Costs and survival were higher for acute MI treated with tPA compared with streptokinase


Objective
To determine the cost-effectiveness of accelerated tissue plasminogen activator (tPA) compared with streptokinase in acute myocardial infarction (MI).

Design
Cost-effectiveness analysis using data on mortality and use of resources from the Global Utilization of Streptokinase and Tissue Plasminogen Activator for Occluded Coronary Arteries (GUSTO) study and on life expectancy from the Duke Cardiovascular Disease Database.

Setting
1081 hospitals in 15 countries.

Patients
41,021 patients in the GUSTO study provided data for survival. Data on the use of medical resources during the initial hospitalization were provided by the 23,105 U.S. patients, and data on the use of medical resources and quality of life for the 12-month follow-up were provided by a random sample of 2600 U.S. patients.

Intervention
Patients were assigned to tPA, streptokinase with intravenous heparin, streptokinase with subcutaneous heparin, or tPA and streptokinase.

Main Cost and Outcome Measures
1-year survival, projected life expectancy beyond 1 year, and incremental cost-effectiveness ratio (expressed as the additional lifetime costs required to add 1 extra year of life with tPA vs streptokinase therapy). The analysis assumed no additional treatment costs because of tPA after the first year and projected an increased life expectancy for tPA of 0.14 years per patient.

Main Results
Survival at 30 days was 92.7% in the streptokinase group and 93.7% in the tPA group (P = 0.001) and after 1 year was 89.9% and 91.0%, respectively (P = 0.006). With a projected increased life expectancy in the tPA group of 0.14 years of life per patient, an observed incremental cost of $2845 per patient, and a discount rate of 5%, the comparative primary cost-effectiveness ratio for the use of tPA instead of streptokinase was $32,678 per year of life saved.

Conclusion
The comparative primary cost-effectiveness ratio for the use of tissue plasminogen activator instead of streptokinase was $32,678 per year of life saved. The use of tPA was most cost-effective in older patients and least cost-effective in younger patients. At all ages, the use of tPA in anterior MIs was more cost-effective than in inferior MIs. The cost-effectiveness values were most sensitive to a lowering of the projected long-term survival benefits of tPA and to large increases in projected medical visits for patients in the tPA group after 1 year. The results were not sensitive to additional costs associated with higher rates of disabling stroke in the tPA group, as noted in the GUSTO study.

Commentary
The economic effect of a medical service can be measured by its incremental cost-effectiveness (additional cost per additional unit of health outcome) compared with that of conventional medical care. The cost-effectiveness of streptokinase compared with no thrombolytic therapy is as low as $10,000 for definite anterior infarction (1) and generally between $30,000 and $21,000 per year of life saved (2). In this study, Mark and colleagues measure the additional cost of using tPA instead of streptokinase for acute MI. Their conclusion is consistent with the incremental cost-effectiveness of many generally accepted medical services. These results are consistent with the Canadian analysis of Goel and Naylor (3). Assuming that the cost and effect of accelerated tPA in community practice would be similar to those in the GUSTO protocol, the results imply that tPA should be used instead of streptokinase.

Mark and colleagues and others (1), however, emphasize that the cost-effectiveness of tPA depends on the age of the patient and the location of the MI. For example, the cost-effectiveness of tPA for an inferior MI in a person aged < 40 years would be $203,071 per year of life saved. Also, the lower the probability that a patient is actually having an MI, the worse the cost-effectiveness ratio (1). Some have questioned whether a strategy using primary angioplasty would be more cost-effective than one in which thrombolysis alone is used (2, 4).

The decision to use tPA, or for that matter streptokinase, depends on whether the resources to obtain these additional outcomes are available, in light of competing demands on the resources. The question of whether the additional cost of tPA can be justified by its additional effectiveness must be addressed by clinical and health policy decision-makers as they influence practice patterns through guidelines, coverage decisions, and other mechanisms.

John Eisenberg, MD
Georgetown University
Washington, DC, USA

References