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# Clinical Significance of Bioimpedance Spectroscopy in Critically Ill Patients

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## Abstract

**Background:** Early fluid resuscitation is a key aspect in the successful management of critically ill patients, but the optimal goal for volume control after the acute stage of critical illness remains unclear. This study aimed to evaluate the prognostic value of bioimpedance spectrometry for fluid management in critically ill patients.

**Methods:** In this prospective observational study, patients who consented to participate were screened within the first 24 hours of admission to a medical intensive care unit (ICU) from February 4, 2015, to January 31, 2016. Information on demographics, comorbidities, primary reasons for admission, baseline laboratory data, and ventilator or inotropic use were documented. Data of fluid intake, fluid output, and body weight were recorded for the first 3 days of ICU admission. Bioimpedance spectrometry was performed on the first and third days after ICU admission. All participants were followed until death or hospital discharge.

**Results:** Of the 140 enrolled patients (median age: 70 years, interquartile range: 60-77 years), 23 (16.4%) patients died during hospitalization. Independent predictors of hospital mortality were Acute Physiology and Chronic Health Evaluation II scores (per 1 point increase, odds ratio [OR]: 1.101) and overhydration (OH) volume on the first day (per 1 L increase, OR: 1.216). Compared to normal OH status (OH volume between -1 and 1 L), hyper OH status (OH volume < -1 L) on the third day after ICU admission was an independent predictor of hospital death (OR: 7.609). Normal OH status on the third day was associated with greater numbers of ICU-free and ventilator-free days.

**Conclusion:** Bioimpedance spectrometry can be used to predict outcomes in critically ill patients. Increased OH volume on day 1 and hyper OH volume on day 3 of ICU admission are associated with a greater risk of hospital mortality. Volume status on day 3 is associated with durations of ventilator use and ICU stay.

**Keywords:** bioimpedance spectrometry; critical care; mortality; resuscitation; ventilator; volume status.

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