

Managing unstable angina and coronary care beds effectively

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Abstract

This article is an evaluation of a new chest pain admission policy at Western Hospital. Our aim was to determine the clinical outcomes of patients with unstable angina treated according to this new policy. It involved attempting to identify a group at low risk of serious complications and to manage them in a general ward area without cardiac monitoring, to reduce the pressure on coronary care unit beds. We conducted a retrospective case note review and concluded that that selected patients with an admission diagnosis of unstable angina can be safely managed in unmonitored medical beds provided mechanisms are in place for their transfer to the coronary care unit if recurrent pain or a complication occurs.

Introduction

Chest pain is a common reason for patient presentation to emergency departments. Some patients will be suffering myocardial infarction and, for that group, the investigation and management of the problem is clear, particularly in terms of the benefits of admission to a critical care area such as a coronary care unit.

For some patients a non-cardiac cause for their pain will be evident. However in a significant number of cases the clinical diagnosis will be that of unstable angina. In practice, this means a history consistent with ischaemic cardiac chest pain in the absence of electrocardiograph (ECG) changes that would diagnose myocardial infarction. In general, this corresponds to the high and intermediate risk groups defined by the United States Agency for Health Care Policy and Research (Braunwald et al. 1994) and the National Health and Medical Research Council (1996).

Over recent years the approach to investigation and management of this group of patients has been changing, particularly as evidence has shown that intensive management of patients with ischaemic chest pain improves outcomes (Lee et al. 1987; Villanueva et al. 1992; McCarthy et al. 1993). In many hospitals, in addition to intensive medical therapy, these patients are admitted to coronary care units. However the benefit of this practice for patients with unstable angina is unproven. This practice places significant stress on a limited number of coronary care unit beds, is costly, and may result in delays to admission (or, on occasion, a requirement to transfer between hospitals) of patients with proven myocardial infarction, thus placing this group at increased risk.

Western Hospital is a 350-bed adult teaching hospital serving a population of approximately 200 000 in the western suburbs of Melbourne. In 1996, Western Hospital adopted new policies for the management of potentially ischaemic chest pain and admission to coronary care unit beds. These policies were developed in response to deficiencies in clinical management and inefficiencies in coronary care unit bed management identified in a review of practice, together with an extensive review of the medical literature. The development and details of this policy have been described previously (Edmonds & Kelly 1997). The policy aimed to encourage aggressive investigation and management of unstable angina and myocardial infarction and to improve the utilisation of coronary care unit beds.

Box 1: Coronary care unit admission policy for patients presenting with potentially ischaemic chest pain

Coronary care unit admission is indicated for patients with:

- a history and ECG changes (ST segment changes, new left bundle branch block) consistent with myocardial infarction
- new ECG changes such as ST depression, T-wave inversion, left bundle branch block
- ongoing pain who require glyceryl trinitrate infusion for control of chest pain
- a history of ischaemic chest pain and a rise on the initial set of cardiac enzymes taken in the emergency department
- any life-threatening arrhythmia requiring continuous cardiac monitoring and ongoing treatment.

Patients with the following features will be managed in an unmonitored general medical bed:

- a history of chest pain with normal ECG and no rise on initial set of cardiac enzymes
- a history of chest pain with no new changes on ECG and no rise on initial set of cardiac enzymes
- a stable arrhythmia not requiring continuous cardiac monitoring.

Any patient in the latter sub-group who develops pain requiring intravenous glyceryl trinitrate for pain control, or who develops a complication requiring coronary care unit management will be admitted/transferred to the coronary care unit.

The coronary care unit admission policy is shown in Box 1. A key feature of this policy is that patients with potentially ischaemic chest pain who:

- have a normal ECG and first cardiac enzyme level in the emergency department, and
- who are not requiring an intravenous glyceryl trinitrate infusion for pain control

would be managed in an unmonitored medical bed in general ward areas. This is a significant departure from previous practice. The policy also called for the transfer to the coronary care unit of patients with recurrent pain or a rise in cardiac enzymes. This article describes the results of an audit of patients with an admission diagnosis of unstable angina. It focuses on myocardial infarction rates, the clinical area of care, the requirement for transfer to the coronary care unit and the clinical outcome.

Method

We conducted a retrospective explicit audit for patients admitted during the two-month period from 1 July to 30 August 1997. All patients with an admission diagnosis of unstable angina, as identified by the emergency department's computerised data management system, were entered into the study. Each patient record was reviewed by a trained research officer for:

- patient demographic data
- the date of admission
- the clinical area to which the patient was admitted
- the results of cardiac enzyme assays
- the clinical outcome, including the occurrence of complications (in particular: transfer to coronary care unit, pulmonary oedema, arrhythmia and death)
- diagnosis at discharge, and
- length of stay.

Myocardial infarction was defined by a rise in cardiac enzymes together with an appropriate clinical history.

Patients were excluded if cardiac enzyme results confirmed myocardial infarction on the first set of enzymes taken in the emergency department. This is because the patient would no longer be eligible for the admission diagnosis of unstable angina. All records were available for review. Hospital records of acute inter-hospital transfers were also reviewed to determine the number of transfers during the study period.

Results

For the study period, 221 patients with an admission diagnosis of unstable angina were identified. Nineteen of these were excluded because of an elevated initial enzyme level that confirmed myocardial infarction rather than unstable angina. Sixty-three patients were admitted to the coronary care unit and 139 to a general ward bed.

The sample is summarised in Table 1. The overall rate of myocardial infarction (defined as a rise in cardiac enzymes) in the unstable angina group was 11% (22/202).

Table 1: Myocardial infarction rates according to clinical area of initial care

Clinical area of initial care	Total number of patients	Number with myocardial infarction during hospital stay (%)
Coronary care unit	63	13 (21)
Unmonitored ward bed	139	9 (6)

It is worth noting that four of the nine patients who suffered a myocardial infarction after initially being treated in an unmonitored bed were transferred into the coronary care unit after complaining of recurrent chest pain prior to the occurrence of the myocardial infarction. Treating physicians chose to treat the remaining five patients who demonstrated an enzyme rise on general medical wards.

Fifteen patients were transferred from general wards to the coronary care unit (15/139; 11%). Fourteen of these transfers were for recurrent chest pain and one was for control of an arrhythmia (rapid atrial fibrillation). Five of these patients (33%) had a cardiac enzyme rise following transfer.

There were four deaths in the study group, an overall rate of 2%. All were inpatients who had suffered myocardial infarction, giving an infarction-related death rate of 4/22 (18%). Two of these deaths occurred in the coronary care unit. Of those that occurred on general wards, one was due to acute renal failure and occurred ten days after admission following a myocardial infarction. The other was due to delayed massive myocardial infarction and cardiac arrest 36 hours after admission with unstable angina. This patient had had four cardiac enzyme assays in the normal range prior to this event.

The discharge diagnoses for the group are summarised in Table 2. Three patients had a discharge diagnosis of myocardial infarction without demonstrating a rise in cardiac enzymes. The reasons for this are outside the scope of this study.

Table 2: Discharge diagnosis for patients with an admission diagnosis of unstable angina

Discharge diagnosis	Number of patients	Percentage of patients
Acute myocardial infarction	25 #	12.0
Atypical chest pain	24	12.0
Unstable angina	131	65.0
Angina	6	3.0
Pneumonia	3	2.0
Acute renal failure	2	1.0
Pericarditis	1	0.5
Pleural effusion	1	0.5
Pulmonary embolism	1	0.5
Carcinoma of the stomach	1	0.5
Cardiac failure	1	0.5
Pleuritic chest pain	1	0.5
Transient ischaemic attack	1	0.5
Chest wall pain	1	0.5
Epigastric pain	1	0.5
Oesophageal spasm	1	0.5

Note: Three patients were assigned the diagnosis of myocardial infarction without demonstrating a rise in cardiac enzymes, so did not fit the study definition of myocardial infarction.

There were four acute inter-hospital transfers of patients with cardiac problems because a coronary care unit bed was not available – two in each month. Two of these patients had a diagnosis of unstable angina, one of myocardial infarction and one of atrial fibrillation.

Discussion

In most Australian hospitals it would be usual practice to admit patients suffering clinical unstable angina or potentially ischaemic chest pain to the coronary care unit. The rationale for this would seem to be an assumption that the benefits afforded by the unit to patients with myocardial infarction also apply to those with unstable angina. This assumption has not been confirmed by research. Additionally, the resources thus consumed would be considerable (Katz et al. 1996).

Recent studies from the United States of America have shown that a sub-group of these patients can be safely managed in telemetry areas. They have also raised the question

about the need for monitored beds for these patients (Hollander et al. 1997). At Western Hospital, based on the available evidence in the medical literature, a chest pain admission policy was developed which attempted to identify a group at low risk of serious complications and to manage this group in a general ward area without cardiac monitoring. The aims of the policy were to improve the efficiency of utilisation of coronary care unit beds, to improve access to coronary care unit beds for patients who had suffered myocardial infarction and to provide safe management for patients suffering unstable angina. The results of this study suggest that the policy is meeting these aims.

The criteria defined in the policy discriminate between patients with clinical unstable angina with a high risk of complications and those with a low risk of complications. This is evidenced by the difference in myocardial infarction rates between the groups admitted to general wards and the coronary care unit. This difference is even more marked if it is remembered that four of the patients in the low risk group who suffered myocardial infarction during their hospital admission were transferred to the coronary care unit because of recurrent chest pain prior to suffering a myocardial infarction.

The change in policy has also translated into less pressure on coronary care unit beds. During the study period there was an average of two patients per day assigned to a general bed who would previously have been admitted to the coronary care unit. For a unit with six acute and four step-down beds, this is a significant change.

There were four acute inter-hospital transfers of patients with chest pain during the two-month study period. This compares to 17 for the month of July 1996, a representative month prior to the introduction of the policy. This is a major change and a significant cost saving to the hospital, both in terms of lost WIES (weighted inlier equivalent separation) units and transfer costs. It is also a benefit (in terms of better access to coronary care unit beds as well as safety and convenience) to those patients who, before the study period, would have been transferred to another hospital.

The outcome for patients initially admitted to general wards has been acceptable. Two deaths in this group (1% mortality) is within expected parameters. Neither death would have been prevented if the patient had been admitted to a coronary care unit bed in the first instance.

The approaches taken in this policy are somewhat at odds with the guidelines for the management of unstable angina published by the United States Agency for Health Care Policy and Research (Braunwald et al. 1994) and the National Health and Medical Research Council (1996). These organisations advocate that patients in high or intermediate risk groups (thus including most of the patients in this study) should initially be managed in an 'intensive care unit or telemetry bed'. The scientific basis of this recommendation is unclear but probably relates to the risk of myocardial infarction and thus the risk of serious arrhythmia.

The only published data on this subject are reported by Katz et al. (1996). Their study looked at patients with unstable angina or suspected unstable angina, as classified by

the Agency for Health Care Policy and Research guidelines (Braunwald et al. 1994). It reported a myocardial infarction rate of 5% in the intermediate-risk group and 15% in the high-risk group. The mortality of the groups was 1.2% and 1.7% respectively. Due to different methodologies and a lack of detail in the report of their study (in particular with respect to complications and outcomes) comparisons with the current study are not possible.

In our study, the admission diagnosis of ischaemic cardiac pain (myocardial infarction, unstable angina or angina) was confirmed in 80% of cases, suggesting that emergency department assessment was quite accurate. In addition, a number of other important diagnoses were made as the result of inpatient investigation including pneumonia, pulmonary embolism and carcinoma of the stomach. Twelve percent of patients (24/202) had a final diagnosis of atypical chest pain/chest wall pain or similar. It might be argued that this group might have been able to be investigated and discharged from the emergency department. The fact that these diagnoses were made after repeated ECG and enzyme assays and a prolonged period of observation would militate against this argument.

Several approaches have been proposed to risk stratification for patients with unstable angina. These include:

- the use of chest pain centres (Gaspoz et al. 1994; Gibler et al. 1995)
- troponin T and I assays (Hamm et al. 1992; Gohkan Cin, Gok & Kaptanoglu 1996; Stubbs et al. 1996; Kerr & Dunt 1997; Luscher et al. 1997; Pettijohn et al. 1997; Benamer et al. 1998; Brscic et al. 1998; Olatidoye et al. 1998; Polamczyk et al. 1998), and
- echocardiography (Mohler et al. 1998; Stein et al. 1998).

A detailed discussion of the evidence relating to these approaches is beyond the scope of this article. However it is unclear whether these approaches will be of assistance with risk stratification in respect to the need for coronary care unit beds, due to issues of:

- availability
- applicability to the heterogeneous population who present to the emergency department with chest pain
- conflicting evidence regarding the tests' utility as independent predictors of in-hospital events, and
- lack of clarity about how these fit into the decision-making process in the emergency department.

There are some limitations that must be considered in interpreting this study. As a retrospective study it is reliant on the quality of data available. It is possible that some patients with the clinical syndrome of unstable angina were misdiagnosed or misclassified by admitting staff. Although it is not possible to quantify, it is unlikely that this represents a large number of patients and it should not have introduced a

systematic bias in the sample studied. In addition, although an explicit review was conducted, it is possible that some complications were not recorded in the medical record so these may be underestimated. A larger prospective study is planned for the future.

Conclusion

This study suggests that selected patients with an admission diagnosis of unstable angina can be safely managed in unmonitored medical beds provided mechanisms are in place for their transfer to the coronary care unit if recurrent pain or a complication occurs. As the numbers in this study are modest, a large prospective study should be conducted to confirm these findings. It also indicates that a chest pain admission policy can improve the efficiency of utilisation of coronary care unit beds and reduce the number of acute inter-hospital transfers of patients with ischaemic heart disease.

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