Good Practices in Health Care

Urethral Catheterization

Section 2

Male, Female and Paediatric Intermittent Catheterization

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European Association of Urology Nurses

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Introduction to the European Association of Urology Nurses

The foundation of the European Association of Urology Nurses (EAUN) is a direct result of the first nursing conference, which was organized at the XVth Congress of the European Association of Urology in Brussels, April 2000, with the administrative and financial support of the EAU board.

The aims and objectives of the EAUN are:

- To act as the representative body for European nurses in urology and facilitate the continued development of urological nursing in all its aspects.
- To foster the highest standards of urological nursing care throughout Europe
- To encourage urological research undertaken by nurses and enable the broadcasting of its results
- To promote the exchange of experience and good practice between its members
- To establish standards for training and practice for European urological nurses
- To contribute to the determination of European urological health care policies

Supporting Statement on Intermittent Catheterization:
Healthcare is not bound by geographical boundaries and the role of the nurse should reflect a sound knowledge and skills base across all European countries. The development of this guideline for intermittent catheterization aims to support the skilled healthcare professional in Europe with the theoretical and procedural evidence required to underpin their practice, and to ensure patient safety, dignity and comfort.

This document should be used to support those practitioners who have been assessed in practice as competent in this procedure. To support safe, effective practice, it is vital that appropriate education and training is provided to ensure the practitioner has a clear understanding of the normal urethral anatomy, and the potential problems and complications that may be encountered.

This document is a support to clinical practice and should only be used in conjunction with local policies and protocols.

1. Intermittent catheterization - Overview

1.1 Definitions

Catheterization
Catheterization is a procedure by which a catheter (hollow tube) is inserted into the bladder, usually via the urethra, to drain or collect urine for investigative tests or for the instillation of agents.

Intermittent Catheterization
For intermittent catheterization (IC), the urinary catheter does not remain inside the bladder. It is inserted for time necessary to empty the bladder and is then removed. This is performed for a wide variety of reasons, some of which are listed in Section 1.2. However, a key factor in the health care professional's role in undertaking intermittent catheterization is in the provision of patient choice, consent, information and support.

1.2 Indications for intermittent catheterization

Intermittent catheterization can be indicated as treatment for voiding problems due to disturbances or injuries to the nervous system, non-neurogenic bladder dysfunction, or intravesical obstruction with incomplete bladder emptying.

In a hospital setting, IC is often used for diagnostic evaluation:

- To obtain sample of urine for evaluation
- To obtain accurate measurement of urinary output
- Bladder distention prior to transvaginal or abdominal ultra sound of the pelvis
- To facilitate urodynamics

Intermittent catheterization can be implemented as a one-time treatment, repeatedly over a short period of time, on an occasional basis, or may be life long, for persons with chronic bladder emptying disturbances. It is often preferred to indwelling catheters, because it can result in a better quality of life for the patient, has less complications, such as urinary tract infections (UTI), urethral stricture, compared to indwelling catheters (1, 2, 3, 4). IC will allow for almost normal bladder function with regular bladder filling and emptying.

1.2.1 Neurogenic bladder dysfunctions

Neurogenic lesions can cause bladder dysfunctions by interrupting "communication" between bladder and micturation centres in the brain. Patients suffering from neurogenic lesions might have a combination of urge incontinence and residual urine (detrusor-sphincter dyssynergia) or partial to total urine retention due to atonic or a non-contractile detrusor. The extent and intensity of retention depends on the location of the lesion. Also, injuries or disturbances in peripheral nerves in the bladder or sacral region can cause incomplete bladder emptying (1, 2, 3, 4, 5, 6, 7). The following neurological conditions can create bladder emptying problems, indicating a need for IC:

- Spinal cord injuries
- Multiple sclerosis
- Myelomeningocele
- Spina bifida
- Spinal tumour
- Autonomic dysreflexia
- Diabetes mellitus (incomplete emptying as a result of neuropathy)

There may be other neurogenic conditions not listed, which could disturb central or peripheral nerve system, and therefore affect bladder functions. Today, in most parts of the western world, intermittent catheterization is the gold start in the management of neurological bladder dysfunction.

1.2.2 Non-neurogenic bladder dysfunctions

Catheterizing intermittently (rather than indwelling) allows for easier observation of spontaneous micturation volume after temporary urinary retention, or incomplete bladder emptying (8, 9). Urethral stricture is often treated after internal uretrotomy by intermittent dilatation with a disposable catheter (1,2).

In summary, IC might be indicated on following conditions with non-neurogenic bladder dysfunctions

- Idiopathic urinary retention or incomplete bladder emptying (1, 2)
- Infravesical obstruction
  - when patient has to wait for surgery, e.g., Trans urethral resection of prostate (TUR-P) (1,2,3)
  - when surgery is impossible or risky
- Urethral stricture (intermittent dilatation) (2,3)
- UTI with residual urine (1, 2)
- Urinary incontinence with residual urine (overflow)
- Urinary incontinence together with another treatment
- Postoperative urinary retention (8,10)
- Postpartum urinary retention (11)
- to obtain urine for urinary diagnostics
- Bladder installation / irrigation

1.3 Contraindications and cautions

As with any urethral catheterization, IC is contraindicated if the patient is experiencing priapism. Catheterization in these instances can result in fracture of the corpus cavernosum of the penis. Suspected complete or partial urethral injury and urethral tumours are other contraindications for urethral catheterization. 'False passage', strictures and some diseases of the penis e.g., injury, tumours and infections can contraindicate IC as well. Caution should be displayed in patients following prostatic, bladder neck or urethral surgery and in patients with urethral stent or artificial prosthesis. The health care professional performing catheterization, should be especially careful if the patient has a tendency to bleed easily (12,13,14).

During individual patient assessment, consideration needs to be given to the patient's suitability for intermittent catheterization as opposed to indwelling catheter or supra-pubic catheterization. When urinary retention with large urine volumes occurs, one may consider an indwelling catheter for a period of time before starting IC. Indwelling catheterization is also preferable when monitoring accurate urine output post-operatively, for continuous bladder irrigation/lavage, to ensure an empty bladder after surgery in lower urinary tracts, in some gynaecological surgery, and to collect urine for analysis when patient is incontinent.

An indwelling catheter or suprapubic catheter is advisable if urethral catheterization is difficult or impossible due to patient's physical or mental circumstances, e.g., terminal care patient (12,13,14,15,16,17,18).

2. Anatomy

2.1 Urinary tract system

The urinary tract system is made up of several structures, each having a particular function.

Bladder
The Bladder is a hollow, muscular sac that acts as a temporary storage site for urine. Acting on nervous stimulation internal and external, sphincter control releases urine.

Urethra
The urethra is a small tube through which urine travels to exit the body.
In adult males, the urethra is approximately 20 cm. When it leaves the bladder, it passes downward through the prostate gland, the pelvic muscle and finally through the length of the penis until it ends at the urethral orifice or opening at the tip of the glans penis *(Fig. 1)*.
In the adult female, the urethra is commonly 2.5 to 4 cm long. It is embedded in the anterior wall of the vagina and exits between clitoris and the vaginal opening *(Fig. 2)*.

A newborn male urethra measures 5 cm. This increases to 8 cm by 3 years of age and 20 cm in adulthood (3). In females, urethral length is comparatively smaller and grows at a slower rate. The female urethra measures 2 cm at birth. It increases to 2.5 cm by 5 yrs and 3.5 cm in adulthood. (19).

Fig. 1: **Anatomy of male urinary tract**

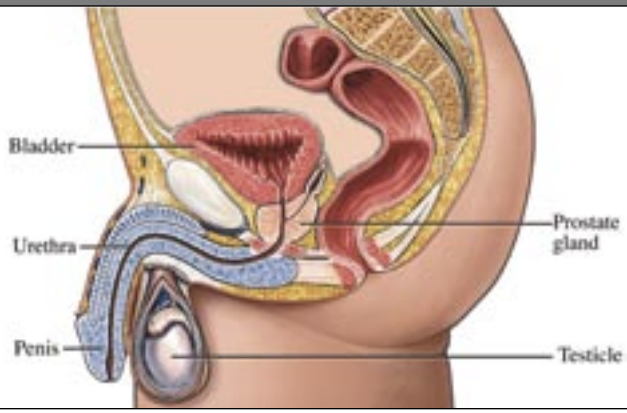
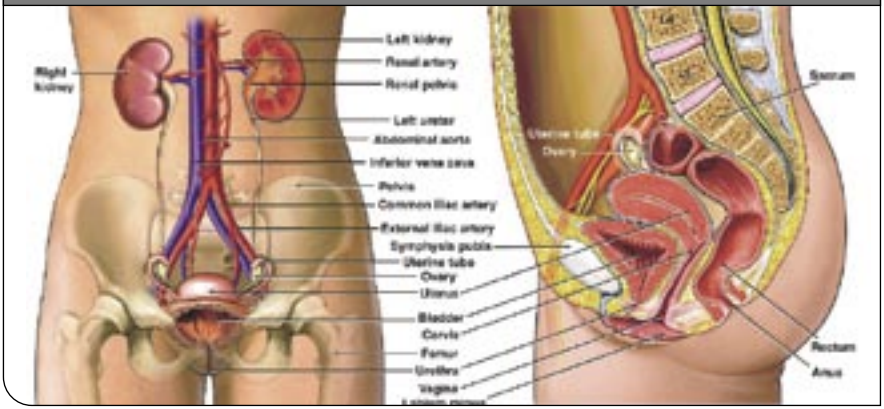


Fig. 2: **Anatomy of female urinary tract**



2.2 Bladder capacity

2.2.1 Adults

The normal bladder should initially expand without resistance and should not begin contractions while filling. Normal bladder capacity in adults is somewhere between 300 to 600cc. A feeling of fullness can occur with a volume of 100 to 200 ml. The urinary bladder can normally hold 250 to 350cc of urine before the urge to void becomes conscious. Urinary continence is maintained as long as the pressure within the urethra (intra-urethral pressure) remains higher than the pressure within the cavity of the bladder (intravesical pressure). The sphincter should relax and open when the patient wills it, accompanied by detrusor contractions. During voiding, detrusor contraction should be smooth and lead to a steady urine stream. (20, 21)

2.2.2 Children

Bladder capacity for children can be calculated using the following formulas:

For children less than 2 years old:

(2 x age (years) + 2) x 30 = capacity [cc]

For those 2 years old or older:

(age (years) divided by 2 + 6) x 30 = capacity [cc].(22*)

Examples:

Child age 6 months

(2 x **.5** + 2) x 30=90 cc bladder capacity

Child age 4

(**4** / 2 + 6) x 30=240 cc bladder capacity

This is important to know when collecting urine, to insure that amounts are within a normal range.

*[*Note: This reference gives the formula in ounces. The added step of multiplying by "30" converts the amount to cc's, and has been done for the reader's convenience.]*

3. Methods

3.1 Sterile and clean

There is conflicting evidence over the value of a sterile intermittent catheterization (SIC) technique compared with clean intermittent catheterization (CIC) with regards to UTI (14,23,24,26,30). However, all medical experts and practitioners agree that urinary catheters should be sterile and inserted using an aseptic technique, when carried out by staff at hospital and in other health care institutions (15,14). The clean technique is often used for self catheterization outside health care institutions, which will not be covered in this booklet. Additionally, methods may vary across Europe.

The term “sterile catheterization” is somewhat of an incorrect term since a procedure cannot be sterile, only in the sense that sterile material is used with aseptic procedures. Therefore, the term “sterile catheterization” will not be used in this booklet.

3.2 Aseptic Technique

The aseptic technique is the preferred (and recommended) method for catheterization (30). Aseptic technique means that the catheter, which is inserted into the urethra and bladder, has no direct contact with the practitioner. This “no-touch” method reduces the potential of external contamination from an intermittent urinary catheter (5,30). In practice, this means inserting the catheter with sterile gloves or tweezers or holding only outside packaging of the catheter. The technique to hold the catheter in areas which have no contact with the urethra is also recommended. Methods may vary depending on the catheter or catheter system, as well as local protocol.

4. Catheters and catheter systems

Catheters are used in a wide range of medical procedures and come in a variety of sizes. New materials and improvements in design have allowed manufacturers to offer a wide range of urinary catheters and appropriate selection ensures that complications are minimized. Catheters, as with all medical products must be used in accordance with the manufacturer's recommendations in order to avoid product liability.

The ideal catheter for intermittent catheterization is:

- sterile
- biocompatible
- flexible
- constructed from high shape retention material
- atraumatic (designed, and if necessary coated, to avoid injury)
- ready to use

The catheter systems/kits should:

- be simple to handle
- allow for insertion of the catheter with a no-touch technique

4.1 Catheter material

Catheters can be made of different materials which can be coated or uncoated

Polyvinyl chloride (PVC/plastic)
PVC catheters are relatively inexpensive and possess a large internal diameter, therefore offering a good drainage facility. At body temperature the material softens slightly, but PVC is stiff and can sometimes still be uncomfortable for the patient. Depending on the intended use, the material is produced in harder or softer versions, giving the catheter the correct rigidity, stability and buckling resistance for the individual application (31). While PVC has traditionally been used because of its low price, skin sensitivities and common allergies can cause discomfort for many patients.

Polyether block amide (PEBA)
PEBA is a PVC-free plastic made without chlorine (environmental friendly). It is durable, kink and shear resistant, has a range of strengths, while remaining flexible and chemical resistant. It is also more biocompatible than many PVC catheters (32).

Silicone
In addition to being one of the most biocompatible synthetic materials available, thus offering reduced toxicity and tissue inflammation, silicone catheters also possesses a range of other properties. They are odorless, water resistant, oxidation resistant, stable at high temperature, and do not conduct electricity. In addition, with its (sometimes) greater rigidity, silicone devices can be manufactured with a relatively thin wall, thus creating a large drainage lumen in relation to external diameter. Like the PEBA catheter, it is also resistant to chemicals.

Other Materials
Stainless steel (medical quality) or red rubber catheters were frequently used in the past. Today, they are only used in special situations, when PVC, PEBA or silicone catheters are not available. Keep in mind that patients with latex sensitivity will need latex-free catheters (i.e., do not use red rubber catheters).

4.2 Catheter coatings and lubricating gels

Coatings
There are different methods to reduce friction in the urethra when inserting the catheter. Catheters have either a prepared hydrophilic coating which come packed pre-lubricated with a gel coating and are ready to use; or a dry coating which requires immersion in sterile water.

Hydrophilic coatings
The hydrophilic coated catheters are coated with a substance called polyvinylpyrrolidone (PVP). PVP is a water absorbent polymer which is able to absorb up to 10 times its own weight. When exposed to water the coating becomes wet and slippery, reducing friction between the catheter surface and the urethral mucosa during insertion.

Hydrophilic catheters are sterile and have either a prepared hydrophilic coating which come packed with an activated hydrophilic coating, i.e., ready to use; or a dry coating which requires immersion in sterile water for 30 seconds in order to activate the coating.

Catheters with hydrophilic coatings cause fewer complications in terms of symptomatic UTIs and hematuria (34). The risk of urethral trauma while introducing the catheter with hydrophilic coating is diminished and there is evidence to suggest a lower incidence of catheter bypass and urethral irritation (35).

Gel coatings
Apart from the hydrophilic coatings there are plain PVC or silicone catheters, which come packed with a separate gel/lubricant or come as pre-lubricated catheters with a gel coating applied.

The lubricating effects for these catheters are essentially the same.

Lubricating and Anaesthetic Gels
For uncoated/plain catheters, a lubricating gel is recommended. There are two types of lubricating gels–with or without anaesthetic. Which gel is used, depends on the patient. For example, a quadriplegic patient, with no physical sensation, would generally not require an anaesthetic lubricating gel. Patient sensitivity may also be a factor. A maximized anaesthetic effect will help the patient to relax and the insertion of the catheter should be easier. By inserting the anaesthetic gel, the friction between the catheter and the mucosal layer is reduced and leads to a smooth insertion of the catheter into the bladder (36).

The use of anaesthetic lubricating gels is well recognized for male catheterization. Using lubricating gel for women and children is also recommended. Ten to 15 ml of gel is instilled directly into the urethra until this volume reaches the sphincter/ bladder neck region. For females, the lubricating gel is placed on the catheter prior to insertion. A 5 to 10 minute gap after instilling the gel is recommended before starting the catheterization, but it is important to follow manufacturer's instructions (37, 38).

Care should be taken when using lignocaine or chlorhexidine based gels as there are some reported cases of hypersensitivity reactions to these gels (39). It is essential to ask the patient if they have any sensitivity to lignocaine or chlorhexidine before commencing the procedure. Check if the patient has heart problems or is taking medication for treating irregular heartbeat; or if the patient is epileptic. Additionally, it is recommended to ensure no interaction exists between chlorhexidine or lignocaine and the patient's current medication(s), and to inquire if the patient:

- has ever had a reaction to a local anaesthetic.
- is allergic or has hypersensitive to E216 and E218 (also called parabens) or any of the other lubricant ingredients.

Although rare, medical practitioners should be aware of the possibility that a severe anaphylactic reaction may occur during use of these products.

4.3 Catheters tips, sizes and connectors

4.3.1 Tips

There are different types of catheters tips, but not all shapes and sizes are available in all countries; and not all types are optimum for all patients. It is best to review the options with the attending physician if there is any doubt.

The *straight tipped* catheter is designed for men, women and children. Urine enters the lumen of the catheter through two "eye" holes.

Fig. 3: **Straight tipped catheter**

The *Tiemann coude* catheter has a curved tip with one to three drainage openings designed to negotiate the membranous and prostatic urethra in patients with prostate enlargement (40). This is the preferred tip for use with male patients (adult and children) with special indications (e.g., prostate enlargement). They do require a special insertion technique, and only trained personnel should use it.

Fig. 4: **Tiemann coude catheter**

Flexible and rounded tips

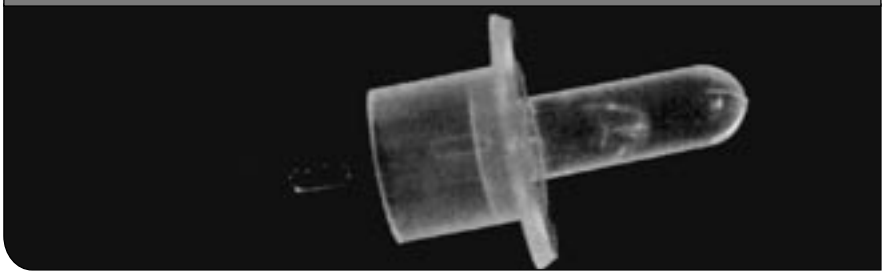
An ideal urethral catheter has a flexible tip which permits passage into almost every urethra, regardless of its configuration or degree of obstruction (42). Some catheters have specially rounded tips intended to prevent urethral trauma as the catheter is passed. They can generally be used for all patients.

Fig. 5: **Examples of flexible, rounded catheter tips**

Introducer tip

It is assumed, that many UTIs are caused during intermittent catheterization when the catheter tip passes through the colonized portion of the urethra, pushing the bacteria further into the urinary tract. A sterile introducer tip catheter system seems to allow the catheter to bypass the colonized portion of the urethra (41).

Fig. 6: **Introducer tip**



4.3.2 Length and Diameter

Length

Standard length catheters should always be used in urethral catheterization, though "standard" lengths may vary from manufacturer or between product lines.

Standard length range:

- Female length: 7 - 20 cm
- Male length: 30 - 50 cm
- Pediatric/adolescent length: 7 - 30 cm

Diameter (Charrière)
The selection of the appropriate charrière size is the key to the success of the catheterization. The measuring instrument used to indicate the exterior diameter of the catheter is the Charrière (Ch) or French Gauge (FG).

- 1 Ch = 1/3 mm diameter.

Selection of the correct catheter size should reflect patient comfort and an adequate drainage facility. Larger diameter catheters can result in increased urethral irritation and urethral trauma, therefore small lumen catheters should be the health care professional's first choice (17).

There are no randomised studies that clearly indicate the "correct" catheter diameter for adults or children, but there are some recommendations below based on the literature (67,68,69) and learned from practice:

- When catheterizing adults, a size 12 or 14 Ch catheter should be the first choice.
- When catheterizing children younger than 6 months, use a size 5 Ch.
- For children over 6 month, begin with catheter Ch 6-8 for males and Ch 8 for females, and adapt the size to the build of the child. However if there is any problem with inserting the catheter, or if the urine contains clots or debris (sediment) a different diameter catheter is indicated, consult the urologist on staff (36).

4.3.3 Connectors

Connectors generally have standardised colours, relating to size, for easy recognition. The colours are international, but not every manufacturer uses the colour coding, so be sure to check the packaging and connector for size confirmation. (Connectors are generally attached during the manufacturing process and are already in place.)

Fig. 7: **Sample connector**

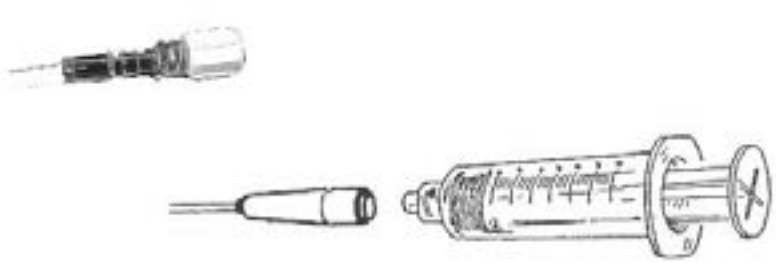
Fig. 8: **Standard catheter connector colour chart**

Catheter size	Colour	Tube diameter
06	Light Green	2.0
07	Violet	2.3
08	Blue	2.7
10	Black	3.3
12	White	4.0
14	Green	4.7
16	Orange	5.3
18	Red	6.0
20	Yellow	6.7

Luer Lock

When irrigating (or instilling) the bladder, a Luer Lock is used to connect the catheter to a syringe. This can be attached to the pre-installed connector.

Fig. 9: **Luer Lock**



5. Procedures

5.1 Patient preparation

5.1.1 Consent

Catheterization is an invasive procedure that can cause embarrassment, physical and psychological discomfort and impact on the patient's self image. To ensure that the patient is fully prepared for catheterization it is the responsibility of the health care professional to inform the patient of the reasons and necessity for the procedure, and obtain the patient's permission (43).

In many areas of urological practice, patients are required to sign a consent form that indicates agreement for the practitioner to undertake a procedure. It also implies an understanding of the event and the associated potential complications/ problems. At present it is not common practice within Europe for patients to provide written consent for catheterization; it is however a necessity that verbal consent and agreement is reached and the relevant information recorded in the patients medical journal and/or nursing notes (44).

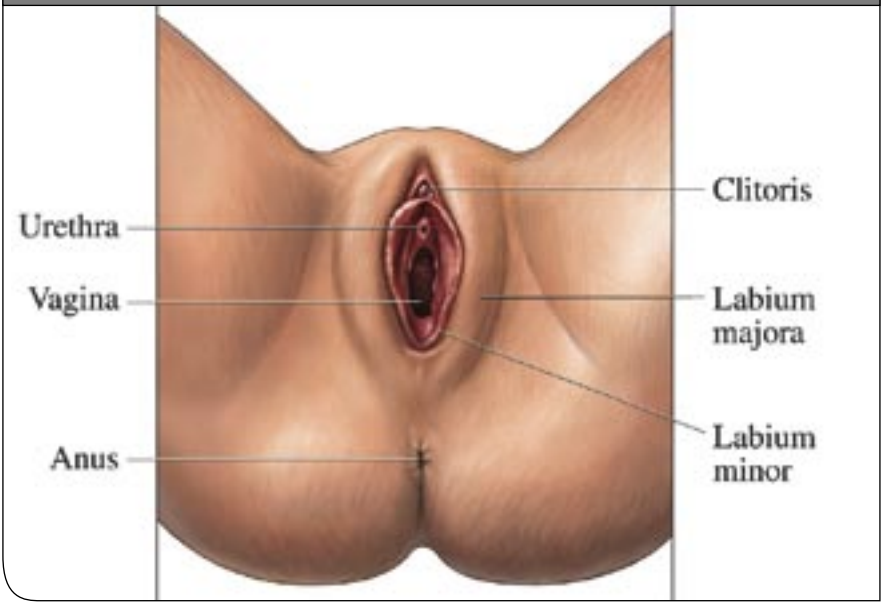
5.1.2 Information, support and instructions

Explaining the procedure and providing the reason for catheterization to the patient will help reduce patient anxiety and embarrassment and help the patient to report any problems that may occur while the catheter is in-situ (36). Relaxing the patient by offering reassurance and support will help for smoother insertion of the catheter and assist in avoiding unnecessary discomfort and the potential of urethral trauma during the insertion (12, 45).

5.2 Insertion procedure

It is essential that health care professionals undertaking the procedure are aware of the associated potential complications. Catheterization in males can be more complicated than in females because of the anatomy (structure and length of the urethra). However, when catheterizing females, there may be difficulties placing the catheter because the urethra and vagina are side by side (Fig. 10). With children, the difficulties vary by gender, and their smaller anatomy also calls for extra caution.

Fig. 10: **Female urethra**



For catheterization within a hospital, the use of standard catheter sets is preferred.

Sets should include:

- cover sheet for the tray or trolley
- 1 forceps
- 1 pair sterile vinyl gloves
- 1 bowl for disinfection with 3-5 pcs woven cotton swabs
- 1 compress

Some sets may also include the items listed below. If they are not included in the set, they should be added to the tray:

- 1 sterile drape
- catheter (Ch 12 -14)
- lubrication or water to activate the hydrogel (if the catheter is not pre-lubricated)
- solution for disinfection of the meatus
- 1 urine collection bag

Fig. 11: **Sample catheter set**

Catheterization sets will vary by manufacturer and product line. If the set does not include a bag for collection of urine, try to acquire one rather than using open urine bottles or kidney dishes if the urine is to be analyzed, to prevent contamination.

5.2.1 Insertion procedure: Female

	Action	Reason
1.	Check the indication/contraindication for the intermittent catheterization. Be sure that the patient cannot empty the bladder herself completely and that the indication for catheterization is given.	
2.	Prepare the material for catheterization.	
3.	During the procedure explain the process to the patient	To ensure the patient understands the procedure.
4.	Undertake procedure on the patient's bed or in clinical treatment area using screens / curtains to promote and maintain dignity	To ensure patient's privacy.
5.	Position the patient in a supine position when ever possible. If this is not possible (e.g., spinal problems) alternative must be used.	To ensure complete bladder emptying.

	Action	Reason
6.	Clean and prepare the trolley, placing all equipment required on the bottom shelf.	The top shelf acts as a clean working surface.
7.	Disinfect hands with bactericidal alcohol or a bactericidal soap.	To prevent contamination and urinary tract infection.
8.	Open the catheterization set under aseptic conditions.	To assure a aseptic catheterization technique
9.	The following steps may vary if using a coated (a) or uncoated catheters (b).	
a.	If using a hydrophilic catheter that requires hydration, open the package and fill with sterile water (following the manufacturer's instructions) and hang the package beside the patient or trolley and wait the recommended amount time (45). If using a hydrophilic pre-lubricated ready-to-use catheter, hang the package beside the patient.	**It is important to wait the recommended amount of time for lubricant to activate or the urethra could be damaged.**
b.	If using a catheter without coating, open the catheter package and lubricating/anaesthetic gel and put it on the sterile wrap.	
10.	Place 5 to 6 woven cotton swabs in a dish with disinfection solution for meatal cleansing.	
11.	Put on sterile gloves.	To reduce risk of infection.
12.	If using a catheter that does not come with lubricant, squeeze the sterile lubricating/ anaesthetic gel onto the catheter, 3-4 cm starting from the tip.	
13.	Position the sterile drape under the buttocks of the patient. If necessary ask for assistance.	To ensure urine does not leak onto bed.
14.	If using a urine collection bag, connect the bag to the catheter.	
15.	Place the dish of cotton swabs (soaking in disinfection solution) on the drape.	
16.	With one hand, separate the labia minora.	To locate the urethral meatus.

continued ➔

	Action	Reason
17.	If menstruation or discharge is present, use a cotton swab or a tampon in vagina to prevent contamination of catheter. Using forceps, pick up and squeeze excess disinfection solution from 1 or 2 cotton swabs. Using a single downward stoke, swab the right labia. Repeat for left labia.	Reducing of the bacterial flora at the meatus.
18.	Keep holding the labia apart for +/- 30 seconds.	Completes disinfection process.
19.	When using anaesthetic lubricating gel, allow a few drops of the lubricant solution to drip onto the orifice, since it is particularly sensitive. Apply the cone of the lubricant syringe to the orifice, stretch the urethra and instill the gel without applying any pressure. Follow the manufacturer's advised wait time to ensure maximized anaesthetic effect (12,37,38,47,48).	Adequate lubrication reduces friction between the catheter and the urethra and helps to prevent urethral trauma. Use of an anesthetic minimizes the discomfort experienced by the patient, and can aid success of the procedure.
20.	Pick up the catheter with the other hand (wearing the sterile glove) and insert the catheter into the urethral orifice and advance the catheter until the urine flows (approx. 3-5cm) and insert 1–2cm further. Do not use force if there are difficulties inserting the catheter.	To prevent urethral injury
21.	Make sure the urine collection bag is below the level of the bladder.	Assists in urine flow.
22.	If the catheter did not properly enter the urethra (e.g., entered vagina), withdraw the catheter and repeat the procedure with a new catheter.	

	Action	Reason
23.	When urine flow stops, withdraw the catheter very slowly, in small cm-by-cm steps. When withdrawing the catheter, bend it so that no suction is created. If the urine flow starts again during withdrawal, discontinue withdrawal and wait for the flow to stop before resuming catheter withdrawal.	Makes sure that the entire bladder is empty
24.	Discard the compressed catheter completely (and remove the tampon/swab).	
25.	Clean the meatus and the labia with remaining cotton swabs in disinfection solution.	Prevents skin irritation.
26.	Dispose of catheter packaging and equipment in a clinical plastic waste bag and seal the bag before moving the trolley.	To prevent environmental contamination.
27.	Record information in relevant documents. This should include: • reasons for catheterization • urine volume • residual volume • date and time of catheterization • catheter type, length and size • problems negotiated during the procedure • patient experience and problems, if any.	To provide a point of reference or comparison.

5.2.1.1 Difficulties that may occur during insertion

Older women may not have the range of motion in their hips to achieve the lithotomy position or full hip abduction ('frog-leg' position). Try alternative positioning is on the side in a knee-chest position. Assistance with a sterile hand in the vagina to replace vaginal prolapse may ease catheter insertion when advanced pelvic organ prolapse is present. Severe vaginal atrophy and lichen sclerosus may narrow the vaginal introitus making visualization difficult. Topical lidocaine gel (5 min. prior) may be applied to the vaginal introitus for women who have pain with labial retraction.

5.2.2 Insertion procedure: Male

	Action	Reason
1.	Check the indication/contraindication for the intermittent catheterization. Be sure that the patient cannot empty the bladder himself completely and that the indication for catheterization is given.	
2.	Prepare the material for catheterization.	
3.	During the procedure explain the process to the patient	To ensure the patient understands the procedure.
4.	Undertake procedure on the patient's bed or in clinical treatment area using screens / curtains to promote and maintain dignity	To ensure patient's privacy.
5.	Position the patient in a supine position when ever possible. If this is not possible (e.g., spinal problems) alternative must be used.	To ensure complete bladder emptying.
6.	Clean and prepare the trolley, placing all equipment required on the bottom shelf.	The top shelf acts as a clean working surface.
7.	Disinfect hands with bactericidal alcohol or a bactericidal soap.	To prevent contamination and urinary tract infection.
8.	Open the catheterization set under aseptic conditions.	To assure a aseptic catheterization technique
9.	The following steps may vary if using a coated (a) or uncoated catheters (b).	
a.	If using a hydrophilic catheter that requires hydration, open the package and fill with sterile water (following the manufacturer's instructions) and hang the package beside the patient or trolley and wait the recommended amount time (45). If using a hydrophilic ready-to-use catheter, hang the package beside the patient.	**It is important to wait the recommended amount of time for lubricant to activate or the urethra could be damaged.**
b.	If using a catheter without coating, open the catheter package and lubricating jelly and put it on the sterile wrap.	
10.	Place 5 to 6 cotton swabs in a dish with disinfection solution for meatal cleansing.	
11.	Put on sterile gloves.	To reduce risk of infection.

	Action	Reason
12.	If using a catheter that does not come with lubricant, squeeze the lubricating gel onto the catheter, 3-4 cm starting from the tip.	
13.	Position a sterile drape under the penis.	To ensure urine does not leak onto bed.
14.	If using a urine collection bag, connect the bag to the catheter.	
15.	Place the dish of cotton swabs (soaking disinfection solution) on the drape.	
16.	Using a gauze pad, hold and lift the penis; retract the foreskin (if patient is not circumcised).	Lifting the penis straightens the penile urethra and facilitates catheterization (32).
17.	Using forceps, pick up and squeeze excess disinfection solution from 1 or 2 cotton swabs. Using a single downward stroke, swab the penis tip. Repeat for urethral orifice.	
18.	Keep the foreskin retracted +/- 30 seconds.	Completes disinfection process.
19.	When using anaesthetic lubricating gel, allow a few drops of the lubricant solution to drip onto the orifice, since it is particularly sensitive. Apply the cone of the lubricant syringe to the orifice, stretch the urethra and instill the gel without applying any pressure. Remove the nozzle from the urethra and continue holding the penis firmly with the thumb and fingers. Follow the manufacturer's advised wait time to ensure maximized anaesthetic effect (12,37,38,47,48). Do not put the penis on the drape. Keep the foreskin retracted for the amount of time advised by manufacturer for anaesthetic to take effect. (Alternatively, a penile clamp may be used to prevent gel from leaking.)	Adequate lubrication reduces friction between the catheter and the urethra and helps to prevent urethral trauma. Use of an anesthetic minimizes the discomfort experienced by the patient, and can aid success of the procedure.

continued ➲

	Action	Reason
20.	Pick up the catheter with the other hand (wearing the sterile glove) and insert the catheter into the urethral orifice and gently insert the catheter 2 – 3cm at a time until the urine flows (approx. 18 – 20 cm); lower the penis and insert 1 – 2 cm further.	
21.	Do not use force if there are difficulties inserting the catheter.	The urethra can be injured.
22.	Make sure the urine collection bag is below the level of the bladder.	Assists in urine flow.
23.	When urine flow has stopped, apply slight pressure to the bladder until urine flow resumes.	
24.	When urine flow stops, withdraw the catheter very slowly, in small cm-by-cm steps. When withdrawing the catheter, bend it so that no suction is created. If the urine flow starts again during withdrawal, discontinue withdrawal and wait for the flow to stop before resuming catheter withdrawal.	Makes sure that the entire bladder is empty
25.	Discard the compressed catheter completely.	
26.	Clean the meatus with remaining cotton swabs in disinfecting solution and reposition the foreskin.	Prevents skin irritation and paraphimosis.
27.	Dispose of catheter packaging and equipment in a clinical plastic waste bag and seal the bag before moving the trolley.	To prevent environmental contamination.
28.	Record information in relevant documents. This should include: • reasons for catheterization • urine volume • residual volume • date and time of catheterization • catheter type, length and size • problems negotiated during the procedure • patient experience and problems, if any.	To provide a point of reference or comparison.

5.2.2.1 Difficulties that may occur during insertion

Difficulty catheterizing the patient may occur for a variety of reasons. Medical advice and support should be sought if problems occur during or after the insertion. Complications of catheters include UTI, trauma and inflammatory reactions, urethral stricture, and possibly carcinoma of the bladder (49). These can result in one or more of the following symptoms occurring: pain, bypassing, blockage, catheter expulsion and bleeding.

5.2.3 Insertion procedure: Paediatric

The insertions procedure is basically the same as those above (female and male, respectively) but there are a few added precautions for catheterizing infants or small children:

- To collect a urine specimen, a urine collection bag that is attached to the perineum with adhesive may be used in lieu of catheterization, although contamination is inevitable. Appropriate collecting requires proper cleansing, rinsing, and drying of the perineum before application of the bag, as well as immediate removal and prompt processing after the void.
- Position a young female patient supine with legs abducted in the 'frog-leg' position for catheterization. This allows stabilization of the pelvis and adequate visualization.
- Clean the urethra with polividone-iodine solution (or similar antiseptic soap if allergic to iodine).
- Place sterile lubricant on the end of an appropriately sized catheter. Lubrication with lidocaine reduces the discomfort of insertion.
- Be aware that an age-inappropriate response to catheterization may be symptomatic of sexual abuse.

Transurethral bladder catheterization should only be performed if bacteriologic results are necessary or urine retention is present. Performance of any pelvic or urethral examination of a child should be performed, whenever possible, with a parent or other support person present to ease the child's anxiety and facilitate collection of the specimen. The patient and guardian should be provided with a clear explanation of the indications for the procedure, as well as the anatomy, to prevent unnecessary anxiety.

Adolescents may be reluctant to have any procedure that involves the genitals performed as they become more aware of their sexuality. Adolescent females may be particularly anxious if a male physician is performing the procedure. Strongly consider a gender-appropriate person for completing the procedure. If none is available, a gender-appropriate chaperone is advised. A parent may not be an appropriate chaperone, depending on age and maturity of patient as well as the nature of their relationship. The adolescent should be asked his/her preference.

5.3 Frequency and other considerations

Monitor and note any difficulties that occur during insertion of the catheter, if any occur, act according to local policy/protocol.

Identification and management of problems is essential when caring for patients with intermittent catheterization, it should be noted that:

- Ongoing reassurance throughout the procedure is essential.
- Antibiotics should not be given on a standard basis.
- Cranberry juice may have a role in the prevention and management of bacteuria. Caution is advised in case of patients using anti-coagulants. (See section 6.3.)
- A Catheter Diary can be useful to monitor problems, record interventions and evaluate care.

Frequency of catheterization varies from person to person, and depends of the type of bladder problem the patient is experiencing, fluid intake of the patient (beverages as well as intravenous fluids), and different medications the patient may be taking. Care must be taken to ensure that catheterization frequency is sufficient to prevent bladder distension, as a full bladder can trigger autonomic dysreflexia in neurogenic patients.

The catheterized volume for each catheterization normally should not be more than 500 ml. Bladder distension may also reduce blood supply and increase the risk for infection. Intermittent catheterization frequency should increase when fluid intake rises or diuretics are administered. The acceptable residual volume in paediatric patients will depend upon the age and size of the child. (Residual urine volumes are not used to regulate fluid intake in children (52,53).

Usually, the patient should be catheterized four to six times per day in order to keep collected volumes below 500 ml, unless otherwise indicated by the attending physician. (54) Although it is sometimes difficult to accurately determine how often a patient should be catheterized, some medical facilities use a portable ultrasound device to determine when catheterization should take place. Use of a portable ultrasound device can reduce the frequency of intermittent catheterization (55).

6. Proactive and preventive care

6.1 Hand Hygiene

Of primary importance in catheter care is the prevention of an acquired UTI. This can be aided by healthcare professionals washing their hands and wearing gloves before and after any interaction with a catheter (56). Healthcare professionals also have a pivotal role in educating and disseminating good hand hygiene practice to patients.

6.2 Promoting Fluid Intake

'Good fluid intake' is associated with catheter care advice but until recently there has not been much evidence to support this information. Good fluid intake also dilutes urine and therefore can inhibit bacterial growth (57). It also ensures a constant downward drainage and flushing effect (58). Poor fluid intake can precipitate constipation, which can impede urinary drainage via a catheter by causing pressure, occlusion and kinking (59). Interestingly, the type of fluid consumed appears to be insignificant as long as the volume is sufficient to prevent concentration of urine; however cranberry juice has been the focus of some studies and advice over the last decade (60).

6.3 Cranberry Juice

There are different studies about the effect of cranberries prevent or reverse UTIs. While some studies describing a positive aspect (55,60-63), there are others which negate the effect (28, 66,67). Cranberry juice causes acidification of urine and is therefore becoming integral in catheter care advice (61). Healthcare professionals should display caution in advocating this advice routinely, as evidence suggests that to achieve sufficient bacteriostasis high concentrations of cranberries are needed (56). Their mode of action is to prevent pathogens adhering to, and subsequently colonizing, mucosal surfaces such as the urinary tract (62). Cranberries can also inhibit the colonization of bacteria in the intestines which is the source of most uro-pathogens (63). It should be noted that the bacteria affected by cranberry juice is restricted to a small group (61). Cranberry juice may be contra-indicated in some patients e.g., patients prone to oxalate or uric acid calculi (64). Cranberry juice is contraindicated in patients on anticoagulation therapy and should not be recommended to this group (65). Advice therefore needs to be given on an individual patient basis and in summary it is a comparatively safe and natural remedy which can provide symptomatic and therapeutic relief for patients with UTIs, stones or excessive mucus formation (61).

7. Key points

Recommendations

- If experiencing difficulty during catheterization instilling some additional anesthetic gel to further dilate and lubricate the urethra may be of benefit (18).
- If resistance is felt at the external sphincter, increase the traction on the penis slightly and apply steady, gentle pressure on the catheter. Ask the patient to strain gently as if passing urine.
- A catheter lumen that is too small can buckle/kink in the urethra; in some instance a slightly larger Ch size might help (50).
- The inability to negotiate the catheter past the S-shaped bulbar urethra can be as a result of tightening of the external sphincter, a urethral stricture, a false passage or an enlarged prostate. This can be overcome by using a curved tipped (Tieman) catheter. These special catheters need a special technique and should be attempted by those with experience and training (12,18,50,51).
- In cases of hypospadias, the urethral orifice is positioned on the proximal aspect of the penis, therefore knowledge of the patient's past medical history can help identify this.

Key points:

- Choose the right catheter type (36) and material after undertaking a thorough patient assessment.
- Ensure your patient is well informed (12) and understands what is going to happen and why it is necessary.
- Gain the patient's verbal consent before commencing the catheterization (44)

8. Abbreviations used in the text

Ch	Charrière
FG	French gauge
IC	Intermittent Catheterization
pcs	pieces
PEBA	Polyether block amide
PVC	Polyvinyl chloride
UTI	Urinary tract infection

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The Writing Group realizes that procedures will vary between principalities and even between medical facilities. The Writing Group is aware that there may be other correct methods and products available that would also accomplish the task. However, one of the aims of the EAUN is to "standardize nursing practices." The materials/procedures recommended in this booklet are based on what the Group believes to be the basic requirements for successful Intermittent Catheterization.

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