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Hydrocortisone, Vitamin C, and Thiamine for the Treatment of Severe Sepsis and Septic Shock

A Retrospective Before-After Study

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Background

The global burden of sepsis is estimated as 15 to 19 million cases annually, with a mortality rate approaching 60% in low-income countries.

Methods

In this retrospective before-after clinical study, we compared the outcome and clinical course of consecutive septic patients treated with intravenous vitamin C, hydrocortisone, and thiamine during a 7-month period (treatment group) with a control group treated in our ICU during the preceding 7 months. The primary outcome was hospital survival. A propensity score was generated to adjust the primary outcome.

Results

There were 47 patients in both treatment and control groups, with no significant differences in baseline characteristics between the two groups. The hospital mortality was 8.5% (4 of 47) in the treatment group compared with 40.4% (19 of 47) in the control group ($P < .001$). The propensity adjusted odds of mortality in the patients treated with the vitamin C protocol was 0.13 (95% CI, 0.04-0.48; $P = .002$). The Sepsis-Related Organ Failure Assessment score decreased in all patients in the treatment group, with none developing progressive organ failure. All patients in the treatment group were weaned off vasopressors, a mean of 18.3 ± 9.8 h after starting treatment with the vitamin C protocol. The mean duration of vasopressor use was 54.9 ± 28.4 h in the control group ($P < .001$).

Conclusions

Our results suggest that the early use of intravenous vitamin C, together with corticosteroids and thiamine, are effective in preventing progressive organ dysfunction, including acute kidney injury, and in reducing the mortality of patients with severe sepsis and septic shock. Additional studies are required to confirm these preliminary findings.

Key Words:

[corticosteroid](#), [hydrocortisone](#), [septic shock](#), [thiamine](#), [vitamin C](#)

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Abbreviations:

[AKI \(acute kidney injury\)](#), [APACHE \(Acute Physiology and Chronic Health Evaluation\)](#), [D5W \(dextrose 5% in water\)](#), [EHR \(electronic health record\)](#), [LOS \(length of stay\)](#), [PCT \(procalcitonin\)](#), [SOFA \(Sepsis-Related Organ Failure Assessment\)](#), [SVCT2 \(sodium-vitamin C transporter-2\)](#)

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