ORIGINAL ARTICLE

Meeting National Service Framework goals for patients presenting with acute myocardial infarction

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Background: The National Service Framework for coronary heart disease established clear standards for the management of patients with acute myocardial infarction in March 2000. This study evaluates an emergency department's thrombolysis performance in light of these standards.
Setting: Inner city teaching hospital emergency department.
Methods: The data were prospectively collected using a formal clinical pathway for all patients receiving thrombolysis in the emergency department between February 2000 and January 2001. Cases were reviewed at monthly multidisciplinary audit meetings. Regular feedback complemented routine teaching for both nursing and medical staff.
Results: 127 patients were thrombolysed, of whom 92 (72%) were immediately eligible. Some 77% of these had a door to needle time of less than 30 minutes and 38% less than 20 minutes. Twenty per cent of patients had a call to door time of less than 30 minutes. Some 84% of patients managed by the emergency department team had a door to needle time of less than 30 minutes compared with 53% of those patients seen by duty physicians.
Conclusions: The thrombolysis target set by the National Service Framework for April 2002 is achievable. The target set for April 2003 remains an ambitious goal. Overall call to needle times are undermined by call to door times. Emergency department teams may be more efficient than duty physicians in processing patients needing thrombolysis.

About 300 000 people in the United Kingdom suffer an acute myocardial infarction (AMI) each year and about 140 000 die.[1] The benefit of thrombolysis in AMI is well established with better outcomes in those patients treated early.[2]

In March 2000 the National Service Framework for coronary heart disease (NSF) set standards, annual audit specifications, and immediate priorities in the management of patients with AMI (box 1).[3] Those patients immediately eligible for thrombolysis were defined (box 2). This study evaluates an emergency department's (ED) performance in light of these standards.

METHODS

This audit was performed in a city centre teaching hospital in Bristol for one year (February 2000 to January 2001). The ED had 46 800 new adult attendances during that period. Thrombolysis was introduced in the department in 1998. All patients thrombolysed in the ED were included in the study. A critical care pathway (see journal web site) was used to record data. All cases were "hot reviewed" within 48 hours by clinical auditors and at a monthly multidisciplinary audit meeting. The review permitted identification of any problems or delays arising during the initial management that hindered thrombolysis. The audit meeting permitted identification of those patients immediately eligible for thrombolysis. This was based on the NSF criteria (box 2) and blind consensus agreement. Consistent problems in delays for thrombolysis were also noted. Appropriate action through targeted individual and group education ensued.

RESULTS

A total of 127 patients were thrombolysed in the ED in the study period. Altogether 92 patients (72%) were immediately eligible for thrombolysis on arrival in accordance with the NSF criteria. A monthly percentage of patients seen with a door to needle time of less than 30 minutes is shown (fig 1). Overall, 77% of these patients had a door to needle time of less than 30 minutes. Some 38% had a door to needle time of less than 20 minutes.

Only 76 patients had a call for professional help time recorded on their critical care pathway. Some 38% of these had a call to needle time of less than 60 minutes. Twenty per cent had a call to door time of less than 30 minutes.

Box 1 National Service Framework for coronary heart disease

Standards
- People thought to be suffering from a heart attack should be assessed professionally and, if indicated, receive aspirin. Thrombolysis should be given within 60 minutes of calling for professional help.
- NHS Trusts should put in place agreed protocols/systems of care so that people admitted to hospital with confirmed heart attack are appropriately assessed and offered treatments of both clinical and cost effectiveness to reduce their risk of disability and death.

Required annual audit data
- Number and percentage of patients eligible for thrombolysis arriving at hospital within 30 minutes of call for professional help ("call to door" time).
- Number and percentage of patients eligible for thrombolysis receiving it within 20 minutes of arrival at hospital ("door to needle" time).
- Number and percentage of patients eligible for thrombolysis receiving it within 60 minutes of call for professional help ("call to needle" time).

Immediate priorities
- 75% of eligible patients receiving thrombolysis within 30 minutes of hospital arrival by April 2002 and within 20 minutes by April 2003.

Box 2 National Service Framework for coronary heart disease

Criteria for immediate thrombolysis

- Suspicion of AMI with ECG and evidence of ST elevation or left bundle branch block on arrival and no contraindications for immediate thrombolysis.

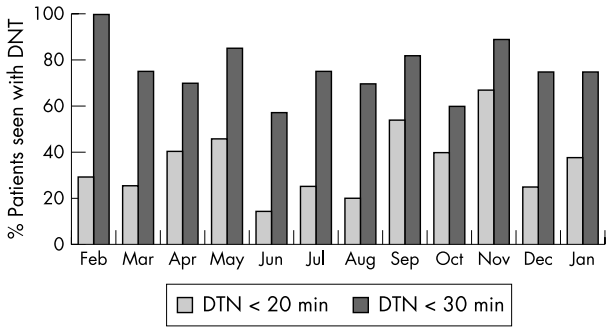

Figure 1 Door to needle time.

Of the patients eligible for immediate thrombolysis 73 (79%) were seen by ED doctors. The remaining 19 (21%) were seen by the duty physicians. The second group were patients referred by their general practitioners. Some 84% of the patients managed by the ED team had a door to needle time of less than 30 minutes compared with 53% of those patients seen by the duty physician (40% *v* 10% within 20 minutes).

Consistent delays in thrombolysis identified at the audit meetings included delay in performing initial ECG, hypertensive patients and those with left bundle branch block.

DISCUSSION

This audit demonstrates that the target set for thrombolysis by the NSF for April 2002 is achievable. Some 75% of patients immediately eligible for thrombolysis can be processed within 30 minutes. We have set out a number of recommendations for reaching the thrombolysis standards (box 3).

We believe that establishing a critical care pathway is paramount. Such pathways have demonstrated improvement in quality of care and reduction in resource consumption.[4] They have also been endorsed by a recent review.[5] Our pathway has evolved over two years. It enables better teamwork between nurse and doctor and clearly illustrates contraindications to thrombolysis. In addition, problems with hypertensive patients or thrombolytic agent selection are addressed. It also acts as the audit tool. The pathway is available for viewing and may be downloaded and modified for local use from the ED online handbook (www.ubht.nhs.uk/edhandbook). The handbook supplements the pathway by acting as an easily navigable reference for problems with thrombolysis management. EEG examples of infarctions (including posterior) are demonstrated on it.

The need for education of new staff is evident. We run thrombolysis workshops for new senior house officers, while ensuring all nurses attend a thrombolysis study day within one year of joining the ED team. These have evolved into national thrombolysis study days at the Bristol Simulation Centre. Any problems brought up in the monthly audit meetings are covered in senior house officer, middle grade, and nursing educational sessions. In addition, we run joint meetings with the cardiology team to discuss problematic cases every three months.

This audit also shows that overall call to needle times are undermined by call to door times. Only a fifth of patients reached hospital within 30 minutes of calling for professional help. In addition this audit suggests that ED doctors process patients needing thrombolysis more efficiently than duty physicians. In agreement with our physician colleagues, local primary care groups have now been advised to refer patients suspected of AMI directly to the ED team.

Box 3 Ten top tips for thrombolysis

1 Establish a critical care pathway
2 (Multidisciplinary) education, education, education!
3 Set a door to ECG standard of five minutes and have the ECG immediately read by doctor
4 Have enough ECG machines
5 Run a monthly audit programme and deliver targeted feedback
6 Develop and teach a policy for hypertensive patients
7 Seek paramedic alert
8 Collaborate with cardiology and medical teams
9 Consider thrombolysis by ED team only
10 Don't forget aspirin

CONCLUSIONS

The thrombolysis target set by the National Service Framework for April 2002 is achievable. The target set for April 2003 remains an ambitious goal. Overall call to needle times are undermined by call to door times. ED teams may be more efficient than duty physicians in processing patients needing thrombolysis.

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Contributors

Liz Gilby and Louisa Chan collected the bulk of the data and ran the "hot reviews". Liz Gilby prepared the paper. Gavin Lloyd chaired the audit meetings and edited the paper. All authors contributed towards the multidisciplinary education and audit feedback of this initiative. Sarah Tosh and Sarah Brierley contributed to data collection and paper revision. Gavin Lloyd is the guarantor for the paper.

Additional information regarding this paper is available on the journal web site (www.emjonline.com/supplemental)

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Conflicts of interest: none.

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BRI ED Critical Care Pathway / Audit Document for AMI

Advance warning: Paramedic ☐ Time ____ GP ☐ Time ____ | **Time arrived** ____ | **Date arrived** ____

Print Label:

Vital Signs Observations

			Time
Pulse		BM*	
BP R arm		L arm	
Sats		Resp	
Temp			

(Repeat obs every 5 mins while thrombolysing)

Start IV insulin therapy if > 11mmol/l

12 Lead ECG recorded time:

First ECG ____ **Diagnostic ECG** ____

A. >2mm ST elevn in 2+ cont chest leads ☐
B. >1mm ST elevn in 2+ cont limb ends ☐
C. New LBBB ☐

Barn door AMI? Yes ☐ No ☐

Repeat ECG 45 mins after starting of thrombolysis ☐

If there is no improvement in the ST segments consider **Reteplase** for those patients given Streptokinase initially. Otherwise patients should be considered for angiography if a cath lab is available. Discuss with duty cardiology registrar.

Chest pain onset	
Call for help	→ 999 ☐
Admission to ED	GP-999 ☐
Nurse assessment	GP ☐
Doctor assessment	Self ☐
Thrombolysis	
Door to needle	
Arrange CCU transfer	
Transfer to CCU	

Contraindications to be considered for thrombolysis:

Y	N	
☐	☐	Possible aneurysm
☐	☐	Active internal bleeding (<2/52)
☐	☐	Major surgery (<2/52)
☐	☐	Head injury
☐	☐	Bleeding disorder, thrombocytopenia
☐	☐	Stroke (<3/12)
☐	☐	Hypertensive $^{180}/_{100}$ (consider atenolol [PTO])
☐	☐	Hypotension, syst <90 (r-PA/cardiology)
☐	☐	Pregnancy
☐	☐	Malignancy, terminal illness
☐	☐	Jaundice, hepatitis or kidney failure
☐	☐	Use of anticoagulants
☐	☐	Infective endocarditis
☐	☐	Previous SK >5 days ago

Seek senior advice (? primary angioplasty) if contraindications exist

Informed consent: Yes ☐ No ☐

Drugs:	**Time admin.**	**Route**

Drugs procedure:

1. Aspirin **Yes** ☐ **Where?** Prehosp ☐ in ED ☐

No ☐

If not, why not? ____

2. Streptokinase Yes ☐ No ☐

If not, why not? – notes C/Is ____

SK 1.5 million units in 10ml sterile water then add to 50ml 0.9 saline. Give over 30-60 minutes via syringe driver**. Reduce dose to 1.0 million iu; if weight below 65kg, or aged greater than 70yrs, or if taking anticoagulant at admission**

3. Reteplase (r-PA) Yes ☐ No ☐

Indication for:

- ☐ Ant MI,<4hrs, <75 yrs
- ☐ Previous SK (>5 days ago)
- ☐ Allergy to SK
- ☐ Syst BP <90

This is two bolus IV injections of 10MU each given slowly over two minutes. The second bolus is given 30 minutes after the first. **Heparin** 5,000iu is given intravenously as a bolus prior to the first dose and an infusion of **Heparin** 1000iu/hour started after the second dose of **Reteplase**. **Heparin** should be administered for at least 24hrs, preferably for 48 to 72 hours, aiming to keep APTT values at 1.5 to 2 times normal

4. Prescribe the above + opiates, antiemetics, nitrates, B-blockers, heparin etc. on drug chart

BRI ED Critical Care Pathway/Audit Document for AMI

Complications: **Yes** ☐ **No** ☐

Please detail any adverse events and record actions (Refer to adverse events wall chart)

Risk Factors:

- ☐ Angina
- ☐ AMI
- ☐ Previous bypass surgery
- ☐ Previous PTCA
- ☐ Family history
- ☐ Smoker
- ☐ Hypertension
- ☐ Diabetes
- ☐ Cholesterol
- ☐ Other PMH (specify)

_____

Bloods:

- ☐ FBC
- ☐ Creat
- ☐ U&E
- ☐ CK
- ☐ Glucose
- ☐ Cholesterol

Current Medications:

Allergies:

Record results of physical examination and evidence and treatment of heart failure and arrhythmias.

Drug Chart completed for CCU ☐ **Notes photocopied for ED** ☐

Doctor's signature

Nurse's signature

Thrombolysis of Hypertensive Patients

Hypertension should not delay thrombolysis for more than 10-15 minutes. It should therefore be treated aggressively.

1. **Try 2 puffs of GTN spray (easy to give)**
2. **5mg IV Atenolol (unless contraindicated)**
3. **If 1 and 2 have not worked, commence IV infusion of Isosorbide Dinitrate (Isoket) at 8mls/hr (4mg/hr). Isoket can be increased at 4ml/hr increments up to 20mls/hr if patient remains hypertensive**
   (Isoket infusion = 30mg Isosorbide Dinitrate in a total of 60mls using n/saline)