Esmolol Shows Superior Survival and Hemodynamic Benefits Over Landiolol in Adults With Septic Shock

Glenview, IL – A new analysis comparing beta blockers in adults with septic shock found that esmolol was associated with the greatest reduction in mortality and improvement in clinical outcomes compared with landiolol or standard care.

Septic shock is a life-threatening condition characterized by circulatory and metabolic dysfunction, resulting in persistently high mortality rates. Excessive sympathetic activation in septic shock leads to increased cardiac strain, immune dysregulation, and metabolic imbalance. Beta blockers, such as esmolol and landiolol, have been investigated for their potential to mitigate these effects by modulating hyperadrenergic activity. This analysis compared the effectiveness of beta blockers on mortality and key clinical outcomes in adults with septic shock, aiming to identify the most effective therapeutic option.

Researchers conducted a Bayesian network meta-analysis of eight randomized controlled trials (RCTs) including 916 participants. Eligible studies compared beta blockers (esmolol or landiolol) with standard care in adults with septic shock.

Hazard ratios (HRs) with 95% credible intervals (CrIs) were used for dichotomous outcomes and mean differences (MDs) for continuous outcomes. A random effects model accounted for study variability, and the Surface Under the Cumulative Ranking Curve (SUCRA) method ranked treatments based on overall performance.

For the primary outcome, 28-day mortality, esmolol ranked highest (HR: 0.47, 95% CrI: 0.29–0.72; SUCRA: 99.16%), followed by control (SUCRA: 33.75%), and landiolol ranked lowest (HR: 1.14, 95% CrI: 0.63–1.83; SUCRA: 17.09%). For ICU mortality, esmolol showed the most significant reduction (HR: 0.54, 95% CrI: 0.16–1.51; SUCRA: 91.35%), followed by control (SUCRA: 31.53%) and landiolol (HR: 1.20, 95% CrI: 0.37 to 3.00; SUCRA: 27.11%). Regarding ICU stay duration (in days), esmolol was associated with the greatest reduction in length of stay (MD: -1.25, 95% CrI: -3.66–1.71; SUCRA: 67.06%), and landiolol (MD: -1.15, 95% CrI: -5.01–3.04; SUCRA: 60.6%). For hospital stay duration (in days), landiolol showed a slight reduction (MD: -0.25, 95% CrI: -7.68–7.15; SUCRA: 56.67%), while esmolol showed a minor increase (MD: 0.84, 95% CrI: -2.20–3.66; SUCRA: 32.45%). In terms of heart rate reduction (in bpm), esmolol had the most significant effect (MD: -18.35, 95% CrI: -22.45 to -12.40; SUCRA: 99.11%), followed by landiolol (MD: -7.50, 95% CrI: -14.54 to -0.46; SUCRA: 49.83%). For serum lactate levels (mmol/L), esmolol was the most effective in reducing lactate (MD: -0.38, 95% CrI: -1.40–0.67; SUCRA: 81.77%), while landiolol showed a modest increase (MD: 0.57, 95% CrI: -1.19–2.31; SUCRA: 19.76%).

"Esmolol may be a promising treatment for septic shock, particularly in patients with high sympathetic activation,**"** said Anika Chowdhury, CHEST 2025 presenter. **"**Its benefits in reducing mortality and improving key clinical outcomes support its potential role in clinical practice, necessitating further research on its safety and efficacy.**"**

Esmolol showed significant reductions in 28-day mortality, ICU mortality, heart rate, and serum lactate levels, as well as a shorter ICU stay. In comparison, landiolol demonstrated less effectiveness.

Further results will be presented at the CHEST Annual Meeting 2025 as part of the Septic Shock: Advancements in Management and Therapeutic Strategies original investigation

presentations titled, *Comparative Effectiveness of Beta Blockers on Mortality and Clinical Outcomes in Adults With Septic Shock: A Comprehensive Systematic Review and Bayesian Network Meta-Analysis.* The study abstract can be viewed on the *CHEST*® journal website.