Chest pain units: A necessity or only a name to encourage patients

Ahmad Reza Assareh[(1)], Nasim Azadi[(1)], Safar Ali Tahmasebi[(1)], Tooba Sahraei[(1)], Razieh Dabbagh[(1)], Ebrahim Hajizadeh[(1)], Kamran Mahdavi[(1)], Ali Heydari[(1)], Mohammad Alasti[(1)]

Abstract

BACKGROUND: Acute chest pain is a common symptom among patients presenting to emergency wards. Identification and admission of patients with real acute coronary syndrome and preventing the hospitalization of people with false diagnosis of coronary syndrome are the most important tasks in emergency wards. The purpose of this study was to investigate the usefulness of designing a special chest pain unit in emergency department of Imam Khomeini Hospital (Ahvaz, Iran).

METHODS: The patients with markers of ongoing cardiac ischemia underwent selective coronary angiography. The chest pain unit protocol was applied to selected patients with no definite evidence of acute coronary syndrome or alternative pathology. The protocol consisted of twelve hours of observation and serial 12-lead electrocardiography, transthoracic echocardiography, and biochemical testing followed by an exercise treadmill test. We compared the number of patients who were discharged after work up, discharged themselves against medical advice, admitted at coronary care unit (CCU), underwent invasive procedures or died between 2007 and 2010.

RESULTS: During 2010, 43% of patients were discharged after evaluation in the chest pain unit. In 2007 however, 26% were discharged following traditional assessments. The admission rate increased from 23% in 2007 to 36% in 2010. The percentage of patients who discharged themselves against medical advice decreased from 37% in 2007 to 14% in 2010. There was not a statistically significant difference between mortality rates in 2007 and 2010.

CONCLUSION: Providing a special chest pain unit in emergency ward in our condition is helpful. It reduces unnecessary admissions and improves patient satisfaction.

Keywords: Chest Pain Unit, Acute Coronary Syndrome, Myocardial Infarction

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Introduction

Acute myocardial infarction is the leading cause of death in all countries including Iran. Failure to diagnose patients with acute coronary syndromes in emergency departments is a serious public health issue. Thus, identifying, treating and admission of these patients on the one hand, and preventing false diagnosis of coronary syndrome on the other, are important responsibilities. Only about 30% of patients admitted to coronary care units (CCU) experience acute myocardial infarction and about 50-60% have acute cardiac ischemia.[1] It has been suggested that using chest pain units would be useful because they decrease unnecessary hospitalization by allowing patients to be further evaluated without being admitted.[1]

We used a chest pain unit at Imam Khomeini Hospital (Ahvaz, Iran) for the first time. The aim of this study was to investigate its usefulness in our conditions.

Materials and Methods

We used the American College of Cardiology/American Heart Association (ACC/AHA 2007) guidelines to estimate the risk of coronary artery disease and risk stratification.[2] Patients with ongoing chest pain, dynamic echocardiographic (ECG) changes, abnormal cardiac injury markers, left ventricular systolic dysfunction, or new regional wall motion abnormality underwent selective coronary angiography. The chest pain unit protocol was applied to selected patients with no definite evidence of acute coronary syndrome or alternative pathology. The protocol consisted of twelve hours of observation and serial 12-lead ECG and transthoracic ECG. Biochemical testing including troponin and creatine kinase isoenzyme MB (CK-MB) levels were also measured on arrival and six and 12 hours after the beginning of pain. Finally, an exercise treadmill test was performed. Patients who

1- Assistant Professor, Department of Cardiology, Imam Khomeini Hospital, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
Correspondence To: Mohammad Alasti, Email: alastip@gmail.com

had ST segment depression in basal ECG or were not able to perform exercise treadmill test underwent selective coronary angiography.

All patients who presented at the internal medicine emergency ward during 2007 and to the chest pain unit during 2010 were evaluated. Comparisons were made between the numbers of patients who were discharged after work up or referred to other wards, patients who discharged themselves against medical advice, those who underwent selective coronary angiography or percutaneous coronary intervention (PCI), were admitted at CCU, underwent cardiac surgery, or died.

Ethical considerations

The study protocol was approved by the ethics committee of Jundishapur University of Medical Sciences (Ahvaz, Iran).

Statistical analysis

Chi-square test was used to compare groups. P values less than 0.05 were considered to be statistically significant.

Results

We considered all patients with chest pain, dyspnea, palpitation, or syncope who presented at the emergency ward during 2007. The patients were referred to the internal medicine emergency ward after early screening. Overall, 5865 patients referred to the emergency ward with cardiac complaints. Of 3876 cases with chest pain, 2154 patients discharged themselves against medical advice. On the other hand, 1512 patients did not have any significant cardiac problem and were discharged. However, 1350 and 849 patients were admitted to the CCU and other wards, respectively. Finally, 168 patients underwent selective coronary angiography or PCI, 18 patients underwent cardiac surgery, and 66 patients died.

We also evaluated all patients with cardiac symptoms who presented at the emergency ward during 2010. They were referred to the chest pain unit after early screening by the emergency medicine specialists. In total, 5818 patients were referred to the chest pain unit. Of 4657 cases with chest pain, 803 patients discharged themselves against medical advice and 2476 patients did not have any significant cardiac problems and were thus discharged. While 2067 patients were admitted to the CCU, 472 cases were referred to other wards. In addition, 382 patients underwent selective coronary angiography or PCI, 48 patients underwent cardiac surgery, and 74 patients died.

Table 1 demonstrates the comparison of the numbers of patients in different groups during 2007 and 2010. There were statistically significant differences between groups in all variables except mortality rate.

Discussion

Acute onset chest pain is a common presentation at the emergency department. It encompasses some life-threatening diagnoses and accounts for a considerable portion of admissions. The most common important diagnosis that should be confirmed or excluded is acute coronary syndrome.[1]

Chest pain units are designed to rule in or rule out acute myocardial ischemia by several protocols and non-invasive modalities.[1] Their use involves the assessment of the likelihood of acute coronary syndrome (and not non-cardiac chest pain) and risk stratification of patients with acute coronary syndrome.[3] Hence, a chest pain unit is based on an accelerated diagnostic strategy containing clinical observation, serial ECGs, and cardiac markers.[1] Assessment of patients with high probability of ischemic heart disease requires a protocol to test cardiac necrosis and ischemia during rest and stress conditions.[4] Therefore, chest pain units do not decrease admission rates for patients who have acute coronary syndrome. They in fact decrease unnecessary hospitalization.[5] Unnecessary admissions of patients can lead to crowding of wards and suboptimal patient care and resource use.[1,6] This benefit is not limited to patients presenting with chest pain but can be applied to patients presenting with exacerbation of heart failure.[1]

Table 1. Comparing the outcome of patients presenting at emergency ward of Imam Khomeini Hospital (Ahvaz, Iran) during 2007 and 2010

	2007	2010	P
Discharged	1512 (26%)	2476 (43%)	< 0.001
Coronary care unit admission	1350 (23%)	2067 (36%)	< 0.001
Discharged against medical advice	2154 (37%)	803 (14%)	< 0.001
Coronary angiography and percutaneous coronary intervention	168 (3%)	382 (6.5%)	< 0.001
Cardiac surgery	18 (0.003%)	48 (0.08%)	< 0.001
Death	66 (1.1%)	74 (1.3%)	0.467

*Statistically significant difference between two groups (P<0.05)

Our results showed that 43% of patients had been discharged after evaluation in chest pain unit during 2010. However, this rate was only 26% using traditional methods during 2007. On the other hand, CCU admission rate was also increased from 23% to 36% using chest pain units. The main explanation may be the decreased number of patients that had discharged themselves against medical advice (37% using traditional methods vs. 14% using chest pain units). It means the emergency ward care has been improved and more patients were satisfied.

The mortality rate increased from 1.1% in 2007 to 1.3% in 2010. However, the difference was not statistically significant. It may be related to the decreased number of patients who had left the emergency ward against medical advice and increased number of patients who underwent invasive procedures during their hospital stay. Consequently, in our conditions, it is useful to provide a chest pain unit in emergency wards of general hospitals to reduce unnecessary admissions and improve patients and their families' satisfaction. Each chest pain unit should have a protocol according to the equipments they can access. Although we performed this task with the least facilities, an ideal chest pain unit should be better equipped. In many cardiovascular emergency centers, radionuclide perfusion imaging and multislice computed tomography scan are used as important tools to assess patients who present with possible acute coronary syndrome.[4] Ideally, cardiac biomarkers bedside testing gives the physician rapid data such as CK-MB and the troponins I and T levels. It thus allows the physicians to quickly stratify risks in chest pain units.[4]

Measuring myoglobin combined with more specific cardiac biomarkers in a serial fashion is also recommended. The negative predictive value of normal myoglobin levels during six hours of observation and without doubling over any two-hour period is 97%. It is most valuable in patients presenting early in the course of symptoms.[4]

Because the patients are in the chest pain unit for at least six hours, providing some comforts that are not generally available in traditional emergency wards (like meals, hospital beds, and television sets) can improve patient satisfaction.[4] A chest pain unit also requires trained nurses because the patients require close monitoring and assessment, serial biomarker testing, ECG, and noninvasive testing.[4]

Study limitations

Our study had some important limitations. First, we did not follow the patients after discharge. Therefore, we cannot estimate the percentage of patients with undiagnosed acute coronary syndrome who had been discharged. Moreover, we cannot estimate the real mortality rate. Second, we did not evaluate the cost-effectiveness of chest pain unit. A comprehensive study to assess the cost-effectiveness of chest pain units can thus be very helpful.

Conclusion

Providing a special chest pain unit in emergency departments of general hospitals or adjacent to it is useful. It reduces unnecessary admission of patients without coronary artery disease and improves patient satisfaction.

Conflict of Interests

Authors have no conflict of interests.

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