Simulation and education

Can a flowchart improve the quality of bystander cardiopulmonary resuscitation?☆

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ABSTRACT

Background: Since the introduction of basic life support in the 1950s, on-going efforts have been made to improve the quality of bystander cardiopulmonary resuscitation (CPR). Even though bystander-CPR can increase the chance of survival almost fourfold, the rates of bystander initiated CPR have remained low and rarely exceed 20%. Lack of confidence and fear of committing mistakes are reasons why helpers refrain from initiating CPR. The authors tested the hypothesis that quality and confidence of bystander-CPR can be increased by supplying lay helpers with a basic life support flowchart when commencing CPR, in a simulated resuscitation model.

Materials and methods: After giving written informed consent, 83 medically untrained laypersons were randomised to perform basic life support for 300s with or without a supportive flowchart. The primary outcome parameter was hands-off time (HOT). Furthermore, the participants' confidence in their actions on a 10-point Likert-like scale and time-to-chest compressions were assessed.

Results: Overall HOT was 147 ± 30 s (flowchart) vs. 169 ± 55 s (non-flowchart), $p = 0.024$. Time to chest compressions was significantly longer in the flowchart group (60 ± 24 s vs. 23 ± 18 s, $p < 0.0001$). Participants in the flowchart group were significantly more confident when performing BLS than the non-flowchart counterparts (7 ± 2 vs. 5 ± 2, $p = 0.0009$).

Conclusions: A chart provided at the beginning of resuscitation attempts improves quality of CPR significantly by decreasing HOT and increasing the participants' confidence when performing CPR. As reducing HOT is associated with improved outcome and positively impacting the helpers' confidence is one of the main obstacles to initiate CPR for lay helpers, charts could be utilised as simple measure to improve outcome in cardiopulmonary arrest.

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1. Introduction

Since the introduction of the basic life support (BLS) in the 1950s, on-going efforts have been made to improve the quality of resuscitation measures.[1–4] International BLS algorithms have been designed, validated and published to meliorate the outcome after a cardiac arrest.[3,5] However, the fundament of a functional chain of survival is in most cases built by lay people, since approximately 67% of the sudden cardiac deaths are witnessed by bystanders and the Emergency Medical Services response interval is eight minutes or more.[6,7] Still, the respective bystanders may or may not have been trained through BLS courses.[3] Unfortunately, even though bystander cardiopulmonary resuscitation (CPR) can increase the chance of survival almost fourfold, the rates of bystander CPR have remained low and rarely exceed 20%.[8–10]

Panicking and lack of confidence are, besides fear of infectious diseases, reasons why helpers refrain from initiating CPR.[11–15] Furthermore, perceived inability to perform CPR correctly is an important cause of CPR non-provision.[11,16–18] Interruptions of chest compressions (e.g. due to hesitations as a consequence of fear or insecurity) is defined as hands-off-time (HOT) and has a detrimental effect on survival.[19] HOT therefore includes all times when chest compressions are not performed. It was one of the aims of the European Resuscitation Council to adapt the BLS Guidelines in order to simplify teaching and skill retention.[3] The 2010 BLS algorithm of the European Resuscitation Council was therefore implemented in order to enable bystanders to execute the algorithm more correctly and aiming at a higher percentage of bystander-initiated resuscitations.[3] Various strategies have been developed to assist bystanders to recognise a cardiac arrest situation, initiate CPR

correctly, and improve its quality.[20,21] Graphic images have been used in to convey medical information and can improve its acquisition and comprehension.[22] Along with written instructions, graphic images are included in current BLS guidelines.[3]

Consequently, we wanted to test the hypothesis that quality of BLS as well as the confidence of the bystander can be increased by supplying lay helpers with a flowchart containing an easy to understand BLS instruction in written and graphic steps. As a self-explanatory term we introduced the name "HeartChart" (Fig. 1).

Fig. 1. Flowchart. Unconscious! – What to do? (1) Speak to and touch the collapsed person! No reaction? (2) Shout for help! (3) Open airway: breathing? – No? (4) Dial emergency medical service: 144! (5) Send for an automated external defibrillator: activate and follow voice instructions! (6) Chest compressions: 30× push hard! (7) Open airway and give two mouth-to-mouth ventilations. Repeat 6 and 7 until emergency medical service arrives.