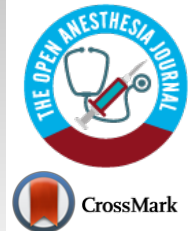




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## Supplementary Material



## Mixed Reality *versus* Mass or Self-directed Training for Adolescents' Basic Life Support Instruction: A Prospective, Randomized Pilot Study

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### APPENDIX I

The aMCQ, anonymous ten-items Multiple-Choice Questionnaire.

The aMCQ offers four answer choices for each item, but only one was correct. We used the same aMCQ throughout the study; however, the order of items varied at each study time point. We scored aMCQ answers as correct (1 point) or incorrect (0 points); thus, an individual aMCQ could score from '0' to '10' points.

### APPENDIX II

Self-evaluation questionnaire. Answer options to items 1 to 5 are Not at All, Little, Sufficient, Much, and Overmuch. The preferred BLS method item answer options are MT, MR, and SDL.

### APPENDIX III

The instructor scored the checklist items as correctly applied (1 point), incorrectly applied (0.5 points), and unapplied (0 points).

We did not assess Circulation, as it is not foreseen for lay people's BLS practice.

### Appendix I, Table A. English version of the aMCQ.

Question	# Answer	Answer
1. The patients' position during Cardiopulmonary resuscitation (CPR) is:	1**	Supine
	2	Semi-sitting position
	3	Lateral
	4	Any position
2. Basic Life Support (BLS) include:	1	The prompt recognition of the absence of consciousness, breath, circulation
	2	Early activation of the rescue system
	3	Carrying out CPR (cardiopulmonary resuscitation) in case of cardiac arrest
	4**	All preceding answers
3. Once consciousness has been assessed, it is necessary to:	1	Immediately begin external heart massage
	2	Assess whether respiratory activity is present and normal
	3**	Ask for help and alert the emergency services by telephone (118, 112 single emergency number)
	4	Give the victim water to drink to recover more quickly.
4. External heart massage in adults should be performed by compressing the rib cage for at least:	1	10 centimeters
	2**	5-6 centimeters
	3	1-2 centimeters
	4	All preceding answers

Question	# Answer	Answer
5. Respiratory arrest leads to cardiac arrest in:	1	15 minutes
	2	30 minutes
	3	45 minutes
	4	Few minutes
6. External heart massage, in adults, should be performed while maintaining a frequency of:	1	Between 40 and 60 compressions a minute
	2	Between 130 and 180 compressions a minute
	3**	Between 80 and 120 compressions a minute
	4	Frequency is not relevant
7. In the presence of cardiopulmonary arrest, the first brain lesions occur:	1**	After 10 minutes
	2	After 4 minutes
	3	After few seconds
	4	After 30 minutes
8. CPR is performed with a sequence of:	1**	30:2 (30 compressions alternating with 2 ventilations)
	2	15:2 (15 compressions alternating with 2 ventilations)
	3	10:1 (10 compressions alternating with 1 ventilation)
	4	15:1 (15 compressions alternating with 1 ventilation)
9. The first thing to consider before approaching the impaired person is:	1	The availability of a telephone
	2	Proximity to an emergency room
	3**	The safety of the scene and the absence of danger for the rescuer
	4	None of the above
10. Which of the following statements relating to the GAS* maneuver is correct?	1	Evaluate the concentration of gas (oxygen) to administer to the victim
	2	It must be performed for at least 30 seconds, counting aloud
	3	Measure the oxygen concentration in the blood using a pulse oximeter
	4**	Search for the presence of respiratory activity, for 10 seconds (I look, listen, feel)

Note: The questions text is freely translated from Italian to English.

\*, The acronym GAS, "Guardo," "Ascolto," and "Sento" in the Italian BLS training stands for "look," "listen," and "feel" in English; note that in Italian, it also may have the general meaning of gaseous state (as opposed to liquid or solid state).

\*\* , correct answer.

#### Appendix I, Table B. Italian version of the aMCQ.

Domanda	# Risposta	Risposta
1. La RCP (rianimazione cardio-polmonare) si effettua con il paziente in posizione:	1**	Supina
	2	Semi-seduta
	3	Laterale
	4	Qualsiasi
2. Il Basic Life Support (BLS) comprende:	1	Il pronto riconoscimento dell'assenza di coscienza, respiro, circolo
	2	L'attivazione precoce del sistema di soccorso
	3	L'esecuzione della RCP (rianimazione cardio-polmonare) in caso di arresto cardiaco
	4**	Tutte le precedenti
3. Una volta valutato lo stato di coscienza occorre:	1	Iniziare subito il massaggio cardiaco esterno
	2	Valutare se l'attività respiratoria è presente e normale
	3**	Chiedere aiuto e allertare telefonicamente i soccorsi (118, 112 numero unico di emergenza)
	4	Somministrare acqua da bere affinché la vittima si riprenda più rapidamente
4. Il massaggio cardiaco esterno nell'adulto va attuato comprimendo la cassa toracica per almeno:	1	10 centimetri
	2**	5-6 centimetri
	3	1-2 centimetri
	4	Tutte le precedenti
5. L'arresto respiratorio porta all'arresto cardiaco in:	1	15 minuti
	2	30 minuti
	3	45 minuti
	4**	Pochi minuti

Domanda	# Risposta	Risposta
6. Il massaggio cardiaco esterno nell'adulto va eseguito mantenendo una frequenza:	1	Tra 40 e 60 compressioni al minuto
	2	Tra 130 e 180 compressioni al minuto
	3**	Tra 80 e 120 compressioni al minuto
	4	La frequenza non è rilevante
7. Le prime lesioni cerebrali si producono in presenza di arresto cardio-respiratorio:	1**	Dopo 10 minuti
	2	Dopo 4 minuti
	3	Dopo pochi secondi
	4	Dopo 30 minuti
8. Il CPR va eseguito con una sequenza:	1**	30:2 (30 compressioni alternate a 2 ventilazioni)
	2	15:2 (15 compressioni alternate a 2 ventilazioni)
	3	10:1 (10 compressioni alternate a 1 ventilazione)
	4	15:1 (15 compressioni alternate a 1 ventilazione)
9. La prima cosa da valutare prima di avvicinarsi all'infortunato è:	1	La disponibilità di un telefono
	2	La vicinanza ad un punto di pronto soccorso
	3**	La sicurezza della scena e l'assenza di pericoli per il soccorritore
	4	Nessuna delle precedenti
10. Quale delle seguenti affermazioni relative alla manovra GAS è corretta:	1	Valuta la concentrazione di gas (ossigeno) da somministrare alla vittima
	2	Deve essere eseguita per almeno 30 secondi, contando ad alta voce
	3	Misura la concentrazione di ossigeno nel sangue attraverso un pulsossimetro
	4**	Ricerca la presenza di attività respiratoria, per 10 secondi (guardo, ascolto, sento)

Note: \*\*, Risposta corretta.

#### Appendix II, Table A. Self-evaluation questionnaire's items and time points.

Item	Time Point
How much BLS training is useful and may serve you in the future? *	T0, T1, T2
How much comfortable would you feel in helping, by yourself, a person needing BLS? *	T0, T1, T2
Altogether how much are you satisfied with the BLS training activity? *	T0, T1
How satisfied you are with the BLS training you received? *	T1
How much would you evaluate your learning with the proposed BLS training method? *	T2
Which of the proposed BLS training methods (MT, MR, and SDL) you prefer? **	T2

Note: T, Time point (T0, pre-intervention; T1, one-month follow-up; T2, three-months follow-up);

\*Answers options: Not at All, Little, Sufficient, Much, and Overmuch.

\*\* Answers options: MT, Mass Training; MR, Mixed Reality; SDL, Self-Directed Learning.

#### Appendix II, Table B. Answers proportions of participants' self-evaluation in all groups.

Participants' Self-evaluation Item	T	All Groups					N+L *
		N *	L *	S *	M *	O *	
1. How much BLS training is useful and may serve you in the future?	T0	0.0	2.0	16.0	44.0	38.0	2.0
	T1	0.0	4.0	34.0	32.0	30.0	4.0
	T2	0.0	14.0	30.0	42.0	14.0	14.0
2. How much comfortable would you feel in helping by yourself a person needing BLS?	T0	0.0	20.0	58.0	18.0	4.0	20.0
	T1	4.0	32.0	50.0	10.0	4.0	36.0
	T2	8.0	38.0	46.0	6.0	2.0	46.0
3. Altogether how much are you satisfied with the BLS training activity?	T0	0.0	2.0	56.0	34.0	8.0	2.0
	T1	4.0	2.0	50.0	32.0	12.0	6.0
4. How satisfied you are with the BLS training you received?	T1	6.0	14.0	30.0	40.0	10.0	20.0
5. How would you evaluate your learning proficiency with the proposed teaching method?	T2	2.0	22.0	44.0	28.0	4.0	24.0

Note: T, Time point (T0, pre-intervention; T1, one-month follow-up; T2, three-months follow-up);

N, Not at all; L, Little; S, Sufficient; M, Much; O, Overmuch.

\*, %.

**Appendix II, Table C. Answers proportions of participants' self-evaluation, split by the study groups.**

Participants' Self-evaluation Item	T	MT					MR					SDL				
		N*	L*	S*	M*	O*	N*	L*	S*	M*	O*	N*	L*	S*	M*	O*
1. How much BLS training is useful and may serve you in the future?	T0	0.0	0.0	18.2	36.4	45.5	0.0	0.0	25.0	37.5	37.5	0.0	4.5	9.1	54.5	31.8
	T1	0.0	0.0	36.4	27.3	36.4	0.0	6.3	25.0	31.3	37.5	0.0	4.5	40.9	36.4	18.2
	T2	0.0	9.1	36.4	45.5	9.1	0.0	6.3	25.0	43.8	25.0	0.0	22.7	31.8	40.9	4.5
2. How much comfortable would you feel in helping by yourself a person needing BLS?	T0	18.2	45.5	36.4	0.0	0.0	6.3	68.8	18.8	6.3	0.0	31.8	54.5	9.1	4.5	0.0
	T1	0.0	36.4	36.4	9.1	18.2	0.0	18.8	81.3	0.0	0.0	9.1	40.9	36.4	13.6	0.0
	T2	9.1	18.2	63.6	9.1	0.0	0.0	50.0	31.3	12.5	6.3	13.6	40.9	45.5	0.0	0.0
3. Altogether, how much are you satisfied with the BLS training activity? *	T0	0.0	0.0	63.6	27.3	9.1	0.0	0.0	43.8	43.8	12.5	0.0	4.5	63.6	27.3	4.5
	T1	0.0	0.0	63.6	27.3	9.1	0.0	0.0	31.3	50.0	8.8	9.1	4.5	59.1	18.2	9.1
4. How satisfied you are with the BLS training you received?	T1	0.0	0.0	27.3	72.7	0.0	0.0	0.0	31.3	37.5	31.3	13.6	31.8	31.8	22.7	0.0
5. How would you evaluate your learning proficiency with the proposed teaching method?	T2	0.0	27.3	27.3	36.4	9.1	0.0	6.3	43.8	43.8	6.3	4.5	31.8	50.0	13.6	0.0

**Note:** T, Time point (T0, pre-intervention; T1, one-month follow-up; T2, three-months follow-up);  
 MT, Mass Training; MR, Mixed Reality; SDL, Self-Directed Learning.  
 N, Not at all; L, Little; S, Sufficient; M, Much; O, Overmuch.  
 \*, %.

**Appendix III. The Six-item BLS sequence checklist.**

Checklist Item	Correctly Applied	Incorrectly Applied	Unapplied
1. Scene security verification	1	0.5	0
2. Person's responsiveness	1	0.5	0
3. Call for help	1	0.5	0
4. Airways inspection	1	0.5	0
5. Breathing (evaluation and head hyperextension)	1	0.5	0
6. Delivery of chest compressions	1	0.5	0
Partial total	-	-	-
Final total	-		

