

Evidence-based Guidelines for
Best Practice in Urological Health Care

Catheterisation

Urethral intermittent in adults

Dilatation, urethral intermittent in adults

2013



Courtesy Rochester Medical

Evidence-based Guidelines for
Best Practice in Urological Health Care

Catheterisation

Urethral intermittent in adults

Dilatation, urethral intermittent in adults

S. Vahr
H. Cobussen-Boekhorst
J. Eikenboom
V. Geng
S. Holroyd
M. Lester
I. Pearce
C. Vandewinkel

Introduction

The European Association of Urology Nurses (EAUN) was created in April 2000 to represent European urology nurses. The EAUN's underlying goal is to foster the highest standards of urological nursing care throughout Europe. With administrative, financial and advisory support from the European Association of Urology (EAU), the EAUN also encourages research and aspires to develop European standards for education and accreditation of urology nurses.

We believe that excellent health care goes beyond geographical boundaries. Improving current standards of urological nursing care has been top of our agenda, with the aim of directly helping our members develop or update their expertise. To fulfil this essential goal, we are publishing the latest addition to our Evidence-based Guidelines for Best Practice in Urological Health Care series; a comprehensive compilation of theoretical knowledge and practical guidelines on intermittent catheters. Although there is considerable literature on intermittent catheters, to the best of our knowledge, prior to this publication there was only limited evidence-based guidance for nurses available on this topic. The EAUN Guidelines Group believes there is a need to provide guidelines with recommendations that clearly state the level of evidence of each procedure, with the aim of improving current practices and delivering a standard and reliable protocol.

In this booklet, we include clear illustrations, extensive references, and annotated procedures to help nurses identify potential problem areas and efficiently carry out effective patient care. The working group decided to include topics such as indications and contraindications, equipment, nursing principles, and interventions in catheter-related care, as well as education to patients and caregivers, and urethral dilatation. We would also like to highlight the psychological and social aspects unique to the experience of patients with intermittent catheters as aspects that have a profound influence on quality of life (QoL).

With our emphasis on delivering these guidelines based on a consensus process, we intend to support nurses and practitioners who are already assessed as competent in the procedure of intermittent catheterisation (IC). Although these guidelines aim to be comprehensive, effective practice can only be achieved if the nurse or practitioner has a clear and thorough knowledge of the anatomy under discussion and the necessary understanding of basic nursing principles.

This publication focuses on urethral IC and intermittent urethral dilatation. The guidelines only describe the procedure and material in adults and not for children. Furthermore, these guidelines are intended to complement, or provide support to, established clinical practice and should be used within the context of local policies and existing protocols and with recognition of the individual situation of the patient.

This text is made available to all individual EAUN members, both electronically and in print. The full text can be accessed on the EAU website (<http://www.uroweb.org/nurses/nursing-guidelines/>) and the EAUN website (www.eaun.uroweb.org). Hard copies can be ordered through the EAU website via the webshop (<https://www.uroweb.org/publications/eaun-good-practice/>) or by e-mail (eaun@uroweb.org).

Table of contents

page

Introduction	3
1. Role of the nurse in different countries	7
2. Methodology	7
2.1 Literature search	7
2.1.1 Limitations of the search	8
2.1.2 Search results	8
2.2 Limitations of the document	10
2.3 Rating system	10
2.4 Review process	11
2.5 Disclosures	12
3. Terminology (definitions)	13
3.1 Urethral intermittent catheterisation	13
3.2 Catheterisation techniques	13
3.3 Further definitions	15
4. Indications, contraindications and alternatives for IC	16
4.1 Indications	16
4.1.1 Detrusor dysfunction	16
4.1.2 Bladder outlet obstruction	16
4.1.3 Post-operative	16
4.2 Contraindications	18
4.3 Alternatives for IC	18
5. Complications	19
5.1 Infection	19
5.1.1 Nosocomial infection	19
5.1.2 Epididymo-orchitis	19
5.1.3 Urethritis	19
5.1.4 Prostatitis	20
5.2 Trauma	21
5.2.1 False passage	21
5.2.2 Urethral stricture	21
5.2.3 Meatal stenosis	21
5.2.4 Bladder perforation	21
5.3 Miscellaneous	21
5.3.1 Catheter knotting	21
5.3.2 Formation of bladder calculus	22
5.3.3 Pain / discomfort	22

6. Catheter material, types of catheters and equipment	23
6.1 Catheter material	23
6.2 Types of catheters	24
6.2.1 Single-Use catheter	24
6.2.1.1 Single-use catheter without coating	25
6.2.1.2 Single-use catheter with coating or gel	25
6.2.1.2.1 Male and female catheters	25
6.2.1.2.2 Discreet / compact catheters	26
6.2.2 Reusable catheters	27
6.3 Catheter systems / complete sets	28
6.4 Catheter tips	29
6.4.1 Nelaton	29
6.4.2 Tiemann / Coudé	29
6.4.3 Flexible rounded tip (Ergothan tip)	30
6.4.4 Pointed tip (IQ-Cath®)	30
6.4.5 Mercier	30
6.4.6 Couvelaire	30
6.4.7 Introducer tip	31
6.5 Catheter connectors	31
6.6 Diameter size and length	32
6.6.1 Size	32
6.6.2 Length	32
6.7 Catheter lubrication / catheter coating	33
6.8 Insertion aids and help devices	34
7. Principles of management of nursing intervention	35
7.1 Frequency of catheterisation	35
7.2 Residual urine volume	36
7.3 Patient and caregiver assessment	37
7.4 Patient and caregiver education – why, who, when, where, how and what	41
7.5 Ongoing support and follow-up	44
8. Procedures for intermittent catheterisation	45
8.1 Choice of technique	45
8.1.1 Intermittent catheterisation by health care professionals	45
8.2 Choice of material	46
8.3 Meatal cleansing	48
8.4 Troubleshooting	48
9. Infection prevention	50
9.1 Urinalysis	50
9.2 Fluid intake	50
9.3 Cranberries	50
9.4 Hand hygiene	51

1. Role of the nurse in different countries

The EAUN is a professional organisation of European nurses who specialise in urological care. In Europe, there is great variation in the education and competency of nurses in urology, with nurses having different activities and roles in various countries. It is therefore difficult for any guideline to fulfil all requirements. However, the EAUN Guidelines Group has tried to ensure that every nurse and health care professional may gain some benefit from using these guidelines. In different countries, and even in different areas within the same country, job titles differ within the speciality. For the purpose of this document we refer to all nurses who are working with intermittent catheters as nurse specialists (NS).

2. Methodology

The EAUN Guidelines Working Group for intermittent catheters has prepared this guideline document to help nurses assess the evidence-based management and incorporate the recommendations of the guidelines into their clinical practice. These guidelines are not meant to be prescriptive, nor will adherence to them guarantee a successful outcome in all cases. Ultimately, decisions regarding care must be made on a case-by-case basis by health care professionals after consultation with their patients, using their clinical judgement, evidence-based knowledge, and expertise. The expert panel consists of a multidisciplinary team of nurse specialists, including Susanne Vahr (chair), Hanny Cobussen-Boekhorst, Janet Eikenboom, Veronika Geng, Sharon Holroyd, Mary Lester, Cel Vandewinkel, and as well as urologist Ian Pearce. (see 'About the authors', Chapter 16).

2.1 Literature search

The information offered in these guidelines was obtained through a systematic literature search and a review of current procedures undertaken in various member countries of the EAUN.

PubMed and Embase were searched using both free text and the respective MeSH and Emtree thesauri. The time frame covered in the searches was January 2000 to July 2011. If a topic were not covered by the results of the search, earlier references were used. Additional searches about topics such as compliance and quality of life were carried out by the Working Group for the specific chapters. Links from the website to relevant articles are also included.

The search was based on the keywords listed below. The main question that is addressed in these guidelines, and for which the references were searched was: "Is there any evidence for intermittent catheterisation and urethral dilatation for nursing interventions in different care situations such as preparation, insertion or care of intermittent catheters as well as catheter materials or complications?"

- Intermittent catheteriz(s)ation (MeSH)
- Self catheteriz(s)ation
- Clean catheteriz(s)ation
- Urinary catheter
- Coated catheter
- Ready to use catheter
- Hydrophilic coated catheter
- Compact catheter
- Single use catheter
- Complications and intermittent catheteriz(s)ation
- Meatal cleaning/disinfection
- Re-use catheter

For indications, contraindications and complications, the following keywords were added:

- Prostatitis
- Orchitis
- Epididymitis
- Epididymo-orchitis
- False passage
- Urethral stricture
- Urethral trauma
- Bladder calculus
- Bladder perforation
- Catheter knotting
- Meatal stenosis
- Cystitis

For dilatation, search studies describing aetiology, indications/contraindications and frequency of dilations were included and the following keywords were added:

- Urethral dilatation and/or stricture

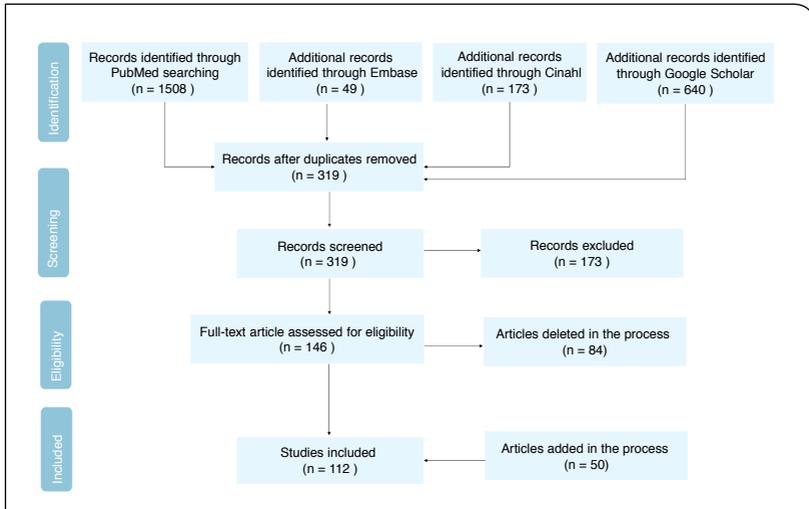
2.1.1 Limitations of the search

The search results were not limited to randomised controlled trials (RCTs), controlled clinical trials, meta-analyses or systematic reviews. In all databases, output was limited to human studies, adults aged ≥ 19 years, 2000 to July 2011, and publications in English language. Additional searches were not limited to any level of evidence and book chapters were also used.

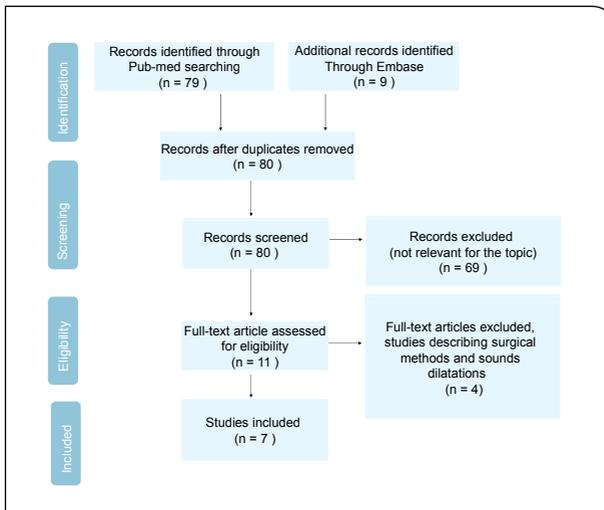
2.1.2 Search results

The initial search on catheterisation was done by two experts in the nursing field, which resulted in:

Flowchart 1. Literature search "Intermittent catheterization"



Flowchart 2. Literature search "Dilatation"



It was a policy decision to restrict the search in this way, although the group were aware that more complex strategies were possible, and would be encouraged in the context of a formal systematic review. In the process of working with the articles, new references were found and added to the reference list, if they were relevant to the topic and cited in the text.

2.2 Limitations of the document

The EAUN acknowledge and accept the limitations of this document. It should be emphasised that the current guidelines provide information about the treatment of an individual patient according to a standardised approach. The information should be considered as providing recommendations without legal implications. The intended readership is the pan-European practising urology nurse and nurses working in a related field.

Cost-effectiveness considerations and non-clinical questions are best addressed locally and therefore fall outside the remit of these guidelines. Other stakeholders, including patient representatives, have not been involved in producing this document.

The list of catheter companies mentioned in the guideline is not meant to be exhaustive. The catheters highlighted are meant as an illustration only and nurses may use similar products from other companies not listed in the guideline.

2.3 Rating system

The recommendations provided in these documents are based on a rating system modified from that produced by the Oxford Centre for Evidence-based Medicine (OCBM) in 2011. All group members participated in the critical assessment of the scientific papers identified.

Whenever possible, the Guidelines Working Group have graded treatment recommendations using a three-grade recommendation system (A-C) and inserted levels of evidence to help readers assess the validity of the statements made. The aim of this practice is to ensure a clear transparency between the underlying evidence and a recommendation given. This system is further described in Tables 1 and 2.

Some of the literature was not easy to grade. However, if the EAUN Working Group thought that the information would be useful in practice, it was ranked as level of evidence 4 and grade of recommendation C. Low-level evidence indicates that no higher level evidence was found in the literature when writing the guidelines, but cannot be regarded as an indication of the importance of the topic or recommendation for daily practice.

The literature used in these guidelines included qualitative research, but because there is no systematic ranking for these types of studies, the qualitative studies were all graded level 4.

The recommendations in these guidelines are not based on reviews.

The working group aims to develop guidelines for evidence-based nursing, as defined by Behrens (2004): “Integration of the latest, highest level scientific research into the daily nursing practice, with regard to theoretical knowledge, nursing experience, the ideas of the patient and available resources”. [1] The group based the text on evidence whenever possible, but if evidence is missing it is based on best practice. Especially most of the text in the appendices is based on best practice.

Four components that influence nursing decisions can be distinguished: personal clinical experience of the nurse; existing resources; patient wishes and ideas; and results of nursing science. [2] This statement implies that although literature is important, the experience of nurses as well as patients is also necessary for decision making. Subsequently, it is not only the written guidelines that are relevant for nursing practice.

Table 1. Level of evidence (LE)

Level	Type of evidence
1a	• Evidence obtained from meta-analysis of randomised trials
1b	• Evidence obtained from at least one randomised trial
2a	• Evidence obtained from one well-designed controlled study without randomisation
2b	• Evidence obtained from at least one other type of well-designed quasi-experimental study
3	• Evidence obtained from well-designed non-experimental studies, such as comparative studies, correlation studies, and case reports
4	• Evidence obtained from expert committee reports or opinions or clinical experience of respected authorities

Table 2. Grade of recommendation (GR)

Grade	Type of evidence – Nature of recommendations
A	• Based on clinical studies of good quality and consistency addressing the specific recommendations and including at least one randomised trial
B	• Based on well-conducted clinical studies, but without randomised clinical trials
C	• Made despite the absence of directly applicable clinical studies of good quality

2.4 Review process

The Working Group included an extensive number of topics that are not always only applicable to catheterisation, but decided to include them because they make the guidelines more complete. A blinded review was carried out by specialised nurses, urologists in various European countries, and a patient organisation representative. The Working Group revised the document based on the comments received and included relevant references received (also from after the search period). A final version was approved by the EAUN Board and the EAU Executive responsible for EAUN activities.

2.5 Disclosures

The EAUN Guidelines Working Group members have provided disclosure statements of all relationships that might be a potential source of conflict of interest. The information has been stored in the EAU database. This Guidelines document was developed with the financial support of Coloplast, Hollister Incorporated, and Wellspect HealthCare.

The EAUN is a non-profit organisation and funding is limited to administrative assistance and travel and meeting expenses. No honoraria or other reimbursements have been provided.

3. Terminology (definitions)

3.1 Urethral intermittent catheterisation

Intermittent (in/out) catheterisation (IC) is defined as drainage or aspiration of the bladder or a urinary reservoir with subsequent removal of the catheter. [3]

For sterile, aseptic, no-touch and clean technique the working group decided to use the definitions below, because the definitions that were found in the literature were not coherent.

Hygienic technique is sometimes used for aseptic and sometimes for clean technique. The group decided not to use this term.

3.2 Catheterisation techniques

There are various intermittent catheterisation techniques, and unfortunately, it is not always clear what is exactly meant by a certain technique that is mentioned in the literature. Also, practice differs even though the same name may be used. The techniques mentioned in this guideline are defined as:

Sterile technique

Complete sterile technique is only used in operating theatres and in diagnostic situations. Sterile technique implies that all the material is sterile and catheterisation is performed with sterile gown, gloves, etc. – that is, full operating theatre conditions.

It is now widely accepted that the abbreviation SIC (sterile intermittent catheterisation) has been used incorrectly for aseptic technique.

The focus in these guidelines is on the aseptic technique, which is the most commonly used technique in different settings.

Aseptic technique (When “aseptic technique” is mentioned in these guidelines it refers to this definition)

- Sterile catheter
- Disinfection or cleansing of the genitals
- Sterile gloves
- Additionally, tweezers can be used
- Use of sterile lubricant (if the catheter is not pre-lubricated)

No-touch technique

An aseptic technique with a ready-to-use catheter.

A pull-in aid or special packages are used to touch the catheter. [4]

Clean technique

Clean technique is only used by patients or caretakers in the home setting. In some countries clean technique is only used if an aseptic technique is not possible, for example, due to cognitive dysfunction or functional disability.

Diagram 1. Intermittent catheterisation techniques - simplified

This diagram gives a simplified overview of the use of the different techniques, but is not meant to be prescriptive in any way.

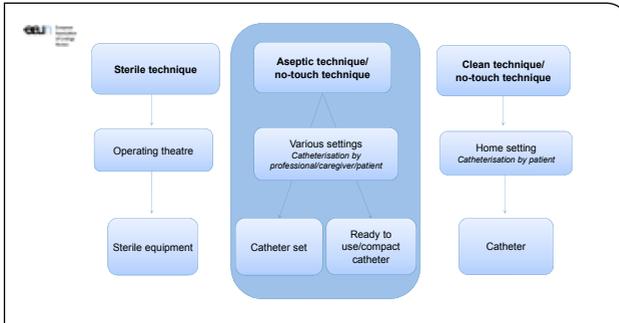


Diagram 2. Intermittent catheterisation techniques - detailed

This diagram shows the differences between the different IC techniques in all relevant aspects. It clearly shows that there is a lot of variation in the practice called "Aseptic".

	Sterile	Aseptic* (EAU definition)	Aseptic* (EAUN definition)	Commonly called "Aseptic"		Clean
Environment	Sterile	Non-sterile	Non-sterile	Non-sterile	Non-sterile	Non-sterile
Catheter	Sterile	Sterile	Sterile	Sterile single use	Sterile no-touch	Sterile Reusable
Lubricant	Sterile	Sterile/Antiseptic*	Sterile	Sterile	Anti-septic (chlorhexidine) No lubricant	Sterile, antiseptic, clean or no lubricant
Gloves	Sterile	Sterile	Sterile	Sterile	Non-sterile No gloves	No gloves
Care of the catheter						Rinse with water, store in dry place
Hand hygiene	Sterile gloves	Sterile gloves	Sterile gloves	Gloves	Water and soap	Water and soap
Genital hygiene	Disinfectant	Disinfectant	Disinfectant or water and soap	Disinfectant	Water or water and soap	Water or water and soap
Touch catheter and genitals	Touch with gloves	Touch with gloves	Touch with gloves or gloves and tweezers	Touch with gloves	No touch Touch catheter with glove or tweezers, pull in aid, package, etc. Touch genitals with glove.	Touch catheter without gloves, but never touch the catheter part that is inserted

*Asepsis is the state of being free from disease-causing contaminants. Antiseptics are antimicrobial substances that are applied to living tissue/skin to reduce the possibility of infection.

Often-used abbreviations

Health care professionals always use aseptic technique, abbreviated as SIC. ISC (intermittent self catheterisation) and CISC (clean intermittent self catheterisation) are often used abbreviations for the techniques used by patients. CIC (clean intermittent catheterisation) is used for the technique used by caretakers.

3.3 Further definitions

- **Urethral stricture/stenosis**

Urethral strictures are either a single or multiple narrowing(s) along the length of the urethra and are more common in men than in women. [5, 6, 7]

- **Bladder neck stenosis**

Abnormal narrowing of the bladder neck.

- **Dilatation**

Dilatation refers to the condition of an anatomical structure being dilated beyond its current dimensions.

For the purpose of this document IC is deemed to include both urethral intermittent catheterisation and urethral intermittent dilatation.

- **Urinary retention**

Acute retention of urine is defined as a painful, palpable or percussable bladder, when the patient is unable to pass urine. [3]

Chronic retention of urine is defined as a non-painful bladder, which remains palpable or percussable after the patient has passed urine. Such patients may be incontinent. [3]

- **Post-void residual (PVR)**

Post-void residual (PVR) is defined as the volume of urine left in the bladder at the end of micturition. [3]

- **Bacteriuria**

For a urine specimen collected by in and out catheter, a count of > 100 CFU/ml is consistent with bacteriuria [8]

Symptomatic bacteriuria is a significant number of microorganisms in the urine that occurs together with urinary tract symptoms such as dysuria and fever

Asymptomatic bacteriuria is defined as a positive urine culture but with absence of symptoms [9]

- **Catheter-associated urinary tract infection (CAUTI)**

Catheter-associated urinary tract infection (CAUTI) is defined as bacteriuria or funguria with a count of more than 10^3 CFU/ml. [10]

4. Indications, contraindications and alternatives for IC

4.1 Indications

It is important to acknowledge that IC should only be performed in the presence of a residual volume AND symptoms or complications, (Table 3) arising from this residual volume of urine. IC should not be instituted on the basis of a post-micturition residual volume only.

Table 3. Complications of a large PVR volume of urine

Complications of high PVR
Urinary tract infection
Bladder calculi
Renal failure
Patient discomfort
Lower urinary tract symptoms, e.g., nocturia, urgency and/or frequency
Incontinence

There are generally three categories of lower urinary tract dysfunction requiring IC, according to the underlying reason for incomplete bladder emptying.

4.1.1 Detrusor dysfunction

With detrusor dysfunction (also known as detrusor failure or hypotonicity), an underactive detrusor or an atonic (or acontractile) detrusor, the detrusor muscle fails to contract for a sufficient duration and with sufficient magnitude to achieve complete bladder emptying. The patient is therefore left with a post-micturition residual volume of urine. The most common causes are neurological and/or idiopathic disorders.

4.1.2 Bladder outlet obstruction

With obstruction or blockage of the bladder outlet, complete bladder emptying is prevented by physical obstruction despite an adequately functioning detrusor muscle. The most common causes of this are prostatic enlargement, a high bladder neck or urethral stenosis in women. Urethral strictures in men may also cause bladder outflow obstruction and is most often found as a consequence of infection or post instrumentation e.g. following transurethral resection of the prostate (TURP), or radical prostatectomy (RP).

4.1.3 Post-operative

Operations aimed at restoring continence all carry a risk of impairing bladder emptying and hence carry a risk of needing to perform IC in the event that any residual volume result in symptoms or complications. Acute urinary retention is also seen post-operatively especially when epidural anaesthetic is used.

a. Procedures for stress urinary incontinence (SUI)

Procedures aimed at curing stress urinary incontinence (SUI), (Table 4) all work on the principle that by causing a certain degree of obstruction to the bladder outlet, SUI will be reduced or, hopefully, resolved. As a consequence, bladder emptying may be impaired, leading to a clinically significant residual volume of urine in some patients. In general, the risk increases from tapes (transobturator - TOT or tension-free vaginal tape - TVT) to colposuspension to fascial slings.

b. Procedures for urgency urinary incontinence (UUI)

Procedures aimed at resolving urgency urinary incontinence (UUI), (Table 5), all work on the principle that by reducing intravesical pressure and increasing functional bladder capacity, episodes of UUI will be reduced or resolved. As a consequence, the ability of the bladder to empty efficiently and completely is impaired, leading to a residual volume of urine that may result in symptoms and/or complications and hence require the use of IC.

c. Other procedures (e.g., Mitrofanoff)

Certain reconstructive procedures involve the creation of a purpose-built channel, typically formed using non-terminal ileum, via which IC is performed to drain either the bladder, the augmented bladder, or a reconstructed neobladder. The Mitrofanoff principle involves the use of the appendix, refashioned non-terminal ileum (Monti procedure), or rarely, a Meckel's diverticulum to create a channel leading from the urinary bladder to the anterior abdominal wall. Typically, the bladder outlet is closed and the channel is tunnelled into the bladder such that there is a natural valve type effect on bladder filling, which causes the lumen of the channel to occlude to prevent unwanted urinary leakage. An intermittent catheter is then inserted to drain the bladder as and when required. Such procedures may be performed for a variety of conditions, including bladder exstrophy and neuropathic bladder, and post cystoprostate-urethrectomy.

For a description of the Mitrofanoff procedure, please refer to the EAUN Guideline 2010 "Continent Urinary Diversion", Section 3.6. [11]

Table 4. Procedures with curative intent for stress urinary incontinence

Procedures for SUI
Transobturator tape (TOT)
Tension-free vaginal tape (TVT)
Colposuspension
Fascial slings
Bulking agents

Table 5. Procedures with curative intent for urgency urinary incontinence

Procedures for UUI
Onabotulinum toxin A (formerly called Botulinum toxin type A), needs repetition
Detrusor myectomy
Clam ileocystoplasty
Sacral neuromodulation

4.2 Contraindications

Contraindications to IC are few and in the main are related to high intravesical pressure (absolute contraindication), which would require continuous free drainage to avoid renal damage. Poor manual dexterity in the absence of an appropriately trained caregiver/attendant is a relative contraindication.

4.3 Alternatives for IC

In case of residual volume and symptoms or complications, alternatives to IC are: suprapubic catheterisation and indwelling urethral catheterisation. When catheterisation is only needed for a few days, both suprapubic drainage and intermittent urethral catheterisation have advantages over indwelling urethral catheterisation due to less discomfort. [12] Regarding symptomatic UTI, a suprapubic or intermittent catheter is preferable to an indwelling urethral catheter. [13, 14] Male external catheter drainage system catheters can be considered in patients with voiding problems without symptoms or complications and without residue. [13, 15]

Table 6. Bladder emptying methods

Bladder emptying method
Intermittent catheterisation
Suprapubic catheterisation
Indwelling urethral catheterisation
Sampling urine with male external catheter

5. Complications

5.1 Infection

5.1.1 Nosocomial infection

Catheter associated urinary tract infection, (CAUTI) is the most common complication of IC [16, 17], although the true incidence, prevalence and relative risk are difficult to determine because studies have varied significantly in their definition of UTI and their means of reporting. In addition, most studies have been confined to specific patient cohorts, for example, spina bifida and spinal cord injury.

The incidence of CAUTI as a consequence of IC is in the region of 2.5 per person per year [18, 19], with over 80% of patients experiencing at least one UTI over a 5-year period. [20]

The recent Cochrane review failed to determine any significant difference in the rate of CAUTI between the various IC techniques, for example: single versus multiple use; clean versus sterile, [16], although this may have been a result of poor study design and low numbers of patients. The EAU guidelines on neurogenic bladder dysfunction suggest that an aseptic technique would be the most appropriate compromise between UTI incidence, practicality and economic viability. [21, 22] In the EAU document, aseptic technique is defined as “catheters remain sterile, the genitals are disinfected and disinfecting lubricant is used”.

CAUTI with resultant pyelonephritis is an uncommon complication, and although studies have been sparse, a risk of approximately 5% is suggested. [23]

5.1.2 Epididymo-orchitis

This is significantly more common in patients performing IC although studies suggest a very wide incidence range from 3% to 12% in the short term to over 40% in the long term representing a seven fold increase in risk. [23, 24, 25] Treatment is via standardised antibiotic therapy based upon local guidelines.

5.1.3 Urethritis

Historical studies have suggested that urethritis occurs in 1-18% of patients undergoing IC. However, catheter characteristics and catheterisation techniques have changed greatly over the years; therefore, extrapolation of historical results to the modern era is impossible, and contemporary series lack data with respect to incidence and risk of urethritis.

5.1.4 Prostatitis

This occurs frequently with an incidence of 18-31% [26, 27] and treatment should be as per local standardised protocols, typically with a prostate-penetrating antibiotic for four weeks and suprapubic catheterisation in the acute period.

Table 7. Factors increasing the risk of infection in IC

Risk factor	LE
Low frequency of IC [19, 21, 28, 29, 30, 31]	2b
Bladder overdistension [32]	1b
Female [19, 33]	1b
Poor fluid intake [19]	3
Non-hydrophilic coating [19, 34]	1b
Poor technique [17]	3
Poor education [29, 30, 31, 33, 35]	2b

Recommendations	LE	GR
• The development of epididymo-orchitis in a patient performing IC should be treated with antibiotic therapy; the choice and duration of which will be dictated by local policy.	4	C
• The development of prostatitis in a patient performing IC should be treated with antibiotic therapy; the choice and duration of which will be dictated by local policy. [26, 27]	2b	B
• In a patient performing IC, only symptomatic UTI should be treated. [13]	4	C

5.2 Trauma

Urethral trauma is common in patients practising IC [25, 27]; particularly in the early period with long-term urethral bleeding occurring in up to 30% of patients. [23, 25]

Addition of a hydrophilic coating significantly reduces the risk of microscopic haematuria in people with neurogenic dysfunction. Stensballe, 2005 found the same in a cross-over study with healthy test persons [36, 37].

The use of lubrication, either incorporated into the catheter device or externally applied reduces the risk of trauma. [38]

Recommendation	LE	GR
• Use a hydrophilic or gel reservoir catheter for IC	4	C

5.2.1 False passage

Urethral trauma resulting in a false passage is almost certainly under-reported but may result in the patient being unable to continue with IC as a consequence of the catheter entering the false passage in preference to the bladder.

In such cases, antibiotics should be administered and an indwelling catheter left in situ for several weeks. [39]

Recommendation	LE	GR
• The development of a false passage in a patient performing IC should be treated with antibiotic therapy; the choice and duration of which will be dictated by local policy, and an indwelling urethral catheter	4	C

5.2.2 Urethral stricture

This complication, with a prevalence of approximately 5% [27], is found exclusively in men, and although studies have suggested that hydrophilic coated catheters cause less urethral inflammation as determined by cytological analysis, no studies have yet been able to address this issue adequately to allow recommendation.

The risk of urethral stricture formation increases with time, with most strictures presenting after 5 years. [25, 27] Common sense measures including, gentle catheter insertion and lubrication, reduce the already relatively low incidence of urethral stricture disease.

5.2.3 Meatal stenosis

This is a rare complication with only a few reported series, none of which have been in the modern era. These reports suggest incidence rates of 10%, although numbers are extremely low. [27, 41]

5.2.4 Bladder perforation

This is a rare complication with only sporadic reports, [42] which occurs in augmented bladders along the anastamotic site. Treatment is with indwelling catheter drainage for 7–10 days with simultaneous antibiotic therapy. If the leak persists, laparotomy may be required.

5.3 Miscellaneous

5.3.1 Catheter knotting

Catheter knotting is extremely rare but a few case reports have described this complication. [43, 44]

Initial treatment is attempted evacuation with flexible endoscopy, proceeding to endoscopic or open extraction under general or regional anaesthesia, should this fail.

5.3.2 Formation of bladder calculus

Long-term IC is associated with an increased risk of bladder calculus formation in children and adults, [45, 46] with a higher risk in patients performing IC via a Mitrofanoff procedure. [46] The pathogenesis is usually related to the introduction of pubic hair that acts as a nidus for stone formation [47, 48]

Mucus appears to play an important role in the genesis of bladder stones after augmentation, possibly acting as a nidus. Metabolic changes following augmentation were similar in stone and non-stone forming populations. Data suggest that mucus calcium-to-phosphate ratios may be predictive of future stone formation. Furthermore, there may be a benefit in instituting more aggressive measures aimed at clearing mucus from the bladder. [49]

5.3.3 Pain / discomfort

Pain may be experienced during catheter insertion or removal, and as a consequence of bladder spasm or UTI. Painful insertion and removing can be caused by incomplete relaxation of the pelvic floor muscles or mucosa atrophy in older women.

Fear of pain can hinder relaxation and learning during the instruction period. [50]

When removing the catheter vacuum suction can occur, probably because the catheter sucks on the bladder wall.

Severe pain when inserting the catheter has a significant impact on QoL. [51]

Pain can be reduced by appropriate training of the person carrying out the catheterisation.

6. Catheter material, types of catheters and equipment

6.1 Catheter material

Single-use medical devices have been under close scrutiny for several years; especially the choice of material. Many different requirements such as medical safety, treatment functionality and efficiency, patient comfort, and environmental performances must be considered. There is an increasing demand from the community for polyvinyl chloride (PVC)-free materials and their phthalate components in medical devices. [52] According to REACH (EU chemical regulation), phthalates are harmful and hazardous to the human body. Products containing classified phthalates must be labelled according to the Medical Devices Directive (93/42/ECC) as of March 2010. Finding good alternatives to phthalates is a technical challenge, but for some products phthalate-free alternatives are available.

Polyvinyl chloride

PVC is a thermoplastic polymer that is cheap, durable and flexible. PVC catheters are clear plastic and usually single use. 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. [52] Skin sensitivities and common allergies can cause discomfort for many patients.

Silicone

Silicone is one of the most biocompatible synthetic materials available, thus offering reduced toxicity and tissue inflammation, low toxicity, and resistance to UV light. Silicone catheters are durable but highly flexible and designed to aid effective bladder drainage. Silicone devices can be manufactured with a relatively thin wall, thus creating a large drainage lumen in relation to external diameter. [53]

Ethylene vinyl acetate (EVA)

Ethylene vinyl acetate (EVA) is a polymer that approaches elastomeric materials in terms of softness and flexibility, yet can be processed like other thermoplastics. The material has good clarity and gloss, barrier properties, low-temperature toughness, stress-crack resistance, hot-melt adhesive water proof properties, and resistance to UV radiation. EVA has little or no odour and is competitive with rubber and vinyl products (PVC) and is more environmentally friendly because it does not contain phthalates.

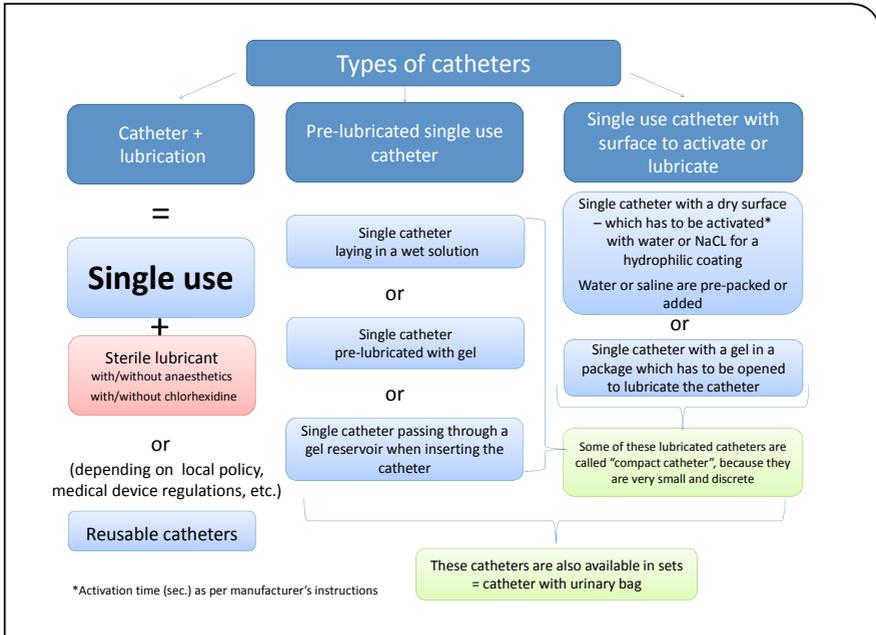
Other materials

Stainless steel catheters date back to the early 1900s. The catheters are rigid and multiple use, requiring adequate cleaning and storage. It is uncommon to see stainless steel catheters used for IC today. Red rubber catheters were frequently used in the past. Today, they are only used in special situations, when single-use 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).

6.2 Types of catheters

Several types of catheters and sets are available for IC. The chart should give an overview about the existing materials. The catheters illustrated in this document are examples only, and not exhaustive.

Diagram 3. Types of catheters



6.2.1. Single-use catheter

All the catheters are available in male and female versions.

6.2.1.1 Single-use catheter without coating

Single-use sterile catheters without any equipment and no coating can be used with lubricants.

Single-use catheters in hospitals are often used in combination with standard catheter sets.

Non-coated catheters are widely considered in the literature to cause an increase in urethral irritation, poor patient satisfaction, increased bacteriuria, and long-term urethral complications, although there is a lack of hard evidence to support this. [9]

6.2.1.2 Single-use catheter with coating or gel

Single-use sterile catheters with hydrophilic coatings, ready-to-use solution, with gel on the surface of the catheter or gel in the wrapping. As the name suggests, these catheters are designed for single use and are pre-coated to allow ease of insertion and removal, thereby reducing the risk of urethral mucosal irritation that can be more prevalent in an uncoated product. [54]



Fig. 1 Single-use catheter

LoFric® Dila-Cath™

(Courtesy Wellspect HealthCare)

6.2.1.2.1 Male and female catheters

The male catheter is longer than the female.

In catheters with a plastic sleeve or plastic grip, the sleeve/grip around the catheter is used as guide to introduce the catheter without touching it. There are two types:

a. catheter with a plastic sleeve/grip around it (sleeve/grip does not cover the catheter completely);



Fig. 2 Male catheter for no-touch use

LoFric® Origo™ Insertion Grip

(Courtesy Wellspect HealthCare)



Fig. 3 Male catheters partly covered by sleeve

(Courtesy C. Vandewinkel)



Fig. 4 Female catheter partly covered by a sleeve/grip

Liquick® Base (Teleflex Ltd.)

(Courtesy V. Geng)

- b. catheter with a plastic sleeve completely covering the catheter, so that the catheter can be inserted safely without sterile gloves and without touching the catheter.



Fig. 5 Male catheters completely covered by sleeve

(Courtesy C. Vandewinkel)



Fig. 6 Female catheters completely covered by sleeve

(Courtesy C. Vandewinkel)

6.2.1.2.2 *Discreet / compact catheters*

Some manufacturers offer a compact intermittent catheter that is a smaller size and therefore more discreet. The smaller packaging is more convenient and the products are sterile and for single use. The compact intermittent catheters are available in male and female versions. The female catheters are designed specifically for the short urethra and are smaller than a standard writing pen, whereas the male version is less than half the size of a standard intermittent catheter.

The compact products have the same coating / lubrication as the standard-length products. Both are easy to use, easy to dispose of, offer a simpler storage solution and can be used with a no-touch technique. Manufacturers that offer a compact style intermittent catheter also offer additional products such as drainage bags and easy to grip handles.



Fig. 7 Telescope catheter

SpeediCath® Compact Male (Coloplast)

(Courtesy V. Geng)

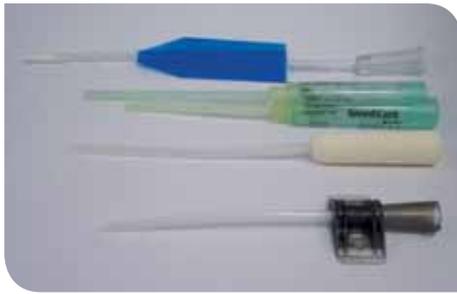


Fig. 8 Various female compact catheters. The top catheter is partly covered by a sleeve/grip

Pictured from top to bottom are:

Liquick® Base (Teleflex Ltd.), SpeediCath® Compact Female

(Coloplast), LoFric® Sense™ (Wellspect HealthCare),

Actreen® Lite Mini (B. Braun)

(Courtesy V. Geng)



Fig. 9 Female compact catheter with grip

Curan Lady (Courtesy Curan)

6.2.2 Reusable catheters

Several studies have investigated the advantages and disadvantages of reusable catheters in the home setting where catheterisation is performed by patient or caregiver. There are some concerns in the literature over the efficacy and compliance with the cleansing techniques [55, 56, 57]. The gold standard in hospital and residential settings remains a new sterile catheter, because of the risk of cross-infection. [15, 58]

Available data on IC do not provide convincing evidence that single or multiple use is superior for all clinical settings. This reflects the lack of reliable evidence rather than evidence of the absence of a difference. Currently, clinicians need to base decisions about which technique and type of catheter to use on clinical judgment, in conjunction with patients. Differential costs of catheters/techniques may also influence decision making. [9]

Recommendations	LE	GR
<ul style="list-style-type: none"> • Make sure the self-catheterising patient is aware which catheters can be reused in the home setting 	4	C
<ul style="list-style-type: none"> • Make sure that patients using reusable catheters are aware how to clean and store the catheter 	4	C

6.3 Catheter systems / complete sets

The above described catheters are mostly also available as catheter set or complete set; the lubrication is the same as in single catheters. The catheters are pre-connected with a urinary bag. However, there is a difference in handling and how to use them with a no-touch technique. For details refer to the manufacturer's insertion instructions.

Complete sets usually contain a catheter suitable for IC, a drainage/reservoir bag to collect the urine, and a lubricant or activator such as water if the catheter is hydrophilic. These sets are ideal for use in confined spaces or restricted facilities such as aeroplanes, building sites, or extremely rural settings where access to toilet facilities may be limited. They are particularly useful for wheelchair users and those patients who catheterise from a seated or prone position.

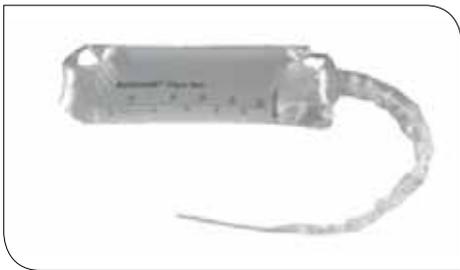


Fig. 10 Catheter set
Actreen® Glys Set
(Courtesy B. Braun)



Fig. 11 Catheter set
LoFric® Hydro-Kit™
(Courtesy Wellspect HealthCare)

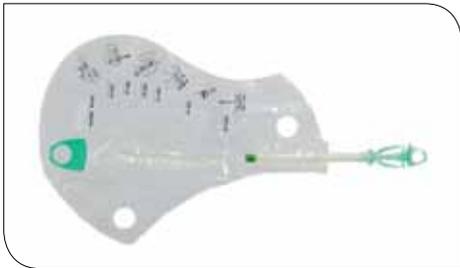


Fig. 12 Catheter set
SpeediCath® Complete
(Courtesy Coloplast)



*Fig. 13 Catheter set
VaPro Plus®
(Courtesy Hollister Incorporated)*



*Fig. 14 Catheter set
IQ-Cath® Bag
(Courtesy Manfred Sauer GmbH)*



*Fig. 15 Catheter set
SpeediCath® Compact Set
(Courtesy Coloplast)*

6.4 Catheter tips

6.4.1 Nelaton

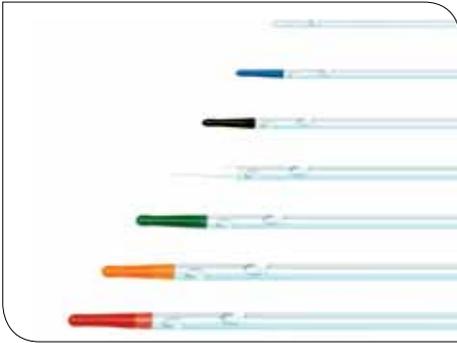
The Nelaton catheter is the standard catheter and has a soft rounded tip that is flexible with a straight proximal end. It has two lateral eyes for drainage that are often polished for comfort.

6.4.2 Tiemann / Coudé

The Tiemann (also known as Coudé) catheter has a slightly curved and tapered tip with up to three drainage holes. This type of catheter is particularly useful in individuals with a narrow urethral passage or prostatic obstruction. The angled tip gives directional stability, and the tip is slightly more rigid than a standard type to allow easier insertion through obstructed areas.

6.4.3 Flexible rounded tip (Ergothan tip)

The flexible rounded catheter tip permits passage into almost any orifice and the urethra, irrespective of configuration, tortuosity, or degree of obstruction. Its flexibility can cause a lack of control for some patients.



*Fig. 16 Flexible Ergothan tips with various Charrières
(Courtesy Teleflex Ltd.)*

6.4.4 Pointed tip (IQ-Cath®)

The pointed tip is squeezable and has a bendy end. This tip can be useful in case of obstruction and dilatation because the Charrière increases in size along the length of the catheter. The tip ends in a ball to prevent the catheter becoming caught up in the urethra.



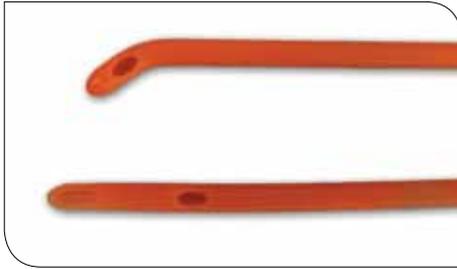
*Fig. 17 Pointed tip
IQ-Cath®
(Courtesy Manfred Sauer GmbH)*

6.4.5 Mercier

The Mercier catheter has a rounded and angular (30-45°) tip that is concave. The angle helps the introduction of the catheter into the membranous or prostatic urethra. There are usually two sets of opposing drainage eyes. The catheter is usually silicone coated for smooth and easy catheterisation. This type of catheter is useful for drainage and irrigation of the bladder to remove large blood clots and sediments. It is therefore more commonly used as an indwelling catheter rather than intermittently.

6.4.6 Couvelaire

The Couvelaire catheter is used in cases of bladder haemorrhage or after urological surgical intervention because it guarantees efficient drainage. The structure can be rigid or semi-rigid and it has one drainage eye at the end and two lateral eyes. This is more commonly used in self-retaining indwelling catheters.



*Fig. 18 Mercier (top) and Couvelaire (bottom) tip
(Courtesy C. Vandewinkel)*

6.4.7 Introducer/protective tip

It is assumed, that many UTIs are caused during IC when the catheter tip passes through the colonised portion of the urethra, pushing the bacteria further into the urinary tract. A sterile introducer/protective tip catheter system seems to allow the catheter to bypass the colonised portion of the urethra. [59]

The working group did not find any studies to underpin the advantages of the introducer/protective tip.



*Fig. 19 Example of an introducer/protective tip
(Courtesy V. Geng)*

6.5 Catheter connectors

Catheter connectors generally have standardised colours, relating to size, for ease of recognition. The colours are international, but not every manufacturer uses the colour coding, so it is necessary to check the packaging and connector for size confirmation. (Connectors are generally attached during the manufacturing process and are already in place.)

Table 8. Standard catheter connector colour chart

Standard catheter connector colour chart							
Catheter size	8	10	12	14	16	18	20
Colour	Blue	Black	White	Green	Orange	Red	Yellow
Tube diameter	2,7	3,3	4	4,7	5,3	6	6,7

Luer Lock

When irrigating (or instilling) the bladder, a Luer Lock catheter system is connected to a syringe. This can be attached to the preinstalled connector. It is also possible to use a catheter with a standard connection and use a special connector with a Luer Lock on one side and tip on the other side to insert the connector.



Fig. 20 Example of catheter with Luer Lock connector

B. Braun

(Courtesy V. Geng)



Fig. 21 Example of Luer Lock adapter

B. Braun

(Courtesy V. Geng)

6.6 Diameter size and length

6.6.1 Size

The external diameter of intermittent catheters is measured in millimetres and is known as the Charrière scale (Ch or CH) or French Scale (F, Fr or FG) which measures the circumference. Sizes range from 6 to 24. Female adult sizes are commonly 10-14 and male adult 12-14, although larger sizes are used for treating strictures. [60] The choice of catheter size should be large enough to allow free flow of urine without causing damage to the urethra. Irrespective of the choice of product, the connection is universally colour coded to denote the size of catheter. The colours of the sizes are the same as the colours of the connectors (see 6.5.2 Connectors)

6.6.2 Length

Intermittent catheters are available in both male and female lengths (approx. 40 cm and 7-22 cm respectively).

Recommendation	LE	GR
<ul style="list-style-type: none"> Choose a catheter size large enough to allow free drainage but small enough to reduce risk of trauma 	4	C

6.7 Catheter lubrication / catheter coating

The purpose of using lubrication is to reduce friction and thus protect the sensitive urethral mucosa during insertion and removal of the catheter [61]. Today most catheters have a hydrophilic coating that reduces friction between the urethral mucosa and the catheter. 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.



*Fig. 22 Example of a catheter packed with gel or water
(Courtesy Manfred Sauer GmbH)*

Different types of lubricants can be distinguished:

- Lubricants without anaesthetic lignocaine/lidocaine and/or chlorhexidine
- Lubricants with chlorhexidine (antiseptic)
- Lubricants with anaesthetic lignocaine/lidocaine
- Lubricants with anaesthetic lignocaine/lidocaine and chlorhexidine
- Lubricants with water and glycerine

Sterile lubricants are always for single use. An open package should not be used again.

Hydrophilic and gel coatings

Hydrophilic-coated catheters are characterised by having a layer of polymer coating, which absorbs and binds water to the catheter up to 10 times its own weight. This results in a thick, smooth and slippery surface reducing friction between the catheter surface and the urethral mucosa during insertion. The coating layer remains intact upon introduction into the urethra and ensures lubrication of the urethra in its entire length. [37]

Several companies produce a variety of products with a hydrophilic coating. Some products require the addition of water for 30 seconds to activate the catheter coating (e.g., LoFric®, EasiCath®, FloCath®, Hi-slip®, IQ-Cath®, Magic³®, and VaQua™ Catheter), whereas others are presented pre-packaged with water or saline (e.g., SpeediCath® and VaPro™) or with an inert transparent water-soluble gel that self lubricates the catheter as it is advanced from the packaging (e.g., InstantCath Protect®, UroCath gel®, Actreen®, and IQ-Cath® gel). [62]

Recommendations	LE	GR
<ul style="list-style-type: none"> Choose lubricant / type of catheter coating based on a comprehensive patient assessment and the reasons for IC 	4	C

6.8 Insertion aids and help devices

There are a variety of accessories available to enable easier insertion, vision or handling. These products can be used when IC is performed by patients or caregivers using a clean or no-touch technique.

Various types of help devices are pictured in: Appendix H Help devices

7. Principles of management of nursing intervention

Before starting with IC some general aspects should be considered:

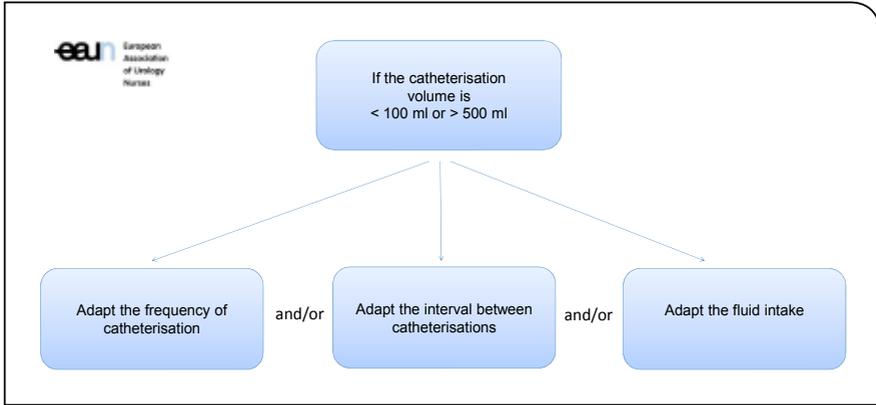
Depending on the setting (hospital, rehabilitation centre, or home) and the patient, the procedure should be performed either with an aseptic, no-touch or clean technique. The decision to start IC is a medical order but local policy should be observed. Optimal conditions need to be available, for instance: a well-educated nurse, suitable material, comfortable place, and hygienic toilet with proper space. The patient's privacy is paramount in all locations. [63, 64]

Recommendations	LE	GR
• Observe local policy before starting catheterisation	4	C
• Be aware that IC is a medical order	4	C
• Assess the patients and their individual circumstances for IC before choosing type of catheter, tip and aids	4	C
• Be aware that the patient's privacy is paramount in all locations. [63, 64]	4	C

7.1 Frequency of catheterisation

Individualised care plans help identify appropriate catheterisation frequency, based on discussion of voiding dysfunction and impact on QoL, frequency-volume charts, functional bladder capacity, and ultrasound bladder scans for residual urine. Numbers of catheterisations per day vary; in adults, a general rule is “catheterising frequently enough to avoid residual urine greater than 500 ml”, but guidance is also provided by urodynamic findings such as bladder volume, detrusor pressures on filling, presence of reflux, and renal function. [9] If the patient is unable to pass urine independently, they will usually require IC 4–6 times daily to ensure the bladder volume remains within 300–500 ml. [65, 66] Excessive fluid intake increases the risk of overdistension of the bladder and overflow incontinence. [67]

Diagram 4. Options when adaptation of the catheterisation pattern is needed



Recommendations	LE	GR
• Assess the fluid intake of the patient if the urine output is > 3 l/day or there is a need to catheterise > 6 times/day	4	C
• Assess the fluid intake of the patient if urine output is > 500 ml per catheterisation	4	C
• Assess the frequency if the urine output is > 500 ml per catheterisation	4	C
• Assess the need for adjustment in anticholinergic medication in patients with post voiding residual (PVR) and overactive bladder (OAB) and frequent need for catheterisation	4	C
• IC before night-time is recommended to help reduce nocturia	4	C

7.2 Residual urine volume

In the early days of establishing IC, observation and management of bladder emptying and residual volume (including retention) are important to measure the urine volume drained to determine the frequency of IC. [65] Completing a voiding diary (Appendix I) can be helpful to keep a record of the fluid intake, how much urine is voided independently (if any), frequency of catheterisation, and residual volume. The diary can then be used by the health professional, in consultation with the patient and caregiver, to decide whether amendment to the frequency of IC is necessary.

Recommendations	LE	GR
• Choose ultrasound to measure residual urine volume after emptying the bladder spontaneously	4	C
• In case of post voiding residual urine (PVR) IC once daily is recommended to prevent CAUTI	4	C

7.3 Patient and caregiver assessment

Patients and/or caregivers need to be assessed with regard to their:

- general health status
- knowledge about the urinary tract [68]
- ability to understand the information
- ability to perform the skill
- compliance
- need for psychological support
- motivation / emotional readiness
- availability to perform the procedure [63, 69]

General health status

Before starting information and instruction for intermittent catheterisation it is necessary to assess the general health status.

Knowledge about the urinary tract

Patients need to have a basic knowledge of the urinary tract. In elderly women, mastery of IC is complicated by limited knowledge of their own bodies. [50]

In caregivers, long-term adherence to catheterisation can be influenced by fear of damaging the urinary tract. [70] Therefore, teaching strategies for clean intermittent catheterisation should ensure that caregivers are familiar with the basic anatomy and function of the lower urinary tract. [68]

Ability to understand the information

In a study of MS patients with different cognitive levels and bladder emptying problems, 87% were able to learn clean intermittent self catheterisation in spite of cognitive function. The number of training sessions required was 2-6 for men and 2-11 for women. Patients did not use written materials or other devices in this study and there was no description of which catheters were used. [71]

The expert opinion of the working group is that in lower cognitive function it is important that a caregiver or health care provider accompanies the patient, and that written materials or pictograms are available. By asking the patient to repeat the training skills one can check whether the explanation has been understood. Sometimes more than one training session is needed and shorter follow-up can be helpful. Also, contacting a community nurse who can take care of these patients at home can be a solution. Sometimes an alarm watch (or mobile phone) can be helpful when patients have difficulties in remembering to perform IC.

For some the procedure is complex, especially at the start of the learning process. They have difficulty memorising the procedure, or lack organisational skills (correct sequence of the procedure, organising catheter materials). [71]

Two small studies on the adherence in short- and long-term IC found that general determinants for initial mastery and short-term adherence relate to knowledge, complexity of the procedure, misconceptions, and timing of the educational session. These determinants illustrate how IC is not as simple as is often assumed. Obtaining the knowledge required and mastering the necessary skills are a real challenge to patients.

Ability to perform the skill

Lack of motor skills (how to sit or stand in neurological problems, tetraplegia), fine motor skills (dexterity, limited hand function), and sensory skills (poor vision) can cause difficulties when learning or performing clean intermittent self catheterisation.

In particular, women can experience difficulties in finding the urethra and need to use a mirror prior to inserting the catheter. [50, 72] Special devices have been developed (see Section 6.8), and when the patient is motivated, it is usually possible to succeed. [73] Sometimes a caregiver or health care professional must be involved to perform IC.

Examples of special devices can be found in: Appendix H Help devices

For patients to continue successfully to use IC as part of their daily routine, the procedure must be made as easy as possible. Some patients find learning the technique difficult and may discontinue because they find the task too burdensome.

Convenience and speed of use are important factors because many people have to fit IC into their busy lives. [74]

Compliance

There are many factors that influence compliance, such as:

- Knowledge of the procedure and the body
- Complexity of the procedure
- Physical impairments
- Psychological factors
 - o Misconceptions
 - o Fears of negative effects of IC
 - o Fear of lack of self-efficacy
 - o Embarrassment
 - o Resistance to the sickness role
- Availability of materials
- Timing of the educational session

[50, 63]

Any of these factors can result in avoiding activities or non-adherence to prescribed IC. Good support from health care professionals can help patients to overcome their (initial) resistance. [63]

The services and information that patient organisations and peer counsellors can offer can increase compliance. Patients should be made aware of these possibilities. Often patient organisations have a relevant website or flyer.

Health care professionals' communication skills and attitudes are instrumental in promoting confidence in carrying out the procedure and can promote long-term compliance.

More information on how to help patients adapt to the new lifestyle can be found in Sections 7.4 and 7.5: Patient and caregiver information and Ongoing support and follow-up, respectively.

Motivation/emotional readiness

Nurses need to be aware that shock and embarrassment can occur with the patient, and investigating the needs and desires of the patient is of great importance. [75] Recognising and responding to the patients' emotional reaction to learning to self catheterise can improve the patients' motivation, compliance, self-esteem and psychological wellbeing. Investigating the motivation of the patient is also important for successful assessment. [50]

Fears of negative effects of IC and lack of self-efficacy persist over time and can have a negative impact on long-term adherence. Patients perceive the combination of IC and having an active social life as difficult and seem to choose from avoiding activities or non-adherence to prescribed IC frequency. Some older patients tend to avoid situations that compromise adherence and some younger patients fight the difficult combination of IC and their image of self, their independence, the routines they wish to maintain, and their intimate relationships. Young patients often have resistance to a sickness role. [50]

Logan (2008) [63] has investigated patients' experience of learning IC. She has stated that the psychological reaction of shock and embarrassment experienced initially by people carrying out IC dissipates over time with good support from health care professionals.

Need for psychological support

The psychological implications for people who need to learn and perform IC, often pose the biggest challenge of this treatment. Therefore, for nurses to provide an effective service and to train and support people, it is important to explore and address the patients' psychological, emotional and practical needs, including correct communication, information giving, and attitudes. Effective communication, skills, and a positive attitude of nurses can help to alleviate patients' shock and embarrassment. [63] Refer the patient to a sexologist or psychologist if needed.

Availability to perform the procedure and performing IC outside patient's own home

As patients express a desire for privacy while performing catheterisation, this must be discussed with patient and caregiver. The preferred location for catheterisation, if given the choice, is at home. When the procedure is taught in an outpatient clinic, the patient's need for privacy must be met [63] Consideration should also be given to the availability of a washbasin for hand washing and lubricating the catheter. [76]

The patient and caregiver should be aware of contingency plans of who will perform IC if the caregiver is unable due to illness or holidays, for example.

Some patients, especially older people, find it difficult to perform IC outside their own house, because they are afraid of poor hygienic sanitary conditions, and the risk of UTI because of this. [50]

Even though IC is the gold standard in bladder management, it might be preferable to use an indwelling catheter during a short period, for instance, during a flight where there is a minimum of sanitary circumstances. [77]

A Medical travel document could be helpful for people who practise IC and are travelling abroad. The travel document offers information on the products the patient carries e.g. for bladder management and contains contact details of the health care provider should a custom employee have any queries.

An example of a medical travel document for patients can be found in:

Appendix K Medical travel document for patients

Recommendations	LE	GR
• Assess the caregiver’s general health, dexterity, motivation, understanding, and availability to undergo IC [69]	4	C
• Assess whether the patient/caregiver has an understanding of the basic anatomy and function of the urinary system [78]	4	C
• Ensure that the patient and/or caregiver has a clear understanding of the patient’s relevant urological condition and why he/she requires IC [17]	4	C
• Use a checklist to predict ability for IC especially in neurological patients [79]	4	B
• Investigate the need for special hand devices and the motivation of the patient [50]	4	B
• Recommend catheter material that is most suitable for the patient’s lifestyle [74]	3	B
• Obtain informed consent to agree with the patient the choice of caregiver who will carry out IC [76]	4	C
• Provide patients with contact details of any available patient organisations or peer support to enhance compliance	4	C
• Offer support to patients and/or caregivers to help them overcome any initial resistance to IC [63]	4	B
• Investigate the needs and desires of the patient [75]	4	B
• Allow the caregiver and patient to express any psychological issues and advantages they may have concerning IC	4	C
• Counsel the patient about the possible alteration in their relationship as a result of the caregiver performing such an intimate procedure, prior to obtaining consent [75, 62, 76]	4	C
• Advise patients to take a Medical travel document in case they are travelling abroad	4	C

7.4 Patient and caregiver education – why, who, when, where, how and what

Why

The purpose of education is to empower the patient and/or the caregiver to enable them to have more control and to ease problem solving. Education needs to be directed to both the patient and the caregiver. Health care professionals' communication skills and attitudes are instrumental in promoting confidence in carrying out the procedure and can promote long-term compliance.

Who

When it is not possible for the patient to carry out IC, the procedure can be taught to an appropriately trained caregiver. The health professional needs to counsel both the patient and the caregiver regarding the:

- potential benefits and difficulties with this method of bladder management
- knowledge and skills required to perform the procedure
- commitment required to carry out IC on a regular basis
- potential lifestyle adjustment

Often the patient feels more at ease during a learning session when supported by their partner. This can be of great value when patients' private circumstances form an obstacle to accepting and feeling comfortable with IC, and the patient has feelings of inferiority or is worried about their sex life.

When

Patients must be physically and emotionally ready to learn, because all types of learning require energy. Patient motivation and previous learning experiences are relevant. The nurse needs to be sensitive to the patient's wishes and needs and be prepared to use a variety of educational strategies. O'Connor (2005) [80] has described the importance of self-care in teaching stoma management skills. This can also be applied to IC education. Sometimes an intermediate step must be taken, in which a caregiver or health care professional performs the IC for a short time.

Where

Teaching IC may be carried out in the patient's home or in hospital. The patient's privacy is paramount in either location. [63, 64]

How

The educator should demonstrate calmness and provide praise and encouragement. It is important to give the caregiver feedback and provide reassurance. [63]

Consistent teaching methods and modelling of desired behaviour increase patient and caregiver's technical skills and satisfaction. They also confirm to nursing staff that their patients and caregivers are ready to carry out IC successfully outside the hospital. [81]

More than one appointment with the patient and caregiver may be necessary to allow time for them to assimilate the information given before they can give full informed consent to the

arrangement. [77] The wishes of both the patient and the caregiver need to be considered. [82] It is important that neither the patient nor the caregiver feels coerced into performing a procedure with which they feel uncomfortable. [82] Respect for the patient's and caregiver's cultural and religious beliefs also needs to be taken into account. [83]

What

There are many things a patient or caregiver needs to know before they can perform the IC procedure confidently and safely. For this purpose, a checklist is provided. This checklist is intended to assist a health care professional to check whether all the information that needs to be given to the patient about IC has been provided.

The checklist for patient information can be found in: Appendix A: Checklist for patient information

Patients need:

- verbal explanation of IC,
- practical instruction in the procedure, and
- written information.



*Fig. 23 Verbal explanation of IC
(Courtesy Manchester Royal Infirmary, UK)*

Written information

Pre-treatment information should be supplemented by booklets (preferably non-commercial), where all topics are explained textually and clarified with relevant anatomical pictures and other patient's experiences. Digital information can be found at websites of suppliers, hospitals, and patient organisations. Preferably, the information should be written in plain language. [75]

All verbal information should be reinforced with written information that the patient and caregiver can keep and consult.

The choice of technique and material

It is important that the health care professional enables the patient to make an informed choice when choosing the best method and product for their individual needs. [77] For more information about the choice of technique and material, refer to Sections 8.1 and 8.2.

Supply and reimbursement of catheter equipment

Reimbursement differs in European countries because each has its own health care system and insurance. Some patients are not reimbursed for their products and cost must be taken into account when recommending appropriate products. Nurses should be aware of their national rules for reimbursement. Some products are not available locally; storage and reuse of catheters might in some countries be a deciding factor on patient choice. Increased risk of complications and cost of treatment may offset the advantages of catheter reuse. [77]

Changes in urine colour and smell

Patients need to be aware of possible changes in the colour and smell of urine, due to what they have eaten, drunk, breathed or been exposed to.

An overview of changes in urine can be found in:

Appendix J Changes in urine due to food and medication

Recommendations	LE	GR
• Ensure that the healthcare professional is proficient in both the skills and teaching of IC	4	C
• IC should be taught by an appropriately experienced nurse	4	C
• Individualise teaching for the patients and their caregivers [72]	4	C
• Use consistent teaching methods and modelling of desired behaviour to increase patient and caregiver's practical skills and satisfaction	4	C
• Develop a relationship and environment that encourages and supports the patient towards self-management of long-term bladder conditions [63]	4	B
• Encourage the patient and/or caregiver to handle the equipment first and talk through the procedure before demonstrating the technique because this aids the learning process	4	C
• Empower the patient and/or caregiver to take an active role in catheter management [75]	4	C
• Educate the patient and/or caregiver about the safe moving and handling of the patient [64]	4	C
• Provide verbal explanation of IC and sufficient time for practical instruction of the procedure to the patient/caregiver	4	C
• Assure that all verbal information is reinforced with written information to help the patient and caregiver learn the procedure	4	C

7.5 Ongoing support and follow-up

Integrating IC in everyday life can be difficult. The patient and the caregiver require close ongoing support and follow-up. [77, 82, 84] However, only half the patients receive these. [75] Following tuition in IC, patients should be offered an early review by a health care professional to ensure that they are successfully performing the procedure, and to offer help with any difficulties they may have experienced. [50, 69, 83, 85]

This can be given in an evaluation by telephone afterwards or during consultation at a polyclinic. [75] It is important to give the patients contact details in order to access professional help should they require it. It may also be helpful for them to be given the contact details of any available support networks for both patients and caregivers.

In some cases it even might be preferable to have home visits by community nurses in order to solve problems and improve compliance in the home setting. [86]

Recommendations	LE	GR
• Provide ongoing social support (by consultation/telephone) to improve QoL [77, 82, 84] and prevent complications	4	C
• Assess adherence in patients by keeping a registration of catheterisation practice, IC cessation, and other relevant aspects. [50]	4	C
• Ongoing support should be available for patients and relatives for the period of the catheterisation.	4	C

8. Procedures for intermittent catheterisation

8.1 Choice of technique

The choice of technique depends on the setting where IC takes place, who will catheterize, and the local policy of the different countries. In hospital settings there are rising concerns about infection control indicating that a sterile technique would be needed for safety [9] Catheterisation by a health care professional is always with a sterile or aseptic/no-touch technique because of the risk of cross-contamination.

In the community setting, clean/no-touch rather than sterile intermittent catheterisation is agreed to be a safe effective procedure with no increased risk of symptomatic urinary tract infection.

A small study (n=36) in spinal cord injury patients who were catheterised by a NS showed, that clean intermittent catheterisation (in this guideline described as a no-touch technique in the rehabilitation setting), does not appear to place the patient with spinal cord injury at increased risk for developing symptomatic urinary tract infection. [87]

Please refer to diagram 1 and 2 for an overview of catheterisation techniques in different settings.

8.1.1 Intermittent catheterisation by health care professionals

For practical guidelines on how to insert a male or a female urethral catheter, see Appendices B-E, and G.

Procedures are listed in:

- Appendix B Male urethral catheterisation by a health care professional – Aseptic procedure*
- Appendix C Female urethral catheterisation by a health care professional – Aseptic procedure*
- Appendix D Male urethral catheterisation by a health care professional – No-touch procedure*
- Appendix E Female urethral catheterisation by a health care professional – No-touch procedure*
- Appendix G Patient's teaching procedure intermittent self catheterisation – female and male*

Recommendations for IC by a healthcare professional	LE	GR
• Verbal consent should be obtained from the patient for IC before starting the procedure	4	C
• Observe local protocol on procedure for IC	4	C
• Observe the protocols for the principles of the aseptic procedures [88]	4	C
• Use a sterile catheter to prevent cross contamination in clinical, rehabilitations and long term care settings	4	C
• Check for lidocaine and chlorhexidine intolerance if using a lubricant containing lidocaine and/or chlorhexidine*	4	C
• Use a sterile single-use packet of lubricant jelly, when inserting a non-coated urethral catheter*	4	C
• Install 10 ml of lubricating gel in male, 6 ml in female patients [89] when inserting a non-coated urethral catheter*	4	C
• Routine use of antiseptic lubricants for inserting the catheter is not necessary*	4	C
• Perform IC after micturition if it is indicated in a patient who is able to void*	4	C
• Use a voiding diary to investigate the fluid intake and output in the patient*	4	C

The above recommendations with an asterisk (*) should also be included in the patient / caregiver education on intermittent (self) catheterisation.

8.2 Choice of material

The choice of material depends on the assessment being undertaken. (Section 73)

Catheter type and characteristics vary as do reasons why individuals need to perform IC. When choosing which product to use, consideration must be given to patient preference, limitations or disabilities, cost-benefit, cost-effectiveness, ease of use, and storage issues. Availability of different types of catheters will differ in various countries and the individual needs to check local availability.

IC relies on compliance and can be demanding for an individual. Therefore, the patient should be guided in selecting the best product for their needs and recognise that their requirements may alter. [90]

Complete sets usually contain a catheter suitable for IC, a drainage/reservoir bag to collect the urine and a lubricant or activator such as water if the catheter is hydrophilic and not pre-lubricated.

Complete set or standard catheter

Most of the packaging of sets requires a level of manual dexterity to activate the lubricant and some patients may find this difficult. The urine collection/reservoir bags can be sealed and often have a built in plug or valve to prevent backflow or leakage. These sets provide a no-touch technique. They are more expensive than standard intermittent catheters and this is a consideration in countries where reimbursement of the cost of catheterisation material is not an option.

Leak-proof urine collection bag

There is a leak-proof drainable or re-sealable urine collection bag that is particularly useful for situations where catheterisation is managed lying on a bed, travelling, or in a confined space. This type of product offers a discreet and safe option with easy insertion and may be of particular use to patients with limited dexterity or mobility or in restricted environments.

Lubrication or coated catheter

Lubrication

Non-coated catheters require the use of lubricants. Female catheterisation has traditionally been performed using either no gel or a small amount of lubricant on the catheter tip. In both male and female patients, the vulnerable urothelium can only be protected by an unbroken film of lubricant. This implies that lubricants must be instilled into the urethra, and not on the catheter or else the lubricant can be wiped off at the entrance to the urethra and, therefore, does not reach the narrow, more vulnerable parts. For those with preserved urethral sensation, a local anaesthetic jelly may be needed. Lidocaine gels are contraindicated in patients with known sensitivity to the active ingredients and those who have damaged or bleeding urethral membranes because there is an increased risk of systemic absorption of lidocaine hydrochloride. [89]

Hydrophilic catheter

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. [91] Bacteria can be introduced with the catheter insertion as a result of trauma therefore hydrophilic coatings cause fewer complications in terms of UTI, haematuria and pain. These findings are from a study including mainly people with neurogenic bladder dysfunction. [32]

Various studies have shown discomfort on withdrawal of hydrophilic coated catheters in patients who take a longer time to manage the process of IC. [54, 92] When catheterisation is prolonged, the urethral wall absorbs the fluid from the hydrophilic coating and the catheter sticks to the urethral wall.

Sometimes handling problems occur due to the slippery surface created by the coating. [70] Most of the available literature suggests that most patients prefer to use a coated single-use catheter for convenience, discretion, comfort, improved QoL, and reduced episodes of UTI. [34, 70, 74, 93]

Material to take home from the hospital

When patients leave the hospital to continue IC at home, they need to be given a sufficient supply of catheter sets, lubricants and bags for the initial period.

8.3 Meatal cleansing

Except for complete sterile technique in the operating theatre setting (see Chapter 3.2) water and soap can be used for meatal cleansing (or only water if there is no evidence of soiling), because it has been shown that water is as safe as antiseptic for preparation of the periurethral area before inserting a catheter. However, the studies of Webster in 2001, Leaver in 2007, and Nasiriani in 2009 that showed these results, were all carried out with indwelling catheters. [94, 95, 96]

Recommendation	LE	GR
• Cleaning or disinfection of the meatus urethrae	Unresolved issue	

8.4 Troubleshooting

Constipation

Constipation may cause pressure on the drainage lumen that prevents the catheter from draining adequately. [97, 98] Maintaining regular bowel function with a high-fibre and high-fluid intake helps prevent constipation. [99]

Pregnancy

Pregnancy can also cause practical difficulties in IC as the length of the urethra is altered as the baby develops. Some women may have to find alternative positions and catheters before their pregnancy is too advanced. [77]

Difficulties with insertion

Sometimes the catheter cannot pass the sphincter due to dyssynergia in neurogenic patients. In that case, the patient should be advised to try and take a deep breath or use a different position (sitting or standing or lying). Sometimes it is helpful to hold the catheter against the sphincter. The sphincter then often relaxes and allows the catheter to pass after a short while. If the problem only occurs when the bladder is full, catheterising at a shorter interval may prevent it (for example after 3 instead of 4 hours).

Recommendations	LE	GR
<ul style="list-style-type: none"> Reassess the choice of material, equipment, catheterisation technique, lubrication, etc. in case of problems 	4	C
<ul style="list-style-type: none"> Increase the traction on the penis slightly and apply a steady, gentle pressure on the catheter if resistance is felt at the external sphincter. Ask the patient to strain gently as if passing urine. 	4	C
<ul style="list-style-type: none"> Instruct the non-neurogenic patient to do pelvic floor exercises (relaxing the pelvic floor during insertion and removing) because this may be helpful to reduce pain. 	4	C
<ul style="list-style-type: none"> Use a slightly larger Ch size if there is a small lumen catheter buckle/kink in the urethra 	4	C
<ul style="list-style-type: none"> Use a smaller lumen catheter in case of complaints of suction or place the thumb on the catheter during removal to avoid suction 	4	C
<ul style="list-style-type: none"> Use a special tip (Tiemann, IQ-Cath®, Ergothan) catheter or hold the penis in an upright position to straighten out the curves, if unable to negotiate the catheter past the U-shaped bulbar urethra 	4	C
<ul style="list-style-type: none"> When inserting a Tiemann tip, the tip must point upward in the 12 o'clock position to facilitate passage around the prostate gland [100] 	4	C
<ul style="list-style-type: none"> Assess the patient's bowel function in case of constipation to prevent pressure on the drainage lumen 	4	C
<ul style="list-style-type: none"> Add additional lubrication and/or gel coated catheters to reduce discomfort in women with mucosal atrophy 	4	C
<ul style="list-style-type: none"> Insert the catheter carefully to reduce the risk of bladder calculus formation caused by pubic hairs in the bladder 	4	C

9. Infection prevention

UTI has an impact on QoL in terms of patients refraining from social activities, number of days ill, and number of days lost from work. [19] Bacteriuria is acquired at the rate of ca. 1-3% per catheterisation. Therefore it is universal by the end of the third week. [13]

9.1 Urinalysis

Patients performing IC routinely have abnormal urinalysis. The majority of patients have chronic or recurring bacteria present in their urine. [14, 30]. Dipstix alone has limited value to rule out infection because of uncertainty in the performance of urinalysis. [101]

Recommendation	LE	GR
• Undertake urinalysis or take a specimen of urine for culture if a patient has symptoms suggesting a UTI [13]	4	C

9.2 Fluid intake

Drinking sufficient fluid dilutes the urine and ensures a constant downward drainage and flushing effect. The amount of fluid needed varies and depends on patient size (25-35 ml/kg/day), amount of fluid loss, food intake, and circulatory and renal status. Inadequate fluid intake is a companion problem to inadequate frequency of emptying. When less than 1200 ml of urine per day is produced, patients are less inclined to empty at desired intervals, producing stagnation and distension, which can lead to an increase in infection rate. [67] Excessive fluid intake increases the risk of overdistension of the bladder and overflow incontinence. [67]

Recommendations	LE	GR
• Encourage patients to drink enough fluid to maintain a urine output of at least 1200 ml per day [67]	4	C
• Patients should be given sufficient fluid based on their weight (25-35 ml/kg/day)	4	C

9.3 Cranberries

The prophylactic administration of cranberry supplementation does not appear to affect the incidence or risk of CAUTI as a result of IC. [24]

Recommendation	LE	GR
• Do not recommend cranberry supplementation routinely to prevent or treat UTI [102, 103]	1b	A

9.4 Hand hygiene

To minimise the risk of cross-infection health care professionals should be constantly aware of their hand hygiene. Patients who self-catheterise should disinfect or wash hands thoroughly with water and soap before catheterisation [104]

Recommendations	LE	GR
• Observe protocols on hand hygiene before catheterisation [13, 105]	1b	A
• Educate patient/caregiver in techniques of hand hygiene before discharge from hospital	4	C

10. Patient quality of life (QoL)

IC has a huge physical, psychological and emotional impact on patients and in many instances their partners, caregivers and the whole family. [75]

Positive impact on patient QoL:

- Improvement of urinary symptoms
- Unbroken sleep
- Independency
- More self-confidence
- Less urine incontinence
- Normal sex life
- Less local periurethral infection, febrile episodes, stones and deterioration of renal failure

Negative impact on patient QoL:

- Difficult to perform and to integrate in daily life (e.g., lack of public toilets, work environment, and holidays)
- Feelings of worry, shock, fear or depression
- Affected family and social life
- Can be painful
- Time consuming, and having to watch the time (every 2-3 hours)
- Fatigue
- May take time to adapt to daily life

[13, 50, 75, 76]

Medical complications are described in Chapter 5.0.

Frequency

The number of times a day that participants carry out IC has major implications for QoL. Those who catheterised twice a day were more able to develop a routine that does not require catheterisation outside the home. This avoids many of the difficulties described so far and allows them, in general, to carry out their normal activities unhindered.

Sexuality and body-image

Few studies have addressed the impact of IC on sexuality and body image. Several negative influences have been described in case reports.

One woman stated that CIC had put a wedge between her and her husband because he resented having to do it for her and their sexual relationship had suffered because he feared hurting her. One young man commented that his personal life virtually stopped. [75]

Performing self-catheterisation might negatively affect intimacy and sexuality, especially in patients under the age of 65. Patients may avoid confronting (potential) partners with CISC and therefore skip one or more occasions when having dates or intimate encounters. [50]

Recommendation	LE	GR
• Discuss sexuality and impact of IC as a part of patient assessment; if necessary, refer to a psychologist/sexologist	4	C

11. Documentation

When a patient starts catheterisation, the following data must be collected and documented:

- reasons for catheterisation
- residual volume
- frequency
- date and time of catheterisation
- catheter type, tip, length and size
- problems negotiated during the procedure

Documentation has to follow local policy.

A voiding diary can be found in:

Appendix I Voiding diary for intermittent catheterisation patients

Recommendations	LE	GR
• Complete a voiding diary for all intermittent catheterisation patients to assess bladder emptying	4	C
• Offer patients an individualised care plan based on the above criteria, bearing in mind the patient's and caregiver's lifestyles and the impact this will have on the patient's QoL. [106]	4	C

12. Intermittent urethral dilatation

Urethral strictures have always been common. We know something about how the ancient Egyptians treated stricture disease 4000 years ago, and other civilisations since, and not much had changed until about 50 years ago. Urethral strictures are still common now. Hospital Episode Statistics in the UK and similar data from the USA suggest that men are affected with an increasing incidence from about 1 in every 10,000 men aged 25 years to about 1 in every 1000 men aged over 65 years. [107, 108]

Urethral strictures can occur at any point along the urethra but are commonest in the bulbar urethra and at the urinary meatus. Intermittent dilatation is a well-established method of managing urethral strictures following either a urethral dilatation (as a surgical procedure) or an internal urethrotomy. [109]

A Cochrane review [110] concludes that there are insufficient data to determine if urethral dilatation, endoscopic urethrotomy, or urethroplasty is the best intervention for urethral stricture disease in terms of balancing efficacy, adverse effects, and costs. A small study comparing CISC and repeated sounds dilatation has shown that patients performing CISC had a significant improvement in flow rate compared with patients who had repeated sounds dilatation. [111, LE 1b]

Why

Intermittent urethral dilatation is performed to maintain the patency of the urethra, bladder neck, or external urethral meatus. The decision to commence urethral dilatation is on medical advice.

When

When the medical decision is made that a patient would benefit from practising urethral dilatation, the patient is taught to self-dilate within a month of surgery. Ideally the catheter should be a size 16 Ch or 18 Ch. [109] Occasionally the patient may need to commence intermittent self dilatation (ISD) initially with a smaller Charrière size because the urethra will not accommodate the larger catheter. If this is the case, the Charrière size should be increased over time to a larger diameter catheter if possible.

How long

Urethral dilatation is considered a long-term solution; patients should be informed that they need to continue to dilate intermittently in the long term [6], unless reconstructive surgery is considered.

12.1 Aetiology

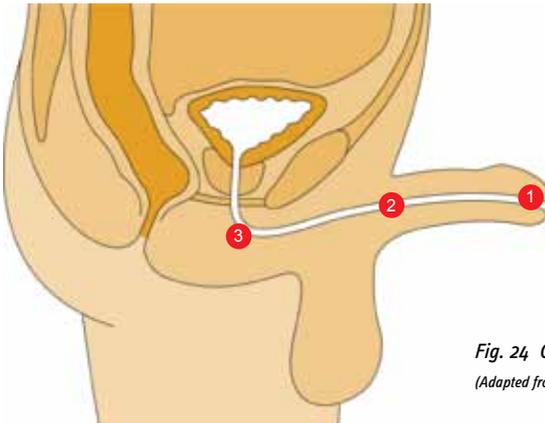
Strictures are more common in men because the male urethra is longer than the female and the female urethra is straighter than the male. Urethral strictures/stenosis can occur due to:

- infection
- trauma
- instrumentation (including catheterisation)
- congenital abnormalities
- inflammation

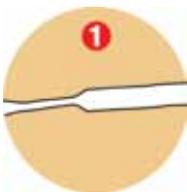
In addition to the above, the cause can be unknown. [5]

12.2 Indications

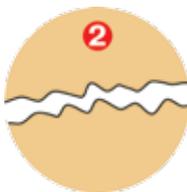
1. Urethral stricture disease
2. Stenosis of the external urethral meatus
3. Bladder neck stenosis



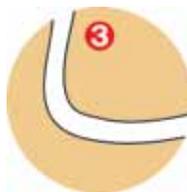
*Fig. 24 Common positions of strictures
(Adapted from Manfred Sauer GmbH)*



*Meatal stenosis/
stricture*



*Strictures of the
urethra*



*Bulbar urethral
stricture*

12.3 Contraindications

1. Suspected or confirmed urethral rupture
2. Suspected or confirmed UTI
3. Suspected or confirmed false passage

12.4 Materials and procedure

The procedure and the material for intermittent urethral dilatation are the same as used for IC.

When teaching patients to self-dilate, it is important that the health care professional and the patient are aware of the location of the urethral stricture. This determines how far the catheter needs to be inserted along the urethra because all strictures require the catheter to be advanced beyond the stricture.

Female patients:

In practical terms, because of the shortness of the female urethra, women should introduce the catheter all the way into the bladder to ensure the stricture has been passed.

Male patients:

- Meatal strictures and strictures occurring in the distal urethra can be negotiated with a meatal dilator or a female-length catheter.

A male length catheter is required for all other urethral strictures.

- Mid-penile strictures need to be passed beyond the stricture. If there is any doubt that the stricture has been negotiated, the catheter should be passed into the bladder.
- For all bulbar and membranous strictures, the catheter should be advanced all the way into the bladder to ensure that the stricture has been dilated.

The procedure for undertaking urethral dilatation is found in:

Appendix F Intermittent urethral dilatation - female and male

The principles for teaching urethral dilatation are the same as for teaching a patient or caregiver how to catheterise intermittently.

Recommendations	LE	GR
• Inform the patient and/or caregiver that long-term intermittent urethral dilatation is not curative and will be required long-term unless e.g., reconstructive surgery is planned [6]	4	C
• Advise the patient and/or caregiver not to continue advancing the catheter if more than minimal force is required	4	C

12.5 Frequency

The frequency is a medical order. In the early days of learning, frequency should be up to daily. Thereafter, frequency can be less often depending on individual symptoms. [5, 6, 109] The recurrence of strictures are much lower, when urethral dilatation is continued for more than 12 months. [111]

13. Abbreviations

- CAUTI Catheter associated urinary tract infection
- CFU Colony forming unit
- CIC Clean intermittent catheterisation
- CISC Clean intermittent self catheterisation
- IC Intermittent catheterisation
- ISD Intermittent self dilatation
- NS Nurse specialist
- QoL Quality of life
- REACH Registration, Evaluation, Authorisation and Restriction of Chemicals
- SIC Sterile intermittent catheterisation
- SISC Sterile intermittent self catheterisation
- SUI Stress urinary incontinence
- TOT Transobturator tape
- TVT Tension free vaginal tape
- UTI Urinary tract infection
- UUI Urgency urinary incontinence

14. Figure reference list

Figure front page Intermittent catheterisation in male and female:
Courtesy Rochester Medical, www.rocm.com

Fig. 1	Single-use catheter - LoFric® Dila-Cath™: Courtesy Wellspect HealthCare, www.lofric.com	25
Fig. 2	Male catheter for no-touch use - LoFric® Origo™ Insertion Grip: Courtesy Wellspect HealthCare	25
Fig. 3	Male catheters partly covered by sleeve: Courtesy C. Vandewinkel	25
Fig. 4	Female catheter partly covered by a sleeve/grip - Liquick® Base (Teleflex Ltd., www.teleflex.com): Courtesy V. Geng	26
Fig. 5	Male catheters completely covered by sleeve: Courtesy C. Vandewinkel	26
Fig. 6	Female catheters completely covered by sleeve: Courtesy C. Vandewinkel	26
Fig. 7	Telescope catheter - SpeediCath® Compact Male (Coloplast, www.coloplast.com): Courtesy V. Geng	26
Fig. 8	Various female compact catheters. The top catheter is partly covered by a sleeve/grip: Courtesy V. Geng	27
Fig. 9	Female compact catheter with grip - Curan Lady: Courtesy Curan, www.curan.eu	27
Fig. 10	Catheter set - Actreen® Glyc Set: Courtesy B. Braun, www.bbraun.com	28
Fig. 11	Catheter set - LoFric® Hydro-Kit™: Courtesy Wellspect HealthCare	28
Fig. 12	Catheter set - SpeediCath® Complete: Courtesy Coloplast	28
Fig. 13	Catheter set - VaPro Plus®: Courtesy Hollister Incorporated, www.hollister.com	29
Fig. 14	Catheter set - IQ-Cath® Bag: Courtesy Manfred Sauer GmbH, www.manfred-sauer.com	29
Fig. 15	Catheter set - SpeediCath® Compact Set: Courtesy Coloplast	29
Fig. 16	Flexible Ergothan tips with various Charrières: Courtesy Teleflex Ltd.	30
Fig. 17	Pointed tip - IQ-Cath® (Manfred Sauer GmbH): Courtesy C. Vandewinkel	30
Fig. 18	Mercier (top) and Couvelaire (bottom) tip: Courtesy C. Vandewinkel	31
Fig. 19	Example of the introducer tip - VaPro™ (Hollister Incorporated): Courtesy V. Geng	31
Fig. 20	Example of catheter with Luer Lock connector - B. Braun: Courtesy V. Geng	32
Fig. 21	Example of Luer Lock adapter - B. Braun: Courtesy V. Geng	32

Fig. 22	Example of a catheter packed with gel or water: Courtesy Manfred Sauer GmbH	33
Fig. 23	Verbal explanation of IC: Courtesy Manchester Royal Infirmary, UK	42
Fig. 24	Common positions of strictures: Adapted from Manfred Sauer GmbH	56
Fig. 25	Insertion of the catheter by the patient: Courtesy Hollister Incorporated	79
Fig. 26	Penis support (width 2 or 4 cm) - p.hold: Courtesy Manfred Sauer GmbH	80
Fig. 27	Freehand Clothing holder: Courtesy Teleflex Ltd.	80
Fig. 28	SpeediHook - Coloplast: Courtesy J. Eikenboom	81
Fig. 29	OptiLux Leg Mirror with light: Courtesy Teleflex Ltd.	81
Fig. 30	Leg spreader small and large with mirror: Courtesy Manfred Sauer GmbH	81
Fig. 31	Leg spreader inflatable with mirror (front and back view): Courtesy Manfred Sauer GmbH	81
Fig. 32	Labia Spreader: Courtesy Manfred Sauer GmbH	82
Fig. 33	Cath-Hand: Courtesy Manfred Sauer GmbH	82
Fig. 34	Handle - Wellspect HealthCare: Courtesy J. Eikenboom	82
Fig. 35	ErgoHand Insertion Aid: Courtesy Teleflex Ltd.	82
Fig. 36	KIC-System®: Courtesy Manfred Sauer GmbH	83

15. Appendices

Several procedures are described in the following pages. These procedures do not have a high level of evidence, but they are based on the experience (best practice) of the Working Group as well as on protocols and care standards of various hospitals. Consequently, the evidence level for these documents is mostly 4.

- Appendix A Checklist for patient information
- Appendix B Male urethral catheterisation by a health care professional – Aseptic procedure
- Appendix C Female urethral catheterisation by a health care professional – Aseptic procedure
- Appendix D Male urethral catheterisation by a health care professional – No-touch procedure
- Appendix E Female urethral catheterisation by a health care professional – No-touch procedure
- Appendix F Intermittent urethral dilatation - female and male
- Appendix G Patient's teaching procedure intermittent self catheterisation - female and male
- Appendix H Help devices
- Appendix I Voiding diary for intermittent catheterisation patients
- Appendix J Changes in urine due to food and medication
- Appendix K Medical travel document for patients

Appendix A

Checklist for patient information

This checklist is intended to assist health care professionals to check whether all the information that patients need to know about IC has been provided.

Patients need to know

- Why IC is necessary
- Basic anatomical knowledge about the urogenital tract
- How to perform the IC procedure
- The number of times to perform IC
- Which difficulties may occur during or after the catheterisation procedure
- Name, size and length of catheter
- How to store the catheters correctly
- To check the expiry date of the material before use
- How to prepare the catheter for use
- How to dispose of the catheters safely
- How to obtain supplies of the catheter [69]
- That the technique of IC may vary in different settings (e.g., hospital, outpatient clinic, and home)
- Importance of fluid intake
- Importance of a healthy diet to avoid constipation
- Importance of good hygiene
- How to avoid UTI
- How to recognise symptoms or the common signs of UTI
 - burning on urination
 - frequency and/or urgency
 - pain
 - offensive smelling urine
 - cloudy/dark urine
 - feeling tired or shaky
 - fever or chills
 - haematuria [17, 69, 78]
 - difficulties with either insertion or removal of the catheter
- Availability of appropriate aids to help with catheterisation such as mirrors, hand grips, leg abductors, integrated drainage bags, and travel kits
- What to do when travelling abroad
- When to contact a health care professional
- Contact the health care professional in case of
 - pain during or after catheterisation
 - catheterisation becoming more difficult
 - haematuria
 - fever
 - problems in bowel movement
 - lower back pain
 - discoloured or malodorous urine

Appendix B

Male urethral catheterisation by a health care professional – Aseptic procedure

Material for catheterisation

1. Catheterisation pack (content varies, but should at least contain):
 - one sterile drape
 - one bowl with swabs
 - one pair of sterile gloves
2. Sterile catheter
Selection of appropriate catheters; it is advisable to take a spare catheter in addition to the one you want, and one of a different/smaller size (non-coated, hydrophilic or pre-lubricated)
3. Sterile (anaesthetic) lubricating jelly (syringe 10-20 ml)
4. Disposable pad for bed protection
5. Container of sterile water of 20 ml for hydrophilic catheter if not pre-packed
6. Universal specimen container, if required
7. Cleansing solution 10 ml (disinfectant or sterile or non-sterile water and soap)
8. Bactericidal alcohol hand disinfection and one pair of clean gloves
9. Catheter drainage bag or sterile receptacle for urine

Action	Rationale
1. Check the indication and patient file for past problems, allergies etc.	To maintain patient safety.
2. Before the procedure, explain the process to the patient.	To gain consent and co-operation and to ensure the patient understands the procedure.
3. Undertake procedure on the patient's bed or in clinical treatment area using screens/curtains. Assist the patient to get into a relaxed supine position of 30° (if possible) with the legs extended to ensure the penis is accessible. Do not expose the patient at this stage of the procedure.	To ensure patient's privacy. To maintain patient's dignity and comfort.
4. Hand hygiene using soap and water / bactericidal alcohol hand rub.	To reduce risk of infection.
5. Clean and prepare the trolley, placing all equipment required on the bottom shelf.	The top shelf acts as a clean working surface.
6. Take the trolley to the patient's bedside.	

7. Open the outer cover of the catheterisation pack and slide the pack onto the top shelf of the trolley.	To prepare equipment.
8. Make the swabs wet with the cleansing solution.	To cleanse the genitals.
<p>9. The following/ steps may vary if using a coated (a) or non-coated (b) catheter:</p> <p>(a) - If using a pre lubricated ready to use catheter, open the package and hang the package beside the patient or trolley.</p> <p>(a) If using a catheter with a lubricating bag in the package, break the lubricating bag, open the outer package and hang the package with the catheter inside beside the patient.</p> <p>(a) If using a hydrophilic pre-lubricated or ready-to-use catheter, open the package and hang the package beside the patient.</p> <p>(b) If using a catheter without a coating, open the catheter package and lubricating gel and put it on the sterile drape.</p>	<p>To activate the coating of the catheter.</p> <p>To activate the coating of the catheter.</p>
10. Using an aseptic technique, connect the bag to the catheter.	To reduce the risk of cross-infection.
11. Remove cover that is maintaining the patient's privacy and position a disposable pad under the patient's buttocks and thighs.	To ensure urine does not leak onto the bed.
12. Place dressing / protective towel across the patient's thighs and under penis.	Hands may have become contaminated by handling the outer packs.
13. Put on clean gloves.	To reduce risk of cross-infection.
14. Place the disposable pad under the patient's buttocks and place the sterile drape across the patient's thighs.	To create a protective field.
15. Place the receptacle between the patient's legs (if a receptacle is used).	
16. Lift the penis and retract the foreskin using a gauze swab and cleanse the glans penis with the wet swabs. Beginning with the foreskin, the glans and urethral meatus at the end. Use for each part a new swab.	<p>To prevent infection.</p> <p>To create a protective field.</p>

<p>17. Step 17, 18 and 19 refer to situation (b, non-lubricated catheter) only. (b) Allow some gel on the meatus, insert the cone of the lubricant syringe. Then instil 10-15 ml of the (anaesthetic) lubricating gel slowly into the urethra while holding the penis firmly below the glans with the thumb and fingers, and the syringe firmly onto the meatus to prevent the gel from leaking out.</p>	<p>Adequate lubrication helps to prevent urethral trauma. Use of a local anaesthetic minimises the discomfort experienced by the patient and can aid success of the procedure.</p>
<p>18. (b) Remove the syringe from the urethra and hold the penis upright and closed so that the gel stays in the urethra. Alternatively, a penile clamp may be used.</p>	
<p>19. (b) Wait in case of anaesthetic lubrication as recommended on the product (3-5 min.).</p>	<p>To ensure a maximised anaesthetic effect [112, 113, 114, 115, 116].</p>
<p>20. Replace existing gloves with a sterile pair .</p>	<p>To prevent infection.</p>
<p>21. Take the catheter with the other hand (wearing sterile glove).</p>	<p>To prevent infection.</p>
<p>22. Insert the catheter in the meatus and gently advance the catheter into the urethra until urine drains (then insert the catheter 2 cm deeper), or until the end of the catheter. During insertion, hold the penis upright with traction of the other hand.</p>	<p>Advancing the catheter ensures that it is correctly positioned in the bladder.</p> <p>To be sure that the catheter is in the bladder.</p> <p>Lifting the penis straightens the urethra and facilitates catheterisation.</p>
<p>23. If no urine flows gently apply pressure over the symphysis pubis area.</p> <p>Do not use force if there are difficulties inserting the catheter.</p> <p>Make sure the urine collection bag is below the level of the bladder.</p>	<p>To prevent injuries of urethra and bladder neck.</p> <p>Makes sure the urine flows.</p>
<p>24. When urine flow stops, withdraw the catheter very slowly, in centimetre steps. If the urine flow starts again during withdrawal, discontinue withdrawal and wait for the flow to stop before resuming catheter withdrawal.</p>	<p>Makes sure that the bladder is empty and prevents residual urine.</p>
<p>25. Discard the catheter completely.</p>	
<p>26. Ensure that the glans penis is cleansed after the procedure and reposition the foreskin if present.</p>	<p>Retraction and constriction of the foreskin behind the glans penis resulting in paraphimosis may occur if this is not done.</p>

<p>27. Help the patient into a comfortable position. Ensure that the patient's skin and bed are both dry.</p>	<p>If the area is left wet or moist, secondary infection and skin irritation may occur.</p>
<p>28. Measure the amount of urine.</p>	<p>To be aware of bladder capacity for patients with previous occurrence of urinary retention. To monitor renal function and fluid balance.</p>
<p>29. Take a urine specimen for laboratory examination, if required.</p>	<p>To rule out UTI.</p>
<p>30. Dispose of equipment in a plastic clinical waste bag and seal the bag before moving the trolley.</p>	<p>To prevent environmental contamination.</p>
<p>31. Record information in relevant documents; this should include:</p> <ul style="list-style-type: none"> • reasons for catheterisation • residual volume • date and time of catheterisation • catheter type and size • colour and odour of urine • problems negotiated during the procedure • patient experience and problems 	<p>To provide a point of reference or comparison in the event of later queries.</p>

Appendix C

Female urethral catheterisation by a health care professional – Aseptic procedure

Material for catheterisation

1. Catheterisation pack; content varies, but should at least contain:
 - one sterile drape
 - one bowl with swabs
 - one pair of sterile gloves
2. Sterile catheter
Selection of appropriate catheters; it is advisable to take a spare catheter in addition to the one you want, and one of a different/smaller size (non-coated, hydrophilic or pre-lubricated)
3. Sterile (anaesthetic) lubricating jelly (syringe 6 ml)
4. Disposable towel
5. Disposable pad for bed protection
6. 20 ml sterile water for hydrophilic catheter if necessary
7. Universal specimen container, if required
8. Cleansing solution (10 ml disinfectant or sterile or non-sterile water and soap)
9. Bactericidal alcohol hand disinfection and one pair of clean gloves
10. Catheter drainage bag or sterile receptacle for urine

Action	Rationale
1. Check the indication and patient file for past problems, allergies etc.	To maintain patient safety.
2. Before the procedure, explain the process to the patient.	To gain consent and co-operation and to ensure the patient understands the procedure.
3. Undertake procedure on the patient's bed or in clinical treatment area using screens/ curtains to promote and maintain dignity. Assist the patient to get into a relaxed supine position of 30° (if possible). Do not expose the patient at this stage of the procedure.	To ensure patient's privacy. To maintain patient's dignity and comfort during the procedure.
4. Hand hygiene using soap and water / bactericidal alcohol hand rub.	To reduce risk of infection.
5. Clean and prepare the trolley, placing all equipment required on the bottom shelf.	The top shelf acts as a clean working surface.
6. Take the trolley to the patient's bedside.	
7. Open the set with swabs.	To prepare equipment.

8. Make the swabs wet with the cleansing solution.	To cleanse the genitals.
9. The following steps may vary if using a coated (a) or uncoated catheter (b) (a) When using a hydrophilic catheter that requires hydration, open the package and fill with sterile water (following the manufacturer's instructions), and hang the packaging beside the patient or trolley and wait for the recommended time (a) When using a catheter with a lubricating bag in the package, break the lubricating bag, open the outer package, and hang the package with the catheter inside beside the patient (a) When using a hydrophilic pre-lubricated or ready to use catheter, open the package, and hang the package beside the patient (b) When using a catheter without coating, open the catheter package and lubricating gel.	To activate the coating of the catheter. To activate the coating of the catheter.
10. Using an aseptic technique, connect the bag (if a bag is used) to the catheter.	To reduce the risk of cross-infection.
11. Remove cover that is maintaining the patient's privacy and position a disposable pad under the patient's buttocks and thighs.	To ensure urine does not leak onto the bed.
12. Hand hygiene using soap and water / bactericidal alcohol hand rub.	Hands may have become contaminated by handling the outer packs.
13. Put on clean gloves.	To reduce risk of cross-infection.
14. Spread the legs in a gynaecological position.	To obtain a good view of the meatus.
15. Separate with one hand the labia and give traction upward with one hand.	To ease cleaning of the labia and meatus.
16. If tweezers are used for inserting the catheter skip step 17-20 and read "tweezers" for "the hand with the sterile glove" in step 21.	
17. Clean the labia majora exterior, then interior, and then the labia minor exterior, then interior, and finally the urethral meatus. One swab for each labia and meatus – use the wipe anterior to posterior. Alternatively, tweezers with swabs could be used for cleaning.	To avoid wiping any bacteria from the perineum and anus forwards towards the urethra.
18. Put on sterile gloves	To work aseptically and prevent infection.
19. Place the receptacle between the patient's legs (if a receptacle is used)	

<p>20. (b) –When using a non-lubricated/ hydrophilic catheter, put some lubrication on the meatus and then insert the cone of the syringe with (anaesthetic) lubrication in the meatus and slowly instil 6 ml of the gel into the urethra. Remove the nozzle from the urethra.</p>	<p>Adequate lubrication helps to prevent urethral trauma. Use of a local anaesthetic minimises the discomfort experienced by the patient and can aid success of the procedure.</p>
<p>21. Separate with one hand the labia and give traction upward with one hand.</p>	<p>To obtain a good view of the meatus and to minimise the risk of contamination of the urethra.</p>
<p>22. Take the catheter in the hand with the sterile glove. Insert the catheter in the meatus and gently advance the catheter into the urethra until it is in the bladder and urine drains. If no urine flows, gently apply pressure on the symphysis pubis area) until urine drains.</p>	
<p>23. Make sure the urine collection bag is below the level of the bladder.</p>	<p>Assist in urine flow.</p>
<p>24. When urine flow stops, withdraw the catheter very slowly, in small centimetre steps. If the urine flow starts again during withdrawal, discontinue withdrawal and wait for the flow to stop before resuming catheter withdrawal.</p>	<p>Make sure that the entire bladder is empty.</p>
<p>25. Discard the catheter completely.</p>	
<p>26. Clean the labia and meatus.</p>	<p>To avoid skin irritation.</p>
<p>27. Help the patient into a comfortable position. Ensure that the patient’s skin and bed are both dry.</p>	<p>If the area is left wet or moist, secondary infection and skin irritation may occur.</p>
<p>28. Measure the amount of urine.</p>	<p>To be aware of bladder capacity for patients with previous occurrence of urinary retention. To monitor renal function and fluid balance. It is not necessary to measure the amount of urine if the urinary catheter is routinely changed.</p>
<p>29. Take a urine specimen for laboratory examination, if required.</p>	<p>To rule out UTI.</p>
<p>30. Dispose of equipment in a plastic clinical waste bag and seal the bag before moving the trolley.</p>	<p>To prevent environmental contamination.</p>
<p>31. Record information in relevant documents; this should include:</p> <ul style="list-style-type: none"> • reasons for catheterisation • residual volume • date and time of catheterisation • catheter type and size • colour and odour of urine • problems negotiated during the procedure • patient experience and problems 	<p>To provide a point of reference or comparison in the event of later queries.</p>

Appendix D

Male urethral catheterisation by a health care professional – No-touch procedure

Checklist equipment:

1. Set with five swabs
2. No-touch catheter (types see below)
3. Disposable towel
4. Disposable pad for bed protection
5. One pair of non-sterile gloves
6. Sterile water (20 ml) for hydrophilic catheter, if necessary
7. Universal specimen container, if required
8. Cleansing solution (10 ml disinfectant or sterile or non-sterile water and soap)
9. Bactericidal alcohol hand disinfection
10. A catheter drainage bag or receptacle for urine

Additionally:

11. Spare catheter (same type)
12. Catheter of a different/smaller size (hydrophilic or pre-lubricated)

For examples of catheters, see Section 6.2.1.2.1

Action	Rationale
1. Check the indication and patient file for past problems, allergies etc.	To maintain patient safety.
2. Before the procedure, explain the process to the patient.	To gain consent and co-operation and to ensure the patient understands the procedure.
3. 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.
4. Assist the patient to get into a relaxed supine position of 30° (if possible) with the legs extended to ensure the penis is accessible. Do not expose the patient at this stage of the procedure.	To maintain patient's dignity and comfort during the procedure
5. Hand hygiene using soap and water / bactericidal alcohol hand rub.	To reduce risk of infection.
6. Clean and prepare the trolley, placing all equipment required on the bottom shelf.	The top shelf acts as a clean working surface.
7. Take the trolley to the patient's bedside	

8. Make the swabs wet with the cleansing solution.	To cleanse the genitals.
<p>9. Prepare the catheter so that it is ready to use.</p> <ul style="list-style-type: none"> - When using a hydrophilic catheter that requires hydration, open the package and fill with sterile water (following the manufacturer's instructions) and hang the packaging beside the patient or trolley and wait the recommended time. - When using a catheter with a lubricating bag in the package, break the lubricating bag, open the package and hang it with the catheter inside beside the patient. - When using a hydrophilic ready to use or a pre-lubricated ready-to-use catheter, open the package and hang it beside the patient. 	<p>To activate the catheter coating.</p> <p>To activate the catheter coating.</p>
10. Using an aseptic technique, connect the bag to the catheter.	To reduce the risk of cross infection.
11. Remove cover that is maintaining the patient's privacy and position a disposable pad under the patient's buttocks and thighs.	To ensure urine does not leak onto the bed.
12. Hand hygiene using soap and water / bactericidal alcohol hand rub.	Hands may have become contaminated by handling the outer packs.
13. Put on clean gloves.	To reduce risk of cross-infection.
14. Lift the penis and retract the foreskin if present using a gauze swab and clean the glans penis with the solution. Begin with the foreskin, then the glans, and finally the urethral meatus. Use a new swab for each part. Place the drape across the patient's thighs and under the penis.	To prevent infection.
15. Take the catheter with the other hand, holding only the plastic cover or the end of the catheter without touching the catheter.	So there is no need for sterile gloves, and to prevent infection.
16. Insert the catheter in the meatus and gently advance the catheter in the urethra until it is in the bladder and until urine drains (then insert the catheter 2 cm deeper) or until the end of the catheter. During insertion, hold the penis upright with traction of the other hand.	<p>Advancing the catheter ensures that it is correctly positioned in the bladder.</p> <p>To be sure that the catheter is in the bladder.</p> <p>Lifting the penis straightens the penile urethra and facilitates catheterisation.</p>
17. If no urine flows gently apply pressure over the symphysis pubis area till urine drains.	Makes sure the urine flows.

18. Do not use force if there are difficulties inserting the catheter.	To prevent injuries of urethra and bladder neck.
19. Make sure the urine collection bag is below the level of the bladder.	Makes sure the urine flows.
20. When urine flow stops, withdraw the catheter very slowly, in centimetre steps. 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 bladder is empty, and prevents residual urine.
21. Discard the catheter completely.	
22. Ensure that the glans penis is cleansed after the procedure, and reposition the foreskin if present.	Retraction and constriction of the foreskin behind the glans penis resulting in paraphimosis may occur if this is not done.
23. Help the patient into a comfortable position. Ensure that the patient's skin and bed are both dry.	If the area is left wet or moist, secondary infection and skin irritation may occur.
24. Measure the amount of urine.	To be aware of bladder capacity for patients with previous occurrence of urinary retention. To monitor renal function and fluid balance.
25. Take a urine specimen for laboratory examination, if required.	To rule out UTI.
26. Dispose of equipment in a plastic clinical waste bag and seal the bag before moving the trolley.	To prevent environmental contamination.
27. Record information in relevant documents; this should include: <ul style="list-style-type: none"> • reasons for catheterisation • residual volume • date and time of catheterisation • catheter type and size • colour and odour of urine • problems negotiated during the procedure • patient experience and problems 	To provide a point of reference or comparison in the event of later queries.

Appendix E

Female urethral catheterisation by a health care professional – No-touch procedure

Checklist equipment:

1. Set with five swabs
2. Disposable towel
3. Disposable pad for bed protection
4. One pair of non-sterile gloves
5. Catheters
6. Sterile water (20 ml) for hydrophilic catheter, if required
7. Universal specimen container, if required
8. Cleansing solution (10 ml disinfectant or sterile or non-sterile water and soap)
9. Bactericidal alcohol hand disinfection
10. A catheter drainage bag or receptacle for urine

Additionally:

11. Spare catheter (same type)
12. Catheter of a different/smaller size (hydrophilic or pre-lubricated)

For examples of catheters, see Section 6.2.1.2.1

Observation	Rationale
1. Check the indication and patient file for past problems, allergies etc.	To maintain patient safety.
2. Before the procedure, explain the process to the patient.	To gain consent and co-operation and to ensure the patient understands the procedure.
3. 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.
4. Assist the patient into a relaxed supine position of 30° (if possible). Do not expose the patient at this stage of the procedure.	To maintain patient's dignity and comfort during the procedure.
5. Hand hygiene using soap and water / bactericidal alcohol hand rub.	To reduce risk of infection.
6. Clean and prepare the trolley, placing all equipment required on the bottom shelf.	The top shelf acts as a clean working surface.
7. Take the trolley to the patient's bedside.	
8. Open the set with swabs.	To prepare equipment.

9. Make the swabs wet with the cleansing solution.	To cleanse the genitals.
10. If using a hydrophilic catheter that requires hydration, open the package and fill with sterile water (following the manufacturer's instructions) and hang the packaging beside the patient or trolley and wait the recommended time.	To activate the catheter coating.
11. If using a catheter with a lubricating bag in the package, break the lubricating bag, open the outer package and hang it with the catheter inside beside the patient.	To activate the catheter coating.
12. If using a hydrophilic pre-lubricated or ready to use catheter, open the package and hang the package beside the patient.	
13. Using an aseptic technique, connect the bag to the catheter.	To reduce the risk of cross-infection.
14. Remove cover that is maintaining the patient's privacy and position a disposable pad under the patient's buttocks and thighs.	To ensure urine does not leak onto bed.
15. Hand hygiene using soap and water / bactericidal alcohol hand rub.	Hands may have become contaminated by handling the outer packs.
16. Put on clean gloves.	To reduce risk of cross-infection.
17. Spread the legs in a gynaecological position.	To obtain a good view of the meatus.
18. Separate with one hand the labia and give traction upward.	To clean the labia and meatus more easily.
19. Clean the labia majora exterior and interior, and then the labia minor exterior and interior and finally the urethral meatus. One swab for each labia and meatus – use the wipe anterior to posterior.	To avoid wiping any bacteria from the perineum and anus forward to the urethra.
20. Separate with one hand the labia and give traction upward.	To obtain a good view of the meatus and to minimise the risk of urethral contamination.
21. Take the catheter with the other hand holding only the plastic cover or the end of the catheter without touching the catheter.	
22. Insert the catheter in the meatus and gently advance the catheter in the urethra until in the bladder and urine flows out.	
23. Make sure the urine collection bag is below the level of the bladder.	Assist in urine flow.

24. When urine flow stops, apply slight pressure to the bladder until urine flow resumes.	Make sure that the entire bladder is empty.
25. When urine flow stops, withdraw the catheter very slowly, in centimetre steps. If the urine flow starts again during withdrawal, discontinue withdrawal and wait for the flow to stop before resuming catheter withdrawal.	Make sure that the entire bladder is empty.
26. Discard the catheter completely.	
27. Clean the labia and meatus.	To avoid skin irritation.
28. Help the patient into a comfortable position. Ensure that the patient's skin and bed are both dry.	If the area is left wet or moist, secondary infection and skin irritation may occur.
29. Measure the amount of urine.	To be aware of bladder capacity for patients with previous occurrence of urinary retention. To monitor renal function and fluid balance. It is not necessary to measure the amount of urine if the urinary catheter is routinely changed.
30. Take a urine specimen for laboratory examination, if required.	To rule out UTI.
31. Dispose of equipment in a plastic clinical waste bag and seal the bag before moving the trolley.	To prevent environmental contamination.
32. Record information in relevant documents; this should include: <ul style="list-style-type: none"> • residual volume • reasons for catheterisation • colour and odour of urine • date and time of catheterisation • catheter type and size • problems negotiated during the procedure • review date to assess the need for continued • catheterisation or date of change of catheter 	To provide a point of reference or comparison in the event of later queries.

Appendix F

Intermittent urethral dilatation - female and male

The procedure for female and male urethral dilatation is almost the same as for intermittent catheterisation.

Material

Procedure

If a health care professional does the dilatation procedure, they should use an aseptic (no-touch) technique. When a patient undertakes the procedure at home they should always use a no-touch technique.

Catheter type

Choose a larger Charrière size than for normal catheterisation; the health care professional can advise the patient in choosing the right Charrière size. A catheter with a flexible rounded or pointed tip could be helpful to dilate the stricture (see Section 6.4.3. and 6.4.4.)

Observation	Management
1. Prepare material for catheterisation.	
2. Choose appropriate catheter for dilatation.	
3. The procedure for dilatation is the same as for intermittent catheterisation.	
4. For dilatation of the stricture: The catheter should be inserted as far as the health care professional advised.	To ensure, that the stricture is passed.
5. Gentle pressure may be needed to insert the catheter past the point of narrowing.	
6. Advance the catheter until the stricture has been passed.	
8. It could be helpful to start with a smaller size of catheter and follow with a larger size in the same dilatation procedure.	
9. The further procedure is the same as in intermittent catheterisation	
10. Documentation of the dilatation procedure	To provide a point of reference or comparison in the event of later queries

Appendix G

Patient’s teaching procedure intermittent self catheterisation - female and male

The procedure for female and male urethral self catheterisation is almost the same as for intermittent catheterisation by healthcare professionals.

Material

Procedure

When the patient performs the ISC him/herself a no-touch technique is preferred. When no-touch technique is not feasible clean technique should be used.

Catheter type

The healthcare professional can advise an appropriate catheter and Charrière, depending on the situation. For instance: female/male/ready-to-use/gel/hydrophilic/lubricated.

Action	Rationale
1. Prepare the patient for ISC with documentation material.	Booklet/DVD.
2. Ask patient’s agreement.	
3. Prepare patient verbally for ISC.	
4. Check patient’s knowledge of ISC.	
5. Check patient’s capability of performing ISC.	Are there special devices needed?
6. Check patient’s motivation in performing ISC.	If not enough, try to motivate the patient before the instruction is started.
7. Choose the appropriate catheter.	
8. In consultation with patient choose no-touch or clean method for ISC.	
9. Choose, together with patient, most appropriate place to perform ISC.	Bed, bathroom, toilet, wheelchair.
10. Verbal explanation of insertion procedure.	Use chosen technique, no-touch or clean.
11. Explain and practise cleansing of the genitals.	
12. Decide together with patient whether the first attempt will be done by the healthcare professional or by him/herself.	
13. If desired: Perform the insertion procedure in the patient	As life example for patient

<p>14. If desired: Patient performs the insertion procedure by him/herself, supported by verbal instruction.</p>  <p><i>Fig. 25 Insertion of the catheter by the patient</i> (Courtesy Hollister Incorporated)</p>	<p>Patient uses the chosen, no-touch or clean technique.</p>
<p>15. Remove catheter before the bladder is completely empty.</p>	<p>Explain to patient he/she should normally wait until bladder is completely empty.</p>
<p>16. Wait short while to recuperate the urethra and to refill the bladder.</p>	<p>Time between practice depends on patient's experience with the procedure.</p>
<p>17. Verbal repetition of the ISC procedure.</p>	<p>Reassure the knowledge of patient before performing insertion procedure him/herself.</p>
<p>18. In case of hospital setting: Accompany patient during the day by practising ISC.</p>	<p>If necessary change insertion procedure.</p>
<p>19. Check if patient feels comfortable with the procedure.</p>	<p>If desired change procedure or material. If desired change insertion procedure.</p>
<p>20. Check if patient feels at ease with the ISC procedure and can perform it on his/her own.</p>	<p>If not, seek for the reason and try to solve the problem.</p>
<p>21. Check if patient feels comfortable to perform ISC him/herself unaccompanied at home.</p>	<p>If not, discuss what is needed to improve patient's self-confidence.</p>
<p>22. Order or give patient catheters until first evaluation.</p>	<p>After evaluation the type of catheter sometimes need to be changed.</p>
<p>23. Give further information about frequency, availability, difficulties which may occur etc. (see Appendix A).</p>	
<p>24. Document the teaching procedure.</p>	<p>To provide a point of reference or comparison in the event of later queries.</p>
<p>25. Give voiding diary to patient.</p>	<p>To visualise the progress of CISC at home.</p>
<p>26. Make appointment for follow-up.</p>	

Appendix H

Help devices

Male

There are various handling aids to enable male patients to achieve the optimum anatomical position while leaving both hands free for handling the catheter and to manage clothing in a discreet manner (see figs. 26, 27, 28).

Female

Many companies provide mirrors for female patients because catheterisation is often managed by touch alone due to the female anatomy (see leg mirror pictures figs. 29, 30, 31). Some types of mirror are designed to fix to the leg to enable the optimum use and view, while leaving both hands free for catheter insertion. The use of a mirror may also complicate catheterisation (they have to carry them, the view is mirrored, manual dexterity may be limited), therefore, patients are often encouraged to learn to catheterise without them. Labia spreaders are useful in female patients who have difficulties spreading the labia (see fig. 32).

Other

Other aids enable the patient to manage IC while sitting or lying down. Leg spacers with or without mirrors are useful in patients with lower limb restrictions.

Some aids hold the catheter thereby facilitating a no-touch technique. In addition to reducing the risk of infection, this also allows a firmer grip for patients with limited or restricted manual dexterity (see figs. 33, 34, 35, 36).



*Fig. 26 Penis support (width 2 or 4 cm)
p.hold*

(Courtesy Manfred Sauer GmbH)

A help device to stretch the penis and hold it in position during catheterisation.



*Fig. 27a and 27b
FreeHand Clothing holder*

(Courtesy Teleflex Ltd.)



Fig. 28 SpeediHook
 Coloplast
 (Courtesy J. Eikenboom)

The Freehand Clothing holder and the SpeediHook keep pants and trousers securely out of the way to leave both hands free for catheterisation.

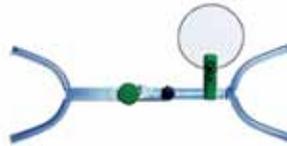
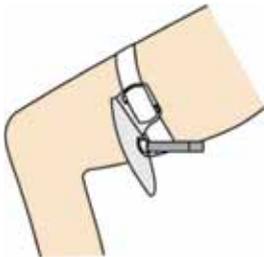


Fig. 29a and 29b
 OptiLux Leg Mirror with light
 (Courtesy Teleflex Ltd.)



Fig. 30 Leg spreader small and large with mirror
 (Courtesy Manfred Sauer GmbH)



Fig. 31a and 31b
 Leg spreader inflatable with mirror
 (front and back view)
 (Courtesy Manfred Sauer GmbH)



Fig. 32 Labia Spreader
(Courtesy Manfred Sauer GmbH)



Fig. 33 Cath-Hand
(Courtesy Manfred Sauer GmbH)

Aid for people with impaired finger dexterity from e.g. neurological conditions. The opening and closing of the Cath-Hand is operated by a gentle movement of the hand lifting muscle. Available for left and right-hander.



Fig. 34 Handle
(Wellspect HealthCare)
(Courtesy J. Eikenboom)



Fig. 35 ErgoHand Insertion Aid
(Courtesy Teleflex Ltd.)

Especially for quadriplegic women and men. The catheter is threaded through the opening of the insertion aid and can be inserted into the urethra.



Fig. 29a and 29b KIC-System®

(Courtesy Manfred Sauer GmbH)

The KIC-System® has a removable connector instead of a fixed tube to connect the leg bag. This connector can be removed from the urinary condom and, using the special condom expander tool, the condom can then be pulled over the penis shaft so that the penis tip is left free for disinfecting and catheterisation. Afterwards, the urinary condom can be restored to its original position and connected to the existing drainage system. This procedure can be repeated any number of times.

With the KIC-System®, only one urinary condom per day is needed – this protects the skin, but it is also more economic.

Appendix J

Changes in urine due to food and medication

Urine consists mostly of water (about 95%). However, the rest of the contents of urine can vary depending of what someone has eaten, drunk, breathed, or been exposed to. The changes in urine colour due to these reasons do not differ between catheterised and non-catheterised people. Normal urine is clear, straw-coloured, with almost no odour. [117]

Table 9. Possible colour and odour changes in urine caused by medication, food or drink

Colour	Food and drug causes	Diseases
Cloudy	Diet high in purine-rich foods.	Kidney stones, excessive cellular material, proteinuria, UTI accompanied by a foul odour.
Brown	Fava beans, levodopa, metronidazole, nitrofurantoin.	Bile pigment, myoglobin.
Brownish-black	Cascara, levodopa, methyl dopa, senna, rhubarb, aloe.	Bile pigment, melanin, methaemoglobin, pseudomonal UTI, liver disorders
Green or blue	Asparagus (offensive smell), sulphonamides, amitriptyline, indomethacin, cimetidine, promethazine, triamterene, Viagra®.	Pseudomonal UTI.
Orange	Carrots, vitamin C, carrot juice, phenothiazines, warfarin.	Dehydration due to increased concentration of urochrome.
Red or pink	Beets, blackberries, rhubarb, rifampin, ibuprofen, levodopa, chlorpromazine, thioridazine, propofol.	Haematuria.
Yellow	Carrot, cascara, vitamin B.	Concentrated urine.
Black	Ferrous salts	

Adapted from Simerville 2005 [118], Panesar 2009 [119]

Appendix K

Medical travel document for patients



Be sure to check the rules and regulations on carrying medical supplies for all the countries you're going to, or pass through, with your travel agent or airline.

Design:

European Association of Urology Nurses
Mr. E.N. van Kleffensstraat 5
NL-6842 CV ARNHEM
The Netherlands
eaun@uroweb.org



Medical Travel Certificate

Important Notice

The holder of this card has a condition, which requires them to carry medical supplies. These (sterile) products are essential for the holder to manage their condition and should not be opened or taken away from this person.

Please be aware that they are also likely to be carrying additional supplies of products in their main luggage. In case of queries please contact their doctor.

Thank you for your assistance.



16. About the authors

Susanne Vahr (DK), Chair

Registered Nurse, Diploma in Nursing, Master in HRD/Adult Learning, Clinical Nurse Specialist, Urological Department, Rigshospitalet, University Hospital of Copenhagen, Denmark.

Susanne is the Course Manager for local urology courses. She is responsible for introducing new staff within the department and to help and support nurses writing nursing projects.

Susanne is a member of the Danish Association of Urology Nurses. She has worked in the field of urology since 1992. Her primary focus has been competence development to secure updated and qualified care for the urological patient.

Special interests: adult urology, development of documentation tools for the elective urological patient regarding the patient perspective.

Hanny Cobussen-Boekhorst (NL)

Registered Nurse and Nurse Practitioner in continence and urostomy care for adults and children at the Department of Urology of the University Medical Centre St. Radboud, Nijmegen, The Netherlands.

Hanny is a frequent speaker at national and international conferences and is involved in the national continence course for nurses in The Netherlands. In 2007, Hanny developed a patient information booklet about clean intermittent catheterisation, including a protocol for nurses, in collaboration with the National Continence Nursing Society of the Netherlands.

Hanny is a member of National Urology Nursing Society (V&VN Urologie Verpleegkundigen), and the National Continence Nursing Society (CV&V). She is also a member of the National Stoma Nursing Society, a member of the ESPU-N (European Society for Paediatric Urology Nurses Group), and a member of the EAUN.

Special interests: urological problems in patients with multiple sclerosis and (children with) spina bifida and extrophia vesicae, as well as urotherapy in children.

Janet Eikenboom (NL)

Born in Rotterdam, the Netherlands, graduated as a registered nurse in 1980. Janet has worked almost her whole career in urology. Since 2006 she worked mainly as continence nurse in policlinic setting in a regional hospital. She participates in two multidisciplinary teams (pelvic floor problems in females and cleanliness problems in children), attends patients with CISC, gives urological instructions to adult patients in the broad sense and urotherapy to children.

She is responsible for knowledge transfer continence care amongst nurses in her own institute and is chairman in the regional forum continence care Zuid-Holland-Zuid (RIF), which is seated in Rotterdam.

Janet is a member of the National Nursing Society (V&VN), the National Continence Nursing Society (CV&V - Continentie Verpleegkundigen & Verzorgenden), the EAUN and a Regional Incontinence Forum.

Special interests: Pelvic floor problems, urotherapie, developing nursing education.

Veronika Geng (DE)

Registered Nurse, Infection Control Practitioner, Coach for Quality in Health Care, MSc in health science specialisation in nursing.

Veronika Geng currently works as a project leader for the Manfred-Sauer-Foundation in Lobbach, Germany. She has performed clinical studies on the incidence of hospital-acquired UTIs. Veronika previously contributed, as a panel member, to guidelines on male external catheters and also produced an instructional videotape on this topic.

Special interests: nutrition, bladder and bowel management in people with spinal cord injury.

Sharon Holroyd (UK)

Registered General Nurse, Registered Sick Childrens Nurse, Advanced Urological Diploma. Sharon is a member of the British Association of Urology Nurses.

Sharon has worked in the fields of stoma, urology and renal disorders for many years in a variety of NHS and private health care organisations. She currently manages an Intermediate Care Unit in Holmfirth West Yorkshire and also works as a Specialist Urology / Continence Nurse for Nuffield Hospital Leeds.

Special interests: ISC, urodynamics, incontinence and non-surgical management of bladder dysfunction.

Mary Lester (UK)

Registered General Nurse, Certificate in Education, BSc Nursing Studies. Urology Specialist Nurse at Manchester Royal Infirmary UK since 2001. Mary is responsible for running nurse-led clinics, supporting consultant-led clinics, teaching and providing support to staff both within the hospital and the community setting.

Special interests: teaching and supporting patients who self-catheterise, prostate assessment, urodynamics, urinary incontinence.

Ian Pearce (UK)

Ian has been a Consultant Urological Surgeon at Manchester Royal Infirmary, UK since 2002 having trained in Nottingham, Stoke and Greater Manchester.

He is currently on the executive committee of the BAUS Section of Female Neurological and Urodynamic Urology.

Special interest: bladder dysfunction.

Cel Vandewinkel (BE)

Registered Nurse and Head Nurse in the Department of Urology of the ZNA Jan Palfijn hospital. Secretary of Urobel (the Belgian Association of Urology Nurses). Teacher in courses for Incontinence and Prostate nurse. (In)continence nurse and prostate nurse.

Special interests: adult urology, incontinence, prostate and catheter care.

17. References

1. Behrens J, Langer G. Evidence-based Nursing - Vertrauensbildende Entzauberung der Wissenschaft. Bern, Göttingen, Toronto, Seattle: Verlag Hans Huber, 2004. <http://www.socialnet.de/rezensionen/1840.php> (Article/book in German)
2. DiCenso A, Cullum N, Ciliska D. Implementing evidence-based nursing: some misconceptions. *Evid Based Nurs* 1998;1(2):38-40. <http://ebn.bmj.com/content/1/2/38.extract?sid=27504c6d-c12f-4dd6-9577-d539f93d7a9b>
3. Abrams P, Cardozo L, Fall M, et al. The standardisation of terminology in lower urinary tract function: report from the Standardisation Sub-committee of the International Continence Society. *Neurourol Urodyn* 2002;21(2):167-178. <http://www.ncbi.nlm.nih.gov/pubmed/11857671>
4. Sitzmann F. Verfahrensanweisung zur Sauberkeit von Lagerschränken und -regalen, zum Umgang mit Medizinprodukten und Regelungen zur Lagerung von Sterilgut 2011 – draft http://www.klinik-hygiene.de/tl_files/files/content/pdf/hygieneverabredungen/Anaesthesieverfahrensanweisung%20zum%20Umgang%20mit%20MP%20und%20Regelungen%20zu%20Lagerung%20Sterilgut.pdf
5. Smith AL, Ferlise VJ, Rovner ES. Female urethral strictures: successful management with long-term clean intermittent catheterization after urethral dilatation. *BJU Int* 2006;98(1):96-99. <http://www.ncbi.nlm.nih.gov/pubmed/16831151>
6. Lauritzen M, Greis G, Sandberg A, et al. Intermittent self-dilatation after internal urethrotomy for primary urethral strictures: A case-control study. *Scand J Urol Nephrol* 2009;43:220-225. <http://www.ncbi.nlm.nih.gov/pubmed/19353382>
7. Mangera A, Chapple CR. Urethral stricture disease. *Surgery (Oxford)* 2011;29(6):272-277. <http://www.sciencedirect.com/science/journal/02639319/29/6>
8. Grabe M, Bjerkklund-Johansen TE, Botto H, et al. Guidelines on Urological Infections. European Association of Urology 2011.;23. http://www.uroweb.org/gls/pdf/17_Urological%20infections_LR%2011.pdf
9. Moore KN, Fader M, Getliffe K. Long-term bladder management by intermittent catheterisation in adults and children. *Cochrane Database of Systematic Reviews* 2007, Issue 4. Art. No.: CD006008. DOI: 10.1002/14651858.CD006008.pub2. <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD006008.pub2/abstract;jsessionid=9BEF016C55D15F552BC91522C4658D15.do4t04>
10. Tambyah PA, Maki DG. Catheter-associated urinary tract infection is rarely symptomatic: a prospective study of 1,497 catheterized patients. *Arch Intern Med* 2000;160(5):678-82. <http://www.ncbi.nlm.nih.gov/pubmed/10724054>
11. Geng V, Eelen P, Fillingham S, et al; members of the European Association of Urology Nurses Guidelines Office. *Continent Urinary Diversion – Good Practice in Health Care*. Edition presented at the 11th International EAUN meeting, Barcelona 2010. ISBN 978-90-79754-32-8. EAUN Office, Arnhem, The Netherlands. <http://www.uroweb.org/nurses/nursing-guidelines/>
12. Dixon L, Dolan LM, Brown K, et al. RCT of urethral versus suprapubic catheterization. *Br J Nurs* 2010;19(18):S7-13. <http://www.ncbi.nlm.nih.gov/pubmed/20948487>
13. Tenke P, Kovacs B, Bjerkklund Johansen TE, et al. European and Asian guidelines on management and prevention of catheter-associated urinary tract infections. *Int J Antimicrob Agents* 2008;31 Suppl 1:S68-78. Epub 2007 Nov 14. <http://www.ncbi.nlm.nih.gov/pubmed/18006279>
14. Ryu KH, Kim YB, Yang SO, et al. Results of urine culture and antimicrobial sensitivity tests according to the voiding method over 10 years in patients with spinal cord injury. *Korean J Urol* 2011;52:345-349. <http://www.ncbi.nlm.nih.gov/pubmed/21687395>
15. Hooton TM, Bradley SF, Cardenas DD, et al and the Infectious Diseases Society of America. Diagnosis, prevention, and treatment of catheter-associated urinary tract infection in adults: 2009 International Clinical Practice Guidelines from the Infectious Diseases Society of America. *Clin Infect Dis* 2010;50(5):625-63. <http://www.ncbi.nlm.nih.gov/pubmed/20175247>

16. Niël-Weise BS, van den Broek PJ, da Silva EM. Urinary catheter policies for long-term bladder drainage. *Cochrane Database Syst Rev.* 2005;(1):CD004201. Online publication 2009. <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004201.pub2/abstract>
17. Wyndaele JJ. Intermittent catheterization: which is the optimal technique? *Spinal Cord* 2002;40(9):432-437. <http://www.ncbi.nlm.nih.gov/pubmed/12185603>
18. Raz R, Schiller D, Nicolle LE. Chronic indwelling catheter replacement before antimicrobial therapy for symptomatic urinary tract infection. *J Urol* 2000;164(4):1254-8. <http://www.ncbi.nlm.nih.gov/pubmed/10992375>
19. Woodbury MG, Hayes KC, Askes HK. Intermittent catheterization practices following spinal cord injury: A national survey. *Can J Urol* 2008;15(3):4065-4071. <http://www.ncbi.nlm.nih.gov/pubmed/18570710>
20. Biering-Sorensen F, Nielans HM, Dorflinger T, et al. Urological situation five years after spinal cord injury. *Scand J Urol Nephrol* 1999;33(3):157-61. <http://www.ncbi.nlm.nih.gov/pubmed/10452290>
21. Stöhrer M, Kramer G, Löchner-Ernst D, et al. Diagnosis and treatment of bladder dysfunction in spinal cord injury patients. *Eur Urol* 1994 (Update Series);3:170-5.
22. Matsumoto T, Takahashi K, Manabe N, et al. Urinary tract infection in neurogenic bladder. *Int J Antimicrob Agents* 2001;17(4):293-7. <http://www.ncbi.nlm.nih.gov/pubmed/11295411>
23. Turi MH, Hanif S, Fasih Q, et al. Proportion of complications in patients practicing clean intermittent self-catheterization (CISC) vs indwelling catheter. *J Pak Med Assoc* 2006;56(9):401-4. <http://www.ncbi.nlm.nih.gov/pubmed/17091752>
24. Waites KB, Canupp KC, Armstrong S, et al. Effect of cranberry extract on bacteriuria and pyuria in persons with neurogenic bladder secondary to spinal cord injury. *J Spinal Cord Med* 2004;27(1):35-40. <http://www.ncbi.nlm.nih.gov/pubmed/15156935>
25. Perrouin-Verbe B, Labat JJ, Richard I, et al. Clean intermittent catheterisation from the acute period in spinal cord injury patients. Long term evaluation of urethral and genital tolerance; *Paraplegia* 1995;33:619-624. <http://www.ncbi.nlm.nih.gov/pubmed/8584294>
26. Wyndaele JJ. Chronic prostatitis in spinal cord injury patients. *Paraplegia* 1985;23:164-169. <http://www.ncbi.nlm.nih.gov/pubmed/4011291>
27. Wyndaele JJ, Maes D. Clean intermittent self-catheterization: a 12-year followup. *J Urol* 1990;143(5):906-8. <http://www.ncbi.nlm.nih.gov/pubmed/2329604>
28. Bakke A, Digranes A, Høisaeter PA. Physical predictors of infection in patients treated with clean intermittent catheterization: a prospective 7-year study. *Br J Urol* 1997;79(1):85-90. <http://www.ncbi.nlm.nih.gov/pubmed/9043503>
29. Günter M, Löchner-Ernst D, Kramer G, et al. Auswirkungen des aseptischen intermittierenden Katheterismus auf die männliche Harnröhre. *Urologe (B)* 2001;41:359-361. <http://link.springer.com/article/10.1007%2F5001310170044>
30. Wyndaele JJ. Complications of intermittent catheterization: their prevention and treatment. *Spinal Cord* 2002;40(10):536-41. <http://www.ncbi.nlm.nih.gov/pubmed/12235537>
31. Sauerwein D. Urinary tract infection in patients with neurogenic bladder dysfunction. *Int J Antimicrob Agents* 2002;19(6):592-7. <http://www.ncbi.nlm.nih.gov/pubmed/12135853>
32. De Ridder DJ, Everaert K, Fernandez LG, et al. Intermittent catheterisation with hydrophilic-coated catheters (SpeediCath®) reduces the risk of clinical urinary tract infection in spinal cord injured patients: a prospective randomised parallel comparative trial. *Eur Urol* 2005;48(6):991-5. <http://www.ncbi.nlm.nih.gov/pubmed/16137822>
33. Cardenas DD, Hoffman JM. Hydrophilic catheters versus noncoated catheters for reducing the incidence of urinary tract infections: a randomized controlled trial. *Arch Phys Med Rehabil* 2009;90(10):1668-71. <http://www.ncbi.nlm.nih.gov/pubmed/19801054>
34. Cardenas DD, Moore KN, Dannels-McClure A. Intermittent Catheterization With a Hydrophilic-Coated Catheter Delays Urinary Tract Infections in Acute Spinal Cord Injury: A Prospective, Randomized, Multicenter Trial. *PM R* 2011;3:408-417. <http://www.ncbi.nlm.nih.gov/pubmed/21570027>
35. Madersbacher H, Wyndaele JJ, Igawa Y, et al. Conservative management in neuropathic urinary incontinence. In: *Incontinence*, 2nd ed. Abrams P, Cardozo L, Khoury S, Wein A, eds. : Health Publication, 2002;10E:697-754. <http://www.icud.info/incontinence.html>

36. Vapnek JM, Maynard FM, Kim J. A prospective randomized trial of the lofric hydrophilic coated catheter versus conventional plastic catheter for clean intermittent catheterization. *J Urol* 2003;169:994-998. <http://www.ncbi.nlm.nih.gov/pubmed/12576829>
37. Stensballe J, Looms D, Nielsen PN, et al. Hydrophilic- coated catheters for intermittent catheterisation reduce urethral micro trauma: a prospective, randomised, participant-blinded, crossover study of three different types of catheters. *Eur Urol* 2005;48(6):978-83. <http://www.ncbi.nlm.nih.gov/pubmed/16126331>
38. Abrams P, Andersson KE, Birder L, et al. Members of Committees; Fourth International Consultation on Incontinence. Fourth International Consultation on Incontinence Recommendations of the International Scientific Committee: Evaluation and treatment of urinary incontinence, pelvic organ prolapse, and fecal incontinence. *Review. NeuroUrol Urodyn* 2010;29(1):213-40. <http://www.ncbi.nlm.nih.gov/pubmed/20025020>
39. Michielsen D, Wyndaele JJ. Management of false passages in patients practising clean intermittent self catheterization. *Spinal Cord* 1999;37:201-203. <http://www.ncbi.nlm.nih.gov/pubmed/10213330>
40. Perrouin-Verbe B, Labat JJ, Richard I, et al. Clean intermittent catheterisation from the acute period in spinal cord injury patients. Long term evaluation of urethral and genital tolerance; *Paraplegia* 1995;33:619-624. <http://www.ncbi.nlm.nih.gov/pubmed/8584294>
41. Kuhn W, Rist M, Zach GA. Intermittent urethral self-catheterisation: long term results (bacteriological evolution, continence, acceptance, complications). *Paraplegia* 1991;29(4):222-232. <http://www.ncbi.nlm.nih.gov/pubmed/1870888>
42. Hasan ST, Marshall C, Robson WA, et al. Clinical outcome and quality of life following enterocystoplasty for idiopathic detrusor instability and neurogenic bladder dysfunction. *Br J Urol* 1995;76(5):551-7. <http://www.ncbi.nlm.nih.gov/pubmed/8535671>
43. Gu erin JG, Marie L, Sibert L, et al. [Unusual complication of self-catheterization in a patient with a continent stoma]. *Prog Urol* 1996;6(3):434-5. [Article in French] <http://www.ncbi.nlm.nih.gov/pubmed/8763701>
44. Brown SC, Lynn NN. An unusual (knotty) complication of clean intermittent self-catheterization in a patient with an augmented bladder. *BJU Int* 1999;84(4):539. <http://www.ncbi.nlm.nih.gov/pubmed/10468782>
45. Chen Y, DeVivo MJ, Lloyd LK. Bladder stone incidence in persons with spinal cord injury: determinants and trends, 1973-1996. *Urology* 2001;58(5):665-70. <http://www.ncbi.nlm.nih.gov/pubmed/1171333>
46. Barroso U, Jednak R, Fleming P, et al. Bladder calculi in children who perform clean intermittent catheterization. *BJU Int* 2000;85(7):879-84. <http://www.ncbi.nlm.nih.gov/pubmed/10792170>
47. Solomon MH, Foff SA, Diokno AC. Bladder calculi complicating intermittent catheterization. *J Urol* 1980;124:140-141. <http://www.ncbi.nlm.nih.gov/pubmed/7411703>
48. Amendola MA, Sonda LP, Diokno AC, et al. Bladder calculi complicating intermittent clean catheterization. *AJR Am J Roentgenol* 1983;141(4):751-753. <http://www.ncbi.nlm.nih.gov/pubmed/6604429>
49. Khoury AE, Salomon M, Doche R, et al. Stone formation after augmentation cystoplasty: The role of intestinal mucus. *J Urol* 1997;158(3):1133-1137. www.ncbi.nlm.nih.gov/pubmed/9258156
50. Van Achterberg T, Holleman G, Cobussen-Boekhorst H, et al. Adherence to clean intermittent self-catheterization procedures: Determinants explored. *J Clin Nurs* 2008;17(3):394-402. <http://www.ncbi.nlm.nih.gov/pubmed/17419781>
51. Kessler TM, Ryu G, Burkhard FC. Clean intermittent self-catheterization: a burden for the patient? *NeuroUrol Urodyn* 2009;28(1):18-21. <http://www.ncbi.nlm.nih.gov/pubmed/18726939>
52. Witjes JA, Del Popolo G, Marberger M, et al. A multicenter, double-blind, randomized, parallel group study comparing polyvinyl chloride and polyvinyl chloride-free catheter materials. *J Urol* 2009;182(6):2794-2798. <http://www.ncbi.nlm.nih.gov/pubmed/19837425>
53. Lawrence EL, Turner IG. Materials for urinary catheters: a review of their history and development in the UK. *Med Eng Phys* 2005;27(6):443-453. <http://www.ncbi.nlm.nih.gov/pubmed/15990061>
54. Fader M, Moore KN, Cottenden AM, et al. Coated catheters for intermittent catheterization: smooth or sticky? *BJU Int* 2001;88(4):373-377. <http://www.ncbi.nlm.nih.gov/pubmed/11564024>
55. Sherbondy AL, Cooper CS, Kalinowski SE, et al. Variability in catheter microwave sterilization techniques in a single clinic population. *J Urol* 2002;168(2):562-564. <http://www.ncbi.nlm.nih.gov/pubmed/12131310>

56. Bogaert GA, Goemann L, De Ridder D, et al. The physical and antimicrobial effects on microwave heating and alcohol immersion on catheters that are reused for clean Intermittent catheterisation. *Eur Urol* 2004; 46(5):641-6. <http://www.ncbi.nlm.nih.gov/pubmed/15474276>
57. Chan LJ, et al. Adequacy of sanitization and storage of catheters for intermittent use after washing and microwave sterilization. *J Urol* 2009;182:2085-2089. <http://www.ncbi.nlm.nih.gov/pubmed/19695602>
58. Barton R. Intermittent self-catheterisation. *Nurs Stand* 2000;15(9):47-52. <http://www.ncbi.nlm.nih.gov/pubmed/11971532>
59. Bennett CJ, Young MN, Razi SS, et al. The effect of urethral introducer tip catheters on the incidence of urinary tract infection outcomes in spinal cord injured patients. *J Urol* 1997;158(2):519-21. www.ncbi.nlm.nih.gov/pubmed/9224337
60. Winn C, Thompson J. Urinary catheters for intermittent use. *Professional Nurse* 1999;14(12):859. <http://www.ncbi.nlm.nih.gov/pubmed/10603898>
61. Spinu A, Onose G, Daia C, et al. Intermittent catheterization in the management of post spinal cord injury (SCI) neurogenic bladder using new hydrophilic, with lubrication in close circuit devices – our own preliminary results. *J Med Life* 2012;5(1):21-28. <http://www.ncbi.nlm.nih.gov/pubmed/22574083>
62. Chartier-Kastler E, Denys P. Intermittent catheterization with hydrophilic catheters as a treatment of chronic neurogenic urinary retention. *Neurourol Urodyn* 2011;30(1):21-31. <http://www.ncbi.nlm.nih.gov/pubmed/20928913>
63. Logan K, Shaw C, Webber I, et al. Patients' experiences of learning clean intermittent self-catheterization: a qualitative study. *J Adv Nurs* 2008;62(1):32-40. <http://www.ncbi.nlm.nih.gov/pubmed/18352962>
64. The National Intermittent Catheterisation Professional Group (NICPG). Clean intermittent catheterisation. The patient's journey. United Kingdom 2009. British Association of Urological Nurses, Bathgate, Scotland.
65. Newman DK, Willson MM. Review of intermittent catheterization and current best practices. *Urol Nurs* 2011;31(1):12-48. <http://www.ncbi.nlm.nih.gov/pubmed/21542441>
66. Di Benedetto P. Clean intermittent self catheterization in neuro-urology. *Eur J Phys Rehabil* 2011;47(4):651-9. <http://www.ncbi.nlm.nih.gov/pubmed/22222962>
67. Heard L, Buhner R. How do we prevent UTI in people who perform intermittent catheterization? *Rehabil Nurs* 2005;30(2):44-5. <http://www.ncbi.nlm.nih.gov/pubmed/15789695>
68. Martins G, Soler Z, Batigalia F, et al. Clean intermittent catheterization. *J WOCN* 2009;36(5):545-549. <http://www.ncbi.nlm.nih.gov/pubmed/19752666>
69. Robinson J. Intermittent self-catheterisation: teaching the skill to patients. *Nurs Stand* 2007;21(29):48. <http://www.ncbi.nlm.nih.gov/pubmed/17432372>
70. Bagi P, Hannibalsen J, Permild R. Safety of a new compact male intermittent catheter: randomized, cross-over, single-blind study in healthy male volunteers. *Urol Int* 2011;86(2):179-84. Epub 2011 Jan 27. <http://www.ncbi.nlm.nih.gov/pubmed/21273758>
71. Vahter L, Zopp I, Kreegipuu M, et al. Clean intermittent self-catheterization in persons with multiple sclerosis: The influence of cognitive dysfunction. *Mult Scler* 2009;15(3):379-384. <http://www.ncbi.nlm.nih.gov/pubmed/18987108>
72. Wilde MH, Brasch J, Yi Z. A qualitative descriptive study of self-management issues in people with long-term intermittent urinary catheters. *J Adv Nurs* 2010;67(6):1254-1263. <http://www.ncbi.nlm.nih.gov/pubmed/21323974>
73. Adler US, Kirshblum SC. A new assistive device for intermittent self-catheterization in men with tetraplegia. *J Spinal Cord Med* 2003;26(2):155-158. <http://www.ncbi.nlm.nih.gov/pubmed/12828294>
74. Pascoe G, Clovis S. Evaluation of two coated catheters in intermittent self-catheterization. *Br J Nurs* 2001;10(5):325-329. <http://www.ncbi.nlm.nih.gov/pubmed/12170675>
75. McConville A. Patients' experiences of clean intermittent catheterisation. *Nurs Times* 2002;98(4):55-56. <http://www.ncbi.nlm.nih.gov/pubmed/12219463>
76. Shaw C, Logan K, Webber I, et al. Effect of clean intermittent self-catheterization on quality of life: a qualitative study. *J Adv Nurs* 2008;61(6):641-650. <http://www.ncbi.nlm.nih.gov/pubmed/18302605>
77. Pomfret I, Winder A. The management of intermittent catheterization: Assessing patient benefit. *Br J Neurosci Nurs* 2007;3(6):266. <http://www.internurse.com/cgi-bin/go.pl/library/abstract.html?uid=23712>

78. Oh SJ, Ku JH, Lim SH, et al. Effect of a 'centralized intensive education system' for clean intermittent self-catheterization in patients with voiding dysfunction who start catheterization for the first time. *Int J Urol* 2006a;13(7):905-909. <http://www.ncbi.nlm.nih.gov/pubmed/16882053>
79. Amarenco G, Guinet A, Jousse M, et al. Pencil and paper test: a new tool to predict the ability of neurological patients to practice clean intermittent self-catheterization. *J Urol* 2011;185(2):578-582. <http://www.ncbi.nlm.nih.gov/pubmed/21168886>
80. O'Connor G. Teaching stoma-management skills: the importance of self-care. *Br J Nurs* 2005;14(6):320-4. <http://www.ncbi.nlm.nih.gov/pubmed/15902027>
81. Lemke JR, Kasprovicz K, Sandford Worrall P. Intermittent catheterization for patients with a neurogenic bladder: sterile versus clean using evidence-based practice at the staff nurse level. *J Nurs Care Qual* 2005;20(4):302-306. <http://www.ncbi.nlm.nih.gov/pubmed/16177580>
82. Winder A. Intermittent catheterisation. *J Commun Nurs* 2008;22(5):42. www.jcn.co.uk/
83. Winders A. Intermittent catheterisation. *Urol News* 2010;14(6):14-17. www.urologynews.uk.com/
84. Jaquet A, Eiskjaer J, Steffensen K, et al. Coping with clean intermittent catheterization - experiences from a patient perspective. *Scand J Caring Sci* 2009;23(4):660-666. <http://www.ncbi.nlm.nih.gov/pubmed/19804371>
85. Billington A. A practical guide to teaching intermittent catheterisation. *Continence UK* 2008;2(3)30-36.
86. Watts W, Lloyd G, Brown WM, et al. Routine clean intermittent self-catheterization: Innovative implementation in the Hunter Area Health Service. *Urol Nurs* 2002;22(2):119-123. <http://www.ncbi.nlm.nih.gov/pubmed/11993240>
87. Moore NM, Burt J, Voaklander DC. Intermittent catheterization in the rehabilitation setting: a comparison of clean and sterile technique. *Clin Rehabil* 2006;20:461. <http://www.ncbi.nlm.nih.gov/pubmed/16892928>
88. Gould CV, Umscheid CA, Agarwal RK, et al. HICPAC. Guideline for prevention of catheter-associated urinary tract infections 2009. Atlanta, GA: Centers for Disease Control and Prevention, 2009. p.34 and 47. <http://www.cdc.gov/hicpac/pdf/CAUTI/CAUTIguideline2009final.pdf> <http://www.ncbi.nlm.nih.gov/pubmed/20156062>
89. Bardsley A. Use of lubricant gels in urinary catheterisation. *Nurs Stand* 2005;20(8):41-46. <http://www.ncbi.nlm.nih.gov/pubmed/16295598>
90. Taskinen S, Fagerholm R, Ruutu M. Patient experience with hydrophilic catheters used in clean intermittent catheterization. *J Pediatr Urol* 2008;4(5):367-371. <http://www.ncbi.nlm.nih.gov/pubmed/18790422>
91. Hedlund H, Hjelmås K, Jonsson O, et al. Hydrophilic versus non-coated catheters for intermittent catheterization. *Scand J Urol Nephrol* 2001;35:49-53. <http://www.ncbi.nlm.nih.gov/pubmed/11291688>
92. Wyndaele J, De Ridder D, Everaert K, et al. Evaluation of the use of UroCath gel® catheters for intermittent self-catheterization by male patients using conventional catheters for a long time. *Spinal Cord* 2000;38(2):97-99. <http://www.ncbi.nlm.nih.gov/pubmed/10762182>
93. Doherty W. The Aquacath hydrophilic coated single-use urinary catheter. *Br J Nurs* 1998;7(21):332-6. <http://www.ncbi.nlm.nih.gov/pubmed/10076209>
94. Webster J. Water or antiseptic for periurethral cleaning before urinary catheterization: a randomized controlled trial. *Am J Infect Control* 2001;29(6):389-94. <http://www.ncbi.nlm.nih.gov/pubmed/11743486>
95. Leaver RB. The evidence for urethral meatal cleansing. *Nurs Stand* 2007;20(21):41. <http://www.ncbi.nlm.nih.gov/pubmed/17633341>
96. Nasiriani K, Kalani Z, Farnia F, et al. Comparison of the effect of water vs. povidone-iodine solution for periurethral cleaning in women requiring an indwelling catheter prior to gynecologic surgery. *Urol Nurs* 2009;29(2):118-21, 131. <http://www.ncbi.nlm.nih.gov/pubmed/19507410>
97. Clifford E. Urinary catheters: reducing the incidence of problems. *Community Nurse* 2000;6(4):35-6. <http://www.ncbi.nlm.nih.gov/pubmed/12778522>
98. Nazarko L. Providing effective evidence-based catheter management. *Br J Nurs* 2009 (Continence Supplement);18(7):S4, S6, S8, passim. <http://www.ncbi.nlm.nih.gov/pubmed/19373178>
99. Emr K, Ryan R. Best practice for indwelling catheter in the home setting. *Home Healthc Nurse* 2004;22(12):820-8. <http://www.ncbi.nlm.nih.gov/pubmed/15597002>

100. Smith JAM. Indwelling Catheter management: From habit-based to evidence-based practice. *Ostomy Wound Manage* 2003;49(12). <http://europepmc.org/abstract/MED/14712009>
<http://www.ncbi.nlm.nih.gov/pubmed/14712009>
101. Little P, Turner S, Rumsby K, et al. Dipsticks and diagnostic algorithms in urinary tract infection: development and validation, randomised trial, economic analysis, observational cohort and qualitative study. *Health Technol Assess* 2009;13(19):1-96. <http://www.hta.ac.uk/1205>
102. Jepson RG, Mihaljevic L, Craig JC. Cranberries for treating urinary tract infections. *Cochrane Database of Systematic Reviews* 1998, Issue 4. Art. No.: CD001322. DOI: 10.1002/14651858.CD001322.
<https://dSPACE.stir.ac.uk/bitstream/1893/2469/1/Cochrane%20cranberry%20treatment.pdf>
103. Jepson RG, Craig JC. Cranberries for preventing urinary tract infections. *Cochrane Database Syst Rev* 2008;(1):CD001321. <http://www.ncbi.nlm.nih.gov/pubmed/18253990> <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001321.pub5/abstract>
104. Ghafoor N, Stoffel F, Mader M. Clean intermittent catheterization (CIC) in spinal cord injury patients. *Journal fur Urologie und Urogynakologie* 2001;8(1):8-11. <http://www.kup.at/kup/pdf/654.pdf> (Article in German)
105. Biering-Sørensen F, Bagi P, Høiby N. Urinary tract infections in patients with spinal cord lesions. Treatment and prevention. *Drugs* 2001;61(9):1275-1287. <http://www.ncbi.nlm.nih.gov/pubmed/11511022>
106. Getliffe K, Fader M, Allen C, et al. Current evidence on intermittent catheterization: sterile single-use catheters or clean reused catheters and the incidence of UTI. *J Wound Ostomy Continence Nurs* 2007;34(3):289-296.
<http://www.ncbi.nlm.nih.gov/pubmed/17505249>
107. Mundy AR. Management of urethral strictures. *Postgrad Med J* 2006;82(970):489-493.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2585709/>
108. Mundy AR, Andrich DE. Urethral strictures. Review article. *BJU Int* 2010;107(6):6-26.
<http://www.ncbi.nlm.nih.gov/pubmed/21176068>
109. Heyns CF. Urethrotomy and other minimally invasive interventions for urethral stricture. In: Brandes SB. *Urethral reconstructive surgery*. Totowa, New Jersey: Humana Press, 2008:63-84.
http://rd.springer.com/chapter/10.1007/978-1-59745-103-1_7#
110. Wong SSW, Narahari R, O'Riordan A, et al. Simple urethral dilatation, endoscopic urethrotomy, and urethroplasty for urethral stricture disease in adult men. *Cochrane Database of Systematic Reviews* 2010, Issue 4. Art. No.: CD006934. DOI:10.1002/14651858. CD006934.pub2. <http://www.ncbi.nlm.nih.gov/pubmed/20393952>
111. Ngugi PM, Kassim A. Clean intermittent catheterisation in the management of urethral strictures. *East Afr Med J* 2007;84(11): 522-4. <http://www.ncbi.nlm.nih.gov/pubmed/18303744>
112. Hadfield-Law L. Male catheterization. *Accid Emerg Nurs* 2001;9(4):257-63.
<http://www.ncbi.nlm.nih.gov/pubmed/11855766>
113. Blandy JP, Moors J. *Urology for nurses*. Oxford: Blackwell Scientific Publications, 1996:76.
114. Colley W. Male catheterization: 1. *Nurs Times Nurs Homes* 1999;1(1):31-2.
<http://www.ncbi.nlm.nih.gov/pubmed/10795304>
115. Doherty W. Instillagel: an anesthetic antiseptic gel for use in the catheterization. *Br J Nurs* 1999;8(2):109-12.
<http://www.ncbi.nlm.nih.gov/pubmed/10214141>
116. Flynn JT, Blandy JP. Urethral catheterization. *Br Med J*. 1980 Oct 4;281(6245):928-30.
<http://www.ncbi.nlm.nih.gov/pubmed/7427511>
117. Mason P. Test on specimens of urine and stools. *Pharm J* 2004;272:544-547.
http://www.pjonline.com/other_clinical_topics
118. Simerville JA, Maxted WC, Pahira JJ. Urinalysis: A Comprehensive Review. *Am Fam Physician* 2005;71:1153-62.
<http://www.ncbi.nlm.nih.gov/pubmed/15791892>
119. Panesar K. Urinalysis: A Guide for Pharmacists. U.S. Pharmacist continued education online. Release date June, 1 2009. http://www.uspharmacist.com/continuing_education/ceviewtest/lessonid/106254/2C2009.mht

If you have questions or comments regarding this publication, please contact:

The EAUN Central Office

P.O. Box 30016

6803 AA Arnhem -The Netherlands

E-mail: eaun@uroweb.org

You can also visit the EAUN website: www.eaun.uroweb.org

Acknowledgements

The European Association of Urology Nurses (EAUN) would like to thank all contributors to this guideline including those involved in proof reading and reviewing this publication.

2013

ISBN 978-90-79754-59-5

Printed by Drukkerij Gelderland

Arnhem - The Netherlands

© EAUN.

This content is owned by the EAUN. A person viewing it online may make one printout of the material and may use that printout only for his or her personal, non-commercial reference.

This material may not otherwise be downloaded, copied, printed, stored, transmitted or reproduced in any medium, whether now known or later invented, except as authorised in writing by the EAUN. Contact eaun@uroweb.org for copyright questions and/or permission requests.

European Association
of Urology Nurses

PO Box 30016
6803 AA Arnhem
The Netherlands

T +31 (0)26 389 0680
F +31 (0)26 389 0674

eaun@uroweb.org
www.eaun.uroweb.org



**European
Association
of Urology
Nurses**