Effect of ambulance 12-lead ECG recording on times to hospital reperfusion in acute myocardial infarction

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Authors' objectives
To review the evidence that recording a prehospital 12-lead electrocardiogram (ECG) reduces time from hospital arrival to initiation of reperfusion therapy for acute myocardial infarction (AMI).

Searching
MEDLINE search from 1966 to the present (articles in all languages) using the search terms, ‘prehospital’, ‘ambulance’, ‘paramedic’, emergency medical service’, combined with 'ECG', 'EKG', 'electrocardiograph', and 'electrocardiogram'. Bibliographies were examined for articles not retrieved by the MEDLINE search. Abstracts were excluded from the review.

Study selection
Study designs of evaluations included in the review
Any published controlled studies of prehospital 12-lead ECG recording that included control groups and reported time intervals from hospital arrival to start of reperfusion therapy. Randomised controlled trials (RCTs), non-RCTs and before and after studies were all included.

Specific interventions included in the review
Prehospital 12-lead electrocardiogram (ECG)recording. This recording was taken by ambulance staff/paramedics/nurse team. One study also used a special 'heart protocol'.

Participants included in the review
People coming to hospital with acute myocardial infarction (AMI). In the included studies participants were patients for thrombolysis or being given thrombolytic therapy, or patients with primary percutaneous transluminal coronary angioplasty.

Outcomes assessed in the review
Reduction in time from symptom onset, ambulance response or hospital arrival to reperfusion therapy. Time from hospital presentation to thrombolysis ('door to needle time' (NDT)).

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the reviewers performed the selection.

Assessment of study quality
The authors do not state that they assessed validity, although they report on the study design, intervention details, measurement of baseline characteristics and statistical analysis.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the reviewers performed the data extraction. Data were extracted on: intervention, control, study design, patient characteristics, arrival to reperfusion for intervention (minutes), arrival to reperfusion (control) and time saving.

Methods of synthesis
How were the studies combined?
Widely varying study methodologies precluded meta-analysis. Results from the studies were reported narratively.

How were differences between studies investigated?
Differences between the studies were discussed in the narrative.

Results of the review
Eight studies (2 RCTs, 6 non-RCTs, and 2 before-after studies) with over 31892 participants (over 2280 in the intervention group and over 29612 in the control group). Study size ranged from 11 to 31325 participants. Only 31 patients were included in the two RCTs.

Eight articles satisfied selection criteria (two RCTs, four non-randomised interventional studies and two prospective observational studies).

All studies had methodological problems. The studies indicated a time saving of 10-30 minutes if a prehospital ECG was performed. Such improvements appear to be small in hospitals where delays are already minimal. Prehospital 12-lead ECG recording was associated with increased prehospital times of 1-3 minutes in 3 studies.

Authors' conclusions
Little evidence is available to support routine prehospital 12-lead ECG recording if the median hospital time to reperfusion is already less than 30 minutes. Improvement of in-hospital treatment times may be a better initial strategy than prehospital 12-lead ECG recording, as this will benefit more patients and allow ambulance services to better allocate their available resources.

CRD commentary
This review has fair inclusion criteria. However, the search strategy is limited to one database and only published studies are included, so the possibility of publication bias cannot be ruled out. Furthermore, it cannot be assumed that all relevant trials have been identified. No details of the methodology of the review are provided. Some aspects of study quality are reported, however, and taken into account in the result's section of the review. The authors' conclusions appear to follow on from the results, but should be interpreted with caution given the above limitations.

Implications of the review for practice and research
Practice: The authors state that little evidence is available to support routine prehospital 12-lead ECG recording if the median hospital time to reperfusion is already less than 30 minutes.

Research: The authors state that further studies are required to determine whether prehospital 12-lead ECG recording is effective in the contemporary setting where DTN delays have been minimised by improved hospital process, an whether transmission to the receiving hospital is necessary.

Furthermore, a large randomised study that includes mortality and morbidity as end points is needed to quantify other potential benefits of prehospital lead ECG recording.

Bibliographic details

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MeSH
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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.