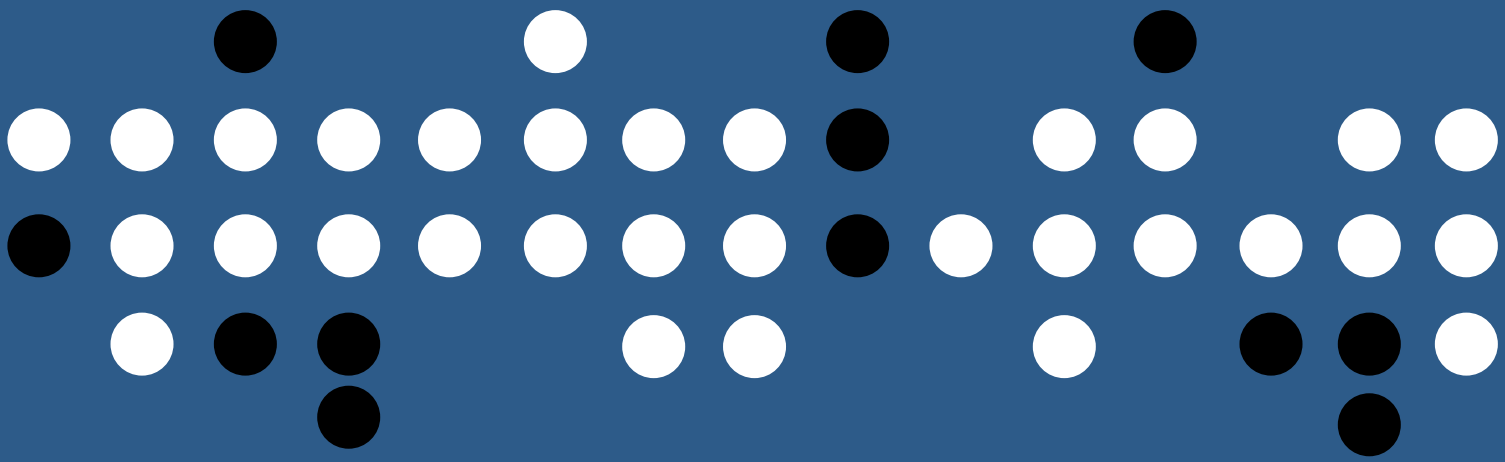
Guidelines for the Prevention of Catheter-associated Urinary Tract Infection

Published on behalf of SARI by HSE Health Protection Surveillance Centre 2011



Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

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SARI

A Strategy for the Control of
Antimicrobial Resistance in Ireland

SARI

Guidelines for the Prevention of Catheter-associated Urinary Tract Infection

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Background

The Strategy for the Control of Antimicrobial Resistance in Ireland (SARI) launched in 2001 provides a blueprint for the prevention and control of antimicrobial resistance. One of the recommendations of the strategy is the development of infection prevention and control guidelines for use in all healthcare settings. This guideline on the prevention of catheter-associated urinary tract infections has been developed in line with this strategy.

Terms of Reference

The first meeting of the subgroup was held in November 2008 and the following terms of reference were agreed

Review international evidence and make recommendations for the prevention of catheter -associated urinary tract infections in Ireland

The subgroup agreed to develop national guidelines for the prevention of catheter-associated urinary tract infection (CAUTI) as part of its remit under SARI.

Consultation Process

The draft document was sent for consultation to a wide range of professional groups in April 2010 **(Appendix M)**.

Foreword

- This document is aimed at healthcare professionals in all healthcare settings and outlines recommendations for the prevention of catheter-associated urinary tract infection (CAUTI) in Ireland.

- This document represents the expert opinion of the SARI sub-group following a literature review. The sub-group did not grade the evidence available in the literature as outlined by the Scottish Intercollegiate Guidelines Network (SIGN) due to the work commitments of sub-group members, which precluded a more detailed literature review and due to the broad consensus on best practice recommendations in international guidelines.[1]

- While we accept that some aspects of the recommendations may be difficult to implement initially due to a lack of resources or insufficient personnel, these guidelines represent best practice to prevent CAUTI.

- Where there are difficulties, these should be highlighted locally and to the Health Services Executive (HSE) and the Department of Health and Children (DoHC) so that measures are taken by the HSE and the DoHC to ensure implementation, including the provision of appropriate resources and personnel.

- The Committee recommends that these guidelines are reviewed and updated in 3-5 years.

Section 1
Summary of Recommendations

A. Implementation of these guidelines
- The Department of Health and Children (DoHC) and the Health Service Executive (HSE) must prioritise prevention of healthcare-associated infection (HCAI) in order to improve patient care and reduce all HCAI, including those associated with urinary catheters.

B. Implementation in each healthcare facility
- Each healthcare facility should ensure that these guidelines are incorporated into local guidelines and procedures on preventing catheter-associated urinary tract infection (CAUTI).

C. Avoid urinary catheterisation
- Use an external catheter (e.g., condom system) in preference to urinary catheterisation, if clinically appropriate and a practical option.

- Limit the use of urinary catheters to carefully selected patients and remove a urinary catheter promptly, when no longer required.

D. Indications for catheterisation
- Indications for catheterisation include the following:
    - To relieve acute urinary retention or bladder outlet obstruction.
    - To assist healing of an open sacral or perineal wound.
    - To assist in achieving patient immobilisation (e.g., required for unstable thoracic, lumbar spine or pelvic fractures).
    - To monitor urinary output (e.g., in critically ill patients or when a patient is unable or unwilling to collect urine).
    - During prolonged surgical procedures with general or spinal anaesthesia.
    - During regional analgesia for labour and delivery.
    - To allow instillation of drugs or during urology investigations (e.g., cystogram).
    - For patient comfort during end of life care.
    - As an exception, at patient request to improve comfort.

E. Method of catheterisation
- Intermittent catheterisation should be used in preference to an indwelling catheter if it is clinically appropriate and a practical solution.

- The selection of either suprapubic or urethral catheterisation should be made on an individual patient basis.

F. Type of catheter
- Use a catheter with the smallest gauge suitable for the patient's needs.

- Choose a catheter of appropriate length to ensure patient safety and comfort.

- Selection of catheter material should be based on an assessment of the individual patient's requirements, history of encrustation if applicable and the clinician's preference (**Appendix A**).

- Consider the use of antiseptic or antimicrobial-coated catheters if the local CAUTI rate is not decreasing despite implementation of a multi-system approach: including optimisation of aseptic technique, appropriate management of catheters and regular audit and feedback of surveillance data.

G. Insertion of urinary catheters

- Healthcare workers (HCWs) must apply Standard Precautions when inserting urinary catheters, with particular reference to hand hygiene and the use of personal protective equipment.
- Antiseptic hand hygiene should be performed immediately before insertion of the catheter.
- HCWs should use sterile gloves and an aseptic non-touch technique when inserting urethral, suprapubic and intermittent catheters.
- HCWs who insert urethral, suprapubic and intermittent catheters should be trained and assessed as competent in aseptic and insertion technique or undertake the procedure under appropriate supervision.
- Clean technique should be used for self intermittent catheterisation.
- Sterile saline or sterile water solution should be used to cleanse the urethral meatus.
- The indication for and procedure of insertion of a urinary catheter should be clearly documented in the patient's medical chart.

H. Management of short-term and long-term indwelling urinary catheters

- Healthcare workers (HCWs) must apply Standard Precautions when caring for patients with a urinary catheter *insitu*.
- A closed drainage system should be used for all patients with an indwelling catheter.
- Using a pre-connected urinary catheter and drainage bag may reduce CAUTI.
- The drainage bag should be maintained below the level of the bladder and secured to the leg (leg bag) or a catheter stand to avoid contamination of the drainage tap.
- Empty the drainage bag regularly, using a clean container for each patient. Avoid touching the drainage tap with the container.
- Single-use sterile drainage bags (including night drainage bags) should be used with indwelling urinary catheter drainage systems.
- The meatal area and suprapubic insertion site (once healed) should be cleaned daily using soap and water.
- Access the catheter drainage system only when absolutely necessary (e.g., changing the drainage bag as per manufacturer's instructions).
- Catheter irrigation should not be undertaken to prevent infection. A closed irrigation system should be used if continuous irrigation required for other purposes (e.g., post-surgery).
- An aseptic technique should be used for intermittent irrigation (e.g., flushing or instillation of drugs).
- Catheter specimens of urine should only be taken when clinically indicated.
- Catheter specimens of urine should only be taken from the drainage tubing sampling port using a non-touch technique and preferably a needleless collection system.

Additional recommendations for management of long-term indwelling catheters

- An individual care regime designed to minimise the problems of blockage and encrustations should be implemented.
- If use of catheter maintenance solutions (CMS) is being considered, they must be prescribed on an individual patient basis. An aseptic technique should be used during instillation and a new sterile drainage bag attached after the procedure.

I. Removal of indwelling catheters

Short-term catheters

- Ensure indwelling catheters are removed promptly when no longer required by using some or all of the following:
    - Daily review by nursing and medical staff.
    - Implementing a procedure specific post operative removal date.
    - Placing reminders into the patient's chart or the electronic patient record if available.

Long-term catheters

- Regularly review the need for long-term catheterisation.
- Change catheters used for long-term catheterisation as per the manufacturer's instructions and individual patient requirements (e.g., before blockage occurs or is likely to occur).

J. Antibiotic prophylaxis

- There is no role for routine antibiotic prophylaxis in patients with urinary catheters.
- Prophylactic use of antibiotics upon change or instrumentation of urinary catheters (both short and long-term) are not indicated in the majority of patients.

K. Surveillance

- Healthcare facilities should consider including CAUTI surveillance as a component of their surveillance programme depending on the risk profile of patients and available resources.

- The following should be considered if CAUTI surveillance is undertaken:
    - The Centre for Disease Control and Prevention (CDC) definition for CAUTI is recommended for use.
    - Standardised methodology should be used and CAUTI rates should be expressed as the number of CAUTIs per 1000 urinary catheter days.
    - CAUTI rates must be fed back to the relevant personnel and the management of the healthcare facility on a regular basis and at least quarterly.

L. Care bundles

- Multidisciplinary teams, in conjunction with infection prevention and control committees, should consider implementing a locally-adapted care bundle for the management of indwelling urinary catheters.

M. Education of healthcare workers

- An education programme should be available at induction for new staff and on a regular basis for HCWs and should include the following:
    - Indications for catheterisation.
    - Insertion technique.
    - Maintenance of the catheter system.
    - Obtaining a urine specimen.
    - Signs and symptoms of infection.
    - Catheter removal.

- Attendance records for education sessions should be maintained

N. Patient education

- Patients should be informed using both written and verbal information of the benefits and risks of urinary catheterisation before catheter insertion. This information should include:
    - Catheter care.
    - Emptying the catheter bag.
    - Where and when the catheter and catheter bag will be changed.
    - Signs and symptoms of complications (e.g., infection, leakage, blockage) and who to contact should complications develop.

- An example of a patient information leaflet is provided in **Appendix J**.

Section 2
Rationale for Recommendations

1.0 Introduction

1.1 Background

Urinary catheterisation is defined as an intervention to enable emptying of the bladder by insertion of a catheter. Indwelling urinary catheterisation is categorised as either; short-term (*in situ* less than 28 days), or long-term (*in situ* greater than 28 days).

Urinary tract infections (UTIs) have been shown to be one of the most common HCAI with up to 80% related to the presence of urinary catheter.[2;3] Data from the 2006 prevalence survey of HCAI in acute hospitals in the Republic of Ireland revealed that UTIs were one of the most common HCAI, accounting for 22.5% of HCAIs, of which 56.2% were catheter-related.[4] In 2009, a pilot project for a European HCAI point prevalence study in long-term care facilities (HALT) involving 14,672 residents in 13 European countries found that urinary tract infections accounted for 30% of the reported HCAIs.[5]

The presence of a urinary catheter and the length of time it remains *in situ* are contributory factors to the development of a catheter-associated urinary tract infection (CAUTI).[3] It has been estimated that the risk of acquiring an infection increases by 5% each day the catheter remains *in situ*. An average of 25% of hospitalised patients are catheterised at some stage during their admission, therefore, it is critical that practices and procedures are in place to minimise the risk of infection. [6;7]

1.2 Definition of catheter-associated urinary tract infection (CAUTI)

The presence of bacteria in urine (bacteriuria) signifies either colonisation (asymptomatic bacteriuria) or infection. Bacteriuria can be found in both catheterised and non-catheterised patients, but 10% - 30% of patients with a catheter *in situ* for greater than 30 days will develop bacteriuria compared to 1% of non-catheterised patients.[8;9] It has been estimated than more that 90% of catheter-associated bacteriuria may reflect colonisation rather than infection.[10] However a definitive diagnosis of CAUTI is not evidence-based. [11] Laboratory criteria for differentiating between CAUTI and asymptomatic bacteriuria have not been established. Clinicians rely on a combination of clinical signs and symptoms in addition to laboratory-confirmed bacteriuria to reach a diagnosis of CAUTI.[12] Clinical signs and symptoms of CAUTI include fever, new-onset confusion, loin or supra-pubic pain.[11;13] Fever is the most common symptom, however the absence of fever does not out rule infection. [12] The Scottish Intercollegiate Guidelines Network (SIGN) recommends the following in catheterised patients who present with fever: [11]

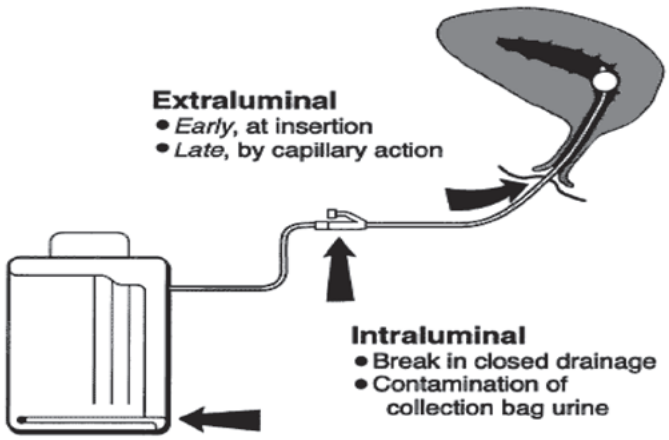


Figure 1: Routes of entry of uropathogens to catheterised urinary tract.[13]

- Look for associated localising (loin or suprapubic tenderness) or systemic features.
- Exclude other sources of potential infection.
- Send an appropriately taken urine sample for culture to determine the infecting organisms and the antimicrobial susceptibility pattern of any organisms identified.
- Consider empiric antimicrobial therapy if clinically indicated taking into account the severity of the presentation, any co-morbid factors and the local antimicrobial susceptibility patterns and antimicrobial prescribing guidelines.

1.3 Pathogenesis

The natural defence mechanisms of the urinary tract include the length of the urethra and urine flow which washes microorganisms away from the bladder. Urethral catheterisation interferes with these defence mechanisms. Most organisms that cause CAUTI enter the bladder by migrating along the internal (intraluminal) and external (extraluminal) catheter surface. Intraluminal migration of microorganisms

occurs following contamination of the catheter lumen from failure of the closed drainage system or from contaminated urine in the drainage bag. Extraluminal migration of microorganisms from the perineum can occur at insertion or later by capillary action via the outer surface of the catheter (Figure 1).[13] The most common organisms to cause CAUTI derive from the patient's perineal flora or from the hands of HCWs; these organisms may include; *Escherichia coli*, *Enterococcus* spp., *Pseudomonas* spp., *Klebsiella* spp., *Enterobacter* spp., or *Candida* spp.[14]

1.4 Risk factors for acquiring CAUTI

Risk factor	References
Duration of catheterisation	(15),(16), (17)
Underlying neurological disease	(18)
Female gender	(15),(16)
Diabetes mellitus	(16)

Table 1: Risk factors for acquiring a CAUTI

1.5 Morbidity and mortality associated with CAUTI

CAUTI increases morbidity, mortality, and length of hospitalisation.[19-22] Surveillance of the incidence, source and risk factors for hospital-acquired bacteraemia in 97 hospitals in England from 1997 to 2002 found that CAUTI was the primary source in 8.5% of bloodstream infection.[23] Irish data from 2004 and 2005 on enhanced bacteraemia surveillance revealed that 3.8% of bacteraemias resulted from CAUTI.[24]

2.0 Factors to consider before insertion of a urinary catheter

2.1 Avoid catheterisation

The decision to catheterise and the type of catheter to use should be based on comprehensive risk assessment and evaluation of the needs of the patient including the expected duration of catheterisation. The most important measure to prevent CAUTI is to limit the use of urinary catheters to carefully selected patients and leave them in place only as long as indications for catheterisation persist (section 2.2).[25;26] Prior to catheterisation, consideration should be given to alternative management methods (e.g., condom).[27]

Urinary catheters should only be used when necessary and should be removed as soon as possible to avoid potential complications including: infection, bacteraemia, urethritis, urethral strictures, haematuria and bladder perforation.[10;28-30] Studies have shown that indwelling urethral catheters are frequently used when not indicated or, if indicated, remain *in situ* longer than necessary.[6;31;32] Urinary catheters should not be used solely for the convenience of patient care or as a method of obtaining urine samples for diagnostic tests. In selected patients, alternatives to indwelling catheters should be considered such as external catheter (e.g., condom system) or intermittent catheterisation.

Recommendations

- Use an external catheter (e.g., condom system) in preference to urinary catheterisation, if clinically appropriate and a practical option.
- Limit the use of urinary catheters to carefully selected patients and remove a urinary catheter promptly when no longer required.

2.2 Indications for catheterisation

In-dwelling urinary catheterisation is an essential intervention in some patients. Various studies have demonstrated that the presence of a urinary catheter is inappropriate in 21-54% of catheterised patients.[31-33] A consensus in international guidelines suggests that urinary catheterisation is indicated in the situations described below: [2;26;34-36]

Recommendations

Indications for urinary catheterisation include the following:

- To relieve acute urinary retention or bladder outlet obstruction.
- To assist healing of an open sacral or perineal wound.
- To assist in achieving patient immobilisation (e.g., required for unstable thoracic, lumbar spine or pelvic fractures).
- To monitor urinary output (e.g., in critically ill patients or when a patient is unable or unwilling to collect urine).
- During prolonged surgical procedures with general or spinal anaesthesia.
- During regional analgesia for labour and delivery.
- To allow instillation of drugs or during urology investigations (e.g., cystogram).
- For patient comfort during end of life care.

2.3 Method of catheterisation

Method of catheterisation	Definition
Indwelling urethral catheterisation	Inserted *via* the urethra and remains *in situ* for a short or prolonged period of time
Suprapubic catheterisation	Inserted *via* the abdomen for a short or prolonged period of time
Intermittent catheterisation	Inserted *via* the urethra but removed once bladder has drained
Self intermittent catheterisation	Intermittent catheterisation performed by the patient

Table 2: Catheterisation methods and definitions

Intermittent catheterisation is advocated as a strategy for incomplete bladder emptying in patients with idiopathic or neurogenic bladder dysfunction. Such patients often experience urinary frequency, urgency, incontinence and repeated urine infections due to residual urine in the bladder.[37] This type of catheterisation is associated with lower rates of CAUTI when compared with urethral and suprapubic catheterisation but the quality of the available studies is poor.[26] Advantages to intermittent catheterisation include greater patient independence, reduced interference with sexual activity and reduced need for equipment and appliances.[38]

Indications for use of suprapubic catheterisation include post pelvic or urological surgery, especially where there is difficulty voiding, urethral trauma, chronic prostatitis and post-gynaecological surgery. Suprapubic catheterisation is associated with lower rates of bacteriuria, recatheterisation and urethral stricture when compared with urethral catheterisation; however, there is no difference in CAUTI. [26]

Recommendations

- Intermittent catheterisation should be used in preference to an indwelling catheter, if it is clinically appropriate and a practical solution.
- The selection of either suprapubic or urethral catheterisation should be made on an individual patient basis.

2.4 Selection of a urinary catheter

2.4.1 Introduction

Urinary catheters are available in various types, sizes and materials. The most common type is the Foley catheter, which may have two or three lumens. Each lumen is used for different functions usually inflation of the balloon, drainage of urine and irrigation.

2.4.2 Catheter size

Catheters are sized by the diameter of the outer circumference, using the French (Fr) metric scale (range from 6Fr-24Fr). The smallest gauge that meets the needs of the patient should be used. This will minimise urethral trauma, bladder spasm and the amount of residual urine in the bladder, all of which may predispose to CAUTI.[39;40] Catheters are manufactured in different lengths and should be used as per the manufacturer's instructions. The UK National Patient Safety Agency issued an alert in 2009 on the inadvertent use of short (female length) catheters in adult males which resulted in trauma to the urethra.[41]

Recommendations

- Use a catheter with the smallest gauge suitable for the patient's needs.
- Choose a catheter of appropriate length to ensure patient safety and comfort.

2.4.3 Catheter material

The selection of catheter material should be based on: [42]

- The expected duration of catheterisation.
- Patient comfort.
- Patient history of allergies to the components (e.g., latex allergy).
- The ease of insertion and removal.
- The ability of the catheter material to reduce the likelihood of complications such as colonisation with bacteria, encrustations and tissue damage.

Catheters are usually composed of polyvinyl chloride (PVC), hydrogel, latex, silicone or a combination of these materials. Most standard catheters are either latex or silicone based. Latex-based catheters are strong, elastic and flexible and are one of the most common catheter types used for short-term catheterisation. Silicone catheters are synthetic and tend to be used for patients with latex sensitivity. There has been no significant difference demonstrated between the use of latex versus silicone catheters and the incidence of bacteriuria.[28;43-45] A Cochrane Review found that there are very few trials comparing different types of urinary catheters used for long-term catheterisation, and that the evidence was insufficient to draw conclusions.[46] However, the CDC advise that silicone may reduce the risk of encrustation in long-term catheterised patients when compared with other catheter materials.[26] Most catheters used for intermittent catheterisation are single-use. However, some catheters used for intermittent catheterisation are designed to be cleaned and reused. The manufacturer's instructions for cleaning and storage of these catheters should be followed.

See **Appendix A** for further information on the uses and a brief outline of advantages and disadvantages of common catheter materials.

Antiseptic or antimicrobial-coated catheters are available, in addition to standard catheters. A variety of different agents have been used, such as; gentamicin,[47] silver hydrogel,[48-50] minocycline, rifampicin[51] chlorhexidine- silver, sulfadiazine, chlorhexidine-sulfadiazine-triclosan, nitrofurazone, [50] and nitrofuroxone.[52] A review suggested that antiseptic or antimicrobial-coated catheters can significantly prevent or delay the onset of CAUTI compared to standard untreated catheters.[45] However, due to the poor methodological quality of these studies it is difficult to recommend the use of a specific catheter type. Unlike silver oxide catheters, silver alloy catheters appear to be associated with a reduced incidence of bacteriuria.[34;53-56] A Cochrane Review suggested that silver-alloy catheters used in hospitalised adults catheterised for less than one week significantly reduced the incidence of asymptomatic bacteriuria.[57] This review showed that antibiotic impregnated catheters compared to standard catheters showed lower rates of asymptomatic bacteriuria at less than one week of catheterisation, but for catheterisation exceeding one week the results were not statistically significant. Further studies are needed on the cost benefit /effectiveness of antiseptic and antimicrobial-coated catheters.[36;45]

Recommendations

- Selection of catheter material should be based on an assessment of individual patient's requirements, history of encrustation and clinician's preference (**Appendix A**).
- Consider the use of antiseptic or antimicrobial-impregnated catheters if the local CAUTI rate is not decreasing following implementation of a multi-system approach including optimisation of aseptic technique, appropriate management of catheters and regular audit and feedback of surveillance data.

3.0 Insertion of a urinary catheter

HCWs performing urinary catheterisation should be trained and have been assessed and documented as competent on the technical aspects and application of the principles of aseptic technique to minimise the risk of infection.[2;45;58;59]

3.1 Standard Precautions

Standard Precautions are a set of evidence-based clinical procedures and measures that **MUST** be applied by **ALL** HCWs for **ALL** patients at **ALL** times. They are based on the premise that blood and body fluids, excretions and secretions (except sweat) may contain transmissible microorganisms. Standard Precautions **MUST** be applied by **ALL** HCWs when inserting and caring for urinary catheters with particular reference to hand hygiene, personal protective equipment (PPE) and management of waste. [60]

3.2 Aseptic technique

Expert opinion, clinical guidance and principles of best practice indicate that sterile equipment and an aseptic technique must be used by HCWs during insertion of indwelling and intermittent urinary catheters in a healthcare setting.[45;61-64]

Aseptic technique refers to practices that help to reduce the risk of post-procedure infections in patients by decreasing the likelihood of microorganisms entering the body during the clinical procedure. The aim of an aseptic technique is to prevent the transmission of microorganisms either directly or indirectly to susceptible sites, thus reducing the risk of infection. Surveys on aseptic technique have found wide variations in practice. A standardised aseptic non-touch technique (ANTT)™ has been developed.[65] The ANTT standard operating procedure for insertion of indwelling urinary catheters has been adapted with permission for use in Irish healthcare settings (**Appendix B**).

3.3 Hand decontamination

Hand hygiene is the single most important procedure for preventing HCAIs. The World Health Organisation's (WHO) five moments for hand hygiene should be used to determine when to decontaminate hands during patient care:[66]

- Before touching a patient.
- Before a clean or aseptic procedure.
- After body fluid exposure risk.
- After touching a patient.
- After touching the patient's surroundings.

Antiseptic hand hygiene should be performed immediately before donning sterile gloves prior to insertion of a urinary catheter. [66, 67]

3.4 Personal protective equipment (PPE)

HCWs should wear sufficient PPE to prevent skin or clothing becoming contaminated by body fluids containing pathogenic micro-organisms which may then be transferred to themselves or other patients. For urinary catheter insertion, a disposable plastic apron and sterile gloves will usually be sufficient.[45;60] Disposable plastic aprons and gloves are single-use items worn for one procedure and then discarded.[60] Hands should be decontaminated after removing PPE. [66]

3.5 Patient preparation

Patients should be provided with adequate information regarding the need for insertion, maintenance and removal of the catheter by the person planning their care and be given the opportunity to discuss the implications of urinary catheterisation.[59] A sample patient information leaflet is provided in **Appendix J**.

3.6 Meatal cleaning and disinfection

3.6.1 Prior to urethral catheterisation (indwelling or intermittent)

As infection can occur extraluminally (*via* the external surface of the catheter) when the catheter is inserted, the urethral meatus should be carefully cleaned prior to catheterisation.[13] Meatal cleansing involves the mechanical removal of exudate and smegma.[68] Where time allows, the meatal area should be washed with soap and water. The use of antiseptic solution versus sterile saline for meatal preparation prior to catheter insertion remains unresolved.[26;45] Some expert opinion indicates that there is no advantage in using antiseptic preparations for disinfection the urethral meatus prior to catheter insertion, [45;69-71] whilst others advocate disinfection of the urethral meatus with antiseptics prior to catheter insertion.[72]

Standard principles for cleansing the urethral meatus include retracting the foreskin (where possible) and cleaning the glans penis for men. The foreskin should be returned to its normal position following insertion of the catheter. For women, the labia minora should be separated and a front-to-back cleaning technique adopted. The urethral opening should be washed using sterile water or sterile saline solution using sterile gauze balls or sterile swabs. Each gauze ball or swab should be discarded after a single use.

3.6.2 Prior to self intermittent catheterisation

The meatal area should be washed with soap and water and dried thoroughly before insertion.

3.7 Skin cleaning and disinfection prior to suprapubic catheterisation

The insertion site should be washed with soap and water and dried thoroughly. An aqueous or alcohol-based surgical site disinfectant solution (e.g., chlorhexidine or povidone-iodine) as per local guidelines, should be used to disinfect the insertion site prior to insertion and allowed to dry thoroughly before proceeding with catheter insertion.[73]

3.8 Maintaining a sterile field

Before the procedure, the environmental surfaces involved should be effectively cleaned and disinfected.[74] Maintaining the integrity of the sterile field is vital wherever urinary catheterisation is being performed. HCWs should use sterile gloves and a drape to create a sterile field.[2] All inclusive sterile catheter packs should be used where available.[45]

3.9 Insertion procedure

3.9.1 Indwelling uretheral catherisation

Urethral catheterisation can cause bruising and trauma to the urethral mucosa, which then acts as an entry point for micro-organisms into the blood and lymphatic system.[75] It is recommended that an appropriate sterile lubricant or anaesthetic gel from a single-use container should be applied to the urethral meatus and the catheter surface prior to insertion of the catheter, to minimise urethral trauma and infection.[45] Once

the catheter is inserted, urine is allowed to drain before the balloon is inflated (where appropriate). The indwelling catheter should then be connected to a closed sterile drainage bag which is placed below the level of the bladder to facilitate drainage.

When a catheter is inserted, each healthcare facility should have a system for documenting the following information in the patient record:[76]

- Indication for catheter insertion.
- Date and time of catheter insertion.
- Type and size of catheter.
- Amount of water used to inflate the balloon.
- Any complications encountered.
- Review date.
- Name of HCW who inserted catheter.

See **Appendix C** for sample insertion checklist.

3.9.2 Intermittent catheterisation

A systematic review found that there is insufficient evidence to state that the incidence of UTI from intermittent catheterisation is affected by use of sterile or clean technique, coated or uncoated catheters, single (sterile) or multiple use (clean) catheters, self-catheterisation or catheterisation by others, or by any other strategy and advised that further research is needed.[37] While many guidelines continue to recommend aseptic technique and sterile equipment for intermittent catheterisation in the healthcare setting, a clean technique is recommended for self intermittent catheterisation.[26;45;76]

3.9.3 Suprapubic catheter

Initial insertion of a suprapubic catheter is a common urological procedure usually performed by an urologist/surgeon in theatre, using a sterile technique. Some catheters are secured to the abdominal wall by a suture. A small sterile dressing may be placed over the site initially but this can usually be removed after 24hours.

Recommendations

- HCWs must apply Standard Precautions when inserting urinary catheters, with particular reference to hand hygiene and the use of personal protective equipment.
- Antiseptic hand hygiene should be performed immediately prior to insertion of urinary catheters.
- HCWs should wear sterile gloves and use an aseptic non-touch technique when inserting urethral, suprapubic and intermittent catheters.
- HCWs who insert urethral, suprapubic and intermittent catheters should be trained and assessed as competent in aseptic and insertion technique or undertake the procedure under appropriate supervision.
- Clean technique should be used for self intermittent catheterisation.
- Sterile saline or sterile water should be used to cleanse the urethral meatus prior to indwelling urethral catheterisation.
- The indication for and procedure of insertion of a urinary catheter should be clearly documented in the patient's medical chart

4.0 Management of urinary catheters

4.1 Standard Precautions

Standard Precautions **MUST** be applied by **ALL** HCWs for **ALL** patients at **ALL** times (section 3.1, 3.3 and 3.4). Hand decontamination should be performed by HCWs before and after patient contact, before clean and aseptic procedure and after body fluid exposure risk which includes emptying a urinary

catheter drainage system. [66;67] The type of PPE worn during a procedure should be based on the risk of contamination from blood or body fluids. Except when an aseptic procedure is being performed, non-sterile single-use gloves should be worn. Hands should be decontaminated immediately before and after removing PPE.[60;66;67]

4.2 Drainage systems

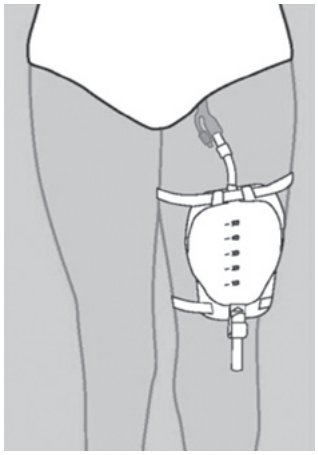


Figure 2: A closed drainage system using a leg bag

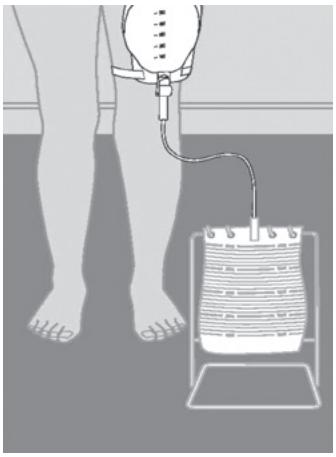


Figure 3: A closed drainage link system using a leg bag & non-drainage night bag

Figure 2: Courtesy of ***Yates, A.*** *(2008) Urinary catheters Part 6 - Catheter valves. Nursing Times; 104: 44: 24-25. Figure 3: Courtesy of* ***Yates, A.*** *(2008) Urinary catheters part 5 - Catheter drainage & support systems. Nursing times; 104: 43: 22-33*

A closed drainage system (see examples in Figures 2 and 3), where the tubing that connects the catheter to the drainage bag is not disconnected and urine is emptied from the bottom of the bag through a valve or port, reduces the risk of ascending infection from intraluminal transmission. However, effectiveness is dependent on good catheter hygiene and care. [25;35;44;74;77;78] 'Leave the closed system alone' is the succinct message on how best to manage the drainage system to prevent CAUTI.[45;55]

There are four main types of drainage bags used with indwelling catheterisation:

1. A leg drainage bag with a drainage tap, which is directly attached to the catheter after insertion and secured to the leg.
2. A drainage bag with a drainage tap, which is secured to a catheter stand. This bag is either attached directly to the catheter after insertion or attached to the drainage tap of a leg bag for overnight drainage (link-system).
3. A non-drainable bag (i.e., no drainage tap) which is secured to a catheter stand. This bag is used for overnight drainage by attaching it to the leg bag drainage tap (link-system; see figure 3).
4. A combined drainage bag and urinary catheter. This drainage bag is pre-connected to the catheter during the manufacturing process.

Some US best practice guidelines (in particular those that address management of catheterisation in patients with spinal cord injury and patients admitted to long-term care facilities) advocate the practice of cleaning, disinfecting and reusing drainage bags.[78;79] However, evidence that this practice does not increase the risk of CAUTI is very limited. Three studies were identified in the literature that examined this practice.[80-82] These studies reported no increase in urinary tract infections[80;82] or asymptomatic bacteriuria,[81] however, the small sample size (8-54 patients) and the short duration (2 days–4 weeks), limits the general applicability of their findings. This practice has been described as controversial and an unacceptable procedure, as it does not provide a validated method of decontamination.[83;84] It is interesting that this practice is not discussed in other evidence-based guidelines. [2;26;35;36;45;55]

The committee recommends that only single-use drainage bags are used.

While sterile and non-sterile (i.e., clean) drainage bags are available, the recommendation that a sterile drainage bag is used when directly connecting to the catheter is endorsed by evidence-based guidelines.[2;26;27;45;81] Non-sterile rather than sterile night drainage bags are used in some healthcare settings, with some authors contending that this poses little risk of CAUTI provided good practice is followed and reflux is avoided.[84] However, no studies could be sourced in the literature that compared the CAUTI rate between sterile and non-sterile night drainage bags. This is an area that requires further study.
The use of pre-connected urinary catheters and drainage bags reduces the risk of disconnection of the closed drainage system; a known risk factor for CAUTI.[85] However, there is no conclusive data that the use of pre-connected systems reduces the incidence of CAUTI.[26;36;85-87]

Good practice in the management of the drainage system includes:
- Maintaining the bag below the level of the bladder.[74;88]
- Minimising contamination of the drainage bag outlet port by use of a catheter stand and avoiding contact with the floor or other surfaces.[74;88]
- Accessing the catheter drainage system only when absolutely necessary (e.g., changing the drainage bag as per the manufacturer's instructions).[55]
- Emptying the drainage bag regularly to prevent reflux and excessive weight on the catheter.[19;74]
- Using a separate clean container for each patient and preventing the container touching the drainage tap when emptying the drainage bag.[19;74]
- Encouraging increased fluid intake, if not clinically contraindicated.[74]

Recommendations

- HCWs must apply Standard Precautions when caring for patients with a urinary catheter *insitu*.
- A closed drainage system should be used for all patients with an indwelling catheter.
- Using a pre-connected urinary catheter and drainage bag may reduce CAUTI.
- Use single-use, sterile drainage bags, including night drainage bags with indwelling urinary catheterisation.
- The drainage bag should be below the level of the bladder and secured to the patient's leg (leg bag) or a catheter stand to avoid contamination of the drainage tap.
- Access the catheter drainage system only when absolutely necessary (i.e., changing the drainage bag as per the manufacturer's instructions).
- Empty the catheter drainage bag regularly, using a clean container for each patient. Avoid touching the drainage tap with the container.

4.3 Catheter specimens of urine (CSU)

Urine samples should only be taken from the specific sampling port. The sampling port should be disinfected with an appropriate disinfectant (e.g., 70% alcohol) and allowed to dry fully before collecting the sample. The manufacturer's instructions should be followed regarding the method used to access the sampling port. Single-step, needle-free urine collection containers that are suitable for laboratory use should be considered, due to the reduced risk of contamination to the sample and HCW exposure to urine splash and needle stick injuries. A recent Irish study reported that only 53% of the HCWs surveyed were able to correctly identify the sample port as the correct place from where to take a urine sample. This finding emphasises the importance of ongoing education of HCWs and audit of clinical practice.[89]

Recommendations

- Catheter specimens of urine should only be taken when clinically indicated.
- Catheter specimens of urine should only be taken from a disinfected sampling port using a non-touch technique and preferably a needleless collection system.

4.4 Catheter valves

A catheter valve is a device connected to the end of the catheter. It allows urine to be stored in the bladder, eliminating the need for a urine drainage bag. The valve is released at regular intervals to prevent over-distension of the bladder or dilation of the renal tract. The use of catheter valves may:

- Reduce the risk of CAUTI.[90-92]
- Reduce bladder irritation by eliminating the weight of the catheter drainage bag and allow the bladder to fill, lifting the catheter balloon away from the bladder wall.[91]
- Maintain bladder tone and capacity, thereby improving rehabilitation after catheter removal.

A systematic review found no difference in infection rates when comparing catheter valves with drainage bags. However, there was evidence that patients preferred catheter valves.[93] The use of catheter valves is contraindicated in patients with the following conditions:

- Limited bladder capacity.[94]
- Reflux or renal impairment.[92]
- Detrusor instability.[90;92]
- Mental disorientation.[90]
- Impaired bladder sensation.[90]
- Poor manual dexterity.[95]
- Immobility.

Recommendation

- The benefit of using catheter valves to prevent CAUTI is not proven. However, their use may increase comfort for specific patient groups.

4.5 Securement devices for indwelling urethral catheters

The use of adhesive, non-adhesive devices (e.g., elastic/Velcro® straps) to secure the urinary catheter to the leg, or abdomen is recommended by best practice guidelines and expert opinion.[26;88;96;97] The advantages ascribed to securing the catheters include reduction in trauma and bleeding, prevention of dislodgement and prevention of bladder spasms which may result from pressure and traction.[96;97] A systematic literature review [98] found no evidence to suggest the use of a catheter-securing system prevent CAUTIs, however, a later study compared the outcome of a specific catheter securement device with other methods of securement or no securement, on the rate of symptomatic CAUTI. While no statistically significant differences were found, a clinically significant 45% reduction in the rate of symptomatic UTI was noted in patients who received the securing device. [99]

It is recommended that, if used, the securement device should be placed at the stiffest part of the catheter (usually just below the bifurcation where the balloon is inflated), to prevent occlusion of the lumen. The securement devices can be placed on the abdomen or thigh.[96] To prevent skin trauma from excess traction, regular assessment is necessary especially in patients unable to voice comfort or discomfort. In addition adhesive material may result in skin irritation and dermatitis and elasticised / Velcro® straps should be used with caution in patients with peripheral vascular disease.[96;100] The skin site used for the securing device should be routinely changed.

Suprapubic catheters
The suprapubic catheter emerges at right angles to the abdomen and needs to be secured in this position. Dressing and tapes should only be used on the healed insertion site when absolutely necessary.

Recommendation

The benefit of using securement devices to prevent CAUTI is not proven but their use prevents trauma to and irritation of the urethra. When used, regular assessment is required to avoid skin trauma from excess traction and skin irritation from adhesive. The use of elasticised or Velcro® straps should be with caution in patients with peripheral vascular disease.

4.6 Meatal cleaning and insertion site care

4.6.1 Indwelling urethral catheters

Expert opinion and best practice guidelines advise that there is no advantage in using antiseptic preparations for meatal care compared with routine bathing or showering.[74;76;101;102] Vigorous meatal cleansing beyond normal hygiene practice is not necessary and may increase the risk of infection. Washing the meatus with soap and water, during daily routine bathing or showering, is all that is required. If this forms part of a bed bath, the water should be changed and a clean cloth used.[103;103] Prevention of contamination of the entry site of the catheter during cleaning is important. For women this means adopting a front-to-back approach, washing towards the anus. For uncircumcised men, the foreskin should be retracted and the area underneath cleaned, as this is often a reservoir for bacteria, particularly in the elderly.[88]

4.6.2 Suprapubic catheters

Aseptic technique, appropriate cleansing solution (as recommended in local wound care guideline) and a sterile dressing (if necessary) should be used for wound care until the insertion site is healed.[76] Once healed, the site should be washed daily with warm soapy water.

Recommendation

- The meatal area and suprapubic insertion site (once healed) should be cleaned daily using soap and water.

4.7 Catheter irrigation

There is no evidence that routine irrigation of a urinary catheter using antiseptic or antimicrobial agents decreases CAUTI.[2;55] A closed continuous irrigation system should be used if irrigation is required for other reasons (e.g., post surgery).

4.7.1 Catheter blockage

Recurrent blockage caused by encrustation of the catheter from deposits of mineral salts is a complication in approximately 50% of all long-term catheterised patients.[104] Catheter blockage causes leakage, bypassing of urine and urinary retention and results in an increased number of catheter changes. Encrustation on the external surface of the catheter can cause trauma to the urethra during catheter removal. Catheter maintenance solutions (CMS) are acidic washout solutions, which are commonly used to

prolong catheter life by reducing pH resulting in dissolution of existing encrustations.[45] Any disruption to the closed system increases the risk of infection. However, where frequent blockage would lead to frequent re-catheterisations, the potential infection risks associated with CMS use may be outweighed by increasing catheter life and reducing patient discomfort.[105]

HCWs should be alert for the signs and symptoms of autonomic dysreflexia in patients with spinal cord injuries (at or above the sixth thoracic vertebra) who have a catheter blockage. Autonomic dysreflexia is a life threatening condition and is commonly caused by bladder problems including catheter blockage. See **Appendix D** for further information.

Recommendations

- Catheter irrigation should not be used to prevent infection. A closed continuous irrigation system should be used, if irrigation is required for other purposes (e.g., post surgery).
- An aseptic technique should be used for intermittent irrigation (e.g., flushing or instillation of drugs).
- Each patient should have an individual care regime designed to minimise the problems of blockage and encrustation.
- If use of catheter maintenance solutions (CMS) is being considered, they must be prescribed on an individual patient basis. An aseptic technique should be used for instillation and a new sterile drainage bag attached after the procedure.

4.8 Catheter removal

The risk of acquiring bacteriuria has been estimated as 5% for each day of catheterisation, accumulating to 100% in 4 weeks. The longer the catheter remains *in situ*, the higher the risk of infection.[74] The clinical need for continuing catheterisation should be reviewed daily and the catheter removed as soon as possible (section 6.0).[26;45;102] Clamping urinary catheters prior to removal is unnecessary.[26]

4.8.1 Strategies to limit the duration of short-term catheters

Approaches that have achieved success in limiting catheter use and duration include the following;

- Implementing procedure-specific guidelines for postoperative catheter removal.[106]
- Providing guidelines to manage postoperative retention, which may include the use of bladder scanners.[107]
- Providing reminders to physicians to review the need for continued catheterisation and to remove catheters promptly when they are no longer indicated.[107-110]
- Development of care plans/protocols directing nurse removal of catheters for patients who meet pre specified criteria.[107;109;111]

A systematic review and meta-analysis of the effectiveness of reminder systems to reduce CAUTI, urinary catheter use, and rate of re-catheterisation reported that the CAUTI rate was reduced by 52% with the use of reminder or stop orders. Duration of catheterisation decreased by 37% and recatheterisation rates were similar in control and intervention groups.[112]

Recommendations

Short-term catheters:

Ensure short-term indwelling catheters are removed promptly when no longer required by using some or all of the following:

- Daily review of the need for continued catheterisation by nursing and medical staff.
- Implementing a procedure specific post-operative removal date.
- Placing standardised reminders into the patient's chart or if available, in the electronic patient record.

4.8.2 Changing long-term catheters

Long-term catheterisation is defined as a catheter *in situ* for greater than 28 days. There is no consensus on how frequently such catheters should be changed. Manufacturer's instructions should be followed in addition to individual patient's requirements (e.g., before blockage occurs or is likely to occur).[35]

Recommendations

- Regularly review the need for long-term catheterisation.
- Change catheters used for long-term catheterisation as per manufacturer's instructions and individual patient requirements (e.g., before blockage occurs or is likely to occur).

4.9 Antimicrobial prophylaxis

The use of prophylactic antimicrobial (commonly aminoglycosides) upon instrumentation or change of a catheter to prevent CAUTI and the potential for bacteraemia and septicaemia, despite a lack of evidence for their efficacy, is a matter of concern. This is especially the case in light of the reported overuse of, and increased resistance to, antibiotics. Possible benefits of antimicrobial prophylaxis must be balanced against possible adverse effects, such as selection pressure for the development of antibiotic-resistant bacteria, *Clostridium difficile* infection and antimicrobial toxicity. Such a risk-benefit analysis cannot be reliably estimated from the currently available trials. The practice of giving prophylactic antimicrobials to patients at the time of urinary catheter insertion, change or removal is variable. Specific guidelines for their use have yet to be established and studies have shown great variation in practice amongst healthcare professionals. [113]

Two Cochrane reviews evaluated the use of antimicrobial prophylaxis in patients with short-term and long-term catheters. [114;115] Both reviews found limited evidence for the use of prophylactic antimicrobial and recommended that further studies and randomised controlled trials are needed in this area. The majority of best practice guidelines do not recommend use of prophylactic antimicrobials prior to the removal of urinary catheters. A comprehensive review found that no conclusions can be drawn about the benefits of antimicrobial cover for catheter removal post urological surgery.[116] There is also little data on whether the patient with a previous episode of septicaemia associated with catheter manipulation is at higher risk of septicaemia from subsequent manipulations. Such practice is worthy of further prospective study. In short-term catheterised patients, preventing bacteriuria would appear to be a better strategy than the use of antimicrobials.

Although an asymptomatic bacteraemia rate of approximately 10% per catheter change has been reported in bacteriuric patients with long-term catheters, studies have concluded that it appears unwise to recommend the use of prophylactic antimicrobials for long-term catheterised patients.[116;117] Two sets of recently-published guidelines from the US do not recommend routine use of systemic antimicrobials at the time of catheter placement, removal or replacement. The CDC states that unless clinical indications exist (e.g., in patients with bacteriuria upon catheter removal post urologic surgery), routine use of

systemic antimicrobials is not required to prevent CAUTI in patients requiring either short or long-term catheterisation.[26;36]The need for prophylaxis in neutropenic patients with bacteriuria undergoing a urinary catheter manipulation has yet to determined.[117]

The UK National Institute for Health and Clinical Excellence (NICE) guidelines on antimicrobial prophylaxis against infective endocarditis, published in 2008, do not support the use of antibiotic prophylaxis to prevent endocarditis in patients undergoing urological procedures, including catheterisation.[118] The 2006 guideline on preventing endocarditis from the British Society for Antimicrobial Chemotherapy also does not support the use of prophylaxis against endocarditis in at risk patients undergoing catheterisation. However, they do state that the risk of bacteraemia increases with the presence of bacteriuria and treatment is recommended pre-procedure.[119] US guidelines on prevention of infective endocarditis, published in 2007, state that no published data demonstrate a conclusive link between procedures of the gastrointestinal or genitourinary tract and development of endocarditis and no studies exist that demonstrate the administration of antimicrobial prophylaxis prevents endocarditis in association with procedures performed on the genitourinary tract.[120]

It appears that the prophylactic use of antimicrobial upon change or instrumentation of urinary catheters (both short and long-term) is not indicated in the vast majority of patients. In patients with bacteriuria at high risk of endocarditis or who are significantly immunocompromised (e.g., patients with neutropenia, haematological malignancy, post solid organ transplantation), definitive randomised-controlled trials are required. Pending further evidence, it seems reasonable to recommend that administration of a single dose of appropriate antimicrobial prophylaxis (based on local and patient specific susceptibility data) should continue in this select group of high-risk patients. This is an area that warrants further study.

Recommendations

- There is no role for routine antimicrobial prophylaxis in patients with urinary catheters.
- Antimicrobial prophylaxis, upon change or instrumentation of urinary catheters (both short and long-term) are not indicated in the majority of patients.

5.0 Surveillance of CAUTI

Surveillance is defined as the ongoing systematic collection, analysis, and interpretation of data and the timely dissemination of the data to those who need to know. The final link of the surveillance chain is the application of this data to prevent and control infection.[121] Prevalence studies are commonly used for surveillance of CAUTI.[122-124] However, prospective CAUTI surveillance is recommended for high risk groups: (e.g., patients admitted to intensive care surgical or obstetric units).[2] Rates of CAUTIs ranging from 3.3 to 17.4/1000 catheter days have been reported from ICU patients.[125-128] Much lower infection rates (1.24-2.26/1000 catheter days) have been reported for long-term care institutions.[129] Each healthcare facility should consider including CAUTI surveillance in their surveillance programme depending on the risk profile of their patients and available resources. If undertaken, the CAUTI rate should be reported as the number of CAUTI per 1000 urinary catheter days.

5.1 Definition of CAUTI for surveillance purposes

In European countries, the CDC or the HELICS definitions are most commonly used for HCAI surveillance.[130;131] However as the HELICS definition for urinary tract infection is specifically designed for use in intensive care units only, the committee recommends that the CDC definitions are used.

• In acute facilities

The US (CDC) definition for CAUTI is recommended for use. See **Appendix E**.[130]

• In long-term care facilities

CAUTI surveillance should only include symptomatic CAUTI, as the prevalence of asymptomatic bacteriuria in elderly care residents is high.[132] The recommended definition for CAUTI in residents of long-term care facilities is detailed in **Appendix F**.[133]

5.2 Data collection forms and protocol

Once a healthcare facility commits to undertaking CAUTI surveillance of a particular high risk area or group of patients, data collectors should be trained in the surveillance definitions and protocols to be utilised (**Appendices E and F**). The committee have provided some examples of data collection forms for CAUTI surveillance (**Appendices G and H**).

- **Denominator form:** This form collects information on denominator data. This is a daily count of all the urinary catheters in the area/patient group under surveillance. Urinary catheter days are the number of patients with urinary catheter device *in situ*. Data should be collected at a specified time each day (**Appendix G**).
- **Numerator form:** This form collects the numerator data. A numerator is a patient with a CAUTI. This form is used to collect and report each suspected or confirmed CAUTI in the area/patient group under surveillance. Information collected includes patient demographics, signs and symptoms of infection, laboratory results if applicable and the presence or not of a urinary catheter (**Appendix H**).

The CAUTI rate per 1000 catheter days is calculated by using the following formula:

$$\frac{\text{No of CAUTIs}}{\text{No of U. Catheter days (denominator)}} \times 1000$$

Example – Calculation of CAUTI rate per 1000 catheter days

1. Two patients in the ICU met the case definition of a CAUTI in the month of February (numerator = 2).

2. To calculate the number of catheter days (denominator data); add the number of patients with a urinary catheter *in situ* on each day in the month of February (e.g., 3 patients on the first day of February had a urinary catheter *in situ*; 8 on day 2; 6 on days 3 to 15, 4 on days 16 to 23 and 8 on days 24 to 28 (3+8+6 +6+6+6+6+6+6+6+6+6+6+6+4+4+4+4+4+4+4+4+8+8+8+8+8=161).

   161 = denominator data (number of catheter days in the month of February in the ICU)

3. The CAUTI rate for the month of February in the ICU (per 1000 urinary catheter days) is thus:

$$\frac{2 \times 1000}{161} = 12.4 \text{ CAUTIs/1000 catheter days}$$

5.3 Feedback of surveillance results

CAUTI rates must be fed back to the relevant area(s) and the healthcare facility management on a regular basis, ideally monthly, but at least quarterly. This will allow the healthcare facility to monitor trends, identify outbreaks and to monitor effectiveness of preventative programmes.

Recommendation

- Healthcare facilities should consider including CAUTI surveillance as a component of their surveillance programme, depending on the risk profile of their patients and available resources.
  - The Centre for Disease Control and Prevention (CDC) definition for CAUTI is recommended for use.
  - Standardised methodology should be used and CAUTI rates should be expressed as **the number of CAUTIs per 1000 urinary catheter days.**
  - CAUTI rates must be fed back to the relevant area(s)/personnel and the management of the healthcare facility on a regular basis and at least quarterly.

6.0 Care bundles

A care bundle is a group of evidence-based practices that improve the quality of care when consistently applied to all patients. Care bundles have been developed for a range of conditions and disease processes.[134-137] Implementation of care bundles allows multidisciplinary teams and individual wards/units to measure, target improvements and demonstrate their compliance against key practices, thereby improving care for all patients. Implementation of a care bundle in a medical ICU showed a significant decrease in Foley related UTIs from 6.23/1000 device days to 0.63/1000 device days. This decrease was still significant when adjusted for device utilisation.[138]

Compliance with a care bundle for an individual patient is measured as either 100% or 0%. To achieve 100%, all of the evidence-based components of the bundle must be implemented. If one of the components of the care bundle is not in place, a score of zero is allocated. The ward or team score is calculated as the percentage of all patients with a urinary catheter that achieved 100% compliance with the care bundle.

An example of a care bundle for the management of indwelling urinary catheters is available in **Appendix I**.

It is important that care bundles are adapted for local use before implementation.

Recommendation

- Multidisciplinary teams in conjunction with the infection prevention and control committee should consider implementing a locally-adapted care bundle for the management of indwelling urinary catheters.

7.0 Education of healthcare workers

A number of studies have demonstrated that staff education programmes can reduce HCAI.[139;140] Best practice guidelines recommend that staff education is the key to preventing CAUTI. [2;26;45;55;101]Education at induction of new staff and regular education of HCWs is recommended. The education programme should include the following: indications for catheterisation, ongoing management of catheters and removal of catheters when no longer required. An Irish study found that 69% of HCWs reported receiving no post-registration education on the prevention of CAUTI.[89] Deficits in knowledge and practice of HCWs that have been identified include:

- Inappropriate use of a drainage tap to collect urine samples.[141]
- Inappropriate use of multi–dose lubricant for catheter insertion.[142]
- Changing catheter bags daily.[142]
- Poor documentation of care.[25;143]

Recommendations

- An education programme should be available at induction for new staff and on a regular basis for HCWs and should include the following:
    - Indications for catheterisation.
    - Safe insertion technique.
    - Maintenance of the catheter system.
    - Obtaining a urine specimen.
    - Signs and symptoms of infection.
    - Catheter removal.

- Attendance records for education sessions should be maintained.

8.0 Education of patients/relatives/carers

Appropriate training and education of patients, relatives and carers on the management of urinary catheters is recommended. [2;26;45;58] Patients and their carers undertaking intermittent catheterisation should be trained on insertion technique and care of reusable catheters, where appropriate. Ongoing support should be available for patients and relatives for the duration of the catheterisation. [27]

Well-designed and appropriate written patient educational materials can augment other education efforts and ultimately improve patient care.[144;145] See **Appendix J** for an example of a patient information leaflet.

Recommendations

- Patients should be informed using both written and verbal information of the benefits and risks of urinary catheterisation before insertion. This information should include:
    - Catheter care.
    - Emptying the catheter bag.
    - Where and when the catheter and catheter bag will be changed.
    - Signs and symptoms of complications (e.g., infection, leakage, blockage) and who to contact should complications develop.

- An example of a patient information leaflet is provided in **Appendix J**.

Section 3: Appendices, references and abbreviations list

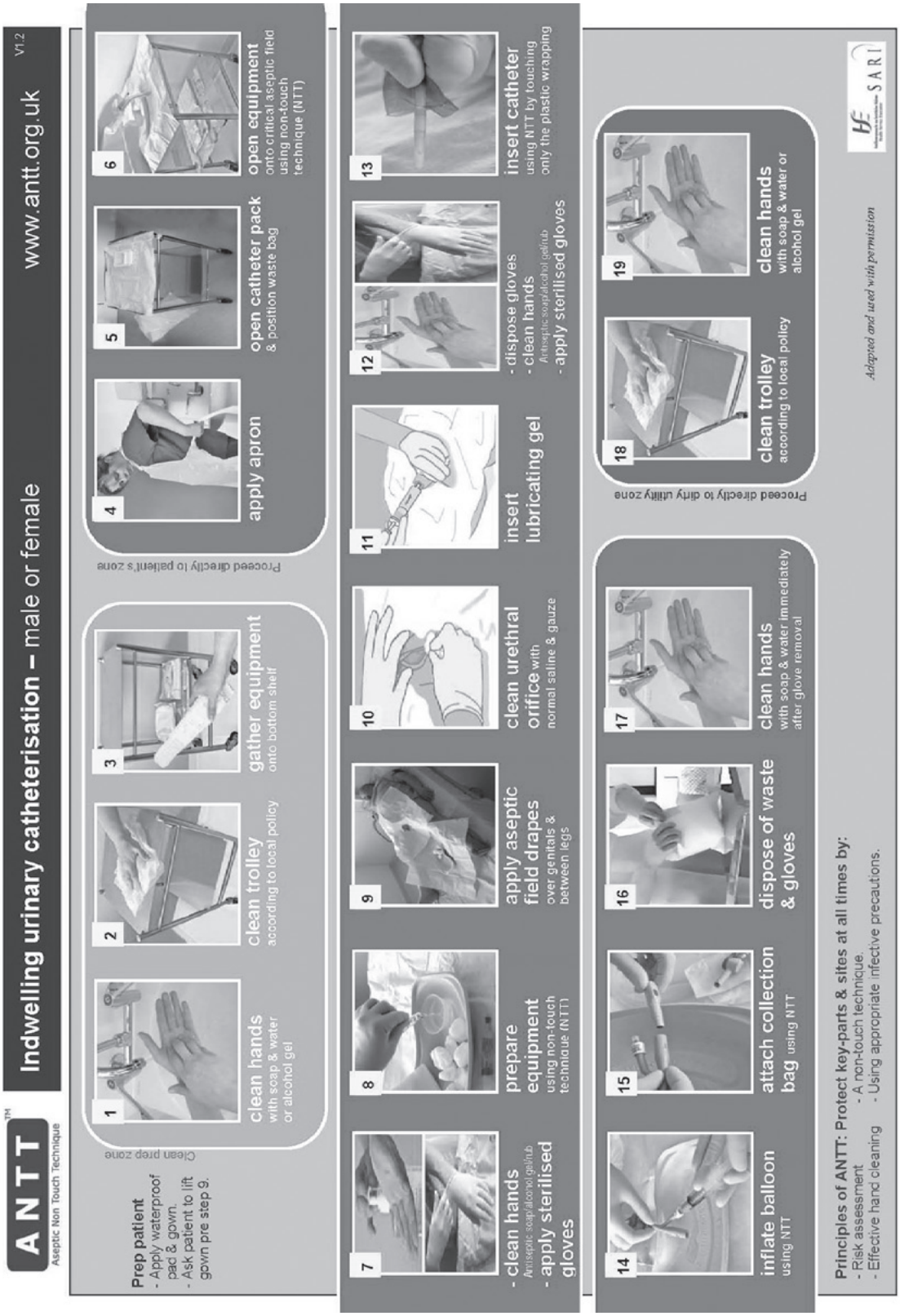
Appendix A: Recommended usage, and a brief outline of advantages and disadvantages of common catheter materials

Catheter Material	Recommended Usage*	Advantages	Disadvantages
Polyvinyl chloride (PVC) Polyvinyl chloride non-balloon	Short-term use only Intermittent catheterisation (IC)	Wide lumen allowing rapid flow rate Suitable for single use for instillation of medications	Rigid and inflexible which may result in patient discomfort Reusable IC catheters: Must be rinsed thoroughly after washing
Teflon coated with latex core	Short-term, up to 28 days	Smoother on external surfaces for insertion	Unsuitable for patients allergic to latex Teflon coating may wear thin if left to long in situ
Silicone	Long-term, up to 12 weeks	Wide lumen for drainage. May reduce the potential for encrustation Suitable for patients with latex allergy	May have difficulty removing when placed in the suprapubic site due to 'cuffing' of the balloon.
Hydrogel coated latex	Long-term, up to 12 weeks	May reduce friction on the urethra mucosal during insertion May reduce potential for encrustation	Unsuitable for patients allergic to latex
Silicone elastoner coated latex (silicone bonding to outer and inner surfaces)	Long-term, up to 12 weeks	May help to reduce potential for encrustation. May reduce mucosal irritation	Unsuitable for patients allergic to latex
Hydrogel coated silicone	Long-term, up to 12 weeks	May reduce friction on the urethra mucosal during insertion Suitable for patients with latex allergy	Rigid material: May result in patient discomfort

*Manufacturer's instructions should always be followed

Table adapted with permission from NHS Quality Improvement Scotland: Best practice statement on urinary catheterisation and catheter care 2004

Appendix B: ANTT™: Standard operating procedure for insertion of an indwelling urethral catheter



Appendix C: Sample checklist for insertion of an indwelling catheter

Patient Name: Medical record number: Date catheter inserted:	
Alternatives to indwelling catheterisation considered and the need for catheterisation outweighs possible complications.	Yes No
The clinical reason for insertion is specified and documented. Clinical reason for insertion (select one). • The clinical team need to closely monitor urinary output (haemodynamic monitoring). • The patient cannot ***sufficiently*** empty his/her bladder (bladder outlet obstruction). • During prolonged surgical procedures with general or spinal anaesthesia. • During regional analgesia for labour or delivery. • The patient has open wounds or pressure sores around the buttocks that are frequently soiled/contaminated with urine. • Patient comfort during end of life care. • To assist in achieving patient immobilisation (e.g., unstable thoracic or lumbar spine or pelvic fractures). • To allow instillation of drugs. State the reason for catheterisation if not listed above: _____	Yes No
The operator has been deemed competent in performing this procedure, or the procedure is being performed under the supervision of a competent person.	Yes No
The operator has explained the need for a urinary catheter, and the potential complications to the patient, and gained the patient's consent.	Yes No
The operator (± supervisor) removed jewellery, put on a clean plastic apron, performed antiseptic hand hygiene and donned sterile gloves.	Yes No
The smallest gauge for effective drainage has been selected: **state size;** _____	Yes No
State size of balloon; ____mls, and amount of sterile water inserted into balloon ____mls.	Yes No
Prior to commencing: The procedure process was explained to the patient and the patient was reassured.	Yes No
The urethral meatus was cleaned with sterile saline or sterile water.	Yes No
The catheter and urethra was lubricated with sterile lubricant.	Yes No
Urine was allowed to drain before balloon was inflated.	Yes No
The catheter was connected aseptically to a sterile drainage bag.	Yes No
The catheter is positioned below the level of the bladder on a clean stand that prevents any part of the catheter drainage system coming into contact with the floor.	Yes No
Name of Operator: **Name of Observer (if present):**	

Adapted with permission from the urinary care bundle produced by Health Protection Scotland.

Appendix D: Autonomic dysreflexia

Appendix D: Autonomic dysreflexia
Autonomic dysreflexia (AD) is an over-activity of the autonomic nervous system causing an abrupt onset of excessively high blood pressure. Persons at risk for this problem generally have a spinal cord injury (SCI) at or above the T6 neurological level. AD can develop suddenly and may lead to seizures, stroke, and even death if not recognised and treated promptly.

AD occurs when a noxious stimulus, such as bladder over-distension, is applied to the body below the level of spinal cord injury. The stimulus results in sensory information passing to the spinal cord, where sympathetic neurons are stimulated. This is followed by unopposed sympathetic outflow because the injury on the spinal cord obstructs inhibitory sympathetic information which originates above the SCI. The main feature of this sympathetic overstimulation is vasoconstriction which causes a rise in blood pressure. At the same time, two compensatory vasomotor reflexes originate in the brain stem. Parasympathetic outflow via the Vagus Nerve slows the heart rate although this is not adequate to compensate for the high blood pressure due to the severity of the vasoconstriction. There is inhibitory sympathetic outflow from vasomotor centres above the level of SCI in an attempt to correct the massive sympathetic overdrive below the level of SCI. However, this is ineffective as it cannot pass the injured area on the cord, but it does result in vasodilatation above the level of SCI causing a number of symptoms including headache, facial flushing, and sweating.

Autonomic dysreflexia can occur in children and the principles of its management are the same as in adults.

Signs and symptoms
- Pounding headache.
- Elevated blood pressure *(a blood pressure of 20 to 40 mm Hg above baseline may be a sign of AD).*
- Blurred vision.
- Sweating and flushing above the level of injury
- Nasal congestion.
- Slow pulse *(may be a relative slowing so that the rate is still within normal range).*
- Anxiety.
- Minimal or no symptoms despite a significantly elevated blood pressure (silent AD).

Causes
Bladder problems are the most common causes of AD
- Bladder over distension.
- Kidney or bladder stones.
- High pressure voiding.
- Urinary tract infection.
- Blocked catheter.
- Kinked tubing or an excessively full drainage bag.

Other causes include constipation, haemorrhoids or anal fissure, skin irritations (e.g., wounds, pressure sores, burns, and ingrown toenails), broken bones, pregnancy, appendicitis, and other medical complications.

Treatment
- Identify the source of the problem.
- Reduce blood pressure by placing patient in a sitting position.
- Check bladder:
  - If the patient is catheterised, empty the drainage bag and ensure there are no kinks in tubing. If the catheter appears blocked, change catheter immediately. The catheter should be lubricated with anaesthetic gel prior to insertion.
  - Perform catheterisation if intermittent self-catheterisation is the patient's method of bladder management
- If infection is suspected commence antimicrobial treatment in line with local antimicrobial guidelines, after taking appropriate specimens for microbiological investigation (e.g. blood culture, CSU).
- Perform digital rectal examination to check for rectal over-distension and check for other potential causes.
- Manage hypertension appropriately. Where blood pressure fails to return to normal or a cause cannot be found, nifedipine 10mgs (or appropriate dose for children) sub-lingually is recommended. Be aware that rebound hypotension may occur.

Appendix E: Acute healthcare facilities: CDC Definition of CAUTI for surveillance purposes

CAUTI must meet at least 1 of the following 4 criteria:[130]

Criteria	Definition
1.	Patient had an indwelling urinary catheter in place at the time of specimen collection **and at least 1** of the following signs or symptoms with no other recognised cause: • Fever (>38°C). • Suprapubic tenderness or costovertebral angle pain or tenderness. **and** A positive urine culture of ≥10^5 colony-forming units (CFU)/ml with no more than 2 species of microorganisms. **OR** Patient had indwelling urinary catheter removed within the 48 hours prior to specimen collection **and at least 1** of the following signs or symptoms with no other recognised cause: • Fever (>38°C). • Urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness. **and** A positive urine culture of ≥10^5 CFU/ml with no more than 2 species of microorganisms.
2.	Patient had an indwelling urinary catheter in place at the time of specimen collection **and at least 1** of the following signs or symptoms with no other recognised cause: • Fever (>38°C). • Suprapubic tenderness, or costovertebral angle pain or tenderness. **and** A positive urinalysis demonstrated by at least 1 of the following findings: i. A positive dipstick for leukocyte esterase and/or nitrite. ii. Pyuria (urine specimen with ≥ 10 white blood cells (WBC)/mm^3 or ≥ 3 WBC/high power field of unspun urine.) iii. Microorganisms seen on Gram stain of unspun urine and a positive urine culture of ≥10^3 and <10^5 CFU/ml with no more than 2 species of microorganisms. **OR** Patient had indwelling urinary catheter removed within the 48 hours prior to specimen collection **and at least 1** of the following signs or symptoms with no other recognised cause: • Fever (>38°C). • Urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness. **and** A positive urinalysis demonstrated by at least 1 of the following findings: i. A positive dipstick for leukocyte esterase and/or nitrite. ii. Pyuria (urine specimen with ≥10 WBC/mm^3 or ≥3 WBC/high power field of unspun urine) iii. Microorganisms seen on Gram stain of unspun urine and a positive urine culture of ≥10^3 and <10^5 CFU/ml with no more than 2 species of microorganisms.

Criteria for CAUTI in acute healthcare facilities (continued)

Criteria	Definition
3.	Patient ≤1 year of age with or without an indwelling urinary catheter has at least 1 of the following signs or symptoms with no other recognised cause: A. Fever (>38°C core). B. Hypothermia (<36°C core). C. Apnea. D. Bradycardia. E. Dysuria. F. Lethargy. G. Vomiting. **and** A positive urine culture of ≥10^5 CFU/ml with no more than 2 species of microorganisms.
4.	Patient ≤1 year of age with or without an indwelling urinary catheter has at least 1 of the following signs or symptoms with no other recognised cause: A. Fever (>38°C core). B. Hypothermia (<36°C core). C. Apnea. D. Bradycardia. E. Dysuria. F. Lethargy. G. Vomiting. **and** A positive urinalysis demonstrated by at least one of the following findings: i. A positive dipstick for leukocyte esterase and/or nitrite. ii. Pyuria (urine specimen with ≥10 WBC/mm^3 or ≥3 WBC/high power field of unspun urine). iii. Microorganisms seen on Gram's stain of unspun urine and a positive urine culture of between ≥10^3 and <10^5 CFU/ml with no more than two species of microorganisms.

Appendix F: Non-acute healthcare facilities: CDC definition of CAUTI for surveillance purposes.

CAUTI must meet the following criteria:[133]

The resident has an indwelling catheter and has at least two of the following signs or symptoms:

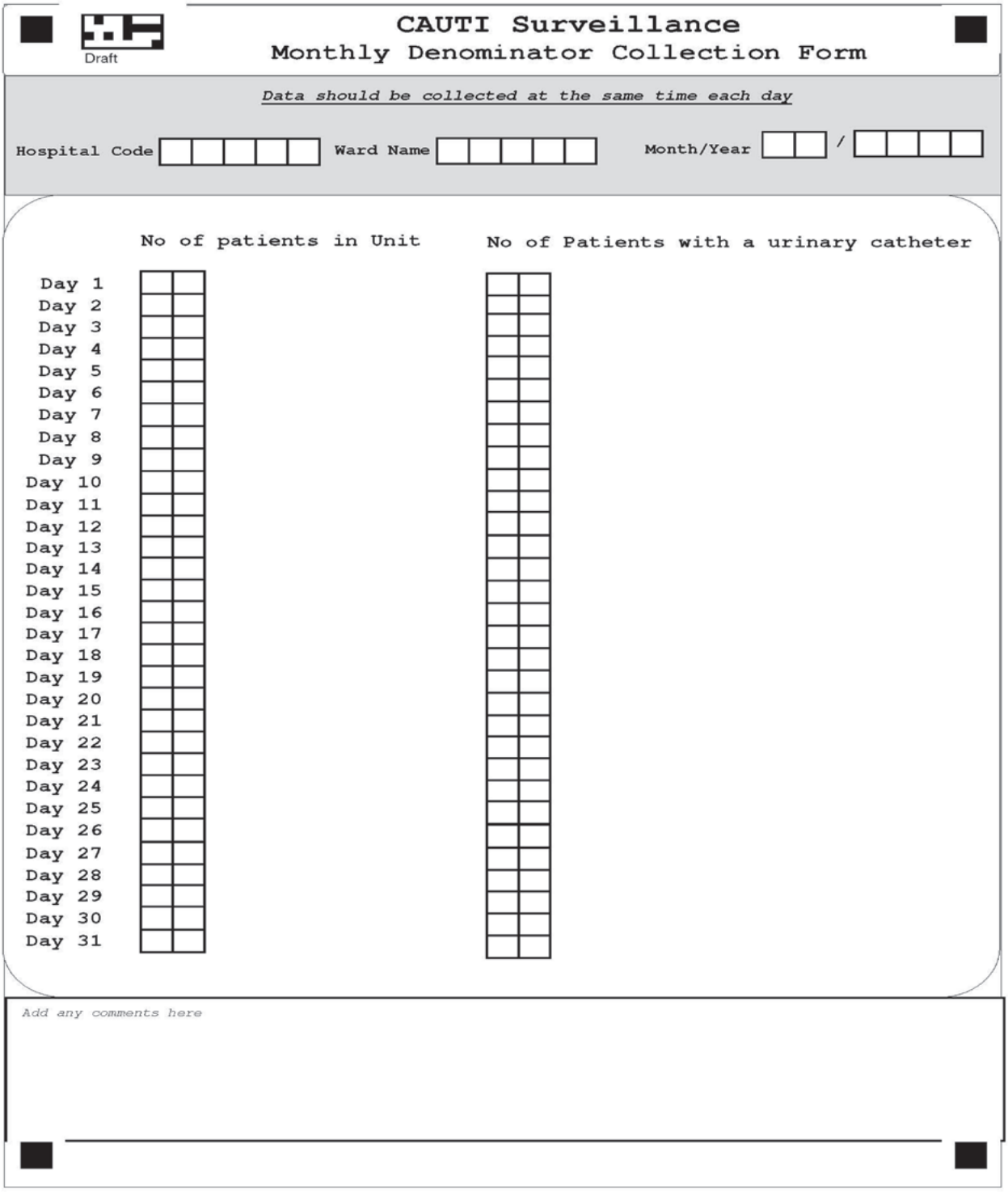
(A) Fever (≥ 38° C) or chills.
(B) New flank or suprapubic pain or tenderness.
(C) Change in character of urine.*
(D) Worsening of mental or functional status.

Comment.
It should be noted that urine culture results are not included in the criteria. However, if an appropriately collected and processed urine specimen was sent and if the resident was not taking antibiotics at the time, then the culture must be reported as either positive or contaminated.

Because the most common occult infectious source of fever in catheterised residents is the urinary tract, the combination of fever and worsening mental or functional status in such residents meets the criteria for a urinary tract infection. However, particular care should be taken to rule out other causes of these symptoms. If a catheterised resident with only fever and worsening mental or functional status meets the criteria for infection at a site other than the urinary tract, only the diagnosis of infection at this other site should be made.

*Change in character may be clinical (e.g., new-onset haematuria, foul smell, or amount of sediment) or as reported by the laboratory (new pyuria or microscopic haematuria). For laboratory changes, this means that a previous urinalysis must have been negative.

Appendix G: Denominator collection form for CAUTI surveillance



Draft

CAUTI Surveillance
Monthly Denominator Collection Form

Data should be collected at the same time each day

Hospital Code ☐☐☐☐☐ Ward Name ☐☐☐☐☐ Month/Year ☐☐ / ☐☐☐☐

	No of patients in Unit	No of Patients with a urinary catheter
Day 1	☐☐	☐☐
Day 2	☐☐	☐☐
Day 3	☐☐	☐☐
Day 4	☐☐	☐☐
Day 5	☐☐	☐☐
Day 6	☐☐	☐☐
Day 7	☐☐	☐☐
Day 8	☐☐	☐☐
Day 9	☐☐	☐☐
Day 10	☐☐	☐☐
Day 11	☐☐	☐☐
Day 12	☐☐	☐☐
Day 13	☐☐	☐☐
Day 14	☐☐	☐☐
Day 15	☐☐	☐☐
Day 16	☐☐	☐☐
Day 17	☐☐	☐☐
Day 18	☐☐	☐☐
Day 19	☐☐	☐☐
Day 20	☐☐	☐☐
Day 21	☐☐	☐☐
Day 22	☐☐	☐☐
Day 23	☐☐	☐☐
Day 24	☐☐	☐☐
Day 25	☐☐	☐☐
Day 26	☐☐	☐☐
Day 27	☐☐	☐☐
Day 28	☐☐	☐☐
Day 29	☐☐	☐☐
Day 30	☐☐	☐☐
Day 31	☐☐	☐☐

Add any comments here

Appendix H: Numerator form for CAUTI surveillance

Form 2: CAUTI - Clinical and Laboratory Data

Draft

Patient details *Laboratory Number* ☐☐☐☐

Hospital Number ☐☐☐☐☐☐☐☐☐☐ **DOB** ☐☐ / ☐☐ / ☐☐☐☐ **Sex** ☐ M ☐ F

Patient Type ☐ Medical ☐ Surgical ☐ Other *Details of Other* ☐☐☐☐☐☐☐☐☐☐☐☐

Date of Suspected Infection ☐☐ / ☐☐ / ☐☐☐☐

Date of Admission to Unit ☐☐ / ☐☐ / ☐☐☐☐ **Ward/Unit** ☐☐☐☐☐☐☐☐

Urinary Catheter Details

Urinary Catheter Status at time of specimen collection

☐ In place ☐ Removed within 48 hours prior ☐ Not in place nor within 48 hours prior

Location of Device Insertion ☐☐☐☐☐☐☐☐ **Date of Device Insertion** ☐☐ / ☐☐ / 20☐☐

Signs & Symptoms

Acute Facilities

<1 year old

- Fever ☐
- Hypothermia ☐
- Apnea ☐
- Bradycardia ☐
- Dysuria ☐
- Lethargy ☐
- Vomiting ☐

>1 year old

- Fever ☐
- Urgency ☐
- Frequency ☐
- Dysuria ☐
- Suprapubic tenderness ☐
- Costovertebral angle pain or tenderness ☐

Non Acute Facilities

- Fever or chills ☐
- New flank or Suprapubic pain or tenderness ☐
- Change in character of urine* ☐
- Worsening of mental or functional status ☐

*Change in character maybe clinical (eg. new bloody urine, foul smell, or amount of sediment) or as reported by the laboratory (new pyuria or microscopic haematuria). For laboratory changes, this means that a previous urinalysis must have been negative.

Laboratory and Diagnostic Testing

- 1 positive culture with ≥10^5CFU/ml with no more than 2 species of microorganisms ☐
- Positive dipstick for leukocyte esterase and/or nitrite ☐
- Pyuria ☐
- Microorganisms seen on Gram stain of unspun urine ☐
- 1 positive culture with ≥10^3CFU/ml and <10^5CFU/ml with no more than 2 species of microorganisms ☐
- Positive Culture ☐
- Positive Blood Culture ☐
- Other evidence of infection found on direct exam, during surgery, or by diagnostic tests# ☐

#per specific site criteria

Microbiology Results

Specimen No ☐☐☐☐☐☐☐☐☐☐

Specimen Date ☐☐ / ☐☐ / 20☐☐

Isolate 1 ☐☐☐☐☐☐☐☐☐☐☐☐

Isolate 2 ☐☐☐☐☐☐☐☐☐☐☐☐

Secondary Bloodstream Infection ☐ Yes ☐ No

Details If Yes

Specimen No ☐☐☐☐☐☐☐☐☐☐

Specimen Date ☐☐ / ☐☐ / 20☐☐

Isolates ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Outcome: **Catheter Associated UTI** ☐ Yes ☐ No

Add any comments here

Appendix I: Sample care bundle for management of indwelling urinary catheters

This sample care bundle has been adapted from the CAUTI bundle produced by Health Protection Scotland. We gratefully acknowledge their permission to use their document. Facilities should review and adapt, if necessary for local use.

Catheter-associated Urinary Tract Infection Care Bundle

Aim: To Reduce the Incidence of Urinary Catheter-associated Infection
Remove catheters as soon as possible
Care for catheters individually

Bundle component	Criteria for compliance with bundle
Check the clinical indication why the urinary catheter is *in situ* – is it still required?	• ALL urinary catheters are indicated. • If there is no clinical indication then the catheter should be removed.
Check the catheter has been continuously connected to the drainage system.	• Urinary catheters must be continuously connected to the drainage bag.
The patient is aware of his/her role in minimising the risk of developing a urinary tract infection *or* ensure routine daily meatal hygiene is performed.	• Patients are involved in their urinary catheter care and educated as to how they can minimise complications. • Routine daily meatal hygiene is performed.
Regularly empty urinary drainage bags as separate procedures, each into a clean container.	• The urinary catheter bag should be emptied regularly, as a separate procedure, into a clean container. • The use of 'separately' here implies that the same container has not been used to empty more than one catheter bag - without appropriate decontamination of the container, change of personal protective equipment and performing hand hygiene. • If the container is for single use it must not be reused – with or without decontamination.
Perform hand hygiene and wear gloves and apron prior to each catheter care procedure; on procedure completion, remove gloves and apron and perform hand hygiene again.	Decontaminate hands (soap and water or alcohol hand rub/gel). • Before accessing the catheter drainage system. • After glove removal following access to the catheter drainage system. • On removal of gloves.

Sample standard operating procedure (SOP) to implement the urinary catheter bundle

Catheter-associated urinary tract infection care bundle – example of an SOP to implement the bundle	
Statement	• Urinary catheters are used frequently in healthcare; however, their use can lead to serious life-threatening complications. • Urinary catheters cause urinary tract infections and are **a common cause of blood stream infections**. • Complications arise directly from their use and in particular if the care is sub-optimal. • The risk of infectious complications increases the longer they are in use. We have a duty to our patients to optimise urinary catheter care. Monitoring our urinary catheter care will assist in optimising procedures and reducing the risk of urinary tract infection.
Objectives	1. To optimise prevention of catheter-associated urinary tract infection (CAUTI) in **OUR** ward and thereby minimise the risk of secondary bacteraemias. 2. To be able to demonstrate quality urinary catheter care in **OUR** ward.
Requirements	**Before the CAUTI bundle procedure can be considered** Quality improvement must be continuous. This is not a short-term commitment – quality improvement needs to be embedded into your systems – to become part of what you do every day. Relevant clinical teams, director of nursing and nurse team should be involved in designing/adapting the bundle, deciding how frequently and who will monitor compliance with the CAUTI bundle and how often and how results will be fed back to relevant clinical, nursing and managerial staff: a multidisciplinary prevention of CAUTI care team could be considered.
Procedure	1. Perform hand hygiene. 2. Collect a bundle form and complete the top boxes: name, location, etc. 3. Identify all patients in the ward/clinical area who have a urinary catheter. 4. Proceed to the first patient with a urinary catheter (if possible be accompanied by the patient's nurse). 5. Introduce yourself to the patient and explain that you are checking all patients with urinary catheters to see if any catheters can be removed. 6. To get the bundle data: • Perform hand hygiene. Confirm from the patient's documentation that the need for the urinary catheter has been reviewed. (i.e. daily for short-term and on a regular basis for long-term catheters) If the continuing need for the catheter has not been documented, check with the patient's nurse/doctor whether the urinary catheter can be removed. • Ask the patient or a nurse whether the catheter has been disconnected – find out whether the disconnection was appropriate. • Ask the patient if they know what they can do to minimise the risk of infection – if they are not aware, inform the patient how to minimise the infection risks. If the patient cannot perform self-catheter care, confirm with the nurse that daily meatal hygiene has been performed. • Confirm that the urinary catheter bag has been emptied regularly, as a ***separate procedure***, into a clean container. (The use of 'separately' here implies that the same container has not been used to empty more than one catheter bag - without appropriate decontamination of the container, change of personal protective equipment and performing hand hygiene. If the container is for single use it **must not be reused** – with or without decontamination.) • Confirm with patient/nurses that hand hygiene has been undertaken before and after accessing the urinary catheter drainage system by HCWs wearing plastic aprons and gloves. 1. Perform hand hygiene between patient observations. 2. Record actions in the bundle against the appropriate number – make arrangements for removal of urinary catheter if necessary. 3. Go to the next patient with a urinary catheter perform hand hygiene and repeat steps 5-9 until all patients with a urinary catheter have been visited.
After care	Complete form. Discuss results with nurse in charge. Give completed form to: _____

Sample care bundle data collection form and summary table of results

Bundle Criteria	Use a single column for each catheterised patient. Put a tick ✓ if achieved, or 'x' if not achieved, in each box.			
	Sample	1	2	Total
There is a documented assessment for the urinary catheter (UC) i.e., every day for short-term and on a regular basis for long-term.	✓			
The UC has been continuously connected.	✓			
The patient is aware of his/her role in minimising the risk of developing a urinary tract infection, ***or*** daily meatal hygiene has been performed by healthcare staff.*	✓			
Empty UC bag often, as a separate procedure, into a clean container.	X			
Hand hygiene performed before & after procedure and apron + gloves worn during procedure.	✓			
Action: request temoval / leave in situ.	**Leave *in situ***			

* This bundle criteria aims at ensuring the daily hygiene is performed either by the patient, if able or by the nurse if the patient is unable

Example of a Summary Table of UC Maintenance Bundle Results	Total	Comment (if required)
Total number of UCs *in situ* at start of the Bundle.		
Total number of UCs with a daily documented comment on the continuing need for the UC.		How many UCs can be removed as a consequence of the bundle round:___
Total number of UCs which were continuously connected.		
Total number of patients aware of their role in minimising urinary tract infection, or whose personal meatal hygiene has been maintained by healthcare staff.		
Total number of UCs which have been emptied regularly as separate procedures into clean containers.		
Total number of UCs for which all procedures were performed aseptically (before and after hand hygiene and correct use of PPE).		
All or None Table – Was UC Care Today Optimal		***Tick if achieved***
100% of UCs *in situ* are required.		
100% of UCs were continuously connected.		
100% of patients were aware of their role in minimising urinary tract infection/ daily meatal hygiene performed.		
100% of UCs drainage bags were emptied regularly as separate procedures.		
100% of UCs procedures were performed aseptically (before and after hand hygiene and correct use of PPE).		
If all the above were achieved the UCs care was optimal.		

Signature of person completing the urinary catheter bundle: _____

Date bundle completed: _____

Appendix J: Sample information leaflet for patients (page 1)

Urinary Catheters
Your Questions Answered.

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

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What is a urinary catheter?

A urinary catheter is a small, soft hollow tube which is inserted into the bladder. It usually goes into the bladder by the same route that urine comes out.

Holes at the top of the tube allow urine to flow through the tube.

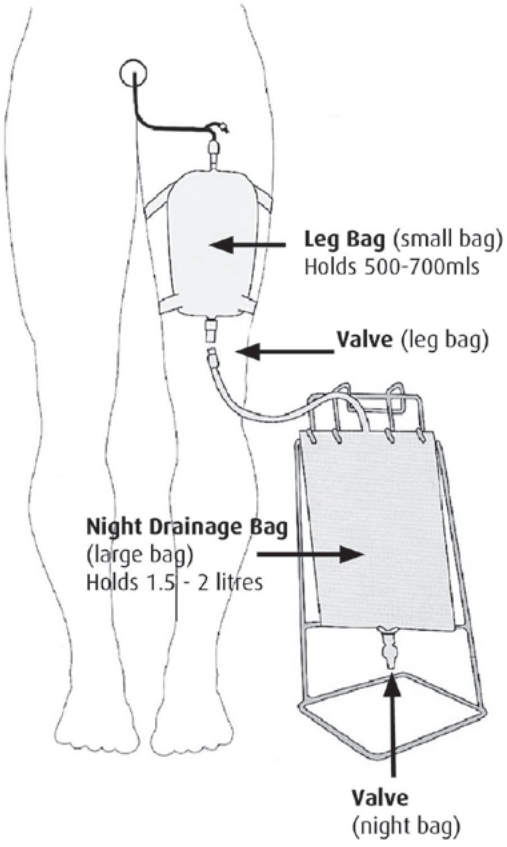
The end of the tube is fitted to a catheter drainage bag which collects the urine. The catheter is held in place in the bladder by a small balloon filled with water.

Why is a urinary catheter needed?

The following are the most common reasons why a urinary catheter is needed:

- There is a blockage in the system from where urine usually flows out.
- There is a risk of urine leaking onto a wound in the buttock area which may delay healing of the wound.
- The bladder is not empty completely when urine is passed.
- It is imortant to watch closely how much urine is being produced.
- Surgery is planned which is going to last a long time.
- During labour/delivery, when an epidural is used.
- It is necessary to put drugs into the bladder.
- To provide comfort for the very ill patient.

The Link System



Sample information leaflet for patients (page 2)

Urinary Catheters Your Questions Answered.

Care of a Urinary Catheter

Personal hygiene is very important to reduce the risk of getting a urinary tract infection.

- Always wash your hands after touching your catheter.
- Wash the area where the catheter enters the body gently with soap and water daily and after you have a bowel motion (if possible have a daily shower/bath).
    - Men should always pull back the foreskin and clean the whole area. When cleaning is finished, it is very important that the foreskin is returned to its normal position.
    - Women should always clean with single strokes from front to back.
- When cleaning the catheter tube always wash away from your body using downward strokes.
- Avoid using talc or perfumed soap which may cause irritation.

What problems may occur?

Infection and catheter blockage can occur.

Signs of infection may include, feeling unwell, a high temperature, change in the smell of the urine, cloudy urine.

Pink/rose coloured urine could be caused by blood as a result of infection or trauma from the catheter being inserted or pulled.

You should call your nurse or doctor if you notice any of the following:

- A high temperature.
- Feeling unwell.
- Pain in your lower abdomen or where the catheter comes out.
- Cloudy, blood stained or offensive smelling urine.
- No urine passed in over four hours.

Care of the drainage bag

The catheter is usually connected to a catheter drainage bag. The bag is either attached to your leg (leg bag) with elasticated/Velcro straps or to a bag which is attached to a catheter stand.

- The bag should be emptied regularly. If overfull it can pull on the bladder and can cause irritation.
- The catheter and bag together should only be disconnected when the bag is being changed, usually once a week.
- A large drainage bag can be connected to a leg bag at night to prevent the leg bag over filling.
- Keep the bag below the level of the bladder to prevent urine flowing back up into the bladder.
- Do not allow the catheter bag or opening port to touch the floor.

Emptying the drainage bag (when approximately 2/3rds full)

1. Wash you hands.
2. Open the tap at the end of the bag and empty into a toilet or a clean container.
3. Wipe the tap clean, and close securely.
4. Flush toilet or empty the container into the toilet and flush.
5. Wash the container with a household detergent and dry well.
6. Wash your hands.

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If you have a problem please contact:

Name: Name:

Phone number: Phone number:

Appendix K: List of abbreviations

AD	Autonomic dysreflexia
ANTT	Aseptic non-touch technique
CAUTI(s)	Catheter-associated urinary tract infection(s)
CFU	Colony-forming units
CSU	Catheter specimen of urine
CDC	Centre for Disease Control & Prevention, USA
CMS	Catheter maintenance solution
DoHC	Department of Health and Children
Fr	French metric scale
HCAI(s)	Healthcare-associated infection(s)
HSE	Health Service Executive
HCW(s)	Healthcare worker(s)
IC	Intermittent catheterisation
PVC	Polyvinyl chloride
SARI	Strategy for the Control of Antimicrobial Resistance in Ireland
SCI	Spinal cord injury
SIC	Self intermittent catheterisation
SIGN	Scottish Intercollegiate Guidelines Network
SOP	Standard operating procedure
UC	Urinary catheter
UK	United Kingdom
UTI	Urinary tract infection
US	United States of America
WBC	White blood cells
WHO	World Health Organisation

Appendix L: Membership of subcommittee

Ms. Shelia Donlon
Infection Prevention and Control Nurse Manager. Health Protection Surveillance Centre (chair).

Ms. Alison Boyd
Registered General Nurse, HSE Dublin North East (representing Public Health Nursing).

Mr. Robert Flynn
Consultant Urology Surgeon, National Rehabilitation Hospital and Adelaide and Meath Hospital incorporating the National Children's Hospital, Tallaght (representing Irish Society of Urology).

Ms. Kathryn Hanly
Infection Prevention and Control Nurse, St Patricks Hospital (Cork) Ltd. (representing Infection Prevention Society).

Professor Samuel McConkey
Consultant in Infectious Diseases, Beaumont Hospital and Royal College of Surgeons in Ireland (representing Infectious Disease Society of Ireland).

Ms. Teresa Moore
Continence Facilitator, Merlin Park Hospital, Galway (representing National Nurse Continence Advisory Forum).

Dr. Margaret Morris-Downes
Surveillance Scientist, Beaumont Hospital, Dublin (representing Surveillance Scientists Association).

Dr. Eoghan O'Neill
Consultant Microbiologist, Connolly Hospital/Royal College of Surgeons in Ireland, Dublin (representing Irish Society of Clinical Microbiologists).

Dr. Lillian Rajan
Consultant Microbiologist, St. Vincent's University Hospital, Dublin (representing Irish Society of Clinical Microbiologists) until December 2009.

Ms. Carol Robinson
Infection Prevention and Control Nurse, South Infirmary-Victoria University Hospital, Cork (representing Infection Prevention Society)

Ms. Mary Shannon
Clinical Nurse Manager, Merlin Park Hospital (representing Irish Urology Nurses).

Ms. Eva Wallace
Clinical Nurse Manager, National Rehabilitation Hospital (representing Suprapubic Interest Group).

Appendix M: Consultation process

The draft document was placed on the HSE and HPSC websites for general consultation in April 2010. In addition, a draft of the this document was sent to the following groups for consultation

Academy of Medical Laboratory Science
HSE HCAI Governance Group
HSE Nurse Practice Development Units
HSE Directors of Nursing
Infectious Disease Society of Ireland
Infection Prevention Society
Institute of Community Health Nursing
Intensive Care Society of Ireland
Irish Association of Critical Care Nurses
Irish Association of Emergency Medicine
Irish Association of Paediatric Nursing
Irish College of General Practitioners
Irish Society of Clinical Microbiologists
Irish Patients Association
Irish Practice Nurses Association
Irish Society of Urology
Irish Urology Nurses
Irish Antimicrobial Pharmacists Group
National Nurse Continence Advisory Forum
Nursing Home Ireland
Public Health Medicine Communicable Disease Group
Royal College of Physicians in Ireland (RCPI)
RCPI Faculty of Pathology
RCPI Faculty of Paediatrics
Royal College of Surgeons in Ireland (RCSI)
Surveillance Scientists Association of Ireland
Strategy for Antimicrobial Resistant in Ireland (SARI) National Committee
SARI Regional Committees

Appendix N

Glossary of terms

Antimicrobial	An agent that kills microorganisms.
Aseptic technique	A set of specific practices and procedures performed under controlled conditions with the aim of minimising the risk of contamination from pathogens.
Aseptic non-touch technique (ANTT)	A method used to prevent contamination of susceptible sites by microorganisms that could cause infection, achieved by ensuring that only sterile equipment and fluids are used and the parts of components that should remain sterile, e.g., the tip of intravenous connectors, are not touched or allowed to come into contact with non sterile surfaces. (http://www.antt.co.uk).
Bacteraemia	The presence of microorganisms in the blood stream.
Bacteriuria	The presence of microorganisms in the urine. If there are no symptoms of infection this is called asymptomatic bacteriuria.
Bladder washout	The introduction of sterile fluid into the bladder, which is allowed to drain more or less immediately, for the purpose of diluting the bladder, contents/ unblocking an obstruction to restore free bladder drainage.
Catheter	A hollow flexible tube that is inserted into a body organ.
Catheter-associated urinary tract infection (CAUTI)	The presence of symptoms or signs attributable to microorganisms that have invaded the urinary tract, where the patient has, or has recently had a urinary catheter
Catheter valve	A valve connected to the outlet of a urinary catheter, allowing the bladder to store urine. Urine is drained by opening the valve at periodic intervals.
Cleaning	A process that physically removes contamination but does not necessarily destroy micro-organisms.
Closed continuous bladder irrigation	The infusion of sterile fluid into the bladder, usually using a closed triple lumen catheter. One lumen is used to drain urine, another is used to inflate the catheter balloon and the third is used to infuse the sterile irrigation fluid.
Closed drainage system	The indwelling catheter is attached to a urine drainage bag. The drainage bag can be attached aseptically at insertion, or the catheter and drainage bag are supplied as one unit from the manufacturer (pre-connected).
Disinfection	A process that reduces the number of microorganisms to a level, at which they will not cause harm, but which usually does not destroy spores.
Encrustation	Urinary proteins, salts and crystals that adhere to the internal and external surface of a urinary catheter.
Hand decontamination	The processes of performing an antiseptic hand rub or social/antiseptic hand wash.
Healthcare-associated infection	Infection acquired in the hospital or other healthcare setting.
Induction programme	Learning activities designed to allow newly appointed staff to function effectively in their new job.
Infection	The entry into the body of microorganisms (e.g., bacteria, viruses) and its establishment and growth in the tissues causing harm.
Indwelling urinary catheterisation	The insertion of a catheter into the bladder, that remains *in situ* to allow continuous drainage of urine. **Short-term:** Catheter remains *in situ* for ≤ 28 days. **Long-term:** Catheter remains *in situ* for > 28 days.

Intermittent catheterisation	The periodic insertion of a catheter into the bladder and its immediate removal when the bladder is drained.
Link-system	A system whereby a drainage bag is attached to the drainage outlet of the leg drainage bag. The link-system is predominately used at night to facilitate overnight drainage due to the small capacity of the leg bag.
Meatus	External opening of the urethra.
Patient	A person who is receiving healthcare or treatment. Sometimes referred to as a service user, resident, or client.
Personal protective equipment	Specialised clothing or equipment worn to protect against health and safety hazards.
Sterile	Free from any living microorganisms.
Suprapubic catheterisation	Catheter inserted into the bladder *via* the abdominal wall.
Urinary catheterisation	The insertion of a catheter into the bladder.

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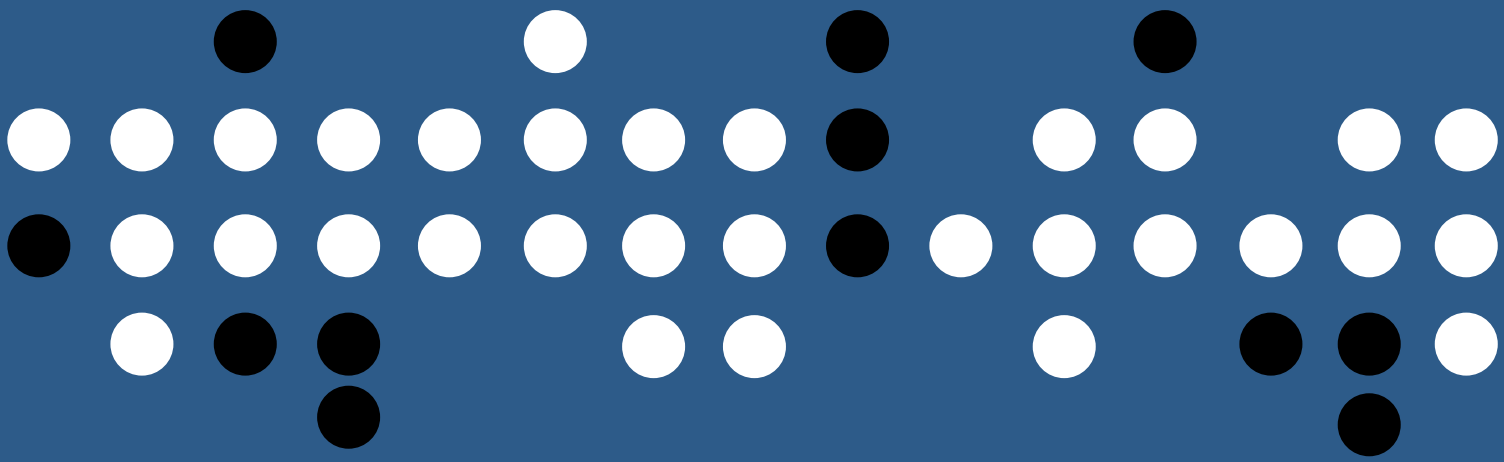

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