Screening for blunt cerebrovascular injuries is cost-effective
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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
This study aimed to determine if screening for blunt carotid or vertebral artery injury was cost-effective for patients after a blunt trauma. Computed tomography (CT) angiography was most cost-effective for patients at high risk, from a societal perspective, and from an institutional perspective, CT angiography prevented the most strokes, at a reasonable cost. The methods were satisfactory, but some of them and the results were not fully reported. This makes it difficult to judge if the authors’ conclusions are appropriate.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to determine if screening for blunt carotid or vertebral artery injury was cost-effective, in populations at high risk of such injury after a blunt trauma. All blunt trauma patients were evaluated as well as those at high risk only.

Interventions
The five strategies were no screening, duplex ultrasound, magnetic resonance angiography (MRA), angiography, and computed tomography (CT) angiography.

Location/setting
USA/secondary care.

Methods
Analytical approach:
A decision-tree model was designed to combine the published data to analyse alternative approaches. The authors stated that two perspectives were considered; a societal perspective and an institutional perspective.

Effectiveness data:
A literature search in MEDLINE was performed to identify the data for the model. The main clinical effectiveness estimates were the stroke rates for each intervention. Other parameters were the incidence of injury, and the sensitivity and specificity of the screening. The literature search results were combined to produce weighted average effectiveness estimates.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The benefit was measured in terms of the decrease in stroke rate.

Cost data:
Medicare reimbursement costs were used for diagnostic tests and procedures, and published US wholesale prices were used for medication costs. The lifetime costs of stroke were obtained from published data, based on the mean age of blunt trauma patients who were screened for an injury, and corrected for inflation. The price year was 2008 and the costs were reported in US dollars ($).
Analysis of uncertainty:
One-way sensitivity analyses were performed to test if the findings were robust. All the probabilities and cost inputs were varied, within reported ranges or authors assumptions, and the results were presented in tornado diagrams.

Results
In the high-risk population, from a societal perspective, CT angiography had the lowest cost per patient at $3,727, compared with $5,499 for angiography, $13,826 for MRA, $20,654 for duplex ultrasound, and $35,289 for no intervention. CT angiography and angiography had the lowest stroke rates of 1%, compared with 4% for MRA, 6% for duplex ultrasound, and 11% for no intervention.

All screening strategies saved costs and decreased the stroke rate, compared with no treatment. CT angiography saved the most ($31,562) and produced the highest reduction in stroke rate (10%). The results for the whole blunt trauma population were similar, with less savings.

In the high-risk population, from an institutional perspective, excluding the lifetime cost of stroke, compared with no treatment, the cost per stroke prevented was $8,940 with duplex ultrasound, $10,670 with CT angiography, $17,100 with MRA, and $29,550 with angiography.

The model was sensitive to the sensitivity, specificity, and costs of CT angiography.

Authors’ conclusions
The authors concluded that CT angiography was the most cost-effective strategy for patients at high risk of blunt carotid or vertebral injury, from a societal perspective. From an institutional viewpoint, CT angiography prevented the most strokes, at a reasonable cost.

CRD commentary
Interventions:
The interventions appear to have been appropriate comparators and no screening was included. These interventions might be available in other settings.

Effectiveness/benefits:
The effectiveness data were identified by a literature review and the source searched was clearly reported. Some of the search terms were provided, as well as the inclusion criteria, but these were not clearly presented and the search might be difficult to reproduce. The benefit measure appears to have been appropriate, but it was unclear if discounting was necessary and if it was undertaken.

Costs:
The two perspectives were clearly stated. It appears that relevant cost categories were included for the institutional perspective. The societal perspective included the lifetime costs stroke, but did not include such costs as productivity losses, meaning that societal costs or savings might have been underestimated. The unit costs were clearly presented, but little resource use information was given, which may hinder the reproduction of the study. The cost sources appear to have been appropriate and the price year was reported. The time horizon and discounting were not reported, making it difficult to assess if the long-term costs were included and appropriately adjusted.

Analysis and results:
The analytic approach appears to have been appropriate and the model structure was presented. The results were reported, but an incremental comparison between strategies was not. The incremental analysis, for the institutional perspective, was not presented for the entire blunt trauma population. The sensitivity analysis was appropriate, but a probabilistic sensitivity analysis could have assessed the overall uncertainty in the model.

Concluding remarks:
The methods were satisfactory, but some of them and the results were not fully reported. This makes it difficult to judge if the authors’ conclusions are appropriate.
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