26. ADD-ON DEVICES

Standard

26.1 The use of add-on devices shall be established in organizational policies, procedures, and/or practice guidelines and according to manufacturers’ directions for use.

26.2 The nurse shall be competent in the use of the add-on device and shall be knowledgeable about the risk of misconnection and potential disconnections.

26.3 All add-on devices shall be of luer-lock design to ensure a secure junction.

Practice Criteria

A. Add-on devices may include, but are not limited to, stopcocks, single- and multilumen extension sets, manifold sets, extension loops, solid cannula caps, needleless systems, in-line filters, and manual flow-control devices.1 (V)

B. All add-on devices should be compatible with the administration system to prevent the risk of leaks, disconnections, or misconnections.2,3 (V)

C. The nurse should be aware that the potential for contamination exists with all add-on devices. In an effort to decrease the risk of contamination, the number of manipulation episodes, accidental disconnections or misconnections, and costs, there should be limited use of these devices.1 (V)

D. To determine the appropriate placement of the selected add-on device, the nurse should trace the administration set from the patient to the point of origin before attaching the device.2,4,5 (IV)

E. The nurse should disinfect the ports of the add-on device using friction, with an appropriate disinfectant such as 70% alcohol before accessing. Specific guidelines directing the appropriate technique, disinfectant, or amount of time required to clean devices prior to access are unresolved. The access port should be accessed only with sterile devices.6,7 (V)

F. The nurse should change the add-on device with the catheter, with each administration set replacement, or as defined by the organization, and whenever the integrity of the product is compromised or suspected of being compromised.3 (V)

G. The use of stopcocks is not recommended due to the increased risk of infection. When a stopcock is attached as an add-on device, the nurse should attach sterile caps to the ports of the stopcock to provide a closed system when not in use and access sites that will allow cleaning prior to accessing.1 (V)

REFERENCES


27. NEEDLELESS CONNECTORS

Standard

27.1 The use of needleless connectors shall be established in organizational policies, procedures, and/or practice guidelines and according to manufacturers’ directions for use.

27.2 Needleless connectors attached to a catheter hub or access site shall be of luer-lock design to ensure a secure junction.

27.3 The nurse shall be competent in the use of needleless connector devices.

27.4 The nurse shall disinfect the needleless connector prior to each access.

27.5 Needles shall not be used to access catheters, administration sets, access sites, or needleless connectors.

Practice Criteria

A. The nurse should be aware that needleless connectors are identified by design (simple and complex) and function. The simple needleless connector group includes the split-septum design with no internal mechanisms, a straight fluid pathway, and can be blunt cannula or luer-lock design. The complex needleless connector group includes a variety of luer-lock mechanical valve needleless connector with various internal mechanism designs and fluid pathways.1,9 (IV)

B. The nurse should be knowledgeable about the function of the needleless connector and the manufacturer’s directions for use for each needleless connector to reduce the risk of blood reflux into the catheter tip upon disconnection. Currently, there are 3 categories of needleless connector function: negative fluid displacement, positive fluid displacement, and neutral design.2,11 (II)

C. The nurse should be aware that the catheter hub is a known source for the development of catheter-related bloodstream infection (CR-BSI) and that needleless connectors are recognized sites for microbial contamination.5,10,12,26 (II)

D. The nurse should be aware of and implement manufacturers’ directions for use, implement appropriate infection prevention practices, and review the research and published literature related to this issue to promote and provide quality patient outcomes.2,4,6,10,14,15,16,20,21,27-36 (II)

E. The needleless connector should be consistently and thoroughly disinfected using alcohol, tincture of iodine, or chlorhexidine gluconate/alcohol combination prior to each access. The optimal technique or disinfection time frame has not been identified.3,5,8,12,13,15-17,19,22-25,27,29,31,32,37-41 (III)

F. The nurse should change the needleless connector in the following circumstances: if the needleless connector is removed for any reason; if there is blood or debris within the needleless connector; prior to drawing a blood culture sample from the catheter; upon contamination; per organizational policies, procedures, and/or practice guidelines; or per the manufacturer’s directions for use. The nurse should be knowledgeable about the manufacturer’s directions for use and other device performance criteria to assist in the development of policies and procedures for needleless connector change frequency. The optimal time frame for changing the needleless connector has not been determined (see Standard 49, Infection).7,8,22,37,42-46 (IV)

REFERENCES


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46. Shertez R, Karchmer T, Ohl C, Palavecino E, Bischoff W. Blood cultures (BC) drawn through valued catheter hubs have a 10-20% positivity rate with the majority being false positives. Paper presented at: Fifth Decennial International Conference on Healthcare-Associated Infections; March 18-22, 2010; Atlanta, GA.

28. FILTERS

Standard

28.1 The use of bacteria- and particulate-retentive, air-eliminating, and blood and blood component filters
shall be established in organizational policies, procedures, and/or practice guidelines.

28.2 For nonlipid-containing solutions that require filtration, a 0.2-micron filter containing a membrane that is particulate-retentive and air-eliminating shall be used.

28.3 For lipid infusions or total nutrient admixtures that require filtration, a 1.2-micron filter containing a membrane that is particulate-retentive and air-eliminating shall be used.

28.4 Blood and blood component filters appropriate to the therapy shall be used to reduce particulate matter, microaggregates, or leukocytes in infusions of blood or blood components.

28.5 For intraspinal infusions, a 0.2-micron filter that is surfactant-free, particulate-retentive, and air-eliminating shall be used.

28.6 A blunted filter needle or filter straw shall be used when drawing medications from glass ampoules.

**Practice Criteria**

A. Use of all filters should adhere to manufacturers’ directions for use and filtration requirements of the therapy.1 (V)

B. Bacteria- and particulate-retentive and air-eliminating membrane filter changes should coincide with administration set changes.2 (V)

C. Blood and blood component filters should be changed every 4 hours or coincide with blood administration set changes.3 (V)

D. Add-on bacteria- and particulate-retentive and air-eliminating membrane filters should be located as close to the catheter insertion site as possible.4 (V)

E. When an electronic infusion device is used, consideration should be given to the pounds per square inch (psi) rating of the filter.1,2,4 (V)

**REFERENCES**


**29. FLOW-CONTROL DEVICES**

**Standard**

29.1 The type of flow-control device selected shall be based on patient age, condition, prescribed infusion therapy, type of vascular access device, and care setting.

29.2 Only electronic infusion devices with administration-set–based anti–free-flow mechanisms shall be used.

29.3 Dose-error reduction systems shall be considered in the selection and use of electronic infusion devices.

29.4 The use of flow-control devices shall be established in organizational policies, procedures, and/or practice guidelines.

29.5 The nurse shall be competent in the use of flow-control devices, including manual devices, mechanical devices, and electronic infusion devices.

**Practice Criteria**

A. Flow-control devices should be monitored during the administration of infusion therapy to ensure accurate delivery of the prescribed infusion rate.1-6 (III)

B. The nurse should not rely on the electronic infusion device alarms to detect IV infiltration or extravasation as these alarms are not intended to detect disruption of the fluid flow pathway.5-6 (V)

C. Safety features and dose-error reduction systems should be considered in the selection of all electronic flow-control devices. The nurse should be involved in the evaluation and selection of flow-control devices.9-15 (V)

D. Systematic methods, such as failure mode and effects analysis (FMEA) or Six Sigma, should be incorporated into the evaluation of flow-control device selection and used to reduce errors and enhance safety. In addition, adverse event reports (such as those from the US Food and Drug Administration’s Manufacturer and User Facility Device Experience site) should be consulted when considering mechanical and electronic flow-control devices for purchase.10-14,16 (V)

E. The frequency of inspection, cleaning, testing, and maintenance of electronic flow-control devices should adhere to manufacturers’ direction(s) for use and directions and guidelines established by regulatory agencies.10,11,17,18 (V)

F. The choice of a flow-control device (manual flow regulators, pressure bags, mechanical pumps, elastomeric balloon pumps, spring-based pumps, negative-pressure pumps, electronic infusion pumps) for a given clinical application should take into account such factors as age and mobility of the patient, severity of illness, type of therapy, and health care setting. Features should be consistent with recommendations for safe and effective use. Additional features are recommended for patient-controlled analgesia (PCA) pumps (eg, patient ease of use, accuracy) and systems that require a higher pumping pressure (eg, arterial and epidural lines).11,17 (V)
G. Patient education for those using electronic flow-control devices in the home care setting should include written instructions, troubleshooting guides, whom/how to contact for assistance, signs of under- or over-infusion, and pump malfunction. Education should include demonstration and explanation of infusion pump functions followed by observation of the patient/caregiver performance.19,20 (V)

REFERENCES


30. BLOOD AND FLUID WARMERS

Standard

30.1 The use of blood and fluid warmers shall be established in organizational policies, procedures, and/or practice guidelines and in accordance with AABB standards for administration of blood.
30.2 Blood and fluid warming shall be performed only with devices specifically designed for that purpose.
30.3 Blood shall be warmed in a manner to avoid hemolysis.

Practice Criteria

A. Blood and fluid warmers should be used when warranted by patient history, clinical condition, and prescribed therapy, including, but not limited to, avoiding or treating hypothermia, during cardiopulmonary bypass, when the patient is known to have cold agglutinins, or during replacement of large blood volumes.15 (III)
B. The frequency of cleaning and preventive maintenance of blood and fluid warming devices should adhere to the manufacturer’s directions for use and guidelines established by regulatory agencies.14,5 (V)
C. Nurses should use blood and fluid warmers equipped with warning systems, including an audible alarm and visual temperature gauges.6-8 (V)
D. Other warming methods, including, but not limited to, microwave ovens, hot water baths, and devices not expressly designed for blood and fluid warming, should not be used because temperatures and infection risks cannot be controlled.9-11 (V)

REFERENCES


### 31. TOURNIQUETS

**Standard**

31.1 A tourniquet shall be properly applied to promote vascular distension in preparation for peripheral venipuncture.

31.2 The use of tourniquets shall be established in organizational policies, procedures, and/or practice guidelines.

**Practice Criteria**

A. The tourniquet should be single-patient use.1-8 (IV)

B. The nurse should assess the patient for latex allergy when considering tourniquet material (see Standard 25, Latex Sensitivity or Allergy).9,10 (V)

C. The tourniquet should be applied at an appropriate location above the selected venipuncture site.8,11,12 (V)

D. An arterial pulse should be easily palpable distal to the tourniquet location.8,11,12 (I A/P)

E. The tourniquet should be applied in such a manner as to prevent circulatory impairment.8,11,12 (I A/P)

F. The nurse should assess for factors indicating that a tourniquet should be loosely applied or its use avoided in patients who bruise easily, are at risk for bleeding, have compromised circulation, and/or have fragile skin or veins.11-13 (V)

**REFERENCES**


32. Vascular Access Device Selection

Standard

32.1 Indications and protocols for vascular access devices (VADs) shall be established in organizational policies, procedures, and/or practice guidelines and according to manufacturers’ directions for use.

32.2 The nurse shall select the appropriate type of catheter (peripheral or central) to accommodate the patient’s vascular access needs based on the prescribed therapy or treatment regimen, length of treatment, duration of dwell, vascular integrity, patient preference, and ability and resources available to care for the device.

32.3 The catheter selected shall be of the smallest gauge and length with the fewest number of lumens and shall be the least invasive device needed to accommodate and manage the prescribed therapy.

32.4 The nurse shall not alter the vascular access device outside the manufacturer’s directions for use.

Practice Criteria

I. Short Peripheral Catheters

A. The nurse should select a short peripheral catheter based on prescribed therapies, duration of treatment (usually for treatments of less than 1 week), availability of peripheral vascular access sites, diagnosis, known complications of the device, and the inserter’s experience.1-9 (V)

B. A short peripheral catheter comes in a variety of gauge sizes (i.e., 14-27); winged or nonwinged; single or double lumen; or over-the-needle catheters. The tip of a short peripheral catheter terminates in a peripheral vein.2,3,5,6,10-16 (V)

C. The nurse should use short peripheral catheters equipped with a passive or active safety mechanism to provide sharps injury protection.12,16,17 (V)

D. The use of steel winged devices should be limited to short-term or single-dose administration.13,14 (V)

E. Therapies not appropriate for short peripheral catheters include continuous vesicant therapy, parenteral nutrition, infuses with pH less than 5 or greater than 9, and infuses with an osmolality greater than 600 mOsm/L. The nurse should collaborate with the pharmacist and the licensed independent practitioner (LIP) to assist in selection of the most appropriate vascular access device based on a projected treatment plan.5,6,13,14,18-24 (IV)

F. Peripheral administration of parenteral nutrition via a short peripheral catheter should be used with caution in adults.21,22 (IV)

G. The nurse should be aware that a short peripheral catheter of 14-24 gauge for adults and 22-24 gauge for pediatric or neonates can generally be used for administration of blood or blood products.11,12,16 (V)

II. Midline Catheters

A. The nurse should consider selection of midline catheters for therapies anticipated to last 1-4 weeks. Reported dwell time for midline catheters in neonates is 6-10 days.9,10,16,25,26 (V)

B. A midline catheter should be used for hydration, intravenous solutions, pain medications, and some antibiotics. Therapies not appropriate for midline catheters include continuous vesicant therapy, parenteral nutrition, infuses with pH less than 5 or greater than 9, and infuses with an osmolality greater than 600 mOsm/L.9,13,14 (V)

C. Midline catheters are peripheral infusion devices with the tips terminating in either the basilic, cephalic, or brachial vein, distal to the shoulder. The basilic vein is preferred due to vein diameter. The tip does not enter the central vasculature.
Midline catheters inserted via a scalp vein in neonates and pediatric patients should have the tip terminating in the external jugular vein (EJV).\(^1,6,10,16,20,27\) (V)

D. Midline catheters are available as single- or double-lumen (1.9 Fr-5 Fr) polyurethane or silicone devices. Midline catheters for pediatric patients are available in gauge sizes of 22-24.\(^3,9,10,12-14,16,25,28\) (V)

**Practice Criteria**

### III. Central Vascular Access Devices (CVADs) (Nontunneled, PICC, Tunneled, Implanted Port)

A. The nurse should use CVADs to administer short- or long-term continuous or intermittent infusion solutions such as antineoplastic medications, vesicants or known irritants, parenteral nutrition, a variety of antibiotics, and any medications with a pH of less than 5 or greater than 9 and osmolarity of greater than 600mOsm/L.\(^5,6,13,29\) (V)

B. The nurse should be aware that in order to minimize thrombotic complications, the tip of a CVAD should terminate in the central vasculature, such as the superior vena cava (SVC) or inferior vena cava (IVC). Dialysis catheter tips may terminate in the right atrium.\(^6,20,30\) (V)

C. CVADs can be manufactured as single or multilumen, silicone, or polyurethane, along with various gauge sizes and lengths; open- or closed-ended; power-injectable; and/or as anti-infective devices.\(^6,10,13,16,31-34\) (V)

D. The nurse should collaborate with the multidisciplinary team to consider anti-infective CVADs in the following circumstances: expected dwell of more than 5 days; catheter-related bloodstream infection (CR-BSI) rate remains high even after employing other preventive strategies; neutropenic, transplant, burn, hemodialysis, or critically ill patients; catheter insertion or exchange in patients with infection or bacteremia; or for emergency insertions. Anti-infective CVADs have shown a decrease in colonization and/or CR-BSIs. These types of CVADs include devices coated or impregnated with chlorhexidine and silver sulfadiazine, minocycline and rifampin, and silver ion. The nurse should be aware that anti-infective CVADs should not be used in patients with allergies to silver, chlorhexidine, silver sulfadiazine, rifampin, or tetracyclines.\(^1,2,9,32,33,34\) (I)

E. CVADs designed to withstand high-pressure injections (up to 300 pounds per square inch [psi]) have been found to be feasible and effective and with published reports of safe use.\(^6,10,12-17\) (II)

F. The nurse should be knowledgeable about whether the CVAD may be trimmed (considering factors such as open- versus closed-ended; staggered lumen exits) and should follow the manufacturer’s directions for use for altering the device length, should the device require trimming. The use of scissors should be avoided in trimming catheter length. Use of scissors to adjust the length of peripherally inserted central catheters (PICCs) was found to result in rough, irregular surfaces as observed with scanning electron microscopy. If the catheter length is modified, the nurse should document the length in the patient’s permanent medical record.\(^34,38-40\) (IV)

G. The nurse should be aware that there are specific catheter selection and placement recommendations for patients with chronic kidney disease (CKD). Catheters with high flow rates should be used (see Standard 40, *Hemodialysis Vascular Access Devices*).\(^30\) (V)

H. CVAD tip location and dwell time for CKD patients vary based on type of catheter selected and the specific patient condition. Short-term CVAD tips should be located in the SVC; long-term (tunneled) CVAD tips should be located in the right atrium; femoral CVAD tip locations should be in the IVC. Uncuffed hemodialysis CVADs should be used in hospitalized CKD patients only and dwell up to 1 week. If an uncuffed hemodialysis CVAD is selected for femoral placement, it should be used in bed-bound CKD patients and dwell for only 5 days (see Standard 40, *Hemodialysis Vascular Access Devices*).\(^30\) (V)

**Practice Criteria**

### IV. Arterial Catheters

A. Peripheral or pulmonary arterial catheters should be considered for short-term use for hemodynamic monitoring, obtaining blood samples, and analyzing blood gas in critically ill patients.\(^28\) (V)

B. The nurse should be aware that the radial artery is the most common insertion site because of easier access and a lower complication rate. Other possible sites are the femoral, axillary, brachial, and tibial posterior arteries.\(^61-65\) (I)

C. If the radial artery site is selected, a 20-gauge arterial catheter is preferred to decrease the risk of thrombosis.\(^62\) (I)

D. The nurse should be aware of the potential complications associated with arterial catheters and that rates of complications, such as thrombosis and infection, appear to increase with extended dwell time.\(^61-65\) (I)

**REFERENCES**

33. SITE SELECTION

Standard

33.1 Site selection for all vascular access devices (VADs) shall be established in organizational policies, procedures, and/or practice guidelines.

33.2 The vascular access shall accommodate the gauge and length of the catheter required for the prescribed therapy.

33.3 Site selection for vascular access shall include assessment of the patient’s condition; age; diagnosis; comorbidities; condition of the vascular at the insertion site and proximal to the intended insertion site; condition of skin at intended insertion site; history of previous venipunctures and access devices; type and duration of infusion therapy; and patient preference.

33.4 Prior to insertion of a peripherally inserted central catheter (PICC), anatomical measurements shall be taken to determine the length of the catheter required to ensure full advancement of the catheter to the lower third of the superior vena cava and the junction of the superior vena cava and right atrium.

33.5 Placement of central vascular access devices (CVADs) by nurses shall be established in organizational policies, procedures, and/or practice guidelines and in accordance with rules and regulations promulgated by the state’s Board of Nursing.

Practice Criteria

I. Peripheral Venous Access via Short Peripheral Catheters

A. For adult patients, veins that should be considered for peripheral cannulation are those found on the dorsal and ventral surfaces of the upper extremities, including the metacarpal, cephalic, basilic, and...
median veins. Avoid the lateral surface of the wrist for approximately 4-5 inches because of the potential risk for nerve damage. For pediatric patients, similar veins to consider are in the hand, forearm, antecubital area, and upper arm below the axilla, as well as the veins of the scalp, foot, and fingers in infants and toddlers. For adult and pediatric patients: avoid the ventral surface of the wrist due to the pain on insertion and possible damage to the radial nerve.\(^3,5\) (V) 

B. Site selection should be initiated routinely in the distal areas of the upper extremities; subsequent cannulation should be made proximal to the previously cannulated site.\(^3\) (V) 

C. Site selection should be initiated routinely in the nondominant arm. VAD sites should avoid areas of flexion; areas of pain on palpation; veins that are compromised (eg, bruised, infiltrated, phlebitic, sclerosed, or corded); location of valves; and areas of planned procedures. In infants and children, avoid the arm veins or fingers, or the thumb/finger used for sucking.\(^2,3,6,7\) (V) 

D. Veins of the lower extremities should not be used routinely in the adult population due to risk of tissue damage, thrombophlebitis, and ulceration.\(^2\) (I A/P) 

E. Veins in an upper extremity should be avoided on the side of breast surgery with axillary node dissection, after radiation therapy to that side, or with lymphedema, or the affected extremity from a cerebrovascular accident. For patients with chronic kidney disease stage 4 or 5, avoid forearm and upper-arm veins “suitable for placement of vascular access.” A collaborative discussion with the patient and the licensed independent practitioner (LIP) should take place related to the benefits and risks of using a vein in an affected extremity.\(^2,3,8,12\) (V) 

F. Veins in the right arm of infants and children should be avoided after procedures treating congenital cardiac defects that may have decreased blood flow to the subclavian artery.\(^13\) (V) 

G. Cannulation of hemodialysis fistulas and grafts for infusion therapy requires the order of a nephrologist or LIP.\(^3\) (V) 

H. The nurse should consider using visualization technologies that aid in vein identification and selection.\(^3,14\) (V) 

**Practice Criteria**

**II. Peripheral Venous Access via Midline Catheters**

A. Site selection should be routinely initiated in the region of the antecubital fossa. Veins that should be considered for midline catheter cannulation are the basilic, cephalic, and brachial veins. For neonate and pediatric patients, additional site selections include veins in the leg with the tip below the groin and in the scalp with the tip in the neck, above the thorax.\(^13\) (V) 

B. Site selection should avoid areas of pain on palpation, veins that are compromised (eg, bruised, infiltrated, phlebitic, sclerosed, orcorded), and for patients with chronic kidney disease stage 4 or 5, avoid forearm and upper-arm veins “suitable for placement of vascular access.”\(^2,3,8,12\) (V) 

C. Veins in an upper extremity should be avoided on the side of breast surgery with axillary node dissection, after radiation therapy to that side, or with lymphedema, or the affected extremity from a cerebrovascular accident. For patients with chronic kidney disease stage 4 or 5, avoid upper-arm veins “suitable for placement of vascular access.” A collaborative discussion with the patient and the licensed independent practitioner (LIP) should take place related to the benefits and risks of using a vein in an affected extremity.\(^2,3,8,10\) (V) 

D. Veins in the right arm of infants and children should be avoided after procedures treating specific congenital cardiac defects that may have decreased blood flow to the subclavian artery.\(^13\) (V) 

E. The nurse should consider using visualization technologies that aid in vein identification and selection.\(^14\) (V) 

**Practice Criteria**

**III. Central Venous Access via Peripherally Inserted Central Catheters (PICCs)**

A. Veins that should be considered for PICC cannulation are the basilic, median cubital, cephalic, and brachial veins. For neonate and pediatric patients, additional site selections include the temporal vein and posterior auricular vein in the head and the saphenous vein in the lower extremity.\(^13,15\) (V) 

B. Site selection should avoid areas of pain on palpation; veins that are compromised (eg, bruised, infiltrated, phlebitic, sclerosed, or corded); and for patients with chronic kidney disease stage 4 or 5, avoid forearm and upper-arm veins “suitable for placement of vascular access.”\(^2,8,12\) (V) 

C. Veins in an upper extremity should be avoided on the side of breast surgery with axillary node dissection, after radiation therapy to that side, or with lymphedema, or the affected extremity from a cerebrovascular accident. For patients with chronic kidney disease stage 4 or 5, avoid upper-arm veins “suitable for placement of vascular access.” A collaborative discussion with the patient and the licensed independent practitioner (LIP) should take place related to the benefits and risks of using a vein in an affected extremity.\(^2,3,11\) (V) 

D. The nurse should consider using visualization technologies that aid in vein identification and selection.\(^14-16\) (V)
**Practice Criteria**

**IV. Central Venous Access via Nontunneled Central Vascular Access Devices (CVADs)**

A. To minimize the risk of catheter-related infection with a nontunneled CVAD, the subclavian vein is recommended in adult patients, rather than the jugular or femoral veins, although benefits and risks accompany each access site. For patients with chronic kidney disease, the subclavian vein is not recommended in order to preserve the vein.6,8,12,1718 (I)

B. To minimize the risk of catheter-related thrombotic complications with a nontunneled CVAD, the subclavian vein is recommended in adult patients, rather than the femoral vein, although benefits and risks accompany each access site.17 (I)

C. There is no preferred venous insertion site for a nontunneled CVAD in infants and children to minimize the risk of infection.19 (V)

**Practice Criteria**

**V. Central Venous Access via Tunneled Central Vascular Access Devices and Implanted Ports**

A. The nurse should collaborate with the health care team and patient in assessment and site selection for placement of tunneled catheters and implanted ports.11 (V)

**Practice Criteria**

**VI. Peripheral Arterial Access**

A. Criteria for selection should include the presence of a pulse and assessment of distal circulation. An Allen test should be performed when selecting the appropriate artery for cannulation, prior to device insertion, and for assessment of distal arterial perfusion.2 (I A/P)

B. The radial artery should be considered the most appropriate access for percutaneous cannulation in adults for its advantages and to prevent infection. Alternative arteries include ulnar, brachial, and dorsalis pedis in adults, with each having advantages and disadvantages. These sites are preferred over the femoral or axillary to reduce the risk of infection. For pediatric patients, site selections include radial, posterior tibial, and dorsalis pedis arteries and are preferred over the femoral or axillary sites to reduce the risk of infection. The brachial artery should not be used in pediatric patients due to the absence of collateral blood flow.2,20 (I A/P)

C. Infusion therapy is not administered in peripheral arteries via peripheral arterial catheters; these catheters are used for hemodynamic monitoring, blood gas analysis, and obtaining blood samples.2,14 (V)

D. The nurse should consider using visualization technologies that aid in arterial identification and selection.14 (V)

**Practice Criteria**

**VII. External Jugular Vein Access**

A. Nurses who are competent in infusion therapy may insert short peripheral intravenous (IV) catheters and PICCs, using the external jugular vein in patients in acute care settings and in emergency situations when other veins cannot be accessed.2,21 (V)

B. A short peripheral catheter in the external jugular vein should not be used for contrast media or with power injectors.21 (V)

C. Central venous pressure monitoring may be performed through PICCs in the external jugular vein.2 (V)

D. When a short peripheral catheter is inserted into the external jugular vein and infusion therapy is expected to exceed 72 to 96 hours, the nurse should collaborate with the LIP for an alternative vascular access site as soon as possible.2,21 (V)

**REFERENCES**


34. LOCAL ANESTHESIA FOR VASCULAR ACCESS DEVICE PLACEMENT AND ACCESS

Practice Criteria

A. Local anesthetic agents including, but not limited to, topical transdermal agents, intradermal lidocaine, iontophoresis, and pressure-accelerated lidocaine, should be considered and used according to manufacturers’ directions for use.1-10 (II)

B. The nurse should consider and encourage the use of all available and effective local anesthetic methods and agents prior to each painful dermal procedure in children and some adults. These include topical anesthetics as well as adjunctive and less invasive anxiolytic, cognitive, behavioral, and complementary therapies to reduce pain and discomfort.11-16 (II)

C. The nurse should assess the patient for potential allergic reactions, tissue damage, or inadvertent injection of the drug into the vascular system when administering a local anesthetic.9,17 (V)

REFERENCES


I. General Practice Criteria

initiation of infusion therapy.

35.8 Tip location of a CVAD shall be determined radiographically or by other approved technologies prior to each catheterization attempt.

35.7 Only 1 vascular access device shall be used for each catheterization attempt.

35.6 Antiseptic solutions in a single unit configuration shall be used.

35.5 Maximal sterile barrier (MSB) precautions, including mask, sterile gown, cap, sterile gloves, protective eyewear, and large full-body drapes, shall be used with the insertion of central vascular access devices (CVADs).

35.4 The nurse shall prepare the intended VAD insertion site with antiseptic solution using aseptic technique.

35.3 The nurse shall be competent in insertion technique, infection prevention measures, identifying potential complications, implementing nursing interventions, and in assisting the LIP with VAD placement.

35.2 VAD placement shall be established in organizational policies, procedures, and/or practice guidelines as approved by the state’s Board of Nursing and organizational policies, procedures, and/or practice guidelines and according to manufacturers’ directions for use.

35.1 The nurse shall place a vascular access device (VAD) upon the order of a licensed independent practitioner (LIP) in accordance with the rules and regulations promulgated by the state’s Board of Nursing and organizational policies, procedures, and/or practice guidelines.

Standard

35. VASCULAR ACCESS SITE PREPARATION AND DEVICE PLACEMENT

A. Prior to inserting a vascular access device, the nurse should provide patient education, addressing the rationale for VAD placement; insertion process; expected dwell time; care and maintenance of the device; and signs and symptoms of complications to report (see Standard 12, Informed Consent).

B. If the intended insertion site is visibly soiled, clean the area with soap and water prior to application of antiseptic solution(s).

C. Clipping should be performed to remove excess hair at the insertion site with single-patient-use scissors or disposable-head surgical clippers; microabrasions produced from shaving increase the risk for infection.

D. The nurse should inspect the VAD for product integrity prior to insertion.

E. If an artery is inadvertently accessed or if the patient complains of paresthesias, numbness, or tingling upon VAD insertion, the catheter should be immediately removed and the LIP promptly notified, as rapid attention may prevent permanent injury; nerves and arteries are often located in very close proximity to the venipuncture site.

F. No more than 2 attempts at vascular access placement should be made by any 1 nurse, as multiple unsuccessful attempts limit future vascular access and cause patients unnecessary pain. Patients with difficult vascular access require a careful assessment of VAD needs and collaboration with the health care team to discuss appropriate options.

G. Chlorhexidine solution is preferred for skin antisepsis. One percent to two percent tincture of iodine, iodophor (povidone-iodine), and 70% alcohol may also be used. Chlorhexidine is not recommended for infants under 2 months of age.

H. The nurse should consider using visualization technologies that aid in vein identification and selection.

Practice Criteria

II. Short Peripheral and Midline Catheters

A. The nurse should consider the use of methods to promote vascular distention in addition to the appropriate use of tourniquets, such as gravity (positioning the extremity lower than the heart for several minutes), having the patient open and close his or her fist, and lightly stroking the vein downward (see Standard 31, Tourniquets). (I A/P)

B. The use of warmth should be considered another method to promote vascular dilation. The use of dry heat was found to increase the likelihood of successful peripheral catheter insertion.

C. The nurse should use a new pair of disposable, nonsterile gloves in conjunction with a no-touch technique for peripheral IV insertion. With no-touch technique, the planned IV insertion site is not palpated after skin cleansing unless sterile gloves are worn.

D. Insertion techniques for midline catheter placement include threading the catheter through an introducer
or using the Modified Seldinger Technique (MST), also known as the microintroducer technique.5,17-19 (V)
E. The midline catheter tip location should be at or below the axillary line.5,17-19 (V)

Practice Criteria

III. Central Vascular Access Devices (CVADs)

A. The nurse should use a standardized checklist to encourage adherence to recommended practices for access site preparation, infection prevention, and safety precautions. The CVAD placement procedure should be stopped for any breaches in sterile technique that occur during the procedure.9,20,21 (IV)
B. The nurse should use a standardized supply cart or kit that contains all necessary components for the insertion of a CVAD.5,20,21 (V)
C. Ultrasound technology should be used when inserting PICC and percutaneous centrally inserted catheters to increase success rates and decrease insertion-related complications.22-31 (III)
D. The nurse should use the Seldinger or Modified Seldinger Technique (MST) as the preferred method for CVAD (ie, peripherally inserted central catheter [PICC], subclavian) insertion due to advantages of decreased vein trauma, decreased insertion complications, and decreased risk of arterial puncture or nerve injury.8,30-34 (V)
E. CVADs shall have the tip dwelling within the superior vena cava (SVC) near its junction with the right atrium or, if placed via the femoral vein, shall have the tip dwell in the inferior vena cava (IVC) above the level of the diaphragm.3,5,13,36 (IV)
F. The nurse should be aware that the presence of a pacemaker requires a careful evaluation and thorough assessment to select the appropriate catheter and insertion site. Pacemakers are usually placed on the left side of the chest or abdomen. The contralateral side is preferred for CVAD placement, but if ipsilateral side is selected, a peripherally inserted central venous catheter may be the safest choice. It is important to have the pacemaker evaluated before and after CVAD insertion to determine integrity of the pacemaker unit and leads. There are no published reports of displaced leads noted during CVAD insertion, and there are currently no practice guidelines developed related to pacemakers and CVADs.8,37,38 (V)

Practice Criteria

IV. Arterial Catheters

A. The nurse should use a cap, mask, sterile gloves, eyewear, and a large, sterile fenestrated drape when placing a peripheral arterial catheter.10 (II)
B. Maximal sterile barrier precautions should be used when placing arterial catheters in the axillary or femoral artery.10 (II)

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36. VASCULAR ACCESS DEVICE STABILIZATION

Standard

36.1 Vascular access device (VAD) stabilization shall be used to preserve the integrity of the access device, minimize catheter movement at the hub, and prevent catheter dislodgement and loss of access.

36.2 VADs shall be stabilized using a method that does not interfere with assessment and monitoring of the access site or impede vascular circulation or delivery of the prescribed therapy.

36.3 The use of stabilization methods shall be established in organizational policies, procedures, and/or practice guidelines.

36.4 The nurse shall be competent in proper use and application of VAD stabilization methods and devices.

Practice Criteria

A. The use of a catheter stabilization device should be considered the preferred alternative to tape or sutures when feasible. Several studies have demonstrated a reduction in overall complications and improved dwell time with peripheral IV catheters. One study demonstrated reduced risk of infection with peripherally inserted central catheters (PICCs) when a catheter stabilization device was used. Sutures were associated with fewer complications when compared to use of tape with PICCs in pediatric patients in a randomized, controlled trial that excluded use of stabilization devices. 1,2,5,10,12,13

B. Transparent semipermeable membrane (TSM) dressings or other dressings are often cited as helpful in stabilizing the catheter; however, there is insufficient evidence supporting their benefits in stabilization at the intravenous catheter hub alone. A randomized, controlled trial with peripheral IV catheters demonstrated that use of a peripheral IV catheter with an integrated stabilization feature in combination with an IV securement dressing performed as well as a standard peripheral IV with a catheter stabilization device. It is important to recognize that these results cannot be generalized to all types of short peripheral catheters. 5,7,11 (III)
G. The use of alternative methods of VAD stabilization in lieu of sutures should be considered to mitigate the risk of needlestick injury; the use of staples has been cited in the literature as an alternative to sutures, reducing exposure to contaminated sharps. Studies are limited, however; they have not demonstrated benefits and may not be appropriate in the nonnursed patient.5,6,12 (V)

D. Use of any stabilization method should be based on evidence as well as analysis of risks versus benefits. While sutures may increase risk of needlestick injury and/or risk of infection due to the presence of suture wounds near the insertion site and development of biofilm on the sutures, sutures may be considered appropriate in special populations such as pediatric patients or those with skin integrity problems, precluding use of tape or an engineered stabilization device.5,10,11 (V)

E. If sutures used to stabilize a VAD at placement become loosened or no longer intact, they should be removed and the VAD should be secured using another stabilization method or resutured as appropriate.5 (V)

F. Removal and replacement of the engineered stabilization device or tape should be done at established intervals according to the manufacturer’s directions for use, and/or in conjunction with replacement of the VAD, or with routine site care and dressing changes.5,14 (V)

G. A catheter that migrates externally should not be readvanced into the vein prior to application of a catheter stabilization device; the VAD should be stabilized at the point of external migration and assessed for proper placement in the vasculature before further use.14 (V)

REFERENCES


37. JOINT STABILIZATION

Standard

37.1 Joint stabilization, using such devices as an arm board or limb or finger splint, shall be implemented to facilitate infusion delivery when the catheter is placed in or adjacent to an area of flexion, and is not considered a restraint.

37.2 A joint stabilization device shall be considered a single-patient-use device.

37.3 The use of joint stabilization devices shall be established in organizational policies, procedures, and/or practice guidelines and according to manufacturers’ directions for use.

37.4 The nurse shall be competent in the proper use and application of joint stabilization devices.

Practice Criteria

A. A joint stabilization device, such as an arm board or limb or finger splint, should be padded and support the area of flexion (ie, finger, hand, arm, foot) in order to maintain a functional position.1-3 (V)
B. The joint stabilization device should be applied in a manner that will provide the ability to visually inspect and assess the vascular access site and vein path, prevent circulatory constriction, prevent skin impairment, and prevent nerve pressure in the area of flexion.1,4 (V)

C. The nurse should assess the patient’s risk for development of pressure ulcers, perform skin inspection and assessment, and implement appropriate interventions to avoid the risk of skin breakdown. The potential risk for skin breakdown and development of pressure ulcers exists due to pressure created from the device restricting vascular circulation.5,8 (V)

D. Joint stabilization devices should be used to minimize complications and maintain device patency.9 (III)

E. Documentation in the patient’s permanent medical record should include the application of the joint stabilization device and the periodic removal for assessment of circulatory status, range of motion, and skin integrity.1,4,10 (V)

REFERENCES


38. SITE PROTECTION

Standard

38.1 The use of site protection and/or physical immobilization devices, proper application, and patient monitoring shall be established in organizational policies, procedures, and/or practice guidelines.

38.2 The nurse shall be competent in the application, use, and removal of a site protection or immobilization device.

38.3 The use of physical immobilization devices (ie, restraints) to protect the vascular access device (VAD) site shall not be routinely implemented and shall be avoided whenever possible.

Practice Criteria

A. Site protection methods such as mittens are recommended for patient populations such as pediatric, elderly, those with cognitive limitations, or whenever there is risk of accidental dislodgment. Clear plastic site protectors specifically designed for this purpose are used to prevent accidental dislodgment or vein damage in children.1,2 (V)

B. The site protection method selected should be based on a comprehensive assessment of the patient’s physical, behavioral, and psychological status.3,9 (III)

C. Immobilization devices or site protection methods should be used in a manner that will preserve circulation and provide visualization of the vascular access site and in accordance with manufacturers’ directions for use. The selected immobilization device or site protection method should not interfere with the prescribed infusion rate, delivery method, ability to assess the vascular access site, or catheter stabilization/securement.9,10 (V)

D. The physical immobilization device should be removed at established intervals to allow assessment of the extremity’s circulatory status and provide an opportunity for supervised range-of-motion activities.3-5,9 (V, Regulatory)

E. The immobilization device should be removed as soon as the patient’s condition allows.2-7,9-11 (V, Regulatory)

F. The nurse should educate the patient, caregiver, or legally authorized representative on the need for and appropriate use of patient-protective methods, including physical immobilization devices.11 (IV)

G. Documentation should include, but not be limited to, the rationale for the immobilization device; type and location of the immobilization device; release and reapplication of the device; site and circulatory assessment; any complications caused by the immobilization device; patient’s response to
the immobilization device; reassessment of need for the immobilization device; patient education; and removal of the device.3-7,10 (V, Regulatory)

REFERENCES


39. IMPLANTED VASCULAR ACCESS PORTS

Standard

39.1 Placement and removal of an implanted vascular access port shall be considered surgical procedures and must be performed by a licensed independent practitioner (LIP) with validated competency operating within the state’s rules and regulations for professional practice and according to organizational policies, procedures, and/or practice guidelines.

39.2 The nurse shall be competent in implanted vascular access port use and maintenance, including port access, identification of potential complications, and appropriate nursing interventions, including patient and caregiver education and according to organizational policies, procedures, and/or practice guidelines.

39.3 Noncoring safety needles shall be used to access an implanted vascular access port.

39.4 Only implanted vascular access ports and noncoring needles designed for power injection shall be used with power-injection equipment for radiologic imaging in accordance with manufacturers’ directions for use.

39.5 A sterile transparent semipermeable membrane (TSM) dressing or gauze dressing shall be maintained over the access site if the implanted vascular access port remains accessed.

Practice Criteria

A. When planning to use an implanted vascular access port for power injection, power-injection capability should be identified at the time of access and immediately prior to power injection. At least 2 identification methods should be used, including presence of identification cards, wristbands, or key chains provided by the manufacturer; review of operative procedure documentation; and palpation of the port. While some power-injection-capable implanted vascular access ports have unique characteristics identifiable by palpation, palpation of the port should not be the only identification method used.

B. The nurse should be aware of the potential for catheter rupture, which can lead to extravasation, catheter fragment emboli, and the need for port removal and replacement. The most common risk factors include pinch-off syndrome and power injection through ports not approved for this purpose (see Standard 51, Catheter Embolism).

C. Aseptic technique, including the use of sterile gloves, should be used when accessing an implanted port. The use of a mask during access is often recommended; however, it remains an unresolved issue due to lack of research.

D. The implanted vascular access port should be accessed with the smallest-gauge noncoring needle to accommodate the prescribed therapy. To reduce risk of needle dislodgment during access, the noncoring needle should be of a length that allows the needle to sit flush to the skin and securely within the port.

E. Prior to use of the implanted vascular access port for infusion, patency should be confirmed; this should include presence of a blood return and ability to flush the port with preservative-free 0.9% sodium chloride (USP) without evidence of infiltration (see Standard 48, Infiltration and Extravasation).

F. When using an implanted vascular access port for continuous infusions, there is insufficient evidence to support the optimal time for replacement of the noncoring needle; the most common practice is to replace the needle every 7 days.

G. When an implanted vascular access port is accessed, a transparent semipermeable membrane (TSM) dressing or gauze dressing should cover the needle and access site. If gauze is used to support the wings of an access needle and it does not obscure the needle insertion site under a TSM dressing, it can be considered a TSM dressing and changed every 7 days (see Standard 46, Vascular Access Device Site Care and Dressing Changes).
H. The use of positive pressure during noncoring needle withdrawal should be used to reduce blood reflux and risk of thrombotic catheter occlusion.10,11 (V)

I. General patient and/or caregiver education should include placement procedure; type of port placed (eg, power injectable, number of lumens); importance of carrying port identification card (eg, in wallet); routine care, including frequency of flushing; expectations of aseptic technique during access; use of only noncoring needles (including appropriate type for power injection); and identification of potential complications and interventions.1-12 (V)

J. For patients who are receiving infusions at home via an accessed port, patient and/or caregiver education should include checking the dressing daily; how to dress and undress to avoid pulling at the needle site; protecting the site during bathing; making sure women’s bra straps do not rub over the accessed area; immediately reporting any signs or symptoms of pain, burning, stinging, or soreness at the site; and recognizing the importance of stopping the infusion pump and immediately reporting any wetness, leaking, or swelling noted at the site.9,13 (V)

REFERENCES


40. HEMODIALYSIS VASCULAR ACCESS DEVICES

Standard

40.1 Placement and removal of a tunneled or implanted hemodialysis vascular access device (VAD), including an arteriovenous (AV) fistula, and insertion of an arteriovenous graft shall be considered surgical procedures and shall be performed by a licensed independent practitioner (LIP) with validated competency operating within the state’s rules and regulations for professional practice and according to organizational policies, procedures, and/or practice guidelines.

40.2 The nurse shall be competent in hemodialysis VAD use and maintenance, including device access, identification of potential complications, and appropriate nursing interventions, including patient and caregiver education, and according to organizational policies, procedures, and/or practice guidelines.

40.3 Administration of medications and solutions through a hemodialysis VAD, including AV fistulas or grafts, shall be upon the order of a licensed independent practitioner (LIP).

40.4 Removal of a temporary nontunneled or nonimplanted hemodialysis VAD shall be performed by the nurse with validated competency, in accordance with rules and regulations promulgated by the state’s Board of Nursing and organizational policies, procedures, and/or practice guidelines.

40.5 Hemodynamic monitoring and venipuncture shall not be performed on the extremity containing an AV fistula or graft.

Practice Criteria

A. The decision to place a hemodialysis VAD or create a means of long-term vascular access for the purpose of hemodialysis is ideally made collaborative-ly between the nurse, physician responsible for care, and the patient/caregiver. General order for vascular access preference is fistula, arteriovenous graft, and long-term VAD.14 (V)

B. The nurse should be knowledgeable about vein-preservation techniques for patients who are likely to need vascular access for hemodialysis.1,13 (V)

C. The nurse should wear sterile gloves and mask when performing dressing changes for hemodialysis VADs, including AV fistulas and grafts.3,6 (V)
D. Povidone-iodine antiseptic ointment or bacitracin/neomycin/polyoxymyxin B ointment can be used for the exit site of a hemodialysis VAD at the end of each dialysis session only if this ointment does not interact with the material of the hemodialysis catheter per manufacturer’s directions for use.7 (V)

E. To minimize the potential for catheter-related complications, consideration should be given to the size and length of the hemodialysis VAD.3 (V)

F. Hemodialysis VADs should have their tips located in the superior vena cava or right atrium and confirmed by chest radiograph or fluoroscopy. Right atrial thrombosis is a serious complication with VADs placed in the right atrium.3 (V)

REFERENCES


41. UMBILICAL CATHETERS

Standard

41.1 Placement and removal of an umbilical arterial or venous catheter shall be considered a surgical procedure and must be performed by a licensed independent practitioner (LIP) with validated competency, operating within the state’s rules and regulations for professional practice and according to organizational policies, procedures, and/or practice guidelines.

41.2 The nurse shall be competent in umbilical catheter use and maintenance, including catheter access, identification of potential complications, and appropriate nursing interventions, including patient and caregiver education according to organizational policies, procedures, and/or practice guidelines.

41.3 Tincture of iodine shall not be used to cleanse the umbilical catheter site because of the potential deleterious effect on the neonatal thyroid.

41.4 Catheter tip location shall be radiologically confirmed before catheter use and documented in the patient’s permanent medical record.

Practice Criteria

A. Prior to insertion, the umbilical catheter site should be cleansed with an appropriate antiseptic solution such as povidone-iodine.1-3 (V)

B. Umbilical artery catheters should be placed so that the tip is located in the descending aorta above the level of the diaphragm and below the left subclavian artery (high positioned catheter).1-4 (V)

C. Umbilical venous catheters should be placed so that the tip is located in the inferior vena cava, above the level of the diaphragm.1-5 (V)

D. Removal of the catheter should be performed aseptically and slowly over several minutes, and followed by manual compression with sterile gauze applied to the umbilical stump until hemostasis occurs.1-5 (V)

E. The site should be monitored after catheter removal for at least 12 hours, and then daily for signs of complication development.1-5 (V)

F. Infusion of medications into the umbilical arterial catheter should be avoided.1-6 (V)

G. The nurse should be knowledgeable of the signs, symptoms, and management of potential complications related to the use of umbilical catheters including, but not limited to, bleeding from the umbilical stump, hemorrhage, air embolism, infection, thrombosis, vascular perforation, and peripheral vascular constriction. The nurse should report complications to the LIP and document them in the patient’s permanent medical record.1-6 (V)

REFERENCES


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42. APHERESIS AND ULTRAFILTRATION CATHETERS

**Standard**

42.1 Placement and removal of apheresis or ultrafiltration catheters shall be performed by a nurse or licensed independent practitioner (LIP) with validated competency operating within the state’s rules and regulations for professional practice and according to organizational policies, procedures, and/or practice guidelines. 42.2 Indications and protocols for the insertion of or assisting with use, and care of apheresis or ultrafiltration catheters shall be established in organizational policies, procedures, and/or practice guidelines. 42.3 The nurse shall be competent in apheresis and ultrafiltration catheter use and maintenance, including identification of potential complications, and appropriate interventions, including patient and caregiver education. 42.4 Apheresis or ultrafiltration catheters shall not be used for medication or solution administration.

**Practice Criteria**

A. A large-bore central catheter, percutaneously or surgically placed, designed to maintain high flow rates and accommodate large blood volumes should be selected and inserted in patients with inadequate peripheral vein access (adult or pediatric) for the purpose of apheresis. 1-7 (IV) B. If using a peripheral approach for apheresis, 2 large-gauge intravenous catheters should be inserted for collection and reinfusion. A multilumen apheresis central catheter should allow for repeated apheresis procedures and provide a multipurpose approach to accommodate long-term infusion needs and supportive care. 5,6,8 (IV) C. The tip of the apheresis central catheter, if placed in the subclavian or internal jugular vein, should reside at the junction of the superior vena cava and right atrium. 3-15 (V) D. Ultrafiltration is used to remove excess salt and water in patients with fluid overload, particularly in patients with congestive heart failure in which conventional treatments have not been effective. This process typically uses a dual-lumen vascular access device. 16-18 (V)

E. The nurse should be knowledgeable of potential complications of apheresis/ultrafiltration catheters and the apheresis/ultrafiltration process, along with appropriate nursing interventions. Potential complications include, but are not limited to, central vascular access device (CVAD) mechanical dysfunction; thrombosis; infection; hypotension; electrolyte imbalance; fluid overload; thrombocytopenia; hypocalcemia; photosensitivity, and citrate toxicity. 1-5,12,14,15 (IV)

F. The nurse should provide the patient and caregiver education related to apheresis/ultrafiltration catheter insertion procedure; reason for the CVAD; use, maintenance, and care; expected dwell time of the catheter; potential insertion; mechanical or infectious complications; and document teaching in the patient’s permanent medical record. 1-3 (V)

**REFERENCES**


