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Letter to the Editor

Layperson use of AEDs – What happens after shock delivery?



To the Editor,

High-quality cardiopulmonary resuscitation (CPR) and early defibrillation with minimal peri-shock pauses are crucial for improving survival from cardiac arrest.^{1,5,6} Studies have shown that user-friendliness of automated external defibrillators (AEDs) impact time to defibrillation.^{2–4} Importantly, no studies have investigated layperson actions after shock delivery. We describe layperson actions after shock delivery with AEDs and how voice prompts may affect post-shock pauses.

This is a post-hoc analysis of two randomized simulation studies allocating adult laypersons (1:1:1) to use one of three different AED models in default adult mode on an adult manikin (n=30) or pediatric mode on a pediatric manikin (n=90). We used a Lifepak CR-T Trainer (PhysioControl, Redmond, Washington, USA), a Laerdal AED Trainer 3/Phillips Heartstart FR3 Trainer (Laerdal Medical, Stavanger, Norway) and a CU Medical IPAD SP1 AED Trainer (SunTech Medical, Inc., Morrisville, North Carolina, USA).

Participants (median (Q1;Q3) age: 30 (23;46) years, female: 43%, previous CPR training: 80%) were asked to use the AED on a manikin similar to a real-life situation. The simulation was stopped when initiating chest compressions after shock delivery or 30 sec-

onds post-shock delivery if no compressions were performed. We report time to first shock, time to compressions, and removal of electrodes.

We found significant differences in time to shock delivery (Table 1). Overall, 15 participants (13%) removed the electrodes after shock delivery (Table 1), 20 participants (17%) did not resume compressions, and major differences in post-shock pauses were observed.

The differences in time to shock delivery may owe to differences in user-friendliness as reported in *Resuscitation* more than a decade ago.² Importantly, our findings of removal of electrodes have not previously been reported. Removal of electrodes before starting compressions may prevent further rhythm checks and shock deliveries. As patients may require several shocks, this may decrease chance of survival.

Several participants using the Philips FR3 AED did not resume compressions after shock delivery, which may owe to the AED prompting “Start CPR” (translated from Danish) for the Phillips FR3 AED which may be unfamiliar to Danish laypersons as this is an uncommon Danish term. In comparison, the Lifepak CRT and the CU Medical SP1 were prompting “Start compressions” or “Start

Table 1 – Cardiopulmonary resuscitation performance by AED type.

	Lifepak CRT (n=40)	CU Medical SP1 (n=40)	Phillips FR3 (n=40)	P-value
Time to delivery of shock (sec.)				
– Overall cohort	82 (75;95)	101 (86;112) ^a	63 (52;78) ^c	p<0.001
– Use of adult mode only	85 (78;91)	97 (83;119)	51 (45;67)	p<0.001
Voice prompt after defibrillation*	Shock delivered. Start chest compressions	Shock delivered. Start cardiopulmonary resuscitation	Shock delivered. Start CPR	
Removing electrodes after defibrillation	6 (15%)	5 (13%)	4 (11%)	p=0.62
Resuming compressions after shock delivery	38 (95%)	37 (93%)	25 (64%) ^a	p<0.001
Time to first compression (sec.)	91 (83;104) ^b	117 (103;124) ^c	76 (69;91) ^d	p<0.001
Post shock pause (sec.)	8 (7;10) ^b	16 (14;18) ^c	12 (9;21) ^e	p<0.001

Continuous data presented as median (Q1;Q3) and categorical data presented as number (%).

CPR= Cardiopulmonary Resuscitation.

^a Missing data for 1 participant.

^b Missing data for 2 participants.

^c Missing data for 3 participants.

^d Missing data for 15 participants.

^e Missing data for 16 participants.

* Translated from Danish.

cardiopulmonary resuscitation” respectively. There was a delay among participants in the CU Medical SP1 group because they were wondering about the meaning of “cardiopulmonary resuscitation”.

Our findings of participants removing electrodes and/or not resuming compressions after shock delivery was in spite of most participants having previous CPR training (this is mandatory in Danish schools and when obtaining driver’s license). Thus, our findings suggest that the period post-shock delivery may be an overlooked part of CPR training and that user-friendliness of voice prompts still is important even for trained laypersons. Study limitations include simulations and use of Danish voice prompts. Our study suggests that caution should be taken when translating abbreviations like “CPR” or using medical terms in voice prompts. Importantly, future CPR training and public campaigns should emphasize to resume compressions and keeping electrodes attached for further rhythm check and defibrillation.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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