

Paramedic – Evidence Based Medicine (P-EBP) Program

Paramedic CAT (Critically Appraised Topic) Worksheet

Title: Dopamine versus Norepinephrine in Prehospital Septic Shock Patients

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Clinical Scenario: Paramedics arrive to a 55-year-old male complaining of generalized weakness. On general impression patient is alert but lethargic, pale, warm, and diaphoretic. The patient meets both Systemic Inflammatory Response Syndrome (SIRS) criteria and quick sequential organ failure assessment score (qSOFA score) criteria by presenting with a fever of 38.6°C, hypotension with a BP of 72/42 mmHg, a HR of 132 bpm, and a RR of 30. The paramedics determine that the working diagnosis is septic shock and plan for treatment. Many prehospital protocols call for a Dopamine infusion for septic shock treatment, but should paramedics be administering a Norepinephrine infusion instead to reduce patient mortality?

PICO (Population – Intervention – Comparison – Outcome) Question:

In prehospital patients experiencing septic shock, should paramedics administer Norepinephrine instead of Dopamine, to reduce overall patient mortality.

Search Strategy:

((septic shock[Title]) AND norepinephrine[Title]) AND dopamine[Title]

Search Outcome:

23 results. 8 outcomes were relevant to this PICO question. 2 with similar 28-mortality outcome measured.



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Relevant Papers:

AUTHOR, DATE	POPULATION: SAMPLE CHARACTERISTICS	DESIGN (LOE)	OUTCOMES	RESULTS	STRENGTHS/ WEAKNESSES
De Backer, 2012	1,360 patients in septic shock (observational). 1,408 patients in septic shock (randomized).	Meta-analysis comparing five observational studies and six randomized controlled trials. This study contains both prospective and retrospective aspects. LOE: Level 1.	28-day mortality or closest estimate.	Observational results: Relative risk, 1.23; confidence interval, 1.05–1.43; $p < .01$. Dopamine administration was associated with an increased risk of death over Norepi. RCT results: Relative risk, 1.12; confidence interval, 1.01–1.20; $p = .035$. Dopamine was associated with an increased risk of death over Norepi. In the two trials that reported arrhythmias, these were more frequent with dopamine than with norepinephrine (relative risk, 2.34; confidence interval, 1.46–3.77; $p = .001$).	Strengths: - This study only included patients in confirmed septic shock. - Had a large number of patients for an adequate sample size. - This study used the most relevant and wide scale databases for study search, so relevant studies would not be missed. Weaknesses: - Outcomes from some studies varied from 28 days of mortality. - Varied endpoints with some studies looking at hemodynamic instability rather than mortality. - Could not assess >28 days for mortality of patients.

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<p>Vasu, 2012</p>	<p>Six studies including 2,043 critically ill patients with septic shock or in a population of critically ill patients with shock predominantly secondary to sepsis.</p>	<p>Systematic Review of Six Randomized Clinical Trials.</p> <p>Has both prospective and retrospective aspects.</p> <p>LOE: Level 1.</p>	<p>28-day or in-hospital mortality.</p>	<p>There were 479 (48%) deaths in the norepinephrine group and 555 (53%) deaths in the dopamine group. There was statistically significant superiority of norepinephrine over dopamine for the outcome of in-hospital or 28-day mortality: pooled RR: 0.91 (95% CI 0.83 to 0.99; P = .028)</p> <p>Secondarily, it was found that a statistically significant decrease in the rate of cardiac arrhythmias in the norepinephrine group as compared to the dopamine group: pooled RR: 0.43 (95% CI 0.26 to 0.69; P ≤ .001).</p>	<p>Strengths:</p> <ul style="list-style-type: none"> - Included only relevant randomized clinical trials. - Used Cochrane's risk of bias tool to assess the quality of studies. <p>Weaknesses:</p> <ul style="list-style-type: none"> - The main limitation of the study is that it is dominated by the study of De Backer and colleagues. - This study included patients' with cardiogenic, septic, and hypovolemic shock; however, the majority of the patients had sepsis as the etiology of the shock.
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Comments:

From the results of these two large meta-analyses, and general research available on academic databases, Norepinephrine provides a reduced chance of mortality, in comparison to Dopamine, following a diagnosis of septic shock. What's interesting, it seems that these two studies also highlighted that Norepi produces less arrhythmias following administration in patients with septic shock in place of Dopamine. Suggesting that this reduction in arrhythmias, may correlate with 28-day mortality and other adverse effects from septic shock and Dopamine administration.

Consider:

The main considerations for restricting the provision of norepinephrine in the prehospital environment could include tangible measures such as cost efficiency or storage requirements, which may warrant a second study to determine efficacy.



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Clinical Bottom Line:

Norepinephrine infusions used for treatment of patients with septic shock provides a reduced risk of mortality and arrhythmias in comparison to the administration of Dopamine. This should be considered in the prehospital environment.

References:

De Backer, D., Aldecoa, C., Njimi, H., & Vincent, J. L. (2012). Dopamine versus norepinephrine in the treatment of septic shock: a meta-analysis. *Critical care medicine*, 40(3), 725-730.

Vasu, T. S., Cavallazzi, R., Hirani, A., Kaplan, G., Leiby, B., & Marik, P. E. (2012). Norepinephrine or dopamine for septic shock: systematic review of randomized clinical trials. *Journal of intensive care medicine*, 27(3), 172-178.

