Cost-effectiveness analysis of open reduction/nonrigid fixation and open reduction/rigid fixation to treat mandibular 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.

Health technology
Using open reduction and internal fixation with rigid internal fixation (ORIF-R) versus open reduction and internal fixation with non-rigid internal fixation (ORIF-NR) in the treatment of mandibular fractures.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing ORIF for mandibular fractures involving the angle or posterior body.

Setting
Hospital. The economic study was carried out in Atlanta, Georgia, USA.

Dates to which data relate
Data was collected for patients treated between 1991 and 1994. Complication rates were estimated based on data belonging to the period 1987-1991. No date was reported for the price data.

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

Link between effectiveness and cost data
The costing was undertaken retrospectively on the same patient sample as that used in the effectiveness study.

Study sample
Power calculations did not determine the sample size. A total of 34 patients were divided in three groups: groups 1 and 2 consisted of patients treated with ORIF-NR (12 patients) or ORIF-R (11 patients), respectively, who experienced no post-operative complications; group 3 consisted of patients treated with either procedure who had post-operative complications (11 patients). The ORIF-R group was statistically older than the ORIF-NR group.

Study design
Retrospective cohort study, carried out in a single centre.
Analysis of effectiveness
The analysis of the clinical data was based on treatment completers only. The health outcomes used were successful treatment and complication rate. It seems that from the beginning of the research, it was assumed that ORIF-R and ORIF-NR were equally effective alternatives in the treatment of mandibular fractures.

Effectiveness results
All patients in groups 1 (12 patients) and group 2 (11 patients) were successfully treated. The complication rate, based on the experience in the study hospital for the period 1987-91 was 20% for ORIF-NR and 6.3% for ORIF-R.

Clinical conclusions
The authors concluded that "It is generally agreed that nonrigid fixation and rigid fixation represent acceptable treatment alternatives" in the treatment of mandibular fractures.

Measure of benefits used in the economic analysis
The benefit measures used were successful treatment and complication rates. It seems that from the beginning of the research, it was assumed that ORIF-R and ORIF-NR were equally effective alternatives in the treatment of mandibular fractures.

Direct costs
No discounting was reported. Quantities and costs were analysed separately. Overhead costs, operating costs and costs of complications were measured based on charges in the authors' hospital. Quantities and costs estimation was based on the patients' medical and billing records. The surgeons' fees were estimated on the basis of the Medicare fee schedule. Charges were used as the proxy for costs. No prices date was explicitly stated. Surgeons' fees were not included in the estimates of treatment costs for the uncomplicated cases (groups 1 and 2), since those fees were thought to be "equivalent and global" regardless of the treatment type. The outpatient costs caused by complications were not included because of lack of relevant data.

Statistical analysis of costs
Student's t test was performed to compare the groups in terms of difference in average total charge.

Indirect Costs
Not included.

Currency
US dollars ($).

Sensitivity analysis
A set of one-way and two-way sensitivity analyses was carried out by focusing on the estimated charges of uncomplicated cases. A two-way threshold analysis was carried out focusing on changes in the estimates of postoperative complication rates.

Estimated benefits used in the economic analysis
The effectiveness result related to successful treatment was the number of patients in each group: groups 1 and 2, for patients treated with ORIF-NR (12 patients) and ORIF-R (11 patients), respectively, who experienced no post operative complications and group 3, for patients treated with either procedure who had postoperative complications (11
patients). The complication rate estimated based on the experience in the study hospital for the period 1987-91 was 20% for ORIF-NR and 6.3% for ORIF-R.

Cost results
For groups 1 and 2, on average, the treatment charges for rigid fixation ($6,116) were $1,468 more than the charges for non-rigid treatment ($4,648)(p=0.02). For group 3, the total charge to treat a complication averaged $11,637 +/- 6,441 (range: $3,682 - $29,805) per case.

Synthesis of costs and benefits
A combination of costs and benefits was performed by estimating the total (uncomplicated and complicated) cost per successfully treated patient. Since at the hospital in which the study took place the postoperative complication rate was reported to be 20% for ORIF-NR and 6.3% for ORIF-R (between 1987 and 1991), the total average estimated costs per successfully treated patient were $6,975 and $6,849 for ORIF-NR and ORIF-R, respectively. The threshold analysis resulted in ORIF-NR being more cost effective than ORIF-R as long as the complication rate for ORIF-NR did not exceed the complication rate of ORIF-R by more than 12.6%. The sensitivity analysis found that under a variation of +/- 10% of the charge estimates for uncomplicated treatments, the break-even point ranged from 3.3% to 21.9%.

Authors' conclusions
On the basis of this study, ORIF-R was more cost effective than ORIF-NR for the particular oral and maxillofacial surgery service considered. However, these conclusions should not be generalised to other institutions or practices. The methods used, however, for doing the cost effectiveness analysis may be generalised.

CRD COMMENTARY - Selection of comparators
Neither of the techniques examined was explicitly stated as the comparator.

Validity of estimate of measure of benefit
The internal validity of the effectiveness results may have been weakened by the lack of randomisation.

Validity of estimate of costs
As the authors acknowledged, the internal validity of the cost results is questionable due to the use of charges as a proxy for costs, and the omission of indirect costs and outpatient complication costs.

Other issues
The authors also acknowledged that the results may not be generalisable to other settings or countries. Patients with complications should have been analysed in the corresponding intervention group.

Source of funding
None stated.

Bibliographic details

PubMedID
7552862
Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Analysis of Variance; Chi-Square Distribution; Cost-Benefit Analysis; Direct Service Costs; Female; Fracture Fixation, Internal /economics /methods; Hospital Costs; Humans; Male; Mandibular Fractures /surgery; Postoperative Complications /economics

AccessionNumber
21995000857

Date bibliographic record published
31/03/1999

Date abstract record published
31/03/1999