

# The characteristics and management of patients with non-traumatic chest pain in hospital emergency departments. The results of the EVICURE II study

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## CONFLICT OF INTEREST:

This study was carried out with the support of the Spanish Society of Emergency Medicine and Lacer, Ltd. None of the members of the committee who took part in this study has a conflict of interests.

**Objective:** Identifying patients with acute coronary syndrome (ACS) attending emergency services with nontraumatic chest pain is a complex process in spite of current guidelines. This study aimed to describe the assessment process in order to identify aspects in need of improvement.

**Design:** A prospective, observational multicenter study enrolling consecutive patients with nontraumatic chest pain suggestive of ischemic heart disease.

**Results:** In a total of 1440 patients studied, the prevalence of ACS was 23.5%, with a ratio of ST-elevation myocardial infarction (STEMI) to non-STEMI cases of 1:3 according to emergency service diagnoses. The first electrocardiogram (ECG) was classified as inconclusive in over 70% of the cases. More than 1 ECG was required in 40%. The median delay in reaching emergency services was 169 minutes and the first ECG was then performed in less than 10 minutes in slightly more than 40% of the patients. The overall agreement on a diagnosis of ACS for admitted patients was 0.64 ( $\kappa$  index).

**Conclusion:** The results reveal the complexity of this diagnostic process and identify areas for possible improvement. [Emergencias 2008;20:391-398]

**Key words:** Acute coronary syndrome. EVICURE (Evaluation of the Treatment of Cardiac Ischemia in Spanish Hospital Emergency Services). Emergency health services.

## Introduction

Coronary heart disease is the main cause of death in Europe, being the first one cause of death for men and the second for women<sup>1,2</sup>. Ten percent of patients admitted to hospital in Spain have coronary heart disease and the figures have risen progressively over the last few decades. Patient readmission is significant and currently stands at 13% according to the RESCATE study<sup>3</sup>.

Despite the importance of these statistics, they do not reflect the fact that separating patients with symptoms of ischaemic heart disease that evolve to an episode of acute coronary syndrome (ACS) from those who do not represents a considerable health

care burden. This first stage in the care of patients with ACS is carried out by the emergency services and the hospital emergency department (HED).

Most of the information published on is as the identification process comes from ACS patient registers, in the first EVICURE study<sup>4</sup> based on the management of patients diagnosed with ACS in HEDs, or on information obtained after following chest pain management guidelines<sup>5</sup>.

Patients who come to the HEDs do so in order to rule out ACS. Coronary heart disease is only identified in 5% to 17% of patients<sup>6</sup>.

It is also the case that 2% to 5% of HEDs do not even consider a diagnosis of ACS and discharge patients. These patients have a less

favourable prognosis than those who are identified as ACS patients and admitted into hospital<sup>7-12</sup>.

The number of cases of acute myocardial infarction (AMI) that are not diagnosed varies from one hospital to another. Higher figures are more common in emergency departments that are less busy which could be considered an area for improvement<sup>13</sup>.

Patients are not correctly diagnosed during their first visit to the HED not only because of errors when assessing the patient but also because of the development of ACS itself<sup>14,15</sup>.

The methodology used in identifying patients with non-traumatic chest pain (NTCP) is detailed in guidelines, recommendations and an infinite number of publications<sup>16-26</sup>. Some only recommend using diagnostic procedures (questioning the patient, diagnostic tests, the Goldman test) and others advise more structured patient care centred on what could be referred to the functional units of chest pain. These publications usually conclude by highlighting the benefits of these procedures although most are based on cases that were diagnosed as ACS and were admitted into hospital. This information, along with the inconsistent management of patients with NTCP in Spain is clearly evident in the IBERICA register<sup>27</sup>.

Therefore the objective of this study was to understand the identification process applied to patients with NTCP used by hospital emergency departments in Spain.

## Method

A prospective, multi-centre, observational, group study was carried out in order to respond to the objectives set out in this study which focused on patients with NTCP suggestive of ACS that were treated in the HEDs of the 25 centres that participated, details of which can be found in Table 1. These centres were selected based on the characteristics of patient care, which basically meant the number of patients seen. The objective was to include emergency departments that were representative of those all over Spain.

Patient cases were consecutive; all patients were over 18 years of age and had come to the emergency departments of the participating centres complaining of NTCP. They were seen during the period of this study in June 2006 until each centre had treated 75 consecutive cases. Patients excluded from the study were those who would not consent to a follow-up by phone. The following information was recorded for each case: a description of the pain, any cardiovascular risk factors, the patient's

**Table 1.** Hospital emergency departments that participated in the study and patient care characteristics

Hospital emergency department	Reference Population	Number of patients seen per day
Hospital Central de Asturias	300,000	278
Hospital Virgen del Rocío	875,000	334
Hospital Universitario de Puerto Real	240,000	201
Hospital Miranda de Ebro	60,000	90
Hospital Marqués de Valdecilla	300,000	375
Hospital de Basurto	400,000	350
Hospital Comarcal del Bidasoa	90,000	125
Hospital Infanta Cristina	250,000	215
Hospital de Cieza	70,000	111
Hospital General Universitario de Valencia	350,000	500
Hospital Sant Joan de Alicante	200,000	210
Hospital Juan Canalejo	550,000	270
Hospital Carlos Haya	348,656	326
Hospital do Meixoeiro	170,000	166
Hospital General de Alicante	260,000	300
Hospital Virgen de la Luz	200,000	170
Clínica Puerta de Hierro	461,860	200
Hospital Nuestra Señora del Prado	150,000	173
Hospital Comarcal de Blanes	100,000	160
Hospital Verge de la Cinta	132,000	130
Hospital Arnau de Vilanova	420,000	250
Hospital Clínic Barcelona	500,000	328
Hospital de Sant Pau	400,000	230
Hospital Universitario de Canarias	400,000	225
Hospital de Móstoles	250,000	150

clinical status when the patient was seen and an analysis of the test results, especially biological markers indicating myocardial damage. These were classified as positive or negative depending on the standard applied in each centre. Repeat visits during this time were treated as new cases. Which were classified according to the type of pain into the following categories: typical, when it included all the characteristics of coronary chest pain: progressive, centralised, oppressive, with/without spread to the left arm, with/without vegetative manifestations; probable, in those cases where it could not be classified as typical but there were suspected ischaemic symptoms (pain spreading to both upper limbs, jaw, lower abdominal pain, the right arm, etc.) and atypical, when the patient was experiencing pleuritic chest pain or bone and muscle pain that appeared suddenly or only lasted for a few seconds.

The first ECG and the first ECG that resulted in the patient diagnosis (carried out if the first ECG was not diagnostic and known as the second ECG regardless of the number of ECGs carried out) were used for assessing the evaluation of ECGs in this study. The ECG readings were carried out by emergency department professionals and standardised as follows: analysis of the ST segment as normal, elevated > 1 mm or depressed > 1 mm; T wave analysis; presence of the Q wave; presence of LBBB. The definitions established by the Ameri-

can College of Cardiologists were used for these classifications<sup>28</sup>. Patients were grouped together into three groups according to the interpretation of their first ECG: One group with an elevated ST segment or a new left bundle branch block, one group of patients with a depressed ST segment and an inverted T wave or significant changes in the ST segment, and a third group with none of the aforementioned changes observed. The groups were created in accordance with the recommendations put forward by scientific organisations (AHA, ESC, SEC). Those in the first and second groups were considered pathological ECGs.

Another variable of interest that was recorded was patient waiting times which were compared to those recommended by the ACS guidelines published by the Ministry of Health and Consumer Affairs<sup>29</sup>: Delay on arrival at the hospital (Time of arrival- Moment when symptoms began), delay until the first ECG (Moment the ECG was carried out- Time of arrival at the hospital), delay in diagnosis (Moment of diagnosis- Time of arrival), delay until admitted or discharged from HED (Time the patient left the HED- Time of arrival at the HED).

The patient management information was registered in the emergency department and specifically included the treatments which are mentioned in the guidelines published by scientific organisations<sup>19,20,22,26</sup>: the use of coronary vasodilators, antiaggregants, heparin, beta blockers, fibrinolysis or carrying out angioplasty and the use of glycoprotein IIb/IIIa inhibitors.

All these cases were followed until the patients were discharged from the emergency department or from the hospital they had been admitted to and their destination and diagnosis at the time of discharge from the emergency department or hospital they had been admitted to was registered. The diagnosis at the time of discharge was used in these cases. Meanwhile, the emergency department classified those patients with cases of STEMI, non-STEMI, coronary heart disease, those not suffering from ACS, those with any conditions apart from those related to the heart and those with no diagnosis.

A 30-day follow up by phone was carried out in a random sample of discharged patients which consisted of 33% of the cases; visits made to the HED by these patients during the same period were also documented. The patient's general health and the use of medical recourses were monitored during the follow up. It was observed that patients used the medical resources when they were seen after being discharged from the emergency department or hospital offering the same service (NTCP); pre-scheduled visits related

to this condition or any other were excluded. New visits related to NTCP were registered during the follow up period and were defined as repeat consults. Death outside the hospital was considered a new serious cardiac event if there was no other obvious cause other than ACS, as was the need for revascularization and a new diagnosis of AMI or Unstable Angina (UA) in accordance with the criteria found in the publication Sabatine<sup>30</sup>.

The information was entered into electronic files that were processed using the Teleform<sup>®</sup> program. The database was then filtered and analysed using the statistics software package SPSS 14.0<sup>®</sup>.

The descriptive analysis carried out included central trend estimators for the continuous variables, expressed with their confidence interval (CI) of 95% and absolute and relative frequencies for the discrete variables. Graphs were used when necessary to present the information in a clearer way. The Kappa index was used to reflect the level of concordance between the diagnoses in the HEDs and those at the time of discharge. A good level of concordance was considered anything between 0.6 and 0.8.

## Results

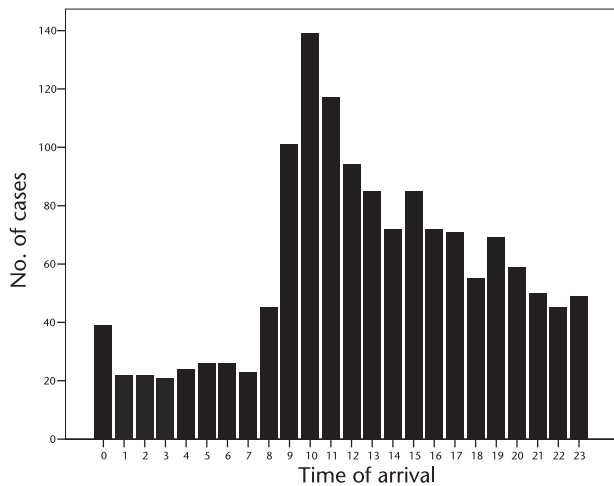
In the 25 centres that participated in the study, 1440 patients with suspected ACS were registered with an average of 57 patients per centre (minimum 14 and maximum 84 patients per centre). Fifty-one (3.5%) patients were excluded from the initial sample because they lacked the relevant information.

Of those included 57.3% were male with a mean age of 58.6 years (SD  $\pm$  16.4) and 64.6 years (SD  $\pm$  16.2) for women.

The temporal distribution of patient access to the HEDs can be seen in Figure 1 which shows that 52.3% of patients came between 08:00 and 15:00 whereas only 14.4% did so between 00:01 and 07:59.

The delay in arrival was a mean of 169 minutes on average with a value of 653 minutes for the 90th percentile. There was no difference between those who had a history of ischaemic heart disease (IHD) and those who did not (mean 155/171 minutes). The proportion of patients who had their first ECG within 10 minutes as recommended was 42.9%.

With regard to the type of pain, in 28.4% of cases the pain was considered typical, in 21.7% probable and in 49.9% atypical. In 27.7% of cases the duration was less than twenty minutes, in 44.8% it lasted for between 20 and 120 minutes and in 27.5% for over 120 minutes.



**Figure 1.** Temporal distribution of patients arriving at the emergency department.

In 71.3% only one episode of chest pain was reported in the previous 24 hours, with two or more episodes in 25.7%.

In 34% of cases patients experienced pain while the ECG was being carried out and in 42.2% of these cases this pain was controlled using nitroglycerin.

The distribution of risk factors and the previous use of antiaggregant medication can be seen in Table 2. A history of ischaemic heart disease stands out among those details related to patient history that were most commonly overlooked. This was not registered in 22.4% of cases.

The results of the interpretation of the first ECG, which included only 1395 patients, can be found in Table 3. The interpretation of the first ECG for 598 patients (42.9%) was considered pathological although anomalies were only considered suspected cases of ACS in 379 patients (25.7%).

At least one more ECG was necessary in 576 cases (40%) in order to be able to make a clear decision with regard to the patient diagnosis and/or management. The interpretation of this new ECG can be found in Table 4.

With regard to the myocardial damage markers, these were not tested in 145 cases (11.4%) and for those who did use markers, in 58.6% of cases troponin and CK-MB were administered, troponin alone in 28.2% and CPK alone in 1.8% of cases. Myocardial damage markers were positive in the first test carried out in 98 patients (7.7%). Twenty cases were positive for CK-MB and negative for troponin. 91.3% of patients no further diagnostic tests were performed apart from clinical assessment, ECG and/or myocardial damage markers. The test to provoke ischaemia was the next most common test

carried out in patients and was included in 61 cases, followed by an echocardiogram in 38 cases.

From a clinical point of view, 85% of patients who arrived at the emergency department could be categorised as Killip class I, 13.5% as Killip class II and only 21 patients (1.5%) as Killip class III-IV. During their stay in the HED 11 (0.8%) cardiac arrests were recorded, 16 (1.1%) advanced AV blocks and 108 (7.5%) arrhythmias in total.

The final destination of patients is summarised in Table 5: 389 (27.9%) were admitted to hospital wards or intensive care units and 6 patients (0.4%) died in the HED.

The diagnoses at the time of discharge from the HED, with 23.5% of cases diagnosed as ACS, include patients admitted into hospital and can be found in Table 6. The diagnoses of 395 patients admitted to hospital can be found in Table 7. Of the patients admitted to hospital, the diagnostic agreement with the diagnosis of the HED can be found in Table 8. Of the 200 cases in which the HED had established a diagnosis of ACS, 169 (84.5%) were discharged with the same diagnosis. Of the patients admitted with suspected IHD but not ACS, 9/51 had ACS, and of those admitted without a diagnosis of IHD, 3/29 had ACS. The weighted Kappa value obtained was 0.57 (CI 95% 0.48-0.66) and 0.65 (CI 95% 0.61-0.77) for the classification of ACS (yes/no).

## Discussion

The identification of patients with ACS is one of the processes that continues to generate a great deal of interest among HED professionals. As a result, the methodology that is applied to the diagnosis of these patients has become the subject of an infinite number of guidelines and publications which are almost always centred on patients with a final diagnosis of ACS. This study has

**Table 2.** The distribution of cardiovascular risk factors

Risk factor	Yes [n (%)]	No [n (%)]
High blood pressure	690 (47.9%)	669 (46.5%)
Diabetes	278 (19.3%)	1,064 (73.9%)
Smoking	393 (27.3%)	924 (64.2%)
Dyslipidemia	507 (35.2%)	841 (58.4%)
History of IHD	391 (27.2%)	726 (50.4%)
History of IHD in the family	189 (13.1%)	1,031 (71.6%)
History of CHF	120 (8.3%)	1,193 (82.8%)
Peripheral heart disease	112 (7.8%)	1,206 (83.8%)
Chronic AF	150 (10.4%)	1,171 (81.3%)
Use of antiaggregants	384 (26.7%)	935 (64.9%)

IHD Ischaemic Heart Disease, CHF Congestive Heart Failure, AF Arterial Fibrillation. The absolute values correspond to cases with the relevant information.

brought together a number of cases involving chest pain and when assessing each of these it has also been necessary to identify which should conclude with a diagnosis of ACS. Given that this is a multi-centre study with 25 centres participating that represent emergency departments of different sizes spread all over Spain, the characteristics of this series of cases are guaranteed to be representative of the situation in the whole of Spain despite the fact that we are dealing with a selection of cases that is not random and runs the risk of being biased because of the difficulty in including consecutive cases which is something that was not achieved in all the centres. The prevalence of ACS found in patients who came to the centres with symptoms compatible with the disease reached 23.5% which is higher than the number described in other studies<sup>31,32</sup>, which state that 10% of patients who complained of NTCB were diagnosed with ACS.

If we consider this prevalence of ACS within the context of the general population of patients that come to the HED, regardless of their symptoms, this figure may be even higher given that a substantial number of patients with ACS may not come to the emergency department when they have chest pain. Some studies have stated that the

**Table 3.** Classification of first ECG

Classification of first ECG	n	%
Elevated ST	108	8.1
Depressed ST or negative T	177	11.7
Non diagnostic ECG	1036	74.7
LBBB	74	5.5
<b>Total</b>	<b>1395</b>	<b>100</b>

LBBB: Left Bundle Branch Block.

**Table 4.** Classification of second ECG

Classification of second ECG	Cases n	%
Elevated ST	59	10,2
Depressed ST or negative T	74	12,8
Non diagnostic ECG	399	69,4
LBBB	44	7,6
<b>Total</b>	<b>576</b>	<b>100</b>

LBBB: Left Bundle Branch Block.

**Table 5.** Destination after the emergency department

Destination after the emergency department	n	%
Discharged	989	68.7
Intensive care	131	9.4
Ward	258	18.5
Died	6	0.4
Transferred	14	1
<b>Total</b>	<b>1398</b>	<b>100</b>

**Table 6.** Final diagnosis of patients in the emergency department

Emergency department diagnosis	n	%
STEMI	76	5.5
Non-STEMI	250	18.0
Not ACS	358	25.8
Not heart related	639	46.0
No diagnosis	66	4.8
<b>Total</b>	<b>1389</b>	<b>100.0</b>

**Table 7.** Final diagnosis of patients admitted

Diagnosis of patients admitted on discharge	n	%
AMI	71	25.0
NQAMI	56	19.7
IHD	56	19.7
Not ACS	64	22.5
Not heart related	33	11.6
No diagnosis	4	1.4
<b>Total</b>	<b>284</b>	<b>100.0</b>

AMI: Acute myocardial infarction; ACS: Acute coronary syndrome. IMD: Ischaemic heart disease.

**Table 8.** Diagnostic concordances between the emergency department and the hospital

Diagnosis in the emergency department	Diagnostic concordance on those patients admitted			Total
	ACS	Coronary not ACS	Not coronary	
ACS	169	22	9	200
Coronary not ACS	9	34	8	51
Not coronary	3	7	19	29
<b>Totals</b>	<b>181</b>	<b>63</b>	<b>36</b>	<b>280</b>

Based on the cases admitted to hospital. Kappa value of 0.57 CI 95% 0.48-0.66. ACS: Acute coronary syndrome.

figures may be as high as 30%-50%, especially among certain population groups elderly such as the women<sup>33-36</sup>.

The distribution of the different types of ACS was as follows: 35% for STEMI and 65% for non-STEMI which was similar to the results found in other publications<sup>9,37</sup>.

The temporal distribution of access to the hospital follows a pattern that has already been established in other publications. However in this study we did not analysed the increase in STEMI during weekends and evenings as this has been described in other studies<sup>38</sup>.

The delay in gaining access to hospital treatment from the time the patient begins to feel pain, a factor that limits the techniques that can be used, was over three hours for all patients. The delay times found in studies in patients with a final diagnosis of IHD were between 120 and 156 minutes and some were even higher. This information reinforces the need to identify the symptoms of ACS quickly and establish fast access to a medical centre especially since those with

patients with a history of IHD experienced the same delays as those without<sup>39,40</sup>.

The time of 16-18 minutes before the first ECG does not comply with the established recommendation of less than 10 minutes and therefore this represents an important area for improvement. The delay in carrying out the ECG is also confirmed in other publications<sup>41,42</sup>.

Over 20% of patients had experienced more than one episode of chest pain. This statistic has been mentioned in other publications and is more commonly linked to cases with a diagnosis of ACS with a less favourable prognosis<sup>43</sup> and could be used as a diagnostic tool, although this should be confirmed by carrying out further studies.

Once third of patients experienced chest pain when they were examined which implies that an effective pain control protocol needs to be established given the importance of managing pain and the associated consequences linked. The pain was controlled with nitroglycerin in only 42% of cases.

Certain important deficits were identified when gathering information about some of the cardiovascular risk factors like a history of IHD, despite being one of the most reliable criteria for predicting ACS in patients with NTCP<sup>44-46</sup>.

ECGs are an important part of patient evaluation<sup>16-18</sup>. Guidelines published by scientific organisations recommend that patients should be classified into three different categories depending on the results of the first ECG: STEMI, non-STEMI and cases where the ECG was not diagnostic. This distribution of cases shows that in a high number of cases (74.7%) the ECG was not diagnostic which demonstrates that identification procedures need to be applied after the first assessment given the number of patients that require at least one more ECG (40% of patients according to our study).

The use of myocardial damage markers, which is fundamental in order to rule out or identify certain risks in some patients<sup>47</sup> has changed<sup>48</sup>. There is a tendency to test for Troponin only, although in this study we observed that Troponin and CK-MB are still being tested. Very few additional tests were carried out and among them the effort test was the most common.

Patients with chest pain not only need their symptoms to be correctly identified but also the risk factors associated with these need to be assessed including, blood circulation problems, the presence of arrhythmias and the duration of the pain, which all give us an indication of the seriousness of the patient's condition. In our study up to 15% experienced respiratory or heart problems and a considerable number of patients presented arrhythmias (7.5%). Eleven patients had a cardiac arrest and half of these died, a statistic that had already been established in the EVICURE I

study where the mortality rate of patients diagnosed with ACS in the HED was 2.3%.

The percentage of patients admitted to hospital in this study was 30%, something that has not been referred to in other studies on similar populations. Some studies have included the number of patients that were mistakenly discharged or admitted into hospital<sup>8,9,11,37</sup>. Information about patients that were incorrectly discharged is part of a later study.

The concordance between the diagnosis in the emergency department and that of the hospital that discharged the patient was lower than that of other studies and stood at 0.57 compared to 0.71, although strictly speaking, in principle these figures cannot be compared because the group in this study includes coronary patients that did not have ACS. If we group together these last patients the Kappa value is very similar (0.64)<sup>49,50</sup>.

## Conclusion

The information in this study reflects the current situation with regard to patient care and clearly demonstrates the need for better resources for these patients in order to establish or rule out a diagnosis of ACS, as well as to identify possible areas for improvement. These include a reduction in the delays experienced by patients and more ECGs to be carried out within the first 10 minutes of being seen. This study highlights a number of issues regarding the best way to carry out the identification procedure.

**Appendix.** A list of the researchers who took part in each of the centres

Hospital Univ. de Canarias	Dr. Alonso Laceras, Emilio
Hospital de Sant Pau	Dr. Epelde Gonzalo, Francisco
Hospital Clínic Barcelona	Dr. Sánchez Miguel
Hospital Arnau de Vilanova	Dr. Cabré Ollé Xavier, Rosendo
Hospital Verge de la Cinta	Dr. Vázquez Negre, Rosendo
Hospital Comarcal de Blanes	Dr. Avendaño, Enrique
Hospital Ntra. Sra. del Prado	Dr. Juárez González, Ricardo
Clínica Puerta de Hierro	Dr. Salgado Marqués, Rosario
Hospital de Móstoles	Dr. Perianes, José Francisco
Hospital Virgen de la Luz	Dr. Montero López, Luis
Hospital Juan Canalejo	Dr. Calvo López, Ricardo
Hospital do Meixoeiro	Dr. Amador Varicela, Luis
Hospital Gral. Univ. de Valencia	Dr. Rubini Puig, Salvador
Hospital Sant Joan de Alicante	Dr. Sánchez Gutiérrez, Abelardo
Hospital General de Alicante	Dr. Carbajosa Dalmau, Josep
Hospital de Cieza	Dr. Piñera Salmerón, Pascual
Hospital Central de Asturias	Dr. Antunez, Luis
Hospital.Comarcal del Bidasoa	Dr. Lasa Garmendia, M <sup>a</sup> Mercedes
Hospital de Basurto	Dr. Varona, Mercedes
Hospital Marqués de Valdecilla	Dr. García Castrillo, Luis
Hospital Miranda de Ebro	Dr. Fernández De Valderrama, Joaquín
Hospital Univ. de Puerto Real	Dr. López Álvaro, Julán
Hospital Carlos Haya	Dr. Suero, Coral
Hospital Virgen del Rocío	Dr. Núñez, Pilar
Hospital Infanta Cristina	Dr. Royano Hernández, Jorge

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## Características y manejo de los pacientes con dolor torácico no traumático en los servicios de urgencias hospitalarios. Resultados del estudio EVICURE II

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**Objetivo:** La identificación de los pacientes que padecen síndrome coronario agudo (SCA) entre la población de pacientes que consultan en los servicios de urgencias hospitalario (SUH) por dolor torácico no traumático constituye un procedimiento complejo a pesar de las guías establecidas. Es objetivo del estudio describir el proceso de discriminación con el propósito de identificar áreas de mejora.

**Diseño:** Estudio observacional, multicéntrico, prospectivo, con inclusión de pacientes consecutivos con dolor torácico no traumático sugestivo de cardiopatía isquémica.

**Resultados:** Se registran 1.440 casos, con una prevalencia de SCA de 23,5% con una relación SCAEST/SCASEST de 1/3 basados en el diagnóstico de urgencias. Más del 70% del primer electrocardiograma (ECG) se clasificó como no diagnóstico y fue necesario hacer más de un ECG en el 40% de los casos. La demora en acceder al SUH tenía una mediana de 169 minutos y algo más del 40% de los pacientes tenían el primer ECG rea-lizado en 10 minutos. La concordancia diagnóstica global para SCA fue del 0,64 de índice de Kappa, entre los pacientes ingresados.

**Conclusión:** Los resultados muestran, junto con la complejidad del proceso discriminativo, la identificación de áreas de posible mejora. [*Emergencias* 2008;20:391-398]

**Palabras clave:** Síndrome coronario agudo. EVICURE. Servicio de Urgencias.