Influence of left ventricular ejection fraction on early resuscitation in critically ill adults with sepsis and shock

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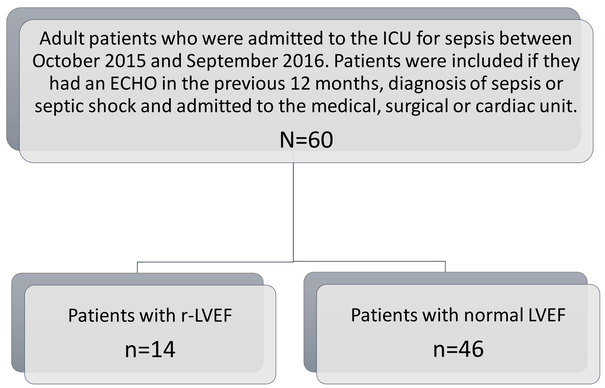
BACKGROUND

- Reduced ejection fraction is classified in the 2013 ACCF/AHA guidelines as those with a left ventricular ejection fraction ≤ 40%.[1]
- Based on the recommendations of the 2016 Surviving Sepsis Campaign, patients presenting with sepsis should receive at least 30mL/kg of crystalloid fluid within 3 hour of presentation.[2]
- Aggressive fluid resuscitation in patients with reduced left ventricular ejection fraction (r-LVEF), who are at heightened risk of fluid overload, may negatively impact patient outcomes[3].
- It is unknown if providers make adjustments to resuscitation techniques for patients with r-LVEF differently than those with preserved ejection fraction.
- Clinical outcomes could be impacted based on the patients ejection fraction and how providers decide to resuscitate them with crystalloid fluids.
- The aim of this research is to evaluate the amount of fluid given at three hours to those with a r-LVEF and those without.

METHODS

- Single center, retrospective study approved by the IRB.
- Data was assessed for normality using the Shapiro-Wilkes test.
- Discrete and continuous data were analyzed using Chi squared/Fischer's exact test and Mann Whitney U tests respectively.



OUTCOME MEASURES

PRIMARY

Volume of crystalloid received (mL/kg) per total body weight at 3 hours

SECONDARY

Volume in mL/kg received at 1 hour
Incidence of receiving at least 30 mL/kg at 3 hours
Duration of Vasopressors
In hospital all cause mortality
ICU mortality
Development of fluid overload, defined as ≥10% increase in body weight
Weight change in Kg from admittance to discharge

RESULTS

Table 1. Baseline Demographics

Characteristic	r-LVEF ≤ 40% n=14	LVEF > 40% n=46	P
Age, years	68 (55-75)	62 (54-71)	0.431
Male	9 (64.3)	21 (45.7)	0.220
Race			
White	6 (42.9)	22 (47.8)	0.854
African-American	8 (57.1)	24 (52.2)	0.744
Weight, kg	82 (67-102)	83 (71-103)	0.896
Comorbidities			
Chronic Kidney Disease	5 (35.7)	12 (26.1)	0.511
End Stage Renal Disease	1 (7.1)	7 (15.2)	0.667
Diabetes Mellitus	11 (78.6)	17 (37.0)	0.006
Hypertension	12 (85.7)	37 (80.4)	0.655
Admission lactate, mmol/L	2.5 (1.7-7.4)	3.0 (1.9-5.5)	0.835
SOFA Score	12 (9-15)	10 (7-13)	0.073
Suspected source of infection			
Pulmonary	5 (35.7)	11 (23.9)	
Skin/soft tissue	1 (7.1)	3 (6.5)	
Intraabdominal	3 (21.4)	7 (15.2)	0.988
Endovascular	1 (7.1)	4 (8.7)	
Genitourinary	3 (21.4)	9 (19.6)	
Unknown	1 (7.1)	12 (26.1)	

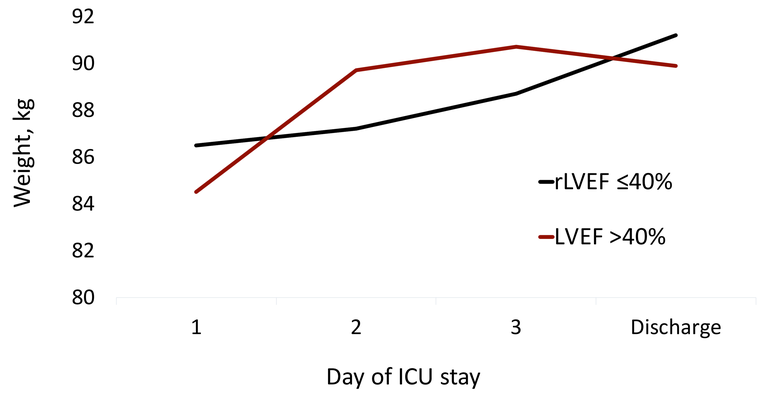
All values presented as n (%) and median (IQR)

Table 2. Primary and Secondary Outcomes

Endpoints	r-LVEF ≤ 40% n=14	LVEF > 40% n=46	P
Fluid received at 3 hours, (mL/kg)	13.6 (9.6-22.8)	14.7 (11.2-22.4)	0.541
Fluid received 1 hour, (ml/kg)	11.7 (9.0-14.6)	13.0 (8.0-17.6)	0.582
Received at least 30 mL/kg at hour 3	1 (7.1)	7 (15.2)	0.667
Duration of Vasopressors, days	4 (3-6)	3 (2-7)	0.628
Mortality			
In Hospital	7 (50)	18 (39.1)	0.470
ICU	2 (14.3)	15 (32.6)	0.310
Fluid overload	5 (35.7)	16 (34.8)	1.00

All values presented as n (%) and median (IQR)

Figure 1. Change in total body weight



DISCUSSION

- The volume of fluid received at 3 hours was neither statistically significant or up to sepsis guideline recommendations.
- A very small percentage even reached the 30mL/kg mark at 3 hours which may be due to the fact that they were not actually fluid responsive. Approximately only 50% of sepsis patients are fluid responsive[4].
- Both groups had an increase in weight at discharge.
- ICU mortality was clinically, but not statistically different.
- Overall each group seemed to receive similar volumes of fluid at 3 hours but half as many in r-LVEF received the SSC recommendations.
- There is also a difference in volume received at 1 hour, which may suggest that clinicians were hesitant as to how quickly they wanted to administer fluid to those with r-LVEF.
- Overall, hospital mortality in the r-LVEF group was 50% which is normal of sepsis. There are many potential confounders, such as severity of age, severity of illness, and comorbidities.
- Patients with r-LVEF spent more time on vasopressors, although not statistically significant. This is a surrogate measure of shock reversal, which could greatly impact the outcomes of a patient.

CONCLUSIONS

Presence of r-LVEF did not impact early volume resuscitation practice or clinical outcomes in adults with sepsis or septic shock. Statistically no difference could be concluded in the secondary outcomes as well. Limitations of this study included that it was single center and had a small cohort, making it less generalizable. Further studies with a greater range of patients and location could help generalize what clinicians practice when it comes to sepsis and those with r-LVEF.

REFERENCES

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