

## A study to forecast the fate: correlating early death in the emergency department with the hemodynamic and blood gas parameters on arrival – a retrospective study

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**Background:** In the high-pressure environment of the emergency department (ED), the rapid assessment of vital signs and arterial blood gas (ABG) parameters is fundamental for managing critically ill patients. This study sought to analyze mortality patterns over one year at a tertiary care center to identify specific hemodynamic and metabolic parameters that could predict early death in the ER.

**Methods:** This retrospective observational study was conducted at AIIMS Patna and included 572 patients who expired in the ED. Participants were categorized into two groups: "early mortality" (death within six hours of arrival) and "late mortality" (death after 6 hours). Data on demographics, initial vital signs – including shock index (SI), pulse rate, blood pressure, and oxygen saturation – and metabolic parameters like random blood sugar and ABG values were extracted from medical records. Statistical analysis was performed using jamovi software, employing chi-square tests and Cramér's V to measure the strength of associations, with significance set at  $p < 0.05$ .

**Results:** The study population had a mean age of 53 years, with a significant male majority of 64.3%. Early mortality accounted for 46.7% of deaths, while 53.3% were late deaths. Highly significant associations ( $p < 0.001$ ) were found between the timing of death and all primary physiological markers. In particular, 76.7% of patients with non-recordable SI and 79.5% of those with non-recordable blood pressure died early. Bradycardia served as a critical indicator, with 65.7% of such patients dying within six hours, compared to only 39.9% of tachycardia patients. Hypoglycemia ( $<70$  mg/dl) was an absolute predictor of early mortality (100%), whereas patients with hyperglycemia ( $>200$  mg/dl) showed delayed mortality. Furthermore, ABG parameters like acidosis, hypocarbia, and low bicarbonate levels were strongly associated with death within the first six hours.

**Conclusion:** These findings underscore the clinical necessity for immediate, aggressive resuscitation and the implementation of rapid triage protocols to target these high-risk markers and potentially prolong patient survival.

**Keywords:** Serum lactate, hypocarbia, hypoglycemia.

**Conflict of interests:** None.

**Funding:** None.

**Consent for participate:** Written informed consent was obtained from all the participants.

**Ethical approval:** Taken from the Institute Ethics Committee – AIIMS Patna AIIMS/ Pat/2025/IEC/1441- dated 13-05-2025.