The role of bladder catheterization in total knee arthroplasty
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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 insertion of an indwelling catheter into the bladder before total knee arthroplasty (perioperative).

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised male and female patients undergoing unilateral total knee arthroplasty.

Setting
The setting was an institution. The economic study was carried out in Burlington (MA), USA.

Dates to which data relate
The effectiveness data were collected between 1993 and 1998. The price year was not explicitly stated.

Source of effectiveness data
The 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 study.

Study sample
The authors did not report how the sample size was determined. A total of 652 patients were randomised to two groups. In one group, 306 patients had an indwelling bladder catheter inserted preoperatively for 24 hours. In the other group, 346 patients had a catheter inserted on an as needed basis only if symptoms of urinary retention occurred. There were 143 men (46.7%) and 163 (53.3%) women who received urinary indwelling catheters preoperatively. There were 162 (46.8%) men and 184 (53.2%) women who received catheters as necessary. The average age of the patients in whom an indwelling bladder catheter was inserted preoperatively was 67.8 years (range: 29 - 92). The average age of the patients in whom the catheter was inserted as necessary was 66.8 years (range: 26 - 92). All patients were treated according to a strict clinical pathway, which was adhered to by the three participating surgeons.

Study design
This was a randomised controlled trial carried out in a single centre. It was stated that the patients were “randomised by surgeon”. No other details were provided. The length of follow-up and loss to follow-up were not stated, although the data did not extend beyond the length of hospital stay. No blinding was reported.

**Analysis of effectiveness**

The analysis of the clinical study was conducted on an intention to treat basis. The primary outcome was the number of patients who contracted a urinary tract infection. There were no significant differences between the groups in terms of the age or gender. All complications were recorded in a total knee arthroplasty database. Another outcome considered was the length of stay among patients in the two groups. When analysing the results, the groups were adjusted for the type of anaesthesia they received.

**Effectiveness results**

Urinary tract symptoms developed in 6 (1.96%) of the patients who had an indwelling bladder catheter, following its removal. Five of these patients had the catheter reintroduced and one of them had intermittent catheterisation.

Urinary tract retention, for which the patient required bladder catheterisation, developed in 229 (67%) of the 346 patients who received a catheter as necessary. An indwelling catheter was inserted in 203 (88.6%) of these 229 patients, while intermittent catheterisation was necessary in 26 (11.4%) of them.

Urinary tract infections developed in 5 (1.6%) patients in whom an indwelling bladder catheter was inserted preoperatively. All these infections developed in patients who did not require a subsequent reinsertion of a catheter.

Urinary tract infections appeared in 6 (1.7%) patients in whom a catheter was inserted as necessary. Five of these infections appeared in patients who had subsequent catheter insertion. One (0.9%) of the patients who had not undergone any catheterisation also developed an infection.

No patient from either group who underwent intermittent catheterisation had a urinary tract infection.

There was no statistically significant difference, (p>0.05) in the occurrence of urinary tract infection between the two groups.

There was also no statistically significant difference in the length of stay among the two groups. Patients with an indwelling catheter stayed for 4.56 days and those with catheter insertion as necessary stayed for 4.29 days.

There was also no statistically significant difference in the incidence of urinary tract infection, or symptoms of urinary infection, when the groups were adjusted for type of anaesthesia.

**Clinical conclusions**

The authors concluded that the incidence of urinary tract infections was not statistically different when patients in whom a catheter was inserted as necessary were compared with those in whom an indwelling catheter was inserted.

**Measure of benefits used in the economic analysis**

There was no summary measure of benefit. The study therefore constituted a cost-consequences analysis.

**Direct costs**

No discounting was undertaken as the treatment period was less than two years. The quantities and the cost were analysed separately. The cost/resource boundary of the cost analysis was not stated. The costs were estimated from actual data. These costs included those of the catheters, operating room time and inpatients stay (hospital cost). The cost data were based on calculations made using an accounting system developed by TSI Inc. (Cambridge, MA). The resource data were collected between 1993 and 1998. The price year was not specified. The unit costs and the quantities of resources were reported separately. Nursing care was considered as a fixed cost between the two treatments. Also,
the authors indicated that a cost analysis that included nursing involved with catheterisation protocols would be inaccurate.

Statistical analysis of costs
Student's t-test was used for the continuous variables analysis, while a chi-squared analysis was used to evaluate the categorical variables. The authors considered a p-value of less than 0.05 to be statistically significant.

Indirect Costs
The indirect costs were not considered as the study was conducted on the basis of a provider perspective.

Currency
US dollars $.

Sensitivity analysis
A sensitivity analysis was not undertaken.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The "average" hospital cost for patients in whom a bladder catheter was inserted as needed was $8,581. The cost for those in whom an indwelling bladder catheter was inserted was $9,071. The "average" difference was $491 per patient.

The hospital costs were statistically different between the two groups, (p<0.0001).

The combination of operating room time ($65), catheter ($3.36) and length of stay differential (0.27 days multiplied by $639.75/day = $172.73) equals $241.09 of the $491 difference in cost between the two groups. The $149.91 differential was attributed to a difference in cement technique among the authors.

Synthesis of costs and benefits
Not applicable.

Authors' conclusions
The routine preoperative insertion of a catheter into the urinary bladder may not be warranted in patients undergoing total knee arthroplasty. The results of the hospital cost data favoured the use of the observation protocol. The authors therefore concluded it was more cost-effective to observe patients for urinary retention and then to insert a catheter.

CRD COMMENTARY - Selection of comparators
The justification for the choice of the comparator used, namely observation of the patient and catheterisation when necessary, was that it was the standard practice. You should decide if this is a widely used health technology in your own setting.

Validity of estimate of measure of effectiveness
The analysis used a randomised trial, which was appropriate for the study question. However, the method of randomisation was not reported and there appears to have been no blinding. The information on the study sample, on
which to base an assessment of the degree to which it was representative of the study population, was limited. The patient groups were shown to be comparable at analysis. More baseline characteristics that are likely to be prognostic might have been provided.

**Validity of estimate of measure of benefit**
The authors did not derive a summary measure of benefit. It might have been useful to have tried to account for any distress to the patient of having either indwelling catheterisation or urinary retention.

**Validity of estimate of costs**
The perspective of the analysis was not explicitly stated, but only the categories of cost relevant to a provider perspective were included in the analysis. The authors indicated that some costs, such as nursing costs, were a fixed cost between the two groups. Thus, a cost analysis that included nursing time involved with catheterisation protocols would be inaccurate. The unit costs and the quantities were reported separately. The price year was not stated. The unit costs used in the study were specific to the study setting, but generalisability is facilitated by their explicit reporting.

**Other issues**
The authors made appropriate comparisons of their findings with those from other studies. They also made reference to the issue of generalisability to other settings where general anaesthesia and patient controlled analgesia were used. The generalisability of the findings may be reduced as sensitivity analyses were not carried out. The authors did not report any major limitations to their study. The results were reported in full. The authors’ conclusions were in keeping with the scope of the analysis.

**Implications of the study**
The authors recommend that, for patients in whom urinary retention develops postoperatively, straight intermittent catheterisation should be used to avoid urinary tract infection.

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