

## SUPPLEMENTARY MATERIAL

### Additional file 1.

*Table 1S.* Check list of scenario number 1: Management of septic shock, ARDS and endotracheal intubation.

Critical performance elements for the management of septic shock with ARDS, and endotracheal intubation.	YES	NO	NA	Points	CC*
1. Adopts a structured and timely approach to the recognition, assessment and stabilisation of the acutely ill patient following the ABCDE approach. <b><i>If disorganized, the item will be considered as not accomplished.</i></b>					1.1 2.1 2.2
2. Increases oxygen supply to increase SpO <sub>2</sub>					3.1 5.1 4.5
3. Orders a second venous catheter					3.3 4.5 5.9
4. Administers balanced crystalloid bolus (10 ml/kg in 15-30 minutes)					3.3 4.4
5. Obtains lactate measure					2.6
6. Obtains and interprets blood analysis (blood count, biochemistry, kidney function and coagulation). <b><i>If one or more omissions, the item will be considered as not accomplished.</i></b>					2.2 2.10
7. Obtains appropriate microbiological samples (blood cultures, etc.)					2,5
8. Administers timely, appropriate antibiotic therapy at correct dose					4.1 4.2
9. Performs cardiac transthoracic ultrasound to evaluate myocardial function and preload					2.3
10. Administers vasopressors early if hypotension persists					3.1 4.1 4.4
11. Asks for help. Calls the senior in charge					11,4
12. Ensures continuity of care through effective structured hand-over of clinical information					11.8 12,8

13. Performs emergency airway management. Assess predictors of difficult airway, prepares and checks the full equipment to intubate, including laryngoscope, endotracheal tube, stylet, and yankauer suction tube. <b>If one or more omissions, the item will be considered as not accomplished.</b>					4.5 5.3
14. Preoxygenates with bag valve mask, HFO or CPAP to obtain SpO <sub>2</sub> > 90% before intubating.					3.8 5.1
15. Prevents hypotension after intubation by fluid and vasopressor administration.					4.4 11.4
16. Administers low doses of sedation and analgesia (i.e Midazolam less than 6 mg, fentanyl less than 100 mcg iv) or chooses ketamine to avoid vascular collapse.					4.1 11.4 7.2
17. Performs rapid sequence intubation with administration of sedation and a myorelaxant drug. <b>If myorelaxant is not used, the item will be considered as not accomplished.</b>					4.1 5.3 5.4 7.3
18. Applies protective mechanical ventilation: Tidal volume ≤ 6 ml/kg IBW, plateau pressure < 30 cm H <sub>2</sub> O, and driving pressure < 15 cmH <sub>2</sub> O. <b>If one or more omissions, the item will be considered as not accomplished.</b>					4.1 3.8 4.6 4.5
19. Obtains a history and performs an accurate clinical examination to identify and control the septic source.					2.1 2.2
20. Once haemodynamic is stable, applies PEEP higher than 5 mm H <sub>2</sub> O to optimize oxygenation.					4.1 3.8
21. Requests image tests to localize the septic focus.					2.3b 2.7 2.8
22. Reevaluates the patient frequently					2.9
23. Prioritizes interventions					1.1 1.4 12.10
24. Integrates clinical findings with laboratory investigations to perform a differential diagnosis					2.10 3.8 3.9
25. Shares the treatment plan with the members of the team					7.4 12.7

					12.2
<b>Critical essential performance elements (CEPE) = 2 points</b> <b>Critical non-essential performance elements (CNEPE) = 1 point</b> <b>NA: not assessed because there were technical deficiencies.</b>					
TOTAL SCORING					

In this scenario number one, items number 1, 4, 8, 10, 13, 15 and 18 were considered as “Critical essential performance elements” (CEPE).

The selection of each CEPE required 80% agreement from the members of the expert panel. There were some complex CEPEs like performing a structured ABCDE approach, preparations for a high risk intubation, or apply the complete protocol for witnessed ventricular fibrillation, in which if any of the elements of the protocol was missed, the CEPE was considered as not accomplished.

Each item was scored as 2 [the task (CEPE) was performed appropriately]), 1 [the task (CNEPE) was performed appropriately]), 0 (the task was not performed or was performed inappropriately), and NA (not assessed because there were technical deficiencies). A CEPE was scored as not performed only when the two raters agreed. When there was a discrepancy in the completion of 2 or more CEPEs of the scenario between the two raters, a third rater was involved. In this case, the two assessments made by the raters closest to each other were considered to determine the final score.

## Additional file 2

**Table 6S.** Total scoring, percentage of CEPEs and CNEPEs completed, and competency level achieved in the performances in the five OSCE scenarios in each hospital. Results are shown as median, interquartil Range (IQR) and range (maximum-minimum).

Hospital *	Performances N	Total scoring			CEPE completed (%)			CNEPE completed (%)			Competency Level achieved N performances				
		Median	IQR	Range	Median	IQR	Range	Median	IQR	Range	I	II	III	IV	V
1	15	66	55-73	41-88	75	57-85	36-91	71	43-68	19-82	5	4	6	-	-
2	12	76	68-84	64-86	81	69.5-93.5	50-100	66.5	60-75	50-82	1	4	6	1	-
3	14	71	51-81	35-97	71	57.5-90	31-100	65.5	48-75	21-91	3	5	5	-	1
4	10	66.5	61-71	57-75	75.5	61.5-81	57-87	55.5	47.5-61	40-77	2	4	4	-	-
5	15	70	65-78	46-88	78	64-90	40-100	54	50-73	36-85	3	5	6	1	-
6	10	67.5	47-81	43-86	80.5	59-91	36-95	53	38-69.5	27-72	2	3	5	-	-
7	15	76	63-78	50-87	80	64-90	57-91	68	54-76	40-82	2	5	8	-	-
8	15	68	57-75	32-78	70	50-80	42-93	59	52-65	16-88	5	6	4	-	-
9	15	69	62-75	47-89	67	59-84	55-96	61	50-79	36-88	4	6	5	-	-
11	15	76	63-83	54-86	71	64-90	50-100	69	59-80	45-94	2	7	5	1	-
12	15	77	69-81	53-89	80	73-86	55-100	64	57-76	36-96	1	4	9	1	-
13	15	74	64-80	52-88	85	73-86	53-100	63	55-74	46-82	2	4	8	1	-
14	10	67.5	60-75	56-81	71	64-81	59-90	58	52-65	41-88	1	5	4	-	-

\*Residents from hospital number 10 eventually declined to participate.

**Table 6Sa to 6Se.** Total scoring, percentage of CEPE and CNEPE completed, and competency level achieved in the performances in each of the five OSCE scenarios in each hospital. Results are shown as median and Interquartil Range (IQR). Hospital number 10 eventually declined to participate and has been removed from the list.

CEPE: Critical essential performance elements. CNEPE: Critical non-essential performance elements.

Table 6Sa.- Scenario 1. Management of septic shock, ARDS and endotracheal intubation.

Hospital	Residents n	Total scoring		CEPE completed (%)		CNEPE completed (%)		Competency level achieved				
		Median	IQR range	Median	IQR range	Median	IQR range	I	II	III	IV	V
1	3	62	55-63	43	36-69	71	60-78	2	1	-	-	-
2	3	73	64-77	64	50-71	80	76-82	1	2	-	-	-
3	2	62.5	56-69	57	43-71	67	67	1	1	-	-	-
4	2	62.5	57-68	57	57	66.5	56-77	2	-	-	-	-
5	3	58	46-70	57	40-64	53	52-80	2	1	-	-	-
6	2	60	43-77	61	36-86	60	49-71	1	-	1	-	-
7	3	77	63-78	77	64-77	76	62-80	-	-	3	-	-
8	3	68	49-77	57	46-62	76	52-88	2	1	-	-	-
9	3	75	74-87	67	59-86	88	79-88	1	1	1	-	-
11	3	77	63-84	71	57-71	82	68-94	1	2	-	-	-
12	3	81	77-89	81	71-86	82	76-96	-	1	2	-	-
13	3	77	61-84	86	57-86	71	63-82	1	-	2	-	-
14	2	72.5	64-81	71	71	73	58-88	-	2	-	-	-
Total	35	70	43-89	64	36-86	76	49-96	14	15	6	-	-

\*Residents from hospital number 10 eventually declined to participate.

Table 6Sb.- Scenario 2. Neurocritical care and intra-hospital transport.

Hospital	Residents n	Total scoring		CEPE completed (%)		CNEPE completed (%)		Competency level achieved				
		Median	IQR range	Median	IQR range	Median	IQR range	I	II	III	IV	V
1	3	52	47-66	59	57-75	43	36-55	2	1	-	-	-
2	3	71	67-77	80	69-82	64	60-72	-	1	2	-	-
3	3	51	35-76	60	31-71	43	40-82	1	2	-	-	-
4	2	66.5	62-71	76.5	73-80	55	49-61	-	1	1	-	-
5	3	69	68-70	76	57-88	59	50-85	1	1	1	-	-
6	2	57.5	48-67	71	67-75	44	31-57	-	2	-	-	-
7	3	53	50-78	59	57-84	50	40-73	2	-	1	-	-
8	3	57	32-72	50	47-80	63	16-65	2	-	1	-	-
9	3	64	47-69	67	57-81	56	36-62	1	1	1	-	-
11	3	80	76-84	93	81-100	69	59-79	-	-	2	1	-
12	3	69	64-79	75	71-83	62	57-75	-	2	1	-	-
13	3	62	52-71	67	53-86	56	53-57	1	1	1	-	-
14	2	63.5	56-71	71	59-83	55.5	53-58	1	-	1	-	-
Total	36	67	32-84	72	31-100	57	16-85	11	12	12	1	-

\*Residents from hospital number 10 eventually declined to participate.

Table 6Sc.- Scenario 3. Acute coronary syndrome management and cardiopulmonary resuscitation.

Hospital	Residents n	Total scoring		CEPE completed (%)		CNEPE completed (%)		Competency level achieved				
		Median	IQR range	Median	IQR range	Median	IQR range	I	II	III	IV	V
1	3	79	69-83	90	84-90	65	50-72	-	-	3	-	-
3	3	73	47-80	85	65-90	54	21-67	-	1	2	-	-
4	2	73.5	72-75	82.5	80-85	61	60-62	-	-	2	-	-
5	3	66	65-70	78	75-80	54	45-57	-	2	1	-	-
6	2	82.5	80-85	92.5	90-95	69.5	67-72	-	-	2	-	-
7	3	76	72-77	85	80-95	56	54-74	-	-	3	-	-
8	3	76	64-78	85	79-93	56	45-62	-	1	2	-	-

9	3	70	69-89	84	75-90	62	50-87	-	1	2	-	-
11	3	83	80-86	90	85-90	80	67-80	-	-	3	-	-
12	3	78	53-83	80	55-100	60	50-76	1	-	1	1	-
13	3	86	80-88	90	85-100	74	71-80	-	-	2	1	-
14	2	76.5	73-80	85	80-90	65.5	64-67	-	-	2	-	-
Total	33	77	47-89	85	55-100	62	21-87	1	5	25	2	-

\*Residents from hospital number 10 eventually declined to participate.

Table 6d.- Scenario 4. Postoperative management, hemorrhagic shock.

Hospital	Residents n	Total scoring		CEPE completed (%)		CNEPE completed (%)		Competency level achieved				
		Median	IQR range	Median	IQR range	Median	IQR range	I	II	III	IV	V
1	3	75	71-88	85	75-90	62	55-82	-	1	2	-	-
2	3	86	75-86	95	89-100	60	51-69	-	-	2	1	-
3	3	84	61-97	90	60-100	73	64-91	-	1	1	-	1
4	2	61.5	58-65	66.5	63-70	52	49-55	-	2	-	-	-
5	3	87	70-88	95	90-100	64	36-73	-	-	2	1	-
6	2	69	52-86	80	65-95	48	27-69	-	1	1	-	-
7	3	84	75-87	90	79-90	73	68-82	-	1	2	-	-
8	3	65	46-75	70	42-79	55	52-69	1	2	-	-	-
9	3	62	52-71	67	55-70	55	46-73	1	2	-	-	-
11	3	65	61-70	70	70	55	45-69	-	3	-	-	-
12	3	71	65-84	80	80-95	55	36-64	-	-	3	-	-
13	3	74	74-76	80	75-85	64	55-78	-	1	2	-	-
14	2	65.5	60-71	75	70-80	48	41-55	-	1	1	-	-
Total	36	72.5	46-97	80	42-100	61	27-91	2	15	16	2	1

\*Residents from hospital number 10 eventually declined to participate.

Table 6Se.- Scenario 5. Initial assessment and management of the multiple-trauma patient.

Hospital	Residents n	Total scoring		CEPE completed (%)		CNEPE completed (%)		Competency level achieved				
		Median	IQR range	Median	IQR range	Median	IQR range	I	II	III	IV	V
1	3	58	41-82	73	55-91	34	19-68	1	1	1	-	-
2	3	78	67-86	89	78-96	61	50-72	-	1	2	-	-
3	3	77	50-91	87	50-97	63	50-83	1	-	2	-	-
4	2	66.5	63-70	82.5	78-87	41.5	40-43	-	1	1	-	-
5	3	78	56-80	85	67-94	52	38-73	-	1	2	-	-
6	2	55.5	43-68	64	41-87	43.5	40-47	1	-	1	-	-
7	3	75	54-87	82	60-91	64	45-79	-	1	2	-	-
8	3	70	59-75	78	60-86	59	58-59	-	2	1	-	-
9	3	63	52-82	64	55-96	61	47-61	1	1	1	-	-
11	3	58	54-67	64	50-64	61	50-71	1	2	-	-	-
12	3	75	69-81	82	73-91	64	64	-	1	2	-	-
13	3	65	64-77	76	73-87	50	46-61	-	2	1	-	-
14	2	61.5	59-64	64	64	57	50-64	-	2	-	-	-
Total	36	67.5	41-91	78	41-97	59	19-83	5	15	16	-	-

\*Residents from hospital number 10 eventually declined to participate.

**Additional file 3.****Table 7S- Analysis of the effect of residents' socio-educational variables on outcomes.**

For the variables GPA degree and MIR entrance position the sample was dichotomized at the median (GPA: group 1: level lower than B; group 2: level equal or higher than B; MIR exam position group 1:  $\leq 3000$ ; group 2: MIR position  $> 3000$ ). Hospital size variable was categorized into three levels (group 1:  $\leq 600$  beds, group 2: 600-1000 beds, group 3:  $\geq 1000$  beds).

**Table 7Sa.- Gender and the outcome variables considered in the study.**

Gender	Total Score					CEPE completed (%)					CNEPE completed (%)					Competency level achieved			
	Male	Female	U	z	p	Male	Female	U	z	p	Male	Female	U	z	p	Male	Female	Chi-square	p
Scenario 1	63	75	78	-2.10	.04*	57	71	80	-2.03	.04*	67	77	77	-2.13	.04*	0	6	4.50	.10
Scenario 2	67	64	132	-0.40	.68	59	73	129	-0.50	.63	53	57	128	-0.54	.61	4	9	3.76	.18
Scenario 3	72	79	77.5	-1.67	.10	80	90	81.5	-1.54	.12	56	64	83	-1.46	.15	7	20	5.47	.03*
Scenario 4	75	71	122.5	-0.72	.48	90	75	113.5	-1.03	.30	64	55	144	0	1.0	7	12	1.11	.67
Scenario 5	59	67	121	-0.77	.44	67	76	124.5	-0.66	.52	50	61	120	-.81	.43	5	11	.73	.71

Results are shown as median

CEPE: Critical essential performance elements. CNEPE: Critical non-essential performance elements.

Groups: Male, n = 12; Female, n = 24

Total Score, CEPE, and: CNEPE, Results are shown as median; Competency level: Results are shown with frequencies of residents with competency level equal to or higher than 3.

\*p < .05

**Table 7Sb.- Residents' grade point average at medical school GPA and the outcome variables considered in the study.**

GPA degree	Total Score					CEPE completed (%)					CNEPE completed (%)					Competency level achieved			
	Group 1	Group 2	U	z	p	Group 1	Group 2	U	z	p	Group 1	Group 2	U	z	p	Group 1	Group 2	Chi-square	p
Scenario 1	68	73	64.5	-0.31	.76	61.5	70	61.5	-0.47	.64	78.5	73.5	57	-0.72	.47	1	4	0.33	.99
Scenario 2	65	60	72.0	-0.08	.96	73	67	59.5	-0.74	.46	56	56	82	0.45	.65	2	7	1.38	.56
Scenario 3	69	79	35.5	-1.37	.18	84	87.5	40.5	-1.08	.28	57	67	82.5	1.63	.10	4	17	3.38	.23
Scenario 4	79	70.5	50.5	-1.23	.22	87.5	72.5	49	-1.31	.19	59.5	58.5	67.5	-0.32	.75	5	9	3.59	.17
Scenario 5	71	68	60.0	-0.72	.47	82	75.5	59.5	-0.75	.46	56.5	58.5	67	-0.35	.73	4	9	0.52	.86

Results are shown as median

CEPE: Critical essential performance elements. CNEPE: Critical non-essential performance elements.

Groups: Group 1: GPA degree < B (n = 7) ; Group 2: GPA degree ≥ B, (n=21).

Total Score, CEPE, and: CNEPE, Results are shown as median; Competency level: Results are shown with frequencies of residents with competency level equal to or higher than 3.

**Table 7Sc.- Residents' MIR entrance exam position and the outcome variables considered in the study.**

	Total Score					CEPE completed (%)					CNEPE completed (%)					Competency level achieved			
MIR position	Group 1	Group 2	U	z	p	Group 1	Group 2	U	z	p	Group 1	Group 2	U	z	p	Group 1	Group 2	Chi-square	p
Scenario 1	69	74	93.5	-.12	.90	71	64	85.5	-0.27	.79	71	78	67	-1.17	.24	3	2	0.50	.88
Scenario 2	57	66	83.5	-.67	.51	60	75	61	-1.70	<b>.09</b>	56	56	86.5	-0.53	.60	3	6	1.59	.52
Scenario 3	77	79	88.5	0.57	.57	85	90	92.5	0.81	.42	62	64	85	0.38	.70	10	11	1.34	1.0
Scenario 4	74	70	82	-0.74	.46	80	70	71.5	-1.20	.22	64	55	92	-0.28	.78	10	4	5.57	<b>.08</b>
Scenario 5	70	63	69.5	-1.31	.19	78	64	74	-1.10	.27	61	52	66.5	-1.45	.15	7	6	2.27	.47

Results are shown as median

CEPE: Critical essential performance elements. CNEPE: Critical non-essential performance elements.

Groups: Group 1: MIR position ≤ 3000 (n = 14); Group 2: MIR position > 3000 (n = 14).

Total Score, CEPE, and: CNEPE, Results are shown as median; Competency level: Results are shown with frequencies of residents with competency level equal to or higher than 3.

**Table 7Sd.- Previous simulation training experience and the outcome variables considered in the study.**

	Total Score					CEPE completed (%)					CNEPE completed (%)					Competency level achieved			
Previous experience	YES	NO	U	z	p	YES	NO	U	z	p	YES	NO	U	z	p	YES	NO	Chi-square	p
Scenario 1	74	69	79	-0.54	.61	64	71	86.5	-0.17	.87	78	71	69	-1.02	.33	2	3	1.06	.69
Scenario 2	66	57	83	-.67	.53	75	60	65.5	-1.47	<b>.14</b>	56	56	94.5	-0.14	.89	6	3	0.43	.89
Scenario 3	79	77	59.5	-1.01	.32	90	85	57.0	-1.17	.27	64	62	64	-0.76	.47	15	10	3.07	.14
Scenario 4	70	74	96	-0.07	.96	70	80	80	-0.81	.44	55	64	65	-1.50	.14	7	7	3.54	<b>.47</b>
Scenario 5	63	70	81.5	-0.74	.47	64	78	81	-0.76	.47	52	61	86.5	-0.51	.62	7	6	0.75	.69

CEPE: Critical essential performance elements. CNEP: Critical non-essential performance elements.

Groups: YES, n = 17; NO, n = 11

Total Score, CEPE, and: CNEPE, Results are shown as median; Competency level: Results are shown with frequencies of residents with competency level equal to or higher than 3.

**Table 7Se.- Hospital size (number of beds) and the outcome variables considered in the study.**

Hospital size	Total Score					CEPE completed (%)					CNEPE completed (%)					Competency level achieved				
	Group 1	Group 2	Group 3	H	p	Group 1	Group 2	Group 3	H	p	Group 1	Group 2	Group 3	H	p	Group 1	Group 2	Group 3	Chi-square	p
Scenario 1	62.5	75	70	3.04	.22	57	67	71	1.36	.51	67	79	71	6.13	.05	1	3	2	3.33	.52
Scenario 2	56.5	66	68	1.17	.56	70	75	67	0.67	.72	46	59	56	1.31	.52	1	6	6	5.77	.23
Scenario 3	77.5	78	76	0.18	.91	87.5	85	85	0.24	.89	64.5	62	64	0.24	.88	6	12	9	1.32	.99
Scenario 4	63	70	75	5.59	.06	67.5	70	85	7.36	<b>.03</b>	59.5	54	61	0.90	.64	3	5	11	8.03	<b>.08</b>
Scenario 5	65	67	65	1.15	.56	82.5	73	76	1.57	.46	45	61	52	1.55	.46	4	5	7	5.79	.24

CEPE: Critical essential performance elements. CNEP: Critical non-essential performance elements.

Hospital size: Group 1: ≤ 600 beds, n=7; Group 2: 600-1000 beds, n=15; Group 3 = ≥ 1000 beds, n=14.

Total Score, CEPE, and: CNEPE, Results are shown as median; Competency level: Results are shown with frequencies of residents with competency level equal to or higher than 3.