Bedside Transthoracic Echocardiography Volume Assessment in the BICU

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Introduction

- Point-of-Care Ultrasound (POCUS) has been shown to be a useful adjunct in assessment of various shock states and utilized to guide resuscitative and post-resuscitation de-escalation efforts
- POCUS use for guiding resuscitation in burn injured patient has not be described

Objectives

- To characterize the use of bedside ultrasound examinations performed by advance practice providers and treating physicians in a burn intensive care unit

Methods

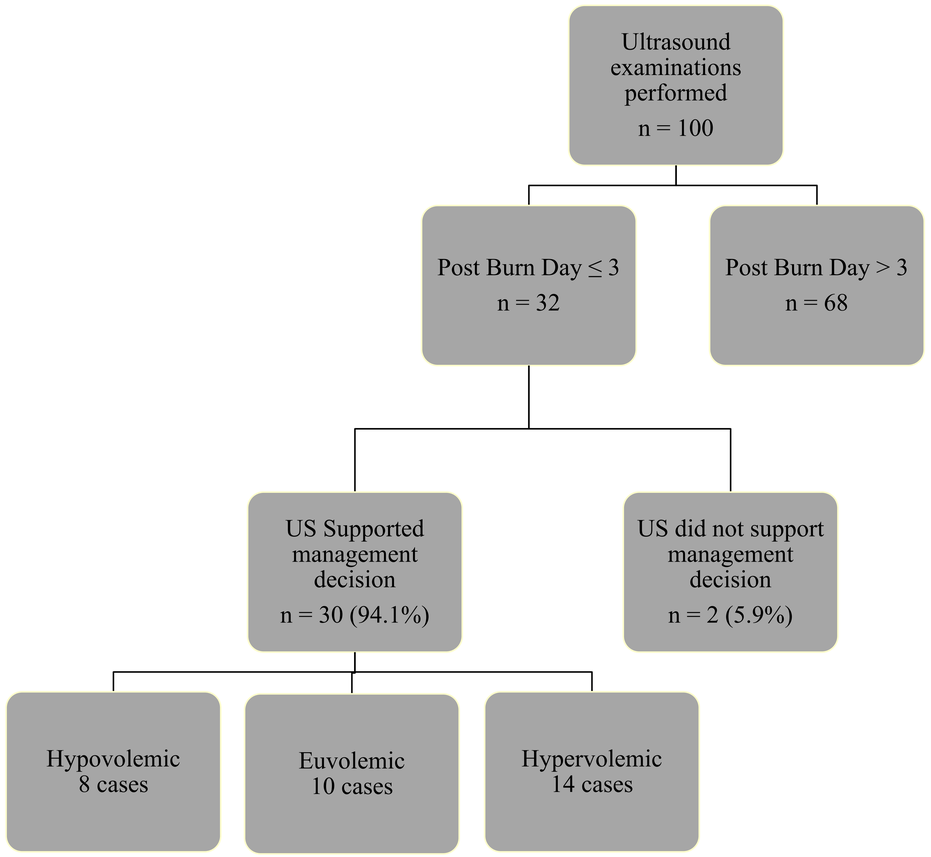
- Daily beside ultrasound examinations were performed utilizing a bedside ultrasound device by an advanced practice provider prior to rounds
- Process Improvement (PI) approved project
- POCUS examinations consist of:
  - Focused transthoracic echocardiographic exam
    - Parasternal long
    - Parasternal short
    - Apical 4 chamber
    - Subcostal
  - Pulmonary exam
  - Inferior vena cava measurement
- Data Recorded
  - Left ventricular systolic function (Qualitative)
  - Right ventricular systolic function
  - Significant (>50%) valvular regurgitation
  - B-lines present
  - Inferior vena cava diameter, distensibility, collapsibility
- Volume assessment made based on US
  - Hypovolemic
  - Euvolemic
  - Hypervolemic
- Ultrasound images were archived to a centralized image repository and reviewed daily during multi-disciplinary rounds.
- Ultrasonographic volume assessment compared to clinical volume assessment made during daily multidisciplinary rounds

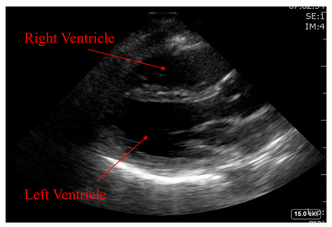
Volume Assessment by Point-of-Care Ultrasound

Parameter	Hypovolemic	Euvolemic	Hypervolemic	Pseudohypervolemic
IVC diameter, Variability	<2 cm and >18% or >50%	1.5cm to 2cm and < 18% or < 50%	➢ 2cm and ➢ < 18% or < 50%	➢ IVC <1.5
B lines	< 3 / field	< 3 / field	Mild: 3-6 Severe: >6 or coalesced	Mild or severe
Left Ventricle	Hyperdynamic	Preserved systolic function	+/- Impaired systolic function	Hyperdynamic
Right Ventricle	Underfilled	Normal	Dilated, TAPSE < 1.4	Normal

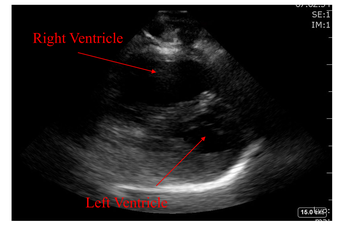
Results

- 100 examinations were performed of which 32 were within the initial 72 hour window
- 94.1 % of examinations demonstrated findings that supported clinical assessment (physical, laboratory, and radiographic findings) and contributed positively to medical decision making.
- 5.9% of examination findings either did not contribute to medical decision making or conflicted with physical exam, radiographic, or laboratory findings.

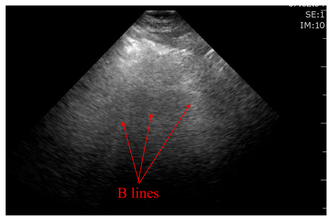




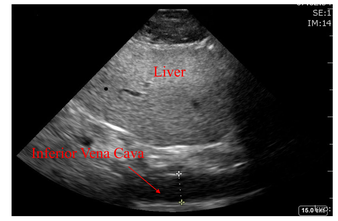
Parasternal Long (PSL)



Parasternal Short (PSS)



Pulmonary



Subcostal

Conclusions

- Our results demonstrate that bedside ultrasound can be incorporated into daily workflow and may be able to assist in guidance of both resuscitative and post-resuscitative efforts.
- We identified a cohort of patients who appeared hypervolemic clinically but US findings supported hypovolemia, we refer to as pseudohypervolemia.
- We believe point of care ultrasound is a viable tool in preventing over-resuscitation as well as to guide post-resuscitative diuresis.
- Futures studies can assess inter-operator reliability and compare resuscitative strategies between ultrasound guided and control cohorts.

Acknowledgements

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