

Title	Basic Principles Related to Intravenous Therapy
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Purpose

The purpose of this course is to provide the basic information necessary to provide safe and therapeutic nursing care related to IV therapy.

Objectives

1. Have a working knowledge of the standard terminology related to intravenous access devices.
 2. Understand the insertion method and technique for each intravenous access device type.
 3. Have the basic knowledge necessary to provide care and maintenance of intravenous access device for prevention of catheter or therapy related infection.
 4. Be able to provide appropriate care following accepted protocols necessary for maintaining patent and complication free IV access.
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ANATOMY AND PHYSIOLOGY RELATED TO INTRAVENOUS THERAPY

A basic review of the anatomy & physiology of the vascular system and the integumentary system will be helpful in understanding the various types of vascular access and their associated care and maintenance; and will aid the nurse in making appropriate judgments related to site and device selection, as well as complication prevention and recognition.

VASCULAR SYSTEM

The vascular system is composed of 3 major types of blood vessels: arteries, veins and capillaries. Arteries transport blood away from the heart. The pulmonary artery carries blood from the right side of the heart to the lungs where oxygenation occurs. Supplying the rest of the body, nearest to the heart is the aorta, the largest artery in the system. The aorta leaves the left ventricle of the heart and branches into smaller arteries, which become smaller as the distance from the heart increases. These smaller arteries branch further into even smaller vessels called arterioles, which subdivide into capillaries. It is primarily in the capillary beds that nutrient and waste exchange occurs. As the capillaries leave the tissues, the decreasing of size reverses. Capillaries join venules, which in turn connect with small veins, which connect with increasingly larger veins, ultimately connecting with the vena cava. The vena cava is the largest vein and it connects directly into the right atrium of the heart.

All blood vessels are hollow conduits and, with the exception of the capillaries, all have three distinct layers of tissue.

The TUNICA INTIMA is the inner most layer, forming the interior lining of the vessel wall. This inner layer is made up of a layer of connective tissue supporting a single layer of endothelial cells. The endothelial cells are flat and smooth, allowing the flow of plasma and blood cells as

well as fluids or drugs. Trauma to these cells, which can occur with catheter insertion, manipulation, or removal, may lead to roughening of the endothelial lining, allowing cells to adhere to the lining, causing thrombosis. Trauma to the lining may also cause actual sloughing of endothelium, which, in turn, may also become thrombi. In veins, there are valves in this inner layer. The valves are made of the same type of endothelial cells and serve to prevent backflow of blood.

Separated from the inner layer by a small collagen and elastic membrane, a layer of smooth muscle cells forms the middle layer, or TUNICA MEDIA,

The outer layer, known as the TUNICA ADVENTITIA, provides strength to the vessel. It is comprised of smooth muscle cells, thick bundles of collagen, varying sizes of elastic fibers and connective tissue. This layer contains the arteries and veins supplying the vessel walls. It also contains nerves.

The table below outlines some important differences in veins and arteries.

Characteristic	Vein	Artery
Color of Blood	Dark red due to low oxygen content (exception is the pulmonary vein)	Bright red due to oxygen from lungs (exception is the pulmonary artery)
Direction of flow	Toward heart	Away from heart
Pulsation	Does not pulse	Pulses with each ventricular contraction
Valves	Positioned at bifurcations; prevent backflow	None
Tissue supplied	Returns blood to heart. Network formation; damage does not threaten tissue.	Each artery supplies a particular area; occlusion or damage threatens survival of that area
Anatomical position	Superficial – just under skin. Deep – near artery.	Deep, surrounded by muscle and other soft tissue for protection.

INTEGUMENTARY SYSTEM

The skin and subcutaneous tissue make up the integumentary system. The skin forms a barrier between the outside environment and internal organs. This protects against bacteria and other organisms. When an infusion device perforates the skin, there is a break in the integrity of the barrier, creating an increased risk of infection.

The skin also prevents loss of body fluid, preventing dehydration. It controls body temperature and manufactures vitamin D. Additionally, the skin is a sensory organ, conveying impulses to the brain, allowing the discernment of various sensations.

The EPIDERMIS is the outer layer of the skin. Although there are four separate layers, the epidermis is generally less than 1mm thick. It has no blood supply or lymph channels of its own and is dependent on the dermis for its nourishment.

The DERMIS lies just below the basal layer of the epidermis. Its thickness varies from 1 – 4 mm in different locations. The primary composition of the dermis is of collagen and elastic fibers, giving the skin its flexibility and strength. The dermis also contains histocytes and mast cells,

the latter of which produce and release heparin. Mast cells also produce histamine in the presence of tissue damage. The dermis contains nerve endings as well as blood supply.

The SUBCUTANEOUS tissue provides a protective cushion for the body, functions as a temperature regulator and depot for caloric reserve. It separates the dermis from the muscle and bone. The subcutaneous is composed of mesenchymal cells, which produce lipocytes (fat cells). The fat layer varies in thickness based upon age, gender, and general nutritional status. This fatty layer has multiple blood vessels of varying size. These vessels perforate & extend into the dermal layer. It is this system of shared blood vessels that facilitates absorption of medications and fluids administered subcutaneously, allowing systemic effects.

INTRAVENOUS ACCESS ROUTES AND DEVICES

There are two main categories of venous access: peripheral lines and central venous catheters (CVC). Each of these broad access types is further categorized according to:

- site of entry,
- method of insertion,
- number of lumens,
- length of catheter,
- site of proximal catheter tip, and
- type of catheter tip.

The type of venous access chosen in any given circumstance is dependent on a variety of factors, including: purpose of access and possible infusates to be used, length of need, clinical status and diagnosis of the patient, availability of access, and sometimes preference of the practitioner. Additionally, when possible, preference of the patient is a consideration.

To ensure patient safety and positive outcome, it is important for the nurse to have a clear understanding of the indication, use, care protocol, and potential complications for each type of venous access. Each type, therefore, will be now discussed individually.

PERIPHERAL VENOUS ACCESS

The most commonly used venous access is the peripheral route. Peripheral access is the percutaneous insertion into a peripheral vein, of a needle or, more often, a flexible catheter, the tip of which does not go into the central vasculature, ie does not enter the vena cava. Generally, the peripheral veins provide the quickest, easiest and least invasive approach to establishing an IV route.

There are three primary types of peripheral access:

- BUTTERFLY, also called winged IV set – a stainless steel, small - bore cannula (needle) with a short, attached extension tubing, generally used for one-time and very short therapy.
- PERIPHERAL CANNULA, interchangeably referred to as PIV, or short peripheral line – a small cannula, less than three inches in length, inserted directly into a peripheral vein, either over or, less often, through a stylet.
- MIDLINE CATHETER - a catheter inserted into a peripheral vein (usually in or near the antecubital space) and threaded three to six inches into the larger diameter area of the vein, or into the next larger vein, moving in toward (but not into) the central vasculature.

(Important Note: Although the PICC is peripherally inserted, its tip lies in the superior vena

cava, and it is, therefore, a central line, and will be discussed in that section.)

SELECTION OF PERIPHERAL ACCESS TYPE AND VEIN SITE

In deciding the type and site of peripheral access, the nurse must consider a number of factors. This includes patient history, diagnosis and clinical status, type of therapy to be received, duration of therapy and activity level of the patient. (1.)

When selecting the site, the veins considered most appropriate are the metacarpal, cephalic, basilic and median veins, as well as their branches. (1, 2.)

With consideration to the above listed factors, the nurse should, for short peripheral cannula (PIV) insertion, begin by assessing the most distal veins and moving proximally as needed. (2.) This allows the more proximal veins to be used for subsequent IV starts. When the insertion of a winged set is for one-time use, the large veins in the antecubital space may be chosen. Otherwise, the same selection process should be used as for a PIV.

A Midline catheter is usually inserted through the cephalic or median vein in the forearm or antecubital area, allowing the tip to be in a larger diameter vein.

Generally, with regard to either PIV or Midline catheter, the best success in establishing access and providing the therapy required is usually through long, straight veins.

In selecting the type of device, the planned duration of therapy must be considered. For example, a regimen of IV antibiotic therapy ordered for more than 6 days might indicate the use of a Midline catheter, in order to avoid repeated PIV restarts. A one - time dose of a diuretic could easily be administered through a winged needle. Likewise, access for a one-time blood draw would indicate the use of a winged set.

When selecting the access type and vein site, the nurse must also consider the nature of infusion to be administered, and the rate of infusion. Infusions of high osmolarity or high or low pH can be caustic to the vein wall. Larger veins naturally have a larger circulating volume, creating greater hemo-dilution and therefore, decreasing the traumatic effect. To protect the vein wall, a larger vein would be selected for rapid infusions of large volumes of fluid. The high viscosity of some blood products, such as packed RBC also necessitates larger veins.

In general, the shortest, smallest gauge device that will accommodate the appropriate vein, the type of infusion and the duration of therapy should be used. (2.) In device selection, it is also important (due to the potential consequences of exposure to bloodborne pathogens) that all needles have a safety device with engineered sharps injury protection. (2.)

CARE AND MAINTENANCE OF PERIPHERAL ACCESS

FLUSHING

Flushing of a peripheral IV is performed to maintain cannula patency and to avoid mixing non-compatible medications or solutions. All three types of peripheral IVs must be flushed between medications, after administering blood or blood products, before and after drawing blood sample, and, in the case of intermittent therapy, at regular intervals. Depending upon facility policy and / or physician order, a short peripheral line may be flushed with saline only, or with a combination of saline and heparin. (2.) With intermittent therapy, a Midline should always be flushed with both saline and heparin. A butterfly is generally for one-time use and therefore flushing would not be necessary. However, if for some reason a butterfly is to be used for more

than one infusion, it should be flushed following the same protocol as the PIV.

SALINE (0.9% sodium chloride) – To maintain patency of an intermittent short peripheral line, one – two ml of saline may be slowly injected through the injection port, maintaining a positive pressure as the line is clamped, (or in the case of a PIV without extension tubing, as the syringe is removed from the injection port.) Prior to injection, the port should be adequately cleaned; and patency and placement should be confirmed by gentle aspiration until positive blood return is visualized. (2.)

HEPARIN – If physician order, facility policy, or patient circumstance indicate the use of heparin to ensure patency, and, if the line is not being used to infuse a medication or solution that is incompatible with heparin, then a 10 –100 unit per ml solution of sodium heparin is used. The infusion volume is 1 - 2ml and the procedure is the same as the saline injection.

COMBINED – When heparin is indicated, but is not compatible with the medication or solution being intermittently infused, the SASH (Saline, Administration, Saline, Heparin) procedure is used. (2.) Prior to administering the non-compatible medication, the PIV is flushed with 2 – 3 ml of saline solution to remove any heparin remaining in the line from the previous infusion. Then the medication is administered as ordered. When the medication administration is completed and disconnected, the line is again flushed with 2 – 3 ml of saline. This second infusion of saline ensures that all of the medication is cleared from the cannula and into the blood circulation. At this point, one – two ml of 10 – 100 unit / ml heparin is injected into the line to maintain its patency until the line is used again. A separate syringe is used with each injection and the port is properly cleansed prior to each of the four steps.

The SASH procedure is the recommended procedure for maintaining patency of a Midline catheter.

If more than one medication is to be administered, one immediately following another, a saline flush should be provided in between the two. This will prevent the possibility of precipitate or crystal formation caused by mixing two non-compatible drugs.

Heparin or saline flushes are not used to restore patency. When a PIV or Midline is occluded with a precipitate or with blood, it should be removed.

SITE ROTATION

A butterfly is most always for one-time use or very short-term therapy, and therefore is removed promptly.

To minimize the risk of thrombophlebitis or catheter related blood stream infection, the Centers for Disease Control recommend that a PIV be removed and replaced with a new catheter every 72 – 96 hours. (3.)

Regarding Midline catheter site rotation, the Infusion Nurse Society, Standards of Care, (published in 2000) (1.) and their Policies and Procedures for Infusion Nursing, 2002, (2.) recommend catheter removal & replacement every two – four weeks. However, the 2002 CDC guidelines indicate that no “randomized study has assessed the benefit of routine replacement as a strategy to prevent catheter related infection.” (3.) The guidelines state, further, that findings suggest a Midline catheter need be replaced only when there is specific indication. The recommendation, then, is to leave a Midline catheter in place for the duration of therapy, unless complications arise. (3.)

SITE ASSESSMENT

All peripheral catheter types should be monitored on a routine basis. In a facility setting, this should occur with each patient contact, or at least twice each shift. In an outpatient or home setting, the patient should be taught signs for which to watch and when to notify a healthcare professional. Assessment for infection includes observation for erythema, tenderness, warmth, or palpable venous cord. Additionally, the catheter, its hub, as well as all tubing, injection ports and connection sites should be regularly inspected for integrity.

The site of PIV should be observed for 48 hours after device is removed to detect any post-infusion phlebitis. If being discharged, the patient should be given written instruction about symptoms for which to observe and whom to contact if they occur.(1.)

SITE ASEPSIS

Prior to insertion and with each dressing change, the site must be aseptically cleaned with an antiseptic solution. A 2% Chlorhexidine solution is the recommended solution, although a 10% povidone iodine solution, or 70% alcohol may be used. (2, 3.) Chlorhexidine is applied in a circular or back & forth stroke, with friction (follow product instruction). Povidone iodine solution and alcohol are both applied with friction in a circular motion, beginning at the site & working outward.(1,2.) In the past, it was recommended that both povidone and alcohol be used, but now the standard of care allows a single dose process(1, 2,3.) Alcohol is not effective unless friction is applied for a full 30 seconds. The antiseptic should be allowed to dry before inserting the catheter or reapplying a dressing. (1,2,3.)

INSERTION SITE DRESSING

At the time of insertion and after securing the catheter, whether a PIV or a Midline, the site must be covered for protection. Whether to use a gauze dressing or transparent dressing is a matter of facility policy, physician order, or nurse choice. In multiple studies, the risk of catheter related infection with the use of a transparent dressing was comparable to use of a gauze dressing. (3.) One benefit of a transparent dressing is that the site can be more readily assessed, both visually and palpably, and therefore does not need to be removed / changed simply for assessment purposes, while a gauze dressing should be changed every 48 hours in order to visualize the site.

For infection prevention, the site dressing should be changed at least every week. Because a PIV is rarely left in place more than 72 – 96 hours, a transparent dressing may be safely left on a PIV site for the duration of its insertion time. The dressing at a Midline insertion site will be changed weekly (1,2.) Any dressing, should, of course, be removed and replaced if loose, damp, or visibly soiled. A dressing should also be removed to facilitate more thorough assessment if there is tenderness at the site or if the patient has a fever without other obvious cause.

ADMINISTRATION SET

The CDC guidelines state that changing of administration sets no more frequently than every 72 hours is safe and cost effective practice. Further, it is stated that it has been shown that rates of phlebitis are not increased if sets are left for 96 hours. (3.) The CDC recommend the changing of administration sets, including piggy-back and add-on tubing, no more frequently than every 72 hours, unless catheter related infection is suspected.(3.) However, the Infusion Nurse Society differentiates that, if the therapy is intermittent, (ie, the set disconnected from the access device after each administration) the sets should be changed every 24 hours. (1,2.)

Sets used for administration of blood or blood products should be changed every 24 hours, (1,3.) and sets used for the infusion of Propofol must be changed every 6 – 12 hours.(3.)

Needleless components and injection caps are changed no more frequently than every 72 hours, but at least every 7 days (1.) Injection caps / ports attached to the catheter or to the administration tubing are cleansed with 70% alcohol with each access. Connection hubs are cleansed with 70% alcohol during set change. Only a sterile device is used for injection into an injection port or connection to hub. (3.) The integrity of the injection or access cap should be confirmed before & after each use and should be changed if the integrity is compromised or if blood is visible within the cap.

CENTRAL VENOUS ACCESS

A Central Venous Access Device is a flexible catheter placed in a large vein and threaded into the central vasculature. The tip of a CVAD lies in the superior vena cava. Central catheters may be used for hemodynamic monitoring as well as for infusion. Infusion related indications for central access include:

- Longer term requirement for venous access
- Poor venous access
- Infusion of vesicant medications
- Infusion of high osmolarity solutions (greater than 500mOs / liter) (2.)
- Parenteral Nutrition if concentration of dextrose exceeds 10%, or concentration of amino acid exceeds 5%. (2.)

There are multiple types of CVADs. The types vary according to insertion site, insertion technique, number of lumens and tip configuration. There are four basic categories based on insertion site and technique:

- Peripherally inserted central catheter (PICC) – a catheter inserted via a peripheral vein and threaded into the central vasculature. The point of insertion is usually one of the four large peripheral veins accessible in or just below the antecubital space (basilic, median basilic, cephalic or median cephalic).
- Non-tunneled, non-cuffed central catheter – a non-cuffed catheter inserted percutaneously, directly into a large vein and threaded over a guidewire into the superior vena cava. Most commonly used veins for insertion are the subclavian, internal jugular and, less often, the femoral.
- Tunneled central catheter (often called Hickman or Broviac) – A catheter designed to allow the distal portion to lie within a six – eight inch subcutaneous passage (tunnel) between the point of venous entry and the percutaneous exit site. The tunneled portion has a Dacron cuff impregnated with silver ions. The distance between the actual venous entry and the outside of the body, along with this cuff helps to reduce the occurrence of infection.
- Implanted Ports – (mediport; port-a-cath) – a small vessel, implanted in a subcutaneous pocket, with an attached silicone catheter which is inserted into vein & threaded into the superior vena cava. Most commonly, the port is placed in the infraclavicular fossa and the catheter is inserted through the subclavian vein. The port body may be made of silicone, or plastic, but is usually, stainless steel or titanium. The reservoir volume is approximately .2 - .3 ml and is covered by a self – sealing septum.

Each of these four types of CVADs can have one to three lumens. With the exception of the PICC, the insertion of a CVAD is a medical procedure and a physician performs placement. A registered nurse with specific training and demonstrated competency may insert a PICC. The correct proximal tip placement must be verified by radiography for all central catheters

There are two different types of CVAD catheter tips and any of the above four types may have either. Because of the design, the maintenance protocols are different and so it is important for

the nurse to confirm the type of CVAD the patient has.

One type is the usual open-ended catheter similar to a peripheral IV catheter. When there is no fluid infusing through a CVAD with this type of tip, it is possible (and common) for blood to back up from the circulation into the catheter.

A catheter with a closed end and a slit valve very near the tip is usually referred to as a Groshong catheter (for Dr. LeRoy Groshong, who developed the design in 1978.) All four types of CVADs are available with this type of tip. This valve, which is very near the tip of the catheter, is activated by pressure. When fluid is infused into the catheter, the positive pressure opens the valve outward, allowing the flow of fluid out into the circulation. The valve opens inward when negative pressure is applied, (aspiration) allowing blood to enter the catheter & be withdrawn for blood sampling. When the valve is not in use for infusion or blood draw, it remains closed, which prevents the back flow of blood into the catheter. The absence of blood in the catheter with a Groshong tip eliminates the need for heparin flush and reduces the required frequency of routine saline flush.

CARE AND MAINTENANCE OF CENTRAL VENOUS ACCESS FLUSHING

The frequency of routine flushing, the flush solution, and the volume of flush solution will vary among CVAD types. However, all types must be flushed between medications, after administration of blood or blood products, before and after drawing blood, and, in the case of intermittent therapy, before and after each administration. (1.)

Additionally, except when there is a continuous infusion, all CVADs must be flushed at prescribed intervals in order to prevent catheter occlusion.

For multi-lumen CVADs, flush protocol applies to each lumen, whether in use or not.

The flush volume should be sufficient to fill the lumen of the catheter. The product package information will include the internal volume of the catheter. The quantities provided in each section below will generally be an acceptable rule of thumb.

The pressure exerted by injection / infusion with smaller gauge syringes may cause the catheter to rupture. Therefore, a 10 ml or larger syringe should be used for all medication infusions (including flushes) into any CVAD. Recently, however, a 3ml syringe has been specifically designed with the diameter of a standard 10 ml syringe and may, if available, be used for CVAD infusions.

PICC – For intermittent therapy, the combined heparin and saline, SASH, procedure should be used for flushing. Flush with five ml saline before and after infusion of medication or fluid, and follow with three ml of 10 –100 unit / ml heparin.

To ensure complete clearance of blood from the catheter, after drawing blood through the PICC, flush catheter with 20 ml of saline and follow with three ml of heparin.

The frequency of flush required is at least daily for each lumen. If the PICC, or any lumen, is used for medication or blood draw less than daily, flush line with five ml of heparin daily.

Flush a PICC with a Groshong tip with ten ml of saline with each use or once every week, if line is not in use during a week.

Non-tunneled and tunneled catheters – The same protocol, flush volume, and frequency

guidelines described for PICC should be followed for both direct percutaneously inserted catheters (ie, subclavian) and tunneled catheters. Again, the protocol applies to each lumen of the device.

A Groshong tip eliminates need for heparin and reduces routine frequency for unused catheter to weekly.

Implanted Port – A specially designed needle with a non-coring tip must be used to access an implanted port. The needle is inserted, at a right angle, through the skin directly over the port, then through the septum of the port and into the reservoir. (2.) The non-coring needle prevents tearing of the septum. Tearing of the septum could cause leakage of infusate into the tissue around the port, or a plug of septum could float into the catheter and become an embolism. The port is flushed before and after medication or fluid infusion, and before and after drawing blood through the port. If not being used at least monthly, the port is routinely accessed and flushed every 4 weeks. (2.)

Because a sludge material consisting of small amounts of old blood and medications can build up in the reservoir and collect around its walls, the saline flush technique is important. Turbulence should be created within the port while infusing the saline. This is accomplished by a brisk, firm “stop – start” rhythm while injecting the saline. As with the other CVADs, the SASH sequence is used. Twenty ml of saline is used before and after a blood draw and fifteen ml is used before and after administration of medication or fluid. The second saline flush is followed by instillation of five ml of 100 unit / ml heparin. If the port will not be used again soon, the access needle may then be removed.

Like the other CVADs, an implanted port may also have a Groshong tip. In this case, the heparin is not used. The frequency of flushing an unused port remains once every four weeks. (1,2.)

ASSESSMENT

All central venous access devices should be inspected at regularly established interval to identify complications and ensure proper functioning. (2.) Most facility policies require site and device assessment at least once per shift. In an outpatient or home care setting, the patient should be taught to observe for complications, infection and malfunction.

The insertion site of the PICC and the non-tunneled CVAD should be assessed for erythema, tenderness, drainage, warmth, or other indication of possible infection.

The tunneled CVAD will, the first few days after insertion, have a puncture site or very small incision at the site of insertion. This may or may not have a suture and will heal within a few days. Due to the method of insertion and tunneling, the point that the catheter is visible at the skin is actually an exit site. Both the exit site and the insertion site (until it is well - healed,) must be observed for complication, especially infection.

The implanted port will have an incision where the port has been imbedded in the subcutaneous tissue. After this surgical incision has healed, the area around where the port can be palpated would manifest symptoms if an infection were to develop. It is therefore wise to regularly assess this area even after the actual surgical site has healed.

SITE ASEPSIS

The protocol for maintaining a contaminate free access is much the same for CVAD as previously described in relation to peripheral access devices. The antiseptic of choice is 2%

Chlorhexidine solution. (2,3.) The site is cleaned with each dressing change, and consists of sterile cleansing of the catheter-skin junction, application of a new stabilization device and application of new dressing. (1.) Site care and dressing changes for all types of central catheters are performed under sterile technique, using sterile gloves, mask, and sterile field.

The site of needle insertion over an implanted port is cleaned (under sterile technique) prior to each port access. (1.)

All hubs and injection ports are cleaned with 70% alcohol before each use. (1,3.)

DRESSING CHANGES

The insertion site of a PICC and a non-tunneled CVAD, and the exit site of a tunneled CVAD must be covered with a sterile gauze dressing or transparent dressing. Gauze dressings that prevent visualization of the site should be changed every 48 hours and immediately if the dressing integrity is compromised. Transparent membrane dressings should be changed at least every 7 days. Gauze, used in conjunction with a transparent dressing is considered a gauze dressing and should be changed every 48 hours. (1.)

With regard to a tunneled CVAD, when completely healed and when the catheter has been in place long enough to be completely secured in the tunnel, it may not be necessary to keep the exit site covered with a sterile dressing. This may be dependent on the patient's lifestyle and prudent judgment should be used. After the surgical incision for an implanted port is well healed, no dressing is necessary. However, when the port is accessed and the needle remains in place, a gauze or transparent dressing is used to secure the needle in place. (1,3.)

ADMINISTRATION SETS

The protocols for administration set, piggy-back or add-on tubing changes are the same for all CVADs as for peripheral access devices, ie every 72 – 96 hours. (3.) In regard to implanted ports, when the port remains accessed, the non-coring needle and its attached extension tubing are changed every 7 days. (1,2.)

POTENTIAL COMPLICATIONS OF INTRAVENOUS THERAPY

Phlebitis - Inflammation / infection of the vein wall, caused by pathogen, or by chemical or mechanical stimulus

Thrombosis – Blood clot in the vein, obstructing the circulation of blood

Thrombophlebitis – Blood clot accompanied by inflammation in the vein

Septicemia – Systemic infection caused by pathogen invading the vascular system

Infiltration – Inadvertent administration of nonvesicant medication or fluid into the surrounding tissues (1.)

Extravasation - Inadvertent administration of vesicant medication or solution into the surrounding tissue. (1.)

Necrosis – Soft tissue damage or destruction, caused by infiltration of vesicant solution

Catheter embolism – Portion of the catheter that has sheared off and is circulating in the bloodstream

Air embolism – Air bubble circulation in the bloodstream

Pulmonary embolism – Air, thrombus or other embolism propelled by venous circulation into the right chambers of the heart and into the lungs

Speed shock – Systemic reaction caused by a substance foreign to the body is rapidly infused into the circulation – may cause syncope, shock or cardiac arrest

DOCUMENTATION

Complete information regarding the IV therapy and vascular access should be documented in the permanent medical record. (1,2.) This should include (but is not limited to):

- type, brand length and size of access device
- date and time of insertion, number & location of attempts, type of stabilization and dressing, response to insertion, and identification of person inserting the device
- identification of site by anatomical descriptor, landmarks or appropriate drawings
- for midline and PICC, external catheter length and effective length of catheter inserted
- radiographic confirmation of anatomic location of the catheter tip for central catheters (before initial use of the catheter)
- site condition and appearance, using standardized assessment scales for phlebitis, infiltration and extravasation
- site preparation
- site care
- type of therapy, drug, dose, rate, time, route and method of administration
- response to therapy
- discontinuation of therapy, including removal of device
- with multiple devices &/or multiple lumens, clear indication of what fluids & medications are infused through each device /lumen. (1.)

SUMMARY

Through advances in medical knowledge and technology, infusion therapy modalities are constantly changing to provide safer, more effective delivery systems. Standardized care practices, use consistent terminology, and thorough knowledge of vascular access options all greatly reduce the risk of infection and other complications related to intravenous therapy. The information included in this course offering is the basic information necessary for providing safe and therapeutic nursing care related to IV therapy. As the Infusion Nurse Society is recognized as the global authority in infusion therapy (1), familiarity and compliance with their Infusion Nursing Standards of Practice, should be considered the primary key to minimizing risk of IV related complications.

References

1. Infusion Nurses Society. Infusion Nursing Standards of Practice; Journal of Infusion Nursing, Supplement. 2006
2. Infusion Nurses Society. Policies and Procedures for Infusion Nursing, 2nd Edition. 2002.
3. CDC. Guidelines for Prevention of Intravascular Catheter Related Infections; Morbidity

and Mortality Monthly Report. 2002

Course Exam

1. The perforation of the skin for insertion of an intravenous access device interrupts the skin's function of protecting the internal tissues from infection.
 True False
2. The care protocols are the same regardless of IV access type.
 True False
3. The two basic categories of IV access are: peripheral and central.
 True False
4. A PICC is considered a peripheral device.
 True False
5. A short peripheral (PIV) catheter should be removed and replaced every 72 – 96 hours.
 True False
6. SASH refers to the combination catheter flush technique using both a saline solution and heparin solution.
 True False
7. A Parenteral nutrition solution of 12.5% Dextrose can be safely administered through a peripheral IV.
 True False
8. The tip design of a Groshong style catheter necessitates daily flushing with both heparin and saline.
 True False
9. As long as good hand washing procedure and clean technique are followed, it is not necessary to maintain sterile technique in providing site care and dressing change of a central venous catheter.
 True False
10. A non-coring needle is the only type of needle appropriate for accessing an implanted central venous access port.
 True False