WOMEN AND NEWBORN HEALTH SERVICE
King Edward Memorial Hospital

NCCU CLINICAL GUIDELINES
SECTION: 5

VENOUS AND ARTERIAL ACCESS AND LINE MANAGEMENT

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Sampling
Date created: August 2006
Date revised: Jan 2014
Review date: Jan 2017

SAMPLING

Capillary
Venepuncture
Peripheral Artery
Umbilical catheter (UAC/UVC)
Central venous catheter

CAPILLARY BLOOD SAMPLING

In the absence of arterial access, capillary blood samples can be used where the total sample volume is < 1ml:

2. U & E’s/FBC/antibiotic assays/caffeine levels/SBR/PGL.
3. Newborn screening.

EQUIPMENT

- 1% chlorhexidine/20% alcohol swab
- Neonatal approved lancet
- Gauze swabs/cotton wool balls
- Specimen tubes/capillary blood tube

PROCEDURE

1. Consider sucrose
2. Check pathology form with infant’s identification bands.
3. Check that investigations are correct for that infant.
4. Collect appropriate sample tubes and equipment for blood sampling.
5. Wash hands and wear gloves.
6. Identify the puncture site that you are going to use, as above
7. Clean site and allow to dry for 30 secs.
8. Lance the skin and wipe away the first drop using a gauze swab.
9. Hold the puncture site downward applying a gentle pumping action and allow blood to flow into the specimen container.
10. Wipe the heel clean with a cotton ball and gently compress the site until bleeding has stopped.
11. Label and check with another person the collected samples are correctly labelled at the bedside.
12. Blood sampling site, the test ordered and the volume of blood taken should be documented in the observation chart.

**VENEPUNCTURE**

Venepuncture can be used for blood samples where the total sample volume is >1ml and there is no arterial access, or where capillary sampling is not advisable. Sick neonates may require frequent intravenous cannulation it is therefore important that when performing a venepuncture the most distal aspect of the hand or the foot is used.

**EQUIPMENT**

- 1% chlorhexidine/20% alcohol swab
- Venepuncture needle
- Specimen bottles
- Cotton balls

**PROCEDURE**

1. Consider sucrose.
2. Check that the investigations are correct for that infant.
3. Choose area to be punctured.
4. Clean skin as per protocol.
5. Puncture skin with the bevel uppermost.
6. Direct the needle into the vein at a 45° angle.
7. Await blood return and then allow blood to drip into specimen bottle.
8. Maintain pressure on the site until bleeding has stopped.
9. Document sample method, the test ordered and the volume of blood taken on the observation chart.

**PERIPHERAL ARTERIAL CATHETER SAMPLING**

Taking a peripheral arterial blood sample is an standard aseptic procedure & can be performed by staff deemed competent in this procedure.

**KEY POINTS**

- Blood samples are only to be sent to the laboratory (known as a FORMAL sample) as requested by medical staff. Most blood samples can be analysed within the nursery setting (known as an INFORMAL sample).
- When analysing an informal biochemistry sample, the volume of the specimen is important. To obtain an accurate result, the sample must be 0.1mL. A smaller sample of 0.05mL is needed for a blood gas analysis.
- NEVER USE GLUCOSE SOLUTIONS FOR PERIPHERAL ARTERIAL LINES.

**EQUIPMENT**

- Dressing pack
- 2 ml syringes x 2 or 3
- Blood gas syringe
- 1% chlorhexidine/20% alcohol swab
- Normal saline
- Specimen bottles
PROCEDURE
1. Open all syringe packets, leaving the syringes lying within the packets to keep clean.
2. Prime one of the 2 ml syringes with normal saline.
3. Place infusion running on hold. Temporarily suspend arterial line monitoring.
4. Ensure 3-way tap is turned off halfway between ports. Remove and discard red combi – stop and wipe port with alcohol wipe. Connect empty 2 ml syringe. Open 3-way tap and withdraw 1 ml of blood. Turn 3-way tap off halfway between ports. (This blood is to be returned to the infant post sampling).
5. Withdraw 0.05 - 0.1mL of blood with the heparinised blood gas syringe. Observe the infant’s vital signs and TcPO₂, TcPCO₂. Turn the 3-way tap off midway, remove the gas syringe and immediately apply the filter cap. Gently expel the air form the gas syringe. Do not flick the syringe as this causes air bubbles to mix with the sample. Mix sample well by inverting 4 times and rolling for 20 seconds. Analyse sample within 10 minutes or place in refrigerator for up to 1 hour. Always remix prior to analysis if a delay has occurred.
6. Take further blood samples as required.
7. Return initial blood removed back to the infant. Observe infant’s limb for any signs of blanching.
8. Flush catheter with enough solution to clear most of blood from the line. This takes approximately 0.5 mL.
9. Place new red combi-stop in situ. Recomence infusion pumps connected to umbilical arterial catheter. Reactivate alarms on monitor.

UMBILICAL CATHETERS (UAC/UVC) SAMPLING
Taking an umbilical blood sample is a standard aseptic technique and can be performed by staff deemed competent in this procedure.

KEY POINTS
- Blood samples are only to be sent to the laboratory (known as a FORMAL sample) as requested by medical staff. Most blood samples can be analysed within the nursery setting (known as an INFORMAL sample).
- When analysing an informal biochemistry sample, the volume of the specimen is important. To obtain an accurate result, the sample must be 0.05 ml. A smaller sample of 0.075ml is needed for a blood gas analysis.
- When both UAC and UVC are in place, it is preferable to sample from the UAC rather than UVC. If an infant only has an UVC, the technique for taking a blood sample is the same as from the umbilical arterial catheter.

- All infants born ≤27 weeks gestation may require half strength normal saline flushes for the first 72 hours of age. This is to reduce the sodium load on these infants.

- There is the potential for infection, vasospasm, emboli and ischaemic injury with this procedure.

**EQUIPMENT**
- Dressing pack
- Alcohol swabs
- 2 ml syringes X 2 or 3
- Blood gas syringe
- Normal saline ampoule
- Blood specimen bottles

**PROCEDURE**
1. Open all syringe packets, leaving the syringes lying within the packets. Prime one of the 2mL syringes with N/saline.
2. Place all infusions running through the line on hold. Temporarily suspend line monitoring.
3. Ensure 3-way tap is turned off halfway between ports. Wipe around open port on 3-way tap with alcohol wipe and connect empty 2 mL syringe. Open 3-way tap and withdraw 1mL of blood. Turn 3-way tap off halfway between ports. This blood is to be returned to the infant.
4. Attach the blood gas syringe and withdraw 0.05 - 0.1mL of blood. Observe the infant's vital signs.
5. Turn the 3-way tap off midway, remove the gas syringe and immediately apply the filter cap. Gently expel the air from the gas syringe. Do not flick the syringe as this causes air bubbles to mix with the sample. Mix sample well by inverting 4 times and rolling for 20 seconds. Analyse sample within 10 minutes or place in refrigerator for up to 1 hour. Always remix prior to analysis if a delay has occurred.
6. Take further blood samples as required.
7. Return the blood taken initially back to the infant. Observe lower limbs for any signs of blanching.
8. Flush catheter with enough N/saline to clear most of blood from the line. This takes approximately 0.5mL.

**CENTRAL VENOUS CATHETER SAMPLING**
Obtaining blood samples from a central venous line is a standard aseptic technique which is to be performed by staff deemed competent in the procedure.

**KEY POINTS**
- Sepsis is one of the most common complications of accessing CVC’s. Blood sampling from CVC’s should be restricted to critically ill infants who have no arterial access, as frequent blood sampling will shorten the life of the central venous catheter. Authorization by medical staff for sampling is to be documented in the infant’s notes.
- The decision to take a blood sample from a catheter infusing medications, especially opiates or inotropes must be discussed with medical staff to avoid bolus injections of medications.
- 28G Premicath should NOT be used for sampling.

**EQUIPMENT**
- Dressing pack and 2% chlorexidine swab
- 2mL syringe x 1
- 10mL syringe x 2
- Blood gas syringe, specimen bottles (if required)
- Sterile heparinised sodium chloride or heparinised glucose solution - 2mL

**PROCEDURE**
1. All solution being infused into a central venous catheter is to be heparinised,
2. Place central venous line infusion on hold.
3. Thoroughly wipe the needleless bung with 2% chlorexidine swab and allow to dry. Place drape from dressing pack under cleaned bung.
4. Using empty 10mL syringe, withdraw 1mL of fluid from the CVC to remove infusiate from the catheter.
5. Place this syringe on the dressing pack to return to infant after sample is taken.
6. Using 2mL syringe, withdraw the required blood sample. Take a blood gas first if required.
   Request assistance from another staff member to perform blood gas analysis.
7. Return the blood from the 10mL syringe to the infant.
8. NEVER RETURN BLOOD IF A POTASSIUM INFUSION IS IN PROGRESS.
9. Flush the catheter with 0.5 -1mL of heparinised solution in the 10mL syringe.
10. Recommence central venous line infusion
11. Transfer blood sample to specimen bottles. Label and verify infant’s identification details.