ORIGINAL ARTICLE

What percentages of patients are suitable for prehospital thrombolysis?

N Castle, R Owen, R Vincent, N Ineson

Emerg Med J 2006;23:444–445. doi: 10.1136/emj.2005.026450

See end of article for authors' affiliations

Correspondence to: N Castle, Frimley Park Hospital NHS Trust, Frimley, Surrey, UK; nicholas.castle@fph-tr.nhs.uk

Accepted for publication 15 November 2005

Objective: To apply the Joint Royal College Ambulance Liaison Committee (JRCALC) checklist to patients who were deemed eligible for thrombolytic therapy on arrival in an Accident & Emergency Department (A&E) to determine the proportion suitable for prehospital thrombolysis.

Design: Retrospective descriptive analysis.

Methods: The clinical notes of all patients thrombolysed in an A&E department in a year were reviewed against the JRCALC guidelines for prehospital thrombolysis.

Results: 14.2% of patients eligible for thrombolysis in a district general hospital were deemed suitable for prehospital thrombolysis according to the JRCALC criteria. The most common exclusion criteria were hyper/hypotension (50%), onset of symptoms (pain) >6 h previously (41.7%), or age >75 years (37%). Two or more contraindications to prehospital thrombolysis were present in 63.9% of patients.

Conclusion: The JRCALC guidelines are an effective tool for identifying patients with potential contraindications to thrombolysis.

The National Service Framework for Coronary Heart Disease has seen a marked improvement in the delivery of thrombolytic therapy.¹ To accelerate treatment further, the Joint Royal College Ambulance Liaison Committee (JRCALC) has produced a prehospital checklist (table 1) to identify patients suitable for paramedic initiated thrombolysis.^{2,3} The checklist is also designed to exclude those patients at risk of known adverse events, particularly intracranial haemorrhage, cardiac rupture, and non-cerebral bleeding, thereby safely facilitating paramedic initiated thrombolysis.

This approach will inevitably exclude patients from prehospital thrombolysis who would be considered eligible for in-hospital thrombolysis. Anecdotally it was believed that the upper age limit of 75 years would have the largest impact, but we were unsure of the potential impact of the remaining criteria.

METHODS

A total of 135 patients received thrombolytic therapy in the Accident & Emergency Department at Frimley Park Hospital between 1st January and 31st December 2003. Of these, nine patients were in cardiac arrest on the arrival of the ambulance service and were excluded from further analysis. All patients were judged to have appropriately received thrombolytic therapy during routine clinical audit. The notes of these patients were then reviewed against the JRCALC checklist to determine whether the patients would have been suitable for prehospital thrombolysis.

Statistical analysis

Descriptive analyses were performed with SPSS Version 12.0.

RESULTS

Of the patients eligible for in-hospital thrombolysis, only 14.2% were suitable for prehospital thrombolysis when assessed against the JRCALC criteria (fig 1). The most common exclusion criteria were hypo/hypertension (50%), onset of symptoms (pain) >6 h previously (41.7%), or age >75 years (37%) (fig 2). Two or more contraindications to prehospital thrombolysis were present in 63.9% of patients.

Table 1 Prehospital thrombolysis checklist (the JRCALC checklist as adopted by Surrey Ambulance)

- 1) Can you confirm patient is 75 years of age or less?
- 2) Can you confirm that the patient has had symptoms characteristic of a coronary heart attack (i.e. continuous pain typical of an acute MI for 15 minutes or more)?
- 3) Can you confirm that the pain started less than 6 hours ago?
- 4) Can you confirm that the pain had a gradual onset (over minutes) and was not abrupt?
- 5) Can you confirm that breathing does not influence the severity of the pain?
- 6) Can you confirm that the heart rate is between 50 and 140?
- 7) Can you confirm that the systolic blood pressure is more than 80 mm Hg and less than 160 mm Hg?
- 8) Can you confirm that the ECG shows ST elevation of 2 mm or more in at least 2 standard leads or at least 2 adjacent pre-cordial leads, not including V1.
- 9) Can you confirm that the QRS width is 0.12 seconds or less? And there is no bundle branch block?
- 10) Can you confirm that there is no AV block greater than 1st degree (if necessary, after treatment with atropine)?
- 11) Can you confirm that the patient is not likely to be pregnant, nor has delivered within the last 2 weeks?
- 12) Can you confirm that the patient has not had an active peptic ulcer within the last 6 months?
- 13) Can you confirm that the patient has not had a stroke of any sort within the last 12 months and no permanent disability from previous strokes?
- 14) Can you confirm that the patient has no diagnosed bleeding tendency, has had no recent blood loss, and is not taking warfarin?
- 15) Can you confirm that the patient has not had any surgical operations, tooth extractions, significant trauma, or head injury within the last 4 weeks?
- 16) Can you confirm that the patient has not been treated recently for any other serious head or brain condition?
- 17) Can you confirm that the patient is not being treated for liver failure, renal failure, or any systemic illness?
- 18) If streptokinase is your drug of choice, can you confirm that it has not been given previously?
- 19) Can you confirm that the patient has not had chest compressions for resuscitation for a period longer than 5 minutes?
- 20) Can you confirm that the patient is coherent and able to understand that a clot dissolving drug will be used?
- 21) Can you confirm that the patient has been made aware of the risks associated with thrombolytic therapy and that the patient has given consent for the administration of a thrombolytic agent as part of their care?

Figure 1 Suitability for prehospital thrombolysis. The percentage of patients who were thrombolysed in A&E and who also met the criteria for prehospital thrombolysis is shown.

DISCUSSION

The low percentage of patients suitable for prehospital thrombolysis reflects the findings of other studies.⁴⁻⁵ It has been stated that prehospital thrombolysis is expensive and that efforts would be better targeted at reducing in-hospital treatment delays as well as reducing patient delay.¹⁻⁶⁻⁸

A meta-analysis has demonstrated a potential saving of up to 45 min per patient⁹; however, the time saved by prehospital thrombolysis is affected by many variables, not

least of which is geography.⁷⁻¹⁰⁻¹¹ In this study, due to short prehospital time (median prehospital contact time 38 min) and prompt in-hospital treatment (median door to needle time (DTNT) 17 min), it is likely that any time saved with prehospital thrombolysis would have been less.¹⁻¹⁰⁻¹²

Currently, thrombolysis is being performed by 84% of UK ambulance services and this number continues to grow.¹³ Within the UK, paramedic initiated thrombolysis is in its infancy and the exclusion criteria used by JRCALC are firmly based on the premise "first do no harm" and resemble similar guidance for prehospital thrombolysis by non-doctors in other countries.⁴⁻⁵ As paramedics gain experience with delivering thrombolytic therapy, judicious modification of the guidelines may be warranted. In the meantime, efforts should be directed towards reducing delays in accessing the emergency services¹ and further collaborative efforts between ambulance services and acute trusts to reduce call to needle time.¹⁻¹⁰⁻¹⁴

CONCLUSION

The JRCALC guidelines are an effective tool for identifying patients with potential contraindications to thrombolysis.

Authors' affiliations

N Castle, Emergency Medical Care and Rescue, Durban Institute of Technology, Durban, South Africa

R Owen, Surrey Ambulance Service NHS Trust, Banstead, Surrey, UK

R Vincent, Brighton and Sussex University Hospital NHS Trust, Brighton, UK

N Ineson, Frimley Park Hospital NHS Trust, Frimley, Surrey, UK

Competing interests: none declared

REFERENCES

- 1 Birkhead JS, Walker L, Pearson M, *et al* on behalf of the MINAP Steering Group. Improving care for patients with acute coronary syndromes: initial results from the National Audit of Myocardial Infarction Project (MINAP). *Heart* 2004;**90**:1004-9.
- 2 Joint Royal Colleges Ambulance Liaison Committee. *Pre-hospital guidelines 2002 Version 2.0*. Warwick, UK: University of Warwick, 2002.
- 3 Pitt K. Prehospital selection of patients for thrombolysis by paramedics. *Emerg Med J* 2002;**19**:260-3.
- 4 Weaver WD, Eisenburg MS, Martin JS, *et al*. Myocardial Infarction Triage and Intervention project—phase 1: patient characteristics and feasibility of pre-hospital initiation of thrombolytic therapy. *J Am Coll Cardiol* 1990;**15**:925-31.
- 5 Gibler WB, Kereiakes DJ, Dean EN, *et al* and investigators of the Cincinnati Heart Project and Nashville Prehospital TPA trial. Prehospital diagnosis and treatment of acute myocardial infarction. A north-south perspective. *Am Heart J* 1991;**121**:1-11.
- 6 Stephenson DT, Wardrope JW, Goodacre SW. Is prehospital thrombolysis for acute myocardial infarction warranted in the urban setting? The case against. *Emerg Med J* 2002;**19**:444-8.
- 7 Goodacre S, Kelly AM, Kerr D. Potential impact of interventions to reduce times to thrombolysis. *Emerg Med J* 2004;**21**:625-9.
- 8 Vale L, Steffens H, Donaldson C. The cost benefits of community thrombolysis for acute myocardial infarction. A decision-analytic model. *Pharmacoeconomics* 2004;**22**:943-54.
- 9 Morrison LJ, Verbeek PR, McDonald AC, *et al*. Mortality and prehospital thrombolysis for acute myocardial infarction. A meta-analysis. *JAMA* 2000;**283**:2686-92.
- 10 Feasibility, safety, and efficacy of domiciliary thrombolysis by general practitioners: Grampian region early anistreplase trial. GREAT Group. *BMJ* 1992;**305**:548-53.
- 11 The European Myocardial Infarction Project Group. Prehospital thrombolytic therapy in patients with suspected acute myocardial infarction. *New Engl J Med* 1993;**329**:383-9.
- 12 Rowley JM, Mounser P, Harrison EA, *et al*. Management of myocardial infarction: implications for current policy derived from the Nottingham Heart Attack Register. *Br Heart J* 1992;**67**:255-62.
- 13 Ambulance Service Association/Joint Royal Colleges Ambulance Liaison Committee Clinical Effectiveness Programme. *ASA/JRCALC Thrombolysis Update*, December 2004. London: ASA.
- 14 Kereiakes DJ, Gibler WB, Martin LH, *et al* and the Cincinnati Heart Project Study Group. Relative importance of emergency medical system transport and the prehospital electro-cardiogram on reducing hospital time delay for acute myocardial infarction: a preliminary report from the Cincinnati Heart Project Study Group. *Am Heart J* 1992;**123**:835-40.

Figure 2 Patients excluded from prehospital thrombolysis. The 100% stacked bar chart shows the proportions of questions from the prethrombolysis checklist that were answered "yes" and "no".