Do we need new clinical standards in management of acute myocardial infarction?

Matthew W Cooke

Are the standards against which we measure the quality of AMI care nearing the end of their use?

Few would deny that the management of acute myocardial infarction (AMI) has improved significantly since the introduction of National Service Framework standards in 2000. But are we truly delivering the best care achievable to every individual?

According to the most recent report from the Myocardial Infarction National Audit Project, 58% of patients with AMI in England are now receiving thrombolytic treatment within 60 min of calling for professional help compared with just 22% in early 2001.¹ The proportion of patients receiving thrombolytic treatment within 30 min of arrival at hospital has almost doubled over this time (from 44% in 2001 to 83% in 2006), and 88% of hospitals now provide thrombolytic treatments to 75% of their eligible patients within 30 min of the patient's arrival at hospital. With similar standards of excellence being met in the provision of secondary prevention medication (97% of patients with AMI receive aspirin, 92% receive β -blockers and 96% receive statins), there seems to be much to support the recent statement from the National Director for Heart Disease, Roger Boyle, that "Patients with heart attack are being treated at a level of excellence that is unsurpassed anywhere in Europe or beyond."¹

The difficulty, of course, will be to maintain the impressive momentum that we have built up over the past 5 years. Indeed, there is already evidence that the pace of progress is slowing down. In the past 2 years, there has been improvement neither in door-to-needle times nor in the percentage of hospitals providing thrombolytic treatment to 75% of eligible patients.

Roger Boyle claims that this is because "it is difficult to improve on services that are already near to the optimum". But it is equally plausible that the standards against which we are measuring the quality of emergency AMI care are finally nearing the end of their useful life. Indeed, the door-to-needle time standard has

already been "de-emphasised" in favour of the call-to-needle time, which offers a more clinically relevant and user-focused reflection of the quality of care delivered.

So, do we need new clinical standards in AMI care?

Certainly, there are a number of viable candidates waiting in the wings. For instance, measuring the time between onset of symptoms and the delivery of reperfusion therapy would provide an indication of the efficiency of care and also of how well at-risk patients are being identified and encouraged to report their symptoms promptly. Targets currently focus on "barn door" myocardial infarction, which does nothing to promote improvements in diagnosing the less obvious cases. Truly patient-focused goals would be to improve outcome for everyone who has a heart attack, whatever the challenges of the clinical situation. New standards should be challenging, not restricted to what we think might be achievable soon.

REPERFUSION RATES

Measuring reperfusion rates would indicate how quickly treatment has been offered and how effective it has been. The increasing availability of primary percutaneous coronary intervention (PPCI) suggests that we should soon be auditing call-to-balloon and call-to-needle times. It has even been suggested that the number of aborted infarcts should be recorded as an indication of how well we are managing those patients who present within the first hour after symptoms.² This, of course, would require us to agree on a single definition of an aborted infarct.

All of these indicators have their merits as potential clinical standards. However, as with the current National Service Framework standards, all of them provide a fairly one-dimensional view of the quality of care on offer. It is no surprise that once a hospital begins to measure certain criteria, its performance over

those criteria begins to improve. But do targets stop continuing improvement by inducing complacency once the target is achieved? What about performance in other areas of AMI care (areas, perhaps, that are not so easily measured but, nevertheless, equally critical to the quality of care)? Indeed, how do we ensure that our clinical standards are driving forward and challenging our whole systems of care rather than simply measuring individual elements within them? In short, how do we ensure that all our patients receive all the care they deserve?

CARE BUNDLE

One recent concept that seeks to address these issues is the care bundle. A care bundle has been defined by the Institute for Healthcare Improvement, Cambridge, Massachusetts, USA, as "a structured way of improving the processes of care and patient outcomes. It is a small, straightforward set of practices—generally three to five—that, when performed collectively and reliably, have been proven to improve patient outcomes."³

All the interventions within a bundle should ideally be based on level 1 evidence and already be accepted as good practice. Inevitably, there will be areas where this level of evidence is not available and the reason for choosing the standard must be transparent. They are often those used in traditional audit, but look at whether the individual has received a complete array of care to the standards specified. A care bundle is therefore not a simple checklist of desirable interventions. It is a cohesive unit of steps that must all be completed to succeed. A care bundle is either achieved or not achieved. It is inappropriate to state how many components have been achieved because just one omission indicates that an individual patient has failed to achieve optimal care. The only reason for analysing individual components is as a guide to where global improvements are required, but this risks focusing on treating the figures and not the individuals.

The concept of care bundles is already being used successfully in several areas of medicine. For instance, it has been shown that the highest potential survival rate from cardiac arrest can only be achieved when the cardiac chain of survival, the care bundle in cardiac arrest, occurs as rapidly as possible on site. Each minute's delay causes the chances of a successful outcome to fall by 7–10%.⁴

In the management of ventilator-associated pneumonia, compliance with the care bundle has been shown to reduce the condition by an average of 44.5%.⁵ The Surviving Sepsis Campaign recently introduced the concept of care bundles in

clinical practice with the goal of reducing mortality by 25% in 5 years.⁶ Non-compliance with the 6 h sepsis bundle has been associated with a more than twofold increase in hospital mortality, whereas non-compliance with the 24 h sepsis bundle resulted in a 76% increase in risk for hospital death.⁷ This study also showed a serious deficit in some elements that most would have presumed was always undertaken, highlighting the need to ensure that the basics are done well.

The management of AMI is ideally suited to the care bundle concept as there are already several practices that are widely recognised as resulting in improved survival after myocardial infarction and well-recognised European guidance.¹⁻³ Developing a care bundle and using it as a clinical standard or audit measure should help ensure that individual patients are receiving the whole package of recognised correct treatment.

So what practices should we include in the AMI care bundle?

At a meeting of the National Health Service Benchmarking Club last year, James Sumner, head of modernisation at St Helens & Knowsley Hospitals Trust, suggested a single care bundle for the management of ST-elevation myocardial infarction (STEMI).⁸ This consisted of:

- thrombolysis;
- aspirin 300 mg administered within 60 min of call for help;
- aspirin/clopidogrel 75 mg commenced within 24 h of admission;
- ACE inhibitor/angiotensin II receptor antagonists commenced within 48 h of admission;
- β -blockers commenced within 48 h of admission;
- atorvastatin 80 mg if total cholesterol >6 mmol/l or simvastatin 40 mg if total cholesterol <6 mmol/l within 48 h of admission;
- echocardiogram before discharge; and
- phase I cardiac rehabilitation undertaken during admission.

Although this undoubtedly represents good practice, its nine different elements are perhaps too unwieldy to fit the true bundle concept, and stray a little too close to becoming a simple checklist. Rather than trying to fit the whole of STEMI management into a single care bundle, it might be more practical to develop two separate bundles: one for acute management and the other for secondary prevention.

In this way, the acute care bundle might require that within 1 h of calling for help, patients with STEMI should have received (where appropriate):

- aspirin and/or clopidogrel;
- nitrate;
- morphine;
- thrombolysis⁴ and appropriate heparin,⁵ or an intervention resulting in reperfusion; and
- oxygen.

It is vital that mechanisms are in place to ensure that the care bundles are responsive to new evidence but do not try to respond to every study as it is published.

The inclusion of a time limit on this bundle corresponds with recent evidence showing that reperfusion treatment within 1 h is not only associated with better survival but, that in 25% of cases, may actually abort the infarct.² It is however important to remember that a "sooner the better" approach is best. We see ambulance services that do not undertake prehospital thrombolysis because they already achieve the target, but do not analyse whether prehospital care could result in even quicker reperfusion. The care bundle should also focus on the patient, so it does not relate to where an intervention is done, so long as it is done at the earliest and safest point in the patient's care.

The secondary prevention bundle might require the patient to receive:

- ACE inhibitor/angiotensin II receptor antagonists within 48 h of admission;
- β -blockers within 48 h of admission;
- statins within 48 h of admission;
- echocardiogram before discharge;
- phase I cardiac rehabilitation during admission; and
- referral to post-myocardial infarction clinic.

This is likely to be based on the National Institute for Health and Clinical Excellence recommendations⁶ currently being developed.

Some local circumstances such as geography, infrastructure and service provision may dictate the practices to include in the bundle. Thus, areas with a functioning PPCI service could include PPCI as an alternative to thrombolysis. Indeed, the care bundle could be used to drive forward progress towards the "optimum reperfusion pathway" as discussed recently by Bristol emergency medicine consultant Jason Kendall.⁹ However, local circumstances must not be allowed to act as excuses. Universal bundles can also act as strong levers to introduce better infrastructure.

Clearly, the concept of care bundles in myocardial infarction management requires clinical study before being accepted as a suitable indicator for audit. However, this should not be difficult, as,

in most cases, the data are already there. A retrospective analysis of the range of interventions offered to patients with STEMI and their outcomes could easily be completed.

Such a study would indicate which practices should be included within the care bundle, and what effect adherence would have on mortality and morbidity. It is likely that a well-developed care bundle will have a greater effect on survival after AMI than development of new thrombolytics or than the difference between thrombolysis and PPCI. Care bundles offer the opportunity to give a complete package of clinically relevant care to individual patients—should we not replace single targets with care bundles in a wide variety of clinical conditions?

Emerg Med J 2007;**24**:315–316.
doi: 10.1136/emj.2007.047191

Correspondence to: Professor M W Cooke, Warwick Medical School, Gibbet Hill Road, Coventry CV4 7AL, UK; m.w.cooke@warwick.ac.uk

Accepted 31 January 2007

This feature was sponsored by an unrestricted educational grant from Boehringer Ingelheim. However, the views expressed are those of the author and do not necessarily reflect those of the sponsor or publication.

Competing interests: None declared.

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