Pediatric Intravenous Insertion and Phlebotomy Tips

Canadian Vascular Access Association (CVAA) and Infusion Nurses Society (INS) advocates the use of the smallest catheter possible that will allow the required flow rate. This will prevent injury to the vein, resulting in a longer lasting IV site. Trauma patients are the exception and require larger catheters (16, 18 or 20 gauge).

Considerations

- Purpose of IV
- Duration of therapy
- Integrity of surrounding tissue – avoid areas with skin break down, rashes or eczema
- Vein size & integrity
- Choose non-dominant hand if possible to allow the child to perform normal daily routine
- Patient diagnosis i.e. Sickle cell patients, avoid joint areas
- Limbs with limited feeling/movement and poor or compromised venous and/or lymphatic circulation should be used only as a last resort when unable to achieve venous access in other preferred sites.

Vein Selection

- The biggest one is not always the best! Hard or bumpy veins are not healthy- avoid sclerosed or thrombosed veins.
- Avoid areas where valves are palpable or where two veins bifurcate.
- Look for straight veins with a bounce in them that are round
- Use distal sites before proximal sites to preserve vein integrity

Possible sites to start an IV

a) Dorsal Metacarpal veins on the back of the hand:

- These veins are usually superficial, palpable and visible.
- The hand can be easily restrained during the procedure, and then comfortably splinted.

b) Cephalic vein on the medial side of the wrist:

- These veins are usually large and palpable but not always visible.
- Detection can be difficult in small children
- A good site for older children

c) Basilic or cephalic veins in the inner aspect of the elbow:

- These veins are best suited for blood sampling and short-term infusions.
- The area requires splinting to immobilize the child's elbow
- There is increased risk of infiltration due to movement.
- This site should be used when no other sites are available or for the administration of I.V. push medications

d) Basilic or Cephalic veins in the upper arm and shoulder:

- These veins are usually not palpable or visible but if accessible they are suitable.
- The site requires minimal splinting but must be carefully monitored if hidden under hospital or patient clothing.

e) Basilic branch veins in the inner wrist:

- These veins are very visible but tend to be tiny and fragile
- Because they are so superficial, these veins tear more easily resulting in more frequent I.V. restarts due to extravasation.
- The site is usually tender during I.V. insertion, therefore topical anesthetic is recommended.
- This site should not be used in neonates due to the increased risk of joint damage, pain, and risks from extravasation.

f) Saphenous and marginal veins in the ankle and foot:

- The ankle vein (saphenous) is generally palpable but not always visible.

- It is a large vein and an excellent site for I.V. therapy.
- Marginal veins are visible and easily stabilized.
- Lower extremities are not preferred in older children due to slower rate of flow in these areas and thus, an increased tendency for the formation of phlebitis, clot formation and pooling of injection medication.
- Should not be used in weight bearing infants/toddlers.

g) Scalp viens:

- Scalp veins provide easy visualization and reduced incidence of infiltration due to movement. These veins are very superficial and very visible. The site is easily secured in tiny babies but much more difficult to maintain in older, more active babies or babies with lots of hair. Potential venipuncture sites in the scalp include:

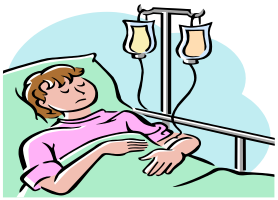
- Superficial temporal vein (in front of the ear)
- Posterior auricular vein (behind the ear)
- Frontal or metopic vein (front of the forehead)
- Occipital vein (at back of the head)

(See section on scalp veins)

Helpful hints to increase vein dilation

- Gently tapping the vein
- Having the patient open and close the hand
- Placing the extremity in a dependent position
- Warming the site

→ A very warm diaper (from hot tap water, not the microwave) on the extremity will help veins appear out of nowhere! It must stay on for at least 3-4 minutes. If it is a challenging IV, one could apply a diaper and then assemble equipment.



Equipment

1. CHEO has implemented a needleless system with their I.V. administration sets and extension sets. Inserting a needle into the needleless access ports will cause leaking of fluid.

2. An extension set is always added to a peripheral I.V. on pediatric patients to limit manipulation of the hub of the catheter and potential catheter related complications.

There are three extension sets in use at present:

- Luer-slip extension set used for older children
- Luer-lock extension set with side port used for infants and small children who are extremely active.
- Luer lock extension set used for procedures to be done with a power-injector. (i.e. contrast for a CT scan)

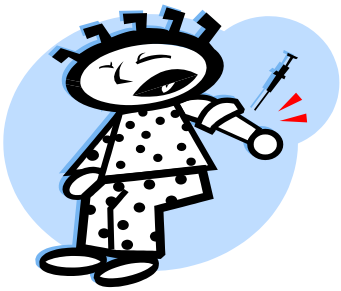
3. Non-occlusive dressings:
   - The site of a peripheral IV site must be visible for site monitoring

4. Arm boards:
   - Choose the appropriate size according to patient age and site used.
   - Cover the boards with facecloth or j-cloth.

5. Protective devises for cannulation:
    - Are small plastic covers taped on to protect the hub of the catheter from movement- CHEO uses "IV houses"

Preparation for IV starts/phlebotomy

- Call child life for pre-procedural teaching, or, if not available provide a brief developmentally appropriate explanation. (see" preparation" under recipe for success)
- Setting up equipment in front of children (and parents!) can increase anxiety, depending on the family! Depending on the patient, some nurses set up in front of the pt. using this time to develop a rapport with the pt. and answer questions.
- When possible have a child in a position for comfort rather than lying them down. A position for comfort provides a secure, non-threatening hold. (see "parents and positioning" under recipe for success). Infants should be supine.
- Put a child older than 12 in semi-reclined position to prevent syncope.
- Have the parent comfort the child, and another health care professional stabilise the child
- Raise bed to a workable level
- Lighting is important
- Have distraction tactics ready i.e. video, distraction kit, bubbles, I spy book(See "coping strategies" under recipe for success)
- Give the child a choice (i.e. would you like to sit on the bed or your mom's lap)



Pain Management

Topical anesthetic cream

Use of topical anesthetics should be used when possible for blood work and IVs. Research has shown the use of topical anesthetic increases your chance of successful cannulation. **NB** Always put topical anesthetic on at least 2 sites. CHEO has 2 topical anesthetic creams:

EMLA Takes 60 minutes to provide anesthetic. Blanching is normal.
If veins are smaller, please allow 90 minutes for EMLA, to allow for any potential effect on veins to wear off.

Ametop Takes only 30 minutes for blood work & 45 minutes for IV's to anesthetize the site. Erythema is normal. Ametop may cause vasodilation. It is in the med room fridge. Call pharmacy if out!

NB Always provide psycho-social support along with topical anesthetic i.e. distraction, position for comfort, pre-procedural teaching

(See topical anesthetic procedure in infusion therapy manual for further information)

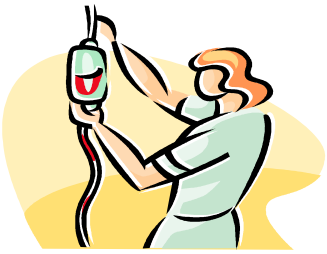
24% Sucrose

Consider giving 24% sucrose on the anterior part of the tongue 2 minutes before an intravenous start or phlebotomy for babies less than 30 days corrected, or dependent upon the nurse's discretion, up to 6 months of age.

(See 24% sucrose policy for further information)

Intravenous Insertion

- Cleanse with skin antiseptic for 30 seconds, then allow to dry (minimum 30 seconds)
- Visualize vein just before you insert the IV catheter- you may want one last feel ABOVE where you plan to put the catheter (be careful not to contaminate insertion site!)
- Stabilize the vein by stretching the skin below the chosen site
- Enter the vein on a 10-30 degree angle, dependent on vein depth. Once you see blood return, stop and lower the needle and advance slightly to ensure that the catheter and not just the needle is entirely inserted within the vein. Then advance the catheter up slowly off the needle.
- Press on the cannula tip to prevent blood flow before you press safety device to retract the needle
- Apply appropriate extension set
- Apply occlusive dressing to catheter hub
- **NB** Never try to reinsert the stylet -this can cause a tear in the cannula and possible foreign body embolism
- Use positive rather than negative language i.e. "Now is the time to hold still! " rather than "Don't move!"
- Use positive encouragement i.e. "You are doing a great job!"
- Try to have the child focus on the distraction provided rather than the procedure
- Child life specialists are glad to be present for all venipuncture and IV inserts.



The Infusion Device

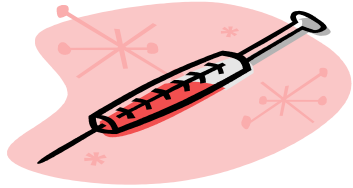
- Keep plugged in as much as possible to ensure battery remains charged
- Chart the pump # on the appropriate form.
- Lock pump to prevent patient/family tampering

- When using a buretrol it must be a certain height to promote accurate flow rates:
  - 24 inches from the top of the fluid in the buretrol when closed
  - 24 inches from the bottom of the IV bag when buretrol is open
- Set the baseline pressure before hooking up IV;
  1) press options (while on pause)
  2) choose set pressure baseline
  3) press OK

Securing the Catheter

- Always ensure the IV site is visible to be able to assess for complications
- Never coil extension set or tubing over IV cannula as this causes pressure and discomfort
- Promote normal joint configuration when taping hands and feet to boards
- Do not tape the fingers flat- leave them out as much as possible
- Double backing the tape is O.K. for older children, however the edge of tape will cut into the skin of a infant-only the fingers and feet can be taped and the tape on the upper part of the extremity should be lined with a 2x2 gauze
- When using a luer-lock connecter place a gauze pad underneath the catheter hub to prevent pressure points.
- Encourage movement of the limb that has the IV.

Phlebotomy Tips



To avoid haemolysis

- Do not leave the tourniquet on longer than 60 seconds as localized stasis with hemoconcentration and infiltration of blood into the tissue can occur. This can affect protein, hematocrit and other cellular

elements and can cause hemolysis. Preferably, the tourniquet should be released once flow is established.

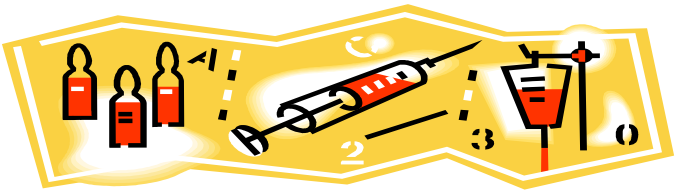
- When using a syringe, avoid drawing the plunger back forcibly (only 1 ml ahead of blood)
- For very small veins, downsize to 3 or 5 ml syringe when withdrawing blood, as this will decrease the amount of pressure put on the vein and prevent the vein from collapsing
- Collect the necessary volume of blood according to the type of macro or micro tube being used to ensure accurate testing.
- Allow antiseptic to dry before vein access (minimum 30 seconds) to prevent chlorhexidine from altering lab values
- When transferring blood into vacutainer tube, use the appropriate blood transfer device and allow the vacuum to pull the blood into the vacutainer. Do not apply pressure to the plunger.
- Gently invert the tube 6-8 times to mix the blood with the additive.

Capillary Samples

- Can be used to obtain small micro tubes or cap gases.
- Not able to do coagulation studies or cultures
- *MOST IMPORTANT* ensure child's extremity is very warm. Often need to warm with a wet, warm diaper for 3-4 minutes
- Wipe away first drop of blood as it contains interstitial fluid
- CHEO has 2 sizes of lancets (these are different from glucoscan lancets!)

  Pink (petite) -used for neonates, infants and small children (dependant on the site) and when you need a medium flow to provide a small volume
  Blue (big) used for high blood flow for multiple tests

- Pick the outer aspect of the finger or toe
- Use the heel for babies up to 6 months
- Gently apply pressure at the surrounding tissue proximal to the puncture site and release. Let the extremity fill back up by giving it a 2-3 second break between applying pressure.
- If blood flow is sluggish try a different angle



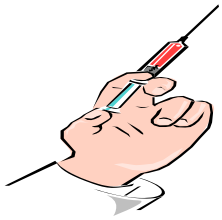
Blood Cultures

- Cleanse the top of the blood culture bottle with 2% Chlorhexadine & 70% alcohol for 30 seconds and allow to dry (minimum 30 seconds). It is important to allow the top of the culture bottle to dry as residue antiseptic can enter culture bottle when inserting blood, potentially killing off bacteria in sample
- Cleanse the skin with 2% Chlorhexadine & 70% alcohol for 30 seconds and allow to dry (minimum 30 seconds)
- Do not take from saline locks (as they can colonize bacteria)
- Minimum volume for effective culture is 1 ml
- Remove any air out of syringe before putting into culture bottle

Blood Tubes

- Ontario Laboratory Association (OLA) standards are to gently invert tubes 6-8 times to mix
- Follow order of draw as indicated by OLA (see Infusion Therapy Manual)
- Rubber stoppers should not be removed from venous blood collection tubes to transfer blood to multiple tubes. When possible use macro tubes for blood collection dependant on vein availability and condition of the child.
- When possible use macro tubes for blood collection, however this depends upon veins availability and condition of the child
- Take in both micro and macro tubes into the room
- Common tests on ice: gases, glucose & calcium (all on green)
- Common tests on red tubes: ASOT, Lipase & total protein
- Common tests on mauve tubes: CBCD, ESR (1 ml minimum)
- Multiple chemistry tests can be done on one full micro green tube
- Most virology tests on large red tubes
- Cover bilirubin in foil to prevent breakdown of bilirubin

- **NB** Verify in the laboratory manual the colour of the tube and the volume required. Verify special collection requirements for samples i.e. ice
- The person drawing the blood must initial all labels and requisitions
- When drawing a sample for blood type or cross match, the person must sign the tube along with the date and time.



Capillary Gases

- Assemble all equipment ahead of time
- Leave one green cap on at an angle, keep the flea in the tube
- Hold the capillary tube almost horizontal, with the tip slightly down where you are collecting the blood
- If you get any air in the sample it will not be processed!
- If you get air in your sample while collecting it, simply tap out the air on a gauze, then resume collecting
- When tube is completely full (ie all the way to the end) then carefully put the other green cap on, being careful to keep the tube level till the cap is on
- Using the magnet, mix the heparin (which is in the inner lumen of the tubes)
- Drag the magnet 15-20 times back and forth up the length of the tube (OLA standards)
- Do not place sample in cup as it may break or cap may fall off when removed
- Place the sample horizontally in a styrofoam soup bowl, or a kidney basin on ice in a plastic bag (so the label will not get soggy)
- Apply pressure to the puncture site with a gauze for 30-60 seconds
- Bandaids are discouraged on infants and toddlers due to the risk of ingesting the bandaid.
- Remember to initial your sample label and requisition & get it to lab STAT

Accessing Scalp Veins for Blood Drawing and/or IV Starts

- The following are some of the strategies and Dos and Don'ts for accessing scalp veins:

Assessment

- Do assess other areas of body (feet, hands, arms) before going to the scalp veins.

- Most parents are uncomfortable with IV access in the scalp for fear of damage to the brain. Explain that veins are on top of the skull, which protects the brain.

- Scalp veins are readily available until about 12-18 months of age. After this the hair follicles mature and superficial layers of skin thicken, making venous access sites disappear.

- To assess potential venipuncture sites, gently tap on the vein or have the baby cry by pinching their nose closed and this will dilate the vein. Never apply a tourniquet to the scalp.

- Avoid veins over the fontanelles

- Palpate for the presence of a pulse to determine if the site is a vein or artery. A pulse indicates an artery. Inadvertent artery puncture reveals bright red blood, pulsation in the tubing and blanching of the skin caused by arteriospasm when the IV device is flushed. If the artery is accessed, remove the device immediately and apply pressure until the bleeding stops.

Preparation & Insertion

- **NB** Remember to consider 24% sucrose

- Remove excess hair to enable site preparation, cannula insertion and dressing adherence for IV starts. Clip excess hair in a 3-inch diameter with scissors or razor. Care must be taken when using a razor to avoid micro abrasions, which may increase potential introduction of microorganisms into the vascular system. (Save some of the hair removed as a memento of the child's first haircut.)

- It is usually not necessary to remove the hair for venipuncture for blood drawing. Clean scalp and hair well with skin antiseptic.

- Use the appropriate size and length of catheter for the scalp vein. (Either a regular or short 24 gauge).

- "Burn net" can be used as a cap enabling visualization of the site.

- Always enter the vein according to the direction of blood flow (towards the heart).

- Use the luer lock extension set to prevent leaking at cannula hub site. Insert a pad (2 x 2 gauze) under luer lock end to prevent pressure spots on the scalp.

- Avoid coiling excess tubing over IV scalp site to maintain easy visibility. Use an IV House cap to protect the IV site and allow the baby to be placed on its side in bed.

- Bunny the baby to prevent accidental dislodgement of the catheter. This needs to be reinforced with the parents on older babies.

- If tape is placed on the hair, use adhesive remover to avoid excessive pulling of the hair when removing IV.

Documentation for IV starts

Chart the type, gauge and length of catheter, peripheral site used, patient tolerance of procedure, blood drawn solution and rate, and any complications.

Example:

#24 3/4 catheter inserted into left hand (metacarpal vein) after failed attempt in right hand. Blood samples drawn then connected to u IV of D%W & .45 at 20 cc/hr with pump # 343.

Attempts

- If you think you have no chance of getting IV ask a more experienced nurse
- CHEO's policy is 2 attempts are acceptable before getting help
- If unable to draw blood during IV insertion and other venous access sites are limited, consider drawing a capillary sample if applicable.

Last word -Have faith and confidence in yourself & go with your gut!

Developed jointly by:
CHEO's Peripheral Infusion Therapy Committee &

CHEO's Pain Committee in October 2007