



Targeted literature review:

What are the key infection prevention and control recommendations to inform a urinary catheter insertion quality improvement tool?

HPS ICT Document Information Grid

Purpose:	To present a review of the evidence to inform the content of HAI related quality improvement tools for NHSScotland. This supports the functions of HPS in developing effective guidance, good practice and a competent workforce and translating knowledge to improve health outcomes.
Target audience:	All NHSScotland staff involved in patient care activities where interventions can lead to HAI, particularly those interventions that can cause bloodstream infections such as line insertion. Infection prevention and control teams in NHS boards and other settings. Partner organisations particularly Healthcare Improvement Scotland and National Education for Scotland to ensure consistent information across similar improvement documentation.
Description:	Literature critique summary and presentation of key recommendations to inform HAI quality improvement tools, based around a framework that evaluates these against the health impact contribution and expert opinion/practical application.
Update/review schedule:	Every three years; however if significant new evidence or other implications for practice are published updates will be undertaken.
Cross reference:	Standard Infection Control Precautions Policies in the National Infection Prevention and Control Manual . Data on HAI incidence and prevalence and process compliance data. Implementation support from Healthcare Improvement Scotland and/or others, education and training support from National Education Scotland.

Contents

1. Executive summary.....	5
2. Aim of the review	7
3. Background.....	7
3.1 The problem	7
3.2 Why indwelling urinary catheters are needed	8
3.3 How infections associated with the insertion of urinary catheters can be prevented.....	8
3.4 Out of scope for this review	8
3.5 Assumptions – to ensure successful application of recommendations into practice .	9
4. Results 10	
4.1 Pre-insertion considerations – rapid summary of evidence.....	10
4.1.1 Risk factors for acquiring catheter associated urinary tract infection (CAUTI)	10
4.1.2 When is urinary catheterisation indicated?	11
4.1.3 Setting/patient specific considerations	11
4.2 Review of evidence base.....	12
4.2.1 Final recommendation - Ensure that alternatives to indwelling urethral catheterisation have been considered (Category 1A).....	12
4.2.2 Final recommendation - Ensure that hand hygiene is performed immediately before donning sterile gloves prior to insertion of the indwelling urinary catheter (WHO Moment 2) (Category 1A) Final recommendation - Ensure that aseptic technique is used for insertion of indwelling urinary catheters (Category 1B)	13
4.2.3 Final recommendation - Ensure that the indwelling urinary catheter selected has the smallest gauge and once inserted, the balloon is filled to the recommended level i.e.10ml (unless clinically indicated) (Category II).....	14
4.2.4 Final recommendation - Ensure that the urethral meatus is cleaned with sterile saline prior to indwelling urinary catheter insertion (Category 1A).15	
4.2.5 Final recommendation - Ensure that single use sterile lubricant is used prior to insertion (Category 1B).....	15
4.2.6 Final recommendation - Ensure that aseptic technique is applied/maintained when connecting indwelling urinary catheter to sterile closed drainage system (Category 1B).....	16
4.3 Review of additional evidence based on initial search findings.....	16
4.3.1 Use of antibiotic and antiseptic impregnated catheters (Category II).....	16
4.3.2 Document date, time, reason for insertion, and person undertaking the insertion (Category II).....	17
4.3.3 Positioning of catheter: Insert the catheter a little further once urine starts to	

drain before inflating the balloon (no recommendation)	18
4.3.4 Position the catheter bag 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 (Category 1B).....	18
References.....	20
Appendix 1: Previous criteria under review	25
Appendix 2: Framework – tool to evaluate evidence based recommendations alongside the health impact contribution & expert opinion (based on the target group covered by this review)	27
Appendix 3: Literature review methodology	45
Appendix 4: Search Strategy	48
Appendix 5: Summary of key recommendations for urinary catheter care	51

1. Executive summary

Indwelling urinary catheters are commonly used invasive medical devices within acute and non-acute settings in NHS Scotland. Urinary tract infections were the most common type of healthcare associated infection (HAI) reported within the HAI Prevalence Surveys of 2007, 2011, and 2016.¹⁻³

Indwelling urinary catheters are required at times to enable short or long term bladder drainage, however their use is associated with an increased risk of infection by enabling microorganisms to gain entry to the bladder. Catheter associated urinary tract infections (CAUTI) can primarily result from contamination from the patient's perineum, from the hands of healthcare workers or contaminated equipment during the insertion procedure.⁴

The key intervention to minimise the risk of CAUTI is to avoid inserting an indwelling urinary catheter in the first place unless clinically required in addition to taking a patient's risk factors into account.⁴⁻⁷ If required, precautions include the use of aseptic technique and lubricant during the insertion; appropriate hand hygiene; aseptic connection to the drainage system; patient hygiene; and choice of appropriately sized catheter and balloon.^{4;6;8}

The Health Protection Scotland (HPS) urinary catheter insertion checklist (2007) was presented as a complete description of all the steps required during the insertion procedure. In order to form the basis of this review, the steps in the checklist which are evidence based and infection prevention focused (rather than procedural) were identified prior to assessing literature.

The recommendations result from the review of scientific evidence and the process of assessing these within a health impact and expert opinion framework. The key recommendations and their scientific grade of evidence for a urinary catheter insertion quality improvement tool are:

- Ensure that alternatives to indwelling urethral catheterisation have been considered (Category 1A) *
- Ensure that hand hygiene is performed immediately before donning sterile gloves prior to insertion of the indwelling urinary catheter (WHO Moment 2) (Category 1A)

- Ensure that aseptic technique is used for insertion of indwelling urinary catheters (Category 1B)
- Ensure that the indwelling urinary catheter selected has the smallest gauge and once inserted, the balloon is filled to the recommended level, i.e.10ml (unless clinically indicated) (Category II)
- Ensure that the urethral meatus is cleaned with sterile saline prior to indwelling urinary catheter insertion (Category 1A)
- Ensure that single use sterile lubricant is used prior to insertion (Category 1B)
- Ensure that aseptic technique is applied/maintained when connecting indwelling catheter to sterile closed drainage system (Category 1B)

* to find out more information on the categories of these recommendations see [Appendix 3](#).

Note: this review identifies the resulting key evidence based recommendations and does not aim to identify all the elements of a checklist or standard operating procedure covering urinary catheter management. A review and recommendations on urinary catheter maintenance is available on [HPS web pages](#).

In conclusion: it is advised that the key recommendations listed here and summarised in [Appendix 5](#) are considered for application into practice as supported by quality improvement tools including care bundles.

2. Aim of the review

To review the evidence base and expert opinion to ensure that the key recommendations included within a quality improvement tool are the most critical in ensuring safe insertion of indwelling urinary catheters and subsequent safety of patients.

3. Background

3.1 The problem

The NHSScotland National Point Prevalence Survey of Healthcare Associated Infection (HAI) and Antimicrobial Prescribing (2016) reported that urinary tract infections were the most common type of HAI in acute hospital inpatients (24.5%) and within non-acute settings (58.8%).² The prevalence survey also found 20.8% of inpatients had an indwelling urinary catheter in place, most commonly in intensive care, geriatric medicine and surgical specialities. As a result of similar findings in the 2007 survey, CAUTI was prioritised as an area for future surveillance particularly focusing on care of the elderly and medical settings. Concurrently this also needs to be addressed with regards to infection prevention measures.

The risk of infectious complications with an indwelling urinary catheter is high because it is an invasive device and is a procedure commonly undertaken on those who are vulnerable to infection due to age or frailty. Entry of microorganisms directly to the bladder can primarily occur during insertion resulting from contamination from the patient's skin or microorganisms from the perineum; or from the hands of healthcare workers. This results in a bypassing of the body's defence mechanism of micturition, which normally flushes microorganisms from the lower urinary tract.⁴ The indwelling urinary catheter drainage system also allows microorganisms to gain entry from any of the connection points if they are disconnected or opened. In addition, once organisms have entered the urinary catheter, biofilms can form on the lumen surface and can lead to infection and blockage of the catheter.^{4;6} To minimise the risk of complications, the insertion procedure must be optimal. Other points including the drainage system are covered under the urinary catheter maintenance literature review.

3.2 Why indwelling urinary catheters are needed

Urinary catheters are required at times to enable bladder drainage in the short or long term and are commonly used invasive devices in both acute and community settings.⁹

3.3 How infections associated with the insertion of urinary catheters can be prevented

Since the risk of infectious complications associated with catheterisation is so high, it is vital to ensure that indwelling urinary catheters are only placed if clinically necessary.^{4;6;10} Therefore the main aim of this review is to present the evidence for not inserting an indwelling urinary catheter as this is the simplest way to avoid CAUTI.^{4;6;7;11} Assessment of the need and benefit of inserting an indwelling urinary catheter versus the patient's risk of complications as a result, should be carefully considered and take a patient's individual risk factors into account.^{4;6;7;12} The other critical interventions include the use of aseptic technique during the insertion, which includes the use of sterile equipment and solutions, the need for hand hygiene at the key moment with relation to insertion of an indwelling urinary catheter, the competence of the healthcare workers undertaking the procedure, the use of the correct catheter size and balloon to minimise tissue trauma, patient hygiene and ensuring that the catheter is aseptically connected to the drainage system.^{4;6;13}

3.4 Out of scope for this review

This literature review does not address any issues specific to:

- Paediatric patients
- Intermittent catheters
- Suprapubic catheters
- Belly bags
- Condom drainage

- Urology specific settings
- Management of urinary tract infections
- Specifics on the use of personal protective equipment e.g. gloves
- Drainage systems
- Specific care actions related to clinical management (even if it is thought there may be an association with infection prevention)

This review was not specifically aimed at community settings however the key recommendations resulting are deemed of equal importance for informing urinary catheter insertion actions in community settings.

3.5 Assumptions – to ensure successful application of recommendations into practice

There are a number of aspects related to healthcare delivery that were not within the remit of this review as it is clear that they are the responsibility of other professionals. These include that:

- Staff are appropriately trained and competent in all aspects of the management of urinary catheters preferably using an approved educational package.
- The overall approach to the delivery of healthcare is supported by patient safety and improvement approaches and organisational readiness.

4. Results

The literature search for the 2018 update identified 609 articles; after screening, 3 articles were included.¹⁴⁻¹⁶

The recommendations presented are based on a review of the current evidence. The previous recommended criteria within the HPS bundles and checklists were used as a basis for the question set in [Appendix 1](#). To further aid the process of deciding which final key recommendations to include, all the recommendations resulting from the review of the evidence were assessed using the 'health impact and expert opinion framework' as found in [Appendix 2](#). The methodology for this is described within [Appendix 3](#); the specific search strategy in [Appendix 4](#) and finally a summary page of the resulting recommendations can be found in [Appendix 5](#).

4.1 Pre-insertion considerations – rapid summary of evidence

There is a consensus of evidence that catheterising individuals increases their risk of urinary tract infection and that the risk increases the longer the duration of catheter usage. The indwelling urinary catheter is associated with the greatest risk of infection.⁴ Currently the use of urinary catheterisation is common during the delivery of care within acute settings in NHSScotland, particularly within medical, surgical, orthopaedic and care of the elderly settings where around 20% of inpatients have a urinary catheter in place.³

4.1.1 Risk factors for acquiring catheter associated urinary tract infection (CAUTI)

The risk factors associated with CAUTI include being female, elderly, the duration of catheterisation and impaired immunity.^{6;15;17;18} In addition there is evidence that conditions such as diabetes, impaired renal function and severity of illness are also risk factors. It is concluded that catheter use and duration should be minimised in all individuals, particularly those at higher risk for CAUTI such as women, the elderly, and individuals with impaired immunity.⁶ Table 1 summarises appropriate indications based on the Healthcare Infection Control Practices Advisory Committee (HICPAC) evidence based guidance and current

consensus. There are a number of references related to CAUTI with regards to optimising healthcare workers approach to the clinical indications for insertion of indwelling urinary catheters; these do not form part of this review.^{7;19-21}

4.1.2 When is urinary catheterisation indicated?

On initial review of the evidence, it was apparent that there is a considerable body of evidence regarding appropriate indications for urinary catheterisation alongside the risk factors associated with development of CAUTI.⁶ This is not a comprehensive review of evidence, but aims to provide some background information on decisions on when to insert indwelling urinary catheters.

The HICPAC guideline for the prevention of catheter associated infection includes a systematic review of evidence on the risks versus benefits of urinary catheterisation in a number of patient populations.⁶ As a result a number of recommendations were made with respect to indications when urinary catheterisation is appropriate and these are summarised in [Box 1](#).

Box 1 Summary of indications when urinary catheterisation may be appropriate

Appropriate indications for urinary catheterisation (includes);⁶

- Patient has acute urinary retention or bladder outlet obstruction
- Requirement to measure urine output in critically ill patients
- To assist in the healing of open wounds or pressure ulcers in incontinent patients
- Patient requires prolonged immobilisation (e.g. potentially unstable thoracic or lumbar spine etc)
- To improve comfort for end of life care
- Perioperative care for selected surgical procedures

4.1.3 Setting/patient specific considerations

On reviewing the evidence it was deemed necessary to describe particular settings as well as specific patient needs in order to highlight the context for urinary catheterisation.

Indwelling urinary catheters are commonly used for patients in operating theatres. There is some evidence, albeit low quality, to show that there is a benefit in avoiding their use. This

rapid review of evidence considered a number of outcomes with regards to insertion. In addition to urinary tract infection (UTI), bladder injury and risk of urinary retention were reviewed. It has been recommended to 'use urinary catheters in operative patients only as necessary, rather than routinely.⁶ The use of intermittent catheters may be indicated, but alongside techniques such as the use of bladder scanners to minimise unnecessary catheterisation.⁶

The use of catheterisation for management of incontinence was also evaluated and again it was found that there was some evidence of benefit in avoiding catheterisation for management of incontinence. Though the presence of pressure ulcers may affect this decision, it has been recommended overall to 'avoid use of urinary catheters in patients and nursing home residents for the management of incontinence'.⁶

The potential benefits and risks of catheterisation in patients with spinal cord injury was also evaluated and again it was found that there was some low quality evidence, which showed that indwelling urinary catheters should be avoided based on a decreased risk of UTI and other urinary complications including injury.⁶ It has been recommended that alternatives to indwelling urinary catheters should be found if possible, including the use of intermittent catheterisation if needed for this patient population.⁶

4.2 Review of evidence base

4.2.1 Final recommendation - Ensure that alternatives to indwelling urethral catheterisation have been considered (Category 1A)

The findings of the 2016 HPS National Point Prevalence Survey of Healthcare Associated Infection and Antimicrobial Prescribing showed that urinary tract infections were the most common healthcare associated infection (HAI) in both acute and non-acute settings.³ Approximately half of the UTIs developed in patients that had been catheterised at some point in the 7 days prior to onset, and overall 1 in 5 patients were catheterised at the time of the survey. The risk of infection complications with an indwelling urinary catheter is high because it is an invasive device which enables microorganisms to gain direct entry to the bladder.⁴ There is consistent evidence associating placement of indwelling urinary catheters with

increased risk of UTI.^{4;22} The development of a CAUTI can lead to significant morbidity and mortality, with approximately 1-4% developing bacteraemia.⁴ It is clear therefore that within both acute and community settings the focus should be on ensuring that all alternatives to indwelling urethral catheterisation are considered alongside the individual's risk of developing CAUTI and other clinical factors.¹⁷

Examples of inappropriate uses for indwelling catheterisation include ease of care for patients with incontinence and/or poor mobility; as a means to obtain urine culture when the patient can voluntarily void; and for ease of care during prolonged postoperative recovery. The adoption of protocols and prompts/reminders to ensure indwelling urinary catheters are inserted only when clinically appropriate and removed as soon as possible have been associated with a reduction in catheter utilisation ratios and CAUTI rates.^{20;21 16} National Institute for Health and Care Excellence (NICE), HICPAC guidance, and Epic3 guidelines further reinforce this advice, recommending that a urinary catheter should only be used "following assessment of alternative methods and discussion with the patient"²³⁻²⁵ also see [Box 1](#) for information on when catheterisation may be indicated.

It is therefore concluded, consistent with current evidence, that alternatives to indwelling urethral catheterisation be considered.

4.2.2 Final recommendation - Ensure that hand hygiene is performed immediately before donning sterile gloves prior to insertion of the indwelling urinary catheter (WHO Moment 2) (Category 1A)

Final recommendation - Ensure that aseptic technique is used for insertion of indwelling urinary catheters (Category 1B)

Use of aseptic technique and the importance of hand hygiene is consistent with all current evidence and forms key recommendations in published guidelines.^{4;6;17} The WHO Guidelines on Hand Hygiene in Health Care clearly describe the indications for hand hygiene and present these within the WHO 'My 5 Moments for Hand Hygiene', which emphasises the importance of performing hand hygiene before clean/aseptic procedures to prevent healthcare associated infection.²⁶ The WHO 5 Moments have been widely promoted within NHSScotland for a

number of years and hygiene performance is measured against compliance with these Moments. In relation to the risk associated with indwelling urinary catheter insertion the clearest indication for hand hygiene is Moment 2 'before clean/aseptic procedures'. This is consistent with the recommendation within the HICPAC guideline which states 'perform hand hygiene immediately before and after insertion or any manipulation of the catheter device or site'.⁶

Aseptic technique is a broad term for a number of actions which prevent cross transmission of microorganisms.^{27;28} These include requirements not to touch critical parts; preparation of a surface area which prevents touch contamination of equipment; use of sterile equipment; and use of personal protective equipment. The aseptic

non-touch technique (ANTT™) has been advocated for use throughout the UK.²⁸ There is a consensus of evidence showing improved outcomes when indwelling urinary catheter insertion is carried out using an aseptic technique.^{4;6;17} NICE guidelines recommend that "all catheterisations carried out by healthcare workers should be aseptic procedures."²⁴ The HICPAC guidelines include a clear recommendation that aseptic technique and sterile equipment including the use of sterile gloves should form part of the insertion actions required.⁶

This review does not aim to cover all procedural steps for clinical practice e.g. glove use. These are covered elsewhere e.g. standard infection control precautions, as covered in the [National Infection Prevention and Control Manual](#).

4.2.3 Final recommendation - Ensure that the indwelling urinary catheter selected has the smallest gauge and once inserted, the balloon is filled to the recommended level i.e.10ml (unless clinically indicated) (Category II)

One of the factors which may influence the development of CAUTI is tissue damage or trauma caused by the insertion of the indwelling urinary catheter itself.^{4;6} It is therefore considered best practice that the smallest gauge of indwelling urinary catheter is selected to minimise this risk of damage and also of residual urine remaining in the bladder. This recommendation is included within the epic2 and updated epic3 guidelines.^{4;23} However it is noted that larger gauge indwelling urinary catheters may be required for certain circumstances, i.e. for patients undergoing urological surgery. This specific topic is not covered in this review. The HICPAC

guidelines similarly recommend that ‘unless otherwise clinically indicated, consider using the smallest gauge for effective drainage’.⁶ NICE guidelines, on the other hand, recommend only that the gauge should be selected “based on an assessment of the patient’s individual characteristics”.²⁴ There is no specific information regarding the balloon size in HICPAC guidelines; however both epic2/epic3 and the NICE guidelines recommend a 10ml balloon size as being appropriate for most adult patients.^{6;22-24} This HPS review update did not identify any studies for inclusion related to gauge and/or balloon size.

4.2.4 Final recommendation - Ensure that the urethral meatus is cleaned with sterile saline prior to indwelling urinary catheter insertion (Category 1A)

Consensus exists within the evidence that indwelling urinary catheters should be inserted using aseptic technique, which therefore means that equipment and solutions used in the procedure should be sterile.²⁷ The HICPAC guidelines recommend that indwelling urinary catheters should be inserted using aseptic technique and sterile equipment using ‘an appropriate antiseptic or sterile solutions for periurethral cleaning’.⁶ There is limited evidence available to assess the effect of different meatal cleansing agents prior to insertion. Studies frequently focus on daily meatal cleansing following catheter insertion, or assess meatal cleansing as part of a bundled insertion protocol.²⁹⁻³² A 2017 systematic review and meta-analysis found no benefit of using an antiseptic agent over a non-antiseptic agent for meatal cleansing in the prevention of CAUTIs, and no superiority of one agent over another.¹⁴ However it should be noted that this meta-analysis grouped studies together involving both pre- and post-insertion meatal cleansing therefore a true analysis of pre-insertion cleansing was not possible. There is currently insufficient consensus of evidence to recommend the use of an antiseptic for meatal cleansing and this is also concluded within epic3 and NICE guidelines.^{6;23;24}

It is therefore concluded that the recommendation that sterile saline be used for cleaning the urethral meatus is consistent with current evidence and still valid.

4.2.5 Final recommendation - Ensure that single use sterile lubricant is used prior to insertion (Category 1B)

There is consensus among clinicians that a lubricant gel should be routinely used for all male

and female catheterisations to reduce pain and discomfort and minimise tissue trauma, especially when using a non-coated catheter. There is evidence that urethral trauma and mucosal irritation can increase the risk of CAUTI.⁴ The use of an anaesthetic gel (i.e. lidocaine) or a lubricant containing an anaesthetic is well recognised for male catheterisation however it should be considered for any patient if pain, discomfort or a difficult insertion is anticipated. Care should be taken when using lidocaine gels on patients with known sensitivity/allergy to any of the active ingredients, and in those patients who have damaged urethral membranes. This is due to the potential risk of adverse effects from systemic uptake in patients with impaired cardiac conditions, hepatic insufficiency, and epilepsy.³³ Regardless of the choice of lubricant, and consistent with the requirement for aseptic technique to be maintained throughout insertion, the lubricant should be sterile and for single patient use only.^{4;6;22}

4.2.6 Final recommendation - Ensure that aseptic technique is applied/maintained when connecting indwelling urinary catheter to sterile closed drainage system (Category 1B)

The recommendation that an aseptic technique should be used for insertion of an indwelling urinary catheter is included within all the evidence based guidance identified during this review.^{4;6;22} There is also consensus within the evidence base and guidelines of the importance of maintaining a sterile, continuously closed drainage system following insertion.^{4;6;23;24;34} It is therefore crucial that the indwelling urinary catheter is connected to a sterile drainage system using an aseptic technique to avoid introducing microorganisms to the system at this stage in the procedure.

4.3 Review of additional evidence based on initial search findings

4.3.1 Use of antibiotic and antiseptic impregnated catheters (Category II)

There are numerous designs of indwelling urinary catheters and these are commonly made from materials such as polyvinyl chloride, latex and silicone. The choice of catheter material

requires clinical decision and is based on patient assessment and anticipated duration of catheter usage.⁴ There has been considerable interest in the development of new materials and designs of indwelling urinary catheters with a view to aid insertion and reduce CAUTI, and antiseptic and antibiotic impregnated indwelling urinary catheters are now available for use. Experimental laboratory studies have demonstrated reduced pathogen and biofilm loads following use of antimicrobial catheters however randomised clinical trials are lacking.^{35;36} Two Cochrane systematic reviews concluded that despite some evidence of a reduction in CAUTI there is currently insufficient evidence to recommend antiseptic or antibiotic impregnated indwelling urinary catheters for routine use in short and long term catheterisation.^{37;38} The HICPAC 2009 guidelines recommend that when the CAUTI rate is not decreasing after all other interventions have been used, then the use of antimicrobial/ antiseptic impregnated indwelling urinary catheters may be considered.⁶ Based on this review, there is currently insufficient consensus of evidence to recommend antiseptic or antibiotic impregnated indwelling urinary catheters for routine use, however this innovation can be followed up in coming years.

It is concluded therefore as a result of this review and after applying the framework for identifying final key recommendations that this is **not** a key recommendation. Consideration could be given to inclusion of information on the possible benefits of alternative catheter types for particular settings or circumstances, within the other documentation, e.g. cause and effect chart.

4.3.2 Document date, time, reason for insertion, and person undertaking the insertion (Category II)

Documentation of catheter insertion and care is included as a key recommendation within the insertion process, based on a good practice point within the epic2 guidelines and is also present in the updated epic3 and NICE guidelines.^{23;24} (Category II)

This step may be important for patient safety however it is not solely an infection prevention precaution during the insertion of indwelling urinary catheters; therefore it is not within the remit of this review. However the importance of documentation is included within the 'practice points' summary of recommendations (Appendix 5).

The HPS National Catheter Passport was launched in January 2018.³⁹ This booklet is a communication tool for health and social care staff that records the date, time, reason for

insertion, and person undertaking the insertion. Details of catheter type, problems encountered, and a record of catheter changes is also maintained. Evaluation of the National Catheter Passport is expected in 2019.

4.3.3 Positioning of catheter: Insert the catheter a little further once urine starts to drain before inflating the balloon (no recommendation)

This step is critical for patient safety during the insertion of urinary catheters, however it is not an infection prevention precaution therefore it is not within the remit of this review. This statement will not form one of the key infection prevention recommendations.

4.3.4 Position the catheter bag 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 (Category 1B)

This recommendation is based on evidence presented within the epic2/epic3 and NICE guidelines which concludes that this action will lessen the possibility of reflux of urine, which has been shown to be associated with an increased risk of infection.^{4,23,24} Furthermore the HICPAC 2009 guidelines include a similar recommendation. It is concluded that this recommendation would be more suitable for inclusion within a maintenance quality improvement tool, however this does not preclude it from being part of insertion tools/procedures used in clinical practice.

In conclusion: it is advised that the key recommendations listed here and summarised in Appendix 5 are considered for application into practice as supported by quality improvement tools including care bundles. These activities can also be supported by national patient safety/quality improvement work (as directed by Healthcare Improvement Scotland).

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Note: A number of references listed above are cited within the literature review methodology which has been placed in [Appendix 3](#) for ease of reading of this document.

Appendix 1: Previous criteria under review

Once all alternatives to indwelling urinary catheterisation have been considered and the decision made to catheterise, the HPS urinary catheter checklist lists all the elements of the procedure to be undertaken during the insertion of a urinary catheter. This review of the evidence concentrates on the key evidence based infection prevention recommendations and will not cover the final format of the quality improvement tool e.g. checklist, which is the remit of Healthcare Improvement Scotland. Therefore the evidence based steps within the current checklist (rather than procedural) were identified and are listed below: The urinary catheter care bundle, checklist and associated tools were first published on the HPS website in 2008. The criteria below were used as the question set to frame this review of the evidence base

- Alternatives to indwelling catheterisation have been considered and the need for urinary catheterisation in this patient outweighs possible complications.
- The operator, and supervisor, removed jewellery, put on a clean plastic apron and performed a hygienic hand hygiene procedure and donned sterile gloves.
- The correct catheter type is selected.
- The smallest gauge for effective drainage has been selected: state size.
- The balloon is 10mls in size: state size of balloon; ___mls, and amount of sterile water inserted into balloon_____mls.
- Clean the urethral meatus with sterile saline.
- Lubricate the catheter with sterile lubricant.
- Insert the catheter a little further once urine starts to drain before inflating the balloon (to ensure catheter is inserted in the bladder and not urethra).
- Aseptically connect the catheter to a sterile approved drainage bag.

- Position the catheter 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.

Appendix 2: Framework – tool to evaluate evidence based recommendations alongside the health impact contribution & expert opinion (based on the target group covered by this review)

Recommendation for review	Ensure that alternatives to indwelling urethral catheterisation have been considered
Grade of recommendation	Category 1A
Health impact contribution (based on Healthcare Quality Strategy for NHSScotland)	Safe: This recommendation ensures that the patient only has a catheter when clinically indicated reducing the risk of associated infection
	Effective: This recommendation reduces the risk of complications from this invasive device, including on occasions systemic (blood stream) infections
	Efficient: This recommendation reduces the risk of infection complications by ensuring that an indwelling urinary catheter is only in place if there is a clinical need, this may result in releasing time for other care and a reduction in associated NHS costs
	Equitable: This recommendation promotes a standard of care for all patients, that may result in a reduction in avoidable personal and NHS costs, which is beneficial for all
	Timely: This recommendation should be timed with patient assessments; it may require coordination of different specialist staff
	Person Centred: This is a person centred action to reduce harm which could be caused by an invasive device and allows for communication with patients undergoing the procedure

Expert opinion/consultation and practical considerations	Measurement and feedback (Y/N/?)	Feasibility and sustainability (Y/N/?)				Applicability and reach (Y/N/?)			Training and informing (Y/N/?)
	Potential for measurement through e.g. observation	Easily implemented within current culture and will improve the quality of care now	Potential for consistent delivery	Easily implemented based on reliably available resources/products/prompts	Stealth integrations into natural workflow/logical clarity of concept (also see Cause & Effect Chart)	Unambiguous	Potential for applicability to a wide range of settings	Avoids unintended consequences/ perverse behaviour	Potential for congruency in design and meaning, with HCW, trainer and observer training and education
	Y	?	?	?	Y	?	Y	?	Y
Is this a key recommendation?	Yes								

Recommendation for review	Ensure that hand hygiene is performed immediately before donning sterile gloves prior to insertion of the indwelling urinary catheter (WHO Moment 2)
Grade of recommendation	Category 1A
Health impact contribution (based on Healthcare Quality Strategy for NHSScotland)	Safe: Not implementing this recommendation would put the patient at risk of harm
	Effective: This recommendation has been shown to be effective in reducing the risk of complications resulting from contaminated hands of healthcare workers. This includes contamination of the insertion site which could enable access to the patient's blood stream resulting in systemic (blood stream) infections
	Efficient: This recommendation reduces the risk of infectious complications and may result in releasing time for other care and a reduction in associated NHS costs
	Equitable: This recommendation promotes a standard of care for all patients, that may result in a reduction in avoidable personal and NHS costs, which is beneficial for all
	Timely: This recommendation should be an integral part of healthcare worker activity and patient/ individual care
	Person Centred: This is a patient centred action to reduce harm caused by the invasive device in every patient. It also allows for patients/individuals to be aware of the importance of hand hygiene and their role in this

Expert opinion/consultation and practical considerations	Measurement and feedback (Y/N/?)	Feasibility and sustainability (Y/N/?)				Applicability and reach (Y/N/?)			Training and informing (Y/N/?)
	Potential for measurement through e.g. observation	Easily implemented within current culture and will improve the quality of care now	Potential for consistent delivery	Easily implemented based on reliably available resources/products/prompts	Stealth integration into natural workflow/logical clarity of concept (also see Cause & Effect Chart)	Unambiguous	Potential for applicability to a wide range of settings	Avoids unintended consequences/perverse behaviour	Potential for congruency in design and meaning, with HCW, trainer and observer training and education
	Y	Y	Y	Y	Y	Y	Y	?	Y
Is this a key recommendation?	Yes								

Recommendation for review	Ensure that aseptic technique is used for insertion of indwelling urinary catheters.
Grade of recommendation	Category 1B
Health impact contribution (based on Healthcare Quality Strategy for NHSScotland)	Safe: Not implementing this recommendation would put the patient at risk of harm
	Effective: This recommendation reduces the risk of complications from this invasive device, including on occasions systemic (blood stream) infections
	Efficient: This recommendation reduces the risk of infectious complications and may result in releasing time for other care and a reduction in associated NHS costs
	Equitable: This recommendation promotes a standard of care for all patients, that may result in a reduction in avoidable personal and NHS costs, which is beneficial for all
	Timely: This recommendation forms part of the natural flow of patient care when safely inserting a catheter
	Person Centred: This is a patient centred action to reduce harm caused by the invasive device in every patient requiring a catheter and allows for communication with patients undergoing the procedure

Expert opinion/consultation and practical considerations	Measurement and feedback (Y/N/?)	Feasibility and sustainability (Y/N/?)				Applicability and reach (Y/N/?)			Training and informing (Y/N/?)
	Potential for measurement through e.g. observation	Easily implemented within current culture and will improve the quality of care now	Potential for consistent delivery	Easily implemented based on reliably available resources/products/prompts	Stealth integration into natural workflow/logical clarity of concept (also see Cause & Effect Chart)	Unambiguous	Potential for applicability to a wide range of settings	Avoids unintended consequences/perverse behaviour	Potential for congruency in design and meaning, with HCW, trainer and observer training and education
	Y	Y	Y	Y	Y	?	Y	?	Y
Is this a key recommendation?	Yes								

Recommendation for review	Ensure that the indwelling urinary catheter selected has the smallest gauge and once inserted, the balloon is filled to the recommended level i.e.10ml (unless clinically indicated)
Grade of recommendation	Category II
Health impact contribution (based on Healthcare Quality Strategy for NHSScotland)	Safe: Not implementing this recommendation would put the patient at risk of harm
	Effective: This recommendation reduces the risk of complications from this invasive device
	Efficient: This recommendation reduces the risk of infectious complications and may result in releasing time for other care and a reduction in associated NHS costs
	Equitable: This recommendation promotes a standard of care for all patients, that may result in a reduction in avoidable personal and NHS costs, which is beneficial for all
	Timely: This recommendation should be an integral part of healthcare worker activity and safe patient/ individual care
	Person Centred: This is a patient centred action to reduce harm caused by the invasive device in every patient with a catheter

Expert opinion/consultation and practical considerations	Measurement and feedback (Y/N/?)	Feasibility and sustainability (Y/N/?)				Applicability and reach (Y/N/?)			Training and informing (Y/N/?)
	Potential for measurement through e.g. observation	Easily implemented within current culture and will improve the quality of care now	Potential for consistent delivery	Easily implemented based on reliably available resources/products/prompts	Stealth integration into natural workflow/ logical clarity of concept (also see Cause & Effect Chart)	Unambiguous	Potential for applicability to a wide range of settings	Avoids unintended consequences/ perverse behaviour	Potential for congruency in design and meaning, with HCW, trainer and observer training and education
	Y	Y	Y	Y	Y	?	Y	?	Y
Is this a key recommendation?	Yes								

Recommendation for review	Ensure that the urethral meatus is cleaned with sterile saline prior to indwelling urinary catheter insertion
Grade of recommendation	Category 1A
Health impact contribution (based on Healthcare Quality Strategy for NHSScotland)	Safe: Not implementing this recommendation would put the patient at risk of harm
	Effective: This recommendation reduces the risk of complications from this invasive device, including on occasions systemic (blood stream) infections
	Efficient: This recommendation reduces the risk of infectious complications and may result in releasing time for other care in a reduction in associated NHS costs
	Equitable: This recommendation promotes a standard of care for all patients, that may result in a reduction in avoidable personal and NHS costs, which is beneficial for all
	Timely: This recommendation should be an integral part of healthcare worker activity and safe patient/ individual care
	Person Centred: This is a patient centred action to reduce harm caused by the invasive device in every patient and allows for communication with patients undergoing the procedure

Expert opinion/consultation and practical considerations	Measurement and feedback (Y/N/?)	Feasibility and sustainability (Y/N/?)				Applicability and reach (Y/N/?)			Training and informing (Y/N/?)
	Potential for measurement through e.g. observation	Easily implemented within current culture and will improve the quality of care now	Potential for consistent delivery	Easily implemented based on reliably available resources/products/prompts	Stealth integration into natural workflow/ logical clarity of concept (also see Cause & Effect Chart)	Unambiguous	Potential for applicability to a wide range of settings	Avoids unintended consequences/ perverse behaviour	Potential for congruency in design and meaning, with HCW, trainer and observer training and education
	Y	Y	Y	Y	Y	?	Y	Y	Y
Is this a key recommendation?	Yes								

Recommendation for review	Ensure that single use sterile lubricant is used prior to insertion
Grade of recommendation	Category 1B
Health impact contribution (based on Healthcare Quality Strategy for NHSScotland)	Safe: Not implementing this recommendation could put the patient at risk of harm
	Effective: This recommendation reduces the risk of complications from this invasive device, including on occasions systemic (blood stream) infections
	Efficient: This recommendation reduces the risk of infectious complications and may result in releasing time for other care in a reduction in associated NHS costs
	Equitable: This recommendation promotes a standard of care for all patients, that may result in a reduction in avoidable personal and NHS costs, which is beneficial for all
	Timely: This recommendation should be an integral part of healthcare worker activity and safe patient/ individual care
	Person Centred: This is a patient centred action to reduce harm caused by the invasive device in every patient and allows for communication with patients undergoing the procedure

Expert opinion/consultation and practical considerations	Measurement and feedback (Y/N/?)	Feasibility and sustainability (Y/N/?)				Applicability and reach (Y/N/?)			Training and informing (Y/N/?)
	Potential for measurement through e.g. observation	Easily implemented within current culture and will improve the quality of care now	Potential for consistent delivery	Easily implemented based on reliably available resources/products/prompts	Stealth integration into natural workflow/logical clarity of concept (also see Cause & Effect Chart)	Unambiguous	Potential for applicability to a wide range of settings	Avoids unintended consequences/perverse behaviour	Potential for congruency in design and meaning, with HCW, trainer and observer training and education
	Y	Y	Y	Y	Y	?	Y	Y	Y
Is this a key recommendation?	Yes								

Recommendation for review	Ensure that aseptic technique is applied/maintained when connecting indwelling urinary catheter to sterile closed drainage system
Grade of recommendation	Category 1B
Health impact contribution (based on Healthcare Quality Strategy for NHSScotland)	Safe: Not implementing this recommendation would put the patient at risk of harm
	Effective: This recommendation reduces the risk of complications from this invasive device, including on occasions systemic (blood stream) infections
	Efficient: This recommendation reduces the risk of infectious complications and may result in releasing time for other care in a reduction in associated NHS costs
	Equitable: This recommendation promotes a standard of care for all patients, that may result in a reduction in avoidable personal and NHS costs, which is beneficial for all
	Timely: This recommendation should form part of the natural flow of patient care on safely inserting a catheter
	Person Centred: This is a patient centred action to reduce harm caused by the invasive device in every patient requiring a catheter and allows for communication with patients undergoing the procedure

Expert opinion/consultation and practical considerations	Measurement and feedback (Y/N/?)	Feasibility and sustainability (Y/N/?)				Applicability and reach (Y/N/?)			Training and informing (Y/N/?)
	Potential for measurement through e.g. observation	Easily implemented within current culture and will improve the quality of care now	Potential for consistent delivery	Easily implemented based on reliably available resources/products/prompts	Stealth integration into natural workflow/logical clarity of concept (also see Cause & Effect Chart)	Unambiguous	Potential for applicability to a wide range of settings	Avoids unintended consequences/perverse behaviour	Potential for congruency in design and meaning, with HCW, trainer and observer training and education
	Y	Y	Y	Y	Y	?	Y	Y	Y
Is this a key recommendation?	Yes								

Recommendation for review	Position the catheter bag 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
Grade of recommendation	Category IB
Health impact contribution (based on Healthcare Quality Strategy for NHSScotland)	Safe: This recommendation may support safer patient care
	Effective: This recommendation helps reduce the risk of complications from this invasive device
	Efficient: This recommendation supports other aspects of catheter care aimed at reducing the risk of infectious complications and may result in releasing time for other care in a reduction in associated NHS costs
	Equitable: This recommendation promotes a standard of care for all patients, that may result in a reduction in avoidable personal and NHS costs, which is beneficial for all
	Timely: This recommendation could fit with other actions being performed at the end of the insertion procedure
	Person Centred: This is a patient centred action in every patient with a urinary catheter

Expert opinion/consultation and practical considerations	Measurement and feedback (Y/N/?)	Feasibility and sustainability (Y/N/?)				Applicability and reach (Y/N/?)			Training and informing (Y/N/?)
	Potential for measurement through e.g. observation	Easily implemented within current culture and will improve the quality of care now	Potential for consistent delivery	Easily implemented based on reliably available resources/products/prompts	Stealth integration into natural workflow/ logical clarity of concept (also see Cause & Effect Chart)	Unambiguous	Potential for applicability to a wide range of settings	Avoids unintended consequences/perversions of the behaviour	Potential for congruency in design and meaning, with HCW, trainer and observer training and education
	Y	?	Y	?	Y	Y	?	?	Y
Is this a key recommendation?	No – but will form part of underpinning advice in supporting tools								

Recommendation for review	Use of antibiotic and antiseptic impregnated catheters
Grade of recommendation	Category II
Health impact contribution (based on Healthcare Quality Strategy for NHSScotland)	Safe: There is currently insufficient evidence to support their benefit to reduce infectious complications
	Effective: There is currently insufficient evidence to support their benefit to reduce infectious complications
	Efficient: There is currently insufficient evidence to support their benefit to reduce infectious complications
	Equitable: There is currently insufficient evidence to support their benefit to reduce infectious complications
	Timely: There is currently insufficient evidence to support their benefit to reduce infectious complications
	Person Centred: There is currently insufficient evidence to support their benefit to reduce infectious complications

Expert opinion/ consultation and practical considerations	Measurement and feedback (Y/N/?)	Feasibility and sustainability (Y/N/?)				Applicability and reach (Y/N/?)			Training and informing (Y/N/?)
	Potential for measurement through e.g. observation	Easily implemented within current culture and will improve the quality of care now	Potential for consistent delivery	Easily implemented based on reliably available resources/ products/ prompts	Stealth integration into natural workflow/ logical clarity of concept (also see Cause & Effect Chart)	Unambiguous	Potential for applicability to a wide range of settings	Avoids unintended consequences /perverse behaviour	Potential for congruency in design and meaning, with HCW, trainer and observer training and education
	?	N	?	N	?	?	?	?	Y
Is this a key recommendation?	No – but should be noted when considering underpinning advice in supporting tools								

Appendix 3: Literature review methodology

The evidence underpinning the criteria for a quality improvement tool was reviewed using a targeted systematic approach to enable input and resource to be concentrated where needed. This methodology is fully described within a separate HPS paper 'Rapid method for development of evidence based/expert opinion key recommendations, based on health protection network guidelines'.

Initial rapid search and review

The initial search rapid literature search was carried out to identify mandatory guidance, or recent national or international evidence based guidance which either agrees or refutes that the current key recommendations are the most important to ensure optimal PVC care:

- The main public health websites were searched to source any existing quality improvement tools.
- Relevant guidance and quality improvement tools e.g. Department of Health (DH), Centers for Disease Control and Prevention (CDC), were reviewed.
- Additional literature identified and sourced e.g. from the relevant Cochrane reviews.

The quality of evidence based guidance was assessed using the AGREE instrument⁴⁰ and only guidance which achieved either a strongly recommend or recommend rating was included.

Targeted systematic review

As a result of initial rapid search and review, recommendations requiring a more in depth review were identified. This involved searching of relevant databases including OVID Medline, CINAHL, EMBASE. All literature pertaining to recommendations where evidence was either conflicting or where new evidence was available were critically appraised using SIGN checklists and a 'considered judgement' process used to formulate recommendations based on the current evidence for presentation and discussion with the National Healthcare Associated Infection (HAI) Quality Improvement Tools Group in Scotland.

Grading of recommendations

Grading of the evidence is using the Healthcare Infection Control Practices Advisory Committee (HICPAC) method.⁴¹ In addition to the overall assessment of the evidence underpinning the recommendation, other factors are considered which affect the overall strength of the recommendation such as the health impact and expert opinion on the potential critical outcomes.

The HICPAC categories are as follows:

HICPAC Category	Grading of evidence for recommendation
Category 1A	Strong recommendation based on high to moderate quality evidence
Category 1B	Strong recommendation based on low quality of evidence which suggest net clinical benefits or harms or an accepted practice (e.g. aseptic technique)
Category 1C	A mandatory recommendation
Category II	A weak recommendation which shows evidence of clinical benefit over harm
No recommendation	Not sufficient evidence to recommend one way or another

Framework for identifying final key recommendations

One way of improving implementation of evidence based guidance is by the identification of key recommendations which if applied will improve practice and outcome.⁴²⁻⁴⁸ This is the foundation of 'care bundles' and other quality improvement tools which rely on the identification of key evidence based recommendations to ensure application in practice.⁴⁹

A method has been developed which aims to reflect graded recommendations in line with ensuring healthcare quality, attention to cost and practical application. It combines approaches used by the Institute of Healthcare Improvement (IHI) and World Health Organization, among others, in identifying the critical factors from the evidence to ensure patient safety in a range of fields.^{48;50} The method considers the current NHSScotland Quality Strategy dimensions and finally expert opinion applied within a formal framework. This framework includes a range of practical considerations under the headings

measurement and feedback, feasibility and sustainability, applicability and reach, training and informing.

Ultimately, HPS key recommendations are presented taking all of these factors into account, with the aim of improving practice and outcome.

Appendix 4: Search Strategy

Database: Ovid MEDLINE(R) <1948 to November Week 2 2011> Search Strategy:

-
- 1 exp Urinary Tract Infections/ or exp Urinary Catheterization/ or exp Catheters, Indwelling/
(58824)
 - 2 insertion.mp. or exp Intrauterine Devices/ (97299)
 - 3 exp Asepsis/ (1412)
 - 4 exp Gloves, Surgical/ or exp Gloves, Protective/ (3925) 5 3 or 4 (5287)
 - 6 1 and 2 and 5 (9)

Database: Ovid MEDLINE(R) <1948 to November Week 3 2011> Search Strategy:

-
- 1 exp Urinary Catheterization/ or exp Catheters, Indwelling/ (25494)
 - 2 exp Handwashing/ or exp Infection Control/ (48503)
 - 3 exp Protective Clothing/ (9175)
 - 4 Gloves, Protective/ (1342)
 - 5 apron\$.mp. (546)
 - 6 exp Asepsis/ (1414)
 - 7 exp Urinary Tract Infections/ (36535)
 - 8 exp Catheter-Related Infections/ or exp Bacteriuria/ (7709)
 - 9 2 or 3 or 4 or 5 or 6 (56770)
 - 10 7 or 8 (37371)
 - 11 1 and 9 and 10 (339)
 - 12 exp Community Health Services/ (446383) 13 11 and 12 (18)

Databases: Ovid MEDLINE(R) 1946 to Present with Daily Update, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations May 22, 2014

Search Strategy for 2014 update:

-
- 1 exp Urinary Tract Infections/ (38528)
 - 2 exp Urinary Catheterization/ (12626)
 - 3 exp Catheters, Indwelling/ (15911)
 - 4 exp Catheter-Related Infections/ (1964)
 - 5 1 or 2 or 3 or 4 (63307)
 - 6 exp Asepsis/ (1446)
 - 7 exp Gloves, Surgical/ or exp Gloves, Protective/ (4167)
 - 8 exp Protective Clothing/ (9867) 9 apron\$.mp (653)
 - 10 exp Handwashing/ (4425)
 - 11 exp Infection Control/ (50034)
 - 12 6 or 7 or 8 or 9 or 10 or 11 (61756)
 - 13 5 and 12 (1486)
 - 14 limit 13 to (English language and yr="2011 -Current") (218)

Database: Embase <1974 to 2018 November 21>, Ovid MEDLINE(R) ALL <1946 to November 21, 2018> Search Strategy for 2018 update:

-
- 1 exp urinary catheterization/ (21769)
 - 2 exp catheters, indwelling/ (32181)
 - 3 ((urinary or urethral) adj10 catheter\$.mp. (42530)
 - 4 1 or 2 or 3 (72931)
 - 5 exp asepsis/ (50091)
 - 6 exp gloves, surgical/ or exp gloves, protective/ (8383)

- 7 exp protective clothing/ (25223)
- 8 apron\$.mp. (2386)
- 9 exp handwashing/ (17706)
- 10 exp hand hygiene/ (18557)
- 11 (meatus or meatal).mp. (14585)
- 12 exp infection control/ or exp cross infection/ (215047)
- 13 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 (303706)
- 14 exp urinary tract infections/ (141417)
- 15 exp catheter-related infections/ (20021)
- 16 exp bacteriuria/ (13951)
- 17 catheter associated urinary tract infection\$.mp. (2860)
- 18 14 or 15 or 16 or 17 (161642)
- 19 4 and 13 and 18 (2731)
- 20 limit 19 to english language (2364)
- 21 limit 20 to human (2242)
- 22 limit 21 to yr="2014 -Current" (733)
- 23 remove duplicates from 22 (609)

Appendix 5: Summary of key recommendations for urinary catheter care



Preventing catheter associated urinary tract infections – Acute Settings



Patient who needs a urinary catheter (acute settings)

When inserting a Urinary Catheter

Ensure that:

- alternatives to indwelling urethral catheterisation have been considered
- hand hygiene is performed immediately before donning sterile gloves prior to insertion of the indwelling urinary catheter (WHO Moment 2)
- aseptic technique is used for insertion of indwelling urinary catheters
- the indwelling urinary catheter selected has the smallest gauge and once inserted, the balloon is filled to the recommend level i.e. 10ml (unless clinically indicated)
- the urethral meatus is cleaned with sterile saline prior to indwelling urinary catheter insertion
- single use sterile lubricant is used prior to insertion
- aseptic technique is applied/maintained when connecting indwelling urinary catheter to sterile closed drainage system

When maintaining a Urinary Catheter

Ensure that:

- there is a daily review of the need for the indwelling urinary catheter; remove if possible
- the connection between the indwelling urinary catheter and the drainage system is not broken except to meet clinical requirements (for example changing the bag in line with manufacturers' recommendations)
- daily meatal hygiene is performed (ensure patients are aware of their contribution in preventing urinary tract infections)
- the drainage bag is emptied when clinically indicated using a clean, disposable container for each patient
- hand hygiene is performed immediately prior to access or manipulation of the indwelling urinary catheter (WHO Moment 2)
- the drainage bag is situated below the bladder level and the tap is not in contact with any surface, e.g. floor

Practice points

Documenting date and time of catheter insertion is an important step to achieve timely line removal.

The use of personal protective equipment (PPE) including gloves is important in all procedures where blood and body fluid risk exists.

The featured recommendation on hand hygiene does not detract from other times when hand hygiene is recommended and will be monitored against (namely the 5 Moments for Hand Hygiene).

The featured recommendations do not aim to cover emergency situations, which require clinical judgement for patient care actions.

For further information on the background to these recommendations and the literature reviews that informed these please visit <http://www.hps.scot.nhs.uk> as well as referring to your local teams and policies.

Also see NHS Education for Scotland <http://www.nes.scot.nhs.uk> and Healthcare Improvement Scotland <http://www.healthcareimprovementscotland.org/home.aspx> for additional information on education and patient safety improvement. Also refer to the Standard Infection Control Precautions Section of the National Infection Prevention and Control Manual <http://www.hps.scot.nhs.uk/haic/ic/nationalinfectionpreventionandcontrolmanual.aspx>.

Preventing catheter associated urinary tract infections – Community Settings

Patient who needs a urinary catheter (community settings)

When inserting a Urinary Catheter

Ensure that:

- alternatives to indwelling urethral catheterisation have been considered
- hand hygiene is performed immediately before donning sterile gloves prior to insertion of the indwelling urinary catheter (WHO Moment 2)
- aseptic technique is used for insertion of indwelling urinary catheters
- the indwelling urinary catheter selected has the smallest gauge and once inserted, the balloon is filled to the recommend level i.e. 10ml (unless clinically indicated)
- the urethral meatus is cleaned with sterile saline prior to indwelling urinary catheter insertion
- single use sterile lubricant is used prior to insertion
- aseptic technique is applied/maintained when connecting indwelling urinary catheter to sterile closed drainage system

When maintaining a Urinary Catheter

Ensure that:

- there is a regular review of the need for the indwelling urinary catheter; remove if possible
- the connection between the indwelling urinary catheter and the drainage system is not broken except to meet clinical requirements (for example changing the bag in line with manufacturers' recommendations)
- daily meatal hygiene is performed (ensure individuals are aware of their contribution in preventing urinary tract infections)
- the drainage bag is emptied when clinically indicated; avoid contact of the drainage tap with any environmental surface
- hand hygiene is performed and gloves donned immediately before access or manipulation of the indwelling urinary catheter (WHO Moment 2)

Practice points

Documenting date and time of catheter insertion is an important step to achieve timely line removal.

The use of personal protective equipment (PPE) including gloves is important in all procedures where blood and body fluid risk exists.

The featured recommendation on hand hygiene does not detract from other times when hand hygiene is recommended and will be monitored against (namely the 5 Moments for Hand Hygiene).

The featured recommendations do not aim to cover emergency situations, which require clinical judgement for patient care actions.

For further information on the background to these recommendations and the literature reviews that informed these please visit <http://www.hps.scot.nhs.uk> as well as referring to your local teams and policies.

Also see NHS Education for Scotland <http://www.nes.scot.nhs.uk> and Healthcare Improvement Scotland <http://www.healthcareimprovementscotland.org/home.aspx> for additional information on education and patient safety improvement. Also refer to the Standard Infection Control Precautions Section of the National Infection Prevention and Control Manual <http://www.hps.scot.nhs.uk/haic/ic/nationalinfectionpreventionandcontrolmanual.aspx>.