

Appendix 1. List of indications for indwelling urinary catheters

Note: This list does not cover urological emergencies. Treatment for these cases is decided by the urologist.

No indications for a urinary catheter are:

- Asymptomatic chronic urinary retention
- Urine output monitoring / fluid monitoring for stable patients, if daily weight control is possible
- Need for intensive care
- Urinary incontinence
- Immobilization, as long as alternative methods¹ for controlled bladder drainage have not been exhausted
- Comfort from the perspective of the patient (or their trusted representative) OR from the perspective of staff

Indication	Specification
Urinary retention	Acute urinary retention of any origin Symptomatic chronic outflow obstruction PLUS >300 ml residual urine
Urine output monitoring	In regular, short intervals (hourly or as defined by hospital) PLUS direct therapeutic consequences from monitoring, if body weight of patient cannot be measured
Surgery	Long surgery (>4h) Perioperative: for surgical reasons, if bladder has to be empty. Catheter is to be removed at the end of the surgery Urogenital surgery and/or pelvic floor surgery Epidural / peridural anesthesia/analgesia
Pressure ulcers PLUS incontinence	Pressure ulcers stage III or IV, or sacral/perineal skin transplants PLUS incontinence, if alternative methods ¹ for controlled bladder drainage failed
Prolonged immobilization	Immobilization for medical reasons, especially for pain reduction, if alternative methods ¹ for controlled bladder drainage failed
Palliation PLUS Comfort	Terminal-palliative situation PLUS dysfunction of bladder PLUS/OR difficulties with normal voiding, if alternative methods ¹ for controlled bladder drainage failed Severe psychological strain PLUS at the request of the informed patient (or their trusted representative)

¹ Alternative methods are: condom catheter, urinal, bedpan, bedside commode, incontinence pads, pants

List was translated for this publication by the authors.

Appendix 2. Questionnaire

Personal ID

First we ask you to create a personal identification number (ID). As part of the program progress! Safe urinary catheterization, you will complete questionnaires at two different points in time. This ID will help us match the two different questionnaires to one person, and to recognize the information coming from one and the same person. At the same time, the ID protects your anonymity, as you cannot be personally identified. This is how you create your personal ID:

The ID consists of your mother's initials (maiden name), your father's initials and your mother's birth year. Example: Mother: Hannah Kaufmann, Father: Peter Muller, Mothers birth year: 1931 → ID: HKPM1931

Part 1 (correct answers provided in parentheses)

Please estimate:

How many patients in Switzerland receive a catheter during their hospital stay?
(10-25%)

Please indicate if the following statements are correct:

After 30 catheter-days, nearly all patients show bacteriuria. (correct)

The duration of catheterization is an important risk factor for the development of a urinary tract infection. (correct)

Most hospital-acquired urinary tract infections are associated with a urinary catheter. (correct)

Single-use urinary catheters carry a higher risk for infections as compared to indwelling catheters. (false)

A closed drainage system is essential for the prevention of catheter-associated urinary tract infections. (correct)

Compared to catheters, non-invasive methods for bladder draining (e.g., condom catheters, incontinence pads) have the advantage that they do not carry a risk for injuries. (correct)

Non-infectious complications (e.g., injuries or allergic reactions) only occur in absolutely rare instances during catheterization. (false)

The choice of an antiseptic for disinfecting the urethral meatus does not affect the correct asepsis when inserting a catheter. (false)

Up to 50 percent of catheters placed in an emergency department are not medically justified. (correct)

One effective measure to prevent catheter-associated urinary tract infections is to change catheters or drainage bags in regular intervals. (false)

In which of these situations is the placement of a urinary catheter indicated?

To monitor urine output in stable patients who can be weighed. (not indicated)

In case of distress at the request of a terminally ill patient. (indicated)

For patients requiring intensive care. (not indicated)

For patients with restricted mobility. (not indicated)

Part 2

Please indicate if you agree with the following statements:¹

On my unit, IUCs are placed only as clearly indicated medical measure.

For medical leadership on my unit, restrictive use of IUCs is very important.

For nursing leadership on my unit, restrictive use of IUCs is very important.

Nursing workload plays an important role when a decision for placing an IUC is made.

People in charge on my unit make sure that everyone placing IUCs is sufficiently trained for this task.

Whenever possible, staff on my unit tries to use alternatives to an IUC (e.g., condom catheters, incontinence pads).

The daily assessment to evaluate if an IUC is still needed is a given for us.
 Basic infection prevention measures are well complied with during placement and care of IUCs.
 If someone needs help when placing an IUC, it is clear on my unit who can be contacted.
 Medical and nursing staff on my unit have a similar attitude concerning the use of IUCs.
 For staff members on my unit, it is a matter of course to openly question the placement of an IUC.
 It is difficult on my unit to speak up when rules of hygiene are broken during placement and care of an IUC.
 It is common on my unit that, whenever possible, two healthcare workers work together to place a catheter.

Part 3

What is your own role regarding the use of catheters? Please select all answers that apply.

It is part of my responsibility to...
 ...write orders for IUC placement
 ...write orders for IUC removal
 ...place an IUC
 ...assist another professional with placing an IUC
 ...care for an indwelling catheter
 ...assess the continued need for an IUC
 ...remove an IUC

Part 4

Please indicate if you agree with the following statements:¹

I can properly estimate in which situations the use of an IUC is appropriate.
 My colleagues appreciate my commitment to reduce the use of IUCs.
 I can influence the use of IUCs in my daily work.
 The risk from IUCs for patients is underestimated.
 I find it difficult in my daily work to reduce the use of IUCs.
 In my hospital I am expected to contribute to the reduction of IUCs.
 I am convinced that I am proficient in caring for an indwelling catheter.
 I am convinced that by reducing the use of IUCs, adverse events to patients can be avoided.
 Our patients appreciate it when IUCs are avoided.
 A reduced use of IUCs makes patient care more stressful for me.
 My supervisors expect that everyone follows the internal protocols for inserting catheters.
 I am convinced that I am proficient in inserting a urinary catheter.
 I think that it's important to reduce the use of IUCs in the hospital.
 My supervisors expect me to reduce the use of IUCs.
 I am confident that I can reduce the use of IUCs in everyday work.

Part 5 (response categories in parentheses)

How old are you?
 Gender (female, male)
 In which professional role are you currently working?
 (surgical positioning specialist, healthcare assistant, registered nurse, nursing manager, physician resident, attending physician, senior physician, chief physician, other)
 How long have you been working in this hospital? (< 2 years, 2 to < 5 years, 5 to < 10 years, 10 to < 20 years, ≥ 20 years)
 How many working hours do you spend in patient care during a typical working week? (less than 10 hours, between 10-24 hours, between 25-39 hours, 40 hours or more)

How often have you placed a urinary catheter throughout your professional career (estimate)? (never, 1-5 times, 6-20 times, > 20 times)

How often do you place a urinary catheter in your current position (estimate)?

(never, rarely (a few times a year), sometimes (a few times a month), often (a few times a week))

Where have you primarily been working in the past three months?

(ward, emergency department, intensive care unit, operating room, other)

In which medical area do you work primarily?

(Anesthesiology, Surgery, Obstetrics/Gynecology, Internal medicine, Neurology, orthopedics, Radiology, Urology, in several medical areas, other)

Do you have any additional comments?

Items only included at T₁

Are you familiar with the indication list that has been implemented as part of the program

“progress! Safe urinary catheterization“? (yes, no)

Have you participated at a training as part of the program “progress! Safe urinary catheterization“?

- Theoretical training (yes, no)

- Practical training (yes, no)

How do you evaluate the participation of your unit in the program “progress! Safe urinary catheterization“? (very positive, rather positive, neutral, rather negative, very negative, don't know the program)

Items translated from German original by the authors.

¹ Items were answered on a Likert-scale from 1 (do not agree at all) to 7 (completely agree)

Appendix 3. Knowledge – % correct answers provided per item

	% T ₀ n = 1,579	% T ₁ n = 1,527
Please estimate:		
How many patients in Switzerland receive a catheter during their hospital stay? (10-25%)	37.6	39.1
Please indicate if the following statements are correct:		
After 30 catheter-days, nearly all patients show bacteriuria. (correct)	81.6	86.9
The duration of catheterization is an important risk factor for the development of a urinary tract infection. (correct)	98.0	98.9
Most hospital-acquired urinary tract infections are associated with a urinary catheter. (correct)	82.2	86.3
Single-use urinary catheters carry a higher risk for infections as compared to indwelling catheters. (false)	89.9	91.9
A closed drainage system is essential for the prevention of catheter-associated urinary tract infections. (correct)	77.4	82.0
Compared to catheters, non-invasive methods for bladder draining (e.g., condom catheters, incontinence pads) have the advantage that they do not carry a risk for injuries. (correct)	62.4	69.0
Non-infectious complications (e.g., injuries or allergic reactions) only occur in absolutely rare instances during catheterization. (false)	61.2	68.8
The choice of an antiseptic for disinfecting the urethral meatus does not affect the correct asepsis when inserting a catheter. (false)	80.6	82.6
Up to 50 percent of catheters placed in an emergency department are not medically justified. (correct)	61.4	73.8
One effective measure to prevent catheter-associated urinary tract infections is to change catheters or drainage bags in regular intervals. (false)	30.4	36.2
In which of these situations is the placement of a urinary catheter indicated?		
To monitor urine output in stable patients who can be weighed. (not indicated)	97.5	98.1
In case of distress at the request of a terminally ill patient. (indicated)	93.3	93.2
For patients requiring intensive care. (not indicated)	21.2	32.3
For patients with restricted mobility. (not indicated)	79.9	81.4

Correct answers for knowledge items are provided in parentheses. Items were translated for this publication by the authors. Sample size differs slightly for each item due to a varying number of missing values.

Appendix 4. Perception of practices and culture – Mean and standard deviation per item

	Mean T ₀ (SD) n = 1,579	Mean T ₁ (SD) n = 1,527	p-value
On my unit, IUCs are placed only as clearly indicated medical measure.	5.5 (1.4)	5.7 (1.3)	<0.001
For medical leadership on my unit, restrictive use of IUCs is very important.	5.1 (1.6)	5.4 (1.4)	<0.001
For nursing leadership on my unit, restrictive use of IUCs is very important.	5.1 (1.5)	5.7 (1.3)	<0.001
Nursing workload plays an important role when a decision for placing an IUC is made.	2.8 (1.8)	2.5 (1.6)	<0.001
People in charge on my unit make sure that everyone placing IUCs is sufficiently trained for this task.	5.4 (1.7)	5.6 (1.5)	<0.001
Whenever possible, staff on my unit tries to use alternatives to an IUC (e.g., condom catheters, incontinence pads).	4.7 (1.8)	5.1 (1.7)	<0.001
The daily assessment to evaluate if an IUC is still needed is a given for us.	5.3 (1.6)	5.6 (1.5)	<0.001
Basic infection prevention measures are well complied with during placement and care of IUCs.	6.0 (1.1)	6.1 (1.0)	0.0219
If someone needs help when placing an IUC, it is clear on my unit who can be contacted.	5.8 (1.5)	5.9 (1.4)	0.2649
Medical and nursing staff on my unit have a similar attitude concerning the use of IUCs.	5.1 (1.4)	5.3 (1.4)	0.0016
For staff members on my unit, it is a matter of course to openly question the placement of an IUC.	5.5 (1.4)	5.7 (1.2)	<0.001
It is difficult on my unit to speak up when rules of hygiene are broken during placement and care of an IUC.	2.9 (1.7)	2.8 (1.6)	0.0358
It is common on my unit that, whenever possible, two healthcare workers work together to place a catheter.	5.0 (1.9)	5.2 (1.7)	<0.001

Items were translated for this publication by the authors. Sample size differs slightly for each item due to a varying number of missing values.

Appendix 5. Determinants of personal behavior – Mean and standard deviation per item

	Mean T ₀ (SD) n = 1,579	Mean T ₁ (SD) n = 1,527	p-value
Perceived behavioral control			
I can properly estimate in which situations the use of an IUC is appropriate.	6.1 (1.0)	6.1 (1.0)	0.2587
I can influence the use of IUCs in my daily work.	5.5 (1.4)	5.7 (1.4)	0.0004
I am convinced that I am proficient in caring for an indwelling catheter.	5.5 (1.6)	5.6 (1.6)	0.0343
I am convinced that I am proficient in inserting a urinary catheter.	5.7 (1.5)	5.7 (1.4)	0.5490
I am confident that I can reduce the use of IUCs in everyday work.	5.0 (1.5)	5.5 (1.4)	<0.001
Subjective Norms			
My colleagues appreciate my commitment to reduce the use of IUCs.	5.1 (1.5)	5.4 (1.4)	<0.001
In my hospital I am expected to contribute to the reduction of IUCs.	4.6 (1.8)	5.7 (1.5)	<0.001
Our patients appreciate it when IUCs are avoided.	5.5 (1.4)	5.6 (1.4)	0.0442
My supervisors expect that everyone follows the internal protocols for inserting catheters.	6.0 (1.2)	6.1 (1.2)	0.0125
My supervisors expect me to reduce the use of IUCs.	4.5 (1.7)	5.5 (1.5)	<0.001
Attitudes			
The risk from IUCs for patients is underestimated.	5.1 (1.6)	5.0 (1.8)	0.0044
I find it difficult in my daily work to reduce the use of IUCs.	3.7 (1.7)	3.3 (1.6)	<0.001
I am convinced that by reducing the use of IUCs, adverse events to patients can be avoided.	5.8 (1.3)	6.1 (1.1)	<0.001
A reduced use of IUCs makes patient care more stressful for me.	3.0 (1.8)	2.9 (1.7)	0.0045
I think that it's important to reduce the use of IUCs in the hospital.	5.7 (1.3)	6.0 (1.2)	<0.001

Items were translated for this publication by the authors. Items are presented according to their construct (perceived behavioral control, subjective norm and attitudes). In the questionnaire, order of the items was randomized. Sample size differs slightly for each item due to a varying number of missing values.