Inferior Vena Cava Ultrasound in Sepsis; Are Residents Able to Identify the Right Patients?

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RATIONALE: Inferior vena cava (IVC) ultrasound (US) has been studied as a surrogate marker for right-sided filling pressures of the heart. The increased availability of bedside ultrasound has led to the use of this tool in the assessment of the fluid status of hypotensive patients. Dynamic changes in the IVC diameter can guide fluid resuscitation in a small subset of patients. We aimed to study whether resident physicians at different levels of training were able to identify patients in whom an IVC US would gauge intravascular fluid status appropriately. METHODS: We created a voluntary and anonymous questionnaire describing five distinct clinical vignettes and asked participants to identify whether they believed ultrasonography of the inferior vena cava would aid in determining the intravascular fluid status of the patient in question. Participants who chose IVC ultrasound as a modality to determine intravascular status were asked a follow-up question on whether IVC compressibility, distensibility, both, or neither should be assessed to make this determination. The survey included 35 internal medicine residents, 3 did not complete the survey. RESULTS: Residents at all levels of training favored using isolated IVC ultrasound to assess the intravascular fluid status of septic patients, irrespective of individual patient and scenario characteristics. 51% of participants favored IVC ultrasound in an inadequately resuscitated patient with septic shock. A majority endorsed the use of this tool, in patients that had already undergone adequate fluid resuscitation at 76.5%. 66% selected it in patients with underlying high right-sided pressures. 59.3% chose IVC US in mechanically ventilated patients with neuromuscular blockade and 37.5% without it. Of the participants that chose IVC ultrasound, no clear pattern emerged regarding which parameter they favored. Most residents chose collapsibility. In patients with ARDS who were mechanically ventilated, distensibility was more popular. 85% of residents surveyed felt that point of care ultrasonography should be incorporated into residency curriculum; the remainder were undecided. Results are summarized in Table1. CONCLUSIONS: Internal medicine resident physicians at all levels of training appear to be deficient in identifying the population of patients in whom IVC ultrasound can be appropriately used to assess fluid status. A majority of residents favored sub-optimal parameters when looking at the IVC indicating a knowledge gap. As portable ultrasonography becomes ubiquitous care must be taken, especially in unsupervised settings, to educate and train all operators before it is allowed to direct therapy in septic patients.

Vignette Characteristics	Participants favoring the use of IVC US to assess fluid status. n (%)	Participants not favoring the use of IVC US to assess fluid status. n (%)	Participants not sure of answer n (%)	Among Participants who chose IVC US to determine intravascular fluid status			
				Compressibility	Distensibility	Both	None
Septic shock, inadequately resuscitated	18 (51.4%)	16 (45.7%)	1 (2.8%)	11 (57.9 %)	1 (5.3%)	6 (31.6%)	1 (5.3%)
Same patient as 1, after adequate fluid resuscitation	26 (76.5%)	7 (20.6%)	1 (2.9%)	15 (57.7%)	2 (7.7%)	9 (34.6%)	0 (0%)
Patient with COPD and HFpEF, with an elevated RVSP presenting with septic shock, adequately resuscitated	22 (66.6%)	8 (24.2%)	3 (9.1%)	10 (45.5%)	4 (18.2%)	8 (36.4%)	0 (0%)
Patient with Septic shock, in Moderate ARDS spontaneously breathing on mechanical ventilation.	12 (37.5%)	19 (59.3%)	1 (3.1%)	4 (30.7 %)	3 (23.1%)	5 (38.5%)	1 (7.7%)
Patient with Septic shock, in Moderate ARDS, paralyzed and passive on mechanical ventilation.	19 (59.3%)	9 (28.1%)	4 (12.5%)	7 (36.8%)	3 (15.8%)	9 (47.4%)	0 (0%)

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