Assessing the effectiveness of primary angioplasty compared with thrombolysis and its relationship to time delay: a Bayesian evidence synthesis
Asseburg C, Vergel Y B, Palmer S, Fenwick E, de Belder M, Abrams K R, Sculpher M

CRD summary
This review concluded that angioplasty is superior to thrombolysis for 1-month fatal and nonfatal outcomes in patients with non-ST myocardial infarction where the time delay is 30 to 90 minutes. The conclusions appear reliable, but consideration should be given to the poor reporting of review methods and the authors’ own cautions and limitations.

Authors’ objectives
To use 1- and 6-month data to assess how the treatment effect of angioplasty on fatal and nonfatal outcomes relates to the additional delay in receiving the intervention.

This review was based on a prior review (see Other Publications of Related Interest no.1).

Searching
The search strategy from the previous review was used, and was updated by searching the following databases: the Cochrane Controlled Trials Register, National Research Register, MEDLINE, EMBASE, DARE, NHS EED and HTA. The searches were limited to articles published in English between 2002 and 2004. Full details of the search strategy are available on the Heart website (supplementary material). See Web Address at end of abstract.

Study selection
Randomised controlled trials (RCTs) comparing intravenous thrombolysis and primary angioplasty using any type of drug, in patients with ST elevation myocardial infarction, were eligible for inclusion. The majority of the included trials used plasminogen activator for thrombolysis and coronary stents for angioplasty. Eligible studies had to report one of the following outcomes of interest: mortality, nonfatal infarctions and fatal, nonfatal and haemorrhagic strokes, in addition to any data about delays in treatment. All trials reported outcomes at between 30 days and 6 weeks (referred to as 1-month outcomes in the analysis), while just less than half of the trials reported outcomes at 6 months post-intervention. Few included studies reported the number of fatal or haemorrhagic strokes at 6 months post-intervention.

The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
Two reviewers independently extracted the data from the included studies. Any discrepancies were resolved through consensus, with a third reviewer consulted if necessary. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated for the incidences of death, nonfatal infarctions and fatal, nonfatal and haemorrhagic strokes, in addition to any data about delays in treatment. The mean times and standard deviations (SDs) to treatment were also extracted; medians and quartiles were used where means and SDs were not available.

Methods of synthesis
Pooled absolute probabilities and ORs with 95% CIs were calculated by Bayesian methods using random-effects data. Meta-regression was used to estimate the relative effect size, taking into account the time delay in receiving an angioplasty. Sensitivity analyses were used to assess the effects of changing prior distributions in the Bayesian model. The authors also reported that sensitivity analyses assessing the effects of different thrombolysis drugs are available on the Heart website (supplementary material). See Web Address at end of abstract.

Results of the review

Database of Abstracts of Reviews of Effects (DARE)  
Produced by the Centre for Reviews and Dissemination  
Copyright © 2020 University of York
Twenty-two RCTs (n=3760 angioplasty and n=3758 thrombolysis) were included in the review.

The mean angioplasty-related time delay (over and above that for thrombolysis) was 54.3 (SD=2.2) minutes. For this time delay, the mean event probabilities for all outcomes were lower for angioplasty than for thrombolysis. At 1 month, the mortality rate was lower for angioplasty than thrombolysis (OR 0.68, 95% CI: 0.46, 1.01) and statistically significant differences in favour of angioplasty were reported for nonfatal reinfarction (OR 0.32, 95% CI: 0.20, 0.51) and nonfatal stroke (OR 0.24, 95% CI: 0.11, 0.50). Similar results were also seen at 6 months post-intervention. However, the benefits of angioplasty were reduced for all outcomes with increases in time delay to treatment.

Cost information
The authors referred to a companion paper which directly assessed the cost-effectiveness of primary angioplasty (see Other Publications of Related Interest no.2).

Authors' conclusions
The benefit of primary angioplasty, over thrombolysis, depends on the additional time delay for angioplasty. Angioplasty is superior to thrombolysis for 1-month fatal and nonfatal outcomes where the time delay is 30 to 90 minutes. Where the time delay is around 90 minutes thrombolysis may be preferable, as assessed by 6-month mortality, but longer time delays are subject to considerable uncertainty.

CRD commentary
This review updates a previous review. It answered a clear review question, searching a number of electronic databases. However, it is difficult to assess the reliability of the authors' methods without further details of the review process. The lack of any assessment of study validity, publication bias, statistical and clinical heterogeneity, and the influence of individual studies also hinders any assessment of the reliability of the data. However, the authors used Bayesian methods to assess the size of effect and its relationship to time delay, which also incorporated a sensitivity analysis to determine the effect of uncertainty around input parameters (prior distributions) in the analysis. The authors identified a number of cautions and limitations concerning, amongst others, the reliability of the data on longer delays and the applicability of the findings to other populations. In conclusion, the data presented appears to support the review findings, but consideration should be given to the poor reporting of review methods and the authors' own cautions and limitations.

Implications of the review for practice and research
Practice: The authors stated that 'if primary angioplasty can be delivered in a appropriate fashion, current evidence supports its use; if not, the choice of treatment probably depends on time from onset of symptoms to presentation and the availability of pre-hospital thrombolysis'. They also stated that the decision about appropriate methods of reperfusion should also take into account the cost-effectiveness of each treatment option.

Research: The authors stated that it would be advisable to investigate whether the potential relationship between time delay and effect in terms of log ORs is linear. They also highlighted the lack of data about the effects of long-term delays in angioplasty.

Funding
Unrestricted educational grant from Cordis Ltd.; NHS R&D Programme, Career Award in Public Health.

Bibliographic details

PubMedID
17277350

DOI

Additional Data URL
http://heart.bmj.com/supplemental

Other publications of related interest
1. Keeley EC, Boura JA, Grines CL. Primary angioplasty versus intravenous thrombolytic therapy for acute myocardial


Indexing Status
Subject indexing assigned by NLM

MeSH
Angioplasty /mortality /standards; Bayes Theorem; Fibrinolytic Agents /therapeutic use; Humans; Myocardial Infarction
/drug therapy /mortality /surgery; Odds Ratio; Randomized Controlled Trials as Topic; Recurrence; Time Factors;
Treatment Outcome

AccessionNumber
12007003503

Date bibliographic record published
09/08/2008

Date abstract record published
01/09/2008

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract
contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on
the reliability of the review and the conclusions drawn.