ORIGINAL ARTICLE

Prehospital management of patients with chest pain by 3 mobile intensive care units

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Objectives: Few studies have examined management by of patients with chest pain mobile intensive care units in rural areas. We sought to establish the characteristics of patients attended; analyze the ability of mobile intensive care units to resolve the emergency; and assess the application of recommendations, appropriateness of transfer destinations, and agreement with diagnoses made in the hospital emergency department.

Methods: Retrospective observational study of chest pain emergencies attended by the mobile intensive care units of the Guadalquivir health care district in Cordoba, Spain, between June 2009 and June 2010. We reviewed emergency care reports from the mobile units and the computerized medical history for each patient, collecting general patient data and cardiovascular risk factors. The following emergency care variables were collected: time until arrival on the scene of the emergency and time from the emergency scene until arrival at the hospital, probability of ischemic heart disease, diagnosis, treatments, referrals and transfer decisions, and unit providing transport. The following information regarding resolution of the emergency was also recorded: destination after evaluation in the hospital emergency department, diagnostic agreement, application of fibrinolysis, and subsequent events in patients not referred for further care.

Results: A total of 278 cases were attended; the mean age was 72.12 years, and 55% were men. Women were older, the prevalence of arterial hypertension was higher in women, and fewer were smokers. Time until provision of emergency care was 9.7 minutes and time until arrival at a hospital emergency department was 93.1 minutes. Low probability of ischemic heart disease was recorded for 59.7%; 83.2% were resolved in the home, and 3.6% of these patients later experienced a coronary event. High probability of ischemic heart disease was recorded for 40.3%; this evaluation was associated with younger age, diabetes, smoking, and number of cardiovascular risk factors. General measures were implemented in over 90% of the cases; nitroglycerin was administered in 83.9%, morphine in 27.7%, and acetylsalicylic acid in 74.1%. Fewer patients received clopidogrel (23.9%) or heparin (17.4%), although use of these drugs improved during the study period. Chest pain unrelated to ischemic heart disease was diagnosed in 47.1%, nonspecific chest pain in 26%, and ischemic chest pain in 26.7%. The mobile unit's diagnosis and the hospital emergency department's were in agreement in 75.3% overall, and in 100% of cases of acute coronary syndrome with ST-segment elevation and high-risk acute myocardial infarction. Hospital admission was ordered in 71.2%. Fibrinolysis was initiated in 40.6% of cases of acute coronary syndrome with ST-segment elevation.

Conclusions: In spite of the wide geographic distribution of cases and advanced age of these rural patients, the mobile intensive care units provided quality care in responding to reports of chest pain. The mobile units were able to resolve many cases and provide a diagnosis. They followed treatment guidelines, but areas for improvement have been identified. [Emergencias 2013;25:13-22]

Keywords: Chest pain. Emergency care, prehospital. Acute coronary syndrome.

Introduction

Diseases of the circulatory system are the leading cause of mortality in Western countries, and a major one is ischemic coronary heart disease (CHD), which justifies research in this area, especially taking into account that the highest mortality occurs before reaching a hospital[1]. The Compre-

hensive Care Plan of heart disease in Andalusia (PICA) 2005-2009[2] established a framework to identify and articulate appropriate interventions in patient attention, training and research. At the same time, it posited redesigning the traditional care model centered on episodes towards a model of attending chronic processes. This involves analyzing the actions performed from initial demand for attendance until the end of the process and then define the recommended actions at each level of care, according to scientific evidence.

Concerning chest pain (CP), six care processes have been published: generic CP[3], stable angina (SA)[4], unstable angina (UA) / non- ST elevation acute coronary syndrome (NSTEACS)[5]; ST elevation acute coronary syndrome[6] (STEACS), acute aortic syndrome[7] (AAS) and pulmonary thromboembolism (PTE). They include recommendations that aim to reduce variability of the actions of the professionals at each level of care.

The evaluation of patients presenting CP is a major challenge for hospital emergency departments (ED). According to various publications[9-11], there is a group of patients with high probability of having ACS judged by clinical symptoms, electrocardiogram (ECG) or enzyme elevation, and a second group with very low risk of having ACS because of young age, atypical pain, physical examination and normal ECG. Then there is a third group with low-intermediate risk, which accounts for half the patients treated, where a combination of clinical factors and laboratory tests are needed to reach a diagnosis[9]. The medical history and type of pain are not reliable indicators of ACS[12]. The same applies to the ECG[13]. In the case of out-of-hospital care, the challenge is even greater given the lack of complementary tests.

Early and correct diagnosis is essential for patient management and taking subsequent decisions, and sometimes determines patient prognosis[14-16]. There is no standardized way to objectively express the quality of diagnoses made in the ED[17], although one of the parameters used is concordance between ED diagnosis and that made on hospitalization[15]; this not only allows assessing the quality of care provided but also favors evaluation of physician diagnostic capacity[15,16]. This may apply to mobile emergency teams (MET), comparing their diagnoses with those made in the ED as the reference, but using the latter as the gold standard could sometimes be erroneous[17].

In general, few studies have been carried out in Spain relating to the assessment and management of CP in the out-of-hospital setting. Some recent work has collected data on the clinical and epidemiological characteristics of these patients, and on the measures employed[18-22]. Regarding diagnostic concordance, most of the relevant studies[15-17,23] were performed in the ED and one referred to non-traumatic CP[24], while in the out-of-hospital setting we found one concordance study with ED diagnoses in patients with CP[14], along with some references to the issue in work with broader objectives[20].

In the generic CP process[3], the objective of initial evaluation (directed anamnesis, physical examination and ECG) is to obtain initial risk stratification of the patient, considering the most serious potential diseases: CHD (SA, UA / NSTEACS, STEACS), AAS and PTE. Faced with CP and suspicion of any of these diseases, ten general measures are recommended[1,18,19,22,25]: monitoring, a nearby defibrillator, rest, venous blood collection, avoid intramuscular (im) injections, pulse oximetry, oxygen, analgesia with sublingual nitroglycerin (NTG sl) and / or morphine, consider sedation and aspirin (except when AAS is suspected). Refer potentially serious CP or CP of uncertain origin to hospital, by medicalized or conventional ambulance according to whether the situation is considered life-threatening or not.

In cases of stable angina[4], clinical evaluation should be widened to rule out UA / ACS, and then the patient should be referred to a family physician, and in cases with pain, NTG sl and acetylsalicylic acid (ASA) should be prescribed. In cases of UA/NSTEACS[5] and STEACS[6], in addition to the general measures, consider the administration of NTG (iv) together with morphine or meperidine iv until pain relief is achieved; beta blockers (BB) iv in cases of persistent pain, with ECG changes and hyperadrenergic state and no contraindications, and dual antiplatelet therapy (aspirin + clopidogrel) in moderate to high risk UA / NSTEACS and STEACS, accompanied by low molecular weight heparin (LMWH). Pre-hospital fibrinolysis, available on our critical care and emergency ambulances (DCCU) since September 2011, is indicated in STEACS classified as priority ARIAM I6 (pain typically lasting >30 minutes and <6 hours which does not respond to NTG, <75 years without contraindications, ST elevation >2 mm in at least 2 leads, systolic blood pressure >100 or diastolic BP <100 mmHg, heart rate >50 bpm without atrioventricular block or bradycardia or tachycardia). The transfer to hospital, in both processes, involves being attended by skilled health personnel.

The aims of the present work were to determine the epidemiological profile and cardiovascular risk factors (CVRF) of patients seen for CP; as-

sess whether treatment was as indicated in the different processes; assess whether CP with a high probability of ACS was identified and treated according to the recommended measures, and whether hospital referral was performed adequately; and to assess diagnostic concordance (pre-hospital vs hospital diagnoses) and what treatment was applied.

Method

The Guadalquivir Health District (Córdoba) has three emergency ambulances staffed by a doctor, a nurse and technician, responsible for emergency assistance between 8:00 and 20:00 hours. Activation of this service, by users or physicians, is made through the emergency coordination center (CCUE). The reference ED is that of the Reina Sofia University Hospital of Cordoba.

The Montoro emergency ambulance team serves a population of 46,633 inhabitants in the basic health zone (ZBS) of Montoro (at 37-55 km from the ED) and Bujalance ZBS (29-68 km). The Carlota emergency ambulance team serves a population of 44,181 inhabitants in the ZBS of Charlotte (21-35 km), Fuente Palmera (53 -68 km) and part of Posadas (17-32 km). Finally, the Palma del Río emergency ambulance team serves a population of 29,795 inhabitants in the ZBS of Palma del Rio and part of Posadas (50-58 km).

We performed a retrospective observational study based on a review of the medical records of each DCCU between 1 June 2009 and 1 June 2010, completed with computerized records (Program "Diraya"), from the ED, health centers and data provided by the coronary unit of the intensive care unit (ICU), Reina Sofia Hospital, on the performance of fibrinolysis.

We included all paper records containing the following: CP, sternal pain, precordial pain, angina, angina pectoris, SA, UA, AMI, ACS, PTE or AAS. We excluded patients without a medical record, or with incomplete information. Variables included were:

– Social security number, age (grouped as in other studies[20]) and gender.

– CVRF: history of ACS, dyslipidemia, hypertension (HTN), diabetes (DM) and smoking status (current and ex-smoker >1 year). Obesity and physical inactivity were excluded since these data were not recorded in numerous cases.

– Probability of ACS / AAS / PTE. Finding no cases labeled AAS or PTE, this variable equals "likely ACS": a) high probability: cases with a MET (pre-hospital) diagnosis of SA, UA / NSTEACS and STEACS, and those cases administered ASA and / or NTG, and those patients transferred to hospital by a medicalized ambulance, b) low probability: non-classified CP and non-ischemic

CP not included in the previous section.

– DCCU Diagnosis: a) CP of unknown etiology (specified as such, and cases diagnosed with precordial or generic chest pain), b) SA, c) UA / NSTEACS, d) STEACS e) AAS f) PTE, and g) non-ischemic CP (ACS ruled out by the MET, for anxiety, "musculoskeletal CP", atypical CP, respiratory infection, etc.).

– Referral: a) home; b) to a family doctor; c) to the ED, d) to the ED for other reasons (not ACS, AAS or PTE, but another, such as an arrhythmia control, possible pneumonia, etc.), and e) voluntary discharge.

– Transfer by: a) conventional ambulance; b) medicalized ambulance (DCCU); c) regional health service (EPES) helicopter; d) transfer of EPES EM, and e) private means.

– General measures: assessed in cases with high probability of ACS. Sedation not included since this was not recorded in numerous cases. For the rest, only the performance of an ECG was considered.

– Additional treatments: benzodiazepine, clopidogrel, heparin, LMWH, beta blockers and NTG iv in cases with high probability of ACS.

– ARIAM I: STEACS meeting all the priority requirements[16].

– Fibrinolysis: a) not administered; b) administered by out-of-hospital (EPES) emergency team and c) administered in the ED.

– Coronary event within 2 months: in cases with a low probability of ACS not transferred to hospital, we ascertained whether they had suffered an episode of SA, UA / NSTEACS or STEACS.

– Diagnostic concordance: considered concordant when MET and ED diagnoses were literally the same (for SA, UA / NSTEACS,STEACS, PTE, AAS, atrial fibrillation, respiratory infection, etc.). MET diagnoses of atypical / non-ischemic CP were considered concordant if the ED diagnoses included non-ischemic causes (musculoskeletal, pleuritic, anxiety, etc..). In CP of unknown etiology, concordance was considered after serial enzyme analysis of myocardial damage performed in the ED.

– Decision taken in the ED: a) discharge; b) observation; c) cardiology department; d) ICU, or e) internal medicine department.

– Deaths from any cause occurring during MET attendance or DCCU transfer or during hospitalization.

– Arrhythmias: a) tachycardia and ventricular fibrillation (VT / VF) in the context of ACS; b) tachyarrhythmias; or c) CP due to bradyarrhythmias without ACS.

– DCCU: the ambulance (Montoro, La Carlota or Palma) and date of attendance by the MET.

– The values of "time to attendance" (from MET activation until the start of attendance) and "time-to-ED" (from MET activation to ED arrival) were obtained differently from other variables. Each MET is activated by calls from the coordinating center on a mobile device with a database with different menus (age, priority, sex, location, referral, diagnosis, etc.) which are completed by the ambulance staff for each call, along with 3 buttons which, when pressed, record the time and one of three options: "activation", "on the scene" and "terminated". For the measurement of "time to attendance" we considered all the cases attended, while for "time-to-ED" we obviously only considered those referred to hospital.

All statistical analysis was performed using SPSS 17.0 software. For quantitative variables we used absolute frequencies and percentages, and for the qualitative variables we used measures of central tendency. Chi square test was used to compare categorical variables and Student's t test was used for quantitative variables.

Results

Data were collected from 305 cases, of which 27 were excluded due to missing information. Of the remaining total of 278: 136 were from Montoro, 69 from Carlota and 73 from Palma del Río. Mean age was 72 ± 14 years. The largest age group (39.2%) was that aged 75-84 years. Men predominated over women, and the latter showed significantly higher mean age and hypertension; there were proportionally fewer smokers amongst the women patients (Table 1).

Figure 1 shows the flow chart of the study patients. Table 2 shows that the group of patients with high probability of ACS were younger and had higher prevalence of all cardiovascular risk factors, significantly so for DM and smoking status. The higher the number of CVRF, the higher the number of cases with high probability of ACS. The mean time to attendance was 9.7 ± 9.2 minutes and mean time to ED arrival was 93.1 ± 62.2 minutes.

The most frequent DCCU diagnosis was non-ischemic CP: 131 (47.1%), followed by CP of unknown etiology: 72 (26%); UA / NSTEACS 37 (13.3%); STEACS 26 (9.3%), and SA 11 (4%). There were no cases of PTE or AAS.

Of the 158 patients referred to the ED (56.8% of the total), there was diagnostic agreement in 119 (75.3%) cases, which was high for SA and non-ischemic CP (100% and 90.9% respectively), moderate for CP of unknown etiology and STEACS (79.7% and 76.9%) and low for UA / NSTEACS (54.1%). The only variable significantly related to concordance was the reason for referral to the ED: 71.2% of CP cases were transferred to the ED in order to rule out ACS, AAS or PTE and 87.5% were transferred for other reasons (P <0.05), with high concordance for tachyarrhythmias (92.9%) and bradycardia (80%).

After ED assessment, the most common outcome was discharge home (29.3%), followed by admission to the observation unit (26.7%), cardiology (21.7%), ICU (14.7%) and internal medicine (7.7%). Table 3 shows the outcome of ED assessment according to each diagnosis.

Regarding the presence of arrhythmias, there were no cases of VT / VF secondary to ACS. By contrast, arrhythmia without ACS as a cause of CP was frequently found. 43 cases (15.5%) had tachyarrhythmia, 15 (34.9%) resolved at home and the rest were transferred to the ED [13 discharged (46.4%), 9 observation (32.1%), 2 cardiology (7.1%) and 1 ICU (3.6%)]. In 8 cases (2.9%) there was bradyarrhythmia: 3 (37.5%) resolved at home and the rest were transferred to the ED (80% cardiology and 20% observation).

There were two hospital deaths for extra-cardiac reasons and one out-of-hospital death (78 year old patient found in asystole who could not be revived, with ACS as a possible cause).

In the analysis of episodes with low probability of ACS, ECG was performed in 151 (91.5%). As Figure 1 shows, they account for 59.7% of the total; 83.2% of non-ischemic CP patients were referred home or to a family physician and 16.8% were transferred to the ED (Table 4), largely for

Table 1. Characteristics of chest pain patients attended. Differences between men and women

CVRF	Men N = 153 n (%)	Women N = 125 n (%)	*P* value
Age in years (mean ±SD)	69.1 ±11.4	75.8 ± 11.7	< 0.05
Previous ACS	71 (46.4)	48 (38.4)	NS
Diabetes mellitus	42 (27.5)	39 (31.2)	NS
Dyslipidemia	45 (29.4)	35 (28)	NS
Hypertension	84 (54.9)	86 (68.8)	< 0.05
Smoker	18 (11.8)	4 (3.2)	< 0.05

CVRF: cardiovascular risk factors; SD: standard deviation; ACS: acute coronary syndrome; NS: not significant.

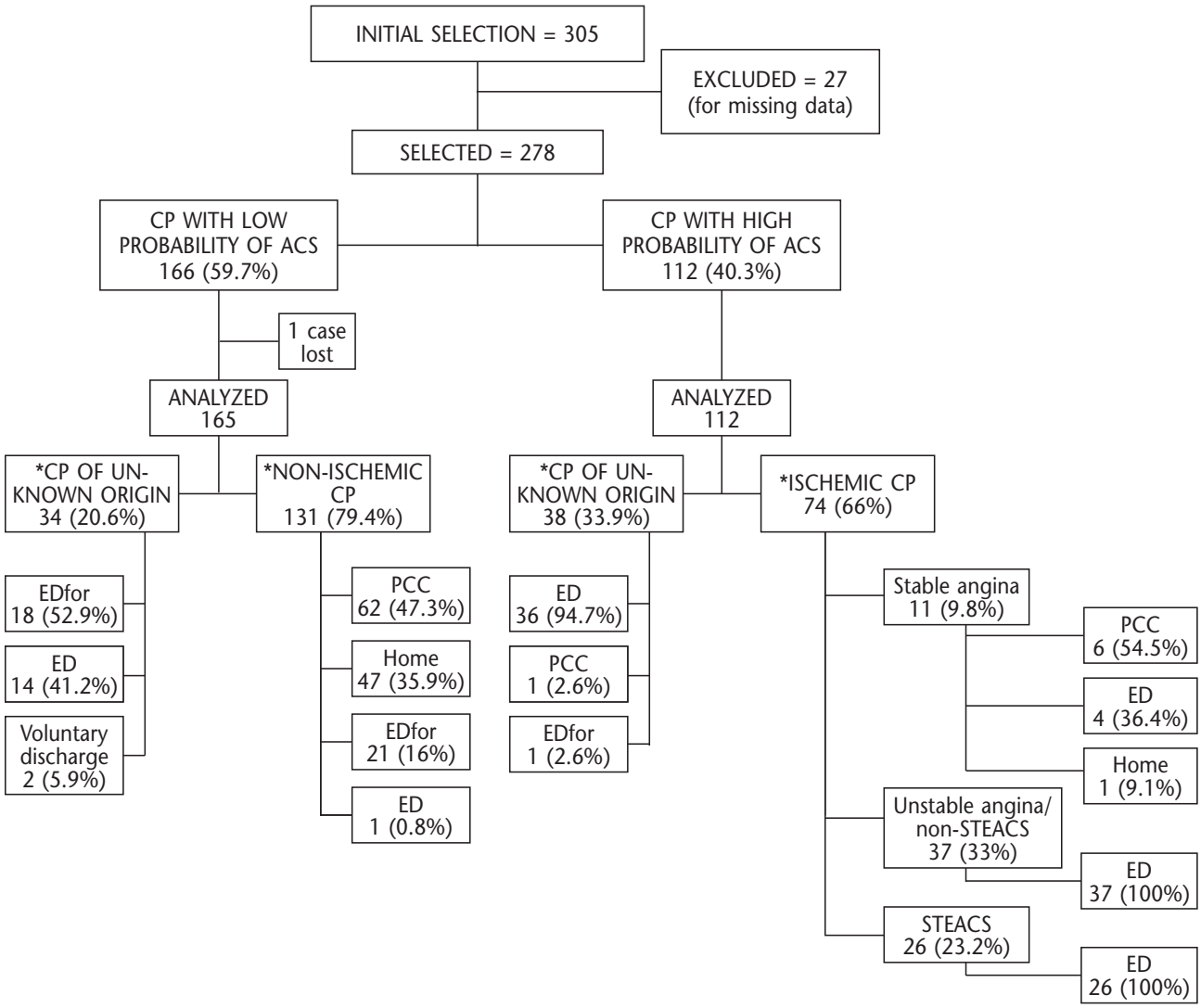

Figure 1. Flow diagram showing patient inclusion. CP: chest pain; ACS: acute coronary syndrome; ED: emergency department; DCCU: critical care and emergency ambulances; STEACS: ST elevation acute coronary syndrome. ED*: single asterisk refers to patients transferred to the ED for CP; EDfor**: double asterisk refers to patients transferred to the ED for other reasons; PCC: primary care center physician.

episodes of hemodynamic angina secondary to tachyarrhythmia (62.5%) or bradyarrhythmia (7.5%). All CP of unknown origin were transferred to the ED. Diagnostic concordance was 83.3% (70.6% La Carlota, 89.3% and Montoro Palma 88.9%).

After ED assessment, the most common destination was discharge home (49.1%), followed by admission to the observation unit (24.5%), internal medicine (15.1%), cardiology (9.4%) and ICU (1.9%).

In patients with low probability of ACS not transferred to hospital (n = 111), 4 (3.6%) suffered a coronary event in the following 2 months. The earliest consulted for stable angina at 20 days. The second was diagnosed with UA at 28 days (2 days after an ED visit). The third case suffered ACS at 32 days. Finally, the fourth case was diagnosed with UA at 50 days (with ED assessment and discharge between the two episodes).

In the analysis of patients with a high probability of ACS, the proportion of the 10 general measures and additional treatments are shown in Table 4. Data on the use of clopidogrel, LMWH and iv NTG are also shown, according to the DCCU diagnosis and MET. Clopidogrel was administered to 18.2% of UA / NSTEACS and 23.1% of STECS in the 2nd half of 2009, and to 26.7% and 84.6% respectively in the first half of 2010. LMWH was administered to 13.6% of UA / NSTEACS and

Table 2. Comparison of patients according to probability of acute coronary syndrome (ACS)

CVRF	High probability CI N = 112 n (%)	Low probability CI N = 166 n (%)	*P* value
Age in years (mean ±SD)	69.0 ± 14.5	74.23 ± 13.7	< 0.05
Previous ACS	52 (46)	67 (40.6)	NS
Diabetes mellitus	41 (36.3)	40 (24.2)	< 0.05
Dyslipidemia	34 (30.1)	46 (27.9)	NS
Hypertension	73 (64.6)	97 (58.8)	NS
Smoker	14 (12.4)	8 (4.8)	< 0.05
Number of CVRF			NS
Any FRCV	12 (26.1)	34 (73.9)	
1 FRCV	28 (41.8)	39 (58.2)	
2 FRCV	33 (37.1)	56 (62.9)	
3 FRCV	26 (46.4)	30 (53.6)	
4 FRCV	10 (58.8)	7 (41.2)	
5 FRCV	3 (100)	0 (0)	
Age groups			< 0.05
< 55 years	25 (55.6)	20 (44.4)	
55-64 years	13 (68.4)	6 (31.6)	
65-74 years	23 (39.7)	35 (60.3)	
75-84 years	42 (38.5)	67 (61.5)	
> 85 years	16 (21.3)	37 (78.7)	

CVRF: cardiovascular risk factors; SD: standard deviation; ACS: acute coronary syndrome; NS: not significant.

15.4% of STEACS in the 2nd half of 2009, and to 20% and 61.5% respectively, in the first half of 2010.

Transfers and mode of transport to hospital are shown in Table 5. The diagnostic concordance in these cases was 71.2%. Of the 22 STEACS with complete information, 12 met criteria for ARIAM Priority I (54.5%), and fibrinolysis was administered in 2 cases by EPES (061) and in another 5 cases in the ED. In these cases, diagnostic agreement was 100%. Two cases of STEACS with ARIAM priority II also received fibrinolysis in the ICU.

Discussion

There is little Spanish literature on the management of CP in the out-of-hospital setting. Studies in Andalusia deal with patient attention either by primary care centers or EPES emergency teams mainly in the large urban areas. The present work is the first to examine DCCU emergency team performance, involving geographically dispersed rural populations far from the reference hospital. The results show appreciable differences in the characteristics of the patients we serve, but also confirm the discriminative "filtering" capability of our teams, good adherence and adaptation to the processes developed by the regional health administration, generally well justified transfers to

Table 4. Analysis of general measures and additional treatments applied

	N (%)
Application of general measures	
ECG and Monitoring	111 (99.1)
Proximity to defibrillator and CPR device	102 (91.1)
Rest	111 (99.1)
Peripheral blood sample	104 (92.9)
Non-intramuscular injection	110 (98.2)
Pulse oximetry	109 (97.3)
Oxygen therapy	98 (88.3)
Consider sedation*	No collected
Nitroglycerin	94 (83.9)
Morphine	31 (27.4)
Aspirin	83 (74.1)
Additional treatments	
Benzodiazepines sL / iv	13 (11.9)
Clopidogrel	26 (23.9)
Nitroglycerin	56 (51.4)
LMWH	19 (17.4)
Beta-blockers	4 (3.7)
Clopidogrel administered according to DCCU and mobile unit diagnosis**	
CP of unknown etiology	–/4 (20)/–
Stable angina	–/–/–
Unstable angina / NTEACS	1 (5.3)/6 (50)/1 (16.7)
STEACS	3 (60)/8 (72.7)/3 (30)
LMWH administered according to DCCU and mobile unit diagnosis**	
CP of unknown etiology	1 (10)/2 (10)/–
Stable angina	–/–/–
Unstable angina / NTEACS	3 (15.8)/1 (8.3)/2 (33.3)
STEACS	4 (80)/4 (36.4)/2 (20)
Nitroglycerin administered according to DCCU and mobile unit diagnosis**	
CP of unknown etiology	3 (30)/5 (25)/1 (12.5)
Stable angina	–/–/–
Unstable angina / NTEACS	11 (57.9)/8 (66.7)/5 (83.3)
STEACS	3 (60)/11 (100)/9 (90)

ECG: electrocardiogram; CPR: cardiopulmonary resuscitation; DCCU: critical care and emergency ambulances, CP: chest pain; sL: sublingual, iv: intravenous; LMWH: low molecular weight heparin. STEACS: ST elevation acute coronary syndrome. *Assess the need for anxiolytic treatment. **La Carlota / Montoro / Palma del Río.

Table 3. Destination of chest pain patients attended in the Emergency Department according to diagnosis

DCCU**	Discharge	ED Observation	Cardiology	ICU	Internal Medicine	Total
CP unknown origin	21 (38.8%)	*23 (42.6%)	5 (9.3%)	1 (1.8%)	4 (7.5%)	54
Non-ischemic CP	*12 (60%)	4 (20%)	1 (5%)	–	3 (15%)	20
Stable angina	1 (25%)	–	*3 (75%)	–	–	4
Unstable angina/Non-STEACS	–	5 (25%)	*12 (60%)	2 (10%)	1 (5%)	20
STEACS	–	–	1 (5%)	*19 (95%)	–	20
TOTAL	**34 (28.8%)**	**32 (27.1%)**	**22 (18.6%)**	**22 (18.6%)**	**8 (6.8%)**	**118**

DCCU: critical care and emergency ambulances; CP: chest pain; STEACS: ST elevation acute coronary syndrome. *Indicates the most frequent destination for each DCCU diagnosis. **Reflects concordant DCCU and ED diagnoses = 118 (75.3% of patients).

Table 5. Transfers to the ED and mode of transfer according to DCCU diagnoses

Transfers					
Cases with low probability of ACS (%)					
	Voluntary discharge	**Home**	**Family Physician**	**ED***	**EDfor****
Non-ischemic CP	–	35.9	47.3	0.8	16
CP unknown origin	5.9	–	–	41.2	52.9
Cases with high probability of ACS (%)					
	Home	**Family Physician**	**ED***	**EDfor****	
CP of unknown etiology	-	2.6	94.7	2.6	
Stable angina	9.1	54.5	36.4	–	
Unstable angina / NTEACS	–	–	100	–	
STEACS	–	–	100	–	
Mode of transfer to hospital					
Cases with low probability of ACS (%)					
	Private means	**Conventional ambulance**	**DCCU**		
Non-ischemic CP	–	33.3	66.7		
CP unknown origin	3.1	59.4	37.5		
Cases with high probability of ACS (%)					
	Conventional ambulance	**DCCU**	**Helicopter**	**EPES EMS**	
CP of unknown etiology	24.3	70.3	5.4	–	
Stable angina	50	50	–	–	
Unstable angina / NTEACS	2.7	94.6	2.7	–	
STEACS	–	80.8	15.4	3.8	

ED: emergency department; DCCU: critical care and emergency ambulances; CP: chest pain; STEACS: ST elevation acute coronary syndrome. EPES EMS: EPES Public health service; EMS: emergency services; ED*: single asterisk refers to patients transferred to the ED for CP; EDfor**: double asterisk refers to patients transferred to the ED for other reasons.

the reference hospital, and high diagnostic reliability achieved only on the basis of anamnesis, physical examination and ECG findings. The study also identified several areas of possible improvement.

The mean age of our CP patients (72 ± 14 years) was approximately 5 years older than that of previous reports[18-20], which may be due to the greater proportion of significantly older women attended in this mostly rural population.

The high prevalence of cardiovascular risk factors in the population of Andalucia is well known[2], but our results for CP patients show figures well above those of previous studies[18], including those conducted in our region (hypertension 42%, DM 22.7%, dyslipidemia 30.4%, ACS 31.8%)[20]. The more aged profile of our population explains these figures.

The DCCU emergency teams were able to discriminate 60% of episodes of CP with low probability of ACS, with a very high degree of reliability, since only 3.6% experienced a coronary event within the following 2 months (none sooner than 2 weeks).

The classification of CP with a high probability of ACS was associated with younger age, presence of DM and smoking, as well as a tendency to have several CVRF. No statistically significant association was found with previous ACS as in other studies[27]. This finding may be partly explained because younger patients, more likely to consult a health center, arrive at DCCU already screened by a family doctor more often than older patients. This implies that patients under 65 years without previous ACS and non-ischemic CP are not reflected in our study. However, this does not fully explain the high percentage of CP with low probability of ACS older than 84 years (78.7%), where the prevalence of previous ACS was 51.1%, so it is possible that this group of patients, or their caregivers, consult more often for non-specific CP. This hypothesis requires confirmation in future investigations, but health education measures may be desirable for these patients and their primary caregivers before the onset of symptoms.

The general measures recommended in the care guidelines for CP3 were complied with in almost 100% of cases. Areas of possible improvement included the administration of ASA, morphine and NTG, although the cases where these were not administered were "CP of unknown origin and SA" with rates of 70%, 50.6% and 61.1% respectively, in addition to cases where these

measures were contraindicated. These data exceed the percentages reported by Aguayo de Hoyos et al.[19] on initial action by EPES emergency teams (ECG 76%; monitoring 61.2%; intravenous line 75.8%, NTG 66.5% and ASA 54.2%) and from different health centers (ECG 46.7%, monitoring 6.4%, intravenous line 19.4%, NTG 65.3% and ASA 23.7%) in patients subsequently admitted to the ICU with a diagnosis of UA or AMI. They also exceed those of Piqué-Gilart et al.[22], who analyzed initial action by several primary care centers in patients then admitted to the ICU with a diagnosis of ACS, before implementing a training plan.

The administration of other recently introduced treatments (2009) by our emergency teams was more erratic: for example, clopidogrel, where the DCCU of Palma team only administered it in 30% of patients with STEACS. Similar data were observed for the use of LMWH in STEACS (<40% Montoro and Palma). In this regard, there was a strong tendency to improvement in the second study period (the first half of 2010), with 84% of STEACS treated with clopidogrel and 60% LMWH. We recommend that our emergency teams should use a risk scale[5,27,32] to define cases of UA / NSTEACS with moderate to high risk that should receive dual antiplatelet therapy and LMWH, and include this in the medical record.

Studies comparing ED diagnoses with the hospital discharge diagnoses have reported concordance rates of 64%[15], 88.1%[16] and 91.8%[17]. Regarding patients with non-traumatic CP, the EVICURE II[24] study with data from 25 hospitals reported a kappa value of 0.57 (concordance 79.2%). Therefore, we consider that the 75.3% diagnostic agreement achieved by our teams was satisfactory, considering the challenges[9,12,18,26,27], i.e. out-of-hospital setting without the availability of additional tests, the advanced age of the target population (which increases the difficulty of making a diagnosis[15]) and taking into account that the final diagnosis is sometimes only possible after an observation period[16,17]. In the only other study of CP patients in the pre-hospital setting[14], a kappa of 0.38 was reported (concordance 61%), which is lower than in our work. Despite this, we need to improve the definition of UA / NSTEACS (54.1%), since they were over-diagnosed. To a lesser extent the same occurred with STEACS (76.9% versus 96.6% Vergel Mellado et al[20]). We found it difficult to identify the variables associated with diagnostic error[15] and further studies are required to analyze this and to establish acceptable limits.

Both the degree of diagnostic concordance and patient risk stratification could be improved using out-of-hospital portable troponin T analyzers; according to some studies[28,29], despite its low sensitivity and excessively early determination, this test is particularly useful in selected cases (those presenting difficulties for clinical and ECG assessment). The hospital transfers made were correct with 71.2% being admitted, and patients who were discharged home underwent previous laboratory tests including myocardial damage enzymes test. Use of the latter may be debatable, since we were unable to assess whether the indication for the enzyme test was correct or not[14].

Fibrinolysis was performed in 40.9% of STEACS cases, versus 56.4% in the study by Vergel Mellado et al.[20]. This difference is partly due to excessive delay in attendance time; mean time to ED arrival was 30 minutes longer in our study than the "symptoms-hospital" time reported in the above-mentioned study (66.3 minutos[20]). However, it should be noted that in our study we measured "activation-hospital" time, so the time interval "symptoms-attendance" should be added. In another study, by Varela López et al.[30] the "symptoms-hospital" interval was 155 minutes.

Delay in administering thrombolysis and a corresponding decrease in effectiveness, attributable to greater distance from the ED, along with the low rate of pre-hospital administration (9% versus 15.2%[20]) probably due to low availability of the EPES (061) resource in our area, justifies implementing a protocol of pre-hospital fibrinolysis. Diagnostic agreement was 100% in possible cases (ARIAM I), representing around 50% of patients with STEACS, so we believe we have sufficient trained personnel available to perform it.

Hospital mortality was 1.8% of those admitted, which is very low compared to the 21% reported by Vergel Mellado et al.[20] or the 9.6% reported by Varela López et al.[30], both referring to ACS. However, our rate is close to the 3% reported by Martinez-Selles et al.[27], whose study is more similar to ours despite its hospital setting, since it included all cases of non-traumatic CP attended. The study has certain limitations, including out-of-hospital mortality, the small sample size, the non-use of a severity scale for ischemic CP and suboptimal completion of medical histories. There is a standardized format for use by the three emergency teams and no quality control was implemented. We found some deficiencies in the section "personal history" within the medical record, with occasional absence of written recording of diseases and almost total lack of information in the elec-

tronic medical record on obesity and sedentary lifestyle (excluded from analysis). We also detected gaps in patient data which hindered the search for these patients in the computerized recording system.

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Manejo extrahospitalario de los pacientes atendidos por dolor torácico en tres dispositivos móviles de cuidados críticos y urgencias

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Objetivos: Existen escasos estudios sobre el manejo del dolor torácico (DT) por los equipos móviles (EM) de emergencias en zonas rurales. Se investiga el perfil de los pacientes atendidos, la capacidad resolutiva de los dispositivos de cuidados críticos y urgencias (DCCU), la aplicación de las medidas recomendadas, la pertinencia de las derivaciones y la concordancia diagnóstica con el servicio de urgencias del hospital (SUH).
Método: Estudio observacional retrospectivo de las asistencias por DT por los DCCU del Distrito Sanitario Guadalquivir (Córdoba), desde junio 2009 hasta junio 2010. Se revisó los informes de asistencia de los EM junto con la historia clínica informatizada de cada paciente, y se recogieron datos demográficos y factores de riesgo cardiovascular (FRCV); variables de la actuación del DCCU (tiempo de asistencia y llegada al SUH, probabilidad de cardiopatía isquémica –CI–, diagnóstico, tratamientos administrados, lugar de derivación, medio de traslado) y datos sobre la resolución del caso (destino tras valoración en el SUH, concordancia diagnóstica, realización de fibrinolisis y eventos posteriores en los pacientes no derivados).
Resultados: De los 278 casos (media 72 años) un 55% eran hombres. Las mujeres eran mayores, con más hipertensión arterial y menos tabaquismo. El tiempo de asistencia fue 9,7 minutos y el de llegada al SUH fue de 93,1. El 59,7% presentó baja probabilidad de CI, y el 83,2% se resolvió en domicilio (3,6% presentó un evento coronario posterior). Un 40,3% se clasificó de alta probabilidad de CI, y se relacionó con una edad menor, presencia de diabetes, tabaquismo y con el número de FRCV. Las medidas generales se realizaron en más del 90% de los casos, salvo la administración de la nitroglicerina (83,9%), mórficos (27,7%) y ácido acetilsalicílico (AAS) (74,1%). Las cifras de uso de clopidogrel (23,9%) fueron menores, y heparina (17,4%), y mejoraron a lo largo del estudio. El 47,1% se diagnosticó de DT no isquémico, el 26% como no filiado y el 26,7% como isquémico. La concordancia fue del 75,3% (en el síndrome coronario agudo con elevación del ST –SCACEST– fue del 100%). El 71,2% fue ingresados. Se realizó fibrinolisis al 40,6% de los SCACEST.
Conclusiones: A pesar de la dispersión geográfica y el perfil envejecido de la población rural, los DCCU garantizan una asistencia de calidad al DT, tanto por su alta capacidad resolutiva y diagnóstica, como por la adecuación a las guías de tratamiento, aunque existien aún oportunidades de mejora. [Emergencias 2013;25:13-22]

Palabras clave: Dolor torácico. Urgencias extrahospitalarias. Síndrome coronario agudo.