a dedicated intensive care unit (ICU) with expertise in neurocritical care [2]. Markedly elevated blood pressure is common in ED patients with acute ICH and has been associated with an increased risk of death [3-5]. Recently, the second Intensive Blood Pressure Reduction in Acute Cerebral Hemorrhage Trial (INTERACT-2) trial demonstrated a nonsignificant improvement in the outcomes (death or disability) of patients with acute ICH, who had an initial systolic blood pressure (SBP) between 150 and 220 mm Hg and received intensive blood pressure reduction to a target SBP <140 mm Hg [6]. Important limitations of the INTERACT-2 trial included that fact that almost 70% of enrolled patients were from a single continent, 7 blood pressure medications were used, patients with SBP readings ≥220 mm Hg were not enrolled, and the majority of patients had small ICHs. As a result of the continued controversy regarding intensive blood pressure reduction in patients with ICH, Qureshi and colleagues sought to determine the efficacy of intensive antihypertensive treatment initiated within 4.5 h after symptom onset in patients with spontaneous supratentorial ICH.

The Acute Cerebral Hemorrhage II (ATACH-2) trial was a randomized, two-group, open label trial conducted at 110 sites in the United States, Japan, China, Taiwan, South Korea, and Germany. Patients included in the study were 18 years of age or older, had a Glasgow Coma Scale (GCS) score of 5 or more upon ED arrival, had an ICH volume <60 cm^3, and had at least one SBP reading of 180 mm Hg or more prior to initiation of antihypertensive treatment. Patients were randomized into two groups: a standard treatment group and an intensive treatment group. Patients in the standard treatment group received antihypertensive therapy to target a SBP between 140 and 170 mm Hg, whereas patients in the intensive treatment group received medications to target a SBP between 110 and 139 mm Hg. Importantly, antihypertensive treatment had to be initiated within 4.5 h after symptom onset. The primary antihypertensive medication used in this trial was nicardipine. Labetalol could be used if the SBP target was not reached with the maximum dose of nicardipine. Patients were assessed with repeat computed tomography (CT) scan of the head at 24 h after initiation of treatment. Follow-up was performed at 1 month with a telephone call and at 3 months with an in-person evaluation. The primary outcome of the study was the proportion of patients who died or had moderately severe to severe disability, as assessed by the modified Rankin Scale (mRS).

One thousand patients were included in the ATACH-2 trial, with 500 randomized to each group. There was no difference in the primary outcome of death or moderately severe or severe disability between the groups (38.7% in the intensive treatment group, 37.7% in the standard group; relative risk 1.04, 95% confidence interval 0.85 to 1.27). Furthermore, there was no difference between the two groups in ordinal distribution of the mRS score at 3 months. Serious adverse events occurred in 1.6% of patients in the intensive treatment group compared with 1.2% in the standard treatment group.

Limitations of the ATACH-2 trial should be noted. Importantly, the trial was stopped early for futility prior to enrolling the target of 1280 patients. Furthermore, the study was an open-label trial and was not blinded. Additional limitations include a lower than anticipated mortality rate in the standard treatment group and a higher proportion of treatment failure in the intensive treatment group compared with the standard treatment group (12% vs. 0.8%). Treatment failure was defined by the investigators as not reaching the target SBP of <140 mm Hg in the intensive treatment group or <180 mm Hg in the standard treatment group. Despite these limitations, the ATACH-2 trial provides valuable information for the EP who must manage blood pressure in a patient with acute ICH. Based on the results of this study, intensive reduction of SBP to <140 mm Hg does not improve patient-centered outcomes.

2.2. Baharoglu MI, Cordonnier C, Al-Shahi Salman R, et al. Platelet transfusion versus standard care after acute stroke due to spontaneous cerebral haemorrhage associated with antiplatelet therapy (PATCH): a randomized, open-label, phase 3 trial. Lancet 2016;387:2605–13

Spontaneous ICH is a devastating illness that affects up to 2 million patients worldwide each year and has a 1-month mortality rate approaching 40% [7,8]. Limited data suggest that patients taking an antiplatelet medication might have a higher incidence of ICH than those not taking that type of medication [9]. In addition, patients with ICH who are taking an antiplatelet medication might have worse outcomes than those not taking an antiplatelet medication [10,11]. The benefit of an empiric platelet transfusion into patients with an ICH known to be taking an antiplatelet medication remains uncertain. Unfortunately, no randomized trials have evaluated the use of platelet transfusions in this setting to guide the bedside clinician. Therefore, the authors of the current trial sought to determine whether platelet transfusion would improve outcomes compared with standard care in patients with a spontaneous ICH who were taking an antiplatelet medication.

The Platelet Transfusion Versus Standard Care after Acute Stroke Due to Spontaneous Cerebral Hemorrhage (PATCH) trial was a multicenter, randomized, open-label, parallel-group trial performed in 36 centers in the Netherlands, 13 centers in the United Kingdom, and 11 centers in France. Patients included in the study were 18 years of age or older