ORIGINAL ARTICLE

Ambulance cardiopulmonary resuscitation: outcomes and associated factors in out-of-hospital cardiac arrest

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Objective. To assess factors associated with survival of out-of-hospital cardiac arrest (OHCA) in patients who underwent cardiopulmonary resuscitation (CPR) during ambulance transport.

Methods. Retrospective analysis of a registry of OHCA cases treated between 2008 and 2014. We included patients who had not recovered circulation at the time it was decided to transport to a hospital and who were rejected as non–heart-beating donors. Multivariate analysis was used to explore factors associated with the use of ambulance CPR, survival, and neurologic outcome.

Results. Out of a total of 7241 cases, 259 (3.6%) were given CPR during emergency transport. The mean (SD) age was 51.6 (23.6) years; 27 (10.1%) were aged 16 years or younger. The following variables were associated with the use of CPR during transport: age 16 years or under (odds ratio [OR], 6.48; 95% CI, 3.91–10.76); *P*<.001)], witnessed OHCA (OR, 1.62; 95% CI, 1.16–2.26; *P*=.004), cardiac arrest outside the home (OR, 3.17; 95% CI, 2.38–4.21; *P*<.001), noncardiac cause (OR, 1.47; 95% CI, 1.07–2.02; *P*=.019], initially shockable rhythm (OR, 1.67; 95% CI, 1.17–2.37; *P*=.004), no prior basic life support (OR, 3.48; 95% CI, 2.58–4.70; *P*<.001), and orotracheal intubation (OR, 1.93; 95% CI, 1.24–2.99; *P*=.003). One patient (0.38%) survived to discharge with good neurologic outcome.

Conclusions. Ambulance CPR by a physician on board is applied in few OHCA cases. Young patient age, cardiac arrest outside the home, the presence of a witness, lack of a shockable rhythm on responder arrival, lack of basic life support prior to responder arrival, noncardiac cause, and orotracheal intubation are associated with the use of ambulance CPR, a strategy that can be considered futile.

Keywords: Out-of-hospital cardiac arrest. Ambulance cardiopulmonary resuscitation. Emergency health services. Futile cardiopulmonary resuscitation.

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Supervivencia y factores asociados a la práctica de reanimación cardiopulmonar en curso entre los pacientes con parada cardiaca extrahospitalaria

Objetivo. Conocer la supervivencia y los factores asociados a la realización de reanimación cardiopulmonar (RCP) en curso entre los pacientes con parada cardiaca extrahospitalaria (PCR).

Método. Análisis retrospectivo de un registro de casos de PCR entre 2008 y 2014. Se incluyeron los pacientes con PCR sin recuperación espontánea de pulso en el momento de la toma de decisión del traslado hospitalario y que fueron desestimados para donación en asistolia. Se realizó un análisis multivariante para determinar las variables que se asociaron al uso de una estrategia de reanimación en curso y se determinó la supervivencia y el resultado neurológico en dicho grupo de casos.

Resultados. Se incluyeron 7.241 pacientes, de los cuales 259 (3,6%) fueron trasladados al hospital con RCP en curso. La edad media fue 51,6 (DE 23,6) años, de los cuales 27 (10,1%) casos tenían ≤ 16 años. Las variables que se asociaron con el uso de RCP en curso fueron: edad ≤ 16 años [OR 6,48 (IC95% 3,91-10,76); p < 0,001)], PCR presenciada [OR 1,62 (IC95% 1,16-2,26); p = 0,004], PCR ocurrida fuera del domicilio [OR 3,17 (IC95% 2,38-4,21); p < 0,001)]; etiología no cardiaca [OR 1,47 (IC95%1,07-2,02); p = 0,019], ritmo inicial desfibrilable [OR 1,67 (IC95% 1,17-2,37); p = 0,004], no existencia de soporte vital previo (SVp) [OR 3,48 (IC95% 2,58-4,70); p < 0,001] y realización de intubación orotraqueal (IOT) [OR 1,93 (IC95% 1,24-2,99); p = 0,003]. Un paciente (0,38%) sobrevivió al alta con buen estado neurológico.

Conclusiones. La RCP en curso en servicios de emergencias con médico a bordo es una estrategia poco frecuente en casos de PCR. La juventud del paciente, que la PCR suceda fuera del domicilio, sea presenciada, no exista soporte vital previo, tenga un ritmo inicial desfibrilable, una etiología no cardiaca y que se consiga IOT se asocian con esta estrategia cuyo resultado final puede considerarse fútil.

Palabras clave: Parada cardiaca extrahospitalaria. Reanimación cardiopulmonar en curso. Servicio de emergencias. Reanimación fútil.

Introduction

There is unanimity on the ethical criteria to initiate resuscitation when an out-of-hospital cardiac arrest (CA) is attended, although it is more complex to decide on the end of the procedure when the patient does not recover a spontaneous pulse[1]. In fact, it is very frequent that these manoeuvres are continued during the transfer to the hospital. This is what is called cardiopulmonary resuscitation (CPR) in progress. There are cultural, legal, ethical and service organization reasons that prevent cessation of the resuscitation manoeuvres on the scene and end with the transfer of the patient in a situation of ongoing CPR[2-4]. In many Asian countries this is the usual strategy[5] and it is also common in countries where extra-hospital emergency systems do not have a doctor on board[6-8]. Despite this, the final results are not usually encouraging[6,8,9]. In fact, there is abundant literature that attempts to define criteria to stop the resuscitation manoeuvres on the ground and avoid transfers without real possibility of survival[10-13].

Taking into account the previously written, this is an aspect that has not been specifically analysed in the emergency services that carry a doctor on board. The aim of our study was to know the associated factors and survival of ongoing cardiopulmonary resuscitation among patients with CA.

Method

This is a retrospective analysis of a registry of cases of CA treated by extra-hospital emergency teams (ET) between January 2008 and December 2014. The registration is adjusted to the legal requirements on security and personal data protection set out in the Spanish legislation, and since its inception, it has been approved by the Research Ethics Committee of the Public Company for Health Emergencies of Andalusia (EPES).

The characteristics and methodology of the registry have been previously described[14]. Briefly, the Andalusian Registry of Out-of-hospital Cardiac Arrest is a prospective and continuous registry of CA cases attended by the ET of the EPES that have a doctor on board. It is the public health service that attends to out-of-hospital health emergencies in Andalusia, giving real coverage to 5,575,128 inhabitants of Andalusia (67% of the Andalusian population).

In this registry, all cases with the diagnosis of cardiac arrest or ventricular fibrillation (codes 427.5 and 427.41, respectively, of the International Classification of Diseases version 9 modified, ICD 9) are included in the medical record of the assistance. These codes are recorded in the information system (IS) of EPES and determine the automatic inclusion of the case. The case inclusion design is designed to minimize the intervention of professionals and avoid biases of inclusion and interpretation. The EPES quality system audits a representative sample of clinical histories every six months to verify the diagnosis and the degree of completion of key variables in CA. Every six months, access is requested to the National Death Index (INDEF), national centre for death certificates of the Ministry of Health of Spain.

For the present study all patients with CA without spontaneous pulse recovery at the time of the decision to transfer the hospital were included, and they were transferred to the hospital with resuscitation manoeuvres during the transfer. The current CPR situation is the last possibility of reversing the CA situation. This decision is exclusive of the doctor who attends the CA and is not related to any type of protocol or agreement with the hospitals of destination.

All cases included correspond to patients rejected for asystolic donation. The asystolia donation program is agreed with two reference hospitals. The criterion of inclusion of patients in this donation program is delimited by the hospital area of coverage of both centers, the patient's profile and the characteristics of the CA itself. Adjusted to defined criteria, the doctor who attends the CA, after discarding in situ the possibility of recovery of the patient and before starting the transfer, should contact the hospital transplant coordinator. Once accepted, the manoeuvres are continued with orotracheal intubation (OTI), if it had not been performed, and chest compressions using external massage devices[16]. If the patient is not accepted, the resuscitation manoeuvres cease. These cases are identified with a specific code that excludes them from any other subgroup of the final result of resuscitation (in situ deaths, spontaneous pulse recovery, donation in asystole and resuscitation in progress).

The variables related to outpatient care (age, sex, time and place of the CA, if it was witnessed and by whom, the reason for the call, hours of hospitalization, were collected from the IS and the consultation of the digitalized medical records), call and arrival of ET, aetiology of CA, initial rhythm, performance of life support prior to the arrival of ET, OTI and if the patient was included in a donation program in asystole). The main result variable was to arrive in a situation of ongoing resuscitation to the hospital (it implies maintaining advanced life support during the ambulance transfer: chest compressions, ventilations and drugs), and the secondary one was survival at discharge, including neurological status of the patient, collected according to the Cerebral Performance Scale Categories[15] (CPC, CPC1 recovery ad integrum, CPC2 mild-moderate disability that does not prevent an autonomous life, CPC3 severe disability, CPC4 vegetative coma, CPC5 death). The definition of the variables during the period studied follows the Utstein model[16]. The follow-up to the hospital discharge of the patients was done by accessing the unified digital history of the Andalusian Health Service and by means of a standardized telephone survey, centralized for all of Andalusia, from an EPES coordination centre, in case of not finding data in the digital history.

The quantitative variables were described by measures of central tendency and measures of dispersion, and qualitative variables, by means of absolute and relative frequency distribution. A univariate analysis was performed to evaluate the association of the independent va-

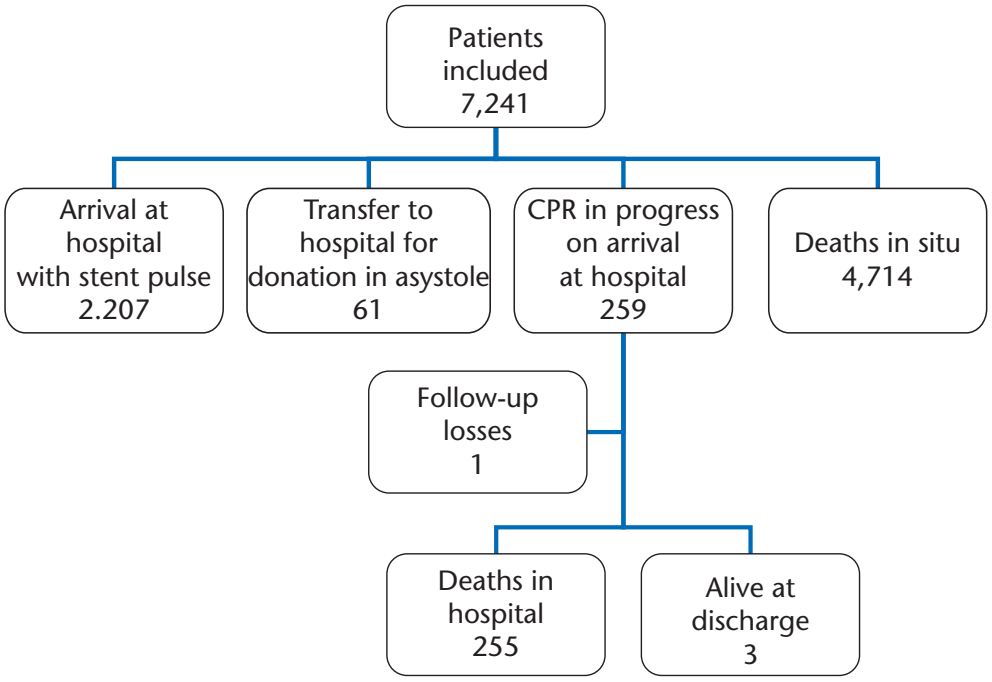

Figure 1. Diagrama de flujo de pacientes incluidos en el estudio. RCP: reanimación cardiopulmonar; CPC: Cerebral Perfomance Categories.

riables and the possibility of reaching the hospital in a situation of ongoing resuscitation. For the quantitative variables, a comparison of means was carried out applying the Student t test, after verifying criteria of normality in the distribution of the variables with the Kolmogorov-Smirnov test. In the case of the qualitative variables, the contingency tables were obtained and the Chi-square test, the Fisher's test, and the associated odds ratio were calculated. A multivariable logistic regression analysis was carried out to find the variables independently associated with the outcome variable: arrive in a situation of ongoing resuscitation to the hospital. We included in the model those independent variables that had a value of $p < 0.1$ in the univariate analysis. The odds ratio and the respective 95% confidence intervals are included. The value of $p < 0.05$ was considered statistically significant. Following the latest recommendations on the Utstein style, in order to facilitate CPR results, the analyses were performed for all of the included patients and in the subgroup of patients whose CA was not seen by the ET[17]. For the analysis of the data used the package statistical Statistical Package for the Social Sciences (SPSS), version 18.0.

Results

During the period analysed, advanced life support (ALS) manoeuvres were performed on 7,241 patients in a situation of cardiac arrest. Of the total, 2,207 (30.5%) patients were transferred with spontaneous pulse to the hospital, 4,714 (65.1%) cases were certified as deceased in the scenario and 61 (0.8%) cases were included in the donation program in asystole. Among the 259 (3.6%) patients without indication of inclusion in the asystole donation program who underwent CPR in progress, 3 (1.1%) patients survived the hospital discharge, of which 1 had recovery integrum (CPC1) and 2 had severe neurological sequelae (CPC3-4) (Figure 1). With regard to the group of patients who received CPR in course, the average age was 51.6 (SD 23.6) years, 27 (10.4%) cases had ≤ 16 years, and 187 (72.2%) were men. One hundred seventy-eight CA (68.7%) were attended outside the home and 209 CA (80.7%) were seen, of which 128 (49.4%) were by own ET (Table 1).

In the univariate analysis, comparing patients who died in situ with patients who received CPR in progress, they had a lower average age (51.6 years vs. 60.9 years; $p < 0.001$), with a higher percentage of patients with 16 years or less (limit of paediatric age in Spain) (10.4% vs 1.8%, $p < 0.001$). Ongoing CPR was more frequent in cases with a different or unconscious cause of suspicion or CA (45.9% vs. 30.7%, $p < 0.001$) and when the CA occurred outside the home (68, 7% vs 40.1%, $p < 0.001$). There was a higher percentage of CA observed (80.7% vs 69.2%, $p <0.001$), including that seen by the ET itself (49.4% vs 12.2%, $p < 0.001$) and was estimated with A noncardiac cause of CA was greater frequency (31.7% vs 17.5%, $p < 0.001$), with an initial shockable rhythm (18.5% vs 13.5%, $p = 0.021$). More IOT was performed (90.7% vs 82.6%, $p <0.001$) and they received less life support before the arrival of ET (28.6% vs 51.9%, $p <0.001$) (Table 1). After the multivariate analysis, the independent factors associated with receiving CPR in progress were: age ≤ 16 years, CA observed, CA outside the home and non-car-

Table 1. Characteristics of cases included in the study as a whole and based on ongoing resuscitation

Variables	Total N = 4,973 n (%)	Deceases N = 4,714 n (%)	CPR in progress N = 259 n (%)	Value of p
Age in years (n= 4962) [mean (SD)]	60.4 (17.6)	60.9 (17.0)	51.6 (23.6)	< 0.001
Age ≤ 16 years old	114 (2.3)	87 (1.8)	27 (10.4)	< 0.001
Sex (n=4972)				0.869
Male	3,612 (72.6)	3,425 (72.7)	187 (72.2)	
Female	1,360 (27.4)	1,288 (27.3)	72 (27.8)	
Reason for the call (n= 4969)				< 0.001
Unconscious/ Suspected CA	3,405 (68.5)	3,265 (69.3)	140 (54.1)	
Others	1,564 (31.5)	1,445 (30.7)	119 (45.9)	
Thoracic pain	288 (18.4)	264 (18.3)	24 (20.2)	
Dyspnea	537 (34.3)	508 (35.2)	29 (24.4)	
Dizziness/Malaise	88 (5.6)	86 (5.9)	2 (1.7)	
Traumatic accident	167 (10.7)	142 (9.8)	25 (21.0)	
Others	484 (30.9)	445 (30.8)	39 (32.8)	
Witnessed CA (n= 4973)				< 0.001
No	1,503 (30.2)	1,453 (30.8)	50 (19.3)	
Yes	3,470 (69.8)	3,261 (69.2)	209 (80.7)	
Witness	2,264 (65.2)	2,200 (67.5)	64 (30.6)	
Public services' staff	51 (1.5)	51 (1.6)	0 (0)	
Emergency team	701 (20.2)	573 (17.6)	128 (61.2)	
Other health staff	454 (13.1)	437 (13.4)	17 (8.1)	
CA witnessed by the emergency team (n= 4973)				< 0.001
Yes	701 (14.1)	573 (12.2)	128 (49.4)	
No	4,272 (85.9)	4,141 (87.8)	131 (50.6)	
Place of the CA (n= 4973)				< 0.001
At home	2,904 (58.4)	2,823 (59.9)	81 (31.3)	
No at home	2,069 (41.6)	1,891 (40.1)	178 (68.7)	
Street	750 (36.2)	678 (35.8)	72 (40.4)	
At work	91 (4.4)	86 (4.5)	5 (2.8)	
Public place	484 (23.4)	455 (24.1)	29 (16.3)	
Assisted care home	63 (3.0)	63 (3.3)	0 (0)	
Out-of-hospital health center	282 (13.6)	271 (14.3)	11 (6.2)	
Mobile ICU	92 (4.4)	48 (2.5)	44 (24.7)	
Other	129 (6.2)	121 (6.4)	8 (4.5)	
Unknown	178 (8.6)	169 (8.9)	9 (5.1)	
Interval call - arrival of the emergency team (n = 4,831)				0.559
≤ 8 minutes	1,143 (23.7)	1,081 (23.6)	62 (25.2)	
> 8 minutes	3,588 (76.3)	3,504 (76.4)	184 (74.8)	
Etiology of the CA (n = 4,966)				< 0.001
Cardiac	4,061 (81.8)	3,884 (82.5)	177 (68.3)	
No cardiac	905 (18.2)	823 (17.5)	82 (31.7)	
Neurological	107 (11.3)	96 (11.7)	11 (13.4)	
Respiratory	233 (25.7)	218 (26.5)	15 (18.3)	
Traumatology	373 (41.2)	326 (39.6)	47 (57.3)	
Toxicological - Pharmacological	74 (8.2)	71 (8.6)	3 (3.7)	
Drowning	50 (5.5)	47 (5.7)	3 (3.7)	
Others	68 (7.5)	65 (7.9)	3 (3.7)	
Initial rhythm (n = 4,973)				0.021
Shockable (VF-VT without pulse)	682 (13.7)	634 (13.5)	48 (18.5)	
Non-shockable	4,291 (86.3)	4,080 (86.5)	211 (81.5)	
Asystolia	3,612 (84.2)	3,493 (85.6)	119 (56.4)	
Pulse-free electrical activity	449 (10.5)	397 (9.7)	52 (24.6)	
Extreme bradycardia	177 (4.1)	145 (3.5)	32 (15.2)	
Others	53 (1.2)	45 (1.1)	8 (3.8)	
Life support prior to the arrival of the emergency team (n = 4,973)				< 0.001
Yes	2,510 (50.5)	2,436 (51.9)	74 (28.6)	
No	2,463 (49.5)	2,278 (48.3)	185 (71.4)	
Orotracheal intubation (n = 4,961)				0.001
Yes	4,119 (83.0)	3,884 (82.6)	235 (90.7)	
No	842 (17.0)	818 (17.4)	24 (9.3)	
Status at discharge (n = 269)				No calculable
CPC_{1-2}	1 (0.4)	0 (0)	1 (0.4)	
CPC_3	1 (0.4)	0 (0)	1 (0.4)	
CPC_4	1 (0.4)	0 (0)	1 (0.4)	
Deaths	266 (98.9)	13 (100)	253 (98.8)	

CA: cardiac arrest; VF: ventricular fibrillation; VT: ventricular tachycardia; CPC_{1-2}: good neurological status; CPC_3: severe disability; CPC_4: vegetative coma.

Table 2. Univariate and multivariate analysis of the factors associated with receiving cardiopulmonary resuscitation in progress (n = 4,973)

Variables	Univariable		Multivariable*	
	OR (CI95%)	p Value	OR (CI95%)	p Value
Age ≤ 16 years old	6.18 (3.93; 9.70)	< 0.001	6.48 (3.91; 10.76)	< 0.001
Sex: Female	1.02 (0.77; 1.35)	0.869		
Reason for the call: Not unconscious/Suspected CA	1.92 (1.49; 2.47)	< 0.001		
Witnessed CA	1.86 (1.36; 2.55)	< 0.001	1.6 (1.16; 2.26)	0.004
Place of the CA: Out of home	3.28 (2.51; 4.29)	< 0.001	3.17 (2.38; 4.21)	< 0.001
Interval call-arrival of the emergency team ≤ 8 minutes	1.09 (0.81; 1.47)	0.559		
Non-cardiac etiology of CA	2.19 (1.67;2.87)	< 0.001	1.47 (1.07; 2.02)	0.019
Initial shockable rhythm (pulseless VF-VT)	1.46 (1.06; 2.03)	0.021	1.67 (1.18; 2.37)	0.004
Without emergency life support previous to emergency team	2.67 (2.03; 3.52)	< 0.001	3.48 (2.58; 4.70)	< 0.001
Orotracheal intubation	2.06 (1.35; 3.16)	0.001	1.93 (1.25; 2.99)	0.003

OR: odds ratio; CA: cardiac arrest; ET: emergency team; VF: ventricular fibrillation; VT: ventricular tachycardia. * The variables age, sex and those variables that in the univariate analysis have a value of p < 0.1 have been included.

diac etiology, initial rhythm shockable and there was life support prior to the arrival of ET, and OTI (Table 2).

When CA was not seen by the ET, in 4,272 (85.9%) cases, the initial rhythm was shockable in 23.7% and those under 17 years of age reached 16.9% of the total. In the multivariate analysis in this group of cases, the independent factors that were associated with receiving CPR in progress were: age ≤ 16 years, CA at home, initial shockable rhythm and OTI (Table 3).

Discussion

The transfer of patients undergoing CPR in progress by ET with a doctor on board represents a small percentage of the total number of resuscitations performed and much lower than that reported for services that exclusively employ paramedics. Only 3.6% compared to percentages that exceed 40% of the CAs served by other HES[7-9]. This is a very significant finding, especially considering that this subgroup of patients with ongoing CPR has poor survival results in those same series, even in the face of prolonged efforts once the hospital emergency department has been reached[7-9,18]. In addition, it is a fact to take into account considering the increasingly frequent use of automatic devices to perform chest compressions during resuscitation. These devices can be used during transport, minimizing the quality problems of massage administered "on the go"[19] and can, indirectly, favour this ongoing CPR strategy.

In our study, a total of 259 patients were transferred in this way. Among the factors associated with the transfer of CPR in progress by ET, the age of the patient, the place where the CA occurred, and which was witnessed, especially when it occurred in the presence of ET, were highlighted. It affected the youngest patients, especially in paediatric age, although the CA was not witnessed by the ET. It is likely that this situation, which far exceeds what happens with adults, is related to the known difficulty in deciding on the ground the cessation of resuscitation in children[20], despite the limited results obtained[21]. Another prominent element was that the event occurred outside the home, where the pressure of the environment and the relative legal difficulties facing a corpse in the street could condition the doctor's decision. The association with the fact that CA was present, especially when it is the ET itself, also has clinical logic. That CA occurs in the presence of an ET is a well-known factor of good prognosis[22]. In addition, when an ET is present in a CA, regardless of whether or not a doctor is on board, resuscitations, even if they are unsuccessful, tend to be longer[23]. Another outstanding aspect that was associated with ongoing CPR was the presence of an initial shockable rhythm. It seems reasonable that the efforts, the failure to terminate the resuscitation and even the investigation of other possible strategies are focused on a subgroup of patients who

Table 3. Univariate and multivariate analysis of the factors associated with receiving resuscitation in progress in patients whose stop was not witnessed by the emergency team (n = 4,272)

Variables	Univariable		Multivariable*	
	OR (CI 95%)	p Value	OR (CI95%)	p Value
Age ≤ 16 years old	10.22 (6.15; 17.00)	< 0.001	8.5 (4.89; 14.84)	< 0.001
Sex: Female	1.05 (0.71; 1.55)	0.797		
Reason for the call: Not unconscious/Suspected CA	1.05 (0.71; 1.56)	0.805		
Witnessed CA	0.88 (0.61; 1.25)	0.468		
Place of the CA: Out of home	2.91 (2.02; 4.19)	< 0.001	2.26 (1.55; 3.31)	< 0.001
Interval call-arrival of the emergency team ≤ 8 minutes	1.04 (0.69; 1.57)	0.848		
Non-cardiac etiology of CA	1.56 (1.02; 2.37)	0.04		
Initial shockable rhythm (pulseless VF-VT)	2.27 (1.52; 3.37)	< 0.001	2.36 (1.54; 3.60)	< 0.001
Without emergency life support previous to emergency team	1.13 (0.79; 1.60)	0.503		
Orotracheal intubation	6.71 (2.47; 18.20)	< 0.001	5.69 (2.09; 15.53)	0.001

OR: odds ratio; CA: cardiac arrest; ET: emergency team; VF: ventricular fibrillation; VT: ventricular tachycardia. * The variables age, sex and those variables that in the univariate analysis have a value of p < 0.1 have been included.

have a priori better prognosis[24]. In fact, it is possible that in the future some of these patients, with CA of possible cardiac etiology and refractory ventricular fibrillation, benefit from more aggressive strategies, such as ECMO (extracorporeal membrane oxygenation) supported by early angiography[25-27]. An unexpected fact, difficult to interpret, is the association with a lower percentage of application of previous life support by witnesses. However, this association is shown in the total series but it was not maintained when the CAs witnessed by ET were excluded. The last associated factor, the intubation of the patients, responds to a clinical logic that has to do with maximizing the measures recommended in the ALS.

In any case, the most relevant was the final result, in which really only one patient benefited from this ongoing CPR strategy. This patient was a 65-year-old man, with a CA seen in the street, with a cardiac cause and initial shockable rhythm, who recovered a spontaneous pulse after ALS, and who underwent two new episodes of CA during the transfer and was admitted to a CPR situation in progress. During the hospital admission, urgent coronary intervention and hypothermia were performed. It was a case that offers little doubt about the decision to continue resuscitation during the transfer, but that represents a 0.38% success over the total. A really insufficient percentage, which offers a minimum option for patient survival, less than 1%, a percentage that can be considered a limit of futility below which a specific strategy should not be recommended[28,29].

Currently, there is an important debate on how to proceed with patients who fail to return to spontaneous circulation during resuscitation, the largest group of patients on the other hand. In a recent paper, Jabre et al[30] explored some key criteria for the early identification, in the field, of patients with no real possibility of survival and their possible consideration for an asystole donation program. Patients who do not recover pulse during out-of-hospital resuscitation have little chance of survival. Taking into account the consumption of time, resources and, above all, the expectations of families, the transfer with CPR in progress of patients with no chance of survival should be avoided.

There are notable limitations in our study. The data comes from the retrospective analysis of a record, with the loss of information specific to this design. On the other hand, the inclusion of each case does not depend on protocolized criteria, but on the personalized decision of each doctor in each assistance. This prevents knowing other concrete reasons, beyond the variables analysed, which could have influenced the decision making. Finally, all the activity comes from a single MES, which could be a limitation in the interpretation and external validation of its results. However, the recent publication of data from the Spanish registry of out-of-hospital CA, in which all the Spanish MES participated, all of them with doctor on board, showed superimposable results in the cohort of patients who were transferred with CPR in progress. Some results that support the futility of this strategy[31].

Despite these limitations, this study allows us to conclude that ongoing CPR performed by ET with a physician on board is a rare strategy. It is conditioned by the youth of the patient, that the CA happens outside the home, be witnessed, fundamentally for the ET, no life support is present, the initial rhythm is shockable, the etiology is not cardiac and OTI is achieved. The poor results in terms of survival with good neurological situation make it a futile treatment, so it should be avoided except in the case of very specific patients or in the context of asystole donation programs.

Conflicting interests

The authors declare no conflict of interest in relation to this article.

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Ethical Responsibilities

The study was approved by the Research Ethics Committee of the Public Company of Health Emergencies of Andalusia (EPES).

All authors have confirmed the maintenance of confidentiality and respect for the rights of patients in the author's responsibilities document, publication agreement and assignment of rights to EMERGENCIES.

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