Comparison of late night and early morning removal of short-term urethral catheters
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CRD summary
The review evaluated whether the timing of the removal of indwelling urethral catheters (IUCs) influences patient outcomes. The authors concluded that the limited available evidence suggested benefit, in terms of patient outcomes and a reduction in the length of hospitalisation, following the midnight removal of IUCs. The conclusion pertaining to the length of hospitalisation is reliable, but the generalised advantage of midnight removal of IUCs for patient outcomes is less clear.

Authors' objectives
To determine whether the timing of the removal of indwelling urethral catheters (IUCs) influences patient outcomes.

Searching
MEDLINE, CINAHL, Nursing Collection, EMBASE and the Cochrane Library were searched up to 2002; the search terms were reported. The reference lists and bibliographies of trials and reviews, and conference proceedings of the International Continence Society (1995 to 2000), the International Urogynecological Association (2000 to 2001) and the Hong Kong Urological Association (1995 to 2001), were also searched. In addition, experts and company representatives were contacted for further studies. No language restriction was applied.

Study selection
Study designs of evaluations included in the review
Randomised and quasi-randomised controlled trials were eligible for inclusion in the review.

Specific interventions included in the review
Studies that compared the early morning removal of short-term catheters with late night removal, and studies comparing removal at different times of the day or night, were eligible for inclusion. Short-term catheters were defined as a catheter inserted for 1 to 14 days. Most of the included studies compared a midnight with a morning removal approach.

Participants included in the review
Adults and children having a short-term IUC were eligible for inclusion. Patients with IUCs for congenital abnormalities of the genito-urinary system, needing intermittent catheterisation, or having nephrostomy and suprapubic catheters, were excluded. The included studies analysed only adult patients aged 49 to 84 years with IUCs following urological procedures and surgery or gynaecological surgery. Three studies analysed exclusively patients undergoing transurethral resection of the prostate (TURP).

Outcomes assessed in the review
The review looked primarily at objective measures: the volume of and time to the first void, the length of hospital stay and the incidence of recatheterisation for urinary retention. The secondary outcomes were patient satisfaction and the percentage of IUCs removed at the allocated time. The majority of the included studies provided data on the volume of and time to the first void, the length of hospital stay and the incidence of recatheterisation; patient satisfaction was not assessed directly. The included studies also reported some rather incidental occurrences (i.e. ‘some patients slept through the procedure of the IUC removal’).

How were decisions on the relevance of primary studies made?
Two reviewers independently selected the studies for inclusion and a third reviewer checked the decisions.

Assessment of study quality

The trials were assessed using the Jadad scale to evaluate randomisation, blinding and withdrawals. Allocation concealment was also evaluated using Cochrane criteria (adequate, unclear, inadequate, not used). Two reviewers assessed the validity of the studies independently. Any discrepancies were resolved by discussion.

**Data extraction**

Two reviewers extracted the data independently, which were cross-checked by a third reviewer. Data on each outcome of interest were extracted as reported in the individual studies. Also presented were details of the study design, patient characteristics, patient inclusion or exclusion criteria, number and reasons for withdrawals and drop-outs, and a description of the intervention and outcomes.

**Methods of synthesis**

How were the studies combined?

The results from individual studies were combined using fixed-effect meta-analysis models where there was no evidence of clinical or statistical heterogeneity. The dichotomous outcomes were summarised as odds ratios, while for the continuous data the weighted mean difference was calculated, both with 95% confidence intervals. A narrative synthesis was undertaken where a statistical pooling was considered inappropriate.

How were differences between studies investigated?

Clinical homogeneity was assessed considering the setting, population, interventions and outcomes. Studies considered clinically homogeneous were also assessed for statistical heterogeneity by applying a chi-squared test. The studies were divided into the subgroups of TURP alone, general or combined urological procedures, and gynaecological procedures.

**Results of the review**

Eight studies (n=889) provided data for the review: 6 randomised controlled trials (n=708) and 2 quasi-randomised trials (n=181).

Seven trials analysed urine volume of first void. All reported larger volumes of urine passed when the IUCs were removed at midnight compared with early in the morning, but only 4 studies tested and reported a statistically significant difference.

Of the 6 studies that analysed the time to the first void, all 5 urological studies reported that it was longer when the IUCs were removed at midnight (statistically significantly longer in 3 trials), whereas the only gynaecological surgery trial reported that the time was significantly shorter.

Six of the 7 studies with patients whose IUCs were removed at midnight showed a shorter stay at hospital: 3 pooled studies showed a statistically significantly greater effect and 2 primary studies showed a significant difference, while in 1 study the difference was not tested statistically.

One study showed no difference in the length of hospital stay with regard to the time of IUC removal.

Six studies pooled within the subgroups (i.e. TURP alone, urological surgery or procedures, and gynaecological surgery) showed no evidence of a statistically significant difference between morning or midnight removal of IUCs with regard to the incidence of recatheterisation.

**Cost information**

One randomised controlled trial demonstrated a reduced length of stay for patients whose IUCs were removed at midnight compared with early morning (17 bed-days a year), with corresponding annual savings of £1,500.

**Authors' conclusions**

The limited available evidence suggested a benefit in terms of patient outcomes and a reduction in the length of hospitalisation following midnight removal of the IUCs. Further research is needed.
CRD commentary
The review question and the inclusion criteria were clear. Extensive searches were undertaken to locate published and unpublished material and no language restriction was applied, thus reducing publication and language bias. Methods were used to reduce bias and errors in the study selection and data extraction processes. The review was restricted to randomised controlled trials and quasi-randomised trials, which provide a sound evidence basis; however, a distinction between these designs was not made. The quality of the included studies was assessed adequately using a combination of the Jadad scale and an evaluation of allocation concealment.

The results were not pooled statistically when clinically heterogeneity between studies had to be assumed. Since the included studies were designed in different clinical settings, the results were not pooled but presented separately within their settings and subgroup analyses were undertaken. The secondary outcomes were addressed in a less formal manner and only limited information was presented.

The authors' conclusion was adequate with regard to the length of hospitalisation. With regard to the beneficial effect on 'patient outcomes', it was hard to reconstruct this generalised conclusion from the result presented: it was not specified which of the studied outcomes, or subgroups of patients, the authors were referring to; not all of the studied outcomes demonstrated a benefit for the midnight removal procedure (i.e. incidence of recatheterisation); and the specific data on patient satisfaction were based on not very informative measures.

Implications of the review for practice and research
Practice: The authors stated that the review evidence suggests a benefit for patient outcomes and cost-effectiveness following the midnight removal of IUCs.

Research: The authors stated that further trials with larger samples should be undertaken. These should assess standardised outcomes with standardised statistical measures, in wider settings and with specific groups of patients to enhance generalisability. In addition, studies should examine the efficacy of midnight or early morning IUC removal compared with removal at any time of the day.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.