

Pediatric/Neonatal IV Therapy

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Pediatric and neonatal IV therapy can be both challenging and rewarding. There are significant differences between IV therapy in children and adults so even a nurse experienced with adults may have to “relearn” technique and make other adjustments. Nurses performing IV procedures in children should be skillful and knowledgeable in basic IV therapy applications and in child development. The main goal of therapy is to provide treatment with the maximum amount of safety and efficiency while meeting the child’s emotional needs and promoting developmental tasks.

Children have approximately half the number of usable veins than adults –that is not to say they have less veins but that they have less accessible veins. Infants have more vein locations but not necessarily more veins. The most common reasons for IV therapy in infants are for the delivery of maintenance fluids, blood and blood products, medications and nutrition.

Choosing an appropriate peripheral IV site should include consideration of type and duration of therapy, rate of infusion and expected site rotations. Although in pediatrics elective site rotation is not done, it is not unusual to replace an IV at 24-48 hour intervals. An infant or small child’s access can be rapidly depleted at that rate resulting in increasing emotional and physical trauma to maintain IVs. Early in the hospitalization the diagnosis and plan of care should be clues as to length and type of therapy and consideration may need to be given to alternate devices such as PICCs or surgically placed central vascular access devices especially when treatment is anticipated to be in excess of 7 days or is known to be potentially damaging to veins and surrounding tissue. Vein preservation should be a secondary goal.

Other considerations when choosing an IV site are age, size, reason for the therapy, condition of the patient and veins, mobility and developmental level as it applies to level of activity, motor skills and cognitive ability.

Appropriate sites for IV placement include the scalp, hands, feet and forearms. Other less desirable sites are the antecubital space, palmar aspect of the wrist, external jugular and trunk. Warmth is essential for successful IV insertion and will make it easier to distend and visualize available veins. The scalp is an excellent place to place an IV in infants. It is easy to stabilize and assess IVs in this location and scalp veins do not have valves making it easier to advance the catheter into the vessel. Veins are visible and can be distended by having the infant cry and using digital pressure at the base of the vein. Catheters should be directed toward the heart. The superficial temporal, frontal, occipital, and pre and post auricular veins are suitable for use. It is important to differentiate between arteries and vein as the scalp may have an impressive arterial network in addition to a selection of veins. It can be difficult to tell the difference before the venipuncture is made. Any inadvertent arterial puncture must be followed by catheter removal and pressure to the site.

The hair if excessive can be removed by clipping close to the surface, however, shaving is discouraged. Hair removal should be done to facilitate securing of the catheter rather than providing access to a vein.

It is vital to educate the parents regarding scalp IVs as most are unfamiliar with this location and can become quite upset without prior information and warning. Advantages of the site should be explained and any misconceptions corrected. Often reassurances of the infant's comfort and mobility as well as the fact that the hair will not be shaved go a long way in making parents more comfortable.

The cephalic, basilic and 4th interdigital vein of the hand are all constant veins, meaning that they are generally anatomically present in everyone and therefore usually early choices for IV use. Chronic patients with multiple past hospitalizations are likely to no longer have healthy constant veins. There are usually other veins on the dorsum of the hand that are suitable for IV placement as well, and in more extreme situations the finger and knuckle veins can be used. Because of the short extremities a splint is usually necessary in children from about 6 months of age to school age. The fingers should always be flexed over the splint in a natural position.

Veins in the feet of infants and toddlers may be used until the child is standing or ambulating although there are always exceptions and every situation must be assessed individually. The greater and smaller saphenous veins are excellent to use due to the ease with which they can be identified and entered. Medial and marginal veins as well as any visible dorsal vein are additional options. It is important to position the IV in such a way as to withstand foot flexion and movement. Immobilizing the foot with a board is not recommended because it often requires the foot to be contorted into an unnatural position which can be a precursor to pressure sores, foot drop and nerve injury.

The antecubital veins and those on the inside wrist should be used as last resort only. The AC veins are best reserved for lab sampling and placement of PICCs; IVs in this area are uncomfortable and can be difficult to assess. IVs in the inside wrist are prone to early infiltration, phlebitis and occlusion due to the size and superficiality of the veins. The veins in the forearm can be used if visible or palpable but are difficult to discern in chubby infants and toddlers.

Parents may desire to be present with their child during procedures including IV placement. Their level of involvement will vary-some parents will feel comfortable holding the child in their laps and others will only want to be in the room but not "do anything". All appropriate requests should be respected and honored if possible. There are also those parents that do not wish to be present at all and they should not be made to feel guilty.

The nurse should never attempt a procedure without assistance if there is concern about safety for the patient or the nurse. However, minimal restraint is recommended. The second person should encourage the patient and provide gentle restraint for the opposite

extremity if necessary. Children instinctively do not like being held down and fear the worst which reduces their ability to cooperate. When allowed to sit up and observe the procedure even the youngest child can hold himself more still than when supine and restrained. The child should be informed of the procedure step by step in short concise statements appropriate to his developmental level. Honesty is vital, children need information just as any hospitalized adult—it just needs to be understandable. Allow the child to participate in decision making (e.g. color of band-aid, which hand to look at first, etc.) and to take ownership of his IV. LMX4 is a 4% lidocaine topical cream that can be used on any patient but is especially beneficial for those children that become very anxious which results in vasoconstriction again causing several attempts to be made.

For most people the “sticks” and “needles” are the most traumatic part of being in the hospital. We do not always realize the impact of what seems to us a minor procedure. Making this experience as painless and stress-free as possible for the patient and by association the family can make all the difference in how the hospital experience is perceived.

All IVs should be secured in a stable manner and be dressed with either a transparent dressing or a band-aid. Strategically positioned tape around the hub of the catheter or a Statlock device snapped onto the hub and adhered to the skin sometime is all that is required. If hand movement jeopardizes the IV then a small arm board to support the wrist is indicated. Any cover up that is used must be easily removed to allow for assessment of the site (the area of the catheter tip and beyond) and cannot compromise circulation. For that reason it is best to avoid Ace wraps, Klings and Kerlix gauze wraps. Most children will not require any thing beyond the basic securement of the device. It is unnecessary to assume every patient will put out his IV: It is in fact unusual.

IV site complications are the same as those that occur in adults, however they occur much more rapidly in children and can be more severe. Extreme complications may include partial or full thickness skin loss, infection, nerve and tendon damage, loss of limb function or loss of limb.

Common complications include phlebitis and infiltration. Hourly site assessments are policy for infusing IVs and will allow early detection of warning signs. Infiltration is defined as “the inadvertent administration of a non-vesicant solution or medication into surrounding tissue”. Extravasations is infiltration of a vesicant which is an agent that causes tissues injury. Vesicants include vincristine, dopamine and calcium. Medications such as Doxycycline, Dilantin and Acyclovir and solutions such as TPN are not classified as vesicants but have the potential to cause damage to cellular tissue as well which underscores the need for vigilance regardless of the infusate.

Phlebitis or vein inflammation is another common complication and is characterized by tenderness, redness and in advanced cases a firm or cord like vein. Mechanical phlebitis is inflammation cause by the catheter itself. Chemical phlebitis is cause by solutions with severity of phlebitis due to high osmolarity but the ph cannot be altered with dilution. Bacterial phlebitis is a result of contamination of the system or during the procedure-an

additional sign of this type is drainage at the insertion site. Phlebitis always requires the removal of the IV device and can result in sclerosed veins which cannot be used again.

This underscores the importance of vein preservation and utilizing other devices when chemical phlebitis is expected to occur.

Documentation includes hourly intakes over cumulative intakes, hourly site assessments, detailed documentation of IV starts and restarts, reason for IV removal and condition of the site. Any persisting complication must be addressed each shift. All infusions should be labeled on the tubing distal to the labeled container –proximal to the patient as to the type of fluid.

Make a point to observe as many IV insertions as possible—you will learn from each one. If you are the one placing the IV, set yourself up for success by choosing veins that are visible and easy to cannulate. As your confidence grows the level of difficulty can increase as well. Limit yourself to two attempts and then ask someone else to try. Never lose sight of the big picture—the patient—how is he doing? Provide rest periods if necessary. If you begin to feel frustrated, step away from the situation because you will not be as effective. Remember to view each patient individually and do what's best for him.

REFERENCES

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TEST

1. Choosing an IV site should include the following considerations:
 - a. Type and duration of therapy
 - b. Age and size
 - c. Level of activity
 - d. All of the above

2. The main goal of IV therapy is
 - a. To rehydrate and discharge
 - b. To educate the patient and family and involve them in the process of infusion therapy
 - c. To provide treatment safely and efficiently while providing for the child's emotional and developmental needs
 - d. To maintain the function of the IV device at all cost

3. Constant veins are those which
 - a. Are generally anatomically present in most people
 - b. Are consistently difficult to use and therefore should be avoided
 - c. Are constantly imbedded in subcutaneous tissue
 - d. Are already damaged from previous IV therapy

4. Utilizing the scalp vein of an infant requires:
 - a. Differentiating between vein and arteries
 - b. Educating parents or caretakers
 - c. Having the infant cry to distend the veins
 - d. All of the above

5. Veins that should be considered as last resort choices include
 - a. the smaller and greater saphenous veins
 - b. the cephalic and basilica veins
 - c. the pre and post auricular veins
 - d. the antecubital and palmer wrist veins

6. During the IV procedure all the following should be done except
 - a. allowing the parent to be present if desired
 - b. having assistance available as necessary
 - c. placing the child in papoose board or mummy wrap
 - d. instructing the child in understandable language

7. Securing the IV device requires
 - a. Ace wrap to prevent removal of the IV by the patient
 - b. Minimal amount of tape and cover up to allow for assessment
 - c. Frequent reinforcement to prevent dislodgment
 - d. Complete immobility of patient

8. Complications of infusion therapy
 - a. Include infiltration, extravasation and phlebitis
 - b. Are usually not severe due to the smaller size of children
 - c. Require no intervention
 - d. Can always be predicted with certainty

9. Solutions with extreme pH or Osmolarity can cause:
 - a. chemical phlebitis
 - b. mechanical phlebitis
 - c. bacterial phlebitis
 - d. extravasation

10. Successful IV insertion in pediatrics can be achieved by:
 - a. observing and learning from others
 - b. choosing an appropriate site
 - c. taking advantage of opportunities to increase experience
 - d. all of the above