

# URINARY CARE FOR NEONATES - GCNC

## PRACTICE GUIDELINE<sup>®</sup>

### SUMMARY/KEY POINTS

- Urinary catheterisation is an invasive two person procedure.
- Female catheterisation can be performed by nursing staff. Male catheterisation is performed by a nurse that has completed the NICU skills package or a doctor.
- Feeding tubes are not recommended for use as indwelling catheters at any time.
- Always position catheter drainage bags below the level of the infant's bladder to avoid backflow and ensure there is no traction or kinking of the tubing.
- For males secure the catheter with tape to the upper thigh or lower abdomen to reduce the risk of tissue damage by traction to the urethra. For females the ideal strapping is to the medio-lateral aspect of the thigh.
- Aqueous Chlorhexidine 0.5% is recommended for cleaning the genitalia of catheterised infants
- A urine analysis and specific gravity is attended daily on all infants in intensive care and those on IV therapy including TPN.

Infants with cardiac or renal anomalies and those receiving **phototherapy, IV therapy, diuretics, Indomethacin, Inotropes**, and **Steroids** have their nappies weighed and a daily urine analysis and specific gravity attended.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

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| <b>Approved by:</b>    | SCHN Policy, Procedure and Guideline Committee |                               |
| <b>Date Effective:</b> | 1 <sup>st</sup> December 2016                  | <b>Review Period:</b> 3 years |
| <b>Team Leader:</b>    | NUM  | <b>Area/Dept:</b> GCNC        |

## CHANGE SUMMARY

- Bladder Pressure monitoring has been removed as is a separate clinical practice guideline for neonates.
- Procedure information added for insertion of catheter
- Urine output calculation added to document
- References updated
- Link to SCHN network document included

## READ ACKNOWLEDGEMENT

- Clinicians working in Grace Centre for Newborn Care are required to read this document.

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## Assessment

### History

- Check the family history for renal failure, cystic kidney disease or genito-urinary anomalies.
- Neonatal history should include;
  - When the infant first passed urine
  - Any hypoxic events that may result in a decreased renal blood flow.
  - Sufficient fluid intake relative to clinical status, gestational age and the immediate environment.
  - Any bleeding or increased gastro-intestinal losses from nasogastric suctioning, vomiting, diarrhoea or increased ostomy output.
  - If the infant has received any nephrotoxic medication.
  - If the infant is under phototherapy for treatment of jaundice or has other potential causes for increased insensible losses including extreme prematurity or congenital skin disorders (Ichthyosis).

### Inspection

- Observe for abdominal distension
- Check if bladder appears distended and is palpable.
- Observe for abnormal openings, depressions or swellings in the perineal tissue that leads to the anal opening. This area should be intact and smooth in appearance.
- Anus should be inspected for patency and position.
- Gentle stroking of the anal tissue and observation for anal sphincter constriction may test the anal wink, which indicates muscle tone.
- Inspect the male scrotal skin for colour, rugae, edema or ecchymosis. In a full term male infant, the scrotal sac should be full and rugae present. The premature male infant exhibits a generally flaccid, smooth scrotal sac.
- Observe scrotum for any bluish discolouration. The scrotum is generally darkly pigmented and cyanosis may denote disruption of circulation to the area indicating the presence of a possible testicular torsion.
- Observe if scrotum is enlarged or edematous as it may indicate a hydrocoele or a trauma from a pressure on this tissue during the birth process. Hydrocoele is a trapping of fluid in the tunica vaginalis.
- Penile size, resting position and position of the urinary meatus should be assessed for hypospadiasis or epispadiasis. Micropenis (penile hypoplasia) with an otherwise normal appearance is associated with a number of clinical syndromes. Downward curvation of the penis or chordee should also be inspected.

- Inspect the female infant's labia, clitoris, urinary meatus and external vaginal orifice. In a term infant, labia minora should be well formed, clitoris should be formed and labia majora should extend beyond the labia minora. In a preterm infant, the labia may not be fully developed and clitoris may be quite prominent.

### **Palpation**

- Place the infant in a supine position with the knees and hips flexed and gently palpate the abdomen with a gradual downward movement, anteriorly to posteriorly.
- Another technique involves placing infant in a supine position and then placing the fingers of one hand along the flank while palpating the abdomen with the thumbs.
- The most common cause of an enlarged kidney in the neonate is hydronephrosis and second is multicystic kidney disease. Bladder distension or uterocoele may present as mobile mass.
- Palpate the scrotal sac for each testis and cord. Gentle movement of the fingers upward over the scrotum until the testis are identified bilaterally indicates whether one or both testes are descended and their location in relationship to the internal ring in the inguinal canal. The testes may not be fully descended at birth.

## **Urine measurement and urine analysis**

### **Defining Statement**

Measurement of urinary output is part of the clinical care of the sick infant and is used as an assessment of the infant's hydration status requiring observation and recordings. Normal urine output may be diminished in infants with severe disease such as cardiac failure, renal problems, respiratory distress, and asphyxia. Urine analysis is used as an investigation for hydration, acid base balance, infection, metabolic status and general renal function. Urine output should be between 2-4mL/kg/hour with a specific gravity between 1005 -1015<sup>7</sup>.

- Variables assessed in urinalysis are pH, specific gravity, white blood cells, blood, protein, leukocytes, nitrites, glucose, bilirubin and ketones in the urine.
- Urine pH values range from 5 to 8 and reflect the kidney's attempt to maintain acid-base balance. Urine pH values in the newborn should be evaluated in relation to the serum bicarbonate values.
- Specific gravity indicates the kidneys ability to concentrate and dilute urine. Normal levels can range from 1.001 and 1.015. A preterm infant has a decreased ability to concentrate urine therefore low specific gravity may not be an accurate reflection of renal function.
- Excessive proteinuria is an indication of glomerular and tubular damage. Extra-renal pathology should also be considered.
- Sources of haematuria include sepsis, urinary obstruction, urinary tract infection, acute tubular necrosis, renal thrombosis, trauma or administration of nephrotoxic drugs.
- Glycosuria occurs when the renal tubules have reached their threshold for reabsorption of glucose, thus resulting in excretion.

## Patient and Carer Safety

- If the urine output is outside normal range, notify the registrar and nurse in charge of the shift.
- Drugs such as narcotics and muscle relaxants can cause urinary retention in a sick infant. The bladder may be gently expressed and if unsuccessful catheterisation may be necessary.
- Spurious low estimates of urine volume may be assessed when weighing the nappy due to evaporation of urine<sup>8</sup>. The wet nappy should be weighed as soon as possible.
- Change nappies regularly every four hours to reduce the risk of excoriation.
- Gloves and universal precautions must be used when handling wet or soiled nappies.

## Procedure

- Urine analysis including specific gravity is attended and recorded daily or as requested<sup>8</sup>.
- All infants have their urine output measured until normal renal function is established.
- Urine measurement is required for all infants who are post-surgery, have cardiac disease, are receiving intravenous therapy, diuretics, indomethacin, inotrope, steroid, infants who have renal abnormalities/impairment, infants receiving muscle relaxants and those nursed under phototherapy.
- Urine may be collected for measurement using a variety of methods.
- Nappies can be pre-weighed and this weight deducted from the output. One gram of increased weight equals one millilitre of fluid. Evaporative weight loss of 2.3g over a six hour period may occur with nappies used in a non-humidified environment<sup>7</sup>. However estimates of urine output may give false readings, it is recommended to change the pad every four hours<sup>9</sup>
- Pre-weighed pads can be placed in the infant's nappy to absorb urine. Cotton balls can also be used for this purpose.
- Infants with a urine output that is difficult to assess accurately or who require a clean urine specimen may need a urine collection bag. When applying a urine bag ensure that the perineal area is cleaned and dried. Ensure urine specimens for culture are obtained using a 'clean' technique.
- If a measurement of the urine output is required and then is no catheter in place then placing a short feeding tube in the corner of the urine collection bag can avoid removing the bag each time.
- Measuring the urinary volume by calculating the volume of urine since midnight and dividing by the number of hours (eg if 8am divide by 8) to give an hourly rate, then divide the hourly rate by the infant's weight to give to volume per kg per hour.

## Catheterisation

### Defining Statement

Urinary catheterisation is used to assess urine output, decrease bladder pressure and to relieve urinary retention. The catheter may be placed intermittently or be left indwelling. Intermittent catheterisation is performed on infants who are unable to pass urine independently, for example those with neurological disorders. It may also be performed for urinary retention or to collect a clean urine specimen.

### Patient and Carer Safety

- Catheterisation of an infant requires two persons for the procedure. This assists in maintaining an aseptic technique, enables correct positioning of the catheter and allows comfort for the infant.
- Female catheterisation can be performed by nursing staff. Male catheterisation is performed by a nurse that has completed the NICU skills package or a doctor.
- If the infant has undergone genitourinary surgery a catheter is placed intra-operatively. If further catheterisation is required the relevant surgical team are notified.
- Administer sucrose two minutes prior to the procedure and throughout the procedure if required.
- If the urethral opening cannot be visualized medical staff are asked to review to infant.
- Strict aseptic technique is required for insertion.

### Equipment

Collect equipment prior to preparing the infant including:

- Dressing Pack
- Indwelling catheter of appropriate size

|   |           |
|---|-----------|
| Preterm infant or Small for gestational age | 5FG       |
| Term infant                                 | 6FG       |
| Older Infant                                | 6FG – 8FG |

- Sterile gloves (1 pair)
- Single pack water based lubricant
- Aqueous chlorhexidine 0.5%
- Urinary drainage bag
- Ampoule of sterile water
- 5ml syringe
- Tapes for securing catheter
- Protective eye wear

- Specimen jar

## Procedure

1. Place the infant in the supine position with the help of the assistant. Position the infant's legs to enable a clear view of perineal area and for ease of insertion of the catheter.
2. Universal precautions are used throughout the procedure, including eye protection and gloves.
3. Gather equipment. Set-up a sterile field.
4. Open a dressing pack on to a trolley with a sterile drape and place the urinary catheter, syringe, aqueous lubricating gel and sterile gloves onto the sterile field.
5. Pour aqueous Chlorhexidine into the gallipot and soak the cotton balls. Aqueous Chlorhexidine 0.5% is used for swabbing the perineal area as this reduces the risk of chemical burning.
6. Wash hands for the required two minutes, dry and don sterile gloves.
7. The assistant helps to draw up the correct volume of sterile water required for the inflation of catheter balloon. The volume is specified on the catheter.
8. Administer sucrose at this time to reduce the stressful effects of the procedure.
9. Place the sterile dressing towel from the pack under the infant's buttocks.
10. Swab the infant's genitalia using aqueous chlorhexidine with gentle movement from front to back. If using forceps ensure no undue pressure is applied.
11. Lubricate the catheter tip with a small amount of sterile lubricant.
12. Choose a catheter appropriate to the size of the infant. For most infants this is either a 6FG or 8FG catheter<sup>1</sup>.
13. If a standard Foley catheter cannot be inserted a small gauge (3.5 or 5FG) Uricath is used. Feeding tubes are not used as there is a risk of tissue inflammation adherence, encrustation and knotting in the bladder<sup>2,3</sup>.
14. Once the catheter has been inserted into the bladder, evident by urine back flow, inflate the balloon with the recommended amount of sterile water as indicated on the catheter balloon lumen. ([Figure 1](#))



**Figure 1:** Catheter balloon inflated using a small syringe of sterile water



**Procedure for males**

1. The penis is held with the non-dominant hand using the gauze square from the dressing pack. It is held at a 90 degree angle to the infant's abdomen.
2. The foreskin is retracted slightly it cannot be retracted back completely and should not be forced back to reveal the urethral opening.
3. Once the opening is visualised the area is then swabbed with the Aqueous Chlorhexidine 0.5%.
4. Whilst still holding the penis the catheter is inserted gently with the dominant hand until urine begins to drain then advanced a further 7.6 -10cm approx<sup>4</sup> (adjust insertion length based on gestational age and size of the infant). Apply constant gentle pressure.
5. The catheter is inserted slowly and should not be forced. If resistance is felt the following strategies should be considered:
6. There may be urethral sphincter muscle spasm, it may take a few seconds for the muscle to relax wait for a short period of time before continuing with the procedure:
  - Consider applying additional lubricant to the catheter
  - Increase traction on the penis and apply gentle pressure on the catheter
  - Gently rotate the catheter
  - If you are unable to pass the catheter notify medical staff. DO NOT use force as you may damage the urethra.
7. Once urine is draining, inflate the balloon of the catheter and attach the catheter to a closed urinary drainage system.
8. Secure the catheter with tape to the upper thigh or lower abdomen to reduce the risk of tissue damage of the urethra<sup>5</sup>. Comfeel should be used to protect the skin.

**Procedure for females**

1. The non-dominant hand is used to open the labia to expose the urethral opening. The labia can be held apart with the gauze swabs from the "Dressing Pack" or with fingers from the non-dominant hand as long as there is no cross contamination from the non-dominant hand to the clean /aseptic areas
2. The genitalia are swabbed with Aaqueous Chlorhexidine 0.5% in a downward motion from the inner labia outward .A clean swab is used for each downward motion.
3. The catheter is inserted until urine drains and then advanced a further 5 cm<sup>4</sup>.
4. If it is suspected that the catheter is not in the bladder and in the vagina, the catheter is left insitu whilst re-catheterising with a new catheter (generally above the first catheter). Once the new catheter is correctly placed the first catheter can be removed.

Once the catheter is in place and the balloon inflated it can be attached to a closed urinary drainage system and secured by tape to the medio – lateral aspect of the thigh. Comfeel may be used to protect the skin.

## Documentation

Once the procedure is complete document in the electronic medical record:

- Indication for catheterisation
- Time of procedure
- Type and size of catheter
- Expiry date of catheter
- Volume of water used to inflate the balloon
- Outline any problems with insertion
- A description of the urine colour and volume
- Urinalysis results

## Urine Output Calculations

- The expected urine output for an infant in 24 hours is 2-4ml/kg/Day.
- Urine output should be calculated on a daily or 24 basis (from midnight to midnight). The total urinary output for the 24 hours is divided by the infants weight and then by 24 hrs. See calculation below.

$$\frac{\text{Total Urine volume in 24 hrs}}{\text{Infants weight}} = \text{mL/kg then } \frac{\text{mLs/kg}}{24 \text{ hrs}} = \text{mL/kg/hr}$$

For example: 3kg with 160mL Urine Output in 24 hours

$$\frac{160}{3\text{kg}} = 58.3\text{mL/kg then } \frac{58.3}{24\text{hrs}} = 2.2\text{mL/kg/hr}$$

- If urine output has increased or decreased and you are required to calculate the output over a shorter period of time utilise the formula below.

$$\frac{\text{Total Urine volume in time period (i.e. 4 hours)}}{\text{Infants weight}} = \text{mL/kg then } \frac{\text{mLs/kg}}{4 \text{ hrs}} = \text{mL/kg/hr}$$

For example: 3kg with 70mL Urine Output in 4 hours

$$\frac{70}{3\text{kg}} = 28.3\text{mL/kg then } \frac{28.3}{4\text{hrs}} = 5.8\text{mL/kg/hr}$$

- The method of calculation used should be recorded in the electronic medical record i.e. mL/kg/hr or mL/kg/Day.

## Care of Infant with indwelling catheter

### Defining Statement

Urinary tract infections (UTI) are the most common complication of indwelling catheters. UTI's can result in increased risk of morbidity and mortality. The risk increases with the duration of catheters in situ. Catheter related urinary tract infections can be minimised by promoting good catheter hygiene which starts from the time of insertion. Urinary catheters should be removed when no longer clinically required<sup>6</sup>.

### Patient Safety

- Always position the urinary drainage bag below the level of the infant's bladder to prevent backflow and potential infection.
- The urinary drainage bag and tubing needs to be secured so that there is no tension or discomfort to the infant, allow free flow of urine and to reduce the risk of kinking and dislodgement. When the infant is moved ensure that the catheter clip has been detached and there is no traction to the catheter.
- Disruption of the system should be kept to a minimum. Use universal precautions when emptying the urinary drainage bag. Micro-organisms can be found at the inlet and outlet tap. It is recommended that the outlet tap be cleaned with an alcohol swab before and after emptying the drainage bag<sup>6</sup>.

### Procedure

- Check for signs of infection at the catheter insertion site each shift.
- Keep the area around the catheter site clean and dry. Clean the meatus to prevent the onset of bacteriuria. Perform a perineal wash at least once per day with sponge baths. For females wash from top of labia to bottom. Do not retract the foreskin in males.
- Cleaning with antiseptics is not recommended as they have been linked to development of multi-resistant organisms<sup>6</sup>.
  - Measure the urine in the urometer then empty the contents into the catheter drainage bag as required. In order to maintain the integrity of the closed system there is no need to empty the drainage bag regularly unless it is overfilling. ([Figure 2](#))



Figure 2a: Emptying the urine into the drainage bag: 2b: Emptying the drainage bag

## Trouble shooting

Catheter not draining/patient oliguric:

- Check catheter and drainage tubing is not kinked
- Ensure catheter is still taped in position and has not migrated out of the bladder
- Discuss with medical staff consider irrigating the catheter with 2-3ml of sterile 0.9% Sodium Chloride. Do not use force to instil fluid. This is an aseptic procedure.

Catheter leaking:

- Review position of catheter
- Check balloon is inflated
- Discuss with medical staff ongoing indication for catheter. If a new catheter is required consider inserting a larger size.

## Caveat to Guidelines

- If the infant has undergone genitourinary surgery there may be specific instructions on the operation notes for cleaning the perineal area and for the solutions to be used.
- There may also be instructions to have the catheter draining into a nappy or dressing rather than an enclosed drainage system.
- For additional information refer to Open Catheter Drainage Section in the [SCHN Catheters and Urinary Management Policy](#).

## Removal of Indwelling Catheter

### Patient and Carer Safety

- If there is a balloon device holding the catheter insitu ascertain from the patient notes the volume of fluid that has been placed in the catheter balloon. This volume is then removed to deflate the balloon.
- If there is any resistance felt, undue force should not be used. Notify medical staff to review the patient. Imaging is necessary if the catheter appears to be stuck.
- Prepare the infant for the procedure by administering sucrose two minutes prior to the catheter removal and as required during the procedure

## Procedure

1. Universal precautions are used throughout the procedure. Gloves do not have to be sterile.
2. A 2mL syringe is placed into balloon port of catheter to remove the amount of water equal to what was recorded in the patient's notes for the balloon inflation.
3. Once the balloon is completely deflated, gentle traction is applied to the catheter with the dominant hand whilst slowly removing the catheter. If resistance is felt and the catheter cannot be removed do not force, leave the catheter insitu and consult the medical team.
4. Inspect catheter tip for intactness.<sup>14</sup>
5. Document any urine in that has collected in the drainage device that has not already been included in the FBC.
6. Dispose of the catheter and the drainage system in the yellow contaminated waste bin.
7. Remove gloves and wash hands.
8. Document catheter removal in the electronic medical record.
9. Observe urine output post catheter removal.<sup>14</sup>

## Caveat to Guidelines

When changes to the infant's status occur such as sepsis, surgery or general deterioration in their condition, measurement of the urine output may be assessed over a shorter period of time.

## Intermittent Catheterisation

### Defining Statement

- Intermittent catheterisation is a procedure used frequently for infants with hypotonic/atonic bladder or bladder outflow obstruction. This is performed to ensure effective bladder emptying. It is also used on occasion as a means of collecting a "sterile" urine specimen rather than performing a bladder tap.
- Parents of infants who require regular intermittent catheterisation are taught the procedure by the nursing staff following instruction by the Clinical Nurse Consultant for Spina Bifida Team.
- A short 6FG (160mm) catheter is used.

- Additional information can be found in the [SCHN Catheters and Urinary Management Policy](#).

## Potential Complications<sup>14</sup>

### Insertion

- Inability to catheterize.
- Urethral injury following trauma from sustained insertion or balloon inflation in the incorrect position:
  - Haemorrhage
  - False passage
  - Urethral strictures following damage to urethra. This may be a long term problem.

### Management

- Infection.

### After removal

- Paraphimosis: failure of the foreskin to return to the normal position following catheter insertion.

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