

Prehospital Postintubation Hypotension and Survival in Severe Traumatic Brain Injury

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Research, Audit, Innovation & Development Group

Improving patient outcomes

Introduction

Traumatic brain injury (TBI) causes significant global mortality and morbidity, affecting over 50 million people annually. In England and Wales, most severe cases are treated in neurosurgical centres, with many transported by helicopter services. Secondary insults such as hypotension and hypoxia commonly occur before hospital care and worsen outcomes. Early management is critical. Prehospital rapid sequence induction (RSI) is often required but remains controversial, with limited trial evidence. Hypotension, even brief, increases mortality risk and frequently occurs before or after RSI. Postintubation hypotension affects over 20% of patients and may worsen outcomes, particularly in severe TBI. This study examines its association with 30-day mortality.

Methods

Design, Setting, and Participants

This multicentre, retrospective, observational cohort study was performed between January 1, 2015, and December 31, 2022, in the East of England Trauma Network (EOETN), including three HEMS

A consecutive sample of patients (aged ≥ 16 years) with trauma and severe TBI who received prehospital rapid sequence induction by HEMS and were transported to a hospital within the EOETN were eligible for inclusion. Severe TBI was defined as a Head AIS score of 3 or higher.

Exposure

Postintubation hypotension defined as a new systolic blood pressure less than 90 mmHg and induction of anaesthesia at 10 minutes or less.

Main Outcomes and Measures

The primary outcome was 30-day mortality.

Results

A total of 555 patients (median [IQR] age, 48 [29-66] years; 408 [73.5%] male) were included in the final analysis; 548 (98.7%) had a blunt mechanism of injury. Within the first 10 minutes of anaesthesia.

106 patients (19.1%) had postintubation hypotension, and 169 (30.5%) died within 30 days of injury.

After adjustment for confounders postintubation hypotension was associated with increased 30-day mortality for patients with polytrauma and severe TBI (adjusted odds ratio [AOR], 1.70; 95% CI, 1.01-2.86; $P = .04$).

For patients with isolated severe TBI who had postintubation hypotension, the odds of death adjusted for confounders were significantly higher than for patients without (AOR, 13.55; 95% CI, 3.65-61.66; $P < .001$).

Conclusion

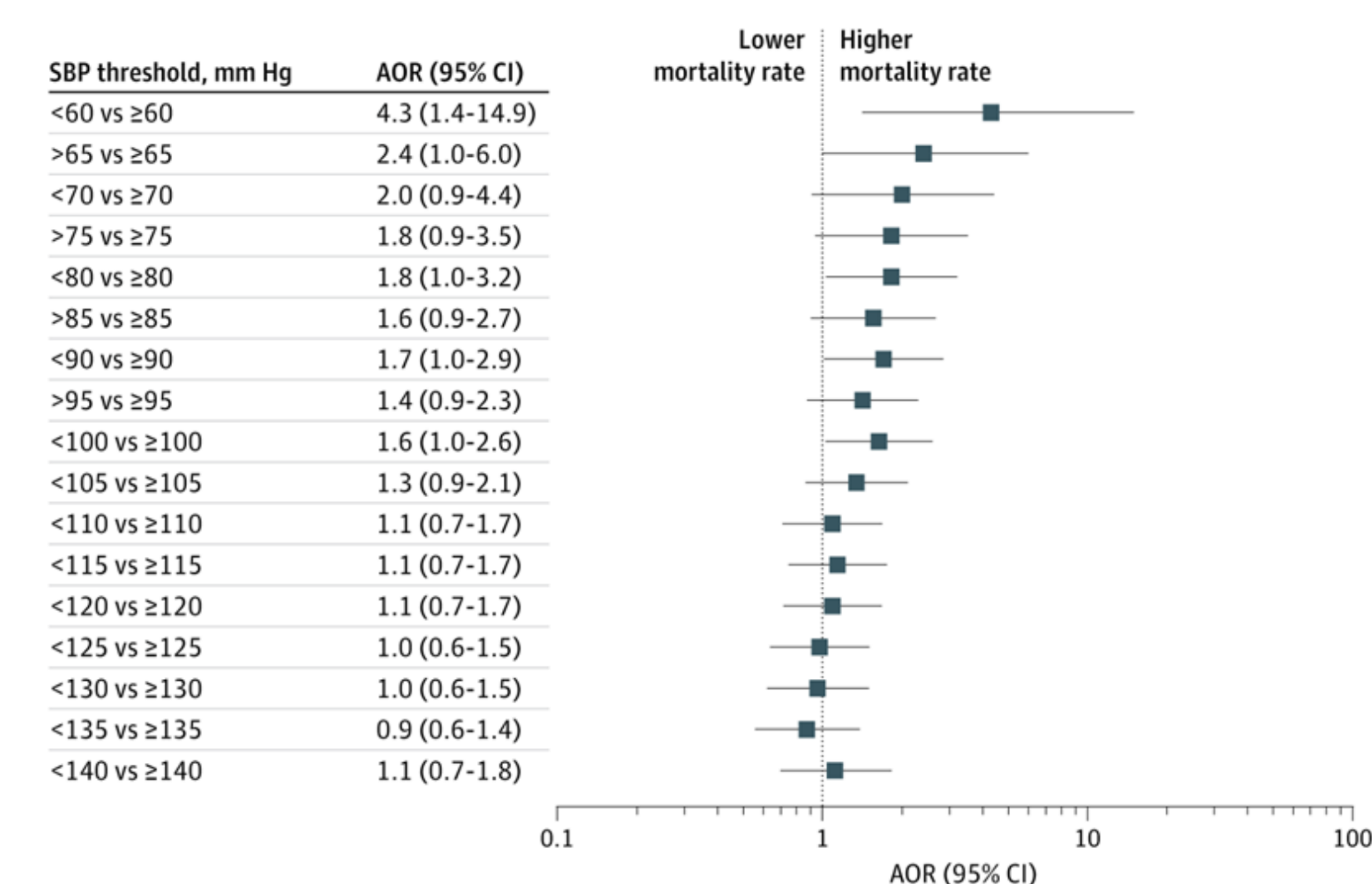
In this cohort study of patients with severe TBI who received prehospital rapid sequence induction, postintubation hypotension was associated with increased 30-day mortality. This association was strongest for patients with isolated TBI. These findings suggest the need for randomized prehospital interventional studies to reduce the incidence of postintubation hypotension in traumatic brain injury.

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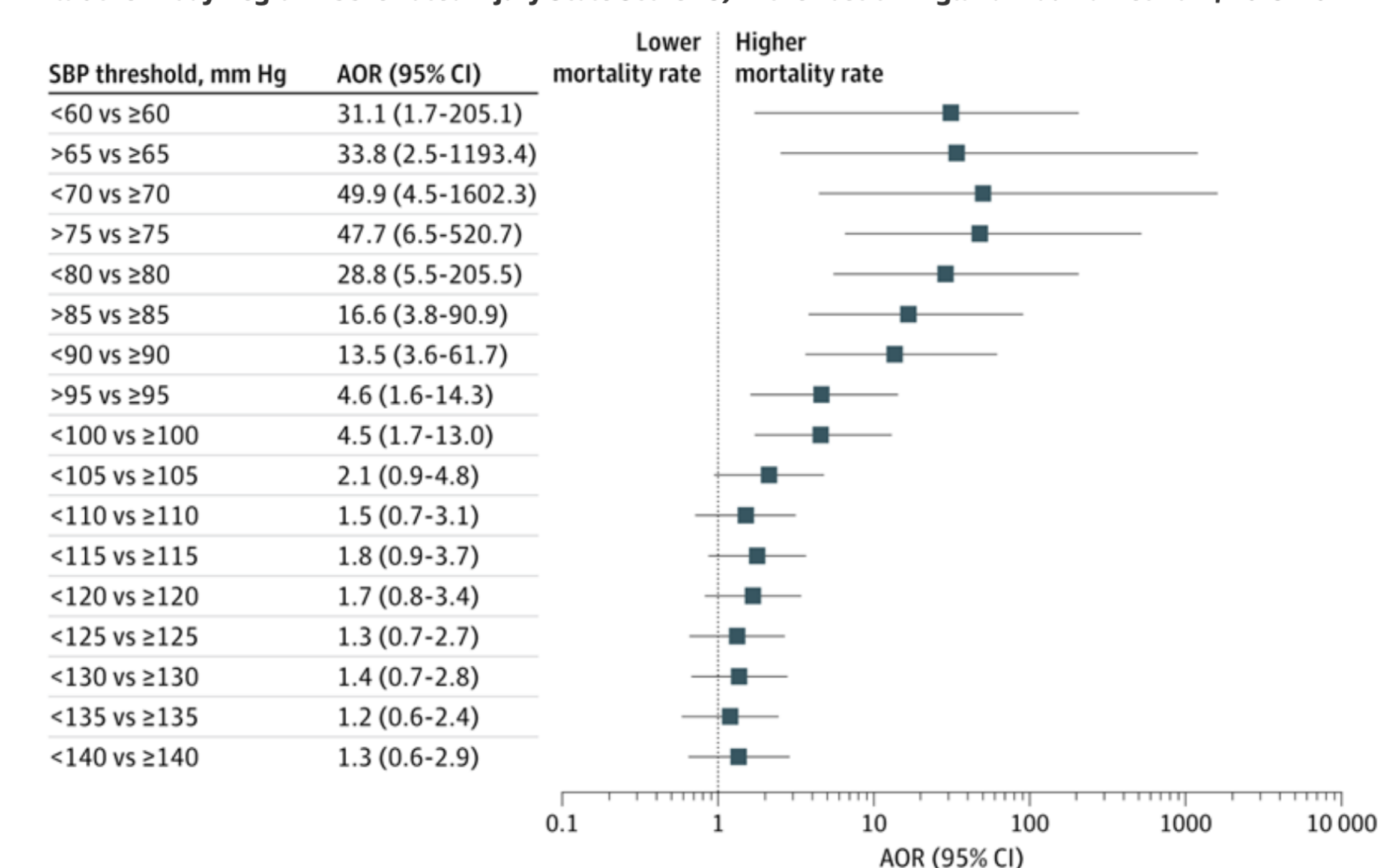
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Figure 2. Adjusted Odds Ratios (AORs) of Death for Lowest Postintubation Systolic Blood Pressure (SBP) in Patients With Polytrauma and Severe Traumatic Brain Injury (Group 1) in the East of England Trauma Network, 2015-2022^a



^aSevere traumatic brain injury was defined as Head Abbreviated Injury Scale Score ≥ 3 .

Figure 3. Adjusted Odds Ratios (AORs) of Death for Lowest Postintubation Systolic Blood Pressure (SBP) in Patients With Trauma and Isolated Severe Traumatic Brain Injury (Head Abbreviated Injury Scale Score ≥ 3 and All Other Body Region Abbreviated Injury Scale Score < 3) in the East of England Trauma Network, 2015-2022



^aIsolated severe traumatic brain injury was defined as head Abbreviated Injury Scale score ≥ 3 and all other body region Abbreviated Injury Scale score < 3 .

