Purchasing for Quality: the Providers' View

Purchasing care for patients with acute myocardial infarction

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Patients with suspected myocardial infarction (MI) now account for a considerable proportion of acute medical admissions, whose number seems to be rising inexorably. Figure 1 shows the rise in such admissions to the Nottingham hospitals since 1982.¹ No sensible provider is going to agree anything with a purchaser, based on the previous year's figures, even though we might have hoped that the number of patients admitted with heart attacks each year would level off and eventually decline. Both purchaser and provider clearly want all patients with suspected MI to receive the best possible quality of care, but with the high and increasing admission rate it is unlikely that all patients will receive "ideal" management. The purchaser and provider will have to agree on acceptable and attainable targets, taking into account local facilities and budgets. The problem is to define those aspects of care that are "ideal," "acceptable," and "attainable."

Figure 1 also shows that the increase in admissions has been due to patients with unconfirmed MI. These patients would "ideally" not have been admitted or extensively investigated, but unfortunately it is not easy initially to predict which patients have had an infarction. A normal electrocardiogram on admission certainly does not exclude this diagnosis, and, although patients with a normal initial electrocardiogram have a good prognosis, some do die. Junior doctors are, very properly, hesitant about not admitting patients with chest pain just because there is no clear diagnosis of infarction. Most of the patients admitted without a proved infarction do have coronary disease, but eventually the investigations do not confirm that a new event

has occurred. In fact, experience in Nottingham has shown that patients with initially suspected but eventually unproved infarction require similar resources to those with confirmed infarction.²

The purchaser and provider therefore need to agree on a strategy that will permit early identification — so far as that is possible — of the patients most likely to benefit from specialist care; that will ensure that a high proportion of patients who would benefit from treatments of proved efficacy actually receive them; and that will allow efficient and sensible management of patients found not to have infarctions. To define this strategy it is simplest to follow the patient sequentially through the stages of hospital admission. In considering the appropriate quality of care for patients with suspected MI we shall take as self evident the needs for quality care that apply to all patients in hospital. We shall avoid suggesting numerical targets for the various delays and procedures associated with treating patients with suspected MI, for these will inevitably vary in different institutions. We shall, however, point out some activities for which each hospital should be expected to review its current practice and then set attainable targets.

Prehospital management

The ambulance service is not the responsibility of the hospital provider, but it is now accepted that all ambulances carrying emergency patients should be equipped with a defibrillator and that their crews should be suitably trained.* Such training is often to some extent the responsibility of the hospital team, and its costs may have to be included as part of high quality hospital care.

The purchaser, provider, and ambulance service need to agree a policy for prehospital management. For the time being this should not include the administration of thrombolytic agents by ambulance crews, but the immediate use of aspirin should be encouraged.* The responsibility of a general practitioner (GP) who elects to give thrombolytic agents needs to be defined according to local circumstances. Education of GPs is necessary but can

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Fig 1 Total number of admissions of patients with suspected MI at two Nottingham Hospitals, 1982-90

* Accepted good practice unsupported by published evidence.

be time consuming, and again its costs can reasonably be included as an aspect of quality.

Reception at hospital

Two things influence a patient's initial reception. Firstly, it has long been recognised that most deaths occur soon after the onset of symptoms; half of those patients who are going to die are dead within two hours.³ Secondly, half of the patients with suspected heart attacks call for help in the first instance from their GP, and half summon an ambulance by an emergency telephone call. The involvement of a GP is a main cause of delay in hospital admission,⁴ and as GPs now appreciate the importance of resuscitation from cardiac arrest and of the early use of thrombolysis, they are tending — and should be encouraged — to send patients to hospital simply on the basis of a description of the symptoms over the telephone. Increasingly, patients are therefore presenting in the accident and emergency department without prior assessment: initial diagnosis and management must therefore be expected in that department and it is not reasonable to suppose that many patients will be admitted directly to a coronary care unit (CCU). The problems with receiving patients with heart attacks in accident and emergency departments are, of course, that these departments are by their nature busy, that they are subject to large and sudden variations in demand, and that the safe and efficient management of emergencies has to take priority over the comfort of patients without immediate needs.

The precise facilities available in an accident and emergency department for receiving patients with suspected MI as opposed to those who have had accidents obviously depends on the size of the population served, the type of hospital, and the department's design. Although it is desirable that delay in this department should be minimised, patients should be resuscitated if necessary, their condition diagnosed and appropriate treatment given. It is reasonable that an electrocardiogram should be recorded in the department* as this is an essential prelude to thrombolytic treatment, but there is little need for the apparently inevitable chest radiograph,[†] which seldom contributes to the management of a patient whose most likely diagnosis is MI and only delays definitive treatment.

Finding an appropriate bed for the patient is usually the main problem: hospitals handling large numbers of emergencies need a relatively high proportion of empty beds at all times and, by some standards, therefore need to appear inefficient. Agreement between purchaser and provider about the bed occupancy and turnover interval of the hospital as a whole should form a fundamental part of any plan for managing patients with suspected MI.

In a busy accident and emergency department a receiving room for medical emergencies is ideal, and purchasers will need

to accept that providing and staffing such a facility is expensive.

Setting targets for managing patients with suspected MI in the accident and emergency department is extremely difficult — and pointless — unless a procedure is established that records whether or not the target has been achieved. It is easy to meet targets and maintain accurate records in a quiet department but very difficult at busy times or during staff shortages. The purchaser can, however, reasonably require that patients are seen by an accident and emergency sister or charge nurse immediately on admission and that electrocardiographic monitoring is instituted within five minutes of arrival*; that the patient should be seen by medical (as opposed to accident and emergency) staff within 20 minutes of arrival; and that a decision is taken about thrombolysis (see below) within 30 minutes. This is possible only if it can be ensured that the medical team is not committed to outpatient clinics on "take" days.

Admission to CCU or medical ward

Ideally, all patients suspected of having an MI would be admitted to a CCU so that if any complications occurred they could be dealt with immediately by experts. In fact, there is no evidence that in a hospital with adequately staffed and equipped medical wards admitting patients with an MI to a CCU reduces mortality. Patients admitted to CCUs do have a lower mortality, but this is almost entirely because older patients tend to be admitted to ordinary wards.^{4,5} Few CCUs operate any sort of age related admission policy, but hospital mortality increases sharply with increasing age wherever the patient is managed.

Nevertheless, a CCU is highly desirable in any hospital receiving medical emergencies. It is perhaps best defined as a ward in which nurses are trained in defibrillation, in managing arrhythmias, and in using special procedures such as temporary pacing and haemodynamic monitoring, and in administering certain approved intravenous drugs. Such units permit the concentration of expensive equipment and specially trained nurses in an environment in which both can be used most efficiently, and in which standards can be maintained. Special units provide a focus for training and research within the hospital. CCUs are necessary for a patient with complications* and desirable, but not essential, for those without: the problem is how to identify patients who will remain free of complications.

All special units handling emergency admissions face the problem of random fluctuations in demand. Although the annual demand for beds may be estimated approximately, there will be wide day to day variations in the number of admissions, and a

* Accepted good practice unsupported by published evidence.

† Redundant practice unsupported by published evidence.

Fig 2 Distribution of daily admissions of patients with suspected MI to CCU (A) or medical ward (B) at Nottingham University Hospital in 1990

unit can change from being empty to full very quickly. Figure 2 shows the variation in admission of patients with suspected MI to our hospital in 1990; in addition, about 20 patients a month were transferred to the CCU from other hospital wards. As special units are more expensive to run than ordinary wards it is unrealistic to suppose that sufficient beds can be made available in such units for all patients with suspected MI. Calculating the appropriate number of beds for a CCU is a complex mathematical exercise, and the purchaser will have to decide what proportion of admissions are required to be admitted to a CCU and agree funding accordingly.

The number of beds required depends on the length of time each admitted patient stays in the unit. By convention patients stay for 48 hours, though shorter stays are possible for patients without infarction if the laboratory results can be obtained quickly. Total "efficiency" of bed use is impossible, for it is unpleasant for both patients and nurses if the turn round is extremely rapid, and it is highly undesirable that patients should be transferred between wards at night. As a basis for comparison, the two Nottingham hospitals that receive medical emergencies serve a population of about 600 000 and have 13 CCU beds between them. Of nearly 4000 admissions of patients with suspected MI in 1989, 2120(53%) patients were sent to a CCU and the remainder to an ordinary medical ward because the CCUs were full. Selection by junior staff in the accident and emergency department meant that 39% of patients admitted to the CCU and 13% of those admitted to the ward were patients in whom MI was eventually confirmed.

The facilities provided for patients with MI are equally important for patients with various other medical problems – most obviously those with cardiac arrhythmias not associated with infarction and those with conditions such

as diabetic ketoacidosis, who might benefit from invasive haemodynamic monitoring. If space permits, the concept of the "medical high dependency" ward is probably superior to that of the CCU, which implicitly is restricted to patients with suspected MI. The high dependency unit is not, however, the same as an intensive care unit: ideally, patients with suspected MI should not be managed in the same surroundings as critically ill patients, who may require ventilation.

Facilities to be provided by CCUs

STAFF

The necessary staffing of a CCU will depend on whether the unit simply handles patients with suspected MI or whether patients with other severe medical problems, who usually require more nursing time, are admitted. An ideal nursing complement would be one nurse on duty for every two beds*: an eight bed unit would thus need four nurses per shift, 12 per day, and an establishment of 24 to allow for sickness, and so on. A ratio of one nurse to three beds might be adequate if only patients with MI were admitted, but under no circumstances can there ever be fewer than two nurses present in the unit, one of whom should be of F, G, or H grade. At least half of the nurses on the establishment should be ENB qualified in coronary or intensive care nursing, or both, or in cardiothoracic nursing. The trained nurses should be permitted to defibrillate,* to give intravenous drugs, and to initiate drug treatment according to a defined protocol, and they should be allowed to take blood samples. They should be trained to assist medical staff during invasive procedures, and they must understand monitoring equipment and the information it produces and be able to identify and rectify simple faults in the equipment they use. The staffing level of nurses and the degree of nurse training are probably the most important aspects of quality in the care of patients with suspected MI. The costs are easily identified, and a provider will insist on suitable funding if asked to provide a service of good quality.

Medical staffing is also very important and will have to be negotiated between purchaser and provider. It is unrealistic, and in the long term probably undesirable, for all patients admitted with suspected MI to be under the direct care of a physician with a special interest in cardiovascular disease. In most hospitals the workload would be too great, and there would be an inequitable division of emergency work among physicians. More importantly, junior staff and medical students not attached to the "cardiac" firm would not gain experience in managing patients with one of the most common and most important diseases. However, a purchaser should expect a cardiovascular physician to carry overall responsibility for organisation of the CCU and the special training of its nurses,* and who should be expected to visit the unit daily and

* Accepted good practice unsupported by published evidence.

to be available to advise on managing difficult problems. The physician should also be responsible for training junior staff in procedures such as resuscitation and temporary pacing. Purchasers should expect that all patients in the unit should be managed according to an agreed therapeutic policy: this will ensure that physicians with other special interests maintain an up to date approach to managing MI and protect the nurses in the unit from having to deal with a wide variety of individual preferences on the different medical firms.

EQUIPMENT

The CCU should be purpose built and situated as close as possible to the accident and emergency department and the medical wards. It should be large enough to allow emergency treatment of individual patients without undue stress being imposed on the others and to permit mobilisation of patients as soon as their condition permits. A balance has to be struck between "high tech" and "home comforts." Nearby facilities including bedrooms for relatives and on call staff are important. Each bed should be equipped with an electrocardiographic monitor linked to a central console at the nurses' station where electrocardiograms can be displayed and recorded. More advanced monitoring is not needed at each bed, but provision is needed for a few patients (perhaps one in four) to have haemodynamic monitoring: even though it is impossible to prove that invasive monitoring techniques such as Swan-Ganz catheterisation improve survival, accurate treatment of patients with acute heart failure is very difficult without it. Facilities for telemetric monitoring for at least half the beds is highly desirable for this permits and encourages early mobilisation. Facilities for inserting temporary pacemakers should also be provided; 3% or 4% of patients admitted to the unit will require these.²

Patients who have rhythm disturbances or haemodynamic problems requiring special facilities clearly need to be in a special unit, but whether the use of thrombolytic treatment in patients with MI without complications should be limited to a CCU is less obvious. At a pragmatic level, the supervision of the infusion of the thrombolytic agent and the subsequent heparin requires a level of nursing that may well not be available in an ordinary ward. Theoretically, patients receiving thrombolytic agents need to be in special units because of the increased incidence of arrhythmias, but in fact these are not associated with an increase in clinical events⁶ and monitoring is not absolutely necessary. Thrombolysis is, however, associated with bleeding (which, admittedly, is usually unimportant), symptomatic bradycardia, and hypotension. The nurses need to have adequate experience in recognising the importance of these problems and in dealing with them, and it is probably this that necessitates thrombolysis being restricted to special units. If such a policy is followed,

Medical and nursing practices contributing to high quality care of patients with suspected MI

Medical treatment

Thrombolysis
Aspirin
β blockers

Patient management

Accident and emergency:	Rapid assessment of admission
Hospital:	Admission to CCU when feasible
	Adequate CCU nursing levels
	Appropriate CCU nurse training
	Patient education

inevitably some patients who might have benefited from thrombolysis will not be treated simply because they had to be admitted to ordinary wards.

Treatment of patients with proved infarction

Routine medical treatment for patients with MI is now well defined, and purchasers and providers must both ensure good clinical practice.

Thrombolysis reduces the mortality at one month in patients thought likely to have had an infarction from about 13% to 11%.^{7,8} Early treatment is more effective than late treatment, but suggestions that treatment within one hour of the onset of symptoms have a dramatically better effect⁹ have not been substantiated by later trials. Although the benefit of treatment is still detectable up to 12 hours, current convention, pending the results of ongoing trials, suggests that thrombolysis is relatively inefficient after six hours. Uncertainty about the "window" for thrombolysis makes target setting unwise. It would be simplistic to require that all appropriate patients should be treated within (say) one hour, for it is sometimes reasonable to wait for a measurement of creatine kinase before deciding whether to give thrombolytic agents or not. A requirement that time from arrival to treatment should be recorded for all patients* would probably be sufficient to ensure that treatment was started with appropriate rather than undue haste. Similarly, a requirement to record the reason why a patient was not given thrombolytic treatment will probably ensure that most patients who should receive this treatment do so.

To be considered eligible for thrombolytic treatment patients should have an electrocardiogram on admission that at least suggests a new infarction and should be free of any condition that might increase the risk of bleeding. Age itself is not a contraindication to thrombolysis. These criteria prevent most patients admitted with suspected infarction

* Accepted good practice unsupported by published evidence.

from being given a thrombolytic agent: in Nottingham in 1990 only 304(14%) of 2143 patients admitted within six hours of the onset of symptoms were so treated; in most thrombolytic agents were not given because the electrocardiographic criteria were not met. Purchasers and providers could try to establish a reasonable target level of treatment for patients with a definite MI, but this will depend on an agreement first about the use of thrombolysis in the ward as well as the CCU.

The cost of thrombolytic treatments depends on the agent used. The cheapest (streptokinase) seems as effective as the most expensive (recombinant tissue plasminogen activator, rtPA),¹⁰ but antibodies to streptokinase persist for at least four years after the first course of treatment so provision is needed to purchase rtPA for the substantial minority of patients who need a second course of treatment.

Aspirin further reduces the mortality at one month from 11% to 9%⁷; its use has few contraindications. β blockers also reduce mortality,¹¹ though it is not certain that their effect adds to that of streptokinase in the short term or of aspirin over the long term. Current knowledge indicates that long term prophylaxis with β blockers should be prescribed. Most patients should be discharged taking aspirin and a β blocker, and if they are not the reason should be recorded.

Plenty of evidence shows that six or seven days in hospital is sufficient for patients with uncomplicated infarction.¹² In Nottingham the average length of stay of all patients admitted with suspected MI in 1989 was 7.2 days, or 5.8 days if the few patients with prolonged admissions were excluded.

Investigations

Patients admitted with suspected MI will impose a considerable workload in terms of blood counts, biochemical tests, chest radiographs and electrocardiographic recordings,² all of which are essential to establish the diagnosis. It is doubtful whether it is worth defining or recording the ideal number of tests, but a purchaser should expect a provider to ensure that a discharge summary is prepared that contains the information on which the final diagnosis is based. However, the extent to which such patients are investigated by more specialist techniques, such as treadmill testing and coronary angiography, will depend on the interests of the physicians and the willingness of the purchasers to pay.

Treadmill testing after MI can identify patients at high risk of subsequent events,¹³ and for this reason it is sometimes advocated as a routine investigation, especially in younger patients. However, no one knows when this test is best done (abnormalities become less common with time from infarction), what exercise protocol should be used, or what constitutes an "abnormal" result. Worse, even though patients at higher

risk can be identified, it is far from certain that any intervention resulting purely from the exercise tests – as opposed to decisions based on the patient's symptoms – will influence survival. It is therefore acceptable to delay any exercise testing for a month after discharge, and if the patient has by then returned to full activity without chest pain it is probably unnecessary. Agreements between purchasers and providers on the costs of managing patients with an MI should include an allowance for an agreed proportion (perhaps 10%) to have an exercise test.

The same argument applies to post-infarction angiography. In some centres in the United States a quarter of patients admitted with suspected infarction will have a coronary angiogram during that admission.¹⁴ However, two clinical trials showed that early angiography and percutaneous transluminal coronary angioplasty after thrombolysis is harmful^{15 16} and clearly should not be undertaken. Some cardiologists may recommend later angiography for younger patients who have had an MI, but there is little supporting evidence unless the patient has angina.

Rehabilitation after infarction

Rehabilitation programmes are becoming fashionable¹⁷ despite a lack of convincing evidence of their value. It has not been shown that a programme of supervised exercise prolongs survival: it can undoubtedly increase physical fitness and thereby mental wellbeing, but patients who have had an MI probably do not specifically need such a programme. If the purchaser either perceives value in rehabilitation programmes or decides to bow to consumer pressure then there is no particular difficulty in setting them up, but they will have to be properly funded.

Rehabilitation is, of course, more than an exercise programme; it includes education about smoking, weight reduction, and so on, and increasing the patient's self confidence is of major importance. Most patients will, however, return to their former activities or jobs fairly quickly if they follow the simple advice of the CCU nurses at the time of admission, the hospital doctors, and their general practitioner. All this constitutes good and simple clinical practice and does not require specific resource allocation. The purchaser can reasonably require that all patients and their relatives are given advice and literature* (such as that provided free by the British Heart Foundation) on recovery after a heart attack. A defined policy for this education should be established and responsible individuals identified: this is a function that can ideally be carried out by appropriately trained nurses, and the nursing budget must accommodate the time needed.

It is not clear whether it is worth establishing rehabilitation programmes for all patients admitted with suspected infarction,

* Accepted good practice unsupported by published evidence.

for a few selected such patients, or whether such programmes really need funding priority in an underfunded service.

It is obviously highly desirable that all patients with a continuing complication should be reviewed in an outpatient clinic. Conventionally, all patients attend a clinic once after discharge after an MI, but for patients without complications this is of unproved value, provided their general practitioner has the time and interest to ensure a full recovery has occurred. Purchasers should expect that at least three quarters of patients will need to be reviewed in a clinic, and should calculate funding accordingly.

Role of audit

Purchasers can reasonably expect an audit of the provider's performance in managing patients with suspected MI. Audit of outcome as measured by mortality is probably not helpful because it is too dependent on case mix and, particularly, on the age structure of the patient group. Audit should be restricted to those aspects of care that are of proved or almost proved benefit: delay from arrival at hospital to initiation of treatment, and the use of thrombolytic agents, aspirin, and β blockers. The hospital discharge summary should contain all of this information, and this document (which needs to be produced anyway) will form the basis of most audit procedures.

It would be reasonable also to audit management policies that bear heavily on costs without having proved impact on outcome,* and in this category come the proportion of patients admitted to a CCU, the length of stay, and the use of defined investigations such as exercise testing and coronary angiography. To make this type of audit sensible the purchaser and provider will have to agree at the outset on the norms of treatment or alternatively comparison will have to be made with other centres or relevant published series. Practices that are to be audited need constantly to be reviewed to take into account new advances in managing patients with MI. The purchaser will have to identify funds for audit, which is time consuming if it is to be done properly.

Conclusion

Some aspects of the management of patients with suspected MI have been defined by the results of adequate clinical trials, but many have not. Purchasers and providers will have no difficulty in agreeing that treatment of proved value should be given to all suitable patients, but there remains room for considerable disagreement about the necessary funding for other procedures. Admissions of

patients with suspected infarction seem to be increasing every year, and this must be taken into account when business plans are agreed. It is unlikely that all patients can ever be expected to receive ideal treatment, and when fixing the budget purchasers will have to define the level of care they are prepared to accept. Providing, ensuring, and continually improving the quality of care of patients with suspected myocardial infarction can never be cheap, and the costs of each phase of patient management need to be properly assessed. The final contract for patient care must reflect quality as well as cost.

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