

Cardiopulmonary resuscitation by law enforcement agents in Spain: lessons from a mixed methods case study

Irene Pérez-Regueiro,¹ Lucía Carcedo-Argüelles,² Elena Fernández Fernández,¹ José Antonio García Fernández,³ Alberto Lana²

¹Coordination Unit of the Framework Program for Emergency Medical Attention, SAMU-Asturias, Asturias Health Service/ISPA, Mieres;

²Department of Medicine, University of Oviedo ISPA, Oviedo; ³Emergency Department, Asturias Central University Hospital, Oviedo, Spain

Abstract

Much of the law enforcement work takes place close to the public, often arriving at the scene before medical services in the case of

victims of out-of-hospital cardiac arrest. If properly trained, these early care procedures can be powerful mechanisms to improve survival. This paper describes a case of out-of-hospital cardiac arrest assisted by law enforcement officers on the public highway in Asturias-Spain. In addition, a qualitative study was carried out to learn about the experience of the officers during the intervention, their willingness to act in similar emergencies, as well as to gather information about their training and knowledge of basic life support. The case was successfully resolved; however, some errors in the spontaneous execution of the chain of survival and the officers' statements prompted some recommendations for the mobilization, training and staffing of law enforcement agencies in Spain.

Correspondence: Alberto Lana, Área de Medicina Preventiva y Salud Pública, Departamento de Medicina, Facultad de Medicina y Ciencias de la Salud, Calle Julián Clavería, s/n. 33006 Oviedo, Spain.

Tel.: +34.985103545.

E-mail: lanaalberto@uniovi.es

Key words: out-of-hospital cardiac arrest, cardiopulmonary resuscitation, emergency medical services, law enforcement, police.

Contributions: IP-R, conception and design of the study, data collection, drafting of the initial version of the manuscript; LC-A and EFF, drafting and review of the final manuscript; JAGF, data collection and review of the final manuscript; AL, conception and design of the study, drafting and review of the final version of the manuscript.

Conflicts of Interest: the authors declare no potential conflict of interest, all authors confirm accuracy.

Ethics approval: this study was approved by the Research Ethics Committee of Asturias (ref. 2020/160), the management of the health centers involved and the Civil Guard Headquarters.

Informed consent: written informed consent was obtained from all subjects involved in the study.

Availability of data and materials: the data presented in this study are available on request from the corresponding author. The data are not publicly available due to Spanish General Data Protection Regulation.

Funding: this research has been funded by a grant from the Official College of Nursing of Asturias (Spain).

Received for publication: 20 March 2023.

Accepted for publication: 9 May 2023.

This work is licensed under a Creative Commons Attribution 4.0 License (by-nc 4.0).

©Copyright: the Author(s), 2023

Licensee PAGEPress, Italy

Emergency Care Journal 2023; 19:11326

doi:10.4081/ecj.2023.11326

Publisher's note: all claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article or claim that may be made by its manufacturer is not guaranteed or endorsed by the publisher.

Case Report

A 78-year-old man suffered a dizzy spell while walking with his wife in the streets of a town of 22,741 inhabitants in Asturias-Spain. The victim lost consciousness 200 meters from a Primary Care Center (12:34 hours), the base of the emergency medical service (EMS) mobile unit. Bystanders immediately alerted the Emergency Coordination Center. At that moment, two Civil Guard (CG) traffic patrols were driving along the road and stopped. The CG is a state security force of a military nature that exercises police functions in Spain. The two CG patrols observed the man lying unconscious, with a bystander elevating his lower extremities and the wife holding his head and pushing down on his tongue, however, no one performed cardiopulmonary resuscitation (CPR). The victim was unresponsive, cyanotic, accompanied by upgaze eye deviation. One officer noted the absence of breathing and pulse and began chest compressions (Officer 1, female, 37 years old), whereas another officer alerted the headquarters (Officer 2, male, 54 years old). A third officer remained to support the maneuvers (Officer 3, male, 48 years old), while a fourth officer ensured public safety (Officer 4, male, 51 years old). The assistance of the CG officers occurred at 12:37 hours. They did not apply an automated external defibrillator (AED) during the process. After eight minutes (12:45 hours) the patient showed signs of recovery of spontaneous circulation with cough, eye opening, improvement of skin and mucous membrane color and limb mobility. The officers verified the presence of a pulse.

At 12:46 hours the EMS arrived, with a delay due to the erroneous indications of the people who raised the alarm. At that moment the victim suffered a new loss of consciousness due to an episode of ventricular fibrillation. After a shock with the monitor-defibrillator, he evolved to ventricular tachycardia without pulse; with a second shock, he presented ventricular tachycardia with pulse and, finally, presenting supraventricular paroxysmal tachycardia after electrical cardioversion. Amiodarone and nitroglycerin were administered by intravenous infusion before transfer to the reference hospital.

The patient was admitted to the emergency room conscious and oriented, with mechanical pain possibly related to life support maneuvers. The physical examination showed no alterations, dyspnea or palpitations. He presented amnesia of the incident. The electrocardiogram (Figure 1) showed sinus rhythm (80 beats per minute), normal PR, normal axis, narrow QRS and normal corrected QT. No repolarization alterations were found, although with abundant monomorphic ventricular extrasystoles. In the chest X-ray (Figure 2) no signs of cardiac insufficiency, rib fracture, masses or condensations were observed. The patient was transferred to the Advanced Cardiac Care Unit. Transthoracic ultrasound and coronary angiography revealed coronary artery disease of the left coronary trunk and three vessels. He underwent surgery five days later for myocardial revascularization. After a favorable evolution, he was discharged 15 days later.

We conducted the present case report using a mixed method approach to gain detailed knowledge of the conditioning factors of LEA assistance in OHCA. Case information was obtained from the records of the Emergency Coordinating Center, and from electronic medical records of the regional reference hospital. In addition, staff trained in qualitative research conducted a semi-structured interview with the CGs who participated in the provision of assistance. The interview was used to reconstruct the case and to explore willingness, barriers, training and knowledge. The questions on knowledge included 9 questions on CPR and 5 on the AED, based on the recommendations of the European Resuscitation Council.¹ The interview script is shown in Supplementary Table 1. All interviews were recorded and transcribed verbatim for qualitative analysis. Interviews ranged 20-45 minutes.

During the discourse analysis of the interviews, the identified units of meaning were condensed into categories. Since the interview was designed to collect information on 4 thematic axes (willingness/attitude, experience, training, and knowledge), each of these categories was incorporated into the predefined themes. Table 1 presents a discussion of the results grouped into the first three thematic axes. First, regarding willingness/attitude, the officers concurred on the need to perform basic life support (BLS) immediately, because they arrive earlier and because their mission is to protect people, but also because it is the obligation of any citizen. However, although they were aware that they must act even when family members are present, they expressed fear of being blamed for failure of assistance and possible complaints. Second, CPR experience was variable. While two of the three had never participated in CPR, the other officer had participated on multiple occasions, largely due to previous work experience in maritime rescue. All the officers were aware of colleagues who had performed in similar situations. Third, questions related to CPR training took up most of the response time. The officers agreed that the basic training they receive on first aid is insufficient, and that periodic formal training is necessary, since only when one is well trained, do actions become automatic and nerve-free. Finally, according to the questions on knowledge of CPR maneuvers and use of the AED, the level of knowledge of the three CGs was moderate/high. One CG was able to answer 12 of the 14 questions correctly and the other two answered 11 questions correctly. The two questions that no CG were able to answer correctly were those referring to the depth of compressions and the maneuver for opening the airway in persons with suspected cervical injury.

Table 1. Samples of narratives from the qualitative study.

Willigness/Attitude

"It's clear to us that when we see a person in trouble of any kind, we must take action. In this case, you do what you remember and as well as you can, without hesitating one second" (...) "In any event, the action must be immediate" (...) "Absolutely, because we are professionals, but also as citizens." (Officer 1).
 "I don't think anything is more satisfying than brining a person back to life and helping someone who is in danger" (...) "All those professionals whose protocol includes helping and serving others should do so" (...) "When you get there and you know that there are relatives and acquaintances you cannot abstain because it's a denial of help, but you know the great responsibility that can be attributed to your malpractice if it doesn't go well, the situation is very complicated." (Officer 2).
 "Action is of vital importance because 90% of the time we arrive before the health workers" (...) "Being on duty makes it easier to access the victim, people move away and let us act, if you are in civilian clothes, it is more complicated." (Officer 3).

CPR experience

"Just one month after this case a colleague from the Mountain Rescue and Intervention Group performed CPR at home." (Officer 1).
 "Yes, I have heard of other similar cases. I think it has happened on other occasions in Oviedo and the Canary Islands." (Officer 2).
 "Shortly after this case there was another similar case. And you always get news through social networks." (Officer 3).

CPR training

"The new generations receive training at the Academy, in 2002 it was already regulated. Subsequently, there are places where they receive refresher training whereas other places don't" (...) "The courses aren't enough because you can retire without having received them. The instructions they receive need to be updated because they keep changing." (Officer 1).
 "During the intervention, I thought about what I had learned during training, especially what not to do. It was mechanical" (...) "Everyone should have basic notions of CPR" (...) "There is no regular training. Back in my time there was no training at the Academy, nowadays I don't know what they teach" (...) "The practical training should be repeated with a certain frequency so that it isn't forgotten, because since they gave us this course 4-5 years ago, nothing was done again" (...) "The main thing is the practice, not the theory and we don't have that." (Officer 2).
 "In traffic school, 24 years ago, I received basic training, later I did two other CPR courses on my own, but there is no formal or continuous training" (...) "More courses are needed, of course it's necessary. For example, you might find a baby and you must resuscitate it without knowing how, which is difficult, but it can happen" (...) " Ideally, it would be best to update knowledge, but of course, as long as there is time or staff, because it means taking officers off the streets. We need commitment from the Directorate, because taking courses means hours of service and there are already very few of us." (Officer 3).

Discussion

This paper describes a case of OHCA assisted by CG officers on public roads in Asturias-Spain, together with a qualitative study to learn about the experience of CGs during CPR, including willingness, training and knowledge about BLS. Case studies enable the exploration of a complex phenomenon through the identification of different interacting factors, and by combining a qualitative approach we attempted to increase the breadth and depth of understanding, and to provide specific recommendations for their training and resources. The present study was conducted in accordance with the CARE guidelines for clinical case reporting.

OHCA is a major health problem.^{2,3} Time between the onset of OHCA and the initiation of CPR is a key prognostic factor. In fact, survival rate decreases by 5-10% for each minute of delay.^{4,5} With few exceptions, immediate initiation of CPR in OHCA depends on bystander action. LEA have a greater number of units and geographical dispersion compared to EMS. In addition, due to the

nature of their work, they spend a large part of their working day patrolling public roads. Therefore, on many occasions they are first responders in emergency situations. A recent study in the United States analyzing 25,067 incidents found that police or firefighters initiated CPR in 31.8% of OHCA.⁶ In Spain, the CG is one of the LEA most involved in these situations, as exercises police functions operating mainly in low density areas. For this reason, the training plan for access to the CG includes a BLS module;⁷ however, the CG agency lacks a regulated CPR training program to maintain knowledge and skills of officers over the course of their career. Consequently, their level of knowledge and confidence for the performance BLS is low.^{8,9}

Although the body of scientific evidence on cardiopulmonary resuscitation is growing every year,¹⁰ it is necessary to continue expanding research into elements that can improve the process. LEA can be a potentially powerful mechanism to improve survival, therefore it is relevant to know the barriers and opportunities to act effectively and safely as first responders.⁶ According to

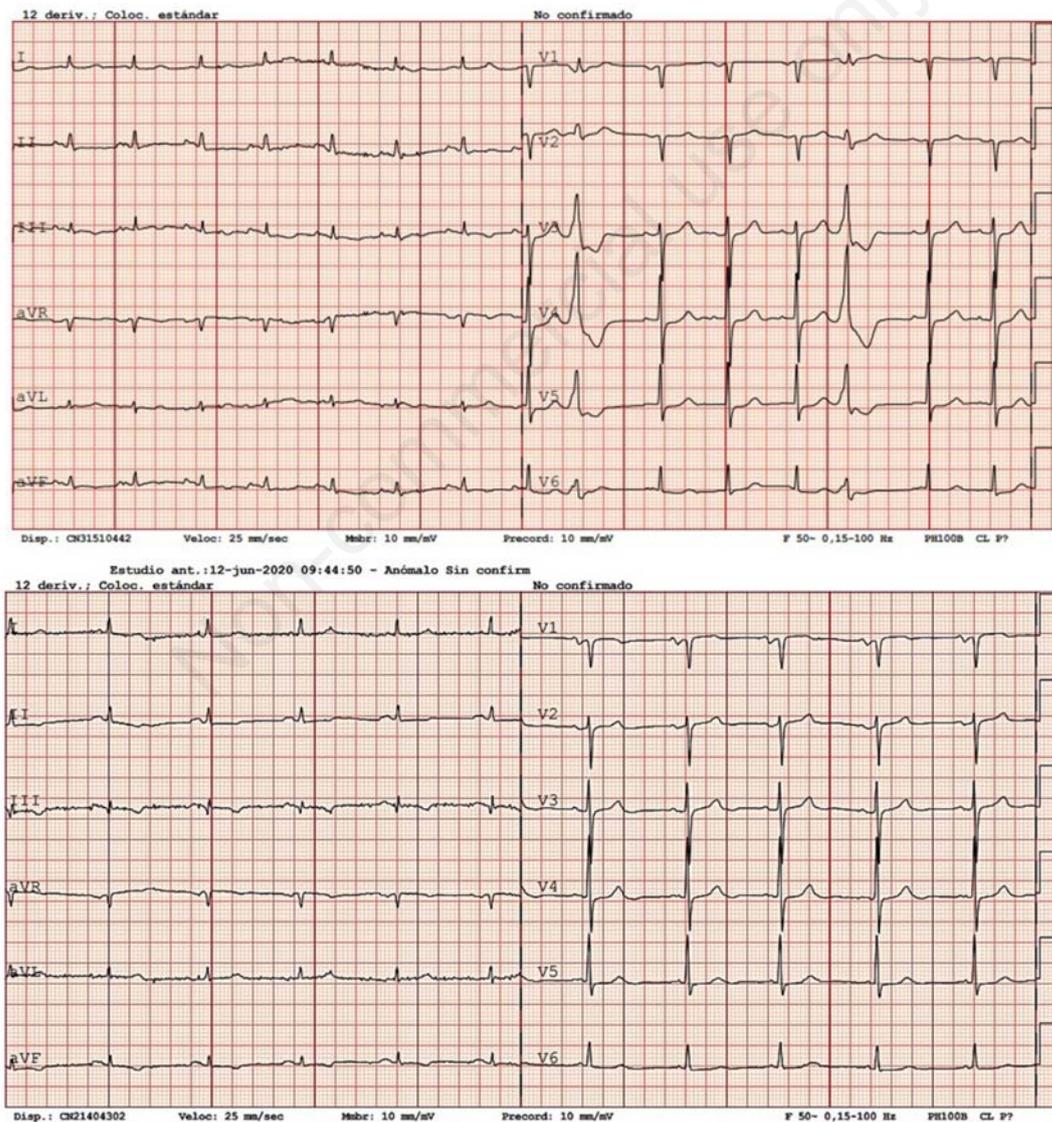


Figure 1. Electrocardiographic evolution: electrocardiogram on admission to the Emergency Department (top) and electrocardiogram prior to hospital discharge (bottom).

Hasselqvist-Ax *et al.*, providing case discussions and opportunities to give and receive feedback on the case is a main task of organizations to improve LEA performance in OHCA.¹¹ In our mixed-methods study, we found that CG officers in Spain are highly willing to perform CPR and, due to the nature of their work, they witness OHCA on numerous occasions; however, they feel insecure due to the lack of refresher courses involving practical training.

The most important prognostic factors for survival after OHCA are early initiation of CPR and the presence of shockable rhythms.¹² Regarding the former, it is estimated that CPR should be initiated within the first 3-4 minutes for a high probability of success.^{3,4} In this case, the victim was assisted by an eyewitness trained in CPR within 4 minutes (Officer 1). In addition, all four officers acted in a coordinated manner to collaborate with assistance and safeguarding the bystanders. Unfortunately, an important part of the smooth functioning of the chain was by chance: the presence of officers was coincidental, and the extensive training and experience of the main rescuer (Officer 1) was the result of personal choices, as she had received refresher training in recent months and had been a volunteer in EMS, where he had attended multiple OHCA. In addition, of the remaining officers, two had taken courses four years earlier and acknowledged recalling what should not be done (Officers 2 and 3).

In emergency situations, it is essential to reduce randomness as much as possible. Regarding the rapid arrival of LEA troops, it would be interesting to consider their immediate mobilization together with EMS. Studies show that dual dispatch increases survival.¹³ The CGs, in a subsequent interview, pointed out that they usually arrive before the EMS despite being notified later. Becker *et al.* estimated the delay in police mobilization to be more than 1 minute compared to EMS.¹⁴ In addition, regular training of officers should be reinforced.^{8,9} Although younger officers have basic training at the academy,⁷ the CGs interviewed expressed the need for refresher courses and more training, since much of their current training was due to personal concerns and took place in their free time. Furthermore, training not only increases knowledge and improves technical competence, but also has a positive influence on self-confidence and disposition.¹⁵ These conditions are essential

not only to increase the probability of survival, but also to avoid thoracic injuries, which are very frequent after CPR.¹⁶ In Spain, EMS have shown high availability and competence to train the lay population,¹⁷ and new technologies offer novel teaching solutions.^{17,18} Regarding the second prognostic factor, considering that the EMS applied AEDs on arrival, perhaps the victim would have benefited from their immediate application if they had been available in the CG vehicle, which would have limited the risk. The percentage of shockable rhythms in OHCA (22.6%) and the reduction in time to defibrillation are arguments in favor of equipping police vehicles with AEDs.^{19,20} Although no firm evidence has emerged, the availability of defibrillators appears to improve survival.¹³

Finally, the fact that the first witnesses did not perform CPR and that they made mistakes in their actions, including confusing the location, reveals the lack of competence of the population to act in OHCA. There is sufficient consensus on the need for training,¹⁸ what is lacking is the commitment of the institutions to carry it out.

Conclusions

In summary, the study of a case of OHCA assisted by the CG and the analysis of the experience and opinions of those involved enables us to make some recommendations: i) the competence of the general population should be improved in order to execute the 5 steps of the chain of survival, especially immediate recognition of cardiac arrest and activation of the emergency response system; ii) dual dispatch of LEAs with EMS, as implemented in several countries, which has been shown to improve survival; iii) mandatory continuous training of LEAs in BLS should take place every 2 years or less; this training could be integrated into the EMS training plan to rehearse coordinated action in real situations; iv) the installation of AEDs in LEA vehicles is advised, which could have the advantages of anticipating the shock in OHCA with shockable rhythms, as well as serving as a daily reminder and stimulus for LEA officers to be ready to act.

References

- Perkins GD, Handley AJ, Koster RW, et al. Adult basic life support and automated external defibrillation section Collaborators. European Resuscitation Council Guidelines for Resuscitation 2015: Section 2. Adult basic life support and automated external defibrillation. *Resuscitation* 2015;95:81-99.
- Gräsner JT, Wnent J, Herlitz J, et al. Survival after out-of-hospital cardiac arrest in Europe-Results of the EuReCa TWO study. *Resuscitation* 2020;148:218-26.
- Odom E, Nakajima Y, Vellano K, et al. Trends in EMS-attended out-of-hospital cardiac arrest survival, United States 2015-2019. *Resuscitation* 2022;179:88-93.
- Ruiz-Azpiazu JI, Daponte-Codina A, Fernández Del Valle P, et al. Variabilidad regional en incidencia, características generales y resultados finales de la parada cardiaca extrahospitalaria en España: Registro OHSCAR. *Emergencias* 2021;33:15-22.
- Rosell-Ortiz F, Escalada-Roig X, Fernández del Valle P, et al. Out-of-hospital cardiac arrest (OHCA) attended by mobile emergency teams with a physician on board. Results of the Spanish OHCA Registry (OSHCAR). *Resuscitation* 2017; 113:90-5.



Figure 2. Portable chest X-Ray on admission to the Emergency Department.

6. Salhi RA, Hammond S, Lehrich JL, et al; CARES Surveillance Group. The association of fire or police first responder initiated interventions with out of hospital cardiac arrest survival. *Resuscitation* 2022;174:9-15.
7. Gobierno de España. Orden PRE/1478/2006, de 5 de mayo, por la que se aprueba el plan de estudios de la enseñanza de formación para la incorporación a la escala de Cabos y Guardias del Cuerpo de la Guardia Civil. *Boletín Oficial del Estado* 2006;116:18761-7.
8. Carcedo Argüelles L, Pérez Regueiro I, García Fernández JA, Lana A. Formación y conocimientos sobre soporte vital básico de la Guardia Civil. *Rev Esp Salud Pública* 2021;94:e202104069.
9. Angulo-Menéndez P, Lana A, Moris de la Tassa J. Conocimientos y disposición para realizar soporte vital básico por agentes de la policía local. *Anales Sis San Navarra* 2017;40:177-86.
10. Márquez-Hernández VV, Gutiérrez-Puertas L, Garrido-Molina JM, et al. Worldviews on Evidence-Based Cardiopulmonary Resuscitation Using a Novel Method. *Int J Environ Res Public Health* 2021;18:9536.
11. Hasselqvist-Ax I, Nordberg P, Svensson L, et al. Experiences among firefighters and police officers of responding to out-of-hospital cardiac arrest in a dual dispatch programme in Sweden: an interview study. *BMJ Open* 2019;9:e030895.
12. Sasson C, Rogers MAM, Dahl J, Kellermann AL. Predictors of survival from out-of hospital cardiac arrest: a systematic review and meta-analysis. *Circ Cardiovasc Qual Outcomes* 2010;3:63-81.
13. Hasselqvist-Ax I, Nordberg P, Herlitz J, et al. Dispatch of Firefighters and Police Officers in Out-of-Hospital Cardiac Arrest: A Nationwide Prospective Cohort Trial Using Propensity Score Analysis. *J Am Heart Assoc* 2017;6:e005873.
14. Becker L, Husain S, Kudenchuk P, et al. Treatment of cardiac arrest with rapid defibrillation by police in King County, Washington. *Prehosp Emerg Care* 2014;18:22-7.
15. Jaskiewicz F, Kowalewski D, Kaniecka E, et al. Factors Influencing Self-Confidence and Willingness to Perform Cardiopulmonary Resuscitation among Working Adults-A Quasi-Experimental Study in a Training Environment. *Int J Environ Res Public Health* 2022;19:8334.
16. Escalada X, Sánchez P, Hernández R, et al. Prehospital emergency services in Catalonia: the SEPHCAT analysis. *Emergencias* 2020;32:90-6.
17. Castillo García J, Cerdà Vila M, de Balanzó Fernández X, et al. Standard basic life support training of the European Resuscitation Council versus blended training: a randomized trial of a new teaching method. *Emergencias* 2020;32:45-8.
18. Lapostolle F, Freund Y. Out-of-hospital cardiac arrest: the long road to equitable emergency care access to resuscitation. *Emergencias* 2021;33:5-6.
19. Husain S, Eisenberg M. Police AED programs: a systematic review and meta-analysis. *Resuscitation* 2013;84:1184-91.
20. Luque-Hernández MJ, Muñoz-Álvarez E, Vierna-de Grosso A, et al. Características de la fibrilación ventricular refractaria extrahospitalaria y uso de la doble desfibrilación secuencial. *Emergencias* 2020;32:295-7.