Prehospital ETCO\textsubscript{2} is Predictive of Death in Intubated and Non-Intubated Patients

Courtney Wham, MS, Paramedic\textsuperscript{1}; Theresa Morin, MA\textsuperscript{2}; Angela Sauaia MD, PhD\textsuperscript{3}; Robert McIntyre, MD\textsuperscript{4}; Shane Urban, BSN, RN, CCRC\textsuperscript{4}; Kevin McVaney, MD\textsuperscript{1}; Mitchell Cohen, MD, FACS\textsuperscript{4}; Alexis Cralley, MD\textsuperscript{2}; Ernest E. Moore, MD\textsuperscript{2}; Eric M. Campion, MD, FACS\textsuperscript{2}

\textsuperscript{1}Denver Health Medical Center, Department of Emergency Medicine, Denver Paramedics
\textsuperscript{2}Ernest E. Moore Shock Trauma Center at Denver Health, Department of Surgery
\textsuperscript{3}University of Colorado, School of Public Health (AS)
\textsuperscript{4}University of Colorado Anschutz, Department of Surgery

**Background:** Prehospital identification of shock in trauma patients lacks accurate markers. Low end tidal carbon dioxide (ETCO\textsubscript{2}) correlates with mortality in intubated patients. The predictive value of ETCO\textsubscript{2} obtained by nasal capnography cannula (NCC) is unknown. We hypothesized that prehospital ETCO\textsubscript{2} values obtained by NCC and in-line ventilator circuit (ILVC) would be predictive of mortality.

**Methods:** This was a prospective, observational, multicenter study. ETCO\textsubscript{2} values were collected by a NCC or through ILVC. AUROCs were compared with prehospital systolic blood pressure (SBP) and shock index (SI). The Youden index defined optimal cutoffs.

**Results:** Of 549 enrolled patients, 488 (88.9\%) had ETCO\textsubscript{2} measured through an NCC. Median age was 36 (27-52) years; 76.3\% were male; median ISS was 12 (5-22). Mortality was 9.8\%. Minimum prehospital ETCO\textsubscript{2} significantly predicted mortality with an AUROC of 0.77 (CI 0.69-0.85). In a cohort of patients that excluded those suffering prehospital cardiac arrest, minimum prehospital ETCO\textsubscript{2} was the only significant predictor of mortality (AUROC 0.65; CI 0.53-0.78; Youden index=22mmHg) and outperformed lowest prehospital SBP (AUROC 0.60; CI 0.44-0.77) and highest calculated prehospital SI (AUROC 0.50; CI 0.35-0.64), though not to a level of statistical significance.

**Conclusion:** Prehospital ETCO\textsubscript{2} measured by non-invasive NCC or ILVC may be predictive of mortality in injured patients.

**Keywords:** Acute injury; ETCO2; End-tidal capnography; Prehospital triage; Shock; Trauma triage.