Cost-effectiveness of urokinase and alteplase for treatment of acute peripheral artery disease: comparison in a decision analysis model

Olvey EL, Skrepnek GH, Nolan PE

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.

CRD summary
The objective was to examine the cost-effectiveness of urokinase versus alteplase for the treatment of acute peripheral artery disease. The authors concluded that urokinase was slightly more effective, but more expensive than alteplase and resulted in an incremental cost-effectiveness ratio of $332,309 per additional 30-day treatment success. Overall, the methodology was valid, but was not extensively reported and the authors’ conclusions should be treated with caution.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study examined the cost-effectiveness of two drug treatments for acute peripheral artery disease. Patients were assumed to be aged 65 years.

Interventions
The interventions were urokinase and alteplase, which were both given intra-arterially.

Location/setting
USA/secondary care.

Methods
Analytical approach:
A decision analytic model (decision tree) with a 30-day time horizon was used. The authors reported that the perspective of a US health care institution was taken.

Effectiveness data:
The effectiveness data were from seven randomised controlled trials (RCTs). Some assumptions were made, to overcome the lack of data in the literature, and these were explicitly stated. The key clinical parameters included the probabilities of clot lysis, major bleeding, intracranial haemorrhage, death due to intracranial haemorrhage, surgical intervention after treatment failure, amputation, additional procedures, and 30-day mortality.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The 30-day treatment success was the measure of benefit and this was defined as clot lysis of greater than 80% with no re-occlusion within the next 72 hours.

Cost data:
The economic analysis included the costs of urokinase and alteplase, amputation, intracranial haemorrhage, surgery, and major bleeding. These costs were reported as macro-categories, but the costs of drug administration, laboratory tests, hospital stay, angiography suite, and computed tomography were included. The costs and resource use data were from the literature or from official national sources. Where only charges were available, a cost to charge ratio was applied. All costs were appropriately adjusted for inflation and reported for the price year 2007.
Analysis of uncertainty:
Second-order Monte-Carlo simulations were conducted with 1,000 iterations. Probabilistic sensitivity analysis was undertaken to investigate the uncertainty and produce 95% confidence intervals (CIs) for the incremental cost-effectiveness ratios (ICERs). The results were presented on a cost-effectiveness plane. Deterministic one-way sensitivity analyses were conducted to assess the uncertainty around the cost estimates and the gamma distributions of costs used in the Monte-Carlo simulations.

Results
In the simulation of 5,000 people, the 30-day treatment success was 0.515 with alteplase and 0.545 with urokinase. The total cost was $34,755 for alteplase and $42,884 for urokinase. Compared with alteplase, urokinase resulted in an incremental cost of $332,309 per additional 30-day treatment success (95% CI: -565,540 to 1,661,247).

In 74.7% of the simulated cases, urokinase was more effective and more costly than alteplase and in 25.2% of cases, urokinase was more effective and less costly than alteplase. One-way sensitivity analyses demonstrated that these results were most sensitive to variation in the cost of the surgical interventions (i.e., angioplasty, revascularisation, etc.).

Authors' conclusions
The authors concluded that compared with alteplase, urokinase resulted in an incremental cost-effectiveness ratio of $332,309 per additional 30-day treatment success. The results were sensitive to distributional assumptions in the cost estimates, but in almost 75% of the Monte Carlo simulations, urokinase was more expensive and only slightly more effective than alteplase.

CRD commentary
Interventions:
The authors chose only pharmacologic treatments and several more invasive treatment options were not included, which makes the study a partial analysis. The doses of the drugs were not explicitly reported.

Effectiveness/benefits:
No systematic review of the literature was reported. In general, RCTs are appropriate sources for the efficacy data, given the strengths of their design, but the basic characteristics of these primary sources (study population, design, follow-up, power calculations) were not reported. This lack of information makes an objective assessment of the validity of the clinical inputs impossible. The authors used only a disease-specific measure of benefit, which did not assess the impact of the interventions on quality of life and does not allow cross-disease comparisons.

Costs:
It appears that the cost categories reflected the perspective. A breakdown of the cost items was not provided and no information on resource consumption was reported, which limits the transparency of the analysis. CIs around the total costs were calculated, using a probabilistic approach, to investigate the uncertainty around the economic inputs.

Analysis and results:
The methods used to synthesise the costs and benefits were appropriate. The issue of uncertainty was investigated using both a probabilistic and a deterministic approach, and the results were satisfactorily presented. The authors discussed the limitations of their study, especially with respect to the quality and availability of the effectiveness data. They highlighted the sensitivity of their results.

Concluding remarks:
Overall, the methodology was valid, but was not extensively reported and the authors' conclusions should be treated with caution.

Funding
Not stated.
Bibliographic details

PubMedID
18653814

DOI
10.2146/ajhp070431

Original Paper URL
http://www.ajhp.org/cgi/content/abstract/65/15/1435

Indexing Status
Subject indexing assigned by NLM

MeSH
Acute Disease; Aged; Cost-Benefit Analysis; Decision Support Techniques; Humans; Male; Monte Carlo Method; Peripheral Vascular Diseases /drug therapy; Tissue Plasminogen Activator /economics /therapeutic use; Treatment Outcome; Urokinase-Type Plasminogen Activator /economics /therapeutic use

AccessionNumber
22008101722

Date bibliographic record published
22/04/2009

Date abstract record published
03/03/2010