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INFUSION NURSES
NURSES
for a Healthier Tomorrow

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ACKNOWLEDGMENTS

INS recognizes the significance that the Infusion Nursing Standards of Practice has to clinical practice. Not only have the Standards been reviewed, revised, and updated, but this edition ranks the strength of the body of evidence to support each standard.

First, I want to recognize the Standards of Practice Committee: Lisa Gorski, chair, Julie Eddins, Lynn Hadaway, Mary Hagle, Marcia Orr, Deb Richardson, and Penny Williams. Without their knowledge and expertise, plus countless hours of research and writing, this document would not have been completed. Their commitment to this project is unsurpassed.

Thanks go to the reviewers of the Standards. From INS members and committee members, physicians, pharmacists, legal advisors, health care clinicians, and industry partners, their thoughtful reviews and diverse perceptions added a unique perspective.

I want to thank the INS Board of Directors for supporting the efforts of the Standards of Practice Committee during the entire revision process. I am also grateful to the INS staff for the assistance and coordination they offered in ensuring that this publication was completed.

I also want to recognize BD Medical—Medical Surgical Systems for their continuous support over the years of the Standards of Practice revisions. INS thanks them for the educational grant that helped to fund this project.

Lastly, I want to thank our INS members. It is your passion and commitment to providing quality patient care that motivates us to continue to provide products and services that support your practice.

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Editor
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The Infusion Nurses Society (INS) is recognized as the global authority in infusion nursing, dedicated to exceeding the public’s expectations of excellence by setting the standard for infusion care. One pillar of INS’ mission is developing and disseminating standards of practice.

As the science and research of infusion nursing expands and technology advances, it is imperative that the Infusion Nursing Standards of Practice be current and relevant. It provides the framework that guides our clinical practice. Therefore, it is important to integrate the best evidence and research available into each standard.

Each standard provides criteria for nursing action and accountability, while the practice criteria provide guidance for implementation of the standard. The Standards are written to be applicable in all patient settings and address all patient populations. They are actions that must be followed in order to provide safe patient care. Clinicians should be advised that the Standards is a legally recognized document.

In this edition of the Standards, not only are the practice criteria supported by the latest available research, but the strength of the body of evidence is also ranked. A ranking system was developed to identify the level of evidence and research that supports each of the practice criteria. The rankings range from Level I, which includes meta-analyses, systematic literature reviews, and guidelines based on randomized controlled trials, to Level V, which includes clinical articles, consensus reports, and generally accepted practices. Also, the practice criteria allow for more detailed explanations for specific patient populations and practice settings.

As nurses strive to meet the infusion needs of their patients in a complex health care environment, the Infusion Nursing Standards of Practice will be invaluable to guide decision making and for developing patient-centered plans of care.
Evidence that is research based is preferred; however, it may come from a variety of sources as needed. The strength of evidence in this document reflects the body of evidence available and retrievable at the time of review, and thus is titled Strength of the Body of Evidence. The strength of the body of evidence is only as robust as the highest level of a single item of evidence. Studies and other evidence comprise similar patient populations unless otherwise noted. Regulatory evidence is kept separate since these criteria may change based on changes in technology or body of research available.

### Strength of the Body of Evidence

<table>
<thead>
<tr>
<th>Strength of the Body of Evidence</th>
<th>Evidence Description*</th>
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<tbody>
<tr>
<td>I</td>
<td>Meta-analysis, systematic literature review, guideline based on randomized controlled trials (RCTs), or at least 3 well-designed RCTs.</td>
</tr>
<tr>
<td>I A/P</td>
<td>Includes evidence from anatomy, physiology, and pathophysiology as understood at the time of writing.</td>
</tr>
<tr>
<td>II</td>
<td>Two well-designed RCTs, 2 or more multicenter, well-designed clinical trials without randomization, or systematic literature review of varied prospective study designs.</td>
</tr>
<tr>
<td>III</td>
<td>One well-designed RCT, several well-designed clinical trials without randomization, or several studies with quasi-experimental designs focused on the same question. Includes 2 or more well-designed laboratory studies.</td>
</tr>
<tr>
<td>IV</td>
<td>Well-designed quasi-experimental study, case control study, cohort study, correlational study, time series study, systematic literature review of descriptive and qualitative studies, or narrative literature review, psychometric study. Includes 1 well-designed laboratory study.</td>
</tr>
<tr>
<td>V</td>
<td>Clinical article, clinical/professional book, consensus report, case report, guideline based on consensus, descriptive study, well-designed quality improvement project, theoretical basis, recommendations by accrediting bodies and professional organizations, or manufacturer recommendations for products or services. Includes standard of practice that is generally accepted but does not have a research basis (for example, patient identification).</td>
</tr>
<tr>
<td>Regulatory</td>
<td>Regulations and other criteria set by agencies with the ability to impose consequences, such as the AABB, Centers for Medicare &amp; Medicaid Services (CMS), Occupational Safety and Health Administration (OSHA), and state Boards of Nursing.</td>
</tr>
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*Sufficient sample size is needed with preference for power analysis adding to the strength of evidence.
1. **PRACTICE SETTING**

**Standard**

1.1 The Infusion Nursing Standards of Practice shall be applied and met in all practice settings where infusion therapy is administered.

1.2 Administration of infusion therapy shall be established in organizational policies, procedures, and/or practice guidelines.

1.3 Administration of infusion therapy shall be in accordance with rules and regulations promulgated by the state’s Board of Nursing and federal and state regulatory and accrediting agencies in all practice settings.

**2. NEONATAL AND PEDIATRIC PATIENTS**

**Standard**

2.1 The nurse providing infusion therapy for neonatal and pediatric patients shall have clinical knowledge and technical expertise with respect to this population.

2.2 Clinical management of neonatal and pediatric patients shall be established in organizational policies, procedures, and/or practice guidelines and in accordance with applicable standards of practice.

2.3 The nurse shall verify that informed consent for treatment for neonatal and pediatric patients, as well as those patients who are deemed emancipated minors or mature minors, is documented.

**Practice Criteria**

A. The nurse should provide care to neonatal and pediatric patients that is individualized, collaborative, and age appropriate.¹⁻⁴ (V)

B. The nurse providing infusion therapy to neonatal and pediatric patients should have knowledge and demonstrated skill competency in the areas of:

1. Anatomic characteristics and their effect on physical assessment, vascular and nonvascular access device site selection, insertion procedures, site rotation, and use of specialized infusion-related equipment, including care and maintenance practices during infusion therapy.²⁻³ (V)

2. Physiologic characteristics and their effect on drug and nutrient selection; administration set selection (eg, free of Di[2-ethylhexyl] phthalate); dosage and volume limitations with reference to age, height, weight, or body surface area; pharmacologic actions, interactions, and side effects; monitoring parameters; and response to infusion therapy.³⁻¹¹ (V)

3. Growth and developmental stages, including implications related to promoting comfort and reducing pain and fears associated with infusion therapy procedures.³,⁴,⁹,¹²⁻¹⁴ (V)

4. Interaction with parents, other family members, or legally authorized representative as members of the patient’s health care team, including patient education that is provided with attention to age, developmental level, health literacy, culture, and language preferences (see Standard 11, Patient Education).²,⁴,¹⁵ (V)

5. Safe and appropriate setting (eg, acute care, ambulatory, school, or home care) for patients receiving infusion therapy.²⁻¹⁶ (V)

6. Obtaining assent from the school-age or adolescent patient as appropriate (see Standard 12, Informed Consent).²,¹⁷⁻¹⁹ (V)

**REFERENCES**


3. OLDER ADULT PATIENTS

Standard

3.1 The nurse providing infusion therapy for older adult patients shall have clinical knowledge and technical expertise with respect to this population.

3.2 Clinical management of older adult patients shall be established in organizational policies, procedures, and/or practice guidelines and shall be according to applicable standards of practice.

Practice Criteria

A. The nurse should provide individualized, collaborative, and age-appropriate care to older adults—those people who are 65 years and older.1,8 (V)

B. The nurse providing infusion therapy to older adults should have knowledge and demonstrated skill competency in the areas of:

1. Anatomic changes related to older adults and their effect on physical assessment, vascular and nonvascular access device site selection, insertion procedures, and use of specialized infusion-related equipment, including care and maintenance practices during infusion therapy.4,9,13,16 (V)

2. Physiologic changes related to older adults and their effect on drug dosage and volume limitations, pharmacologic actions, interactions, side effects, monitoring parameters, and response to infusion therapy.5,9,12,14 (V)

3. Changes in cognitive abilities and dexterity; communication methods, including vision, hearing, and verbal changes; as well as psychosocial and socioeconomic considerations.4,9,13,15 (V)

4. Interaction with family members, caregivers, or legally authorized representative as members of the patient’s health care team, with consent of the patient or as necessary due to mental status.4,9,15 (V)

5. Potential for adverse events and drug interactions in older adults who may be prescribed multiple medications.4,9,13,14 (V)

6. Safety and environmental considerations related to older adults receiving infusion therapy and effective management of those considerations.9,13,16,17 (V)

REFERENCES


4. ETHICS

Standard

4.1 Ethical principles shall be the foundation for decision making and patient advocacy.
4.2 Guidelines and resources for ethical issues shall be outlined in organizational policies, procedures, and/or practice guidelines.
4.3 The nurse shall act as a patient advocate; maintain patient confidentiality, safety, and security; and respect, promote, and preserve human autonomy, dignity, rights, and diversity.
4.4 Principles of beneficence, nonmaleficence, fidelity, protection of patient autonomy, justice, and veracity shall dictate nursing action.

Practice Criteria

A. Ethical principles should be integrated in all areas of nursing practice.1-4 (V)
B. The nurse should use professional ethical resources, including the Guide to the Code of Ethics for Nurses: Interpretation and Application by the American Nurses Association and the Infusion Nursing Code of Ethics.1-4 (V)
C. The nurse should assess for and raise issues related to potential ethical problems, act as a role model for ethical care, and contribute to resolving ethical issues related to patients, colleagues, or the health care system.1-4 (V)
D. The nurse should use organizational ethics resources, such as ethics committees, and support nursing participation when dealing with ethical issues.1-4 (V)

REFERENCES

B. The method for making scope of practice decisions is different for each state’s Board of Nursing and includes a decision-tree model, declaratory rulings, and advisory opinions. The expansion of infusion therapies and technologies requires the nurse to be knowledgeable of the method used in the state(s) where one practices.4,5 (V, Regulatory)

C. Decisions about the scope of practice for each type of personnel involved with infusion therapy should focus on the following:

I. Nursing Assistive Personnel (NAP)
   a. NAP function in assistive roles to perform supportive patient care tasks that are noninvasive. Job titles may include many combinations of the terms aides, assistants, or technicians. Training is provided in many different settings, and requirements vary among states. NAP working in some facilities and agencies receiving federal funding are required to have a minimum amount of training and pass a state competency evaluation. Some states do require a license.6-8 (V)
   b. Infusion-related tasks assigned to NAP include managing equipment and supplies, gathering statistics, and assisting licensed personnel with invasive procedures.6,7 (V)
   c. NAP should not have the responsibility to perform invasive infusion therapy procedures such as catheter insertion, catheter maintenance procedures, or the administration of any fluid, nutrition, blood, or medication. A practice analysis for NAP identified 119 activity statements; however, there were no infusion-related tasks, activities, or procedures identified.5,9 (IV)
   d. State Boards of Nursing may have statements affirming that initiation, administration, and monitoring of infusion therapy may not be delegated to unlicensed personnel.6,7 (V)
   e. Personnel (eg, infusion team technicians) performing catheter insertions have been identified as a predictor of complications such as phlebitis and infiltration.10 (IV)

II. Medical Assistant (MA)
   a. MA's function in assistive roles to physicians and other health care practitioners by performing administrative and clinical tasks. Their primary place of employment is the medical office.8,11 (V)
   b. Due to the increasing frequency and types of infusion therapy provided in non–acute care settings, MAs should have basic knowledge of infusion therapy as it applies to their role.11 (V)
   c. MAs should complete a course of infusion therapy training, including supervised clinical practice.11 (V)

III. Licensed Practical/Vocational Nurse (LPN/LVN)
   a. Successful completion of an organized educational program, including supervised clinical practice on infusion therapy, is required for LPN/LVN's in many states. In states without such requirements, completion of a similar educational program is recommended prior to performing infusion therapy procedures. These educational programs should apply the Infusion Nursing Standards of Practice.12-14 (V, Regulatory)
   b. An LPN/LVN practice analysis identified 13 of 159 activity statements as being infusion tasks, activities, and procedures. The frequency of performance of each activity varies by work practice setting, age and type of patients, and years of experience.7 (IV)
   c. All infusion-related tasks should be performed under the supervision of a registered nurse with appropriate infusion therapy knowledge and skills.13 (V, Regulatory)

IV. Registered Nurse (RN)
   a. The RN performing infusion therapy should have the requisite knowledge and skills derived from application of the Infusion Nursing Standards of Practice.15,16 (V)
   b. Due to the lack and/or inconsistency of infusion therapy in basic nursing curricula, the RN should successfully complete an organized educational program on infusion therapy.15,17 (V)
   c. The RN should participate in the development of policies and procedures and in quality improvement activities related to infusion therapy.18,19 (V)
   d. When the RN has received a delegated assignment from another health care professional and concludes that she or he is inadequately prepared to perform this function, the RN must refuse this assignment and seek other means for providing the patient care required.20 (V)
   e. Tasks delegated by the RN to other nurses or assistive personnel are required to be within the legal boundaries for those personnel. Tasks delegated to assistive personnel should not require professional judgment, require little or no modification for each patient, and can be performed with a predictable outcome.20,21 (V)

V. Infusion Nurse Specialist (CRNI®)
   a. Infusion nurse specialists are RNs who have attained certification in infusion nursing from the Infusion Nurses Certification Corporation (INCC) and use the designation CRNI® (Certified Registered Nurse Infusion). This credential signifies specialized knowledge and experience in infusion nursing. All RNs...
specializing in infusion nursing should seek to earn this credential.\textsuperscript{22,24(V)}

b. Nurses earning a certification credential from a professional organization report benefits of personal and professional growth, career advancement, financial rewards, and empowerment.\textsuperscript{25,27(IV)}

c. In addition to the practice criteria for the RN, the CRNI\textsuperscript{®} serves as direct care provider, care coordinator, advocate, patient and staff educator, manager, and consultant on all issues related to infusion therapy.\textsuperscript{28(V)}

d. The CRNI\textsuperscript{®} is recognized as expert in this specialty and should organize and coordinate quality improvement activities in infusion therapy and be the primary resource to guide policy and procedure development derived from best evidence.\textsuperscript{28(V)}

e. The CRNI\textsuperscript{®} should be involved with implementation of clinical decision support systems (CDSS) to ensure the needs of nursing are addressed. CDSS designed for nursing may have the potential for guiding clinical decisions within the nurse’s scope of practice; however, the available studies have many limitations. Management of catheter- and infusion-related complications could benefit from such systems.\textsuperscript{29(V)}

VI. Advanced Practice Nurse (APN)

a. Nurse practitioners, clinical nurse specialists, nurse midwives, and nurse anesthetists compose the group of advanced practice nurses. APNs may be licensed independent practitioners (LIPs) and function under a facility’s guidelines and procedures for medical staff. APNs may have the legal authority to prescribe infusion therapy and perform surgical procedures for insertion and removal of vascular access devices.\textsuperscript{28,31(IV, Regulatory)}

b. APNs should be involved with education, consulting, and research in infusion therapy.\textsuperscript{25,20(IV)}

REFERENCES


6. COMPETENCE AND COMPETENCY VALIDATION

Standard

6.1 As a method of public protection, the nurse shall be competent in the safe delivery of infusion therapy within her or his scope of practice.
6.2 The nurse shall be responsible and accountable for attaining and maintaining competence with infusion therapy within her or his scope of practice.
6.3 Competency validation shall be performed initially and on an ongoing basis.
6.4 Competency validation shall be documented in accordance with organizational policies, procedures, and/or practice guidelines.

Practice Criteria

A. The nurse bears responsibility for becoming competent to enter nursing practice and maintaining continued competence throughout her or his career. Competence goes beyond psychomotor skills to include application of knowledge, critical thinking skills, and decision-making abilities. Competency requires a commitment to lifelong learning, self-reflection, and professional ethics. Completion of continuing education programs is the most common method for continuing competence; however, this method does not prove or guarantee competence.1-10 (IV)
B. Employers should use competency validation processes to document that the nurse has the knowledge, skills, behaviors, and ability to perform the assigned job. Competence should initially be validated at the time of employment, after orientation to the organization, on an ongoing periodic basis, when scope of practice changes, and with the introduction of new equipment or technology. Frequency of ongoing competence validation and performance evaluation is determined by the organization. Frequency for validation of specific skills or tasks should be based on the associated risk and may be considered a component of the quality improvement process.11,12 (V)
C. Multiple infusion-related tasks are identified as core competencies for all registered nurses. Infusion-related tasks performed by licensed practical/vocational nurses (LPN/LVN) are determined by the state’s Board of Nursing and vary greatly among states.13,14 (V, Regulatory)
D. Core competencies for the infusion nurse specialist should be established in the written job description and should be based on the infusion nursing core curriculum, including:
1. Technology and clinical application
2. Fluid and electrolyte balance
3. Pharmacology
4. Infection prevention
5. Neonate and pediatric patients
6. Transfusion therapy
7. Antineoplastic and biologic therapy
8. Parenteral nutrition
9. Quality improvement15,16 (V)
E. Nurses working as contracted staff (eg, peripherally inserted central catheter [PICC] insertion) are required to document competency with the tasks being performed and to comply with the organization’s requirements for staff qualifications and personnel practices.11 (V)
F. Competency validation is a dynamic process that changes based on organizational needs. Skills or tasks for ongoing competency validation are identified through use of clinical outcome data, problems documented through Unusual Occurrence and Sentinel Event Reports, changing patient populations, and patient satisfaction data. Prioritizing the specific tasks for competency validation is determined by the frequency of performing those tasks and the risks associated with the tasks. Low-frequency tasks are performed rarely (eg, less than weekly). High-risk tasks include invasive procedures with the potential to be harmful or even life-threatening to the patient. Problem-prone tasks include those that are documented to produce issues for the patient, staff, or organization.15,16,17 (V)
G. A variety of different methods should be used for competency validation including, but not limited to, written tests for evaluating knowledge, use of clinical scenarios, and assessment of critical thinking skills; observation in a skills laboratory; and observing performance of the skill in the work environment, which is the preferred method for invasive infusion therapy procedures.11,14 (V)
H. A skills laboratory setting involves use of simulation with anatomical models and computer-based virtual reality. Performance of invasive procedures (eg, venipuncture) on peers is discouraged due to health risk for the peer-volunteer.19-21 (V)
I. Documentation of observed performance requires a well-designed form or checklist that focuses on objective, measurable assessment of the actual performance; however, data on the validity and
REFERENCES


7. QUALITY IMPROVEMENT

Standard

7.1 The nurse shall participate in quality improvement activities that advance patient care, quality, and safety.

Practice Criteria

A. Quality improvement activities include evaluating patient or clinical outcomes; identifying clinical
indicators, benchmarks, and areas for improvement; providing best evidence; recommending and implementing changes in structures or processes; analyzing data and outcomes against benchmarks; considering the use of cost analysis; or minimizing and eliminating barriers to change and improvement.\(^{11,13}\) (V)

B. The quality improvement program should create a culture that fosters the reporting and analysis of quality and safety indicator outcomes, near-miss errors, and adverse events. The program should focus on systems and processes that promote individual accountability and a just culture.\(^{12,14-22}\) (V)

C. The knowledge gained through this process should be shared internally and externally with other health care providers and organizations.\(^{13,23}\) (V)

REFERENCES


8. RESEARCH AND EVIDENCE-BASED PRACTICE

**Standard**

8.1 The nurse shall use research findings and current best evidence to expand nursing knowledge in infusion therapy, to validate and improve practice, to advance professional accountability, and to enhance evidence-based decision making.

8.2 The nurse shall obtain approval for research and research-related activities in accordance with federal regulations, professional standards, and criteria set forth by accrediting agencies and organizational policies, procedures, and/or practice guidelines.

8.3 The nurse shall develop and revise organizational policies, procedures, and/or practice guidelines based on research findings and current best evidence.

8.4 The nurse shall integrate evidence-based nursing knowledge with clinical expertise and the patient’s preferences and values in the current context when providing infusion therapy.

**Practice Criteria**

A. The nurse should actively participate in infusion therapy research activities that advance nursing
knowledge, such as participating on a research team or journal club, or conducting systematic literature reviews, in relation to the individual’s education and experience.1-5 (V)

B. The nurse should actively participate in critically evaluating, interpreting, and implementing research findings and/or current best evidence into nursing practice. This includes, but is not limited to, policy and procedure development and review; product technology selection; practice guideline implementation; or abstraction of data from published papers, in relation to the individual’s education and experience.5-10 (V)

C. The nurse should be competent in using evidence-based nursing knowledge and identifying patients’ preferences and values to provide effective and safe infusion therapy practice.7,11-14 (V)

REFERENCES


9. POLICIES, PROCEDURES, AND/OR PRACTICE GUIDELINES

Standard

9.1 Infusion policies, procedures, and/or practice guidelines shall describe the acceptable course of action, including performance and accountability, and provide a basis for clinical decision making.

9.2 Infusion policies, procedures, and/or practice guidelines shall be compliant with state and federal laws and professional standards.

9.3 Infusion policies, procedures, and/or practice guidelines shall be written, reviewed at established intervals, and revised as needed based on best evidence, and approved within a formal organizational process.

9.4 Infusion policies, procedures, and/or practice guidelines shall be readily available and accessible to health care team members.

Practice Criteria

A. Infusion policies, procedures, and/or practice guidelines should encompass all applicable areas of infusion therapy and should ensure patient safety, as well as minimize or mitigate patient harm.1,3 (V)

B. Infusion policies, procedures, and/or practice guidelines should be developed in accordance with criteria set forth in this document, in collaboration with other health care disciplines, patients, industry recommendations, and in keeping with specific needs of the organization and criteria set forth by regulatory and nonregulatory agencies (see Standard 8, Research and Evidence-Based Practice).1,2 (V)

C. The organization should have a process to develop policies, procedures, and/or practice guidelines that are evidence based, maintains the same standard of care throughout the organization, and includes all stakeholders.1,2,4 (V)

D. Procedural checklist(s) should be incorporated into policies, procedures, and/or practice guidelines to promote patient safety and desired patient outcomes.5 (III)

REFERENCES

10. ORDERS FOR THE INITIATION AND MANAGEMENT OF INFUSION THERAPY

**Standard**

10.1 Infusion therapy shall be initiated, changed, or discontinued upon the order of a licensed independent practitioner (LIP).

10.2 The nurse shall verify that the LIP’s order is complete by inclusion of patient identification; fluid type, volume, and a specific infusion rate; specific medication(s), dosage(s), route, and frequency of administration; and any special considerations.

10.3 The nurse shall verify that the LIP’s order is clear, concise, legible, and complete prior to initiation, change, or discontinuation of infusion therapy.

10.4 Use of verbal and telephone orders shall be established in organizational policies, procedures, and/or practice guidelines.

10.5 The nurse shall accept only those abbreviations approved by the organization.

10.6 Appropriateness and accuracy of the prescribed therapy shall be assessed and documented using the nursing process.

10.7 All patient medications shall be reconciled at the time of admission, transfer within or between health care systems, and discharge.

**Practice Criteria**

A. The nurse should be aware that processes of prescribing and transcribing medication orders are responsible for the greatest number of adverse drug events. The nurse should advocate for a systems approach for improvement.1-3 (III)

B. Technology for enhancing the process of prescribing, changing, and discontinuing infusion orders includes computerized provider order entry (CPOE) and clinical decision support systems (CDSS). Introduction of information technology should incorporate the principles of patient safety and involve all stakeholders in implementing the technology and required processes.2-7 (III)

C. Adherence to prescribing guidelines, such as appropriate dose ranges, population-specific dose reductions, and biochemical and microbiological test values, may result from the integration of CDSS with CPOEs, thus facilitating nursing assessment of order appropriateness.5,8 (IV)

D. The nurse should advocate for organizational protocols and standard order sets for patient safety.7,9-11 (IV)

E. The nurse should accept verbal orders from LIPs only when medically necessary.11,12 (IV)

F. The nurse should adhere to a standard “read-back” process when accepting verbal or telephone orders from an LIP.6,12 (V)

**REFERENCES**


11. Practice Criteria

A. Teaching methods should be developed and based upon an assessment of age, developmental and cognitive level, health literacy, cultural influences, and language preference; additional factors affecting readiness to learn such as current stressors, sensory deficits, and functional limitations should also be assessed.1,4 (V)

B. Health literacy is a critical component of communication and patient education. Written educational materials and verbal presentation of teaching should be made as simple as possible for all patients. Use of materials such as pictures, diagrams, and audio/video instructional aids should be considered for patients with low or limited literacy and/or for those who speak English as a second language. Medical jargon and abbreviations should be avoided, and simple terminology should be used.1,8 (V)

C. Education should include, but not be limited to:

1. Proper care of the access device.
2. Precautions for preventing infection and other complications, including aseptic technique and hand hygiene.
3. Signs and symptoms to report, including those that may occur after infusion device removal and after the patient leaves the health care setting (eg, signs of postinfusion phlebitis, fever) and how/where to report them.
4. Ensuring that health care providers are employing proper infection prevention methods, such as hand hygiene, when providing care.
5. For outpatients and those receiving home infusion therapy, additional education should include:
   a. Safe storage, maintenance, and disposal of solutions, supplies, and equipment.
   b. Infusion administration as appropriate.
   c. Information on how to live with an access device, including activity limitations and protecting the device while performing activities of daily living.3,8-14 (V)

D. Patient or caregiver comprehension and performance should be initially evaluated and periodically reevaluated at established intervals.1,4,11,12 (V)

E. Effective education is critical to the safe provision of infusion therapy and in reducing the risk for infusion-related complications. Goals of infusion therapy and the patient/caregiver role related to performance of specific aspects of infusion care should be mutually developed with the patient or caregiver.1,3,4,11,15 (IV)

REFERENCES


12. INFORMED CONSENT

Standard

12.1 The nurse shall confirm that the patient’s informed consent was obtained for the defined procedure as identified in organizational policies, procedures, and/or practice guidelines and in accordance with local, state, and federal regulations.

12.2 Consent shall be obtained by the health care provider who will perform the procedure and shall include full details of the procedure, risks and benefits, alternatives, and complications associated with the treatment or therapy, in a language that the patient or legally authorized representative can understand.

12.3 The nurse shall advocate for the patient’s or legally authorized representative’s right to accept or refuse treatment.

Practice Criteria

A. The nurse should be knowledgeable of the protocol for obtaining informed consent from the patient or legally authorized representative, both verbally and written, and ensure that the information given to the patient or legally authorized representative includes discussion of risks, benefits, alternatives, and complications associated with the treatment or therapy. This should be done in a method such as asking the patient to recount or “teach back” the proposed treatment or procedure.1-7 (V)

B. The nurse should verify that informed consent was obtained for the treatment for neonatal, pediatric, and adolescent patients from the patient’s parent or legal guardian, and should document the information given to the legally authorized representative(s) and the response in the patient’s permanent medical record.4,8-10 (V)

C. The nurse should obtain and document the child’s (age 7 or older) or teenager’s assent to the procedure, tailoring the information with consideration for knowledge and developmental level.11-13 (V)

D. As elements of informed consent, the nurse should ensure that the patient, parent, or legally authorized representative, at a minimum, should be able to explain in everyday words the diagnosis or health problem; the name, type, and general nature of the treatment, service, or procedure; and the primary risks, benefits, and alternatives.5,11 (V)

E. The nurse should ensure that informed consent includes the following elements:

1. Documents written at or below the 5th-grade reading level and provided in the primary language of the patient.
2. Provision of a qualified medical interpreter or reader to assist patients with limited language proficiency, limited health literacy, and visual or hearing impairments.
3. Patient-centered information that is adequate and meaningful to the individual.
4. A dialogue with the patient and, as appropriate, the family and other decision makers, about the nature and scope of the procedure.5,8-14 (V)

F. The nurse should ensure that if the patient’s condition does not allow for such interaction, appropriate documentation is provided in the patient’s permanent medical record.11 (V)

REFERENCES


13. PLAN OF CARE

Standard

13.1 The nurse shall collect comprehensive data pertinent to the patient’s health care needs.
13.2 The nurse shall analyze assessment data and determine nursing diagnosis (problem).
13.3 The nurse shall identify outcome criteria based on nursing diagnoses.
13.4 The nurse shall develop a plan of care that describes nursing actions to achieve expected outcomes.
13.5 The nurse shall implement nursing actions identified in the plan of care.
13.6 The nurse shall evaluate the patient’s progress toward expected outcomes, revising the plan of care as appropriate and at established intervals.
13.7 The use of care plans shall be established in organizational policies, procedures, and/or practice guidelines.

Practice Criteria

A. Nursing assessment should be systematic and prioritized by patient needs, based on organizational policies, procedures, and/or practice guidelines using best evidence and nursing judgment.1,2 (V)

B. The nurse should develop nursing diagnoses (actual or potential bio-psychosocial patient problems) based on pertinent and accurate assessments.1,4 (V)

C. The nurse should develop interventions consistent with the established plan of care, achievable in the current patient context, and based on best evidence.1,3,5 (V)

D. The nurse should determine the type and frequency of patient monitoring based on the prescribed therapy, access device, patient’s condition and age, and care setting.1,4-6 (V)

E. The nurse should develop outcome criteria in relation to the patient’s capabilities, availability, and accessibility to resources, and should include a time frame for achievement.1 (V)

F. The nurse should conduct an ongoing evaluation of the plan of care and revise diagnoses, interventions, and outcome criteria as needed.1,2 (V)

G. The nurse should develop a plan of care that is minimally composed of assessment, diagnoses, interventions, and outcome criteria; uses nursing judgment and critical thinking; is individualized for the patient, spanning the care continuum as needed; and includes, but is not limited to, age, cultural and linguistic appropriateness, environmental sensitivity, and socioeconomic factors.1,3,6-11 (IV)

H. The nurse should involve the patient, caregiver, or legally authorized representative in the development, evaluation, and revision of the plan of care to achieve expected outcomes.1,2,13 (V)

I. The nurse should collaborate with other members of the health care team in the development, evaluation, and revision of the plan of care and communicate the plan to the team.1,6,14 (V)

J. The documented plan of care should be in a standardized language or terminology, in a retrievable format, and contained within the patient’s permanent medical record.1,10,11,15-17 (V)

REFERENCES


**14. DOCUMENTATION**

**Standard**

14.1 Documentation shall contain accurate, factual, and complete information in the patient’s permanent medical record regarding the patient’s infusion therapy and vascular access.

14.2 Documentation shall be legible, timely, accessible to qualified personnel, and readily retrievable.

14.3 Documentation shall include factors relating to initial and ongoing assessment, nursing diagnosis or problem, intervention, and the patient’s response to that intervention.

14.4 Documentation shall reflect the continuity, quality, and safety of care.

14.5 Documentation guidelines and the confidentiality of the patient’s permanent medical record shall be established in organizational policies, procedures, and/or practice guidelines, according to the scope of practice for personnel, standards of care, accrediting agencies, and state and federal regulations.

**Practice Criteria**

A. Documentation should be done by appropriate clinical personnel, and identify the person providing the care.1–3 (V)

B. Documentation should include, but not be limited to, the following:

1. Patient, caregiver, or legally authorized representative’s participation in and understanding of therapy, interventions, and patient education.3–6 (V)

2. Specific site preparation, infection prevention, and safety precautions taken, using a standardized tool for documenting adherence to recommended practices.6–9 (IV)

3. For all infusion devices, type, length, and gauge/size of vascular access device (VAD) inserted; for central vascular access devices (CVADs) and all long-term infusion devices, include the manufacturer and lot number.5,10,11 (V)

4. Date and time of insertion, number and location of attempts, functionality of device, local anesthetic (if used), and the insertion methodology, including visualization and guidance technologies.5,11 (V)

5. Identification of the insertion site by anatomical descriptors, laterality, landmarks, or appropriately marked drawings.10,12 (V)

6. For midline (ML) and peripherally inserted central catheters (PICCs): external catheter length and effective length of catheter inserted.5,13 (V)

7. Confirmation of the anatomic location of the catheter tip for all CVADs prior to initial use and as needed for evaluation of catheter dysfunction.5,11 (V)

8. Condition of the site, dressing, type of catheter stabilization, dressing change, site care, patient report of discomfort or pain on device insertion and with each regular assessment of the access site, and patient report of changes related to the VAD or access site.6,14 (V)

9. A standardized assessment, appropriate for age-specific patient populations, for phlebitis, infiltration, or extravasation, that allows for accurate and reliable assessment on initial identification and with each subsequent site assessment (see Standards 47, Phlebitis; 48, Infiltration and Extravasation).13,14 (V)

10. Type of therapy, drug, dose, rate, time, route and method of administration; include condition of venipuncture or access site prior to and after infusion therapy, as well as patency.3,14–16 (V)

11. Pertinent nursing diagnosis (problem), initial and ongoing assessment, and vital signs as appropriate; patient’s response to insertion and therapy, including symptoms, side effects, or complications; laboratory test results as
appropriate; and barriers to patient education or care.14,17-21 (V)

12. Daily assessment of the need for continuation of the VAD.22,23 (IV)

13. Upon removal: condition of site, condition of the catheter and length, reason for device removal, nursing interventions during removal, dressing applied, patient response, patient education, date/time of removal.4,5 (V)

14. If cultures are obtained, document source of culture(s).4,5 (V)

15. When multiple access devices or catheter lumens are used, documentation should clearly indicate what fluids and medications are being infused through each pathway.4,5 (V)

REFERENCES


15. UNUSUAL OCCURRENCE AND SENTINEL EVENT REPORTING

Standard

15.1 The nurse shall report and document unusual occurrences or sentinel events in practice as a result of infusion therapy according to organizational policies, procedures, and/or practice guidelines.

15.2 Reporting of unusual occurrences and sentinel events shall be defined in organizational policies, procedures, and/or practice guidelines.

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Practice Criteria

A. The Unusual Occurrence and Sentinel Event Report should be shared with the appropriate organizational levels and departments, such as risk management (RM), nursing management, and quality improvement (QI) teams.1–7 (V, Regulatory)

B. The event reporting process should incorporate and exhibit a strong culture of safety or “just culture” by creating an environment that encourages reporting, empowers the nurse to identify and implement appropriate action to prevent adverse events, focuses on fixing the system(s) instead of individual responsibility, determines cause, is considered a learning opportunity, and promotes quality patient outcomes.3,8–15 (IV)

C. The adverse, significant, preventable complications, Unusual Occurrence, or Sentinel Event Report should be written and reviewed, with the reported event(s) analyzed, trends identified, and retained in a retrievable form to ensure patient safety.1,2 (V)

D. The organization should have a defined process to investigate an unusual occurrence or sentinel event to assess cause and improve safety. This process may include such actions as a root cause analysis (RCA), peer review, or an individual action plan.1,3,6–18 (V)

E. The RCA, an interdisciplinary approach, should focus on systems issues, procedures, human resources, products/equipment, processes, and training gaps. The RCA should identify cause(s), provide an analysis of the event, and should result in specific strategies and/or actions for improvement that enhance patient safety.6,16–18 (V)

F. The nurse should actively participate in the RCA process and in the development and implementation of the action plan derived from the RCA.1–7 (V)

G. The nurse should communicate unanticipated nursing outcomes that are within the control or accountability of the nurse to the patient, caregiver, or legally authorized representative. The nurse should be involved in the predisclosure planning discussion and participate as a member of the disclosure team providing information to the patient, caregiver, or legally authorized representative.10,19 (V)

REFERENCES


16. PRODUCT EVALUATION, INTEGRITY, AND DEFECT REPORTING

Standard

16.1 The nurse shall be involved in the evaluation of infusion-related technologies, including attention to
clinical application, expected outcomes, performance, infection prevention, safety, efficacy, reliability, and cost. 16.2 All infusion equipment and supplies shall be inspected for product integrity before, during, and after use. Product integrity shall be determined by verification of expiration date, if applicable, and visual inspection of the product. If a product’s integrity is compromised or the product is expired, it shall not be used.

16.3 The nurse shall verify that preventive maintenance has been performed on infusion equipment being used. 16.4 When a defective product is identified, the nurse shall remove it from patient use and report per organizational policies, procedures, and/or practice guidelines. 16.5 Product evaluation, integrity, defect reporting, and product recall shall be in accordance with organizational policies, procedures, and/or practice guidelines and with state and federal rules and regulations.

Practice Criteria

A. A multidisciplinary group of direct and indirect end users should be included in the product evaluation committee and should be oriented and educated on the new product, as well as data collection tools for analysis and ongoing monitoring.1 (V)

B. The person responsible for managing product evaluation should receive information about adverse outcomes and events.2 (V)

C. Identification of a product defect before, during, or upon completion of therapy requires intervention and removal of the product from the clinical location.3,4 (Regulatory)

D. Product defect reporting should include suspected and known intrinsic and extrinsic contamination, product damage, product tampering, improper, unclear, or confusing patient or user instructions or labeling, similar or confusing names, packaging problems, and errors related to reliance on color coding (see Standard 17, Verification of Products and Medications).1,3,10 (IV, Regulatory)

E. When a product defect is identified before use, the nurse should retain the product, remove it from patient use, and report per organizational policies, procedures, and/or practice guidelines.1 (V)

F. Serial and lot numbers used in product identification, tracking, and product recall should be retained to allow for a copy of the report to be kept on file at the health care organization.3 (Regulatory)

G. When a product defect results in an unusual occurrence or sentinel event, reporting should include, but not be limited to:

1. Identification of occurrence, event, or product problem.
2. Outcomes attributed to the occurrence or event (eg, death or serious injury).
3. Life-threatening injury or illness.
4. Disability resulting in permanent impairment of a body function or permanent damage to a body structure.
5. Injury or illness that requires intervention to prevent permanent impairment of a body structure or function.
6. Date of event.
7. Date of report by the initial reporter.
8. Description of event or problem, including a discussion of how the device was involved, nature of the problem, patient follow-up or required treatment, and any environmental conditions that may have influenced the event.
9. Description of relevant tests and laboratory data, including dates.
10. Description of other relevant patient history, including preexisting medical conditions.3 (Regulatory)

H. Prevention strategies that focus on facilitating optimal care decisions, identifying patients or conditions associated with higher risk, and enabling early detection and intervention to address risk factors may be more effective in improving safety and reducing preventable adverse events.4 (V)

REFERENCES

17. VERIFICATION OF PRODUCTS AND MEDICATIONS

Standard

17.1 The nurse shall identify and verify use of the correct product and/or medication by reviewing the label for the name (trade and generic), dosage and concentration, beyond-use date, expiration date, sterility state, route of administration, frequency, flow rate, and any other special instructions.

17.2 The nurse shall trace all catheters/administration sets/add-on devices from the patient to the point of origin before making additional connections of medications or tubing.

17.3 The process of medication and product verification shall be established in organizational policies, procedures, and/or practice guidelines.

Practice Criteria

A. The nurse should not use color coding, color differentiation, or color matching for product or medication identification. Color coding can lead users to rely on the color coding rather than ensuring a clear understanding of which tubing and catheters are connected.1,2 (V)

B. Confusing labeling should be reported to the appropriate department within the organization to allow for process improvements and reporting to the manufacturer and appropriate state and federal regulatory agencies.2 (V)

C. Unit-dose and premixed infusions are preferred to reduce compounding and labeling errors and decrease medication errors.3 (V)

D. The nurse should recheck administration set/catheter connections and trace all catheters/administration sets/add-on devices from the patient to the point of origin when a patient is transferred to a new setting and as part of the hand-off process.3,10 (IV)

E. The nurse should instruct the patient, nonclinical staff, and caregivers to obtain assistance from clinical staff whenever there is a real or perceived need to connect or disconnect devices or infusions.5 (V)

F. The nurse should route tubing having different purposes in different directions (eg, IV catheters routed toward the head; feeding tubes routed toward the feet).11 (IV)

G. The nurse should avoid writing directly on the IV bag or use a marking pen to label the IV bag. There is the possibility that certain chemical components of the inks used in marking pens may permeate the plastic sheeting and compromise the contained solution. Labeling in this manner may also lead to smearing, which would cause the labeling to be unrecognizable.1 (V)

REFERENCES


18. INFECTION PREVENTION

Standard

18.1 Infection prevention and surveillance protocols shall be in accordance with organizational policies, procedures, and/or practice guidelines and local, state, and federal rules and regulations.

18.2 The nurse shall be competent in procedures to prevent infusion- and vascular/non-vascular access device-related infections.

18.3 Standard Precautions shall be used and appropriate personal protective equipment (PPE) shall be worn during all infusion procedures that potentially expose the nurse to blood and body fluids.

18.4 Maximal sterile barrier precautions shall be required for insertion of central vascular access devices (CVADs) and all methods of central vascular catheter exchange and repair.

18.5 Appropriate hand hygiene shall be used.

18.6 Single-patient-use items shall be used whenever possible and disposed of in the appropriate container upon discontinuation of use.

18.7 Morbidity and mortality rates associated with infections shall be collected, reviewed, evaluated, and reported in compliance with state regulations as applicable.

18.8 Quality improvement and monitoring programs shall include surveillance of infection prevention practices to minimize health care-associated and community-acquired bloodstream infections (CLABIS).

18.9 The nurse shall educate the patient and caregiver about procedures and actions to prevent infection and signs and symptoms of infection to report to the health care provider.

Practice Criteria

A. Bundling of evidence-based interventions for CVAD insertion, such as hand hygiene, use of maximal sterile barrier precautions, use of chlorhexidine gluconate as a skin antiseptic, optimal selection of catheter site, and daily review of the necessity of a CVAD should be used to reduce risk of CLABSI. (II)

B. The nurse should use a checklist at the time of CVAD insertion to ensure compliance with sterile technique and protocol. The nurse should be empowered to stop the insertion procedure if any step(s) is/are not performed. (III)

C. Nurses should be involved in the organization's infusion-related infection prevention program and surveillance for CLABSI. The goal is 0% infection rate. A standard formula should be used to measure the incidence of CLABSI (as shown below). (V)

\[
\text{CLABSI Rate} = \frac{\text{Number of BSIs in patients with central lines}}{\text{Total number of central line days}} \times 1000
\]

D. Infusion-related infection surveillance data should be analyzed to serve as one component of a quality improvement plan of action, and is currently a major focus of patient safety initiatives relating to health care-associated infections. (V)

E. The nurse should reduce the manipulation of all the components of the entire infusion system (e.g., administration set junctions, catheter hub) to as few as needed to deliver the infusion therapy. (V)

F. Infusion nurses should be represented in the organization’s infection prevention program and should participate in interdisciplinary collaboration and implementation of infection prevention strategies. (V)

REFERENCES


19. HAND HYGIENE

Standard

19.1 Hand hygiene shall be a routine practice established in organizational policies, procedures, and/or practice guidelines.

19.2 Hand hygiene shall be performed before and after touching a patient; before handling an invasive device; before moving from a contaminated body site to another site; before donning and after removing gloves; and after contact with inanimate objects in the immediate vicinity of the patient.

19.3 The nurse shall not wear artificial nails when performing infusion therapy procedures.

19.4 In cases in which the nurse’s hands are visibly contaminated with blood or body fluids or hands have been exposed to spore-producing pathogens, hand hygiene with either nonantiseptic or antiseptic (preferably antiseptic-containing) liquid soap and water shall be performed.

Practice Criteria

A. Alcohol-based hand rubs are preferred for routine hand hygiene unless hands are visibly soiled.1,4 (II)

B. Chosen hand hygiene products should provide high efficiency with low potential for skin irritation. Towelettes and non-alcohol-based hand rubs should not be used for hand hygiene. Hand hygiene products should be used according to manufacturers’ directions for use.1,4 (V)

C. Proper hand hygiene should be taught to the patient and caregivers involved in care of the patient.1,4 (V)

D. Dispensers of liquid soap or antiseptic solutions are recommended. Containers should be filled, discarded, and replaced according to organizational policies, procedures, and/or practice guidelines and should be accessible at the point of care.1 (V)

E. Single-use soap scrub packets or waterless antiseptic products should be used when clean running water is not ensured or is unavailable.1 (V)

F. The nurse should be involved with hand hygiene product evaluation to assess for product feel, fragrance, and skin irritation. Nurses who have sensitivity to a particular product should be provided with an alternative. Other products for skin care such as gloves, lotions, and moisturizers should be assessed for compatibility with hand antiseptic products.5 (V)

G. Hand hygiene is a key component of a group of evidence-based interventions to promote better outcomes for patients with intravascular catheters.6 (V)

H. Artificial nails have been associated with transmission and outbreaks of infection.7,9 (IV)

REFERENCES


20. COMPOUNDING OF PARENTERAL SOLUTIONS AND MEDICATIONS

Standard

20.1 Compounding of parenteral solutions and medications shall be in accordance with state and federal regulations and the American Society of Health-System Pharmacists (ASHP) and United States Pharmacopoeia (USP) standards.

20.2 The nurse shall perform compounding under the direction of the pharmacy and shall adhere to compounding practices as defined in USP Chapter <797>, state pharmacy rules and regulations, and ASHP guidelines. The compounding environment is defined by risk category.1-3 (V, Regulatory)

20.3 A list of medications that the nurse may compound shall be developed in collaboration with or under the direction of the pharmacy and shall be congruent with standards set forth by regulatory agencies and by rules and regulations promulgated by the state’s Board of Nursing.

20.4 Procedures for compounding sterile parenteral solutions and medications shall be established in organizational policies, procedures, and/or practice guidelines.

Practice Criteria

A. Sterile preparations should be compounded in an appropriate environment as defined in USP Chapter <797>, state pharmacy rules and regulations, and ASHP guidelines. The compounding environment is defined by risk category.1-3 (V, Regulatory)

B. Immediate-use medication should be used within 1 hour of preparation or discarded.1,2,4 (V, Regulatory)

C. Whenever possible, the nurse should administer pharmacy-prepared or commercially available products.5,6 (V)

D. Access to the sterile compounding area should be limited to staff deemed competent to work in this area.1-3 (V, Regulatory)

E. The nurse should use appropriate technique to withdraw any sterile medications from glass ampoules using a 5-micron filter needle or filter straw. The filter needle/straw should be replaced with a new sterile needle after the medication is withdrawn from the ampoule, and both the top and bottom of the ampoule should be discarded in the sharps container.4,6 (V)

F. The nurse should label any multidose vials that are used with the date opened, and the vials should be stored according to manufacturers’ directions for use. Multidose vials should be used for single patients only; use of commercially pre-

pared sterile product, such as prefilled syringes or pharmacy-filled syringes, is strongly preferred when available. The vial must be discarded after the beyond-use date (BUD).4,5 (V)

G. The nurse should cleanse the tops of multidose vials and the neck of glass ampoules with 70% alcohol before inserting the needle or breaking the ampoule.4,6 (V)

H. Cleaning procedures should be established to disinfect and remove pyrogenic and endotoxic ingredients from work surfaces.1,2 (Regulatory)

I. Quality-control logs should be maintained to document all cleaning and calibration procedures according to state and federal regulations, manufacturers’ directions for use, and ASHP and USP standards and practice recommendations.1,3 (V, Regulatory)

J. Materials placed in the compounding area should be limited to those essential for preparing the solutions or medications.1-3 (V, Regulatory)

REFERENCES


Practice Criteria

A. Sterile, disposable scissors should be used for suture removal and catheter repair; nondisposable scissors have been found to harbor bacteria and may potentially contribute to transmission of microorganisms.1-3 (IV)

B. Patient injuries and catheter damage related to the use of scissors in the vicinity of the catheter and dressing have been reported.3,4 (V)

C. The use of scissors to alter the length of peripherally inserted central catheters (PICCs) was found to result in rough, irregular surfaces and should be avoided. The manufacturer’s directions for use for altering the device length should be followed if the device requires trimming.5,6 (IV)

REFERENCES


22. SAFE HANDLING AND DISPOSAL OF SHARPS, HAZARDOUS MATERIALS, AND HAZARDOUS WASTE

Standard

22.1 All blood-contaminated sharp items, including, but not limited to, needles or stylets, surgical blades, and syringes, shall be discarded in a nonpermeable, puncture-resistant, tamper-proof biohazard container.

22.2 Sharps shall not be recap, broken, or bent without use of a mechanical device or a one-handed technique.

22.3 All biohazardous materials, wastes, and drugs shall be discarded in the appropriate containers and disposed of according to local, state, and federal regulations.

22.4 Sharps disposal containers shall be replaced before they are full to avoid disposal-related injuries.

22.5 Devices that provide built-in safety controls shall be activated during use and remain protective during disposal.

22.6 Manufacturers’ directions for use, standards of practice, and state and federal regulations shall be adhered to when developing organizational policies, procedures, and/or practice guidelines pertaining to the safe handling of hazardous materials and hazardous waste.

22.7 Protocols for safe handling of hazardous materials and hazardous waste shall be established in organizational policies, procedures, and/or practice guidelines.

22.8 Exposure to potentially infectious materials or injury from sharps should be identified, tracked, and analyzed for trends per the organizational exposure control plan and in accordance with the Occupational Safety and Health Administration (OSHA) bloodborne pathogen standard.

Practice Criteria

A. Device components should be discarded as a single unit after use.1-4 (V)

B. Primary prevention measures to reduce exposure to hazardous materials should include, but not be limited to, the use of biological safety cabinets and personal protective equipment (PPE—mask, gown, cap, drapes, gloves, and protective eyewear).1,2,5 (V)

C. All sharps should be accounted for before, during, and immediately upon completion of a procedure.1,3,6 (V)

D. Nurses should be trained in the use of engineered sharps safety mechanisms and how to properly engage the safety mechanism.1,3,7 (V)

E. The nurse should be involved in the multidisciplinary team to develop, implement, and evaluate a plan to reduce needlestick injury.7,8 (Regulatory)

F. The nurse should advocate for passive safety-engineered devices for needlestick injury prevention.7,9 (V)

REFERENCES

23. DISINFECTION OF DURABLE MEDICAL EQUIPMENT

Standard

23.1 Durable medical equipment (DME) shall be cleaned to remove foreign material, followed by disinfection to eliminate microorganisms after each patient use.
23.2 Cleaning and disinfection of DME shall be established in organizational policies, procedures, and/or practice guidelines.
23.3 Disinfection solutions shall be used in accordance with equipment and manufacturers’ directions for use to prevent damage or alteration to the function or performance of the equipment.
23.4 All cleaning solutions shall be cleared by the US Food and Drug Administration (FDA) and registered with the Environmental Protection Agency (EPA).

Practice Criteria

A. To prevent cross-contamination and transmission of infectious agents, cleaning and disinfection should be performed prior to new patient use and at established intervals during long-term single-patient use.1-3 (I)
B. DME requiring cleaning and disinfection should include, but not be limited to, poles, flow-control devices, ultrasound or infrared devices, and other nondisposable infusion-related equipment.1-3 (II)
C. Primary prevention measures to reduce exposure to disinfection solutions containing glutaraldehyde, ortho-phthaldehyde, and other hazardous chemicals should include engineering controls, administrative controls, and personal protective equipment (PPE).1-3 (II)
D. DME removed from the home care setting should be cleaned and disinfected before transporting to an appropriate site for terminal cleaning and disinfection.1-4 (V)

REFERENCES


24. TRANSMISSION-BASED PRECAUTIONS

Standard

24.1 Transmission-based precautions shall be used to prevent transmission of infectious agents in health care settings when the route(s) of transmission is/are not interrupted using Standard Precautions alone.
24.2 The use of transmission-based precautions shall be established in organizational policies, procedures, and/or practice guidelines.

Practice Criteria

A. Transmission-based precautions are implemented when strategies beyond Standard Precautions are required to reduce the risk for transmission of infectious agents (see Standard 18, Infection Prevention).1 (II)
B. Transmission-based precautions are implemented for patients with suspected or documented infection or colonization with highly transmissible or epidemiologically important pathogens for which additional precautions are required to prevent disease transmission.1 (II)
C. Contact precautions are implemented to prevent transmission of infectious agents, including multidrug-resistant organisms, which are spread by direct or indirect contact with the patient or the environment, including when there are excessive bodily discharges such as wound drainage.1,2 (II)
D. Droplet precautions are implemented to prevent transmission of pathogens spread through close respiratory or mucous membrane contact with respiratory secretions.1 (II)
E. Airborne precautions are implemented to prevent transmission of infectious agents that remain infectious when suspended in the air over long distances.1 (II)
F. Guidelines for transmission-based precautions should be adapted and applied as appropriate for non–acute care settings, including long-term care facilities, the home care setting, and other workplaces where infusion therapy is provided.1 (V)
In ambulatory and home care settings, Standard Precautions are followed for patients with multidrug-resistant organisms (MDROs).\(^2,3\) (V)

In home care settings for patients with MDROs, reusable patient care equipment should be limited and left in the home until discharged, and disinfected before removing from the home in a container (e.g., plastic bag) or transported to an appropriate site for cleaning and disinfection.\(^1,3\) (V)

**REFERENCES**


### 25. LATEX SENSITIVITY OR ALLERGY

**Standard**

25.1 Exposure to latex in the health care environment shall be minimized.

25.2 Latex-free personal protective equipment (PPE) shall be provided to latex-sensitive or latex-allergic individuals.

25.3 Latex-free supplies and equipment shall be used with patients at risk for latent sensitization and those with known latex allergy.

**Practice Criteria**

A. The nurse should review the label on medical devices for the presence of latex, which is a component of product labeling required by the US Food and Drug Administration (FDA).\(^2,3\) (V)

B. Powdered gloves made of natural rubber latex should be eliminated from the health care environment as they are associated with the greatest risk of sensitization and subsequent allergic reactions in individuals. Low-protein, powder-free latex gloves, or gloves made of nonlatex materials, such as neoprene or polyisoprene, will reduce exposure.\(^4,6\) (IV)

C. The nurse should assess all patients for history of asthma, environmental allergens, medications, and food allergies. Allergies that may create cross-reactions with latex include, but are not limited to, avocados, mangoes, pears, bananas, citrus fruits, chestnuts, and other tropical foods.\(^7,9\) (II)

D. The nurse should have knowledge of evolving guidelines about preventing allergic reactions from the Centers for Disease Control and Prevention (CDC) and the Occupational Safety and Health Administration (OSHA).\(^5,9,10\) (Regulatory)

E. Staff and patient education programs should be developed to aid in risk reduction.\(^7,9,11\) (IV)

F. Latex allergy in patients should be documented in the patient’s permanent medical record with adequate patient education about avoiding future exposure and management of an anaphylactic reaction.\(^7,9\) (IV)

G. Latex allergy in health care workers and patients should be reported to the appropriate departments within the organization per organizational policies, procedures, and/or practice guidelines. Latex allergy in health care workers should be recorded and reported according to OSHA requirements.\(^5,9,12\) (IV, Regulatory)

**REFERENCES**


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, needless 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.²,³,⁴ (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.⁵,⁶ (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.¹ (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.3-5 (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 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.2-4,6,10,14-18,20,21,27-36 (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.3,5,9,12,13,15-17,19,22-25,27,29,31,32,37-41 (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


28. FILTERS

**Standard**

28.1 The use of bacteria- and particulate-retentive, air-eliminating, and blood and blood component filters

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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.2 (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.6,8 (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.12-14,16 (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).13,17(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.\textsuperscript{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.\textsuperscript{1,2} (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.\textsuperscript{1,4,5} (V)

C. Nurses should use blood and fluid warmers equipped with warming systems, including an audible alarm and visual temperature gauges.\textsuperscript{5,6} (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.\textsuperscript{5,11} (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.8,11,13 (V)

### REFERENCES


Vascular Access Device Selection and Placement

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 (ie, 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, infusates with pH less than 5 or greater than 9, and infusates 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)

Practice Criteria

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.8,10,16,25,26 (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, infusates with pH less than 5 or greater than 9, and infusates 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) \( \text{[S38]} \), \( \text{[5,10,20,27]} \) \( \text{(V)} \)

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 \( \text{[3,9,10,12-14,16,25,28]} \) \( \text{(V)} \)

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 \( \text{[6,10,13,29]} \) \( \text{(V)} \)

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 \( \text{[6,20,30]} \) \( \text{(V)} \)

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 \( \text{[6,10,13,16,31-34]} \) \( \text{(V)} \)

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 \( \text{[1,29,32,33-51]} \) \( \text{(I)} \)

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 \( \text{[6,10,52-57]} \) \( \text{(II)} \)

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 \( \text{[34,55-60]} \) \( \text{(IV)} \)

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”) \( \text{(V)} \)

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”) \( \text{(V)} \)

**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 \( \text{[28]} \) \( \text{(V)} \)

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 \( \text{[61-64]} \) \( \text{(I)} \)

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

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 \( \text{[61-65]} \) \( \text{(I)} \)

**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 vasculature 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 vasculature 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.\(^1,5\) (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 hand 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.\(^3,8,9,12\) (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.\(^1,3\) (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.”\(^2,3,6,12\) (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.\(^3,8,9,11\) (V)

D. 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)

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

#### 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 extremities.\(^13,15\) (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.\(^3,8,11\) (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.1,3,12,17,18 (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.21 (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

#### Standard

34.1 Local anesthesia shall be considered based upon nursing assessment of patient condition, needs, risks, and benefits. 34.2 When local anesthesia is ordered or necessary, the agent and method that is least invasive and carries the least risk for allergic reaction or infection shall be considered first. 34.3 The nurse shall be competent to administer local anesthesia for vascular access device (VAD) placement and access. 34.4 Use of local anesthesia shall be established in organizational policies, procedures, and/or practice guidelines, and in accordance with the rules and regulations promulgated by the state’s Board of Nursing.

#### 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


35. VASCULAR ACCESS SITE PREPARATION AND DEVICE PLACEMENT

Standard

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.

35.2 VAD placement shall be established in organizational policies, procedures, and/or practice guidelines and according to manufacturers’ directions for use.

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.

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

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).

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

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

35.8 Tip location of a CVAD shall be determined radiographically or by other approved technologies prior to initiation of infusion therapy.

Practice Criteria

I. General

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).1 (V)

B. If the intended insertion site is visibly soiled, clean the area with soap and water prior to application of antiseptic solution(s).2,3 (V)

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.4 (V)

D. The nurse should inspect the VAD for product integrity prior to insertion.5 (V)

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.6-8 (V)

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.4 (V)

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.9-11 (I)

H. The nurse should consider using visualization technologies that aid in vein identification and selection.12,13 (V)

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).14 (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.4-12-15 (II)

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.16 (V)

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.\(^3\),\(^17\)-\(^39\) (V)

E. The midline catheter tip location should be at or below the axillary line.\(^3\),\(^17\)-\(^39\) (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.\(^9\),\(^20\),\(^21\) (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.\(^8\),\(^35\),\(^36\) (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.\(^37\),\(^38\) (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.\(^39\) (II)

B. Maximal sterile barrier precautions should be used when placing arterial catheters in the axillary or femoral artery.\(^39\) (II)

**REFERENCES**


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 dislodgment and loss of access.

36.2 VADs shall be stabilized using a method that does not interfere with elevation of the access device 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 the use of tape with PICCs in pediatric patients in a randomized, controlled trial that excluded use of stabilization devices.1-6 (III)

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.5-11 (III)
C. 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.5,10,13 (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.16 (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.13 (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.3-5 (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.3-9 (V, Regulatory)

E. The immobilization device should be removed as soon as the patient’s condition allows.2,7,8-11 (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 reaplication 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.1,2 (V)

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).1-6 (V)

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.7-9 (V)

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.8 (V)

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).8 (V)

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.7,8 (V)

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).8 (V)
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.5,12 (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.5,13 (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 collaboratively by the nurse, physician responsible for care, and the patient/caregiver. General order for vascular access preference is fistula, arteriovenous graft, and long-term VAD.1,4 (V)

B. The nurse should be knowledgeable about vein-preservation techniques for patients who are likely to need vascular access for hemodialysis.1,3,5 (V)

C. The nurse should wear sterile gloves and mask when performing dressing changes for hemodialysis VADs, including AV fistulas and grafts.1,6 (V)
D. Povidone-iodine antiseptic ointment or bacitracin/neomycin/polymyxin 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.2 (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).1-3 (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**


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 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 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 shall 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 multi-lumen apheresis central catheter should allow for repeated apheresis procedures and provide a multipurpose approach to accommodate long-term infusion needs and supportive care.4,6,8 (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.9-15 (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; photosensitization, and citrate toxicity.1,3,12,14,15 (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.1,2 (V)

REFERENCES


43. ADMINISTRATION SET CHANGE

Standard

43.1 Administration set changes shall be performed routinely, based on factors such as type of solution administered, type of the infusion (continuous versus intermittent), immediately upon suspected contamination, or when the integrity of the product or system has been compromised.

43.2 The administration set shall be changed whenever the peripheral catheter site is rotated or when a new central vascular access device is placed.

43.3 Add-on devices used as part of the administration set, such as single- and multilumen extension sets and filters, shall be changed at the same time as the administration set.

43.4 The frequency of performing administration set changes and the system used to promote adherence to administration set change (eg, labeling/electronic) shall be established in organizational policies, procedures, and/or practice guidelines.

43.5 A vented administration set shall be used for solutions supplied in glass or semi-rigid containers, and a nonvented administration set shall be used for plastic fluid containers.

43.6 All administration sets shall be of luer-lock design to ensure a secure junction.

Practice Criteria

I. General

A. The use of add-on devices for administration sets should be minimized as each device is a potential source of contamination, misuse, and disconnection; it is preferable to use an administration set with devices as an integral part of the set (see Standard 26, Add-on Devices).1 (V)

Practice Criteria

II. Primary and Secondary Continuous Infusions

A. Primary and secondary continuous administration sets used to administer fluids other than lipid, blood, or blood products should be changed no more frequently than every 96 hours. There is strong evidence that changing the administration sets more frequently does not decrease the risk of infection.2,3 (I)

B. Extending the administration set change to every 7 days may be considered when an anti-infective central vascular access device (CVAD) is being used or if fluids that enhance microbial growth are not administered through the set.3,4 (II)

C. If a secondary administration set is detached from the primary administration set, the secondary administration set is considered a primary intermittent administration set and should be changed every 24 hours (see Practice Criteria III, Primary Intermittent Infusions).1 (V)

D. When compatibility of infusates is verified, use of secondary administration sets that use back-priming infusion methods are preferred due to reduced need for disconnecting secondary intermittent administration sets.1 (V)

Practice Criteria

III. Primary Intermittent Infusions

A. Primary intermittent administration sets should be changed every 24 hours. When an intermittent infusion is repeatedly disconnected and reconnected for the infusion, there is increased risk of contamination at the catheter hub, needleless connector, and the male luer end of the administration set, potentially increasing risk for catheter-related bloodstream infection. There is an absence of studies addressing administration set changes for intermittent infusions. In a meta-analysis of 12 randomized, controlled trials that supported increasing the time interval for administration set changes to 96 hours, at least 2 of the studies excluded administration sets used for heparin-locked catheters and in sets disconnected for more than 4 hours. In several others, exclusions were not stated.1,5 (V)

B. A new, sterile, compatible covering device should be aseptically attached to the end of the administration set after each intermittent use. The practice
of attaching the exposed end of the administration set to a port on the same set (“looping”) should be avoided.1,5 (V)

Practice Criteria

IV. Parenteral Nutrition

A. Administration sets used for nonlipid-containing parenteral nutrition (PN) solutions should be routinely changed no more often than every 96 hours.2,6 (I)
B. Administration sets used for total nutrient admixtures (TNA) containing intravenous fat emulsions (IVFE) with the amino acid and dextrose solution should be routinely changed every 24 hours.2,6 (III)
C. When primary administration sets used for PN are exposed to IVFE, consideration should be made to changing the administration set every 24 hours. Limited evidence suggests an increased risk for infection when duration of administration sets is extended beyond 24 hours.7 (III)

Practice Criteria

V. Intravenous Fat Emulsions (IVFE) and Other Lipid Product Infusions

A. When units of IVFE are administered intermittently, the administration set should be changed with each new container; the characteristics of IVFE (iso-osmotic, near neutral-alkaline pH, and containing glycerol) are conducive to the growth of microorganisms.6,8 (III)
B. When units of IVFE are administered consecutively, the administration set should be routinely changed every 24 hours.8 (III)
C. A dedicated administration set should be used to administer propofol infusions and should be replaced every 12 hours, when the vial is changed, and according to the manufacturer’s directions for use.8 (Regulatory)
D. Administration sets used to administer lipid-based infusates, such as IVFE or TNA, should be free of diethylhexyl-phthalate (DEHP). DEHP is lipophilic and is extracted into the lipid solution with commonly used polyvinyl chloride administration sets and containers. DEHP is considered a toxin, and studies have demonstrated increased DEHP levels in lipid solutions, which is especially a risk with neonatal, pediatric, and long-term home care patients.5,6,9-13 (IV)

Practice Criteria

VI. Blood and Blood Components

A. Administration sets used for blood and blood components should be specific to blood transfusion and include a filter; the administration sets should be replaced every 4 hours (see Standard 28, Filters).14 (IV)

Practice Criteria

VII. Hemodynamic and Arterial Pressure Monitoring

A. The disposable or reusable transducer and/or dome and other components of the system, including the administration set, continuous flush device, and flush solution used for invasive hemodynamic pressure monitoring, are considered a closed system and should be changed every 96 hours, immediately upon suspected contamination, or when the integrity of the product or system has been compromised. The number of manipulations and entries into the system should be minimized.15 (III)

REFERENCES


44. VASCULAR ACCESS DEVICE REMOVAL

Standard

44.1 Removal of a vascular access device (VAD) shall be performed upon the order of the licensed independent practitioner (LIP), in accordance with the rules and regulations as promulgated by the state’s Board of Nursing, organizational policies, procedures, and/or practice guidelines, or immediately upon suspected contamination or complication.

44.2 The nurse shall be competent in the process of VAD removal, including identification of potential complications, and appropriate nursing interventions and/or emergency measures as needed, and patient and caregiver education.

44.3 VADs shall be removed upon unresolved complication, therapy discontinuation, or if deemed unnecessary.

44.4 VADs placed in an emergency situation shall be replaced as soon as possible and not later than 48 hours.

44.5 The frequency of short peripheral catheter removal for the purpose of site rotation shall be established in organizational policies, procedures, and/or practice guidelines.

44.6 Removal of an implanted port shall be considered a surgical procedure and shall be performed by an 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.

Practice Criteria

I. Short Peripheral Catheters

A. The nurse should consider replacement of the short peripheral catheter when clinically indicated and when infusion treatment does not include peripheral parenteral nutrition. The decision to replace the short peripheral catheter should be based on assessment of the patient’s condition; access site; skin and vein integrity; length and type of prescribed therapy; venue of care; integrity and patency of VAD; dressing; and stabilization device.1,10 (I)

B. The nurse should not routinely replace short peripheral catheters in pediatric patients.1,12 (IV)

C. Caution should be used in the removal of a short peripheral catheter. Digital pressure should be applied until hemostasis is achieved, and a dressing should be applied to the access site.1 (V)

D. With any patient reports of discomfort or pain related to the short peripheral catheter, the catheter should be removed. The LIP should be notified if unable to restart the short peripheral catheter or a delay in medication administration occurs.1,12 (V)

E. If a catheter-related bloodstream infection (CR-BSI) is suspected, consideration should be given to culturing the catheter after removal (see Standard 49, Infection).2,12 (V)

F. If a vesicant medication has extravasated, treatment should be determined prior to catheter removal. The nurse should aspirate the remaining drug from the catheter prior to removal (see Standard 48, Infiltration and Extravasation).2,13 (V)

II. Midline Catheters

A. The midline catheter is indicated for those peripheral infusion therapies prescribed for a duration of 1-4 weeks. For therapies requiring catheter dwell times greater than 4 weeks, extension of catheter dwell should be based on the professional judgment of the nurse after consideration of the following factors including, but not limited to, length and type of therapy remaining, peripheral vascular status, condition of the vein in which the catheter is indwelling, skin integrity, and patient condition.2,14 (V)

B. Removal of a midline catheter should be determined by patient condition, completion or change of therapy administered, presence of infectious or inflammatory process, catheter malposition, or catheter dysfunction. Midline catheters should be removed if the tip location is no longer appropriate for the prescribed therapy.1,2,12 (V)

C. Caution should be used in the removal of a midline catheter. Digital pressure should be applied until hemostasis is achieved, and a petroleum-based ointment and a sterile dressing should be applied to the access site to seal the skin-to-vein tract and decrease risk of air embolus.1 (V)

D. If a catheter-related complication is suspected, an assessment of the patient and catheter should...
occur. If unable to resolve the complication, or the complication warrants removal, after collaboration with the health care team, the midline catheter should be removed.1 (V)
E. With any patient reports of discomfort or pain related to the midline catheter, the patient and catheter should be assessed and appropriate interventions performed. The LIP should be notified. When interventions are unsuccessful, the catheter should be removed.1,2,12 (V)

Practice Criteria

III. Nontunneled Central Vascular Access Devices (CVADs)*

A. Daily assessment of CVAD need and removal when no longer needed are components of the central line bundle known to decrease risk of infection. The maximum dwell time of a nontunneled CVAD is unknown; ongoing and daily monitoring of the device necessity should be performed.12,15-17 (II)
B. Removal of a nontunneled CVAD should be determined by patient condition, completion of therapy, presence of infectious or inflammatory process, catheter malposition, or catheter dysfunction.12,17 (V)
C. The decision to remove or salvage a catheter due to suspected or confirmed catheter-related bloodstream infection (CR-BSI) should be based on blood culture results, specific type of cultured organism, patient’s current condition, available vascular access sites, effectiveness of antimicrobial therapy, and LIP direction (see Standard 49, Infection).1,2 (V)
D. The CVAD should be removed after patient assessment and in collaboration with the health care team if a catheter-related complication is suspected and interventions are unsuccessful.17 (V)
E. A CVAD with a malpositioned catheter tip location that cannot be repositioned to a central vein should be removed.17 (V)
F. Caution should be used in the removal of a nontunneled CVAD, including precautions to prevent air embolism. Digital pressure should be applied until hemostasis is achieved by using manual compression and/or other adjunct approaches such as hemostatic pads, patches, or powders that are designed to potentiate clot formation. The nurse should apply petroleum-based ointment and a sterile dressing to the access site to seal the skin-to-vein tract and decrease the risk of air embolus. When removing the CVAD, the nurse should position the patient so that the CVAD insertion site is at or below the level of the heart to reduce the risk of air embolus (see Standard 50, Air Embolism).17-22 (IV)
G. If resistance is encountered when the catheter is being removed, the catheter should not be forcibly removed, and the LIP should be notified and discussion should occur related to initiating appropriate interventions for successful removal.23,24 (V)
H. With any patient reports of discomfort or pain related to the CVAD, the patient and CVAD should be assessed, appropriate interventions performed, and the LIP notified. When interventions are unsuccessful, the CVAD should be removed.17-18 (V)
I. Coagulation studies, such as the International Normalized Ratio (INR), are not routinely necessary for the removal of a CVAD.25 (IV)

Practice Criteria

IV. Surgically Placed CVADs: Tunneled/Implanted Ports

A. The maximum dwell time of a surgically placed CVAD is unknown; ongoing and frequent monitoring of the access site should be done as well as ongoing assessment of need. When no longer necessary, the surgically placed CVAD should be removed.17 (V)
B. The decision to remove or salvage a CVAD due to suspected or confirmed CR-BSI should be based on blood culture results, specific type of cultured organism, patient’s current condition, available vascular access sites, effectiveness of antimicrobial therapy, and LIP direction (see Standard 49, Infection).1,13 (V)
C. If a catheter-related complication occurs (eg, cuff exposure, dislodgment, infection) and interventions are unsuccessful, the catheter should be removed after patient assessment and in collaboration with the health care team.2,11-13 (V)
D. If resistance is encountered when the tunneled CVAD is being removed, the device should not be forcibly removed, and further collaboration with the health care team should occur.17,21,26 (IV)
E. After removal, the nurse should continue to monitor the site, implement interventions as necessary, provide patient education, and document observations and actions in the patient’s permanent medical record.17,18 (V)
F. Coagulation studies, such as the International Normalized Ratio (INR), are not routinely necessary for the removal of a tunneled catheter or implanted port.25 (IV)

Practice Criteria

V. Arterial Catheters

A. Arterial catheters should not be routinely removed or replaced.27 (V)

*Includes PICCs.
B. When a peripheral arterial catheter is removed, digital pressure should be applied until hemostasis is achieved by using manual compression and/or other adjunct approaches such as hemostatic pads, patches, or powders that are designed to potentiate clot formation. A sterile dressing should be applied to the access site. Prolonged digital pressure and adjunct hemostatic approaches may need to be applied in patients with coagulation abnormalities or femoral arterial catheters.2,20-22 (IV)

C. The nurse should assess and document the circulatory status distal to the area of cannulation after removal of the peripheral arterial catheter.2 (V)

REFERENCES


45. FLUSHING AND LOCKING

Standard

45.1 Vascular access devices shall be flushed prior to each infusion as part of the steps to assess catheter function.

45.2 Vascular access devices shall be flushed after each infusion to clear the infused medication from the catheter lumen, preventing contact between incompatible medications.

45.3 Vascular access devices shall be locked after completion of the final flush solution to decrease the risk of occlusion.

45.4 Flushing and locking of all vascular access devices shall be established in organizational policies, procedures,
and/or practice guidelines and in accordance with manufacturers’ directions for use.

### Practice Criteria

A. Single-use systems include single-dose vials and prefilled syringes and are the preferred choices for flushing and locking. If multiple-dose containers must be used, each container should be dedicated to a single patient.13 (IV)

B. Flushing is accomplished with preservative-free 0.9% sodium chloride (USP). When the medication is incompatible with preservative-free 0.9% sodium chloride (USP), 5% dextrose in water should be used and followed by flushing with preservative-free 0.9% sodium chloride (USP) and/or heparin lock solution. Dextrose should be flushed from the catheter lumen because it can provide nutrients for biofilm growth.4 (IV)

C. Bacteriostatic 0.9% sodium chloride contains benzyl alcohol as the preservative. The maximum volume that can be tolerated by adult and pediatric patients is undetermined; however, one study suggests that this should not exceed 30 mL in a 24-hour period for adults.12 (IV)

D. The minimum volume of preservative-free 0.9% sodium chloride (USP) for catheter flushing depends upon the type and size of catheter, age of the patient, and type of infusion therapy being given. A minimum volume of twice the internal volume of the catheter system is recommended; however, a larger volume may be needed for blood sampling or blood transfusion procedures.15 (V)

E. The nurse should aspirate the catheter for blood return as a component of assessing catheter function prior to administration of medications and solutions (see Standard 61, Parenteral Medication and Solution Administration) 64 (V)

F. Due to varying degrees of physiologic maturity for drug metabolism and excretion in the neonate, solutions used for flushing and/or locking catheters should not contain the preservative benzyl alcohol.5,78 (IV)

G. If resistance is met and/or no blood return noted, the nurse should take further steps to assess patency of the catheter prior to administration of medications and solutions. The catheter should not be forcibly flushed (see Standard 56, Catheter Clearance) 36 (V)

H. To prevent catheter damage, the size of the syringe used for flushing and locking should be in accordance with the catheter manufacturer’s directions for use. Patency is assessed with a minimum 10-mL syringe filled with preservative-free 0.9% sodium chloride (USP). Flush syringes holding a smaller volume and/or designed to generate lower amounts of pressure may also be used to assess patency.

Administration of small quantities of medication should be given in a syringe appropriately sized for the dose required following confirmation of catheter lumen patency.12-14 (V)

I. Prefilled syringes filled with preservative-free 0.9% sodium chloride (USP) should not be used for dilution of medications. Due to risk of serious medication errors, syringe-to-syringe drug transfer is not recommended.12-15 (V)

J. Short peripheral catheters should be locked with preservative-free 0.9% sodium chloride (USP) following each catheter use in adults and children.15-17 (I)

K. No specific recommendation can be made about the use of heparin lock solution or preservative-free 0.9% sodium chloride (USP) for locking short peripheral catheters in neonatal patients. Data are inconsistent and inadequate to make specific recommendations.18-21 (V)

L. The nurse should assess for contraindications for the use of heparin lock solution including, but not limited to, presence or risk for heparin-induced thrombocytopenia, heparin’s impact on laboratory studies drawn from the catheter, and systemic anticoagulation. Heparin-induced thrombocytopenia (HIT) has been reported with the use of heparin flush solutions, although the exact rates are unknown. All patients should be monitored closely for signs and symptoms of HIT. If present or suspected, heparin and all sources of heparin (ie, heparin-coated catheters) should be discontinued.22-30 (IV)

M. For postoperative patients receiving heparin lock solutions of any concentration, monitoring platelet counts for heparin-induced thrombocytopenia (HIT) is recommended every 2 to 3 days from day 4 through day 14 or until the heparin is stopped. For medical patients receiving heparin lock solutions, routine platelet count monitoring is not recommended.31 (II)

N. The use of preservative-free 0.9% sodium chloride (USP) for locking catheters with an integral pressure-sensitive valve system is recommended by manufacturers’ directions for use, although the continued use of heparin lock solution has also been suggested. There are multiple designs of these valves located on the internal catheter tip and the external catheter hub. Available data are inconclusive and conflicting.32-38 (II)

O. While many studies report equivalent outcomes in central vascular access catheters when locked with heparin lock solution or preservative-free 0.9% sodium chloride (USP), others have reported greater complications with saline locking. Due to the risk and costs associated with central vascular access device (CVAD) insertion, heparin lock solution 10 units/mL is the preferred lock solution after each intermittent use.26,39-44 (III)
P. Before removal of an access needle from an implanted port and/or for periodic access and flushing, the device should be locked with a heparin lock solution 100 units/mL.\(^3\),\(^4\) (\(V\))

Q. Catheters used for hemodialysis should be locked with a heparin lock solution 1000 units/mL after each use.\(^3\),\(^4\) (\(IV\))

R. Catheters used for apheresis procedures are large-bore catheters and require rapid flow rates; the procedure has an impact on coagulation factors. The flushing and locking procedures for these catheters should follow the same practices as hemodialysis catheters.\(^7\),\(^8\) (\(V\))

S. Patency of arterial catheters used for hemodynamic monitoring is greater when heparin solution is infused, although existing studies are inconclusive due to variations in the catheter's location (peripheral versus pulmonary), duration of catheter use, and differences in patency measurement. The decision to use preservative-free 0.9% sodium chloride (USP) instead of heparin infusion should be based on the clinical risk of catheter occlusion, the anticipated length of time the arterial catheter will be required, and patient factors such as heparin sensitivities.\(^9\),\(^10\) (\(II\))

T. Concentrations of heparin less than or equal to 1 unit/mL should be used as an infusion in umbilical arterial catheters in neonates; however, heparinized flush or locking solution is not effective.\(^10\) (\(II\))

U. Positive fluid displacement within the lumen of the catheter should be maintained to prevent reflux of blood upon luer disconnection. This is accomplished with either a flushing technique or a needleless connector designed to overcome blood reflux.\(^11\),\(^12\) (\(V\))

V. Alternative locking solutions may be considered in patients with HIT including, but not limited to, ethanol, sodium citrate, taurodilone, ethylenediamine-tetraacetate (EDTA), or combinations of these solutions. These solutions are not commercially available in single-use containers and do not have a labeled indication for maintaining catheter patency. These locking solutions should be obtained from a compounding pharmacy.\(^13\),\(^14\) (\(II\))

W. Antibiotic lock solution may be used for salvage of an infected long-term CVAD in the absence of a tunnel or port-pocket infection. High concentrations of vancomycin, ceftazidime, cefazolin, ciprofloxacin, gentamicin, and ampicillin have been reported to be effective when used in conjunction with systemic antibiotics. Drug precipitation is possible when heparin is added to these lock solutions. The length of dwell time for the lock solution and the duration of treatment depends on the need to use the catheter for infusion and the clinical response. Use of antibiotic lock solution is not recommended as a routine prophylactic measure due to the possibility of development of resistant strains of microorganisms and adverse reactions to the high concentration of lock solution. Prophylactic use may be considered in patients with a history of catheter-related bloodstream infections or those with other risk factors such as a prosthetic heart valve.\(^15\),\(^16\) (\(I\))

REFERENCES


46. VASCULAR ACCESS DEVICE SITE CARE AND DRESSING CHANGES

Standard

46.1 Vascular access device (VAD) site care and dressing changes, including frequency of procedure and type of antisepctic and dressing, shall be established in organizational policies, procedures, and/or practice guidelines.

46.2 The nurse shall be competent in performing VAD site care and dressing changes.

46.3 VAD site care and dressing changes shall be performed at established intervals and immediately if the dressing integrity becomes compromised, if moisture, drainage, or blood is present, or if signs and symptoms of site infection are present.

46.4 A sterile dressing shall be applied and maintained on VADs.

Practice Criteria

A. Routine site care and dressing changes are not performed on short peripheral catheters unless the dressing is soiled or no longer intact. (V)

B. Central vascular access device (CVAD) site care and dressing changes should include the following: removal of the existing dressing, cleansing of the catheter-skin junction with appropriate antiseptic solution(s), replacement of the stabilization device if used, and application of a sterile dressing (see Standard 36, Vascular Access Device Stabilization). (V)

C. Chlorhexidine solution is preferred for skin antisepsis as part of VAD site care. 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. (V)

D. For infants under 2 months of age or pediatric patients with compromised skin integrity, dried povidone-iodine should be removed with normal saline wipes or sterile water. (V)

E. CVAD site care frequency is based on the type of dressing; transparent semipermeable (TSM) dressings should be changed every 5-7 days, and gauze dressings should be changed every 2 days. While the evidence does not support one type of dressing site, it is not considered a gauze dressing.

F. Placement of a gauze dressing under a transparent dressing should be considered a gauze dressing and changed every 2 days. If gauze is used to support the wings of a noncoring needle in an implanted port and does not obscure the insertion site, it is not considered a gauze dressing. (V)

G. The use of a chlorhexidine-impregnated dressing with short-term CVADs should be considered in patients older than 2 months of age as an additional catheter-related bloodstream infection (CR-BSI) prevention measure. (I)

H. With a well-healed tunneled CVAD, consideration may be given to no dressing. (III)

I. The catheter-skin junction site should be visually inspected or palpated daily for tenderness through
the intact dressing; for patients receiving outpatient or home care, the patient should be instructed to check the VAD site and dressing every day for signs of infection and to report such changes or dressing dislodgment immediately to the health care provider.1,3 (V)

J. Gauze, bandages, or any dressing material that may obstruct visualization of the catheter-skin junction and/or constrict the extremity should not be used (see Standard 38, Site Protection).1,4 (V)

K. The dressing should be labeled with the following information: date, time, and initials of the nurse performing the dressing change.1,3,4 (V)

L. Sterile gloves should be worn when performing CVAD site care. The use of a mask during access is often recommended; however, it remains an unresolved issue due to lack of research.2,3,15,16 (IV)

REFERENCES


47. PHLEBITIS

Standard

47.1 The assessment and treatment of phlebitis shall be established in organizational policies, procedures, and/or practice guidelines.

47.2 The nurse shall assess the vascular access site for phlebitis; determine the need for and type of intervention; educate the patient and/or caregiver about phlebitis, the intervention, and any follow-up; and assess patient response to treatment.

47.3 The nurse shall document in the patient’s permanent medical record the signs and symptoms of phlebitis using a standardized scale, interventions implemented, and patient response to treatment.

Practice Criteria

A. The nurse should routinely assess all vascular access sites for signs and symptoms of phlebitis based on patient population, type of therapy, type of device, and risk factors. Signs and symptoms of phlebitis include pain, tenderness, erythema, warmth, swelling, induration, purulence, or palpable venous cord; the number or severity of signs and symptoms that indicate phlebitis differ among published clinicians and researchers.1-9 (IV)

B. If phlebitis occurs, the nurse should:
   1. Assess the vascular access site for signs, symptoms, and severity of phlebitis using a standardized scale.6,8,9 (V)
   2. Determine the possible etiology of the phlebitis—chemical, mechanical, bacterial, or postinfusion—and implement appropriate interventions for midline and peripherally inserted central catheters. Remove the short peripheral catheter (see Standard 44, Vascular Access Device Removal).1,6,10-15 (V)
   3. Assess and document patient response to intervention(s).5,8 (V)
   4. When the vascular access device (VAD) is removed, consider the need to collaborate with the licensed independent practitioner (LIP) regarding the need for continued or alternative vascular access.6,13,16 (V)

C. When any VAD is removed, the nurse should monitor the vascular access site for 48 hours to detect postinfusion phlebitis; or upon discharge, the patient and/or caregiver should be given instructions about signs and symptoms of phlebitis and the person to contact if this occurs.6 (V)

D. The nurse should use a standardized phlebitis scale that is valid, reliable, and clinically feasible. Two phlebitis scales have demonstrated validity and reliability and have been used for adult patients. The population for which the scale is appropriate should be identified: adult or pediatric patients.1,2,6,9,17-21 (IV)

1. The Phlebitis Scale has concurrent validity, inter-rater reliability, and is clinically feasible (below).22 (IV)

2. The Visual Infusion Phlebitis (VIP) scale has content validity, inter-rater reliability, and is clinically feasible (below).22 (IV)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Clinical Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No symptoms</td>
</tr>
<tr>
<td>1</td>
<td>Erythema at access site with or without pain</td>
</tr>
<tr>
<td>2</td>
<td>Pain at access site with erythema and/or edema</td>
</tr>
<tr>
<td>3</td>
<td>Pain at access site with erythema</td>
</tr>
<tr>
<td></td>
<td>Streak formation</td>
</tr>
<tr>
<td></td>
<td>Palpable venous cord</td>
</tr>
<tr>
<td>4</td>
<td>Pain at access site with erythema</td>
</tr>
<tr>
<td></td>
<td>Streak formation</td>
</tr>
<tr>
<td></td>
<td>Palpable venous cord &gt;1 inch in length</td>
</tr>
<tr>
<td></td>
<td>Purulent drainage</td>
</tr>
</tbody>
</table>

2. The Visual Infusion Phlebitis (VIP) scale has content validity, inter-rater reliability, and is clinically feasible. This scale includes suggested actions matched to each scale score.22 (IV)

E. The nurse should participate in quality improvement activities or outcomes evaluation regarding the occurrence and reporting of phlebitis with infusion therapy (see Standard 7, Quality Improvement).6,9,10,15,20,24-28 (V)
F. The nurse should advocate for ongoing improvement in phlebitis rates. \(2,4,17,20-25,28,31\) (IV)

G. The nurse should use a consistent, standard, and clinically feasible calculation for short peripheral catheter phlebitis, which may be reported as a phlebitis rate based on point prevalence of short peripheral catheters. \(2,4,17,18,28,32\) (V)

One clinically feasible calculation for point prevalence (measurement at 1 point in time) of peripheral VAD phlebitis rate is:

\[
\text{Number of Phlebitis Incidents} \times 100 = \% \text{ Periperal Phlebitis}
\]

\[
\text{Total Number of IV Peripheral Catheters}
\]

REFERENCES


48. INFLTRATION AND EXTRAVASATION

Standard

48.1 The assessment and treatment of infiltration and extravasation shall be established in organizational policies, procedures, and/or practice guidelines.
48.2 The nurse shall assess the vascular access site for infiltration and extravasation; determine the need for and type of intervention; educate the patient and/or caregiver about infiltration and extravasation, the intervention, and any follow-up; and assess patient response to treatment.

48.3 The nurse shall document in the patient’s permanent medical record the signs and symptoms of infiltration and extravasation, interventions implemented, and patient response to treatment.

**Practice Criteria**

A. Infiltration and extravasation are reported with all types of peripheral and central vascular access devices (CVADs) and intraosseous devices. The nurse should routinely assess all vascular access sites for signs of infiltration and extravasation based on patient population, type of therapy, type of device, and risk factors.1,3 (V)

B. The nurse should determine possible causes of infiltration and extravasation, which include mechanical, pharmacologic, obstructive, and inflammatory factors.1,3,5 (IV)

C. The nurse should immediately stop all infusions when the patient complains of any type of pain, burning, or stinging, at or around the insertion site, catheter tip, or entire venous pathway as this should not be considered within normal limits with any infusion. These symptoms require further assessment to determine appropriate intervention(s).5,6 (IV)

D. The nurse should use a standardized scale for assessing and documenting infiltration/extravasation from all types of vascular access devices (VADs). This measurement should occur initially and regularly until resolution, based on patient condition and age; type of fluid; severity of infiltration/extravasation; type of device; and anatomical location. Signs and symptoms progress from simple to complex, and the clinical presentation can easily be confused with phlebitis or irritant and flare reactions. Early recognition of infiltration/extravasation is critical to limit the amount of fluid that escapes into the subcutaneous tissue and potential subsequent tissue injury.1,6-10 (III)

E. Frequency of site assessment after infiltration/extravasation depends upon the drugs involved and the individual patient needs. All changes should be reported to the licensed independent practitioner (LIP).1 (V)

F. The nurse should not rely on alarms from electronic infusion pumps to identify infiltration/extravasation because these alarms are not designed to detect the presence or absence of these complications. Electronic infusion pumps do not cause infiltration/extravasation; however, they will exacerbate the problem until the infusion is stopped.11,12 (V)

G. All infusions through the peripheral catheter or CVAD should be discontinued at the first sign of infiltration/extravasation, the administration set disconnected, and all fluid aspirated from the catheter with a small syringe (eg, 3 mL). The peripheral catheter or implanted port needle should be removed after aspiration. Timing of CVAD removal depends on the plan of care. The nurse should notify the LIP about the complication and activate the treatment protocol or other prescribed treatments.6,10,13 (I)

H. The nurse should estimate the volume of fluid that has escaped into the tissue based on the rate of injection or infusion and the length of time since the last assessment. Large volumes (eg, greater than 25-50 mL) of escaped fluid increase the risk of tissue damage, and consultation with a plastic surgeon may be necessary.14 (V)

I. Treatment of infiltration depends on the severity when it is recognized. Treatment may include extremity elevation, thermal manipulation, use of antidotes, and surgical interventions.2 (IV)

J. The nurse should educate the patient and caregiver about the possible progression of the signs and symptoms of infiltration/extravasation, changes that should be reported to the LIP (eg, changes in extremity mobility and sensation, elevated temperature, and other signs of infection), to protect the site from sunlight, and the frequency of follow-up visits to the LIP and/or other medical consultants as needed (see Standard 11, Patient Education).1 (V)

K. There is insufficient evidence for the management of infiltration/extravasation in neonates and other pediatric patients. Thermal manipulation is a controversial issue, and skin maceration with moist heat is possible.6 (IV)

L. The nurse should monitor clinical outcomes associated with infiltration, which may include compartment syndrome with the need for rapid surgical intervention, and nerve injury from excessive compression producing neuropathies and complex regional pain syndrome.15-21 (V)

M. The nurse should monitor clinical outcomes associated with extravasation that may include formation of blisters over a prolonged period (eg, 7-14 days), skin sloughing and tissue necrosis, functional and sensory loss in the injured area, disfigurement and loss of limb, or mastectomy.4,5,22-27 (V)

**REFERENCES**


49. INFECTION

Standard

49.1 The assessment and treatment of infusion- and vascular access device (VAD)-related infections shall be established in organizational policies, procedures, and/or practice guidelines.

49.2 The nurse shall assess the patient for suspected infusion- and VAD-related infections; provide timely and appropriate information to the licensed independent practitioner (LIP); educate the patient and/or caregiver about infusion- and VAD-related infections, the intervention, and follow-up; and assess patient response to treatment.

49.3 The nurse shall document in the patient’s permanent medical record the signs and symptoms of infusion- and VAD-related infections, interventions implemented, and patient response to treatment.

49.4 The nurse shall implement infection prevention measures with the goal of preventing all infusion- and VAD-related infections.

Practice Criteria

A. VAD-related infection includes exit-site, tunnel, port pocket, and catheter-related bloodstream infection (CR-BSI). Infusate-related bloodstream infections are caused by intrinsic or extrinsic contamination of the administration delivery system, infusing fluids and medications.1-7 (IV)

B. The nurse should immediately notify the LIP of signs and symptoms of infection including, but not limited to, erythema, edema, induration, or drainage at the VAD insertion site, and/or body temperature elevation, and take appropriate interventions.1,2 (V)

C. Routine culturing of all central vascular access device (CVAD) tips upon removal is not recommended. Catheter colonization may be detected but does not indicate the presence of bloodstream infection. This practice results in inappropriate use of anti-infective medications, thus increasing the risk of emergence of antimicrobial resistance.3,4 (I)

D. Immediate removal of a functioning CVAD is not recommended based solely on temperature elevation. Clinical findings, such as temperature elevation with or without chills or inflammation and purulence at the insertion site, are unreliable indicators of bloodstream infection.3 (I)

E. When present, purulent exudates from a peripheral or CVAD insertion site should be collected for culture and Gram-staining to determine gram-negative or gram-positive bacteria.4 (IV)

F. The goal of catheter salvage should be a collaborative decision among the LIP, nurse, and patient based on: 1. The type of VAD (eg, percutaneous versus surgically inserted long-term catheter);
2. Difficulty with inserting a new CVAD;
3. Presence of bleeding disorders;
4. The infecting organism(s) as confirmed by paired blood cultures;
5. The presence of other complicating conditions including, but not limited to, severe sepsis, suppurative thrombophlebitis, endocarditis, or the presence of vascular hardware (e.g., a pacemaker).  

G. Infection in a subcutaneous tunnel or implanted port pocket requires removal of the CVAD; however, uncomplicated exit-site infection without systemic infection, positive blood culture, or purulence may be treated with topical antimicrobial ointment as indicated by the culture results. 

H. The nurse should ensure that all blood cultures have been obtained prior to initiation of anti-infective agents.  

I. Use of phlebotomy teams for collecting peripheral blood cultures is recommended.  

J. Skin preparation for blood cultures obtained from a peripheral venipuncture should be done with alcohol, tincture of iodine, or chlorhexidine gluconate/alcohol combination. Antiseptic agents should be applied with adequate contact and drying time. Povidone-iodine is not recommended.  

K. When a sample for blood culture is drawn from the catheter, the used needleless connector should be changed prior to obtaining the sample. The new needleless connector should be thoroughly scrubbed with alcohol, tincture of iodine, or chlorhexidine gluconate/alcohol combination. The first drawn sample should be collected and used to inoculate the culture bottles without discarding the initial blood sample.  

L. Short-term central vascular and arterial catheters suspected of being the cause of a BSI should have the tip cultured using a semiquantitative (roll-plate) method or quantitative (sonication) method upon removal. A suspected BSI from a pulmonary artery catheter requires culture of the introducer/sheath tip.  

M. If an implanted port is removed for suspected CR-BSI, the port body should also be sent for culture of the reservoir contents along with the catheter tip.  

N. For short- and long-term catheters, paired blood cultures have been shown to accurately diagnose CR-BSI.  

O. In a patient with a CR-BSI, the insertion of a new CVAD at a new site should be a collaborative decision based on the specific risks and benefits for each patient. There is insufficient evidence for a definitive recommendation for the insertion of a new CVAD.  

P. A catheter exchange procedure may be chosen when other vascular access sites are limited and/or bleeding disorders are present. The removed CVAD should be sent for culture and the new catheter removed if tip culture results produce significant growth (see Standard 55, Central Vascular Access Device Exchange).  

Q. The use of thrombolytic/fibrinolytic agents as an adjunctive treatment for CR-BSI is not recommended.  

REFERENCES


6. Sherretz R, Karchmer T, Ohl C, Palavecino E, Bischoff W. Blood cultures (BC) drawn through valved 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.  


50. AIR EMBOLISM

Standard

50.1 The prevention, identification, and management of air embolism during the insertion, care, and removal of vascular access devices (VADs) shall be established in organizational policies, procedures, and/or practice guidelines.  

50.2 The nurse shall be competent to insert, manage, and remove all types of VADs toward the goal of preventing air emboli.  

50.3 Luer-locking connections shall be used on all catheter-administration set junctions.  

50.4 All air shall be purged from syringes, administration sets, needleless connectors, and all other pieces added to the catheter.  

50.5 The nurse shall document in the patient’s permanent medical record the signs and symptoms of air embolism, interventions implemented, and patient response to treatment.  

50.6 Patients and/or caregivers managing infusion therapy in non–acute care settings shall be taught how to
Practicing Criteria

A. The nurse should suspect air embolism with the sudden onset of dyspnea, continued coughing, breathlessness, chest pain, hypotension, jugular venous distension, tachycardia, wheezing, tachypnea, altered mental status, altered speech, changes in facial appearance, numbness, and paralysis. Clinical events from air emboli produce cardiopulmonary and neurological signs and symptoms.1,2 (V)

B. The nurse should immediately take the necessary action to prevent more air from entering the bloodstream by closing, folding, or clamping the existing catheter or by occluding the puncture site if the catheter has been removed.3 (V)

C. The nurse should immediately place the patient in the left lateral decubitus position if not contraindicated by other conditions such as increased intracranial pressure or respiratory diseases. The goal is to trap the air in the lower portion of the right ventricle; however, animal studies have not shown any benefit from this position. Data on humans are not available.1,4 (V)

D. The nurse should assess for conditions that contraindicate the use of the Valsalva’s maneuver including, but not limited to, aortic stenosis, recent myocardial infarction, glaucoma, and retinopathy. When these conditions are present, ensure that a catheter clamp is present before changing administration sets or needleless connectors. During catheter removal, the nurse must rely upon the patient’s position and the petroleum-based ointment dressing to prevent air embolism.5,6 (V)

E. The nurse should instruct the patient and caregiver not to disconnect or reconnect any IV administration sets or connectors from the catheter hub, as reconnecting the wrong type of tubing has been documented to cause air embolism.7,8 (V)

REFERENCES


51. CATHETER EMBOLISM

Standard

51.1 The prevention, identification, and management of catheter embolism during the insertion, care, and removal of vascular access devices shall be addressed in organizational policies, procedures, and/or practice guidelines.

51.2 The nurse shall be competent to insert, manage, and remove all types of vascular access devices toward the goal of preventing catheter embolism.

51.3 The nurse shall document in the patient’s permanent medical record the signs and symptoms of catheter embolism, interventions implemented, and patient response to treatment.

51.4 Patients and/or caregivers managing infusion therapy in non–acute care settings shall be taught how to prevent catheter embolism and how to manage the catheter if a catheter embolism is suspected.

Practice Criteria

A. Nursing interventions to prevent catheter embolism include:
1. No catheter should be withdrawn through a needle during insertion.
2. A stylet should not be reinserted into a catheter.
3. The nurse should not use power injection for vascular access devices that are not designed for this purpose.
4. To prevent catheter damage, the size of the syringe used for flushing should be in accordance with the catheter manufacturer’s directions for use (see Standard 45, Flushing and Locking).
5. Be aware of early signs and symptoms of pinch-off syndrome in subclavian vein insertion sites.1,4 (II)

B. The nurse should suspect catheter embolism when the patient exhibits symptoms such as palpitations, arrhythmias, dyspnea, cough, or thoracic pain when not associated with the patient’s primary disease or comorbidities.1,2,4,5 (II)

C. The nurse should be aware that catheter dysfunction, such as inability to aspirate blood or fluid...
with localized pain and/or subcutaneous swelling, may be a precursor to catheter embolism, or leaking at the site can indicate catheter rupture. In the presence of these symptoms, the nurse should further evaluate catheter integrity before using the vascular access device for infusions or blood draws. The most frequent mechanisms of catheter fragmentation are catheter pinch-off syndrome, catheter damage during catheter exchange, separation of the catheter from an implanted port, and fracture of a distal portion of an implanted port catheter.1,5 (II)

D. Because catheter embolism is often asymptomatic, when chest radiographs of patients with vascular access devices are obtained as part of care, the radiographs should be assessed for catheter fragment, catheter pinch-off, and infraclavicular catheter compression.1,5 (II)

E. Upon removal, vascular access catheters should be examined for damage and possible fragmentation. If damage is seen, a chest radiograph or further evaluation may be warranted.1,2,4,5 (II)

F. The nurse should carefully assess the patient for signs or symptoms of catheter embolism and for catheter damage when vascular access device removal is difficult.7,8 (V)

REFERENCES


52. CATHETER-ASSOCIATED VENOUS THROMBOSIS

Standard

52.1 The assessment and treatment of catheter-associated venous thrombosis shall be established in organizational policies, procedures, and/or practice guidelines.

52.2 The nurse shall assess the patient for suspected catheter-associated venous thrombosis; provide timely and appropriate information to the licensed independent practitioner (LIP); educate the patient and/or caregivers about catheter-associated venous thrombosis, the intervention, and follow-up; and assess patient response to treatment.

52.3 The nurse shall be competent in venipuncture insertion procedures toward the goal of preventing catheter-associated venous thrombosis.

52.4 The nurse shall document in the patient’s permanent medical record the signs and symptoms of catheter-associated venous thrombosis, interventions implemented, and patient response to treatment.

Practice Criteria

A. Skillful venipuncture insertion procedures by the nurse decreases the risk of vein wall trauma and associated thrombus development.1 (I A/P)

B. Before central vascular access device (CVAD) insertion, the nurse should assess the patient for risk factors for venous thrombosis including, but not limited to:

1. Presence of chronic diseases that produce a hypercoagulable state such as cancer, diabetes, irritable bowel syndrome, or end-stage renal failure;

2. Known presence of genetic coagulation abnormalities (eg, Factor V Leiden, prothrombin mutation);

3. Pregnancy or the use of oral contraceptives, surgery, and immobility;

4. Age extremes in young children and older adults;

5. History of multiple CVADs, especially with difficult or traumatic insertion and the presence of other intravascular devices (eg, pacemakers).1,5 (II)

C. Decisions about VAD choices impact the rate of catheter-associated venous thrombosis including, but not limited to:

1. Peripheraly inserted central catheter (PICC) insertion sites in the antecubital fossa have higher rates of catheter-associated venous thrombosis than mid-upper arm insertion sites.

2. Suboptimal CVAD tip location in the mid-to-upper portion of the superior vena cava is associated with greater rates of catheter-associated venous thrombosis.2,6 (II)

D. The nurse should encourage the patient to use nonpharmacologic strategies for thrombosis prevention whenever possible, including early mobilization of the catheterized extremity, performance of normal activities of daily living, gentle limb exercise, and adequate hydration.2 (II)

E. The nurse should be aware that the majority of catheter-associated venous thromboses are clinically silent and do not produce overt signs and symptoms, although pulmonary emboli have been linked
to catheter-associated venous thrombosis. Clinical signs and symptoms of catheter-associated venous thrombosis are related to obstruction of venous blood flow and include, but are not limited to:

1. Pain in the extremity, shoulder, neck, or chest;
2. Edema in the extremity, shoulder, neck, or chest;
3. Engorged peripheral veins on the extremity, shoulder, neck or chest wall;
4. Difficulty with neck or extremity motion.\(^2,^7\) (II)

F. VAD flushing and locking procedures have no effect on catheter-associated venous thrombosis as the technique and solutions used are directed to the internal CVAD lumen rather than the vein lumen.\(^7,^8\) (V)

G. Usual management of catheter-associated venous thrombosis includes systemic anticoagulation with or without CVAD removal.\(^2,^9\) (I)

H. Prophylaxis with anticoagulant therapy is not recommended for patients at risk for catheter-associated venous thrombosis; the use of anticoagulant prophylaxis is controversial due to the risk of bleeding. The use of an assessment tool to predict catheter-associated venous thrombosis could be beneficial to identify patients that could benefit from prophylactic anticoagulation. The patient’s preferences and the burden of anticoagulant therapy (eg, subcutaneous injection) should be considered.\(^2,^{10-13}\) (I)

REFERENCES


53. CENTRAL VASCULAR ACCESS DEVICE MALPOSITION

Standard

53.1 Central vascular access device (CVAD) repositioning techniques shall be addressed in organizational policies, procedures, and/or practice guidelines.

53.2 The nurse shall be competent with the chosen CVAD repositioning techniques.

53.3 The nurse shall know the anatomic location of the CVAD tip prior to initial infusion through the catheter.

53.4 The nurse shall know the clinical signs and symptoms of CVAD malposition and report the condition to the licensed independent practitioner (LIP).

53.5 The nurse shall document in the patient’s permanent medical record CVAD malposition, interventions implemented, and patient response to treatment.

Practice Criteria

A. The nurse should be knowledgeable of aberrant CVAD tip locations from primary and secondary malpositioning and catheter dislodgment.\(^1,^2\) (V)

B. Primary CVAD malposition occurs during the insertion procedure with the catheter passing into numerous aberrant locations, including contralateral innominate and subclavian veins, ipsilateral or contralateral internal jugular veins, ayzygos vein, right or left internal thoracic vein, pericardiophrenic vein, and the right atrium or ventricle.\(^2,^7\) (IV)

C. Inadvertent arterial insertion may be a location for primary CVAD malposition, even with the use of dynamic ultrasound during the insertion procedure (see Standard 35, Vascular Access Site Preparation and Device Placement).\(^8,^{10}\) (V)

D. Repeated radiographic identification of a malpo-
sitioned tip may be due to anatomical anomalies such as persistent left superior vena cava.11 (V)
E. The nurse’s awareness of primary CVAD malposition during the insertion procedure is enhanced by use of tip location technology; however, a post-procedure chest radiograph remains the recommended method to identify tip location. While a posterior-anterior chest radiograph is preferred, an anterior-posterior chest radiograph may be needed for bedridden patients. A lateral chest radiograph may be required to confirm some aberrant tip locations (eg, azigos vein) or if clinically indicated.12-14 (V)
F. During the insertion procedure, ultrasound may be used to rule out tip location in the internal jugular vein (see Standard 35, Vascular Access Site Preparation and Device Placement).12,13,17 (III)
G. The inserter/operator should know the results of the chest radiograph, properly reposition the CVAD if required, obtain a confirming repeat chest radiograph, and document all actions taken.7,12 (IV)
H. Secondary CVAD malposition, also known as tip migration, may occur at any time during the catheter dwell time and is related to sporadic changes in intrathoracic pressure (eg, coughing, vomiting); presence of congestive heart failure; neck or arm movement; positive-pressure ventilation; high-pressure injection; or flushing techniques. The most common locations for secondary CVAD malposition include internal jugular, innominate, subclavian, axillary, and azigos veins, and the right atrium.1,16-18 (V)
I. The nurse should assess for catheter function prior to each use, observing for clinical signs and symptoms such as lack of blood return; difficulty or inability to flush the CVAD; unusual shoulder, chest, or back pain; edema; complaints of hearing gurgling or flow stream sounds on the ipsilateral side; paresthesia; and neurological effects due to retrograde infusion into the intracranial venous sinuses.1,5,6,9,19,20 (V)
J. Primary and secondary CVAD malposition may produce atrial and ventricular tachyarrhythmias. Peripherally inserted central catheter (PICC) tip migration into the heart is associated with arm adduction and flexion.21-25 (IV)
K. The nurse should notify the LIP immediately of any signs or symptoms related to CVAD malposition and obtain orders for diagnostic procedures. Procedures include, but are not limited to, chest radiograph and contrast injection through the catheter under fluoroscopy.1,16,18,26 (V)
L. The nurse should perform procedures for repositioning percutaneous CVADs or prepare the patient for radiologic or surgical intervention for repositioning the catheter tip.26-28 (V)
M. Infusion through a malpositioned catheter should be withheld until proper tip position has been established. The nurse should assess the infusion therapy being administered and, if possible, insert a short peripheral catheter to continue therapy. If the infusion therapy is not possible through a peripheral vein, the nurse should assess the potential risk for discontinuing therapy, or seek orders to change the infusion therapy until the proper CVAD tip location can be reestablished.29 (V)
N. Extravascular CVAD tip location has been reported to be the cause of cardiac tamponade and severe intrathoracic inflation and extravasation injury.25,29-32 (V)
O. CVAD dislodgment is caused by arm movement, body habitus, patient manipulation (eg, Twiddler’s syndrome), and inadequate catheter stabilization, resulting in changes of the external catheter length and alteration of CVAD tip location.1,31 (V)
P. The nurse should not advance any external portion of the CVAD that has been in contact with skin into the insertion site. Skin cannot be rendered sterile, and no studies have established an acceptable length of time after insertion for such catheter manipulation.34,35 (V)
Q. The nurse should measure the external CVAD length and compare to the external CVAD length documented at insertion. Dislodgment could indicate the tip location is suboptimal, increasing the risk for catheter-related thrombosis.1 (V)
R. CVAD malposition and dislodgment may require a catheter exchange procedure or removal and insertion at a new site.1 (V)
S. CVAD migration and dislodgment increase the risk for thrombosis, thrombophlebitis, pericardial effusion, cardiac tamponade, and cerebrovascular accidents. If complications are present, the catheter should be removed and inserted at a new site if infusion therapy is to be continued.37,22,23,36 (V)

REFERENCES
Other Infusion-Related Procedures

54. VASCULAR ACCESS DEVICE REPAIR

Standard

54.1 Vascular access device (VAD) repair shall be initiated upon the order of a licensed independent practitioner (LIP).

54.2 Guidelines and resources for repair of the external segment of a central venous catheter shall be established in organizational policies, procedures, and/or practice guidelines.

54.3 The nurse shall be competent in access device repair.

54.4 The device shall be repaired according to the manufacturer’s directions for use.

54.5 Assessment of the patient’s risk-to-benefit ratio shall be performed prior to repair of the access device.

Practice Criteria

A. Immediately upon discovery of catheter damage, the device should be clamped or sealed (eg, closing an existing clamp, adding a clamp, covering the damaged area with adhesive dressing material, folding the external segment, and securing) between the patient and the damaged area to prevent air embolism or bleeding from the device. The damaged catheter should be labeled “Do Not Use” while waiting for the repair procedure to be performed.1 (V)

B. Options to consider for managing a damaged or ruptured catheter include use of a repair procedure, an exchange procedure, or insertion of a new catheter at a different site. Factors to consider in making this decision include, but are not limited to, the patient’s immune status; length of time remaining on infusion therapy; characteristics of infusion therapy (eg, pH and osmolarity); external catheter length; and resulting changes in proper tip location with repair.2 (V)

C. Patient and caregiver education should include how to prevent catheter damage, how to assess for catheter damage, and what immediate actions to take if catheter damage is found.2,3 (V)

D. Catheter damage increases the risk for catheter fracture and embolization, air emboli, bleeding, catheter-lumen occlusion, and bloodstream infection. If catheter repair is chosen, it should be performed as soon as possible to reduce the risk of these complications.1,4 (V)

E. The selected repair kit should be specifically designed for the device being repaired. If no device-specific repair kit is available, the nurse should consider other alternatives, such as catheter exchange or insertion of a new catheter.3 (V)

F. Ongoing assessment after repair should be routinely performed to confirm the integrity of the repair and identify any continuing problems, as the repaired catheter may not have the same strength as the original catheter. The access device should be removed if the repair was unsuccessful or the device is unable to be repaired.2,4 (V)

G. Access device repair should be documented in the patient’s permanent medical record.2 (V)

H. Data on the causes of device damage should be analyzed to identify the root cause(s) including, but not limited to, flushing technique, syringe size, and use of scissors during dressing changes.1-3 (V)

REFERENCES


55. CENTRAL VASCULAR ACCESS DEVICE EXCHANGE

Standard

55.1 Central vascular access device (CVAD) exchange shall be initiated upon the order of a licensed independent
practitioner (LIP) in accordance with the rules and regulations promulgated by the state’s Board of Nursing, organizational policies, procedures, and/or practice guidelines, and according to the manufacturer’s directions for use.

55.2 The nurse shall be competent to perform or assist with a CVAD exchange.

55.3 The nurse shall implement maximal sterile barrier (MSB) precautions for the CVAD exchange procedure.

55.4 After completion of the exchange procedure, the CVAD tip location shall be determined radiographically or by other approved technologies and documented prior to resumption of the prescribed therapy.

Practice Criteria

A. Prior to performing a CVAD exchange, the nurse should assess the risk-benefit of the procedure, particularly in high-risk patient populations, such as burn or transplant patients.1 (IV)

B. CVAD exchange should be considered to replace a nontunneled catheter for the following reasons: need for a different type of catheter, malpositioned or malfunctioning catheter, or when there is no evidence of a site infection.2,3 (V)

C. Assessment along with a risk-benefit analysis should occur prior to performing an exchange procedure on a catheter with infection or suspected infection. If venous access is limited or other sites unavailable and there is no evidence of exit site or tunnel infection, a catheter exchange procedure may be considered. An anti-infective catheter should be considered for placement when exchanging a catheter for infection or suspected infection.4,5 (II)

D. The nurse’s responsibilities for a CVAD exchange procedure should include, but are not limited to, positioning the patient to facilitate the procedure; ensuring MSB precautions are in place; ensuring that techniques to reduce the risk of air embolism are employed; and obtaining a radiograph or using other approved technologies to confirm correct CVAD tip location prior to initiating or resuming prescribed therapies.6,7 (IV)

E. The nurse should be aware that routine exchanges are not necessary for CVADs that are functioning and without evidence of local or systemic complications.8,9,10 (I)

REFERENCES


56. CATHETER CLEARANCE: OCCLUDED CENTRAL VASCULAR ACCESS DEVICES

Standard

56.1 Medications and/or solutions used to dissolve thrombotic deposits or precipitate in central vascular access devices (CVADs) shall be administered upon the order of a licensed independent practitioner (LIP) in accordance with organizational policies, procedures, and/or practice guidelines.

56.2 The nurse shall be competent in performing procedures used in catheter clearance.

56.3 The nurse shall assess the patient and the patient’s CVAD for appropriateness of the use of catheter clearance medications and/or solutions in relation to the suspected cause of catheter occlusion.

Practice Criteria

A. The nurse should assess for and identify signs of CVAD occlusion, including the inability to withdraw blood, sluggish flow, and/or inability to flush or infuse through the device.1,4 (III)

B. The nurse should assess for potential causes of catheter occlusion and consider the use of an appropriate catheter clearance procedure in order to preserve the patient’s CVAD.1,4 (III)

C. The responsibility of the nurse performing catheter clearance should include, but not be limited to, knowledge of medication and/or solution dosage, contraindications, side effects, techniques
for instillation, potential complications, and patient and caregiver education.1-7 (V)

D. The instillation of low-dose alteplase is effective in restoring blood flow and has been found to be safe for use in both adult and pediatric patients.7-14 (II)

E. Infusions of low doses of alteplase over 1-2 hours have been found successful in restoring patency to hemodialysis catheters.13,15,16 (IV)

F. Instillation of 0.1 N hydrochloric acid into the occluded catheter lumen has been used to dissolve low pH drug precipitates, and instillation of sodium bicarbonate has been used to dissolve high pH drug precipitates.17-19 (V)

G. Instillation of ethanol, ethyl alcohol, and sodium hydroxide into the occluded catheter lumen has been used to restore patency to catheters with suspected buildup of intravenous fat emulsions particularly associated with administration of total nutrient admixtures.20-22 (V)

H. Instillation of alcohol solutions such as ethanol or ethyl alcohol may damage catheters made of some types of polyurethane; manufacturers’ directions for use should be reviewed and followed.2 (V)

I. Consideration should be given to the potential pressure exerted on an occluded CVAD when medications and/or solutions used for catheter clearance are instilled. The syringe size used for catheter clearance procedures should be no smaller than 10 mL and should be in accordance with the catheter manufacturer’s directions for use. Instillation methods that use a negative-pressure approach should be considered.23-26 (V)

J. If the catheter clearance procedure does not result in patency of the CVAD, the LIP should be notified; alternative actions such as a referral to interventional radiology should be considered; and catheter removal should be considered if catheter patency is not restored.17 (V)

REFERENCES


57. PHLEBOTOMY

Standard

57.1 Phlebotomy and blood sampling via vascular access devices (VADs) shall be performed upon the order for
laboratory tests by a licensed independent practitioner (LIP) in accordance with organizational policies, procedures, and/or practice guidelines.

57.2 Therapeutic phlebotomy shall be performed upon the order of an LIP in accordance with organizational policies, procedures, and/or practice guidelines.

57.3 The nurse shall be competent in performing phlebotomy procedures.

57.4 The blood sample shall be identified at the time of collection at the patient’s bedside or ambulatory setting and clearly labeled with patient identifiers.

57.5 All hazardous waste, including discarded blood from VAD sampling and therapeutic phlebotomy, shall be disposed of in an acceptable biohazard container.

Practice Criteria

I. Phlebotomy via Direct Venipuncture

A. The nurse should assess the patient for anxiety, understanding of the purpose of venipuncture for blood testing, and for any history of vasovagal reactions with venipuncture. The nurse should provide education and reassurance as needed and be prepared to manage a vasovagal reaction in patients at risk (see Standard 12, Informed Consent).1-5 (V)

B. Venipuncture for the purpose of phlebotomy should be drawn from the opposite extremity of an infusion. Should venipuncture be required on the extremity with a VAD infusion, it should be performed in a vein below the device or infusion.2,6 (V)

C. Venipuncture should be avoided on the side of breast surgery with axillary node dissection, after radiation therapy to that side, or with lymphedema; the affected extremity from a cerebrovascular accident; or the extremity with an actual or planned fistula access.7-9 (V)

D. The nurse should select an appropriate vein for phlebotomy; the most common veins include the median cubital, the cephalic, and the basilic veins in the antecubital area. Skin-puncture blood collecting methods (eg, heel/finger stick) may be used with infants or adults/children with difficult venous access and with point-of-care testing methods; venipuncture was found to be less painful than heel punctures in term neonates.2,6,10,11 (V)

E. The nurse should be knowledgeable about technical factors involved in blood specimen collection such as the need for patient fasting prior to collection, minimal tourniquet time to avoid hemoconcentration and hemolysis, use of appropriate blood collection tubes in the correct sequence, and timeliness of dispatch to the laboratory.2,6,12 (V)

F. Only the volume of blood needed for accurate testing should be obtained; phlebotomy contributes to iron deficiency and blood loss in neonates and critically ill patients. Efforts to conserve blood should be considered; these may include use of low-volume blood collection tubes; recording the volume of blood obtained for laboratory testing; avoidance of routine testing; use of point-of-care testing methods; and consolidation of all daily tests with 1 draw.12-16 (V)

G. Pressure should be applied with a sterile dressing following the venipuncture and maintained until bleeding stops.2,6 (V)

Practice Criteria

II. Blood Sampling via a Vascular Access Device

A. Blood sampling for laboratory testing from a central vascular access device (CVAD) should be considered based on an evaluation of benefits versus risks. Benefits include avoidance of anxiety, discomfort, and dissatisfaction associated with venipuncture in patients who require frequent blood tests and/or those with difficult vascular access. Risks include increased risk for occlusion and catheter-related bloodstream infection (CR-BSI) due to increased hub manipulation and potential for inaccurate laboratory results, although there was no significant increase in occlusion, infection, or other complications in peripherally inserted central catheters (PICCs) used for blood sampling in one study.17-19 (V)

B. Sampling of blood through short peripheral catheters has been found to be reliable for many routine blood tests, including coagulation studies, and may be considered for pediatric patients, those who require multiple laboratory tests including patients with risk for bleeding, and/or those who have difficult vascular access.18,20-22 (IV)

C. Caution should be exercised when interpreting drug levels with a CVAD-obtained blood sample. When questionable results are obtained (eg, unexpected high levels that would necessitate a medication dosage change), the nurse should collaborate with the LIP in retesting via direct venipuncture. Some studies have shown elevated drug levels with blood sampling from CVADs; factors negatively influencing accuracy include sampling from implanted ports, silicone catheters, and from the same catheter lumen used for drug infusion.18,23-30 (IV)

D. Caution should be exercised when interpreting coagulation values with a blood sample obtained from a heparinized CVAD. Current literature does not support blood sampling for coagulation levels via heparinized CVADs; literature is inconsistent in relation to sampling from heparinized arterial catheters. With hemodialysis catheters, accurate
coagulation levels were obtained using the arterial port of the catheter. When questionable results are obtained (eg, unexpected high levels that would necessitate a medication dosage change), the nurse should consult with the LIP in retesting via direct venipuncture.\textsuperscript{18,31-38} (IV)

E. The nurse should be knowledgeable about technical factors involved in blood specimen collection, such as changing the needless connector, need for patient fasting prior to collection, use of appropriate blood collection tubes in the correct sequence, and timeliness of dispatch to the laboratory.\textsuperscript{1,2,6} (V)

F. The reinfusion method for blood withdrawal should not be used due to risk of contamination and blood clot formation, as this method includes reinfusion of the discard specimen following blood withdrawal.\textsuperscript{18,26,30} (IV)

G. Prior to blood sampling from a VAD, infusions should be stopped and the VAD flushed with preservative-free 0.9% sodium chloride (USP). The largest lumen should be used for blood sampling with multilumen CVADs. For CVADs with staggered lumen exit sites, the sample should be drawn from the one highest in the superior vena cava; for drug levels, the sample should be preferentially drawn from the catheter lumen not being used for the drug infusion.\textsuperscript{18,26,30} (IV)

H. Only the volume of blood needed for accurate testing should be obtained; phlebotomy contributes to iron deficiency and blood loss in critically ill patients and neonates, so efforts to conserve blood should be considered. These may include use of low-volume blood collection tubes, recording the volume of blood obtained for laboratory testing, and the avoidance of routine testing, use of point-of-care testing methods, consolidation of all daily tests with 1 draw, and consideration of the use of the mixing method for blood sampling from CVADs.\textsuperscript{13-16,18,37,41-43} (V)

**Practice Criteria**

**III. Therapeutic Phlebotomy**

A. Orders for therapeutic phlebotomy should include frequency of phlebotomy and amount of blood to be withdrawn; orders for fluid replacement may also be included and if ordered, should include the type of fluid, amount, and rate of infusion.\textsuperscript{44-46} (V)

B. Patient education should address potential side effects such as syncope and nausea/vomiting, need for increased fluid intake postprocedure unless contraindicated, and when to resume normal activities.\textsuperscript{44,47} (V)

C. Use of a short peripheral catheter for therapeutic phlebotomy is preferred. Adequate blood flow is based upon size of the vein and catheter size; 18- to 20-gauge catheters are acceptable and cause less insertion pain and less bleeding after catheter removal. To ensure the best results and reduce the risk of trauma to the vein, the catheter should be placed immediately before phlebotomy and removed upon completion.\textsuperscript{44,48} (V)

D. The use of CVADs is not recommended for therapeutic phlebotomy due to risk of thrombotic occlusion or catheter damage. In patients who require multiple phlebotomies, an apheresis catheter may be placed for this purpose.\textsuperscript{44} (V)

E. Blood collection receptacles may include collection bags used for volunteer blood donation or bags specifically designated for therapeutic phlebotomy; use of vacuum containers to facilitate blood flow is controversial due to risk of air embolism and vein collapse.\textsuperscript{44} (V)

F. After completion of the phlebotomy, hemostasis should be maintained at the venipuncture site after removal of a peripheral catheter, and the patient should remain in a reclining position for several minutes.\textsuperscript{44} (V)

G. Documentation should include total volume of blood withdrawn, patient response to the procedure, and patient education.\textsuperscript{44,46} (V)

**REFERENCES**


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58. INTRASPINAL ACCESS DEVICES

Standard

58.1 Intraspinal medication administration and care and maintenance of intraspinal access devices shall be initiated 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.

58.2 Removal of temporary intraspinal access devices (intrathecal and epidural) shall be performed upon the order of an LIP in accordance with rules and regulations promulgated by the state’s Board of Nursing and organizational policies, procedures, and/or practice guidelines. Removal of long-term implanted ports/reservoirs/pumps or tunneled intraspinal devices shall be considered a surgical procedure.

58.3 Medications administered via an intraspinal route shall be preservative-free.

58.4 A 0.2-micron surfactant-free, particulate-retentive filter shall be used for intraspinal medication administration.

58.5 Alcohol, antiseptics containing alcohol, or acetone shall not be used for site preparation or for cleansing the catheter hub due to potential deleterious effects as a neurotoxin.

58.6 The nurse shall be competent in the care of a patient with an intraspinal access device.

58.7 Intraspinal access devices and administration sets shall be identified and labeled as a specialized infusion administration system and differentiated from other infusion administration and access systems.

Practice Criteria

A. Intraspinal administration of opioids and adjuvant medications via the intrathecal, epidural, or ventricular space may be used to control pain with surgical procedures, for patients in labor, and with cancer and chronic pain conditions when pain control has not been achieved through less-invasive routes. Intrathecal baclofen may be used to control spasticity in children with cerebral palsy and adults with spasticity due to spinal cord injury or multiple sclerosis unresponsive to oral therapy.\(^1\)\(^-\)\(^6\) (IV)

B. Preservative-free medications administered via the intrathecal or epidural route include, but are not limited to, morphine, fentanyl, hydromorphone, ziconotide, clonidine, bupivacaine, and baclofen. Infusions may include opioids alone, opioids in combination with dilute local anesthetics, and opioids in combination with local anesthetics and clonidine. Antineoplastic agents and pain medications may be administered via an intraventricular access device.\(^1\)\(^-\)\(^6\) (IV)

C. The responsibility of the nurse in caring for a patient with an intraspinal access device includes, but is not limited to, knowledge of anatomy and physiology; device placement; care and maintenance practices; implanted port/reservoir/pump filling and/or access; potential complications; and patient and caregiver education.\(^3\) (V)

D. Careful titration is required when initiating medications, when converting from one route to another (eg, intravenous to epidural to intrathecal), when converting from one medication to another, and when adding adjuvant medications. Dosing and opioid conversion guidelines should be used, and dosing should start extremely low when converting from one medication to another.\(^1\)\(^-\)\(^2\) (IV)

E. Epidural access devices should be aspirated to ascertain the absence of spinal fluid and blood prior to medication administration. Intrathecal and ventricular access devices should be aspirated to ascertain the presence of spinal fluid and the absence of blood prior to medication administration.\(^3\) (V)

F. Medication compounding, accessing, and filling of an implanted intraspinal delivery system with a medication reservoir should be performed at regular intervals in accordance with the manufacturer’s directions for use.\(^2\)\(^-\)\(^7\)\(^-\)\(^8\) (V)

G. Infusion medication delivery via an intraspinal access device may be a single administration, an intermittent injection, or a continuous infusion. Continuous infusions should be administered using an electronic infusion device with anti-free-flow protection. Patient-controlled analgesia may be used with epidural infusions.\(^2\)\(^-\)\(^7\)\(^-\)\(^8\) (V)
H. The patient should be carefully monitored for the first 24 hours after initiating or restarting intraspinal infusions. High-risk patients such as the elderly, the very young, the opioid naive, and those with cardiac and/or respiratory disease should be monitored in a hospital setting for the first 24 hours.2 (V)

I. The patient should be assessed for response to therapy at established intervals. Recommendations include assessing the following hourly for the first 24 hours and then every 4 hours; assessment of outpatients and patients receiving home care should occur with every patient encounter:
1. Pain rating using a validated, appropriate pain scale (eg, 0-10), with regard to patient age and condition, both at rest and with activity
2. Blood pressure, pulse, respiratory rate, temperature
3. Level of sedation if opioid is being administered
4. Number of bolus doses, if used (eg, patient-controlled epidural analgesia)
5. Fetal status and response to intraspinal infusion for the patient in labor
6. Presence of any side effects: pruritis, nausea, urinary retention, orthostatic hypotension, motor block
7. Signs of catheter insertion site infection or epidural abscess such as back pain, tenderness, erythema, swelling, drainage, fever, malaise, neck stiffness, progressive numbness, or motor block
8. Dressing for intactness and absence of moisture/leakage
9. Catheter and administration set connections
10. Changes in sensory or motor function that may indicate an epidural hematoma, including unexplained back pain, leg pain, bowel or bladder dysfunction, motor block
11. Oxygen saturation levels via pulse oximeter and/or carbon dioxide levels, if prescribed
12. Electronic infusion device for history of analgesic use and correct administration parameters3,6,10 (V)

J. The potential for catheter tip migration should be routinely assessed by checking for changes in external catheter length. Migration of the catheter may result in changes including decrease in pain control (eg, intrathecal migration to epidural space) or increase in side effects (eg, epidural migration to intrathecal space).3,6 (V)

K. A dressing should cover the intraspinal access site; routine dressing changes on short-term epidural and intrathecal access devices are not recommended due to risk of dislodgment and infection. Transparent semipermeable membrane (TSM) dressings are most often used for tunneled and implanted epidural devices and are changed every 7 days; after the first 24 hours postplacement of a ventricular reservoir, the site is generally left open to air.3,7,10 (V)

L. Use of chlorhexidine-impregnated dressings should be considered for patients with epidural access devices; use of these dressings is associated with a significant reduction in epidural exit site/catheter colonization with microorganisms and with a trend toward decreased central nervous system infection.12 (I)

M. After intraspinal access device removal, a sterile dressing should be applied.10 (V)

REFERENCES

59. INTRAOSSEOUS ACCESS DEVICES

Standard

59.1 Intraosseous (IO) access and infusion of medications or fluids via the IO route shall be initiated upon the order of a licensed independent practitioner (LIP) in accordance with rules and regulations promulgated by the state’s Board of Nursing.
59.2 The use of IO access and infusion shall be established in organizational policies, procedures, and/or practice guidelines.

59.3 The nurse shall be competent in the care of a patient requiring IO access.

Practice Criteria

A. In situations of adult or pediatric cardiac arrest, the IO route should be used if vascular access is not available or cannot be quickly obtained.6-8 (IV)

B. The IO route may be considered for emergent and nonemergent use in patients with limited or no vascular access and when the patient may be at risk of increased morbidity or mortality if access is not obtained. Use of IO infusion is reported in pediatric anesthesia.7-11 (IV)

C. The site most often used for IO access in both adults and children is the proximal tibia; other sites for adults include the proximal humerus, sternum, distal femur, humeral head, radius, ulna, pelvis, and clavicle; in children, distal tibia or distal femur are also used.7,8,12,13 (V)

D. The responsibility of the nurse caring for a patient requiring intraosseous access includes, but is not limited to, knowledge of anatomy and physiology; IO device placement and removal; care and maintenance practices; potential complications; and patient and caregiver education.13 (V)

E. IO access should be avoided in the following sites: previously used IO sites or where IO access has previously been attempted; fractures at or above the site where previous surgery has been performed on the bone; presence of infection at the insertion site; and local vascular compromise. Bone diseases such as osteogenesis imperfecta, osteopetrosis, and severe osteoporosis may be a contraindication, depending on the device.7,8,13,14 (V)

F. Pain management during insertion and infusion should be considered especially in the conscious patient. Lidocaine is recommended prior to insertion (subcutaneously at the intended site) and into the IO space prior to infusion initiation.7,8,13,15 (V)

G. Proper placement of the IO device is confirmed by assessment of the needle position and flushing with 5-10 mL of preservative-free 0.9% sodium chloride (USP) that should enter by free flow or infuse without resistance.7,13 (V)

H. The dwell time of the IO device should be limited to no longer than 24 hours. Assessment should be made for a replacement vascular access device (VAD).8 (V)

I. Complications associated with IO access are relatively rare but include extravasation from dislodgment, iatrogenic fracture, growth plate injury, infection, fat emboli, compartment syndrome, and osteomyelitis. Infectious complications were more likely to occur with prolonged infusion or if bacteremia was present during the time of insertion.6,7,8,10-11 (V)

J. The IO device should be covered with a sterile dressing after placement.10,12 (V)

REFERENCES


60. CONTINUOUS SUBCUTANEOUS INFUSION AND ACCESS DEVICES

Standard

60.1 Administration of continuous subcutaneous infusion of medications or hydration fluids shall be initiated upon the order of a licensed independent practitioner (LIP) in accordance with organizational policies, procedures, and/or practice guidelines.

60.2 The use of continuous subcutaneous infusion access shall be established in organizational policies, procedures, and/or practice guidelines.

60.3 The nurse shall be competent in the care of a patient requiring continuous subcutaneous infusion therapy.

60.4 The nurse shall assess the patient for appropriateness of the subcutaneous route in relation to the prescribed medication or fluid and to the patient’s clinical condition and presence of adequate subcutaneous tissue.

Practice Criteria

A. Isotonic dextrose or 0.9% sodium chloride fluids may be administered as a continuous infusion via a subcutaneous access device (hypodermoclysis) for treatment of mild to moderate dehydration.1-3 (II)

B. The most common types of medications used in continuous infusion via a subcutaneous device are opioids for pain management.4-10 (III)

C. The responsibility of the nurse caring for a patient requiring continuous subcutaneous infusion therapy includes, but is not limited to, knowledge of anatomy and physiology; care and maintenance practices; potential complications; and patient and caregiver education.11 (V)

D. Site selection for subcutaneous access should include areas with adequate subcutaneous tissue with intact skin such as the upper arm, subclavicular chest wall, abdomen, upper back, and thighs.1,4,8,12-14 (III)

E. A small-gauge (25- to 27-gauge) subcutaneous infusion device should be used to establish subcutaneous access.1,4,8,12-14 (III)

F. Nonmetal subcutaneous access devices are preferable to metal devices; advantages include extended dwell time and decreased risk for health care provider needlestick injury.15-18 (IV)

G. The subcutaneous infusion access device should be aspirated to ascertain the absence of blood prior to medication and fluid administration.5,11 (V)

H. Hyaluronidase may be considered for use in increasing absorption and dispersion of subcutaneously administered medications and/or hydration fluids.1,3,19-21 (III)

I. The optimal subcutaneous infusion rate is unknown. Medication infusion rates of 3-5 mL per hour are reported, and hydration infusion rates of up to 1500 mL over 24 hours are reported. More than 1 infusion site may be used to accomplish a larger infusion volume.14,8,10,12-14,22 (IV)

J. Medications infused via a subcutaneous access device should be administered using an electronic infusion device; syringe pumps are used most often for subcutaneous immunoglobulin infusions.8,9,12 (V)

K. Hydration fluids infused via a subcutaneous access device should be administered via a manual flow-control device or an electronic infusion device.13,14 (V)

L. The subcutaneous access site used for medication administration should be rotated every 2-7 days and as clinically indicated based on the integrity of the access site.8,11,13,22 (IV)

M. The subcutaneous access site used for hydration fluids should be rotated every 24-48 hours or after 1.5-2 liters of infused fluid and as clinically indicated.1,3,14 (II)

N. A transparent semipermeable membrane (TSM) dressing should be applied over the subcutaneous access site and changed with each subcutaneous site rotation, and immediately if the integrity of the dressing is compromised.8,13,23 (V)

O. Subcutaneous sites should be assessed for and rotated when there is erythema, swelling, leaking, bruising, burning, or pain.1,8,13 (II)

REFERENCES


**61. PARENTERAL MEDICATION AND SOLUTION ADMINISTRATION**

**Standard**

61.1. The administration of parenteral medications and solutions shall be initiated 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.

61.2. The nurse shall be competent in the administration of parenteral medications and solutions.

61.3. Prior to the initiation of therapy, a Keep Vein Open (KVO) order shall contain a specific infusion rate.

**Practice Criteria**

A. The nurse should review the order for appropriateness of prescribed therapy for the patient’s age and condition, access device, dose, rate and route of administration, and follow the rights of medication administration.1,2 (V)

B. The nurse should aspirate for a positive blood return from the vascular access device (VAD) to confirm device patency prior to administration of parenteral medications and solutions.3 (V)

C. A list of approved parenteral medications and solutions for each type of administration method and route (eg, continuous, intermittent, or push/direct injection; intravenous, intra-arterial, subcutaneous, hypodermoclysis, intraspinal, intrasosseous, intrathecal) should be established in organizational policies, procedures, and/or practice guidelines.1 (V)

D. The nurse administering parenteral medications and solutions should have knowledge of indications for therapy, side effects, potential adverse reactions, and appropriate interventions.1 (V)

E. The nurse should inspect solutions and medications for appropriate labeling, integrity (no leakage/discoloration/open packaging), accuracy (right drug or solution and right dose), sterility (within beyond-use or expiration date), and in the home care setting, verify appropriate storage/refrigeration (see Standard 20, Compounding of Parenteral Solutions and Medications).4,5 (V)

F. The nurse should reduce the manipulation of all the components of the entire infusion system (eg, administration set junctions, catheter hub) to as few as needed to deliver the infusion therapy.6 (V)

G. The nurse should administer solutions and medications prepared and dispensed from the pharmacy or as commercially prepared solutions and medications whenever feasible. Medications admixed outside of the pharmacy, pharmacy-labeled solutions, and medications labeled for emergent use should be administered within 1 hour of preparation. Multidose vial use should be avoided. Filter needles or filter straws should be used when withdrawing medications from glass ampoules.4,7-12 (IV)

H. The nurse should trace the administration set from the patient to the point of origin before making connections and on admission or transfer of a patient to a new setting.12,13 (V)

I. The nurse should advocate for the use of engineering controls, protocols, and technology that is intended and has been shown to reduce medication errors including, but not limited to, electronic order entry, smart pumps with drug libraries, bar coding, procedures for distraction-free medication administration, establishment of protocols for high-risk intravenous drugs, and standardized drug concentrations or standard order sets.14-18 (IV)

J. The nurse should exercise particular care when administering solutions and medications to pediatric and neonatal patients, as medication errors are significantly higher in incidence for these patients. The use of standardized drug concentrations is strongly recommended for this population.2,15 (IV)

K. The nurse should be accountable for evaluating and monitoring the effectiveness of prescribed therapy; documenting patient response, adverse events, and interventions; communicating the results of laboratory tests; and achieving effective delivery of the prescribed therapy.2,14 (V)
L. Documentation of administration of intravenous solutions and medication should include date; drug name/concentration; time administered/started; time discontinued/stopped; route of administration; VAD used; presence of blood return; patient’s response and tolerance, including any signs and symptoms of adverse reaction; patient/caregiver instructions postadministration; and name and title of the nurse administering the medication.\textsuperscript{1,2,19,20} (V)

M. Discontinuation of therapy may occur when the nursing assessment determines that intervention is necessary (eg, in the event of an adverse reaction, complication such as phlebitis or infiltration, suspected VAD malposition, or loss of VAD patency); the LIP should be notified of the assessment and intervention immediately.\textsuperscript{21} (V)

N. Discontinuation of therapy, including amount infused, time, date, condition of the site, integrity of the catheter if removed, and reason for discontinuation, should be documented in the patient’s permanent medical record.\textsuperscript{19,20} (V)

O. The nurse should provide instruction to the patient and caregiver about observations and care of the infusion and catheter site and potential postinfusion complications, such as postinfusion phlebitis or infiltration, and document such instructions in the patient’s permanent medical record.\textsuperscript{19,20} (V)

REFERENCES


62. ANTINEOPLASTIC THERAPY

Standard

62.1 The administration of antineoplastic agents shall be initiated upon the orders 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.

62.2 The nurse administering antineoplastic agents shall be competent and have knowledge of and protocols for prescribed therapies.

62.3 The nurse shall administer antineoplastic agents delineated by written orders only, including new orders or changes to existing orders. Verbal orders are acceptable only if antineoplastic agents are to be placed on hold or stopped.
Practice Criteria

A. The patient and caregiver should be informed of all aspects of antineoplastic therapy, including physical and psychological effects, side and adverse effects, risks, and benefits.1-5 (V)

B. Prior to administration of antineoplastic agents, laboratory data should be reviewed and the patient assessed in collaboration with the health care team.1-5 (V)

C. Validation by 2 registered nurses prior to administration of antineoplastic agents should include body surface area (BSA) and weight if applicable, medication, dose, concentration, rate, route of infusion, and confirmation of the calculation for dosing to reduce the risk of adverse outcomes and medication errors.5,12 (V)

D. The nurse should participate in monitoring any cumulative chemotherapy dose to ensure that the drug is discontinued if the maximum lifetime dose is reached.5-15 (V)

E. The nurse should use electronic infusion devices (EIDs) for specific types of antineoplastic administration and for all continuous administrations.13 (V)

F. When administering a vesicant medication:
   1. A low-pressure flow-control infusion device should be the instrument of choice.
   2. Prior to administration, positive blood return should be confirmed and documented.
   3. A new access site should be initiated prior to any peripheral vesicant administration and documented.
   4. Peripheral access devices should not be used for the continuous infusion of vesicants (see Standard 48, Infiltration and Extravasation).3,11 (V)

G. Scalp veins should not be used for administration of vesicant therapy in the neonate and pediatric patient.3 (V)

H. Drug administration sets should be attached and primed prior to the addition of the antineoplastic agent within the biological safety cabinet (BSC). This eliminates the need to prime the set in a less well-controlled environment and ensures that any fluid that escapes during priming contains no drug. If priming must occur at the site of administration, the administration set should be primed with non–drug-containing fluid.13,14 (V)

I. Nurses planning for a family or who are pregnant should be advised of the potential risks associated with handling antineoplastic agents and should be given the opportunity to refrain from preparing or administering these agents.3,14,15 (V)

J. Safe handling of antineoplastic agents should include access to personal protective equipment, material safety data sheets (MSDS), spill kits, containment bags, and disposal containers in all areas where hazardous drugs are handled.12,13-16 (V)

REFERENCES


63. BIOLOGIC THERAPY

Standard

63.1. The administration of biologic medication(s) shall be initiated 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.

63.2. The nurse administering biologic medications shall be competent and have knowledge of and protocols for prescribed therapies. This knowledge shall include, but not be limited to, appropriate drug dose, volume, concentration, adverse and expected reactions, and rate and route of delivery with regard to the patient’s condition and vascular access.

63.3. Clinical management of potential adverse events, including treatment and management of anaphylactic and anaphylactoid reactions, shall be addressed in organizational policies, procedures, and/or practice guidelines.

Practice Criteria

A. The patient and caregiver should be informed of all aspects of biologic therapy, including physical and psychological effects, side and adverse effects, and management of adverse events, such as infusion reactions, risks, and benefits.1-4 (V)

B. Prior to administration of biologic medications, laboratory data should be reviewed and the patient assessed for appropriateness of the prescribed therapy.1,3 (V)

C. The nurse should be prepared to manage acute infusion-related hypersensitivity reactions.1,3-9 (V)

D. The nurse should consider using an electronic infusion device for the administration of biologic medications to ensure the correct rate of infusion during initial and subsequent infusions.1,3 (V)

E. The nurse handling and administering biologic medications should strictly adhere to safe handling protocols and USP Chapter <797> protocols.1,4,10 (V)

F. For self-administration of a subcutaneous biologic infusion, the patient should be educated in drug preparation, subcutaneous injection administration, the importance of site rotation, what to do with missed doses, and what to monitor or report during or after the injection (see Standard 60, Continuous Subcutaneous Infusion and Access Devices).3 (V)

G. The nurse should educate the patient and caregiver on the pharmacologic and nonpharmacologic management of delayed infusion reactions.1 (V)

REFERENCES


64. PATIENT-CONTROLLED ANALGESIA

Standard

64.1. The administration of patient-controlled analgesia (PCA) shall be initiated upon the order of a licensed independent practitioner (LIP) in accordance with the state’s Nurse Practice Act, rules and regulations promulgated by the state’s Board of Nursing, and organizational policies, procedures, and/or practice guidelines.

64.2. The nurse shall be competent in the care of patients receiving PCA. The nurse shall have knowledge of the appropriate drugs used with PCA, including pharmacokinetics and equianalgesic dosing, contraindications, side effects and their management, appropriate administration modalities, and anticipated outcomes.

64.3. The patient and caregiver shall be educated in the use of PCA. The patient’s and caregiver’s comprehension...
and ability to comply with procedures shall be evaluated and documented prior to, and on initiation of therapy. 64.4 The use of infusion devices for PCA shall adhere to manufacturers’ directions for use. Dose-error reduction infusion systems shall be considered when available.

**Practice Criteria**

A. The nurse should assess the patient for the appropriateness of PCA therapy and the patient’s comprehension of, and ability to participate in, the intended therapy. 1–4 (I)

B. If the patient is unable to actively participate in PCA, the nurse should assess the patient for appropriateness of using Authorized Agent Controlled Analgesia (AACAs). 1–5,8–16 (IV)

C. The nurse should advocate for the use of standardized medication concentrations and standardized or preprinted order sets for PCA and AACAs. 1,7,16–26 (IV)

D. Patient risk factors should be identified and appropriate monitoring implemented to prevent respiratory depression and other adverse events. Risk factors include, but are not limited to, elderly patients, morbid obesity, obstructive sleep apnea, chronic obstructive pulmonary disease, renal insufficiency, and continuous background infusions for patients with obstructive sleep apnea. The use of pulse oximetry and/or capnography should be considered when monitoring for respiratory depression. 1,7,16–26 (IV)

E. A double check by another clinician using independent verification should be considered prior to initiation of the PCA, and when the syringe, solution container, drug, or rate is changed. Special attention should be given to drug, concentration, dose, and rate of infusion according to the order and as programmed into the electronic infusion device (EID), in order to reduce the risk of adverse outcomes and medication errors. 6,7 (V)

F. Patient and caregiver education should be appropriate to duration of therapy and care setting and should include the purpose of PCA therapy, operating instructions for the EID, expected outcomes, precautions, potential side effects, and contact information for support services. 7,8,27,28 (IV)

G. Nursing interventions should include evaluating the effectiveness of PCA therapy using valid and reliable monitoring and assessment methods or scales and documentation tools:

1. Regular assessment and reassessment of patient self-report of pain using a consistent pain assessment scale appropriate to the patient

2. Monitoring for potential adverse effects including, but not limited to, sedation and respiratory depression

3. Regular evaluation of PCA injections and attempts

4. Considering the need for change in treatment methods as necessary. 8,10,19,29–32 (V)

H. The nurse should participate in selection and evaluation of PCA EIDs to promote patient safety, which may include dose-error reduction systems and bar-coding technology. 19,25,31 (V)

**REFERENCES**


65. PARENTERAL NUTRITION

Standard

65.1 The administration of parenteral nutrition shall be initiated 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.

65.2 The nurse shall be competent in the administration and monitoring of patients receiving parenteral nutrition.

65.3 Non-fat-emulsion-containing parenteral nutrition solutions shall be filtered using a 0.2-micron filter, and fat-emulsion-containing parenteral nutrition solutions shall be filtered using a 1.2-micron filter.

65.4 Parenteral nutrition containing dextrose and amino acids alone or with fat emulsion added as a 3-in-1 formulation shall have a hang time not to exceed 24 hours. Fat emulsions alone shall have a hang time not to exceed 12 hours.

65.5 Parenteral nutrition shall be administered using an electronic infusion device (EID) with anti-free-flow control.

65.6 Parenteral nutrition solutions shall be prepared, labeled, and managed according to pharmacy law and regulations.

65.7 The nurse shall not add medications to the parenteral nutrition solution once it is actively infusing.

Practice Criteria

A. The nurse should collaborate with the patient or caregiver and other members of the health care team on the development and implementation of the nutrition plan of care. The nurse should recommend that the enteral route of feeding be used when feasible, especially in the critically ill adult or child.1-5 (II)

B. Parenteral nutrition solutions containing final concentrations exceeding 10% dextrose should be administered through a central vascular access device (CVAD) with the tip located in the central vasculature, preferably the superior vena cava-right atrium junction for adults.2,5,6 (III)

C. Parenteral nutrition solutions with a final concentration of 10% dextrose or lower administered via...
a short peripheral or midline catheter should be reserved for situations in which a CVAD is not currently feasible and delay of feeding would be detrimental to the patient. The solution’s osmolarity should not exceed 600 mOsm. Clinical trials demonstrate that peripheral parenteral nutrition causes phlebitis. The literature also shows that the frequency and severity of phlebitis can be mitigated by the addition of heparin and steroids to the parenteral nutrition, coadministration with fat emulsion, cyclical infusion, keeping the osmolarity of the parenteral nutrition solution less than 600 mOsm, frequent catheter site changes (every 24-48 hours), and limiting the duration of peripheral parenteral nutrition use. The risk/benefit decision to use peripheral parenteral nutrition should include as many phlebitis-mitigating techniques as possible. The most conservative approach of a maximum of 600 mOsm final concentration is recommended for peripheral parenteral nutrition as that recommendation appears to be the limit of tolerance not requiring mitigation for most patients.2,5,7-11 (V)

D. The nursing assessment of patients who are receiving long-term parenteral nutrition should include both physiological and psychological aspects of response to therapy.2,12 (IV)

E. Parenteral nutrition solutions should be removed from the refrigerator 30 minutes to 1 hour prior to infusion.2,13 (V)

F. Parenteral nutrition solutions should be compounded in the pharmacy using sterile technique under a horizontal laminar flow hood in compliance with pharmacy rules and regulations.2,14,15 (Regulatory)

G. Medications added to parenteral nutrition solutions prior to administration of the solution should be assessed for compliance with pharmacy rules and regulations.2,14,17 (Regulatory)

H. Medications added to parenteral nutrition solutions should be documented on the label affixed to the infusion container in compliance with pharmacy rules and regulations.2,14,15 (V)

I. The nurse’s monitoring of the patient receiving parenteral nutrition should include, but not be limited to, body weight; fluid and electrolyte balance; metabolic tolerance, especially glucose control; organ function; nutrition therapy-related complications; functional performance; and psychological responses. The nurse should educate the home patient or caregiver about signs and symptoms of metabolic intolerance, infection, and access device complications to report to the health care team.1,5,16 (V)

J. Documentation in the patient’s permanent medical record should include, but not be limited to, type of access device, parenteral nutrition formulation, additives, volume, rate, patient assessment, and response to therapy.1 (V)

REFERENCES


66. TRANSFUSION THERAPY

Standard

66.1 The administration of transfusion therapy shall be initiated upon the order of a licensed independent practitioner (LIP) in accordance with the rules and regulations promulgated by the state’s Board of Nursing, state regulations, AABB standards, and organizational policies, procedures, and/or practice guidelines.

66.2 The nurse shall be competent in transfusion administration, identification of transfusion reactions, and/or complications associated with transfusion therapy and implementation of appropriate interventions.

66.3 Validation of correct patient and blood product shall be simultaneously performed at the bedside by 2 qualified clinicians prior to administration.

66.4 Blood and blood components shall be filtered using an in-line or add-on filter appropriate to the prescribed therapy.

Practice Criteria

A. The nurse administering transfusion therapy should have knowledge and understanding of immunohematology; blood grouping; blood and its components; administration equipment, including vascular access devices (VADs) and filters; techniques appropriate for each component; transfusion reactions and nursing interventions; and associated risks of transfusion therapy. 1,4,6 (V)

B. The nurse should administer blood components using an in-line or add-on filter that is appropriate for the prescribed component. Standard, microaggregate, and leukocyte-depleting blood filters are designed with different filtering capability (20-260 microns). The filter should not be used beyond 4 hours. The nurse should follow the manufacturer’s directions for use of the selected filter (see Standard 28, Filters). 1,4,6,7 (V)

C. The transfusion administration set and filter should be changed after the completion of each unit or every 4 hours. If more than 1 unit can be infused in 4 hours, the transfusion set can be used for a 4-hour period (see Standard 43, Administration Set Change). 1,4,6,8 (IV)

D. Single units of blood should be administered and completed within a 4-hour time period. Platelets should be administered over 30 minutes to 4 hours. 1,4,6,8-11 (V)

E. The nurse should initiate the administration of blood or blood components within 30 minutes from the time of its release from transfusion services or blood bank or its removal from a controlled environment. 1,4,11 (V)

F. Blood or blood components should be administered only with 0.9% sodium chloride. No other solutions or medications should be added to blood or blood component products. 1,4,6,11 (V)

G. Prior to transfusion therapy, the nurse should perform a patient assessment to identify and verify current status and appropriateness of the indwelling VAD, and/or select and initiate a peripheral VAD, and/or collaborate with the health care team for placement of a central vascular access device (CVAD). 1,4,6 (V)

H. Blood or blood components may be transfused via a 14- to 24-gauge short peripheral catheter. Transfusion for neonate or pediatric patient populations is usually given using a 22- to 24-gauge peripheral VAD. 1,4,6,8,10,12 (IV)

I. Blood or blood components may be transfused via a CVAD as small as 1.9 French. Umbilical venous catheters or small saphenous vein catheters are commonly used in infants and/or pediatric patients. The clinician should be aware that catheter length will decrease the rate of infusion. (IV) 4,8,10,12,17

J. Electronic infusion devices (EIDs) can be used to deliver blood or blood components without significant risk of hemolysis of red blood cells. However, the EID should be analyzed to evaluate the safety and rate of hemolysis. The nurse should follow the manufacturer’s directions for use of EIDs for blood and blood component administration. 4,8,10,18,19 (IV)

K. Blood warmers should be used for large-volume or rapid transfusions, exchange transfusions, patients with clinically significant conditions, and the neonate/pediatric population. Microwaves, hot water or another heat source, or devices not specifically designated and approved by the US Food and Drug Administration for warming blood should not be used (see Standard 30, Blood and Fluid Warmers). 1,4,8,11,19,20 (V)

L. The nurse should be aware that external compression devices, if used, should be equipped with a pressure gauge, totally encase the blood bag, and apply uniform pressure against all parts of the blood container. A blood pressure cuff should not be used as it is unable to apply uniform pressure. 4,9 (V)

M. The nurse should check the blood bag for any signs of contamination (ie, clumping, gas bubbles) and return it to the blood bank if any contamination is observed or if any questions are raised about the blood component. 4,11 (V)

N. The nurse should have an appropriate level of knowledge and skill in identification, detection, and management of adverse transfusion events. Adverse events can be classified into immunologic and non-immunologic categories (ie, transfusion-related acute lung injury [TRALI] and iron overload). 1,3,5,6,14,21-32 (V)
O. In the event of an adverse reaction, the transfusion should be stopped, the LIP and blood bank notified, and interventions implemented.1,2,13 (V)

P. The nurse should monitor and assess the patient for 1 hour after the transfusion for signs and symptoms of delayed transfusion reaction. Educate the patient and caregiver about signs and symptoms of delayed transfusion reactions.4 (V)

Q. The nurse should be aware that for the administration of transfusion therapy in the alternative care setting, a well-planned program with safety features is required, in addition to trained and competent staff in the administration of blood components and patient monitoring; the ability to appropriately dispose of medical waste; immediate access to the LIP by phone; another competent adult present and available to assist with patient identification and calling for medical assistance if needed; documentation showing no identified adverse events during previous transfusions; ability to transport blood product in cooling containers verified for correct temperature; and a well-designed patient and caregiver education process.5,34,35 (V)

R. Misidentification of the patient is one of the most important factors in transfusion errors. Barcoding systems have been found to improve compliance and decrease errors during the transfusion process.36-38 (V)

REFERENCES


67. MODERATE SEDATION/ANALGESIA USING INTRAVENOUS INFUSION

Standard

67.1 The administration of moderate sedation/analgesia using intravenous (IV) infusion shall be initiated upon the order of a licensed independent practitioner (LIP) in accordance with the rules and regulations promulgated by the state’s Board of Nursing, state and federal regulations, standards for sedation by nonanesthesiologists, and organizational policies, procedures, and/or practice guidelines.

67.2 Moderate sedation/analgesia using IV infusion shall be provided only in a setting with appropriate equipment for administering therapy, monitoring the patient, and managing complications.

67.3 The nurse shall be competent in the administration of moderate sedation/analgesia using IV infusion and in airway management and resuscitation.

67.4 An emergency cart and reversal agents shall be immediately accessible, and personnel shall be available with expertise in airway management, emergency intubations, cardiopulmonary life support, and management of potential complications.

Practice Criteria

A. The nurse should be knowledgeable about medications and reversal agents for moderate sedation/analgesia, as well as competent in airway management and resuscitation through age-appropriate cardiac life support validation.1-3 (V)

B. Vascular access should be initiated, if not already available, and maintained throughout the procedure and recovery period.1,5,6 (V)

C. The patient receiving moderate sedation/analgesia by IV infusion should be continuously monitored throughout the procedure by a nurse, and one who is other than the person performing the procedure.1,2,4,5 (V)

D. The nurse should provide patient and caregiver education prior to, and reinforcement after the procedure, about the sedation/analgesia infusion; procedure; information about any restrictions related to eating or driving; signs and symptoms of complications related to the infusion site and the procedure; emergency instructions; and contact phone number.7,12 (V)

E. The moderate sedation/analgesia infusion and procedure should be documented in the patient’s permanent medical record including, but not limited to, patient identification and verification; patient and caregiver education; informed consent; assessments; interventions; patient responses; and, if needed, complications and interventions.3,8 (V)

REFERENCES


### 68. Administration of Parenteral Investigational Drugs

#### Standard

68.1 The administration of parenteral investigational drugs shall be initiated 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.

68.2 The nurse administering parenteral investigational drugs shall be competent and have knowledge of and protocols for prescribed therapies. This knowledge shall include, but not be limited to, appropriate drug dose, volume, concentration, adverse and expected reactions, and rate of delivery with regard to the patient’s condition and vascular access.

68.3 Informed consent of the patient or legally authorized representative shall be confirmed prior to the administration of these agents and shall be documented in the patient’s permanent medical record.

#### Practice Criteria

A. The nurse administering parenteral investigational drugs should have available information including, but not limited to, drug information for all study medications, including formulation; drug stability; storage requirements; administration information; pharmacologic indications; actions; side effects; route and rate of delivery; dosage and dilution; known toxicities; and potential complications and interventions.1-3,8 (V)

B. Documentation of the informed consent process prior to the administration of parenteral investigational drugs should include, but not be limited to, patient identification and verification; education; informed consent; assessment; adverse reactions and interventions; anticipated patient response to therapy; and monitoring.1-3,8 (V)

C. The nurse shall ensure that all aspects of risk evaluation and mitigation strategy (REMS) related to the investigational drug are followed. This may include, but not be limited to, special labeling requirements, medication guides, communications planning, elements to ensure safe use, and implementation system.1-3,8 (V)

D. The nurse administering the parenteral investigational drug should be aware of potential adverse events and report any adverse event to the sponsor investigator (see Standard 15, *Unusual Occurrence and Sentinel Event Reporting*).1-3,8 (V)

#### REFERENCES


Illustrations

Figure 1 Veins of the head and neck.
Figure 2 Principal veins of the body.
Figure 3 Superficial veins of the upper limb.
Figure 4 Superficial veins of the lower limb.
Add-on Device. An additional component such as an inline filter, stopcock, y-site, or needleless connector that is added to the administration set or vascular access device.

Administration Set. A device used to administer fluids from a container to a vascular access device.

Admixing. The preparation or compounding of medications.

Advanced Practice Nurse (APN). A nurse practitioner, clinical nurse specialist, nurse anesthetist, or nurse-midwife.

Adverse Event. Any unintended or untoward event that occurs with a patient receiving medical treatment; can be related to medications, products, equipment, and procedures.

Air Embolism. The presence of air in the vascular system.

Airborne Precautions. Methods used to prevent transmission of infectious agents that remain infectious over long distances when suspended in the air; examples include measles (rubeola), varicella zoster virus infections, Legionella infection, disseminated zoster, and tuberculosis.

Allen Test. A test performed on a radial artery prior to arterial puncture to ascertain adequate arterial perfusion.

Ambulatory Infusion Device. An electronic infusion device specifically designed to be worn on the body to promote patient mobility and independence.


Ampoule. A hermetically sealed glass medication container that must be broken at the neck to access the medication.

Analgesic Infusion Pump. An electronic microprocessing machine that can be programmed to deliver a prescribed amount of medication via continuous infusion, at specified intervals, or on demand by activation of a button; also referred to as a PCA pump.

Anastomosis. The surgical formation of a passage between 2 normally distant structures (eg, 2 blood vessels).

Anti–Free-Flow Administration Set. An administration set that stops the flow of intravenous fluid when removed from the infusion device, yet allows gravity flow when the user manipulates the regulatory mechanism.

Anti–Free-Flow Protection. Technology that prevents intravenous fluid from flowing into the patient when the administration set is removed from the flow-control device.

Anti-Infective Central Vascular Access Device (CVAD). A central vascular access device that is coated or impregnated with antiseptic or antimicrobial agents.

Antineoplastic Agent. Medication that prevents the development, growth, or proliferation of malignant cells.

Antineoplastic Therapy. In oncology practice, the term is used synonymously with cytotoxic (cell-killing) drug therapy.

Antiseptic. An agent that inhibits the growth of, or kills, microorganisms on the external surfaces of the body.

Antiseptic Ointment. A semisolid preparation that prevents the pathogenic action of microbes.

Apheresis. A process of separating whole blood into 4 components—plasma, platelets, red blood cells, and white blood cells—by removing one of the components and then reinfusing the remaining components. Types of apheresis include peripheral blood progenitor cell collection, leukapheresis, granulocyte collection, platelepheresis, plasmapheresis, and erythrocytophoresis.

Arterial Pressure Monitoring. Monitoring of arterial pressure through an indwelling arterial catheter connected to an electronic monitor.

Arteriovenous (AV) Fistula. A surgical anastomosis between an artery and a vein, creating an access for hemodialysis.

Arteriovenous (AV) Graft. A surgical structure connecting an artery and a vein with synthetic material to create an access for hemodialysis.

Aseptic Technique. A set of specific practices and procedures performed under carefully controlled conditions in order to minimize contamination by pathogens.

Assent. Agreement by an individual not competent to give legally valid informed consent (eg, a child or cognitively impaired person).

Authorized Agent Controlled Analgesia (AACA). A method of pain control in which a consistently available and competent individual is authorized by a licensed independent practitioner and properly educated to activate the dosing button of an analgesic infusion pump when a patient is unable, in response to that patient’s pain.
Bacteria. A microorganism that may be nonpathogenic (normal flora) or pathogenic (disease-causing).

Beneficence. An ethical principle referring to actions that promote the well-being of others.

Beyond-Use Date. The date added to a product label during the admixing process after which a product may not be used based on the fact that the manufacturer’s original container has been opened and exposed to ambient atmospheric conditions and may not have the integrity of the original packaging.

Biohazardous Waste. Blood, body fluids, body parts, or materials that have come in contact with blood, body fluids, or body parts and have the potential to carry bloodborne pathogens.

Biologic Agent. A medicinal preparation made from living organisms and their products, including sera, vaccines, antibodies, and antitoxins.

Biological Safety Cabinet. A ventilated cabinet using high-efficiency particulate air filtration, laminar air flow, and containment to provide protection against particulates or aerosols from biohazardous agents.

Biotherapy. A treatment using biological agents made by the process of genetic engineering.

Blood Warmer. An electronic device that raises refrigerated blood to a desired temperature during administration.

Body Surface Area. The surface area of the body expressed in square meters; used in calculating pediatric dosages, managing burn patients, and determining radiation and chemotherapy doses.

Bolus. A concentrated medication and/or solution given over a short period of time.

C

Caregiver Controlled Analgesia (CCA). A nonprofessional individual (eg, parent, significant other) who has been authorized to administer medications to the patient via a PCA pump.

Catheter. A tube for injection or evacuating fluids; hollow tube made of plastic, silastic, rubber, or metal that is used for accessing the body.

Catheter-Associated Venous Thrombosis. A secondary vein thrombosis related to the presence of a central vascular access device; includes extraluminal fibrin sheath, mural thrombosis overlying the fibrin sheath, and veno-occlusive thrombosis.

Catheter Clearance. The process to reestablish catheter lumen patency using medications or chemicals instilled into the lumen.

Catheter Dislodgment. A catheter movement into and out of the insertion site indicating tip movement to a suboptimal position.

Catheter Dysfunction. The inability to withdraw blood or infuse solutions via the catheter; may result from mechanical obstruction or catheter damage.

Catheter Exchange. The replacement of an existing central vascular access device with a new central vascular access device using the same catheter tract.

Catheter Malposition. The catheter tip is in a suboptimal position.

Catheter-Related Bloodstream Infection (CR-BSI). A bacteremia or fungemia in a patient with a vascular access device and no apparent source for the bloodstream infection other than the vascular access device. There must be at least 1 positive blood culture (obtained from a peripheral vein) in addition to clinical manifestations of infection (ie, fever, chills, and/or hypotension).

Catheter Stabilization Device. A device/system specifically designed and engineered to control movement at the catheter hub, thereby decreasing catheter movement within the vessel and risk of catheter malposition.

Central Line-Associated Bloodstream Infection (CLABSI). A primary bloodstream infection that occurs in a patient with a central vascular access device inserted within 48 hours prior to the development of the bloodstream infection.

Central Vascular Access Device (CVAD). A device that permits access to the central vascular system. A catheter is inserted with the tip residing in the lower one-third of the superior vena cava, or above the level of the diaphragm in the inferior vena cava.

Chemical Incompatibility. A change in the molecular structure or pharmacologic properties of a substance that may or may not be visually observed.

Clinical Decision Support System (CDSS). An electronic system that provides guidance on medications, dosage, formulary support, drug allergy, and other dosing parameters based on patient factors and/or nursing protocols.

Closed System. An administration system with no mechanism for external entry after initial setup and assembly.

Closed System Transfer. The movement of sterile products from one container to another in which the container’s closure system and transfer devices remain intact through the entire transfer process, compromised only by the penetration of a sterile, pyrogen-free needle or cannula through a designated closure or port to effect transfer, withdrawal, or delivery.

Color Coding. A system developed by manufacturers that identifies products and medications by the use of a color system. Color code systems are not standardized (since each manufacturer uses different color code systems).

Compatibility. Capable of being mixed and administered without undergoing undesirable chemical and/or physical changes or loss of therapeutic action.

Competence. The capability of the nurse to apply knowledge, critical thinking, interpersonal decision
making, and psychomotor skills to the performance of infusion therapy; maintenance of the required knowledge, skills, and attitudes to provide safe, competent care from the time of initial licensure.

**Competency.** An integration of behaviors in the varied circumstances of the work environment demonstrating the individual’s ability to perform the desired job-related activities and tasks.

**Competency Assessment.** The process of reviewing and documenting the individual’s demonstrated ability to perform a job, role, specific tasks, or other patient-care activities.

**Complex Needleless Connector.** A device that contains an internal mechanism that allows both the injection and aspiration of fluids; commonly referred to as a mechanical valve.

**Compound.** To form or make by combining different elements, ingredients, or parts; as to compound a medicine.

**Computerized Prescriber Order Entry (CPOE).** A computer-based system with varying levels of sophistication for automating and standardizing medication orders.

**Conscious Sedation.** A minimally depressed level of consciousness in which the patient retains the ability to maintain a patent airway independently and continuously and to respond appropriately to physical stimulation and verbal commands. The drugs, doses, and techniques used are not intended to produce loss of consciousness.

**Contact Precautions.** Methods used to prevent the transmission of infectious agents by direct contact (person to person) or indirect contact (medium to susceptible person).

**Contamination.** The introduction or transference of pathogens or infectious material from one source to another.

**Continuing Competence.** Maintenance of the required knowledge and skills to provide safe, competent care since the time of initial licensure.

**Corrective Action.** A defined plan to eliminate deficiencies.

**Criteria.** Relevant, measurable indicators.

**Cross Contamination.** The movement of pathogens from one source to another.

**Delivery System.** Product(s) that allows for the administration of medication. The system can be integral or can have component parts, and it includes all products used in the administration, from the solution container to the catheter.

**Disclosure.** The process of revealing to the patient and family all the facts necessary to ensure an understanding of what occurred when a patient experiences a significant complication from a medical error or mistake; information that is necessary for the patient’s well-being or relevant to future treatment.

**Disinfectant.** An agent that eliminates all microorganisms except spores.

**Distal.** Farthest from the center, or midline of the body or trunk, or from the point of attachment; the opposite of proximal.

**Distention.** An increase in size because of pressure from within; a stretching out or inflation.

**Document.** A written, printed, or electronic record containing original, official, or legal information.

**Documentation.** The act of recording information on a written, printed, or electronic form.

**Dome.** A plastic component used in hemodynamic monitoring.

**Dose Error Reduction System.** Electronic flow-control devices manufactured with drug libraries containing drug name and soft and hard infusion limits, designed to prevent errors in solution and medication delivery; often called “smart pumps.”

**Droplet Precautions.** Methods used to prevent the transmission of infectious agents from the respiratory tract.

**Durable Medical Equipment.** Equipment that may be considered property or capital equipment; it is reusable and cleaned between patient use; examples include intravenous poles, flow-control devices, and ultrasound machines.

**Dwell Time.** The suggested length of time a vascular access device may remain in place.

**E**

**Electronic Infusion Device (EID).** A programmable device powered by electricity or battery used to regulate infusion rate and volume.

**Emancipated Minor.** A child who has been granted the status of adulthood by a court order or other formal arrangement, such as marriage.

**Embolus.** A mass of clotted blood or other material, such as catheter fragments or air, brought by the blood from one vessel and forced into a smaller one, obstructing the circulation.

**Epidemiology.** A study of the distribution and determinants of health-related states and events in populations; defines and explains the interrelationships among the host, agent, and environment.

**Epidural Space.** The area surrounding the spinal cord and its coverings that may be used for the infusion of anesthetic agents or opioids.

**Epithelialized.** The healing of a wound or catheter site by the process of epithelial growth.

**Erythema.** A redness of skin along a vein track that results from vascular irritation or capillary congestion in response to irritation; may be a precursor to phlebitis.

**Exit Site Infection.** An erythema or induration within 2 cm of the catheter exit site without evidence of a bloodstream infection or purulent drainage.

**Expiration Date.** The date beyond which a manufacturer has designated a product not to be used.

**Extravasation.** The inadvertent infiltration of vesicant solution or medication into surrounding tissue.

**Extrinsic Contamination.** Contamination that occurs after the manufacturing process of a product.

**F**

**Failure Mode and Effects Analysis (FMEA).** A methodology for analyzing potential reliability problems.
Immediate-Use Medication. Medication that is administered within 1 hour of preparation.

Immunocompromised. Having an immune system with reduced capability to react to pathogens or tissue damage.

Immunohematology. The study of blood and blood reactions with respect to the immune system.

Immunologic Transfusion Reaction. Untoward effects of a blood transfusion that are not unexpected and in many cases are benign.

Implanted Port. A catheter that is surgically placed into a vessel, body cavity, or organ and is attached to a reservoir located under the skin.

Implanted Pump. A catheter that is surgically placed into a vessel, body cavity, or organ and is attached to a reservoir located under the skin that contains a pumping mechanism for medication administration.

Incompatible. Incapable of being mixed or used simultaneously without undergoing chemical or physical changes or producing undesirable effects.

Infection. The presence and growth of a pathogenic microorganism.

Infiltration. The inadvertent administration of a nonvesicular solution or medication into surrounding tissue.

Informed Consent. A person’s voluntary agreement, based on adequate knowledge and understanding of relevant information, to participate in research or to undergo a diagnostic, therapeutic, or preventive procedure. In giving informed consent, subjects may not waive or appear to waive any of their legal rights, or release or appear to release the investigator, the sponsor, the institution, or agents thereof from liability for negligence.

Infusate. A parenteral solution administered into the vascular or nonvascular systems.

Infusate-Related Bloodstream Infection. An infection caused by intrinsic or extrinsic contamination of the administration delivery system, infusing fluids, and/or medications.

Infusion-Related Hypersensitivity Reactions. Any sign or symptom experienced by the patient during the infusion of a pharmacologic or biologic agent that results in an immediate hypersensitivity reaction and anaphylactic or anaphylactoid response.

INR (International Normalization Ratio). A system established by the World Health Organization for reporting the results of blood coagulation tests.

Intermittent Infusion. The administration of intravenous medications or solutions at prescribed intervals.

Intradermal. Within or between the layers of skin.

Intravenous Fat Emulsion (IVFE). A preparation of lipids administered intravenously to maintain or support nutrition.

Intrathecal. Inside the spinal cord; within the spinal canal.

Intravenous Fat Emulsion (IVFE). A preparation of lipids administered intravenously to maintain or support nutrition.

Intrinsic Contamination. Contamination that occurs during the manufacturing process of a product.

Introducer. A needle used to control, direct, and place a catheter into a blood vessel.
Investigational Drug. An intravenous drug that has not been approved for general use by the US Food and Drug Administration but is under investigation in clinical trials to evaluate its safety and efficacy.

Iontophoresis. A noninvasive transdermal method of administering medication via an electrical charge.

Iron Overload. Abnormally high levels of iron that may cause life-threatening organ damage; a side effect of frequent blood transfusions.

Irritant. An agent capable of producing discomfort or pain along the internal lumen of the vein.

Isotonic. Having the same osmotic concentration as plasma.

Joint Stabilization. A device used to stabilize or restrict movement of the joint.

Just Culture. An environment that recognizes human potential for error and clearly defines acceptable behavior in a consistent manner.

Laminar Flow Hood. A contained workstation with filtered air flow; assists in preventing bacterial contamination and collection of hazardous chemical fumes in the work area.

Latex Precautions. Measures taken to prevent and eradicate latex allergy.

Latex-Safe Environment. A health care setting in which all products containing natural rubber latex intended for contact with mucosa or nonintact skin are removed or covered.

Legally Authorized Representative. An individual person, judicial body, or other body of individuals authorized under state and federal laws to consent on behalf of a legally designated person.

Licensed Independent Practitioner. An individual permitted by law to provide care and services without direction or supervision within the scope of the individual’s granted clinical privileges, license, and organizational policies.

Locking. The instillation of a solution into a vascular access device to maintain device patency.

Low-Frequency Tasks. Tasks that are performed infrequently (less than weekly).

Lumen. The interior space of a tubular structure, such as a blood vessel or catheter.

Manual Flow-Control Device. A manually operated device to control the flow rate of the infusion.

Mature Minor. Someone who has not reached adulthood (as defined by state law) but who may be treated as an adult for certain purposes, such as consenting to medical care. A mature minor is not necessarily an emancipated minor.

Maximal Sterile Barrier Protection. Equipment and clothing used to avoid exposure to pathogens, including mask, gown, protective eyewear, cap, sterile gloves, sterile drapes, and towels.

Mechanical Infusion Device. A device that uses a nonelectronic method to regulate infusion flow rates; examples include the elastomeric balloon device and the spring coil piston syringe device.

Mechanical Valve Device. A needleless connector with an internal mechanical device that provides a fluid pathway capable of infusion and aspiration.

Medication Reconciliation. The process of collecting and documenting complete and accurate medication information for each patient, including prescribed, over-the-counter, and herbal medications that the patient is currently taking.

Microabrasion. A superficial break in skin integrity that may predispose the patient to infection.

Microaggregate. A microscopic collection of particles, such as platelets, leukocytes, and fibrin that occurs in stored blood.

Microaggregate Blood Filter. A filter that removes microaggregates and reduces the occurrence of nonhemolytic febrile reactions.

Microintroducer. A dilator/introducer assembly used in the Modified Seldinger Technique for insertion of a peripherally inserted central catheter.

Micron. A unit of length equal to one millionth of a meter or one thousandth of a millimeter.

Microorganism. An extremely small living body not perceptible to the naked eye.

Mid-Arm Circumference. Measurement of the upper arm at a predetermined distance above the insertion of a peripherally inserted central catheter or midline catheter.

Midline (ML) Catheter. A vascular access device measuring 8 inches or less with the distal tip dwelling in the basilic, cephalic, or brachial vein, at or below the level of the axilla and distal to the shoulder.

Milliosmoles (mOsm). One thousandth of an osmole; osmotic pressure equal to one thousandth of the molecular weight of a substance divided by the number of ions that the substance forms in 1 L of solution.

Modified Seldinger Technique. A method of percutaneous insertion of a catheter into a blood vessel. A needle is inserted into the vein and a guidewire is threaded through the needle. The needle is removed, and a small nick is made in the skin. A dilator/introducer unit is threaded over the guidewire. The guidewire and dilator are removed, and the catheter is advanced through the introducer, followed by removal of the introducer. This technique reduces trauma to the vein as well as the risk of artery or nerve injury.

Needless Connector. A device designed to accommodate needleless devices for the administration of solutions into the vascular system.

Needless System. An umbrella term used to encompass all types of needleless devices or products.
Negative Displacement. Blood reflux into the catheter lumen upon disconnection with movement of valve mechanism, or when a fluid container empties and remains connected to the administration set.

Neonate. Pertaining to the first 4 weeks of life.

Neutral Connector. A needleless connector with an internal mechanism designed to prevent blood reflux upon connection or disconnection.

No-Touch Technique. A method to ensure the aseptic preparation of a peripheral insertion site. Once the site has been prepared, it is not to be touched unless sterile gloves are used.

Noncritical Equipment. Items that touch only intact skin, not mucous membranes, or that do not directly touch the patient.

Nonimmunologic Transfusion Reaction. An infusion reaction that is not related to the immune system including, but not limited to, circulatory overload, hypothermia, electrolyte imbalance, or iron overload.

Nonmaleficence. An ethical principle based on the Hippocratic maxim, *primum non nocere*, or “first, do no harm.”

Nonpermeable. Impervious to the passage of substances.

Nontunneled Central Vascular Access Device. A vascular access device inserted by puncture directly through the skin and to the intended location without passing through subcutaneous tissue.

Nurse-Controlled Analgesia (NCA). A nurse who has been authorized to administer medications to the patient via a PCA pump.

Nurse Practice Act. Legislation that defines the practice of registered nurses and licensed practical or vocational nurses within each state.

Nursing Diagnosis. A clinical judgment of a patient’s experiences and responses to actual or potential health issues.

Nursing Interventions. Concepts that link specific nursing activities and actions to expected outcomes.

Nursing Process. An orderly, logical approach to administering nursing care so that the patient’s needs for such care are met comprehensively and effectively; includes the steps of assessment, problem identification, planning, intervention, and evaluation.

O

Oclusion. The state of being occluded; the inability to infuse or inject fluid into a catheter; the inability to aspirate blood from a catheter or both.

Off-Label Use. The use of an approved drug in the treatment of a condition or for a purpose for which it has not been approved or cleared for use by the US Food and Drug Administration.

Older Adult. Greater than 65 years of age as defined by the American Society of Geriatrics.

Osmolality. The number of milliosmoles per kilogram of solvent.

Osmolarity. The number of milliosmoles per liter of solution.

Outcome. The interpretation of documented results.
Positive Displacement. The result of a small amount of fluid being pushed out of the end of the catheter lumen, clearing any blood reflux resulting from the disconnection of an administration set or syringe.

Pounds per Square Inch (psi). A measurement of pressure; 1 psi equals 50 mm mercury (Hg) or 68 cm water (H₂O).

Power-Injectable Central Vascular Access Device. A device capable of withstanding high-pressure injections up to 300 psi.

Practice Guidelines. Direct clinical care decisions based on the current state of knowledge about a specific disease state or therapy.

Precipitation. The act or process of a substance or drug in solution to settle in solid particles.

Preservative-Free. Containing no added substance capable of inhibiting bacterial growth.

Primary Catheter Malposition. A tip location of any central vascular access device found to be in a suboptimal position as determined by the initial chest radiograph.

Primary Continuous Administration Set. The main administration set used to deliver solutions and medications to the patient.

Primary Intermittent Administration Set. An administration set that is connected and disconnected with each use.

Problem-Prone Tasks. Tasks that are documented to produce issues for the patient, staff, or organization.

Procedure. A written statement of a series of steps required to complete an action.

Product Integrity. The condition of an intact, uncompromised product suitable for intended use.

Proximal. Closest to the center or midline of the body or trunk, nearer to the point of attachment; the opposite of distal.

Psychomotor. Characterizing behaviors that place primary emphasis on the various degrees of physical skills and dexterity as they relate to the thought process.

Purulent. Containing or producing pus.


Quality Improvement. An ongoing, systematic process for monitoring, evaluating, and problem solving.

Quantitative Culture Technique. A laboratory protocol used for isolating and identifying microorganisms in which a catheter segment is flushed or soaked in broth followed by serial dilutions and surface plating on agar.

Radiopaque. Impenetrable to x-rays or other forms of radiation; detectable by radiographic examination.

Risk Evaluation Mitigation Strategies (REMS). A strategy to manage known or potential serious risk associated with a drug or biological product. REMS can include a medication guide, patient package insert, a communication plan, elements to ensure safe use, and an implementation system; must include a timetable for assessment of the REMS.

Risk Management. The process that centers on identification, analysis, treatment, and evaluation of real and potential hazards.

Root Cause Analysis (RCA). The process for identifying factors that contribute to variations in performance.

Safety Device System. An engineered physical attribute of a device that effectively reduces the risk of bloodborne pathogen exposure.

Scale. A tool to measure gradations.

Sclerosis. Thickening and hardening of the layers in the wall of the vessel.

Secondary Catheter Malposition or Tip Migration. Tip location of any central vascular access device found to be in a different, suboptimal position following initial correct positioning.

Secondary Continuous Administration Set. An administration set attached to the primary administration set for a specific purpose, usually to administer medications; also known as a piggyback set.

Seldinger Technique. A method of percutaneous insertion of a vascular access catheter into a blood vessel. The vessel is accessed with a needle, and a guidewire is placed through the needle. The needle is removed. A catheter is placed into the vessel over the guidewire and advanced to the desired location. The guidewire is removed, leaving the catheter in place.

Semi-quantitative Culture Technique. A laboratory protocol used for isolating and identifying microorganisms in which a catheter segment is rolled across the surface of an agar plate, and colony-forming units are counted after overnight incubation.

Sentinel Event. An unexpected occurrence involving death, serious physical or psychological injury; serious injury specifically includes loss of limb or function.

Sharps. Any device or item having corners, edges, or projections capable of cutting or piercing the skin.

Simple Needleless Connector. A device with a straight fluid pathway that contains no internal mechanisms or moving pieces.

Single-Use Product. A device, such as a vial or syringe, that is intended for 1 entry or use.

Single-Use Vial. A bottle that is hermetically sealed with a rubber stopper and is intended for one-time use.

Site Protection. A method or product used to protect the catheter insertion site.

Six Sigma. A data-driven, fact-based philosophy of quality improvement that values prevention over detection.

Skill Validator. An individual with documented competency in a specific skill who is qualified by training.
and education to objectively assess the performance of others.

**Split-Septum Device.** A simple needleless connector with a prepierced septum that can be of blunt cannula or luer-lock design.

**Standard.** An authoritative statement enunciated and promulgated by the profession by which the quality of practice, service, or education can be judged.

**Standard Precautions.** Guidelines designed to protect workers with occupational exposure to bloodborne pathogens; all blood and body fluids are treated as potentially infectious.

**Statistics.** The systematic science of collection, organizing, analysis, and interpretation of numerical data.

**Sterile.** Free from living organisms.

**Stylet.** A rigid metal object within a catheter designed to facilitate insertion.

**Subcutaneous Infusion.** Administration of medications or solutions into the tissues beneath the skin.

**Surfactant.** A surface-active agent that lowers the surface tension of fluid.

**Surveillance.** Active, systematic, ongoing observation of the occurrence and distribution of disease within a population and of the events or conditions that increase or decrease the risk of such disease occurrence.

**Tamper-Proof.** Unable to be altered.

**Therapeutic Phlebotomy.** Removal of a specific volume of blood from a patient for the treatment of a specific condition or disease.

**Thrombolytic Agent.** A pharmacologic agent capable of dissolving blood clots.

**Thrombophlebitis.** Inflammation of the vein in conjunction with formation of a blood clot (thrombus).

**Thrombosis.** The formation, development, or existence of a blood clot within the vascular system.

**Thrombus.** A clot composed of fibrin and blood cells that is attached to a vessel. The thrombus may grow to surround a vascular access device, eventually obstructing the device as well as the vessel. Factors that promote the formation of a thrombus are vascular endothelial damage, venous stasis, and hypercoagulable states (Virchow’s Triad).

**Transducer.** An electronic device that converts one form of energy to another.

**Transfusion Reaction.** A complication of a blood transfusion in which there is an immune response against the transfused blood cells or other components of the transfusion.

**Transfusion-Related Acute Lung Injury (TRALI).** A potentially fatal acute lung injury characterized by noncardiogenic pulmonary edema following transfusion of blood products.

**Transmission-Based Precautions.** Methods used to protect health care workers when patients are suspected or known to be infected or colonized with infectious agents that cannot be controlled with standard precautions alone.

**Transparent Semipermeable Membrane (TSM) Dressing.** A sterile dressing that allows moisture to pass through the dressing away from the skin while preventing external moisture from contacting the insertion site of the vascular access device.

**Tubing Misconnection.** An inadvertent connection of a tubing to the wrong catheter, port, or lumen that may result in serious injury or death; examples include enteral or oxygen tubing connected to an intravenous administration set, or an intravenous administration set connected to a feeding tube.

**Tunnel Infection.** Tenderness, erythema, and/or induration 2 cm from the catheter exit site, along the subcutaneous tract of a tunneled catheter with or without a confirmed bloodstream infection.

**Tunneled Catheter.** A vascular access device whose proximal end is tunneled subcutaneously from the insertion site and brought out through the skin at an exit site.

**U**

**Ultrafiltration.** A method used to remove excessive amounts of sodium and water from patients with fluid overload, such as patients with congestive heart failure.

**Unusual Occurrence.** An event determined to have an impact on patient care, and/or any practice felt to be outside the norm of acceptable patient care according to the organization.

**Unusual Occurrence Report.** Documentation of an event that requires action because of potential or implied consequences.

**V**

**Vascular Access Device (VAD).** Catheters, tubes, or devices inserted into the vascular system, including veins, arteries, and bone marrow.

**Veracity.** A legal principle that states that a health care professional should be honest, give full disclosure to the patient, abstain from deceit or misrepresentation, and report known lapses of the standards of care to the proper agencies.

**Vesicant.** An agent capable of causing blistering, tissue sloughing, or necrosis when it escapes from the intended vascular pathway into surrounding tissue.

**Virchow’s Triad.** The pathophysiological explanation for the development of vascular thrombosis. The triad consists of the following components: vessel wall damage or injury, alterations in blood flow, and hypercoagulability of the blood.

**Visual Infusion Phlebitis (VIP) Scale.** A tool developed by the Royal College of Nursing in the United Kingdom to determine the degree of phlebitis.

**Visualization Technology.** A device that employs the use of sound waves or light to allow for the location and identification of blood vessels.
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