



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

Greg Malt RN, BNurs, GradDipCNurs

Master of Clinical Science

Student Number a1060073

The Joanna Briggs Institute, Faculty of
Health Sciences The University of Adelaide

gregory.malt@adelaide.edu.au

October 2011

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.

Signature:

Date:

Acknowledgements

I thank my supervisors Professor Alan Pearson AM and Dr William Greer, for their guidance, support and comments while undertaking this Master of Clinical Science. To my colleague in Qatar – you are extremely hard working and diligent, and I wish you all the best in your PhD. To my life, my wife, thank you for your constant encouragement; your belief in me is never ending.

Table of Contents

REDUCING CONTAMINATION RATES AND CATHETER ASSOCIATED URINARY TRACT INFECTION ASSOCIATED WITH MID STREAM URINE COLLECTION IN PEDIATRICS	I
THESIS DECLARATION	II
ACKNOWLEDGEMENTS	III
TABLE OF CONTENTS	IV
ABSTRACT	VI
BACKGROUND	VI
OBJECTIVES.....	VI
INCLUSION CRITERIA	VI
<i>Types of participants</i>	<i>vi</i>
<i>Types of intervention(s)/phenomena of interest</i>	<i>vi</i>
<i>Comparison</i>	<i>vi</i>
<i>Types of studies</i>	<i>vi</i>
<i>Types of outcomes</i>	<i>vi</i>
SEARCH STRATEGY	VII
METHODOLOGICAL QUALITY.....	VII
DATA COLLECTION	VII
DATA SYNTHESIS	VII
RESULTS AND DISCUSSION.....	VII
KEYWORDS	VIII
CHAPTER 1: INTRODUCTION TO THE STUDY	1
SITUATING THE STUDY- A MATTER OF PATIENT SAFETY	1
STRUCTURE OF THESIS.....	2
ABBREVIATIONS:	2
CHAPTER 2: BACKGROUND TO THE STUDY	3
PERIURETHRAL CLEANSING	3
URINARY TRACT INFECTION (UTI)	4
SOCIOECONOMIC IMPLICATIONS.....	7
BAG COLLECTION	7
MIDSTREAM	8
URETHRAL CATHETERIZATION	9
SUPRA-PUBIC ASPIRATION	9
PROCESSING OF URINE CULTURES	10
KEY DEFINITIONS	10
CONCLUSION.....	12
CHAPTER 3: STUDY DESIGN AND METHODS	13
JBI-MAStARI METHOD OF CONDUCTING A SYSTEMATIC REVIEWS	13
CRITICAL APPRAISAL OF THE STUDIES RETRIEVED,	14
REVIEW OBJECTIVE	14
INCLUSION CRITERIA	14
<i>Types of participants</i>	<i>14</i>

<i>Interventions</i> -----	15
<i>Comparators</i> -----	15
<i>Primary Outcome</i> -----	15
<i>Secondary Outcome:</i> -----	15
TYPE OF STUDIES-----	15
EXCLUSION CRITERIA-----	16
SEARCH STRATEGY-----	16
<i>Databases Searched</i> -----	16
<i>Unpublished studies or Grey Literature</i> -----	16
<i>Initial keywords used:</i> -----	17
METHODS OF THE REVIEW-----	17
<i>Assessment of methodological quality</i> -----	17
DATA COLLECTION-----	18
DATA SYNTHESIS-----	18
CONFLICTS OF INTEREST-----	19
CONCLUSION-----	19
CHAPTER 4: RESULTS-----	20
INTRODUCTION-----	20
DESCRIPTION OF STUDIES-----	20
<i>Figure1: Flow diagram of the search results and study selection of the studies</i> -----	22
METHODOLOGICAL QUALITY-----	23
SAMPLE SIZES-----	23
STUDY SETTING-----	24
PEDIATRIC PATIENTS-----	24
SOLUTIONS-----	24
TECHNIQUES OF PERIURETHRAL CLEANSING-----	25
<i>Figure 2: Results of meta-synthesis of quantitative research findings</i> -----	27
CONCLUSION-----	27
CHAPTER 5: DISCUSSION AND CONCLUSIONS-----	28
INTRODUCTION-----	28
IMPLICATIONS FOR PRACTICE-----	29
PERIURETHRAL CLEANSING PRIOR TO URINARY CATHETERISATION-----	29
BACTERIAL CONTAMINATION OF MID STREAM URINE COLLECTION-----	29
IMPLICATIONS FOR RESEARCH-----	29
CONCLUSIONS-----	30
REFERENCES-----	31
APPENDIX I: MASTARI CRITICAL APPRAISAL INSTRUMENT-----	35
APPENDIX II: FINAL ASSESSMENT OF INCLUDED STUDIES-----	38
APPENDIX III: MASTARI DATA EXTRACTION INSTRUMENTS-----	39
APPENDIX IV: LIST OF EXCLUDED STUDIES-----	41
APPENDIX V: COMPREHENSIVE SEARCH STRATEGIES-----	42

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 >10⁴ 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