A comparative analysis of the accuracy, diagnostic uncertainty and cost of imaging modalities in suspected 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 aim was to evaluate the clinical and economic performance of second-line imaging techniques for patients with clinically suspected scaphoid fracture. The authors concluded that the current treatment regimen offered poor immediate diagnostic accuracy and routinely over treated most patients, and that second-line imaging offered high diagnostic accuracy, at a higher cost. There were limitations to the study’s methodology, especially concerning the data used, and for this reason the authors’ conclusions should be considered with a degree of caution.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The aim was to evaluate the clinical and economic performance of second-line imaging techniques for patients with clinically suspected scaphoid fracture.

Interventions
The standard care (plain radiography) was compared with enhanced care (standard care plus second-line imaging techniques). Second-line imaging included magnetic resonance imaging (MRI), computerised tomography (CT), radionucleotide bone scan (RNBS) and ultrasound (US). Patients with ongoing symptoms and negative radiographs were referred for second-line imaging.

Location/setting
UK/hospital.

Methods
Analytical approach:
This economic evaluation was based on data derived mainly from electronic patient records of 200 consecutive patients attending a trauma service with clinically suspected scaphoid fracture. The time horizon was 14 days and the authors did not explicitly state the perspective.

Effectiveness data:
The prevalence of proved fracture was derived from a retrospective review of patients’ charts at the authors’ institution. A sample of 200 patients over the period from March 2002 to December 2003 was considered. Evidence on the sensitivity and specificity for each of the imaging techniques was obtained from the literature.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
No summary benefit measure was used in the study as a cost-consequences analysis was performed. The key clinical end point was the presence or absence of scaphoid fracture on follow-up radiography.

Cost data:
The cost categories were the costs of staffing, materials and general overheads. The sources of cost data were the local
hospital management and the Scottish Health Statistics (2006). The costs were reported in UK pounds sterling (£).

**Analysis of uncertainty:**
The issue of uncertainty was addressed by conducting best or worst case scenario analysis.

**Results**
The prevalence of true fracture was 16%.

Among the four techniques under examination, MRI performed best clinically with US being the least effective.

The cost of standard care was £204 for a patient with confirmed fracture and £132 for a patient with no confirmed fracture. The cost of enhanced care for a fracture confirmed patient was £362 for MRI, £302 for RNBS, £172 for US, and £262 for CT. For a patient with no confirmed fracture, the cost was £290 for MRI, £230 for RNBS, £100 for US, and £190 for CT.

The scenario analysis provided the costs in the best and worst scenarios.

**Authors' conclusions**
The authors concluded that the current treatment regimen offers poor immediate diagnostic accuracy, and only achieves safety by the routine overtreatment of the majority of patients. They suggested that second-line imaging offered high diagnostic accuracy but at a higher cost.

**CRD commentary**

**Interventions:**
The alternatives were described in detail and were appropriately selected as they represented current practice in the authors' setting.

**Effectiveness/benefits:**
The use of a retrospective review of patients' charts to derive clinical data may have introduced some selection bias. Although the sources of the literature were provided neither the methods used to identify primary studies nor the inclusion criteria were reported. Therefore it is difficult to ascertain if the best available evidence was used.

**Costs:**
The authors provided little information around the costs used in the analysis as these were reported as macro-categories. The perspective of the analysis and the price year were not explicitly reported, although the price year may have been 2006. No statistical analysis of the costs was performed.

**Analysis and results:**
No synthesis of the effectiveness and cost data was carried out; in effect, a cost-consequence analysis was performed. Nevertheless, the study results were clearly reported. The impact of uncertainty on the study parameters was not investigated which makes it difficult to assess how robust the results were. The authors acknowledged some limitations to their analysis.

**Concluding remarks:**
There were a few limitations to the study's methodology, especially concerning the data used in the analysis, and for this reason the authors' conclusions should be considered with a degree of caution.

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