Reducing contamination rates and catheter associated urinary tract infection associated with mid stream urine collection in Pediatrics

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Thesis declaration

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent for a copy of my thesis to be deposited in the University Library, being made available in all forms of the media, now or thereafter.

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Date:
Acknowledgements

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Abstract

Background
Best practice recommendations for the prevention of adult catheter associated urinary tract infections are available from many international patient safety authorities such as the Cochrane Library, Joanna Briggs Institute, National Health Service, The WHO guidelines and Centre for Disease Control and Prevention. However, guidance for clinicians working with pediatric patients is, limited. Similarly, there is a lack of consensus on if periurethral cleaning is an important step in helping to reducing the contamination rates of midstream urine collection, and if a solution other than potable water is needed to undertake this cleansing. In order to ensure our pediatric population is receiving evidence based health care, as healthcare professionals it is our responsibility to ensure that guidelines and or practice recommendations are as readily available, as this not only impacts economic benefits but more importantly patients quality of life.

Objectives
The objective for this review was to synthesize the best available evidence related to the type of solution used for periurethral cleansing in reducing the rate of contamination of mid stream urine collection and catheter associated urinary tract infection in pediatric patients.

Inclusion criteria
Types of participants
This review considered studies involving children from the age of 1 month to 18 years with a short-term indwelling urethral catheter and / or children who required midstream urine sampling.

Types of intervention(s)/phenomena of interest
Any cleansing solution e.g. Soap, 10% Providone-Iodine, Sterile Water, Chlorhexidine Gluconate or Saline.

Comparison
Any alternate method (solution or no solution) to the intervention.

Types of studies
Randomized, quasi-randomized and non-randomized studies.

Types of outcomes
The primary outcome of interest was:
• The presence of urinary tract infection, as determined by the patient’s urine culture growing at least one organism with a colony count of >10^4 Colony Forming Units / ml of urine.

Secondary Outcome:

• The presence of urethral meatus trauma i.e. burns, redness.

Search strategy
The search included both published and unpublished studies with an initial limited search of MEDLINE and CINAHL databases undertaken to identify key words contained in the title or abstract, and index terms used to describe relevant interventions. A second extensive search used all identified key words and index terms. The third step included a search of the reference lists and bibliographies of relevant articles. The databases searched included: CINAHL, MEDLINE, and Embase. The Dissertation Abstracts International and Mednar database was used to search for unpublished studies.

Methodological quality
Methodological quality was assessed using a standardised checklist. Critical appraisal and data extraction were conducted by two independent reviewers; discrepancies were addressed through discussion with a third reviewer as required.

Data collection
Data was extracted from clinical studies that fulfilled the protocol inclusion criteria. The JBI Mastari standardized data extraction tool was used to assess the quality of included studies and extract data for analysis.

Data synthesis
Pooling of data for bacterial contamination and midstream urine collection was undertaken using the JBI MASTARI Meta-Analysis program. Secondary outcomes were reported in a descriptive way.

Results and Discussion
A total of three studies met the inclusion criteria for this review: one randomised control trial (RCT) and two descriptive studies. The RCT compared periurethral cleansing with sterile water versus 10% povidone-iodine prior to the insertion of an indwelling urinary catheter whilst the descriptive studies measured the effect of meatal cleansing with 2% Castile soap on the rate of bacterial contamination during midstream urine collection. Meta-analysis of the data was
undertaken with the two descriptive studies. All three studies concluded that using a solution other than sterile water does not significantly decrease the rate of bacterial contamination.

Given the small number of studies and sample size addressing the two topics, no firm conclusions can be drawn from this review. However, the results suggest that a non-irritant solution such as sterile water is acceptable for periurethral cleansing in children prior to urinary catheterization and/or midstream urine collection.

**Keywords**
Urinary catheterization, cleaning solution, pediatrics, urinary tract infection, systematic review