Cost-effectiveness of immediate postoperative radiographs after uncomplicated total knee arthroplasty: a retrospective and prospective study of 750 patients

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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
Immediate post-operative radiographs after uncomplicated total knee arthroplasty.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing uncomplicated TKA.

Setting
Hospital, the economic study was set in the USA.

Dates to which data relate
The retrospective study related to the period from January 1994 to November 1995, and the prospective study was carried out from November 1995 until March 1998. The price year was not reported.

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

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

Study sample
200 consecutive patients undergoing primary TKAs with immediate post-operative radiographs were reviewed. 550 consecutive patients who underwent an uncomplicated TKA had the first post-operative radiographs taken at the 6-week follow-up visit. No power calculations were reported. Seven patients were excluded because predischarge post-operative radiographs were not obtained. One operative death was excluded.

Study design
The study was a retrospective and prospective cohort study carried out at a single centre. Patients were followed up for 6 weeks. No patients were lost to follow-up.
Analysis of effectiveness
The analysis of the clinical study was based on intention to treat. The primary health outcomes included the number of post-operative radiographs performed, the effect of post-operative radiographs on post-operative management, and the quality of radiographs.

Effectiveness results
Of the 200 patients who underwent primary TKA, 196 had an uncomplicated intraoperative course. 192 patients had 405 post-operative radiographs taken before discharge. For the 189 patients who underwent an uncomplicated primary TKA, the radiographs did not alter the postoperative management. In evaluating the angle of the beam in the anteroposterior and lateral projections, 10% were rated as excellent, 31% were rated as good, 34% were rated as fair, and 25% were rated as poor. The exposure was adequate in 80%, underexposed in 19% and overexposed in 1%. 36% were of sufficient quality to provide an accurate baseline for future studies. Of the 550 patients followed prospectively, there were no instances in which radiographs taken before discharge were needed to aid in post-operative management decisions.

Clinical conclusions
Although the information obtained for a total hip arthroplasty patient can be clinically important, the practice of obtaining routine, immediate post-operative knee radiographs in the absence of clinical indication does not provide any additional clinical information and does not appear to benefit patient care.

Measure of benefits used in the economic analysis
The measures of benefit included the number of post-operative radiographs performed and the effect of post-operative radiographs on post-operative management.

Direct costs
Direct costs were not discounted because of the short time horizon of the study (less than one year). Quantities and costs were not reported separately. Direct costs related to the costs of the film, developing, and radiologic interpretation. The quantity/cost boundary adopted was that of the hospital. The estimation of quantities and costs was based on actual data. Costs and quantities were collected from the hospital standard billing scheme. The price year was not reported.

Statistical analysis of costs
No statistical analysis was reported.

Indirect Costs
Indirect costs were not included.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was reported.

Estimated benefits used in the economic analysis
Among the 189 patients who underwent an uncomplicated primary TKA, the radiographs did not alter the postoperative
management. There were no instances in which radiographs taken before discharge were needed to aid in post-operative management decisions.

**Cost results**
The total cost of the radiographic evaluation was approximately $36,000.

**Synthesis of costs and benefits**
Cost and benefit measures were not combined into cost-effectiveness ratios.

**Authors’ conclusions**
Post-operative radiographs obtained before discharge do not contribute enough information to warrant the discomfort to the patient, the increase in health care costs, and repeated radiation exposure of personnel and patient.

**CRD COMMENTARY - Selection of comparators**
The implicit comparator was the strategy of not taking post-operative radiographs.

**Validity of estimate of measure of benefit**
The analysis was based on a cohort study, which was appropriate for the study question. The study sample was representative of the study population. The analysis of effectiveness was handled credibly. The authors did not derive a measure of health benefit and the analysis used a cost-consequences design.

**Validity of estimate of costs**
All relevant direct cost categories were included. The costs for the transport services, x-ray technologist’s time, equipment maintenance, and repeat exposures were not considered. Charges were used to proxy prices. Quantities and costs were not reported separately. No statistical or sensitivity analyses were reported on quantities or costs. The price year was not reported.

**Other issues**
The authors made appropriate comparisons of their findings with those from other studies, but the issue of generalisability to other settings was not addressed. The authors did not present their results selectively. The study enrolled patients undergoing uncomplicated TKAs and this was reflected in the authors’ conclusions. The authors reported a number of study limitations, specifically:

- they did not include all financial costs and subjective patient comfort costs, thereby underestimating total cost savings to the institution and hospital community;
- by not specifically considering rotation in the x-ray rating system, the authors assumed that all views were true anteroposterior or lateral, potentially overestimating the percentage of films that can be rated using the Knee Society scoring system;
- the surgeon reviewing the prospective group was not blinded to the study hypothesis.

**Implications of the study**
The practice of obtaining routine, immediate post-operative knee radiographs in the absence of a specific clinical indication does not provide any additional clinical information, is not cost-effective, and does not appear to benefit patient care.