Magnetic resonance imaging of suspected scaphoid fractures using a low field dedicated extremity MR system

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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.

Health technology
The use of magnetic resonance imaging (MRI) to examine patients with a clinically suspected scaphoid fracture within 4 days of injury, as compared with 10 days to 6 weeks following injury.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients with a clinically suspected scaphoid fracture. Patients with a fracture of the scaphoid or any other bone that was identified on a plain radiograph were excluded. The patients had a history of recent wrist injury.

Setting
The setting was hospital. The economic analysis was carried out in the UK.

Dates to which data relate
The dates during which the effectiveness, resource use, and cost data were gathered were not reported. The price year was not reported.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was carried out prospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
There were 56 patients in the early MRI group and 53 patients in the late MRI group. No power calculations were performed to determine the sample size. All of the patients studied were consecutive referrals.

Study design
This was a retrospective cohort study carried out at a single centre. The patients in the early MRI group were studied...
once patients had been acquired for the late MRI group. The patients in the early MRI group were followed up until 2 to 3 months after the initial injury.

**Analysis of effectiveness**
The clinical study was analysed on the basis of treatment completers only. The primary health outcomes used in the analysis were the number of scaphoid fractures and the changes in treatment. The author did not report whether the groups were comparable in terms of their demographic characteristics.

**Effectiveness results**
Fifty per cent of the patients in the late MRI group had a fracture demonstrated by MRI. In this group, there were 14 scaphoid, 9 radial and 3 other fractures. All of the 20 patients with normal scans were given a soft splint for symptomatic relief. Ten were discharged and the other 10 were kept under review. Twenty-eight per cent of patients in the early MRI group had a fracture demonstrated by MRI. In this group, there were 7 scaphoid, 6 radial and 4 other fractures. Thirty-one patients with a normal scan were placed in a supportive splint and discharged. Treatment was altered in 89% of the patients in the early MRI group, and in 69% of the patients in the late MRI group.

**Clinical conclusions**
The author concluded that the optimum time to examine the patient by MRI was soon after injury.

**Measure of benefits used in the economic analysis**
The author did not report a summary health benefit and left the clinical outcomes disaggregated. Hence, a cost-consequences analysis was conducted.

**Direct costs**
The direct costs were not discounted due to the short timeframe of the study (less than one year). The quantities and costs were reported separately. The direct costs related to the cost of staff and consumables. The quantity/cost boundary adopted was that of the hospital. The source of the cost data was the author's hospital. The price year was not reported. The author assumed that patients with clinical scaphoid injuries but normal radiographs re-attended the department, on average, 2.5 times.

**Statistical analysis of costs**
No statistical analysis of costs was reported.

**Indirect Costs**
The indirect costs were not included.

**Currency**
UK pounds sterling (€).

**Sensitivity analysis**
No sensitivity analyses were reported.

**Estimated benefits used in the economic analysis**
See the 'Effectiveness Results' section.
Cost results
The patients in the late MRI group incurred MRI costs of £2,650, but avoided 65 outpatient appointments. A clinic attendance would have to cost £40 to remain cost-neutral.

The patients in the early MRI group incurred MRI costs of £2,800, but avoided 97.5 outpatient appointments. A clinic attendance would have to cost less than £30 to remain cost-neutral.

Synthesis of costs and benefits
The cost and health benefit measures were not combined because the author conducted a cost-consequences study.

Authors’ conclusions
The author argued that examination of all patients with a suspected scaphoid fracture by magnetic resonance imaging (MRI) was a realistic proposition. The optimum time to examine the patient by MRI was soon after injury.

CRD COMMENTARY - Selection of comparators
It was unclear why the comparator used was chosen. The author pointed out alternative technologies that were not covered in this study, such as comparative views, macroradiography and isotope bone scintigrams. You should decide if the chosen health technology is relevant to your own setting.

Validity of estimate of measure of effectiveness
The analysis was based on a retrospective cohort study, which was appropriate for the study question. However, this type of study is subject to selection bias and confounding variables. The author did not report if the groups were comparable in terms of demographic characteristics, which again, may hinder the validity of the results.

Validity of estimate of measure of benefit
The author did not derive a summary measure of health benefit. The analysis was therefore categorised as a cost-consequences study. No statistical analysis was performed to compare the health benefits between the two groups.

Validity of estimate of costs
More details about the costing method and the components of the direct cost estimate could have been provided. The positive features of the cost analysis were that all relevant direct cost categories were included, and that the quantities and costs were reported separately. This made it possible to replicate the cost results in other settings. However, the price year was not reported. In addition, the author did not conduct sensitivity or statistical analyses on the quantities or costs, which limited the validity and generalisability of the results.

Other issues
The author made appropriate comparisons of his findings with those from other studies, but did not address the issue of generalisability to other settings. The author did not seem to present the results selectively. The study considered patients with a clinically suspected scaphoid fracture and this was reflected in the author’s conclusions. The author did not investigate other techniques to detect scaphoid fractures, such as comparative views, macroradiography and isotope bone scintigrams.

Implications of the study
The author argued that the examination of all patients with a suspected scaphoid fracture using MRI was a realistic proposition. The optimum time to examine the patient by MRI was soon after injury. The findings would benefit from a prospective randomised trial, if this were feasible.
Source of funding
None stated.

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