

IV Essentials



Presented by:

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RN.com acknowledges the valuable contributions of...

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PURPOSE & OBJECTIVES

The purpose of this article is to review the fundamental concepts of intravenous (IV) therapy needed to provide basic IV care for the adult, hospitalized patient.

After successful completion of this course, the participant will be able to:

1. Describe the proper technique and documentation criteria for inserting and removing a peripheral IV line or saline (or heparin) lock.
2. Discuss when to change various types of IV tubing, rotate IV site, and change peripheral dressings to decrease the risk of infection
3. Discuss common complications of peripheral IV therapy, their associated signs and symptoms and basic treatment of these complications.

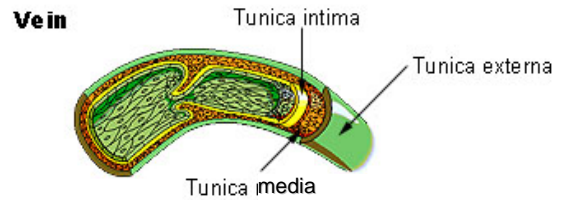
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INTRODUCTION

IV therapy is a complex nursing treatment that most patients in an acute care setting have at one time or another during their hospital stay. Although the technique of actually “placing” an IV is one that needs practice, the theory behind IV placement and management is didactic in nature and can be covered in a module such as this. The importance of correctly identifying veins, catheter selection, dressings, and potential complications are all issues that nurses face on a daily basis.

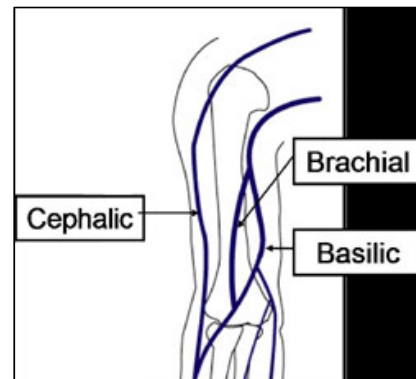
ANATOMY OF A VEIN

Blood leaving the capillaries returns to the heart through the venous system, beginning with venules and progressing to larger and larger veins which lead to the superior and inferior vena cavae which enter the right atrium. Veins are highly distensible, thin walled vessels. They act as a volume reservoir for circulatory systems. At any given time, the veins carry about fifty percent of the body's blood volume. The veins transport blood back to the lungs and heart. Veins have valves that keep blood moving back to the heart. The vein valves also provide footholds for the blood as it travels against gravity towards the heart. For example, blood returning to the heart from the foot has to travel against gravity. The venous valves and muscle contracts of the leg prevents backflow of blood, in this scenario. The vein is composed of three layers, the tunica intima (internal layer), tunica media (middle layer), and the tunica externa or tunica adventia (outer layer) (American Association of Critical Care Nurses, 1998).



Anatomy of a vein

Courtesy of the National Cancer Institute, 2005.
www.nih.nci.gov.



The names and anatomical location of the most commonly accessed veins of the upper extremity are listed below.

Name of Vein	Anatomical Description
Basilic Vein	The largest arm vein of the upper extremity. It courses along the medial (ulnar) aspect of the arm from wrist to shoulder. It begins at the dorsum of the hand, crosses the elbow and drains into the brachial vein.
Cephalic Vein	This vein runs along the lateral (radial) aspect of the arm also from the wrist to shoulder and empties into the axillary vein. Although the basilic vein is larger, the cephalic vein is more superficial and easier to access.
Median Vein	Forms a Y just below the elbow and drains into both the basilic and cephalic veins.
Median Antecubital Vein	Oblique coursing vein at the elbow that joins the basilic and cephalic veins.
Deep Forearm Veins	These are 2 or 3 veins each that course with and are named like the corresponding arteries of the forearm (radial & ulna).
Brachial	These veins are the deep veins of the upper arm, usually paired and smaller than the superficial veins. They travel in the upper arm parallel to (on either side) the brachial artery and join with the basilic vein to form the axillary vein.

You usually perform venipuncture for the purpose of IV access, continuous or intermittent IV infusion of fluid, or infusion of medications. Generally, supervised instruction and competency evaluation in venipuncture for peripheral IV therapy will be documented. Facility and state regulations may further limit who may perform this task. Please check with your facility and state policies and/or laws regarding this task before performing.

INSERTION OF A PERIPHERAL IV LINE OR SALINE OR HEPARIN LOCK

The first step in the insertion of a peripheral IV line or saline or heparin lock is to obtain a physician's order. IV therapy should only be initiated after this order is obtained, or as necessitated in an emergency situation.

After the order is obtained, you must verify the patient's identity by at least two methods. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) National Patient Safety Goals (NPSG) include using 2 patient identifiers for all patient identification issues. Your facility will have specific standards about the identifiers they use.

Next, you will want to provide patient and/or family education regarding the procedure and obtain consent as appropriate. You may then gather your materials and prepare for IV insertion.

STEP 1: Gather your Equipment!

You Absolutely Need:

- ◆ Antiseptic solution
- ◆ Gloves
- ◆ Tourniquet
- ◆ Peripheral short catheter
- ◆ Sterile 2x2 gauze pads or a sterile, transparent, semi-permeable dressing
- ◆ 1" non-allergenic tape (if applying a gauze dressing)
- ◆ Sterile tape or sterile surgical strips or a manufactured securing device
- ◆ Flush solution (.9% sodium chloride, 20 milliliter vial, preservative-free)
- ◆ Flush syringes (3-5 milliliter size)
- ◆ Sharps container
- ◆ IV solution with attached, primed tubing (if ordered) or an already primed saline or heparin lock
- ◆ IV pole (for administration of fluids or IV medications if needed)

These Items are Optional:

- ◆ Arm Board
- ◆ Warm packs
- ◆ Local anesthetic (usually a topical anesthetic like Elma* cream)
- ◆ Scissors

STEP 2: Select Your Device!

Consider This:

- ◆ Your choice of cannula should be of the smallest gauge that will accommodate the prescribed therapy. This will allow for sufficient blood flow around the cannula.
- ◆ Only one device should be utilized for each attempt.
- ◆ Stylets shall never be reinserted into the cannula when attempting IV access.
- ◆ Facilities may have different guidelines regarding which type of access device they prefer.

You usually have three choices:

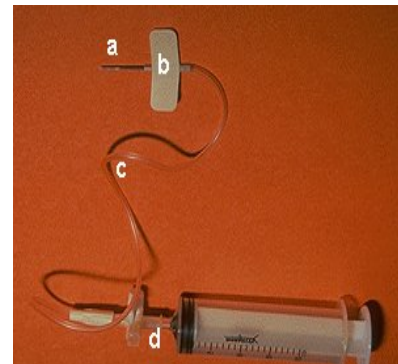
- ◆ Winged infusion set
- ◆ Over-the-needle catheter
- ◆ Through-the-needle catheter

Winged Infusion Set:

Purpose: Short term therapy for any cooperative adult, therapy of any duration for an infant, child, or elderly patient with fragile veins.

Advantages: Some claim it is the easiest IV device to insert and ideal for IV push drugs

Disadvantages: Can easily infiltrate due to rigidity of catheter



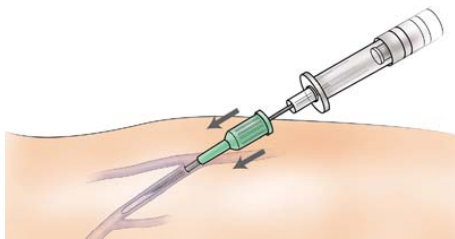
(Courtesy of Washington State University, College of Veterinary Medicine, 2005)

Over-the-Needle Catheter:

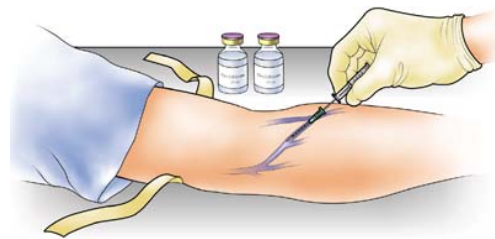
Purpose: Longer-term therapy for the agitated or active patient

Advantages: Accidental puncture of the vein is less likely than with a needle, contains radiopaque thread for easy location, more comfortable for the patient

Disadvantages: More difficult to insert



Over-the-needle catheter insertion.
Used with permission from
www.mrprotocols.com.



Withdrawing the needle in an “over-the-needle”
catheter insertion. Used with permission from
www.mrprotocols.com.

Through-the-Needle Catheter:

Purpose: Long term therapy for the agitated or active patient

Advantages: Accidental puncture of a vein is less likely than with a needle, more comfortable, contain radiopaque thread for easy location, available in many lengths; one variant, the peripherally inserted central catheter must be inserted by a specially prepared nurse

Disadvantages: Leaking at the site may occur, especially in the elderly patient. If a needle guard is not used, the catheter may be severed.

(Krozek, C.; Milliam, D., & Pelikan, R., 1996)

STEP 3: Position the Patient's Arm!

Consider this:

- ◆ Dependent positions increase capillary refill and may increase the likelihood you will be successful in inserting the IV.
- ◆ For cold skin, warm it by rubbing or stroking the skin or applying warm packs for 5-10 minutes as needed.

STEP 4: Apply the Tourniquet!

1. Apply 6" above insertion site to dilate the vein.
2. Check for distal pulse. (If no pulse, remove tourniquet and reapply as not to occlude the arterial blood flow.)
3. Lightly palpate vein with your index and middle fingers, while stretching it to prevent rolling.
 - If the vein feels hard or rope-like, **select another site!**
 - If the vein is easily palpable, but not sufficiently dilated you may try these things to promote engorgement of the vessel with blood
 1. Tap the skin over the vein lightly
 2. Place vein in a more dependent position
 3. Warm the vessel
 4. Have patient open and close fist a few times

(Krozek, C.; Milliam, D., & Pelikan, R., 1996)

If the patient is elderly, apply tourniquet carefully as not to pinch the skin, may cause skin tears. If necessary apply it over the patient gown.

STEP 5: Select Your Insertion Site!

Consider this:

- ◆ Use a vein in the non-dominant arm if possible
- ◆ Use smallest catheter possible for anticipated needs
- ◆ Save antecubital for emergencies if possible
- ◆ Use most distal sites so you can move proximally as needed
- ◆ Assess the patient's condition, vein condition, vein size and location, patient age, and the type and duration of therapy to insure ideal and safe IV access.

AVOID

- ◆ Antecubital fossa
- ◆ Lower extremities (legs/feet) unless specifically ordered by the physician or necessitated by the patient's condition (should definitely avoid in diabetic patients)
- ◆ Previously used veins and injured or sclerotic veins
- ◆ Veins in the affected arm of an axillary dissection. There must be a physicians order to use the affected arm.
- ◆ Veins in the arm of a dialysis AV Fistula.

STEP 6: Prepare the Site!

1. Wash Your Hands!
2. Put on gloves.
3. Wash the insertion site with soap and water if visibly soiled.
4. Clean the site.
 - Use the antiseptic solution your facility recommends by applying in a circular motion, outward from the insertion site to approx. 2" to 4".
 - Use friction to "scrub" the site in this circular fashion.
 - The key is providing enough friction to "scrub" the site.
 - Allow the cleansing agent to dry thoroughly.



1. If ordered, you may administer a topical, local anesthetic such as Emla* Cream (a combination of Lidocaine and Prilocaine).
2. Hold skin taut. (This stabilizes the vein!)
3. Grasp needle or catheter bevel up.
 - If using a winged infusion set, grasp by both wings between the thumb and forefinger of the dominant hand.)
 - When using the over-the-needle-catheter, grasp the plastic hub with your dominant hand, remove cover and examine catheter tip. Use the opposite hand to keep the vein stabilized by holding the skin taut below the insertion site.
4. Lightly palpate the vein. (The vein should be engorged, round, firm, and resilient.) (Intravenous Nurses Society, 2000)

STEP 7: Venipuncture Itself!

1. Confirm the integrity of the product and insert the device always per manufacturer guidelines.
2. Warn the patient that you are ready to insert the IV.
3. Insert the device. Different nurses may use different approaches. Both are acceptable. You will need to choose the approach that works best for you and gives you the greatest likelihood of success.
 - For the direct approach, enter skin directly over the vein at a 30 to 40 degree angle.
 - For the indirect approach, enter the skin slightly adjacent to the vein and direct the device into the side of the vein wall at a 30 to 40 degree angle.
4. Advance the device slowly and steadily until you meet resistance.
 - Don't penetrate the vein!
 - Lower the needle to a 15 to 20 degree angle, THEN slowly pierce the vein.
 - You may feel a "pop" or a sensation of release when the needle enters the vein.
5. Observe flashback!
 - This ensures that the catheter is in the vein.
 - If using a winged infusion set, advance needle slowly, secure needle and open roller clamp to IV solution to check for free flow.
 - If you fail to see flashback, pull the catheter slightly back and rotate slightly. If you still fail to see flashback, remove the catheter and try again with a new IV needle.
6. Tilt the needle very slightly upward to advance the needle without penetrating the lower wall of the vein.
7. Advance the catheter device so that needle is held stationary by the hub.



Example of venipuncture on a model arm.
Courtesy of NASA (2004). www.nasa.gov.

8. Withdraw the needle while holding the catheter at the hub so it doesn't move.
 - As you withdraw, press slightly on the catheter to prevent bleeding.
9. Advance catheter tip or hub until it is fully inserted or you meet resistance.
10. Release tourniquet.
11. Remove stylet.
12. Attach IV fluids or saline or heparin lock.
13. Check for placement of the cannula in the vein either by opening the roller-clamp on the IV, or flushing with saline. If the device is resistant to flushing or you notice a “wheal” of fluid developing under the skin, remove the cannula immediately. It is not in the vein and should not be used for IV therapy.
14. After two unsuccessful attempts at insertion of an IV (or per your facility policy), consult with another professional to initiate therapy.

(Krozek, C.; Milliam, D., & Pelikan, R., 1996; Intravenous Nurses Society, 2000)

STEP 8: Secure the Device!

1. Use sterile tape or sterile surgical strips to secure the hub of the cannula to the skin, so that the device is secure, but the tape does NOT obscure the insertion site.
2. If using a manufactured stabilizing device, follow the manufacturer’s instructions for securing the IV.

STEP 9: Dress the Site!

The site may be dressed by either using a gauze dressing or a transparent semi-permeable membrane dressing such as Opsite*3000 or other similar dressing.

Using a Gauze Dressing

Gauze dressings are most appropriate to use when there is a lot of moisture on the skin. For example, a diaphoretic patient or patient at end of life with a lot of skin moisture. Gauze dressings do not allow you to view the insertion site routinely and may not be the best choice for a patient receiving IV therapy in an acute care setting. If you do use a gauze dressing:

1. Cleanse the site as needed before applying the sterile gauze over the insertion site.
2. Seal the dressing’s edges with tape.
3. Change the dressing every 48 hours or when it becomes soiled.

Using a Transparent Semi-permeable Membrane

An advantage to using this dressing is that the insertion site of the cannula can be routinely visualized. Additionally, the dressing can be changed when the site is changed unless soiled or there is noticeable moisture under the dressing. If a transparent semi-permeable dressing is applied over gauze, then it is considered a gauze dressing and should be changed every 48 hours at minimum.

1. Cleanse the site as needed before applying the transparent semi-permeable membrane.
2. Position the sterile dressing over the insertion site.
3. Gently smooth the dressing from the center to the edges. Do not apply excessive tension as skin shearing may result.
4. Do not seal the dressing’s edges with tape and do not cover the dressing with roller gauze.
5. If near a moveable joint secure device with an arm board as necessary.

STEP 10: Flush the Device!

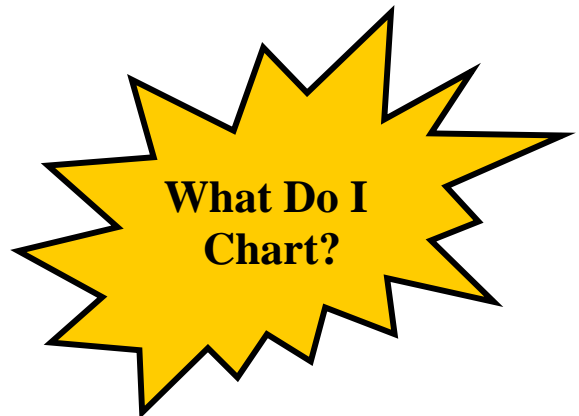
After the dressing is applied, secure connection junctions and flush the site with saline or heparin per facility policy if IV fluids are not initiated.

1. Clean port with alcohol swab.
2. Connect flush device to short peripheral catheter to prepared port.
3. Slowly, pull back on plunger to aspirate blood and confirm placement of cannula.
4. Slowly inject flush solution into the catheter, maintaining positive pressure, by clamping the connection (tubing or t-connector) prior to removing the syringe.
 - Positive pressure flushing prevents the backflow of blood into the cannula with syringe removal and may increase the life of your patent IV site, by reducing the potential for thrombus formation.
 - When flushing with heparin, you do not have to maintain positive pressure during the flush.

(Intravenous Nurses Society, 2000)

Documentation of Venipuncture

- ◆ Date and time of venipuncture
- ◆ Type and gauge of needle and catheter
- ◆ The location of the insertion site – Use the anatomical names of the veins!
- ◆ Reason site was changed or initiated
- ◆ Number attempts at venipuncture (REMEMBER – Only stick a patient twice before getting another competent, trained professional to try or follow facility policy!)
- ◆ The type and flow rate of the IV solution (if any)
- ◆ The name and amount of medication in the solution (if any)
- ◆ Any adverse reactions and actions taken to correct them
- ◆ Patient teaching and evidence of patient understanding
- ◆ Your name or initials
- ◆ How the patient tolerated the procedure



Documentation Example

2/9/99 22:00 20 gauge angiocath inserted in patient's right antecubital vein - successful on first attempt – flashback observed. Inserted for purpose of IV hydration with normal saline infusing at 150 milliliters per hour. IV fluids infusing well. No swelling, pain, or hematoma noted.

The patient tolerated the procedure without any complaints. The patient verbalizes understanding of signs and symptoms of intravenous complications, and to call the nurse if any of these signs or symptoms should occur-----Janice Smith RN

MAINTENANCE OF PERIPHERAL IV SITES AND SALINE OR HEPARIN LOCKS

IV sites should be monitored at established intervals to insure these devices are working properly. This inspection includes both equipment and site inspection.

When inspecting equipment examine:

- ◆ The catheter itself for migration
- ◆ All connections are secure
- ◆ Fluids being infused
- ◆ Pump function and flow rate

When examining the site be sure to examine:

- ◆ The insertion site (must remove gauze dressing)
- ◆ Patient's report of pain or discomfort at access site
- ◆ Signs of IV-related infections or complications
 - Discoloration (i.e. blanching, erythema)
 - Disruption of Sensation (i.e. pain, tenderness, numbness)
 - Edema
 - Localized Swelling
 - Exudate
 - Increase in skin or basal body temperature
 - Induration (i.e. sclerosis) with palpable cord

(Intravenous Nurses Society, 2000)

Site Changes

Short-peripheral catheter sites should be rotated at established intervals (consult your institution's policies and procedures) and immediately upon suspected contamination. The Intravenous Nurses Society (2000) recommends that these catheters should be rotated every 48 hours or every 72 hours if the institution's phlebitis rate is less than 5% for three consecutive months. It is not recommended to change access sites in pediatrics unless indicated by the assessment of the site. Additionally, if your patient has limited venous access due to the condition of their veins, changing the site may be extended for longer than the recommended dwell time. A physician's order is usually required to extend the dwell time of a short peripheral catheter if necessary.

REMOVAL OF PERIPHERAL IV LINE OR SALINE OR HEPARIN LOCK

A peripheral catheter should be removed with an order from the physician when therapy is completed, during routine site rotation, when contamination or IV-related complication is suspected, or when the tip location is no longer appropriate for the prescribed therapy.

Equipment

- ◆ Alcohol sponge
- ◆ Sterile gauze
- ◆ Adhesive bandage

Procedure

1. Discontinue administration of all infusates.
2. Wash hands.
3. Don gloves.
4. Remove dressing from site.
5. Inspect cannulation site.
6. Remove catheter securement device.
7. Disinfect cannulation site.
8. Place the first two fingers of your non-dominant hand lightly above the catheter-skin junction site with the gauze between the fingers.
9. Use your other hand to withdraw the needle of catheter slowly and smoothly, keeping it parallel to the skin. If during removal, you encounter resistance or a complication occurs, stop removal and notify the physician immediately.
10. Inspect the catheter tip. If the catheter's condition is different than it was when originally placed, notify M.D. immediately and assess patient.
11. Apply pressure to site for a minimum of 30 seconds, or until bleeding has stopped.
12. Apply a new gauze to the insertion site using antiseptic ointment per institutional policy.
13. Secure gauze to site.
14. Change dressing every 24 hours until site is healed.

(Intravenous Nurses Society, 2000)

Documentation of Removal

- ◆ Date and time and reason of removal
- ◆ Size, type and condition of catheter upon removal
- ◆ Location and condition of the site
- ◆ Type of dressing applied
- ◆ How the patient tolerated the procedure
- ◆ Any actions taken for infiltration or phlebitis or extravasation

Documentation Example

“2/10/05 06:00 20-gauge angiocath removed from patient's right antecubital vein due to swelling and tenderness over site. Catheter tip intact. Sterile 2x2 dressing applied. Patient tolerated well, without complaints. Warm soaks applied to right antecubital area and right upper extremity elevated on 2 pillows.”

Janice Smith RN

PERIPHERAL IV DRESSING CHANGE

Equipment:

- ◆ Non-sterile gloves
- ◆ Disinfection product used by your facility
- ◆ Dressing type used by your facility
- ◆ Tape

Procedure: Utilize aseptic technique and observe standard precautions throughout procedure.

1. Wash hands
2. Don gloves
3. Remove dressing from site.
4. Inspect access site and catheter.
5. Disinfect insertion site.
6. Use a back and forth friction scrub for 30 seconds.
7. Cleanse all areas that will be under the dressing.
8. Allow solution to air dry.
9. Place dressing over hub and leur-locked portion of T-connector to secure. Transparent dressings may need additional tape to secure, but insertion site should be visible.
10. Discard used supplies.
11. Remove gloves and wash hands.
12. Label new dressing with date of insertion, date of change (if not insertion date), gauge used, and initials.
13. Document on bedside flow sheet.

All guidelines in this course are meant to be general in nature. Always follow your facility guidelines for IV insertion, dressing changes, and IV removal.

FLUID AND FLUID ADMINISTRATION SET CHANGES

Administration sets, including add-on devices and tubing should be changed immediately when contamination is suspected or observed or as deemed necessary due to kinks, uncleanness or damage to tubing. Otherwise, they should be changed at set intervals determined by your institution. Set changes should occur based upon the type of infusate prescribed and/or by the type of infusion set being used. Additionally, all tubing should be dated, timed, and initialed. The Intravenous Nurses Society (INS) (2000) has guidelines to how often sets should be changed and are as follows (however, always follow facility policy):

Change by Infusate:

Blood or Blood Components: Set should be changed after each unit or every four hours

Lipid Emulsions: Set should be changed after each unit of lipid emulsion is administered or every 24 hours

Parenteral Nutrition: Set should be changed every 24 hours

Change by Infusion Set:

Continuous Administration – Primary and Secondary Administration Sets: The INS states that sets should be changed every 72 hours. The Centers for Disease Control (CDC) recommends that the intravenous tubing including add-on devices be changed no more frequently than every 72 hours. (Intravenous Nurses Society, 2000; O’Grady, N.; Alexander, M.; Dellinger, E.; Heard, S.; Maki, D.; Masur, H, et al., 2002).

Intermittent Administration – Primary Sets: These sets should be changed every 24 hours. (Intravenous Nurses Society, 2000)

Homecare

Most patients going home with IV therapy will have a central line. If not, they will be going home with peripheral access. If your patient is going home with a short-peripheral catheter, you should:

- ◆ Teach care of the IV site and complications.
- ◆ Teach patient how to examine site and notify physician for redness, swelling, drainage, or increased pain.
- ◆ Teach patient the role of the home health nurse in their IV catheter care, how to reach this nurse, and when it is important to call her.
- ◆ If the patient has a heparin or saline lock, teach the patient how and when to flush it.
- ◆ Teach the patient to document daily - pain, redness, or swelling.

Key Points to Remember

Depending on your institution's policies and procedures...

- ◆ Assess IV site and extremity with every assessment and document any abnormalities.
- ◆ Subcutaneous Lidocaine or topical EMLA may be used to numb the area if policy allows and/or you have an order.
- ◆ Ensure peripheral IV sites from outside hospitals are changed per your facility policy. For example, you may want to change the site within 24 hours of admission when the patient is stable.
- ◆ Ensure phlebotic areas are treated with heat and elevation of the extremity for, at minimum, 24 hours and that a physician is notified of the phlebitis.
- ◆ Ensure that extension sets and IV tubings are leur-locked whenever possible.
- ◆ A needleless system is the recommended method for accessing all venous access devices.
- ◆ If the initial IV line is not compatible with a needleless system, convert the entire system to a needleless system.
- ◆ If tubing is from an outside facility, it should be changed within 24 hours of admission or per facility policy.
- ◆ Ensure that all 'PRIMARY CONTINUOUS' IV sets and 'SECONDARY CONTINUOUS' IV sets are changed every 72 hours (or per facility policy) or immediately upon suspected contamination or when integrity of the product has been compromised.
- ◆ Examples of CONTINUOUS IV TUBING - maintenance IV tubing, continuous drips, PCA tubing, IV tubing that remains part of a closed system.
- ◆ 'PRIMARY and SECONDARY INTERMITTENT' infusion sets should be changed every 24 hours or immediately upon suspected contamination or when the integrity of the product has been compromised.
- ◆ Examples of INTERMITTENT IV TUBING - piggyback antibiotics, IV Bolus, K+ Runs, IV tubing that is part of an interrupted system.
- ◆ Back flushing should be utilized when appropriate to maintain patency of the closed system.
- ◆ Blood (and/or its components) administration sets should be changed at the end of each unit or at the end of four hours, whichever comes first. They should also be changed immediately upon suspected contamination or when the integrity of the product has been compromised.
- ◆ Changes of add-on devices such as injection sites, extension sets, t-connectors, stopcocks and filters should coincide with the change of the system or administration set and immediately upon suspected contamination.
- ◆ Consideration to changing of manifolds should be performed based upon sound nursing judgment and according to hospital or department standard.
- ◆ If a vascular access device is capped off, the injection cap and t-connector should be changed every 72 hours or with site rotation.
- ◆ Preferred method of accessing most vascular access devices is with the needleless system utilizing the leur lock cannula, instead of hub-to-hub.
- ◆ Hub-to-hub can be utilized at your discretion when patient safety may be an issue, for example antineoplastic vesicants, combative patients, and with pediatric patients.
- ◆ Injection caps should be changed after blood sampling if blood is not completely cleared from the catheter lumen cap.
- ◆ Tubing changes, injection cap changes and changes of all add-on devices for neutropenic patients should be evaluated by the RN caring for the patient, giving consideration to platelet count, WBC count and neutrophil count.
- ◆ The nurse should notify the physician for redness, swelling, drainage, or pain at any catheter insertion site.
- ◆ Ensure that caps are placed on all stopcocks.

Common Complications of Peripheral Therapy

Phlebitis is the inflammation of a vein. If it is associated with clot formation as well it is known as thrombophlebitis. Signs and symptoms of phlebitis include redness, swelling, pain, and edema at the insertion site and/or along the vein. It is often caused by poor blood flow around the venipuncture device, friction from catheter movement in the vein, clotting at the catheter tip (thrombophlebitis, or a medication or fluid with a high or low pH or high osmolarity). Treatment includes removal of the catheter, and application of warm soaks.

Extravasation occurs when the venipuncture device is dislodged from the vein. Signs and symptoms of extravasation include swelling at and above the limb, discomfort, burning or pain at the site, tightness at the site, cooler temperature at the site, blanching at the site, and absent backflow of blood. Treatment includes stopping the infusion, delivery of a local antidote (if appropriate), and ice initially and warm soaks.

Catheter dislodgement occurs when the catheter backs out of the vein. The IV solution may infiltrate and the catheter will be backed out further than normal from the vein and the tape may be loose. Treatment includes treating the infiltration, if any, dressing the old site and restarting the IV.

Occlusion occurs when fluid or medication cannot enter the vein. The IV flow is interrupted and blood may be backed up in the tubing or heparin or saline lock. Treatment includes attempting to flush with mild pressure. If the catheter does not flush with mild flush, do not force it. Remove the IV and start a new one in a new site.

Vein irritation occurs due to solutions with high or low pH and high osmolarity (such as potassium chloride, phenytoin, vancomycin, erythromycin, and nafcillin). Signs and symptoms of vein irritation include the patient's report of pain at the site, possible blanching, red skin over the vein during infusion, and quickly developing signs of phlebitis. Treatment includes decreasing the flow rate and diluting the infusions.

Hematomas occur when blood leaks into the extravascular space. The patient will have tenderness at the site, a bruise may be evident at the site, and the infusion will not flow. The IV catheter must be removed and restarted elsewhere. Additionally, you should apply pressure until the bleeding stops and warm soaks to aid in the absorption of the blood.

Venous spasm occurs due to severe vein irritation, administration of cold fluids or blood, and a very rapid flow rate. The patient will experience pain at the IV site, the flow rate will become sluggish even if roller clamp is wide open, and the skin will be blanched over the vein. Treatment includes warm soaks over the vein and reduction in the flow rate of the infusate.

Vasovagal reactions can occur when the patient experiences vasospasm from anxiety or pain. The vein suddenly collapses during venipuncture and causes the patient to become pale, diaphoretic, faint, dizzy, and nauseated. The patient may also have a sudden drop in blood pressure. If this occurs, lower the head of the bed and have the patient take slow deep breaths while you monitor vital signs. The reaction should resolve quickly.

Thrombosis occurs when the platelets adhere to the tunica intima of the vein due to vessel injury during venipuncture. The vein will appear painful, red and swollen. The IV infusate will not run quickly. If thrombosis occurs, you will need to remove the IV catheter and restart the IV in the opposite arm if at all possible. Warm soaks can also be applied.

Nerve, tendon or ligament damage occurs due to improper venipuncture technique, tight taping or improper arm board application. The patient will experience extreme pain at the insertion site, numbness, muscle contraction and eventually may exhibit paralysis, numbness and deformity.

Circulatory overload can occur when the IV roller clamp is loosened and the infusate is allowed to run into the vein quickly. The patient may be anxious, experience respiratory distress, crackles in the lung bases, increased blood pressure and neck engorgement. Treatment includes raising the head of the bed, administering oxygen and IV furosimide as ordered, and prompt notification of the physician.

Systemic infection or bacteremia can occur as a result of phlebitis, poor taping that allows the venipuncture device to move in and out of the vein, prolonged dwell time of the catheter, and failure to maintain aseptic technique during insertion or site care. The patient may experience malaise, fever, and chills. Treatment includes contacting the physician, culturing the site and device, administering antibiotics and hemodynamic support.

Air embolism occurs when the solution container runs empty and the added container pushes air down the line into the patient. The patient will experience respiratory distress, unequal breath sounds, a weak pulse, increased central venous pressure, decreased blood pressure, and loss of consciousness. If air embolism is suspected, discontinue the infusion, place the patient in Trendelenburg, administer oxygen, and notify the physician.

Allergic reaction may occur when the patient is allergic to the catheter that has been inserted or the medications being administered. The patient will itch, develop watery eyes and nose, experience bronchospasm, wheezing, and possibly anaphylaxis. If a reaction does occur stop the infusion or discontinue the catheter. Emphasis should be placed notification of the physician and airway support. Administration of an antihistamine, a steroid, or epinephrine may be indicated.

(Krozek, C.; Milliam, D.; Pelikan, R., 1996)

CONCLUSION

IV therapy is a complex but necessary healthcare treatment for many patients. Through the theoretical information provided in this course, the framework for IV management has been set. Through experience and training with a mentor or instructor, the nurse can fine tune IV skills in order to provide the highest level of care for patients receiving this treatment.

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