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THE EFFECT OF EARLY FLUID BOLUS RESUSCITATION ON LACTATE CLEARANCE AMONG PATIENTS WITH SEPTIC SHOCK

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INTRODUCTION: Lactate is often the only predictor of severe sepsis and lactate clearance is associated with reduced mortality among septic shock patients. The extent to which lactate clearance is affected by compliance with the SEP-1 bundle elements remains a subject of debate. This study aims to determine the effect of the fluid component of the bundle on lactate clearance among patients with septic shock.

METHODS: A retrospective cohort study in a large community health care system (310,000 annual emergency visits) of all adults (age > 18 years) admitted from January 2017 through December 2022 with an ICD-10 diagnosis of sepsis and an initial emergency department systolic blood pressure < 90 mmHg, mean arterial blood pressure < 65 mmHg, or lactate \geq 4 mmol/l. From this cohort, we excluded those without an initial lactate result. The time to lactate clearance was defined as when admitting SBP was recorded to the first lactate value < 2.0 mmol/l. The Cox proportional hazard model assessed fluid bolus's effect on lactate clearance time.

RESULTS: 1579 patients met inclusion criteria, median (IQR) age was 70 (59-80) years, initial lactate 4.2 (2.2-5.9) mmol/l, SBP 88 (78-110) mmHg, and time to lactate clearance 10.5 (4.9-20.9) hours. Mortality was 24.0%, with 28.7% requiring mechanical ventilation and 64.2% requiring vasopressors. Initial lactate > 4 mmol/l was associated with increased odds of mortality, mechanical ventilation use, and ICU admission [OR 2.4 (95% CI 1.8-3.2); OR 2.8 (95% CI 2.1-3.6); OR 1.3 (95% CI 1.0-1.7)] respectively. The initial lactate value was comparable between those who completed 30mL/kg within 2-3 hours and those who did not (4.2 vs 4.3 mmol/l). The median time to lactate clearance was shorter among patients who received the recommended fluid bolus (9.2 vs 12.1 hours; p-value = 0.04). After adjustment, those who received the recommended fluid bolus had a 27% faster rate of lactate clearance [HR 1.27 (95% CI 1.04-1.55), p=0.02] and reduced mortality [OR 0.59 (95% CI 0.38-0.92), p = 0.02].

CONCLUSIONS: We observed that adherence to the fluid component of the SEP-1 bundle is associated with a shorter time to lactate clearance and reduced mortality. These results support the inclusion of lactate clearance as a measure in the sepsis bundle.

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IDENTIFYING SEPSIS PATIENTS AT HIGH RISK OF MORTALITY USING PROCALCITONIN TRAJECTORY

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INTRODUCTION: Procalcitonin (PCT) has been recommended as a valuable biomarker in the management of sepsis due to its sensitivity to bacterial infections. However, the relation between PCT trajectory and mortality remains unclear. This study aims to investigate the trajectory of PCT levels in sepsis patients and its correlation with survival outcomes.

METHODS: We retrospectively reviewed patients who were diagnosed with sepsis from Jan 2019 to March 2024 at Zhongshan Hospital Fudan University. PCT measurements within the first 7-day in ICU were included and hierarchical linear mixed-effects (HLME) model was constructed to identify latent classes of PCT trajectory. Baseline characteristics across these classes were compared. Proportional hazard model was performed to study the association between PCT trajectory classes and survival probability.

RESULTS: In total, 564 patients diagnosed with sepsis (174/31% female; median age 68.5 years [IQR: 59-77] were included. Three classes were identified regarding PCT trajectory: "high-value-slow-decrease" class (Class 1, n=43/8%), "low-value-slow-decrease" class (Class 2, n=354/66%), "high-value-fast-decrease" class (Class 3, n=140/26%). The baseline Sequential Organ Failure Assessment (SOFA) score and lactate, septic shock proportion, and in-hospital mortality were the highest in Class 1. PCT trajectory in Class 1 is an independent risk factor for in-hospital mortality compared to Class 2 (HR 0.507[95% CI, 0.287-0.895], P=0.020) and Class 3 (HR 0.449 [95% CI, 0.244, 0.827], P=0.011).

CONCLUSIONS: PCT trajectory can be utilized to distinguish different clinical outcomes in sepsis patients. Patients exhibiting "high-value-slow-decrease" PCT trajectory are at a relatively higher risk of in-hospital mortality.