

## Appendix

### Supplemental Methods

#### Enrollment Criteria:

Acute circulatory failure was defined as hypotension (systolic blood pressure <90 mmHg, or a mean arterial pressure <65 mmHg for  $\geq 30$  min); persistent tachycardia (heart rate >120 bpm for  $\geq 30$  min); and/or serum markers suggesting organ hypoperfusion (acidosis with a serum pH <7.3 or lactic acidosis >2 meq/l). Patients were excluded if they were receiving positive pressure ventilation, had evidence of pulmonary edema, or if further IV fluid administration posed a clinical risk. Patients also were excluded if they had primary traumatic, cardiogenic, obstructive, or neurogenic shock; or were < 18 years-old; incarcerated; or pregnant.

**Supplementary Table #1:** Secondary analysis of cIVC performance by the novice sonologist and the corresponding performance under expert sonologist review

Novice Sonologist	Point of cIVC measurement	cIVC cutoff %	ROC [95% CI]	Sensitivity % [95% CI]	Specificity % [95% CI]
1	Expert Sonologist N = 22 <sup>a</sup>	$\geq 25$	0.83 [0.67-0.98]	90.0 [59.6-98.2]	75.0 [46.8-91.1]
	Novice Sonologist N = 21 <sup>b</sup>	$\geq 25$	0.65 [0.49-0.81]	55.6 [26.7-81.1]	75.0 [46.8-91.9]
2	Expert Sonologist N = 21	$\geq 25$	0.85 [0.72-0.98]	90.9 [62.3-98.4]	70.0 [39.7-89.2]
	Novice Sonologist N = 21	$\geq 25$	0.80 [0.66-0.94]	63.6 [35.4-84.8]	70.0 [39.7-89.2]
3	Expert Sonologist N = 33	$\geq 25$	0.87 [0.76-0.99]	85.0 [64.0-94.8]	84.6 [57.8-95.7]
	Novice Sonologist N = 33	$\geq 25$	0.76 [0.62-0.90]	75.0 [53.1-88.8]	61.5 [35.5-82.3]

Nine ultrasounds in the expert review and novice analysis performed by sonologists 4 and 5 were excluded due to small numbers.