A cost/utility analysis of open reduction and internal fixation versus cast immobilization for acute nondisplaced mid-waist scaphoid fractures

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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
The objective was to compare the costs and quality of life of screw fixation against cast immobilisation in the treatment of acute non-displaced mid-waist scaphoid fractures. The authors concluded that, compared with casting, open reduction and internal fixation was cost-effective from the perspective of society. Overall the level of reporting was good. The methods seemed robust and the conclusions reached appeared to be appropriate.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to compare the costs and quality of life of screw fixation against cast immobilisation in the treatment of acute non-displaced mid-waist scaphoid fractures.

Interventions
Open reduction and internal fixation of acute non-displaced mid-waist scaphoid fractures was compared with cast immobilisation.

Location/setting
USA/in-patient care.

Methods
Analytical approach:
A decision analytic model was used to synthesise the clinical and cost data. The model was run until all patients were deceased or had reached the age of 75 years. The authors stated that the perspective was that of society.

Effectiveness data:
The clinical and epidemiological data were derived from a review of the literature. MEDLINE was searched in 2003 for English language papers. The papers selected were three randomised controlled trials, observational studies, and descriptive studies. The main clinical parameters were the duration and probability of occurrence of the following health states: no early complications, non-union, late arthritis, delayed union, infection, and misplaced screw.

Monetary benefit and utility valuations:
The utilities were measured using the time trade-off method. After web-based pilot testing, the time trade-off assessment was administered to 50 randomly selected University of Michigan medical students.

Measure of benefit:
The measure of benefit was quality-adjusted life-years (QALYs).

Cost data:
Both the direct costs and productivity losses were included. The direct costs were those to the health care system, such as the physician payment, anaesthesia, and in-patient care. Medical costs were valued using the Medicare Resource-Based Relative Value Scale. Productivity costs were estimated using the average US hourly wage, obtained from the US Bureau of Labor. The price year was 2003, discounting was conducted at an annual rate of 3%, and the currency was
US dollars ($).

Analysis of uncertainty:
A series of one-way sensitivity analyses was conducted to ensure the stability of the authors’ conclusions. These analyses included: using only direct medical costs; varying the amount of lost income; varying the patients’ ages; and varying the probability of each health state occurring.

Results
The results were presented for patients aged: 25 years, 35 years, 45 years, 55 years, and 65 years. The main results were:

The average cost incurred by patients receiving the open reduction and internal fixation treatment was $7,940 for patients aged 25 to 55 years, and $7,792 for patients aged 65 years. The QALYs gained ranged from 25.89 for patients aged 25 years, to 8.74 for patients aged 65 years.

The average cost incurred by patients receiving casting was $13,851 for patients aged 25 to 55 years, and $13,651 for patients aged 65 years. The QALYs gained ranged from 25.68 for patients aged 25 years, to 8.70 for patients aged 65 years.

These costs and benefits were combined using an incremental analysis, which showed that open reduction and internal fixation was dominant over casting, which means it was both more effective and less costly, for all age groups.

These results were fairly robust in sensitivity analysis, with the exclusion of productivity losses having the greatest impact.

Authors’ conclusions
The authors concluded that, compared with casting, open reduction and internal fixation was cost-effective from the perspective of society.

CRD commentary
Interventions:
The interventions were clearly reported and justified, and both were acceptable treatment options for non-displaced mid-waist fractures of the scaphoid in the authors’ setting.

Effectiveness/benefits:
The parameters were derived from published research. A number of different studies of varying design were used. The authors reported that the results from the included studies were averaged to obtain a probability. No further details were provided, so it is not possible to be sure that the method of synthesis was appropriate. The authors reported the source used to identify potential studies and provided some justification for the parameters used. The methods used to derive the utilities were reported in full.

Costs:
The analysis of the costs was performed from a societal perspective and it appears that all relevant costs and their sources were included. It is not clear if the costs were in fact charges, or the actual costs of the services being provided. No cost-to-charge ratio was reported. As these costs were incurred over the assumed lifetime of the patient, discounting was relevant and was appropriately performed.

Analysis and results:
The model structure was described in detail, including a diagram. As the authors showed that open and internal fixation dominated casting, the costs and benefits were appropriately not combined (in the base-case analysis). Further, the impact of uncertainty was investigated through a series of one-way sensitivity analyses, the results of which were well reported. However, the use of probabilistic sensitivity analysis might have better assessed the parameter uncertainty. The authors identified and discussed the limitations of their analysis.
Concluding remarks:
Overall the level of reporting was good. The methods seemed robust and the conclusions reached appeared to be appropriate.

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