

ORIGINAL ARTICLES

ISCHEMIC HEART DISEASE

Chest Pain Unit: One-Year Follow-Up

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Introduction and objectives. In Spain there is little information available about chest pain units for the treatment of patients of low-to-medium risk with suspected acute coronary syndrome.

Patients and method. A prospective study was performed among emergency room patients who complained about acute chest pain and were suspected of suffering an acute coronary syndrome with a normal or unspecific initial evaluation. They underwent an early submaximum stress test to decide on possible hospitalization. The follow-up time was 1 year.

Results. Of 472 emergency room patients with suspected acute coronary syndrome, 179 performed the stress-test during the first hours of the triggering chest pain episode. None met the high-risk criteria for unstable angina. In 78.8% of the cases, the test results were negative and the patients were discharged. The results were positive in 15.1% and inconclusive in 6.1%; there were no complications during the procedure. Patients with a negative stress test had a more favorable outcome than the rest, with fewer following visits to the emergency room (11% vs 22%, $p < 0.001$). One patient with a negative stress test died of a non-cardiovascular complication. None of the patients suffered acute myocardial infarction during follow-up and 89% of the patients with negative stress test had a favorable outcome (in terms of visits to the emergency room, unstable angina, acute myocardial infarction, or cardiovascular death).

Conclusions. Chest pain units for the care of low-to-medium risk patients with acute chest pain allow a fast and safe hospital release with a favorable mid-term outcome.

Key words: *Chest pain. Unstable angina. Diagnosis. Emergency room.*

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Unidad de dolor torácico: seguimiento a un año

Introducción y objetivos. El objetivo del estudio es analizar los resultados a medio plazo de una unidad de dolor torácico en nuestro medio, dada la escasez de información al respecto en nuestro país.

Pacientes y método. Se estudiaron prospectivamente a pacientes que consultaron en urgencias por dolor torácico sospechoso de síndrome coronario agudo y cuya evaluación inicial era normal o inespecífica. Se les sometía a una prueba de esfuerzo submáxima temprana para decidir su hospitalización. El período de seguimiento fue de un año.

Resultados. Un total de 472 pacientes consultaron por sospecha de síndrome coronario agudo, 179 fueron sometidos a una prueba de esfuerzo durante las primeras horas del dolor torácico. En el 78,8% de los casos, el resultado de la prueba fue negativo y se procedió al alta. En un 15,1% la prueba de esfuerzo fue positiva y en el 6,1% fue no concluyente, sin aparecer complicaciones durante la realización de la misma. Los pacientes con prueba de esfuerzo negativa tuvieron una evolución más favorable frente al resto, con un menor número de consultas en urgencias (11 frente a 22%; $p = \text{NS}$), y menor número de hospitalizaciones por dolor torácico (2 frente a 22%; $p < 0,001$). Un paciente con prueba de esfuerzo negativa falleció de causa no cardiovascular. Ningún paciente sufrió un infarto agudo de miocardio en la evolución y el 89% de los casos con prueba de esfuerzo negativa tuvo una evolución libre de acontecimientos (visita a urgencias, hospitalización por angina inestable, infarto agudo de miocardio o muerte cardiovascular).

Conclusiones. Una unidad de dolor torácico en la atención de pacientes de bajo riesgo permite un alta temprana y segura, con una evolución favorable a medio plazo.

Palabras clave: *Dolor torácico. Angina inestable. Diagnóstico. Urgencias.*

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INTRODUCTION

Chest pain (CP) is one of the primary reasons patients worldwide go to the emergency room, and it is estimated that in the United States there are more than 5 million emergency room visits every year for chest pain.¹ In Spain, the incidence of chest pain has caused even the lay press to question the capability of hospi-

ABBREVIATIONS

CK-MB: creatinphosphokinase MB fraction
MET: metabolic consumption equivalents
beats/min: beats per minute
mm Hg: millimeters of mercury
ECG: electrocardiogram
AMI: acute myocardial infarction

tals to deal with the resulting enormous demand for care.² Added to this is the fact that less than 15% of CP is a result of infarct. All these factors translate into a significant number of unnecessary hospitals admissions, while concomitantly the pressure of caring for so many patients means that between 2% and 10% of patients discharged may actually have an infarct.³

The basis of a plan of action for dealing with CP is based on 3 processes: *a*) identify the presence of an acute coronary syndrome (ACS) as opposed to other possible serious non-coronary deficits (pulmonary thromboembolism, aortic dissection, etc.); *b*) correctly identify the risk level so that the appropriate treatment plan can be followed, and *c*) complete the process in the least amount of time possible. Chest pain units (CPU) were created in the 1980s with the objective of effectively executing these 3 functions.

From 1980 on, there has been a progressive increase in the number of CPUs in the United States that have been created with a concrete objective in mind: reduce the coronary reperfusion times for high-risk patients. A particular physical profile is required for admission to these units, and specific equipment is also needed.⁴

At a later date, and with the need for improving the cost: efficiency ratio for low-risk patients, who are the ones most frequently seen, another type of unit began to be developed that, although grouped under the same name, had different objectives — reducing the number of admissions, eliminating unnecessary costs, improving the quality of medical attention, and avoiding inappropriate hospital discharges; this last objective was particularly important because of the large amount of criticism it generated. In these CPUs, a particular physical environment was not required, as the existing emergency room structure could be used, and, instead, attention was centered on the creation and use of appropriate procedures and on coordinating all the elements needed to carry out the process.

At the time of writing this manuscript, according to Task Force⁵ data, in the United States there are some 1200 CPUs. Nevertheless, their existence in Spain is practically nonexistent despite the fact that Spanish emergency rooms treat some 250 patients with CP a month for every 250 000 residents.⁶

In March of 2000, we created our own CPU, which is under the direction of the cardiology service and coordinated with the emergency medicine service, that was intended to improve the attention to CP in a second-tier hospital that serves a population of 350 000 inhabitants.

The study that we detail below is the result of a 12-month followup of patients seen in our CPU during the first 3 months of its existence.

The aim of our study is to show that patients who visited an emergency room in a second-tier hospital because of suspicious CP with ACS and normal or inconclusive ECG, and who had a stay in a CPU for observation and underwent a sub-maximal early stress test during the first 24 hours, were differentiated from patients with ACS who did not have ACS, as well as from low-risk patients with SCA. In this manner, we avoided inappropriate hospital discharges and unnecessary hospital admissions, without the use special equipment or additional personnel.

PATIENTS AND METHODS

This was a prospective study carried out over a period of 3 months (between March and May, 2000) and included patients 18 years of age and older who went to the emergency room secondary to CP or with symptoms that suggested of ACS whose initial clinical evaluation was normal or inconclusive.

After arrival at the hospital, initial triage was performed by a physician. All patients received an ECG, blood samples were taken to determine the presence of markers for myocardial damage such as CK-MB mass and troponin T, and, except where contraindicated, all patients were given aspirin. Patients treated in a controlled bed in the observation area of the emergency room for the evaluation of the presence of an acute myocardial infarction (AMI), with an ECG and analysis performed for the presence of markers of myocardial damage repeated every 6 to 8 hours, according to established treatment protocol (Figure 1). If the patients remained stable, did not meet high-risk criteria (Table 1),⁷ and did not show initial myocardial markers or ischemic changes on ECG, they underwent a stress test by means of submaximal ergometry on a treadmill, provided they were capable of walking and provided the ECG was interpretable (absence of baseline repolarization changes, branch blocks, or pacemaker rhythm). When we were unable to administer the stress test because of any the aforementioned reasons, the patient was hospitalized in the coronary unit or placed in a hospital bed, depending on the case. Ergometry was performed between 10 and 24 hours after symptoms began. In those cases where ergometry was negative, the patient was discharged and then seen again on an outpatient basis after between 48 to 72 hours; the clinical and echocardiograph evaluations

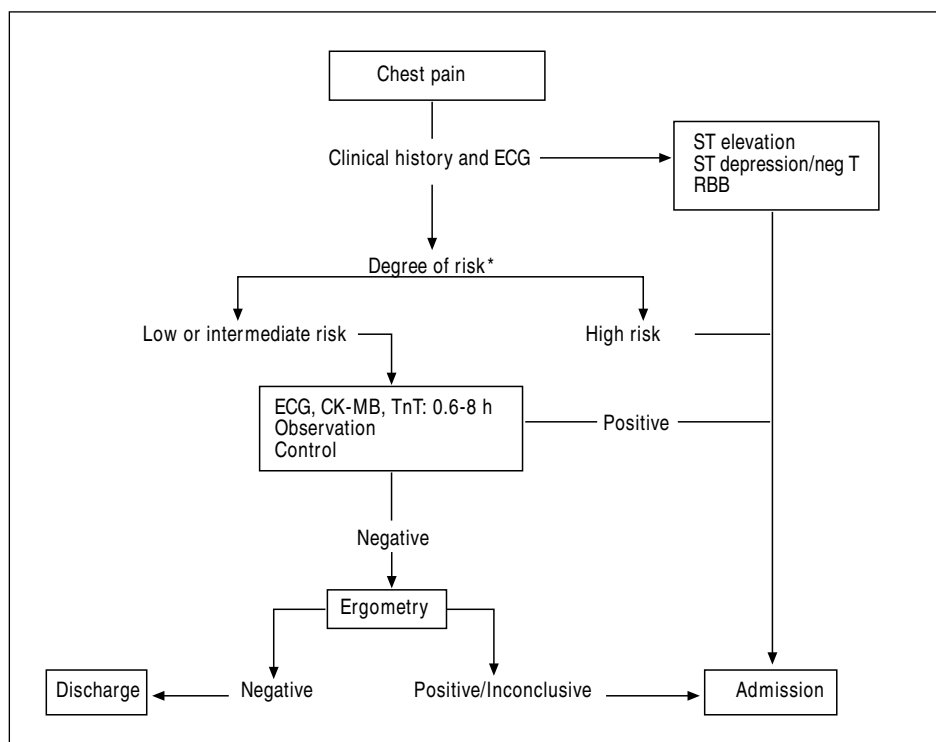


Fig. 1. Performance protocol for a patient with chest pain and the suspicion of ASC (see text). *According to AHCPR criteria (Table 1). RBB indicates right branch block.

were repeated. Patients with positive or inconclusive ergometry were hospitalized and treated according to the judgment of the attending physician. The staff of the CPU consisted of a cardiologist and a part-time nurse.

Stress test

Available times for performing ergometry were limited to the hours between 8:00 a.m. and 3:00 p.m. The test was performed by a cardiologist and a nurse. The Bruce protocol was followed, and the test was considered conclusive if the patient completed 6 minutes of exercise or reached 85% of maximum theoretical cardiac frequency for their age (220 – age in years). For patients more than 70 years of age, achievement of 5 MET⁸ was considered conclusive. Antiangina medication was not discontinued if the patient was already taking this type of drug.

The test was considered positive for ischemia if the classic criteria were met: elevation of the horizontal or descending ST segment equal to or greater than 1mm, or the appearance of anginous chest pain.

The test was interpreted as being high-risk if clinical or electrocardiographic data indicative of ischemia as previously described was evident during a workload of less than 5 MET, or if accompanied by hypertension (decrease in arterial systolic pressure of more than 10 mm Hg), or a cardiac frequency of less than 130 beats/minute, or with a decrease in the ST segment in more than 4 leads.

According to the judgment of the cardiologist responsible for the CPU, in some cases the study was completed by performing a transthoracic echocardiogram to evaluate changes in segment contractility or to look for a nonischemic cause of the chest pain.

TABLE 1. High-risk criteria for unstable angina

High risk criteria (at least one of the following)	
History	Symptoms of ischemia that increased over the previous 8 hours
Characteristics of the pain	Presence of prolonged pain (>20 min)
Clinical findings	Pulmonary edema New or aggravated mitral regurgitation murmur S3 or rales Hypotension, bradycardia, tachycardia Age >75 years
ECG	Resting angina with transitory ST segment changes >0.05 mV New or possibly new branch block Sustained ventricular tachycardia
Cardiac markers	Elevated markers (for example, TnT Tnl>0.1 ng/ml)

Adapted from Braunwald E, et al.⁷

S3 indicates third tone; TnT, troponin T; Tnl, troponin I.

Follow-up

All patients were followed for 1 year by telephone interview. The following data was noted: emergency room visits, hospitalization because of chest pain, unstable angina, AMI, and death (total and cardiovascular).

Statistical analysis

The SPSS statistical package for Windows, version 10.0, was used. First, a descriptive analysis was made by means of frequency tables for categorical variables and measurement of centralization and dispersion patterns for quantitative variables.

The patient's course was considered «unfavorable» if any of the following events occurred during follow-up: a new visit to the emergency room or hospitalization secondary to CP, unstable angina, AMI, or cardiovascular death. Bivariate and multivariate analyses were performed to determine clinical and ergometric data that were predictive of an unfavorable course. In both analyses, the following were considered independent or predictive variables: age, sex, number of coronary risk factors, the presence or absence of said risk factors, previous history of AMI or revascularization, and treatment with anti-angina agents, aspirin, hypolipemians, or vasodilators. With the exception of age, the rest of the independent variables were categorical; therefore, the bivariate analysis was performed by using contingency tables, applying the χ^2 test (with Yates continuity correction in the case of Tables 2x2) or the exact Fisher test in the case of tables with little information. The limit of statistical significance was $P<.05$. In the case of 2x2 tables, we also performed risk estimates by determining the odds ratio (OR) and the relative risk (RR) according to standard procedures.

Logistical regression analysis was performed later with respect to the dependent variable of patient course (favorable or unfavorable), introducing all the predictive variables previously mentioned and selected by a step-by-step-back procedure that eliminated the less significant variables (according to Wald statistics), and maintaining the rest of the options with SPSS package default. Finally, we used Kaplan-Meier curves to determine patient survival free of cardiac events in the 2 groups of patients with and without a positive stress test. Both curves were compared by the Mantel y Haenszel logarithmic range test, with values of $P<.05$ considered as statistically significant.

RESULTS

We evaluated 472 patients who were seen in our emergency room because of chest pain with suspected ASC and whose initial ECG did not show an elevation of the ST segment. After initial evaluation, 35 patients were excluded from the study after confirmation of an

AMI on electrocardiographic and enzyme followup, 196 were excluded because they met high-risk criteria for unstable angina (Table 1),⁷ and 62 were excluded because the ECG could not be interpreted or because the patient was unable to complete an ergometric test. Of the 196 who did not undergo a stress test and who were hospitalized right away because of high-risk angina, the diagnosis was later confirmed in 178 patients (90.1%).

A total of 179 patients underwent a submaximum stress test between 10 and 24 hours after first being examined. The baseline characteristics of these patients are shown in Table 2. Of note is the prevalence of coronary risk factors, with 52% of the patients having 2 or more factors present. In one-fourth of cases there was a history of ischemic heart disease.

The stress showed clinical or electrical ischemia in 27 patients (15.1%), was negative in 141 patients (78.8%), and was inconclusive in 11 patients (6.1%). In 6 cases (3.2%), ergometry met the criteria for high-risk. There were no complications during administration of the test, and an exercise level equal to 8.9 ± 2.6 MET was reached on average. All the patients with a negative stress test were able to be discharged without complications, while the rest of the patients were hospitalized.

Mean followup was 11.4 months, and 2 patients died during this period. All patients were re-evaluated 72 hours after hospital discharge in the outpatient clinic; it was not necessary to admit any patient at the time of their visit. Only 1 patient, belonging to the group with negative ergometry results, died of noncardiovascular causes (carcinoma of the colon) 6 months after discharge from the emergency department.

With respect to events that occurred during the follow-up period, no patient presented with an AMI, and 9 patients were hospitalized for CP; 6 belonged to the group with positive ergometry results. Ten coronary angiographies were performed, 9 on patients with a positive stress test and 1 with a negative stress test (33.3% vs 0.6%; $P<.0001$). All the patients with a positive stress test had significant cardiac lesions (33.3% vs 0%; $P<.0001$), and in the only patient with a negative stress test who underwent catheterization, the coronary arteries were normal. Seven patients underwent revascularization, all by means of angioplasty with the elective implantation of a coronary stent, and all without complications.

The 11 patients (6.1%) with inconclusive stress tests were initially hospitalized, although they later had a favorable course, without any events occurring during followup and without ischemic heart disease confirmed during their admission.

Of the 79 patients who underwent a stress test, 22 (12.3%) were treated again in the emergency for CP. Of these, 16 patients (11%) belonged to the group with negative stress test results and 6 (22%) belonged to the group with positive stress test results (22 vs 11%; OR,

TABLE 2. Patient characteristics

	Stress test		P
	Positive (n=27)	Negative/inconclusive (n=152)	
Mean age	59.7±9	53.3±13	.003
Male, %	81.5	65.1	.03
Cardiovascular risk factors			
Smoking, %	48.1	34.9	NS
Hypertension, %	48.1	44.7	NS
Diabetes, %	29.6	15.8	NS
Dyslipemia, %	70.4	43.4	.01
Family history of IC, %	18.5	23.7	NS
Number of cardiovascular risk factors			
>3, %	14.8	3.9	NS
2-3, %	51.9	48.7	NS
<2, %	33.3	47.4	NS
Cardiovascular history			
Angina, %	48.1	13.2	.001
Myocardial infarct, %	18.5	7.9	NS
Bypass, %	0	0	NS
Angioplasty, %	7.4	2.0	NS
Previous treatment			
Aspirin, %	56.6	23.0	.001
Beta-blockers, %	55.6	17.1	.0001
Nitrates, %	37.0	7.9	.0001
ACEI, %	29.6	21.5	NS
Calcium antagonists, %	11.1	6.6	NS
Hypolipemiant, %	33.3	15.1	.03

IC indicates ischemic cardiopathy; ACEI, angiotensive converting enzyme inhibitors; NS, not significant.

2.4; 95% CI, 0.9 to 6.9; $P=NS$). All the patients with positive stress test results who were seen again for CP were admitted for unstable angina; this diagnosis was confirmed at the time of hospital discharge. Only 3 patients (2%) from the group with negative stress test results were hospitalized for CP after the new emergency room visit, without ischemic origin confirmed in any case at the time of discharge.

The probability of being hospitalized for CP during the follow-up period was significantly greater in the group with the positive stress test results (22% vs 2%; OR, 14.2; 95% CI, 3.3-61.1; $P<.001$). Of the patients who were discharged after evaluation in the CPU 89% had a course that was free of events (emergency room visits, hospitalization for CP, unstable angina, AMI, or cardiovascular death) (Figure 2).

On multivariate analysis via logistical regression, only a positive stress test, the presence of coronary risk factors, and advanced age (greater than 55 years) predicted the possibility of an unfavorable course. The variable of patient age, although included in the multivariate model, did not reach a value generally accepted as statistically significant (Table 3).

DISCUSSION

There are few hospitals in Spain that have a CPU. We have very little data from those that do, and our

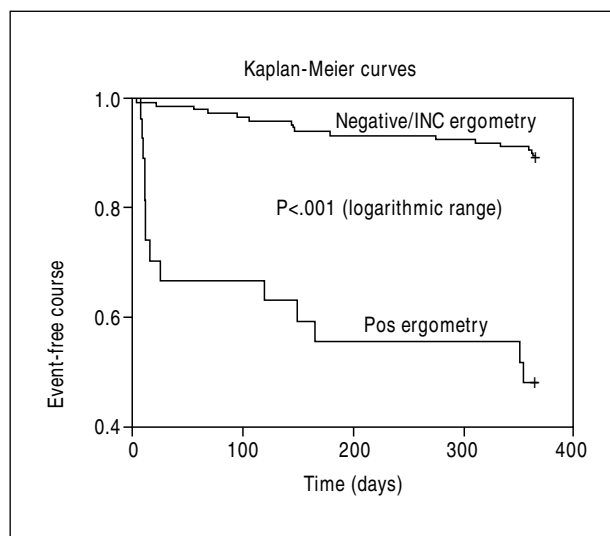


Fig. 2. Kaplan-Meier curve. Event-free course (emergency room visits, hospitalization because of unstable angina, AMI, or cardiovascular death) at 1 year among the 179 patients as a function of the results of the stress test. INC indicates inconclusive.

view of them are based on data obtained from studies performed in foreign medical centers, where social conditions, epidemiological characteristics, and health care organizations may not be the same as ours.

TABLE 3. Variables identified by the logistical regression model as predictors of an unfavorable patient course

Variable	P	OR	95% CI for the OR	
			Upper limit	Lower limit
Positive stress tests 2 or more coronary risk factors	<.001	54.9	13.3	225.8
Age >55 years	.048	4.6	1.1	21.0
	.071	2.5	0.9	7.5

Assuming that these data are relevant could lead us to believe that procedures and processes are efficient that may not be the same in our health system. For this reason, the initiation of our CPI was subjected to scrutiny; we present and discuss the results of this process below.

We treated 472 patients considered to be low to moderate risk. Of these patients, 78.8% had a negative stress test and a favorable course and were discharged at 12 months followup. When our results are compared with the results from similar studies performed in other countries, similar percentages are reported. A study from the University of Cincinnati⁹ reported 85% of patients with negative stress test and early discharge, but followup of these patients lasted only 30 days; the authors report an incidence rate of complications during this period of 0.53%, including 1 death. In the ROMIO study,¹⁰ in a total of 50 patients studied, the percentage of negative tests was 82% and there were no complications, but again followup was no longer than 30 days. As a result, one of the study values we proved is that in Spain we can progress to a high percentage of early discharges with an excellent medium-term prognosis.

One of the problems that results from early discharge from a CPU is existing increased rate of repeat emergency room visits, as well as readmissions, that in some cases was as high as 30% and 16%, respectively.¹¹ In a study by de-Filippi,¹¹ 248 low-risk patients were randomized from the emergency room to undergo pre-discharge stress testing or coronary angiography with the aim of studying whether an invasive intervention resulted in a decrease in the high rate of repeat visits for patients discharged from the CPU in their hospital. The repeat visit rate for those patients decreased from 30% for those patients with a negative stress test to 10% ($P=.0008$) for those patients with negative coronary angiography results. The study showed that an invasive intervention decreased the number of repeat visits and admissions. When the numbers achieved with this interventionist strategy are analyzed, it can be concluded that they are similar to those achieved with use of a conservative approach in our study (11% repeat visits and 2% readmissions). Lewis

et al¹² asserted that disregarding a cardiac origin or typifying it as low-risk should not be the end of the process, but rather a first step in the evaluation of patients being treated for CP. It is widely known that when a patient meets low-risk criteria after being categorized, the probability that the symptoms are cardiac origin is only 7%,¹³ meaning that the probability that the origin is noncardiac is greater than 90%, influencing the future direction of the evaluation. Nevertheless, in our study, as a security measure, we decided to have a cardiologist re-evaluate the patients discharged from the CPU during the subsequent 48 to 72 hours. At the time of the re-evaluations, it was not necessary to hospitalize any patient or to change the initial patient classification, which leads us to believe that our initial evaluation was correct.

One of the limitations of this study is the skew that could result from the emergency room physicians in new cases of CP with regard to the tendency for decreased rates of hospitalization for unstable angina in patients with a previously negative stress test as opposed to a patient with a positive stress test. This may explain, in part, that in our series the probability of being hospitalized was significantly greater in the group with a positive stress test (22% vs 2%; $P<.001$).

Of the 27 patients (15.1%) with positive ergometry in our study, 6 met high-risk criteria and immediately underwent coronary angiography and revascularization. Of the remaining patients, coronary angiography was performed only in 3 patients who also underwent revascularization; as a result, the total number of coronary angiographies performed in this group was 9 (33.3%). In any case, the decision to perform catheterization was made by a physician who was not staffing the CPU.

Although the medium-term prognosis for the subgroup of patients with positive stress test results was also good, the rest of the indicators revealed less favorable results: the percentage of repeat emergency room visits was higher (22% vs 11%) and the probability of requiring readmission for a new episode of unstable angina was also increased (22% vs 2%). No patient died or had a reinfarct or a clinical presentation that was refractory to medical treatment. Of note, some authors have presented convincing arguments regarding the low prognostic value of stress tests in patients who have been stabilized after an episode of unstable angina.¹⁴⁻¹⁶ This claim is supported by the fact that there is a high incidence of complications in the 3 months following discharge in patients who are considered low risk. Although it is possible that we are viewing our sample populations differently (the selection criteria for patients included in other studies were stricter and more extreme than those used for our study), we believe that a recurrence rate of 22% alone for patients requiring readmission would have justified coronary angiography for this type of patient.

We did not find any characteristic that allowed us to identify patients who would have a worse course. It is possible that the introduction of markers for inflammation as a variable, such as C-reactive protein, could be used in the future to identify high-risk patient subgroups.¹⁷

Another controversial element of CPUs is their cost efficiency. In principle, a working CPU is no more than an accelerated diagnostic tool. In this sense, costs should not be increased, as unit can take advantage of its already existing infrastructure and evaluation and performance protocols based on clinical evaluation, cardiac biomarkers, and a stress test can be used. Nevertheless, there are few controlled studies with regard to cost efficiency, and some publications have suggested that these units could render obsolete the overuse of high-cost diagnostic tests.⁴ In the case of our patients, diagnostic tests beyond conventional ergometry and, in some case, an echocardiogram, were not required.

In summary, we concluded that the management of low-risk patients with chest pain in a CPU allows for the proper classification of the patient and early discharge with an excellent medium-term prognosis, avoiding further unnecessary admissions.

Establishing a CPU is not complicated in the material sense and is more a matter of redefining patient care systems than installing sophisticated technology. The point of CPUs is to classify patients by risk status, using appropriate methods to avoid the possibility of high-risk patients being inappropriately discharged and the possibility of low-risk patients being unnecessarily hospitalized. To achieve the goals of the CPU, it is fundamental it involves a multidisciplinary team comprising emergency department physicians and cardiologists, and that continued patient care from primary care physicians is provided.

REFERENCES

1. Ewy GA, Ornato JP. 31st Bethesda Conference. Emergency Cardiac Care (1999). *J Am Coll Cardiol* 2000;35:825-80.
2. Appleby J. ER conditions: critical. *USA Today* 2000;4:01A.
3. Pope JH, Aufderheide TP, Ruthazer R, Woolard RH, Feldman JA, Beshansky JR, et al. Missed diagnosis of acute cardiac ischemia in the emergency department. *N Engl J Med* 2000;342:1163-70.
4. Bassan R, Gibler W. Unidades de dolor torácico: estado actual del paciente con dolor torácico en los servicios de urgencias. *Rev Esp Cardiol* 2001;54:1103-9.
5. Braunwald E, Antman EM, Beasley JW, Califf RM, Cheitlin MD, Hochman JS, et al. ACC/AHA guidelines for the management of patients with unstable angina and non-ST segment elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association task force of practice guidelines (committee on the management of patients with unstable angina). *J Am Coll Cardiol* 2000;36:970-1062.
6. Bayón J, Alegría E, Bosch X, Cabadés A, Iglesias I, Jiménez J, et al. Unidades de dolor torácico. Organización y protocolo para el diagnóstico de los síndromes coronarios agudos. *Rev Esp Cardiol* 2002;55:143-54.
7. Braunwald E, Jones RH, Mark DB, Brown J, Brown L, Cheitlin MD, et al. Diagnosing and managing unstable angina. Agency for Health Care Policy and Research. *Circulation* 1994;90:613-22.
8. Stein R, Chaitman B, Balady J, Fleg J, Limacher M, Pina I, et al. Safety and utility of exercise testing in emergency room chest pain centers. *Circulation* 2000;102:1463-7.
9. Gibler WB, Runyon JP, Levy RC, Sayre MR, Kacich R, Hattemer CR, et al. A rapid diagnostic and treatment center for patients with chest pain in the emergency department. *Ann Emerg Med* 1995;25:1-8.
10. Gomez MA, Anderson JL, Karagounis LA, Muhstein JB, Moores FB for the ROMIO Study Group. An emergency department-based protocol for rapidly ruling out myocardial ischemia reduces hospital time and expense: results of a randomised study (ROMIO). *J Am Coll Cardiol* 1996;28:25-33.
11. deFilippi C, Rosanio S, Tocchi M, Parmar R, Potter M, Uretsky B, et al. Randomized comparison of a strategy of predischARGE coronary angiography *versus* exercise testing in low-risk patients in a chest pain unit: in-hospital and long-term outcomes. *J Am Coll Cardiol* 2001;37:2042-9.
12. Lewis WR, Amsterdam EA. Defining the role of chest pain unit. *J Am Coll Cardiol* 2001;37:2050-2.
13. Lee TH, Goldman L. Evaluation of the patient with acute chest pain. *N Engl J Med* 2000;342:1187-95.
14. Moreno R, López de Sá E, López-Sendón JL, Ortega A, Fernández MJ, Fernández-Bobadilla J, et al. Prognosis of medically stabilized unstable angina pectoris with a negative exercise test. *Am J Cardiol* 1998;82:662-5.
15. Sionis A, Bosch X, Miranda-Guardiola F, Anguera I, Sitges M, Díez-Aja S, et al. Evolución hospitalaria y pronóstico actual de la angina inestable. *Rev Esp Cardiol* 2000;53:1573-82.
16. Castillo Moreno JA, Florenciano Sánchez R, Molina Laborda E, Jiménez Pascual M, García Urruticoechea P, Egea Beneyto S, et al. Prueba de esfuerzo de bajo riesgo en pacientes con angina inestable: ¿Implica un pronóstico favorable? *Rev Esp Cardiol* 2000;53:783-90.
17. Ferreiros ER, Boissonnet CP, Pizarro R, García Merletti PF, Orbeti P, Corsado G, et al. Independent and combined prognostic value of C-reactive protein and stress-test in patients recovering from unstable angina [abstract]. *Circulation* 1999;100(Suppl):I-371.