# The Impact of Body Habitus on Resuscitation Practices and Clinical Outcomes in Critically Ill Adults with Sepsis and Shock

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## BACKGROUND

- Sepsis accounted for 6% of U.S. hospitalizations in 2014.[1]
- Additionally, almost 40% of Americans are living with obesity.[2]
- Treatment recommendations of sepsis include initial fluid resuscitation with at least 30 mL per kg of IV crystalloids within the first 3 hours.[3]
- The obesity paradox is a phenomenon showing better clinical outcomes in obese patients compared to those of their normal-weight counterparts.[4]
- Since fluid overload has been shown to lead to poor outcomes in critically ill patients[5], it is possible that overweight or obese patients are less likely to get the recommended treatment, due to concerns of fluid overload.
- **Purpose:** To investigate how likely patients are to receive the recommended amount of fluid based on their body mass index (BMI).
- **Hypothesis:** Overweight and obese patients with sepsis are less likely to receive the guideline recommended 30 mL/kg of initial fluid resuscitation than under or normal weight patients based on total body weight (TBW).

## OUTCOMES

**Primary**

- Percentage of patients that received at least 30 mL/kg based on Total Body Weight (TBW) within 3 hours of beginning fluid resuscitation

**Secondary**

- Percentage of patients who received recommended fluid resuscitation by IBW
- IV fluid input at 72 hours
- Incidence of fluid overload
- Vasopressor requirement
- Vasopressin use within 48 hours
- Mechanical ventilation free days
- ICU length of stay
- All cause in-hospital mortality

## STUDY DESIGN

- IRB approved, single center, retrospective review
- Medical records were identified and reviewed based on ICD-10 diagnoses for sepsis or septic shock
- Inclusion Criteria:
  - Patients ≥ 18 years old
  - Admitted to an Intensive Care Unit (ICU) with sepsis or septic shock between October 2015 and December 2017
- Study Groups:
  - Under/normal weight, defined as BMI < 30 kg/$m^2$
  - Overweight/Obese, defined as BMI ≥ 30 kg/$m^2$
- Statistical Analysis:
  - Categorical and continuous data were compared using the $\chi^2$ and Mann-Whitney U tests, respectively
  - Logistic regression controlling for severity of illness was performed to evaluate the association between BMI group and mortality

## RESULTS

**Table 1. Baseline Demographics***

| Variable | Overweight/Obese n=51 | Underweight/Normal n=34 |
|---|---|---|
| Age, years | 66 (55-73) | 65 (54-77.75) |
| Male | 20 (39.2) | 19 (55.9) |
| Caucasian | 23 (45.1) | 14 (41.2) |
| Admission weight, kg | 94.40 (81.19-110.55) | 60.33 (52.27-69.50) |
| SOFA score | 12 (8-15) | 9 (6-12.25) |
| Initial blood lactate, mmol/L | 2.6 (1.85-5.85) | 2.6 (1.3-5.00) |
| Chronic Kidney Disease | 14 (27.5) | 7 (20.6) |
| End Stage Renal Disease | 7 (13.7) | 3 (8.8) |
| Hypertension | 46 (90.2) | 24 (70.6) |
| Diabetes | 27 (52.9) | 13 (38.2) |
| Heart Failure | 18 (35.3) | 9 (26.5) |
| Liver disease | 6 (11.8) | 4 (11.8) |

*All values reported in median (IQR) or n (%)

**Figure 1. Received at least 30mL/kg TBW by hour 3**

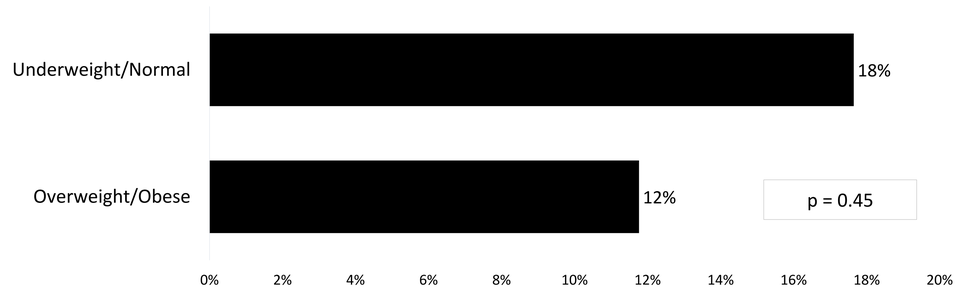


**Table 2. Secondary Outcomes***

| Outcome | Overweight/Obese n=51 | Underweight/Normal n=34 | P-Value |
|---|---|---|---|
| Received at least 30 mL/kg IBW by hour 3 | 16 (31.4) | 5 (14.7) | 0.081 |
| Total amount of IV fluid input at 72 hours | 9714 (7932-13210) | 9419 (6875-11024.75) | 0.328 |
| Incidence of fluid overload | 14 (27.5) | 15 (44.1) | 0.112 |
| Required vasopressors | 42 (82.3) | 24 (70.5) | 0.202 |
| Received vasopressin within 48 hours | 28 (54.9) | 8 (23.5) | 0.004 |
| Mechanical ventilation-free days | 15 (0-28) | 21 (0-28) | 0.887 |
| ICU Length of stay in days | 6 (4-21) | 5.5 (3.75-10.50) | 0.445 |
| All cause in-hospital mortality | 17 (33.3) | 17 (50) | 0.124 |

*All values reported in median (IQR) or n (%)

**Table 3. Factors associated with all cause in hospital mortality**

| Variable | Odds ratio | 95% Confidence Interval |
|---|---|---|
| BMI < 30 kg/$m^2$ | 3.81 | 1.31-11.1 |
| SOFA Score | 1.24 | 1.08-1.42 |

## CONCLUSIONS

- Overweight and obese patients had similar likelihood of receiving the recommended volume of initial fluid resuscitation as their underweight/normal counterparts
- Both groups were unlikely to get the recommended amount fluid resuscitation
- The use of vasopressin was more common in obese and overweight patients
- The obesity paradox in septic patients is apparent but remains unexplained
- Limitations of the study include small sample size and single center, retrospective design
- **Future Research:**
  - Expand to a multi-center trial including four sites
  - Investigate alternative explanations for the obesity paradox such as early vasopressin use
  - Investigate reasons practitioners rarely administer the recommended amount of initial fluid resuscitation

## REFERENCES

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