Potential cost effectiveness of tissue plasminogen activator among patients previously treated with streptokinase

Massel D

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The use of tissue plasminogen activator (t-PA) among patients previously treated with streptokinase.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients with recurrent infarction presenting more than four days from previous treatment with streptokinase.

Setting
Hospital. The study was carried out in Ontario, Canada.

Dates to which data relate
Effectiveness data were collected from studies published between 1988 and 1996. Resource use and cost data were collected from 1986-1988 and 1991 sources. The price year was 1997.

Source of effectiveness data
Effectiveness data were derived from a review of previously published studies.

Modelling
A model was developed to incorporate the short-term (five- to six-week) costs and mortality data for the various thrombolytic strategies.

Outcomes assessed in the review
The review assessed the following outcomes: mortality rate, the rate of percutaneous transluminal coronary angioplasty (PTCA) and coronary artery bypass graft (CABG), and the rate of revascularisation.

Study designs and other criteria for inclusion in the review
Not stated.
Sources searched to identify primary studies
Not stated.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Summary statistics from each study.

Number of primary studies included
Approximately 7 studies were included.

Methods of combining primary studies
Not stated.

Investigation of differences between primary studies
Not stated.

Results of the review
70% of patients receive an internal thoracic artery graft and there are an average of 3.5 grafts per patient. Thrombolysis leads to a small, short-term increase in the use of coronary angiography, PTCA. The use of t-PA results in more revascularisation procedures than the use of streptokinase, in the ratio of 87:51. The ratio of PTCA:CABG is 3:2. A short-term placebo mortality rate of 14% for patients with previous myocardial infarction was chosen. A 20% relative risk reduction in mortality with ASA alone was assumed irrespective of streptokinase-resistant status. In the absence of streptokinase resistance, a 40% relative risk reduction in mortality with streptokinase and ASA over placebo was assumed. A 1.0% absolute mortality benefit of repeat t-PA over streptokinase in the absence of streptokinase resistance was assumed. In the second analysis (streptokinase and ASA versus t-PA and ASA), all patients received ASA with a resultant baseline mortality rate of 11% and there was a 20% relative risk reduction for both t-PA and streptokinase over ASA. TABLE C

Measure of benefits used in the economic analysis
The number of short-run survivors was used as the measure of benefits.

Direct costs
Costs were not discounted given the short time frame of the study (less than 1 year). Costs and quantities were not reported separately. Direct costs reflected the costs for the treatment of AMI, including costs for drugs, cardiac procedures, and professional fees. The quantity/cost boundary adopted was that of the health service. The estimation of quantities and costs was based on actual data. Costs for cardiac procedures and hospitalisations for AMI were obtained from four Ontario teaching hospitals between 1986 and 1988. Professional charges were taken from the provincial health insurance fee schedule. Drug costs were obtained from the manufacturers. The 1991 Ontario Health Insurance Plan Fee Schedule was used to update all professional charges. All costs were inflated to 1997 dollars with the Health and Personal Care component of the Canadian Consumer Price Index.

Statistical analysis of costs
Not reported.
Indirect Costs
Not included.

Currency
Canadian dollars (Can$).

Sensitivity analysis
A two-way sensitivity analysis was conducted on the following variables: baseline mortality rate, the proportion of patients resistant to streptokinase retreatment, and the absolute reduction in mortality from t-PA use instead of streptokinase.

Estimated benefits used in the economic analysis
See synthesis of costs and benefits below.

Cost results
See synthesis of costs and benefits below.

Synthesis of costs and benefits
In the absence of streptokinase resistance, streptokinase is a cost-effective strategy for patients with suspected myocardial infarction, even when the expected mortality is low. The addition of ASA markedly improved the cost-effectiveness ratio. In the presence of streptokinase resistance, the combination of streptokinase and ASA is most cost-effective when rates of resistance are low (Can$16,389 per short run survivor with 5% resistance versus Can$21,306 with 50% resistance). t-PA is a cost-effective alternative when rates of resistance are high (Can$54,158 per short run survivor with 50% resistance) assuming a 1% absolute risk reduction in mortality. As the level of resistance decreases, t-PA becomes a less cost-effective choice (Can$203,092 per short run survivor with 5% resistance). However, t-PA is always more cost-effective in the presence of any streptokinase resistance than when administered for an index myocardial infarction.

Authors' conclusions
The analysis shows that using t-PA in patients previously treated with streptokinase is a cost-effective strategy. t-PA becomes less cost-effective as the percentage of patients with streptokinase resistance decreases. t-PA used in the presence of streptokinase resistance is always more cost-effective than when it is used for a first myocardial infarction.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparators was clear. You, as a user of the database, should verify whether these health technologies are relevant to your setting.

Validity of estimate of measure of benefit
The relevant measure of benefits was considered. However, only short-run outcome data were included. Differences in major and minor side effects were not incorporated in the model. The use of higher rates of revascularisation with t-PA than with streptokinase systematically biased the results against t-PA More details about the literature review could have been provided.

Validity of estimate of costs
Only direct costs falling to the health service were considered. Non-cardiac care costs, long-term costs, and costs related to productivity gains or losses were not included. The robustness of the cost results was not tested. These cost results
may not be generalisable since resource use related to invasive procedures is likely to be specific to the local setting. The cost implications of major and minor side effects were not considered.

Other issues
The results do not appear to have been presented selectively. Comparisons with other relevant studies were made.

Implications of the study
The authors suggest that there is a need to develop alternative reperfusion strategies for this particular patient group and, possibly, for the development of methods for the rapid determination of streptokinase resistance status.

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None stated

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