URINARY CATHETERIZATION CARE AND MANAGEMENT

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Learning Objectives

1. Define what's an indwelling urinary catheter
2. Explain best practices of indwelling catheter care and maintenance
3. Adopt CAUTI prevention strategies from the CAUTI prevention bundle insertion ,maintenance, removal including the Nurse Led HOUDINI protocol
4. Perform urine specimen collection appropriately

Definition Indwelling Catheterization (IDC)

Drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a closed collection system

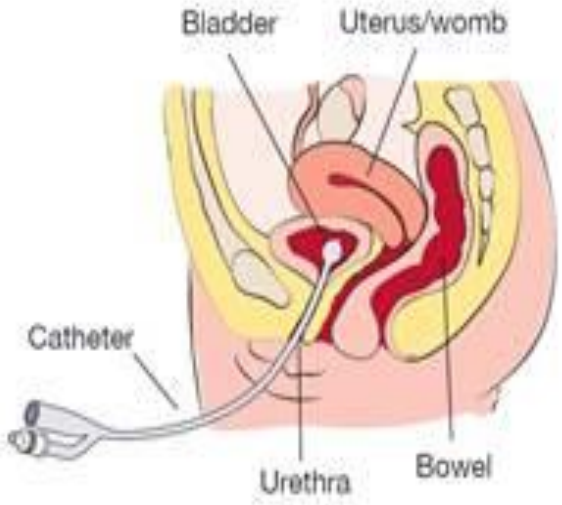


Figure 1 – Female catheter

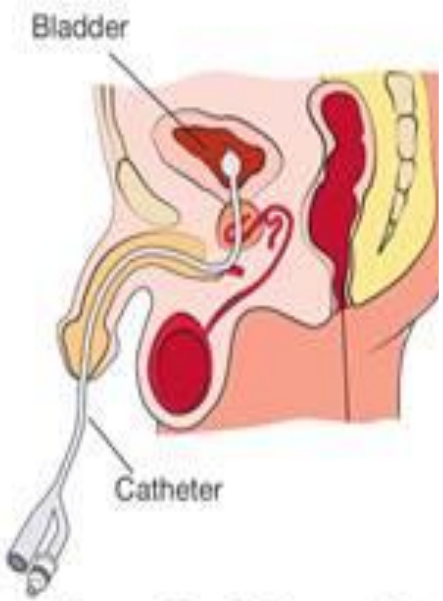
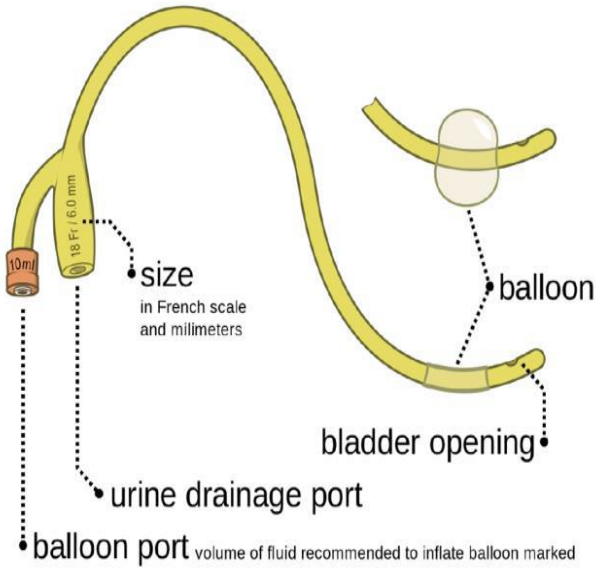


Figure 2 – Male cathet



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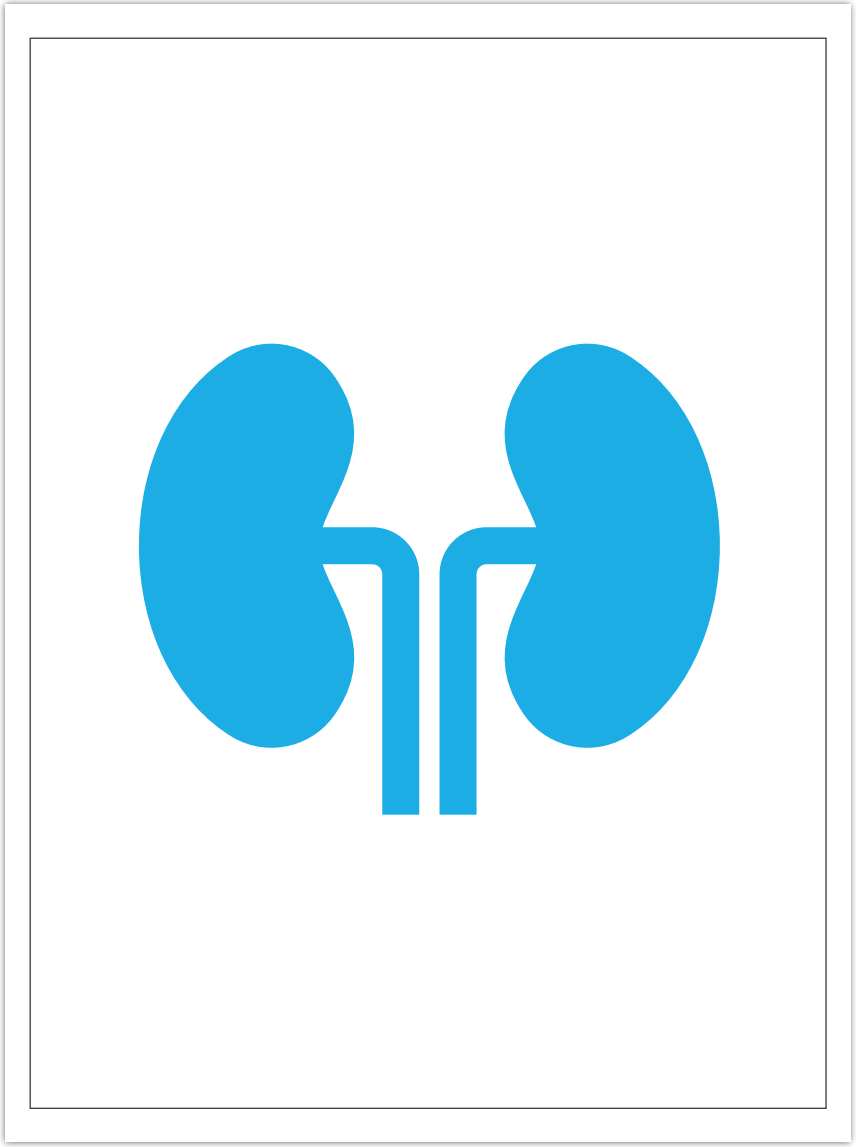

Urinary Catheter

Short-term catheterization

- no longer than 14 days

long-term catheterization

- More than 14 days

Type and duration

- Silicone Elastomer Coated Foley Catheter -14 days
- All Silicone Foley Catheter – 12 weeks

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Patient had an indwelling urinary catheter that had been in place for >2 d on the date of event (day of device placement = day 1) and was either:

- a. Present for any portion of the calendar day on the date of event, or
- b. Removed the day before the date of event

Fever (>38.0°C), suprapubic tenderness, costovertebral angle pain or tenderness, urinary urgency, urinary frequency, dysuria

Urinary tract infection in person with an indwelling urinary catheter within the 48 hours period before the onset of infection

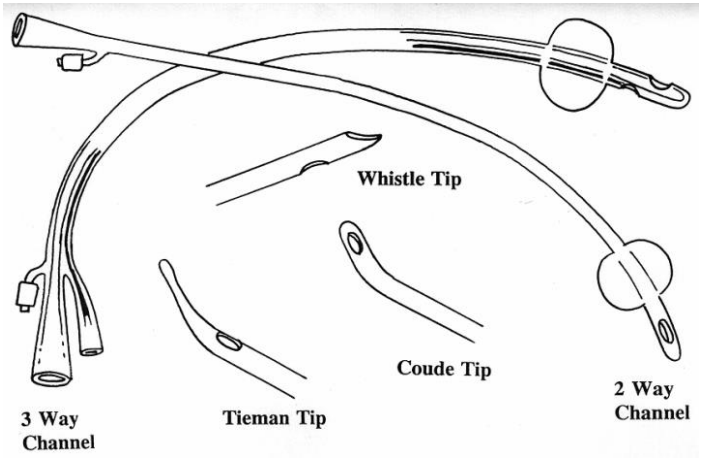
Patient has a urine culture with no more than 2 species of organisms identified, at least 1 of which is a bacterium of ≥105 CFU/mL

CAUTI

Indications for Indwelling Catheter Use

Appropriate Indications for Indwelling Catheter Use	Inappropriate Uses of Indwelling Catheters
Patient with acute urinary retention or bladder or ureter obstruction (e.g. transient myelitis, spinal injury, tumour invasion)	As a substitute for nursing care of the patient or resident with incontinence.
Patient on regional anaesthesia (e.g. epidural) for surgical or obstetric reasons	As a means of obtaining urine for culture or other diagnostic tests when the patient can voluntarily void
To improve comfort for end of life care if needed.	For prolonged postoperative duration without appropriate indications
Patient requires prolonged immobilization (e.g., potentially unstable thoracic or lumbar spine, multiple traumatic injuries such as pelvic fractures).	
For accurate measurement of urinary output in critically ill patients	
To assist in healing of open sacral or perineal wounds in incontinent patients.	
Perioperative use for selected surgical procedures: ❖ Patients undergoing genitourinary surgery (e.g. hypospadias repair/ bladder operations) ❖ Anticipated prolonged duration of surgery (catheters inserted for this reason should be removed in post-anaesthesia care unit). ❖ Patients anticipated receiving large-volume infusions or diuretics during surgery. ❖ Intraoperative monitoring of urinary output.	

Types Of Urinary Catheter



Straight Nelaton	• *in/out use e.g. Intermittent Self Catheterisation*
2 way channel	• *routine drainage*
3 way channel	• *urine contains clot or debris, or for* ***bladder irrigation***

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CATHETER SELECTION

- Indication for catheterisation
- Type of catheterisation e.g. urethral or suprapubic
- Consistency of urine

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- Use the smallest bore that will allow good drainage to minimise bladder and urethral trauma
- Consider silicone catheter if for long term use
- Catheter length :Pediatric /Female 20-25cm ,Regular /Male 40cm -45cm

Guidelines for Length of Catheter Insertion and Catheter Size				
Age	Weight	Length of Insertion by Sex		Catheter Size
		Female	Male	
0-5 months Newborn/small infant	3 – 6 kg	5 cm	6 cm	5-6 Fr
6 months – 1 year Infant	6-10 kg	5 cm	6 cm	5-8 Fr
1 – 2 years Toddler	10-12 kg	5 cm	6 - 8 cm	6-8 Fr
2- 6 years Small child	12-20 kg	6 cm	6 - 9 cm	8-10 Fr
6- 10 years Child	20-30 kg	6 - 8 cm	10 - 15 cm	10-12 Fr
> 12 years Adolescent	>30 kg	6 - 8 cm	13 - 18 cm	12-14 Fr

Urethral Length

The length of the urethra varies depending on age and sex.

In males, the urethra is measures 5 cm in new-borns, increases to 8 cm by 3 years of age and 20 cm in adulthood.

In females, the urethra measures 2 cm at birth, increases to 2.5 cm by 5 years old and 3.5 cm in adulthood.

Normal bladder capacity in adults is between 300 to 600cc.

The expected bladder capacity (EBC) for children (between ages 4 - 12) is defined by a formula: **30 x (age in years + 1) ml**. The EBC is used as a reference (Stuart B., et al, 2015).

Insertion of Urinary Catheter Bundle - CAUTI

Key features in the Insertion Bundle include:

- Patient meets appropriate criteria for catheter use
- HCW is trained and competent to insert urinary catheter
- Surgical hand hygiene is completed before insertion
- Appropriate sterile supplies (sterile gloves, drape, antiseptic solution) was used for insertion
- Aseptic technique was used by HCW
- Single use packet of lubricant jelly was used for insertion
- Catheter and tubing were secured to prevent movement and catheter bag is below the level of the bladder

Insertion of Urinary Catheters

- Remove catheter slowly if it was just for specimen collection
- For catheter indwelling –inflate balloon according to manufacturer recommendation
- Tug gently on catheter after balloon is inflated to feel resistance and then attach to drainage bag
- Secure catheter
  - ✓ **Thigh (adults) or abdomen (pediatrics)**
  - ✓ **Leave enough slack to prevent tension**
  - ✓ **If catheter is to be indwelling test catheter -balloon**
  - ✓ **Inject appropriate amount of solution (water for injection WFI) to test balloon and inflate balloon with the manufacturer recommended amount of WFI (stated on catheter port)**
  - ✓ **Discuss with the physician if the catheter cannot be safely changed due to recent urological surgery**

Documentation

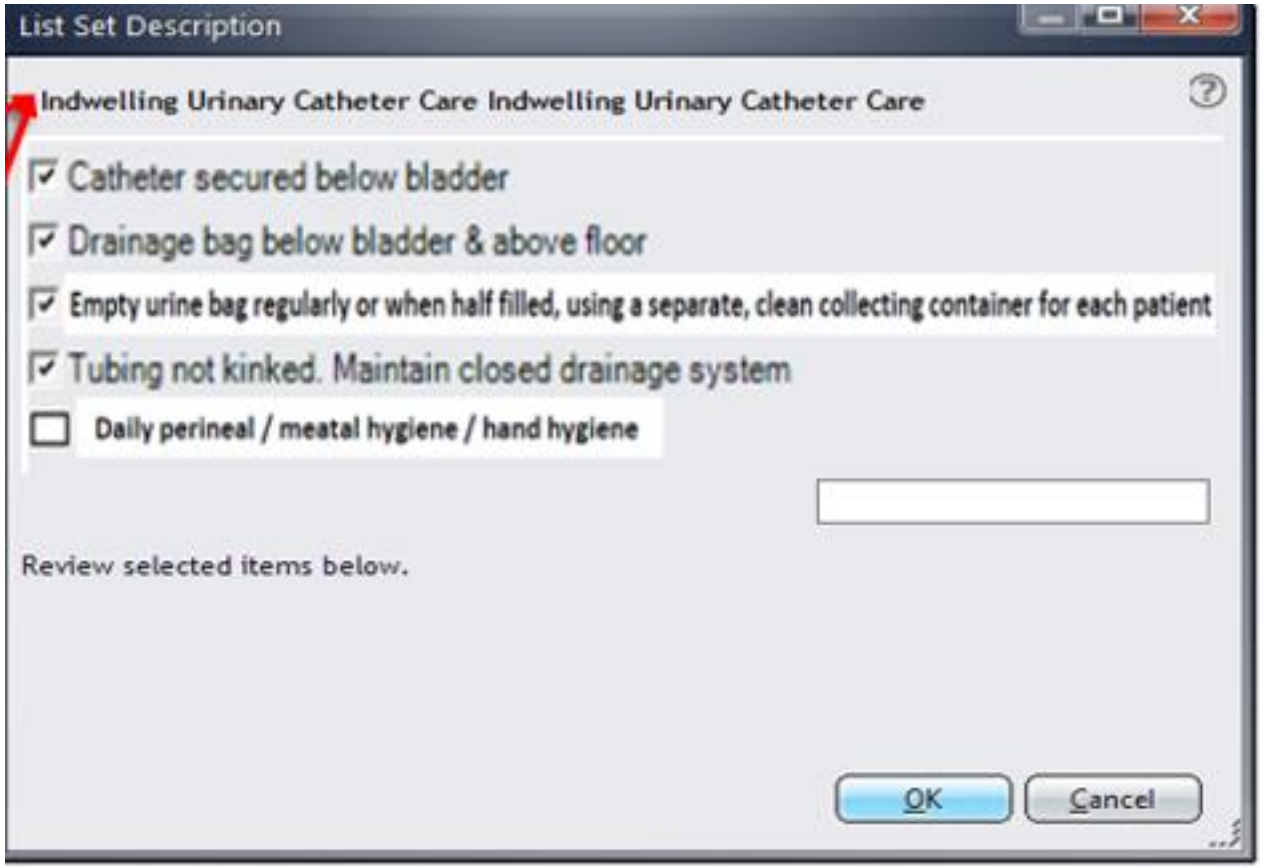
❖Proper documentation for urinary catheterization should include

- ✓ indications for catheter insertion
- ✓ urine Outflow –volume ,clarity
- ✓ date and time of catheter insertion and removal
- ✓ type of catheter and size
- ✓ balloon inflation amount in cc or ml for foley,"s catheter

Key features in the Maintenance Bundle

- Daily review of urinary catheter for necessity of use is done.
- Hand hygiene was performed before touching patient and clean pair of gloves were used to manipulate catheter or drainage system.
- Catheter and tubing is free of kinks and well secured.
- Catheter has been continuously connected to tubing
- Urine is draining well (i.e. no obstruction or blockages) noted.
- Drainage bag is below level of the bladder and does not touch the floor.

SCM Maintenance Bundle



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Maintenance of Urinary Catheters

- Infants who have catheters inserted after urological surgery may have the open catheter draining into an external diaper (double diaper technique).
    i. The external diaper is regularly changed while the internal diaper prevents stool contamination of the open catheter end.
    ii. eliminates need for a heavy urine bag
    iii. limits catheter blockage and dislodgement.

As this is not a closed system, the managing surgeon will advise on the duration of catheterisation and need for antibiotics.

Disconnection of a closed urinary drainage system is avoided unless for good clinical reason such as **obstructions, cloudy urine, heavily blood-stained urine, sediments ,leakage**

Changing of indwelling urinary catheters and urinary drainage bags at routine, fixed intervals is not recommended however based on manufacturer's recommendation **change latex urinary catheter within 2 weeks, and silicone urinary catheter within 12 weeks**

Change of indwelling urinary catheter and/or urinary drainage bag is based on clinical indications such as infection, obstruction or when the closed system is compromised

Post genitourinary surgery indwelling urinary catheters needing a change of urinary catheter due to close system compromised **consult the surgeon/physician prior to changing the urinary catheter**

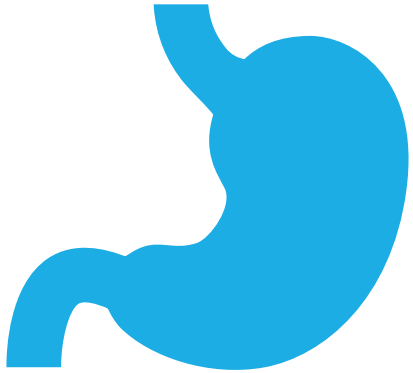
Replace with new urine bag with every change of catheter.

Good Clinical Reason and Break In Close Drainage System

- Augmentation of the bladder involves surgery to make the bladder bigger by using a segment of the patient's bowel / stomach as a patch onto the bladder. This alters the behaviour of the native bladder and hence the risks and safety protocols required will be different.

- All augmented bladder patients will have specific postoperative instructions on bladder washout that are individualised based on surgeon preference and unique patient characteristics.

- Post augmentation **there is a need for frequent bladder wash** or flushing via catheters insitu to prevent blockage of catheters due to mucus



Closed system will be compromise for <u>good clinical reason</u> as need to break system several times a day for bladder irrigation

Specimen collection

- Urine collection from catheter should only be done when clinically indicated.

- Inappropriate urine specimen collection may result in unnecessary treatment of catheter-associated asymptomatic bacteriuria.

- Urine specimen should collected from a newly inserted urinary catheter for patien who are on long term urinary catheters

For any other urinary system surgically created stoma e.g. vesicostomy, ureterostomy, urostomy ***to confirm with surgeon/physician on urinary specimen collection method***

Send urine specimen promptly according to P n P specimen collection

Pointers to Note on Urine Specimen Collection

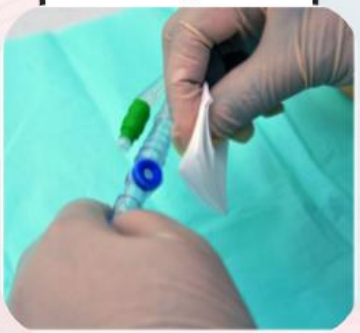
Step 1

Perform 7-steps of hand hygiene

Step 2

Don clean gloves

Step 3



Cleanse sampling port with 70% isopropyl alcohol

Step 4

For small volume of fresh urine e.g., urinalysis/culture, aspirate urine from sampling port with sterile syringe or cannula adapter

Step 5

Dispatch the collected sample in a sterile container

Note for large volumes of urine for special analyses (not culture), collect aseptically from the drainage bag

Periurethral or Meatal Care

- For routine daily **personal hygiene, soap and water would suffice for meatal cleansing IDC/ SPC site**
- Aggressive cleaning may be associated with increased infection!
- Routine hygiene during bathing is appropriate.

Unexpected Situations After Insertion Of IDC

- No immediate flow If patient is co operative take in a deep breath will help to relax perineal and abdomen muscles
  - ✓ Gently rotate catheter as drainage hole may be sitting against the bladder wall
  - ✓ Raise the head of patient bed to increase pressure in bladder
  - ✓ Gentle compression pressure on symphysis pubic area

Unexpected Situations After Insertion Of IDC

- Patient complaints of extreme pain when balloon is inflate
  - ✓ **Stop inflation of balloon**
  - ✓ Balloon is most likely still in urethra.
  - ✓ Allow solution in a balloon to withdraw.
  - ✓ Insert catheter an additional I cm to 2 cm and slowly attempt to inflate balloon again

- Patient complaints of **extreme pain when balloon is inflate in male** especially
  - ✓ **Stop inflation**
  - ✓ **The balloon is probably still in the urethra**
  - ✓ **Damage to the urethra can result if balloon is inflated in the urethra**

Unexpected Situations After Insertion Of IDC

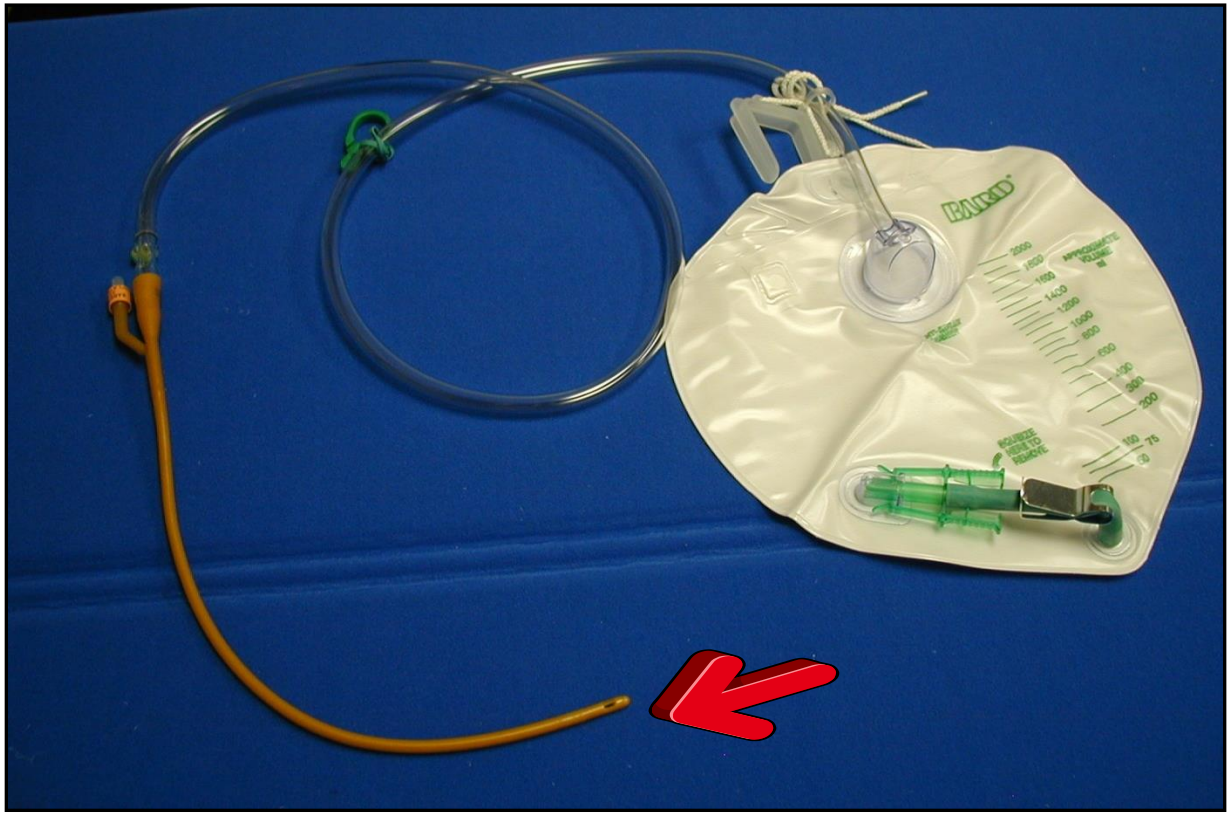
- After balloon is inflated patient voids large amount of urine
  - ✓ Check that required amount of solution has been injected into the balloon
  - ✓ Do not over inflate balloon
- Leaking around a catheter is a common occurrence when initially inserting catheter owing to a large amount of urine pressure.
  - ✓ If this continues to happen, a larger catheter may need to be inserted

Unexpected Situations After Insertion Of IDC

- Urine flow contains large amount of sediments initially and stop flowing but bladder is palpable
  - ✓ Urinary catheter may be plugged with sediments –inform physician may require gentle irrigation

- Patient is obese and had retracted penis
  - ✓ **have assistance to hold penis up and back**
  - ✓ ***the catheter still needs to be inserted to and the length of the urethra has not change***

Potential Site for Contamination

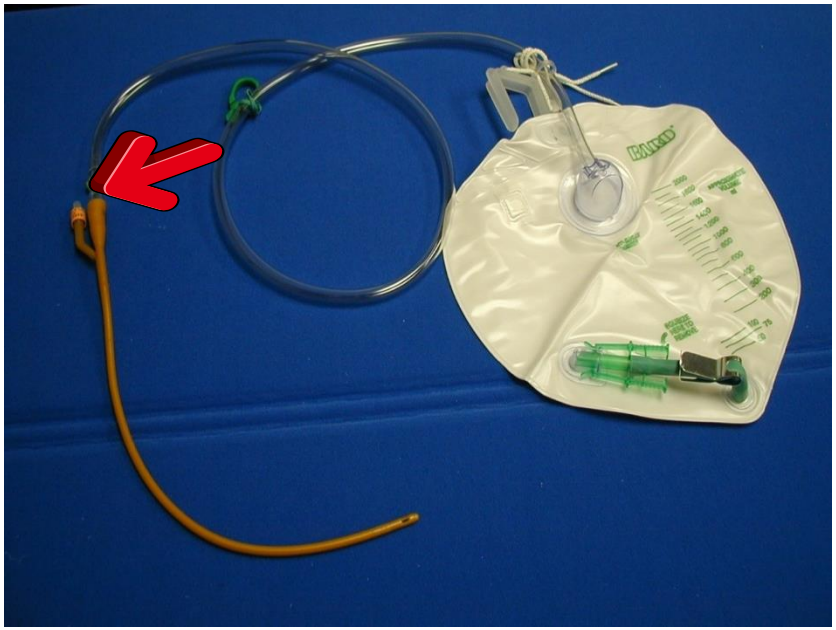


Sterile technique must be used when inserting the catheter

Potential Site for Contamination

Sampling Port:

- ✓ Disinfect port before sampling urine.
- ✓ Check site for possible disconnection of catheter from drainage bag



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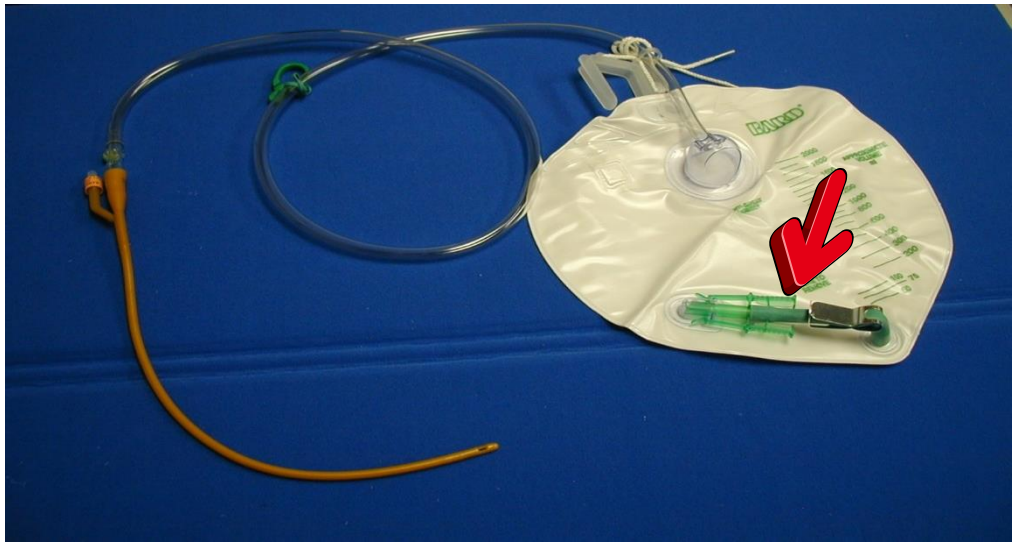
Potential Site for Contamination

System may become an open system if outlet is left hanging or is unclamped



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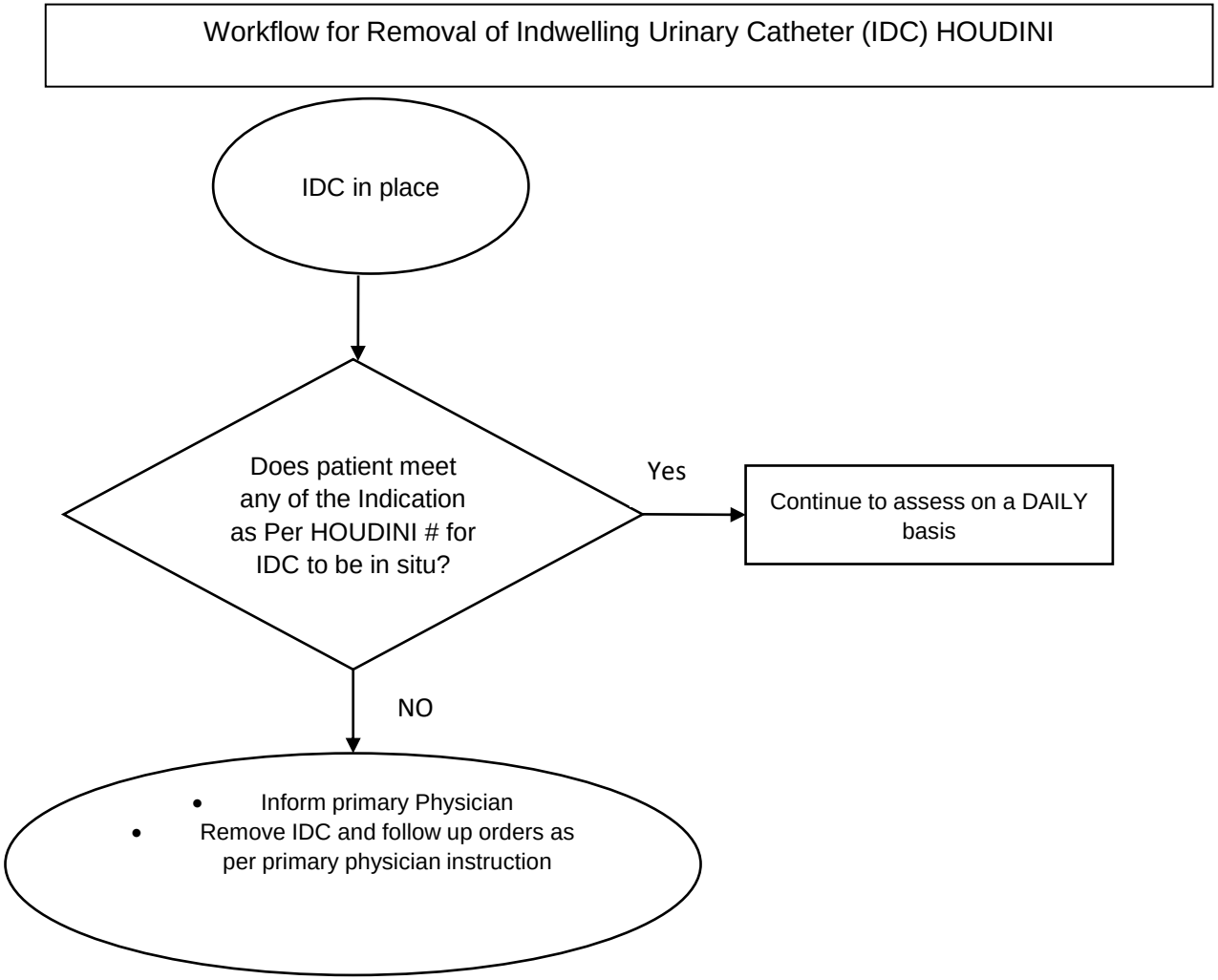

Pediatric's HOUDINI

Acronym	Definition	Description
H	Hematuria	Urine that is visibly discolored by blood or blood clots
O	Obstruction	Urinary obstruction (congenital or acquired) or history of difficult catheterization
U	Urological/Abdominoperineal surgery	Recent operation on genito-urinary tract, abdominal, gynaecology or perineal surgery, recent hypospadias surgery
D	Dressings / Decubitus ulcer	Dressing management for sacral /perineal wounds or pressure sores in an incontinent patient
I	Intake & Output Measurement	Input and output measurement to guide patient management (hemodynamic instability) or tests (e.g. 24H urine collection)
N	Nursing comfort/ Neurogenic bladder	Comfort care in end-of-life/ neurological void failure
I	Immobility from medication or physical constraints	Epidural analgesia or strong sedation, potentially unstable thoracic or lumbar spine, multiple traumatic injuries such as pelvic fractures

Women's HOUDINI

Acronym	Definition	Description
H	Hematuria	Urine that is visibly discolored by blood or blood clots
O	Obstruction	Urinary obstruction, acute retention of urine (ARU), or history of difficult catheterization
U	Urological surgery	Includes adjacent structure of genito-urinary tract, radical hysterectomy, or perineal surgery
D	Decubitus ulcer	Pressure injuries, open sacral or perineal wound in incontinent patient, vulva ulceration
I	Intake & Output Measurement	Input and output critical for patient management or hemodynamic instability
N	Nursing-end-of-life care	Comfort care
I	Immobility due to physical constraints	Potentially unstable thoracic or lumbar spine, multiple traumatic injuries such as pelvic fractures

Procedure

- The RN reviews and documents the need for an IDC using the HOUDINI acronym
- The assessment is done daily, preferably in the morning
- **RN to remove IDC** if none of the indication for an IDC is present after consulting doctor
- After removal, RN monitors the patient's ability to void
- Performs bladder scan to measure Residual Urine or Post Void Residual Urine if ordered by physician or surgeon
  - Informs Dr on results of Residual Urine or Post Void Residual Urine done and carry out further orders if needed

Removal of IDC

- Check amount of WFI used for inflating the balloon
- Connect syringe to catheter balloon hub and allow pressure in balloon to fill syringe with water
- Ensure all WFI is withdrawn, and balloon is fully deflated before removal and document the following after catheter removal:
  - Indications for urinary catheter to be removed
  - Date and time of catheter removal
  - Date and time of first void after removal of urinary catheter
  - Interventions performed
  - Doctor is consulted prior to removal of urinary catheter (refer to institution's procedure)
- Monitor patient's ability to void according to age group # after removal of IDC

REFERENCE VOIDING FREQUENCY BLADDER CAPACITY AND RESIDUAL GUIDE

This references guide are available at P&P 60110-1091 Management and Care of Indwelling Urinary Catheterization

voiding frequency according to age group

Voiding frequency according to age group	
1 year	hourly
2 years	2 hourly
3-12 years	3-4 hourly
> 12 years	4-6 hourly

- PVRU calculation

Expected Bladder Capacity

- 2 years to 12 years [age(yrs)+1] x 30ml
- Less than 2 years old: weight x 7
- Above 12 adult capacity 400 – 600 ml

BC (Bladder Capacity) is determined as Voided Volume (VV) and Post Void Residual (PVR)

PVR

- ≤6y > 20ml or >10% of BC considered significantly elevated
- ≥7y PVR>10ml or 6% BC is considered significantly elevated

To get percentage actual of PVR which is $\frac{PVR}{VV+PR\ (BC)} \times 100$

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Changing of IDC and Drainage Bag

- **Change of IDC:**
  - •Latex catheter-2 weeks
  - •100% Silicone catheter-12 weeks
- **Drainage bag change:**

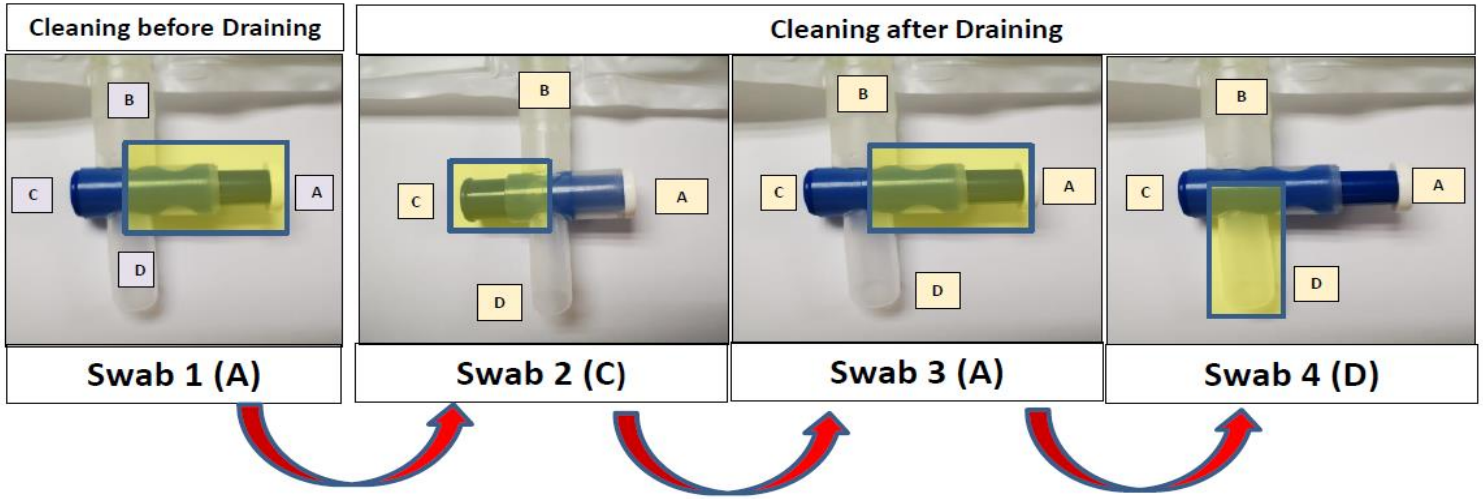
Scenario of changing of drainage before due date for IDC change:

- Leaking
- Blockage along drainage bag tubing
- Heavily stained drainage bag

- **Urine bag Connection technique**
  - •The connection of the drainage bag and IDC must be vigorously swab with 70% alcohol when there is a need to change drainage bag

Empting Urinary Bag

Cleaning of draining port when emptying urine bag (4 Alcohol swabs)



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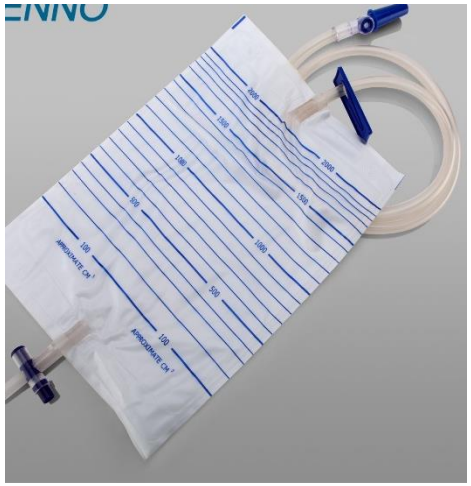
Types Of Urine Bag

Urine bag 2litre non sampling port

Urine bag 2litre with sampling port



Hourly urine bag

Leg bag

Placement of urine bag

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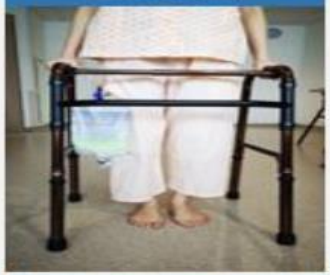
Places To Hang Urine Bag

Urine bag has to be placed below bladder and above the floor

1. Mobile With A Walking Devices

Walking Frame



Walking Stick

2. Inside The Toilet/Shower Room

3. Patient Bed

4. Commode

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Dislodgment of Drainage Bag

❖Dislodgment of drainage bag from IDC for an unknown period:

- ***remove existing IDC*** *and* ***re-insert*** *under aseptic technique only for those patient with* ***no*** urological surgery
- **Patient with urologic** surgery

  change a new drainage bag with proper connection technique and inform doctor immediately

Patient and Healthcare Professional Education

- Teach patients to recognize and report symptoms of UTI post catheterization e.g. frequency, urgency and dysuria
- If UTI is suspected, collect urine specimen for further investigation Training and education programme for healthcare professionals at induction and regular intervals are conducted and include the following:
  - Infection control measures
  - Maintenance of the catheter system;
  - Obtaining urine specimen;
  - Observation of signs and symptoms of CAUTI;
  - Reviewing catheter days and early removal of indwelling catheters

Complications of Urinary Catheterizations

❖ Bladder Spasm and pain:

symptoms

- ✓ urgency
- ✓ abdominal/perineal pain
- ✓ partial blockage of catheter.

❖ Caused by inflammation of the bladder and urethral mucosa.

Treatment :

i. oral, transdermal or intravesical anticholinergic medications

ii. Use catheter with smaller lumen and balloon size.

iii. Ensure the catheter is taped with enough slack to avoid traction on the catheter that causes the balloon to press on the base of the bladder (trigonal area).

iv. Promote regular bowel movement

v. Consider use SPC instead of UC where appropriate, since the apical position avoids stimulation to the trigone and minimizes bladder pain

Catheter Blockage

❖**Presentation :**

- ✓ urinary leakage around the catheter

❖**Possible factors :**

- ✓ blockage from debris or encrustation
- ✓ kinking of the catheter
- ✓ catheter drainage holes blocked - catheter lying against bladder wall which is exacerbated by constipation

❖**Prevention**

- ✓Encourage adequate fluid intake - reduce risk of encrustation
- ✓Empty urine bag regularly
- ✓Keep the level of the urine bag below the bladder at all times
  - a.Elevation of the urine bag increases the risk of polypoidal inflammation within the bladder urothelium
- ✓Perform bladder irrigation
- ✓Investigate for possible bladder stones when catheter blockage is frequent

Inability To Remove Catheter

- balloon does not deflate properly
- possibly due to balloon encrustation or faulty deflation mechanism
- **Troubleshooting**
  - Puncture the balloon inflation pathway to release the water content
  - **Inform physician immediately :**
    - **Management Options**

i. ***Perform ultrasound guided trans-abdominal balloon puncture***

ii. ***Perform cystoscopy and use a metal guide wire to perforate the balloon***

iii. ***Avoid trans rectal perforation of the balloon so as to prevent sepsis***

iv. ***If puncturing the balloon, it is essential to ensure that all catheter material is completely evacuated***

Complication of CAUTI

- Prostatitis
- Epididymitis
- Orchitis in males
- Cystitis
- Pyelonephritis
- Bacteraemia
- Endocarditis
- Vertebral osteomyelitis
- Septic arthritis
- Endophthalmitis
- Meningitis

leading to

- **Prolonged hospital stay**
- **Increased cost**
- **High mortality**

(CDC, 2018)

Thank you