

Analysis of dispatcher-assisted cardiopulmonary resuscitation instructions to laypersons in an out-of-hospital cardiac arrest

Análisis de las instrucciones de la reanimación cardiopulmonar guiada por teléfono en paradas cardíacas extrahospitalarias atendidas por ciudadanos

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ABSTRACT

Randomized simulation trial to analyze dispatcher-assisted cardiopulmonary resuscitation instructions provided from the emergency call center in an out-of-hospital heart arrest assisted by lay persons. An analysis of the telephone instructions was performed using a 14-item checklist by two external researchers. Simulations lasted nine minutes. Twenty-one volunteers were enrolled. All of them started resuscitation maneuvers. Telephone instructions were verbalized in very heterogeneous ways. Half of the indicators exceeded 90% compliance. Frequently the recommendation of *push hard and fast* on the patient's chest was omitted and the dispatcher tended to mark a slower compression rate. The average time from the call to the start of the resuscitation was 3 min 33 s (SD: 1 min 7 s). The telephone instructions were verbalized in a very heterogeneous way. It is necessary to standardize and provide training in how to guide a dispatcher-assisted resuscitation.

Keywords. Cardiopulmonary resuscitation. Automated external defibrillators. Dispatch assisted. Simulation.

RESUMEN

Estudio de simulación para analizar el contenido de las instrucciones telefónicas de reanimación cardiopulmonar emitidas por un centro coordinador de urgencias durante la parada cardíaca extrahospitalaria asistida por ciudadanos sin entrenamiento. Cada simulación duró nueve minutos. El análisis de las instrucciones telefónicas fue realizado por dos observadores mediante una lista de comprobación de catorce indicadores. Participaron veintiún voluntarios. Todos fueron capaces de iniciar maniobras de reanimación. La mitad de los indicadores superaron el 90% de cumplimiento. Frecuentemente se omitió la necesidad de *comprimir fuerte y rápido* el tórax, con tendencia a marcar un ritmo de compresiones lento. El tiempo medio desde la llamada hasta el inicio de la reanimación fue de 3 min 33 s (DE: 1 min 7 s). Las instrucciones telefónicas se verbalizaron de formas muy heterogéneas. Es preciso normalizar y entrenar la forma de guiar telefónicamente una reanimación.

Palabras clave. Reanimación cardiopulmonar. Desfibrilación externa automática. Soporte telefónico. Simulación.

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INTRODUCTION

The prognosis of out-of-hospital cardiac arrest (CA) is determined by many well-studied factors¹⁻³, including the ability of the witness to quickly start cardiopulmonary resuscitation (CPR) maneuvers of sufficient quality as to generate cerebral blood flow, and continue them until the ambulance's arrival.

Some of the strategies implemented in Spain to help laypersons act correctly in the event of an out-of-hospital CA include the regulation and installation of publicly accessible automated external defibrillators (AED)⁴, as well as dispatcher assistance from the Emergency Dispatch Centre (EDC) on the steps to follow in initiating CPR⁵.

Since it is reasonable to think that the dispatcher-assisted technique will directly affect the performance of CPR being performed by the witness, the objective of this paper is to focus on analysing the content of the CPR telephone instructions issued to untrained laypersons by an EDC during out-of-hospital cardiac arrest.

METHODS

A descriptive *post hoc* analysis of a randomized clinical simulation study evaluated the quality of CPR performed by laypersons without prior training in life support maneuvers (NCT03771911)⁶.

Participants, with the support of an AED trainer (Philips HeartStart FR2) and EDC telephone instructions, carried out a simulation of cardiac arrest on a true-to-life mannequin without the possibility of being relieved by another person. The scenario was introduced by describing a case (briefing), in which the participant found a person lying supine on the floor, and was only equipped with a mobile phone that could be used to request help and a publicly accessible AED within their reach.

Phone calls were received at the corresponding EDC by an operator who, after initial questioning, transferred the communication to the center's health care coordinator for case management. The telephone

instructions were given by eleven different dispatchers at the EDC (emergency team of physicians and nurses with at least five years of professional experience), following the recommendations of the Spanish Resuscitation Council⁵.

Each simulation lasted nine minutes (approximately the time required for emergency resources to arrive at the site) in a high-fidelity simulated environment, which allowed observation of the situation and its recording on audio and video without interfering with its implementation. The simulation sessions took place on days and at times of low assistance load at the EDC, which was reinforced with additional personnel to avoid affecting the normal performance of the service.

For the descriptive analysis of the content of the dispatcher-assisted cardiopulmonary resuscitation instructions, a checklist of fourteen indicators was used, prepared on the basis of the recommendations proposed in the literature^{5,7}, in which the response was *did or did not do*. At the same time, the intervals of the call management process to the EDC were timed. Data collection was carried out independently by two researchers, while a third acted as an evaluator by comparing the information that they gathered, with agreement reached on the content of the final template.

The number of times that each of the telephone instructions described in the checklist were indicated was counted and their percentage was calculated. The timing of the telephone calls is displayed in the form of mean and standard deviation (SD). Inter-rater reliability was assessed using Cohen's *kappa* and its 95% confidence interval (95%CI). Statistical analysis was performed using IBM SPSS Version 25, thereby setting the level of statistical significance at $p < 0.05$.

RESULTS

Twenty-one volunteers participated in the study, of which ten (47.6%) were women. The average age of the participants was 39.1 years (SD: 8.2).

The initial inter-rater agreement between researchers in content analysis related to dispatcher instructions was very high ($k = 0.73$; 95%CI: 0.65-0.81; $p < 0.001$).

All the participants were able to initiate CPR maneuvers. In general, the instructions on how to proceed in the CPR technique were verbalized in very heterogeneous ways, and the prompts were not standardized. Half of the proposed indicators

exceeded 90% compliance. The most frequently omitted instructions corresponded to the need to *push hard and fast* on the patient's chest and the recommendation to activate the hands-free phone system. The most deficient instructions were those referring to the compression rate (with a tendency to mark slower rates). Table 1 summarizes how often dispatchers gave key instructions for performing CPR.

Table 1. Telephone instructions given by the Emergency Dispatch Center to guide the cardiopulmonary resuscitation (n=21)

Instruction	n (%)
Asked the rescuer to check whether the victim is breathing	20 (95,2)
Asked whether there was someone else with the rescuer or asked him/her to shout for help	17 (81)
Asked whether there was an AED nearby and ask them to bring it over to the victim	21 (100)
Told the rescuer to put his/her phone on speaker mode	10 (47,6)
Told the rescuer to <i>remove clothes from the victim's chest</i>	11 (52,4)
Told the rescuer to <i>turn on the AED</i>	21 (100)
Explained how to place the AED pads	20 (95,2)
Told the rescuer to follow the AED instructions or repeat the AED instructions	20 (95,2)
Told the rescuer to <i>kneel beside the victim's chest</i>	15 (71,4)
Told the rescuer to <i>place his/her hands, one on top of the other and with fingers interlocked, on the center of the victim's chest</i>	20 (95,2)
Told the rescuer to <i>press down hard on the chest</i>	2 (9,5)
Told the rescuer to <i>press fast</i>	1 (4,8)
Indicated an adequate compression rate (100-120 cpm)	7 (33,3)
Gave regular encouragement	20 (95,2)

AED: automated external defibrillator; cpm: compression per minute.

As shown in table 2, the mean time between the emergency call and the start of

chest compressions or turning on the AED was 3 min 33 s (SD 1 min 7 s).

Table 2. Timing of the calls to the Emergency Dispatch Center (n=21)

Event	Average time (SD)
From the first ring until the call is picked up by an operator	0 min 15 s (7 s)
From call picked-up by the operator until transfer to the healthcare dispatcher	1 min 0 s (19 s)
From transfer until the call is picked up by the healthcare dispatcher	0 min 32 s (18 s)
From call picked-up by the healthcare dispatcher until start of the resuscitation maneuvers*	1 min 25 s (58 s)
From first ring until start of the resuscitation maneuvers*	3 min 33 s (1 min 7 s)

SD: standard deviation; *: *start of the resuscitation maneuvers* is understood to refer to the point at which the defibrillator is turned on or chest compressions are started.

DISCUSSION

This paper represents an approximation of the actual performance of EDC as a telephone assistance provider for laypersons who are faced with the challenge of performing CPR without having specific training. The results of this simulation show that the EDC is capable of getting an untrained layperson to begin life support maneuvers, regardless of the quality thereof.

Papers evaluating the quality or content of dispatcher-assisted CPR are not abundant in the literature, thereby making it difficult to compare results; however, a previous study carried out in Asturias (Spain), based on twenty-eight recordings of calls received at the EDC about CA, detected a proportion of compliance with the indicators and some points of improvement close to those observed in our paper⁸.

The aspects that deserve more attention in this study, due to their low emphasis on dispatcher-assisted CPR instructions, are those that address the depth and rate of compressions. One of the most reiterative quality parameters in the latest international recommendations refers to chest compression depths⁷, since a compression of less than 5 cm does not generate cerebral blood flow. Overall, the dispatcher assistance during our simulations showed no emphasis in indicating the need to *press hard, like in the movies*; it should be noted that in less than half of the cases, the EDC told the rescuer to put the phone in hands-free mode. It is necessary to bear in mind that the evident discomfort of holding the phone close to the ear while performing compressions could affect their quality.

In addition to *pressing hard*, the EDC must urge the rescuer to *press fast*, with the intention of achieving a compression rate of between 100 and 120 per minute. The vocal marking of the compression rate from the EDC was inadequate in most cases, which is a result that corresponds to the observations made in previous publications⁹ and has led to solutions such as the integration of a metronome during dispatcher-assisted telephone CPR instructions^{10,11}; however, this option is not without its detractors,

considering the possible negative effect compared to the usual practice¹².

Another aspect of our results that should be discussed is the EDC's vague description of the correct way to position the CPR provider and prepare the patient. It must be considered that for the experienced professional caregiver, it may be obvious that the patient must be placed in a supine position, the provider must kneel next to the victim for cardiac massage, and this must be performed on the bare chest of the patient, but these details may not be known or deduced by the layperson raising the alarm, especially in a stressful situation.

Lastly, the timing of calls deserves special attention. Considering that the prognosis of CA is time-dependent, the strategies of the EDC must be oriented to preferentially handling calls that are suspected of being about CA and minimizing the time until CPR is initiated. In comparison with the results of Roza et al⁸, in this case lower mean times were achieved until the start of resuscitation, although three and a half minutes may be considered excessive from a clinical point of view.

Despite efforts aimed at possibly reproducing the most realistic situation, it is necessary to point out, as a limitation, that the study was carried out in a simulation space on a mannequin. This fact may obscure some reactions, which in a real situation might have led the layperson to act in a different way, such as the state of anxiety and nervousness that an emergency produces, and the reticence to perform CPR on a real person. In addition, the contextualization of the case during the briefing can help the participant to quickly identify the CA, when in a real situation there might be doubts or setbacks.

The overall conclusion of this paper shows that there is room for improvement in dispatcher-assisted services. EDC professionals must be aware of the need to provide clear, concise and homogeneous CPR telephone instructions, with the aim of reducing the time until the start of life support maneuvers, getting the rescuer to adopt a comfortable position (including the recommendation of activating the hands-

free option of the phone), clearly indicating the way to prepare oneself and get into position to perform a heart massage, and reinforcing the need for hard and fast compression (perhaps marking the compression rate aided by a metronome).

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