The effectiveness of the ultrasound bladder scanner in reducing urinary tract infections: a meta-analysis

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CRD summary
This review concluded that ultrasound bladder scanning to assess residue volume in adult postoperative patients reduced unnecessary catheterisations and the associated risk of urinary tract infection. The small number of included studies and weaknesses in the review methods and analysis mean that this conclusion should be viewed cautiously.

Authors' objectives
To determine the effectiveness of ultrasound bladder scanning in reducing the risk of catheter-associated urinary tract infection (CAUTI) in patients where bladder volume assessment is required.

Searching
MEDLINE and CINAHL were searched (January 1986 to February 2008). There were no language restrictions. Search terms were reported. The online Journal of Ultrasound in Medicine was searched from 1997 to July 2008. Internet searches were conducted, citations reported on ultrasound manufacturers' websites were screened, bibliographies of included studies were screened and authors of included studies were contacted to identify additional articles.

Study selection
Randomised controlled trials or quasi-experimental studies that compared ultrasound bladder scanning with the clinical judgment of nurses in evaluation of acute urinary retention followed by a decision of whether or not to apply a catheter were eligible for inclusion. Studies had to be in hospitalised adult patients who required bladder volume assessment. Studies were required to report the occurrence of at least one CAUTI detected before discharge from hospital.

All studies were conducted post surgery. Mean age of participants in the intervention group ranged from 45.2 to 63 years and the proportion of males ranged from 38% to 53%. Mean age of participants in the control group ranged from 45.7 to 63.3 years and the proportion of males ranged from 38.2% to 51.3%.

The authors did not state how many reviewers performed the study selection.

Assessment of study quality
The authors did not state that they assessed study quality.

Data extraction
Data were extracted to calculate the odds ratio (OR) with 95% confidence interval (CI).

The authors did not state how many reviewers performed data extraction.

Methods of synthesis
A pooled odds ratio, with 95% CI, was calculated using the Mantel-Haenszel fixed-effect model.

Between-study heterogeneity was assessed using the Q statistic and I² and by visual examination of a forest plot.

Results of the review
Three studies (4,442 participants, range 82 to 4,116) were included in the review.

Ultrasound bladder scanning was effective in reducing CAUTI (OR 0.27, 95% CI 0.1-6 to 0.47, Q=0.19, I²=62%).
Authors’ conclusions
Use of the ultrasound bladder scanner for evaluating and monitoring the residue volume in immediate postoperative patients aged 18 or above reduced unnecessary catheterisations and, therefore, the risk of urinary tract infection associated with catheterisation.

CRD commentary
The review provided a clear research objective and defined inclusion criteria in terms of population, intervention, comparator, outcome measure and study design. A range of sources were searched for relevant studies and no language restrictions were applied, which reduced the chance that relevant studies were missed. No assessment of the methodological quality of included studies was reported and it was unclear whether measures were taken to minimise error and bias in the review process; therefore, it was not possible to assess the reliability of either the underlying studies or the review process. The use of a fixed-effect model to produce an overall odds ratio was questionable given the degree of between-study heterogeneity indicated by the \( I^2 \) statistic.

Given the small number of included studies and weaknesses in the review methods and analysis, the authors’ conclusions should be viewed cautiously.

Implications of the review for practice and research

Practice: The authors stated that the introduction of evaluations by an ultrasound bladder scanner should become a widespread practice by nurses who managed surgical patients who frequently developed acute urinary retention.

Research: The authors did not state any recommendations for future research.

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