The 2016 Infusion Therapy Standards of Practice: Nurse Care vs Technology

Ann Lin
Regional Clinical Consultant
3M
Objectives

• Describe the methodology used to develop the Standards.
• Discuss at least three infusion therapy standards of practice.
• Identify factors used to make the decision for placement of a peripheral versus a central vascular access device (VAD).
• Explain how proper VAD care and maintenance procedures reduces the risk for VAD related complications.
• Identify strategies to integrate and implement the standards in your clinical setting.
INS Mission

- Develop and disseminate standards of practice
- Provide professional development opportunities and education
- Advance best practice through synthesis and research
- Support professional certification
- Advocate for the public
Infusion standards of practice prior to 2006

- Site selection
- Immobilization
- Cannula visible
- Peripheral sites changed every 3 days (including children)
INS Standards of Practice update in 2011

- Rotating IV site every 96 hours not addressed
- Visibility of insertion site
- Use of securement system to minimize phlebitis
Revision Process

• Work began in 2013: 2--day Kick--off meeting at INS offices
  • Review of 2011 Standards
  • Discussion -- major changes in organization of the document
  • Literature searching process
• Quarterly, then monthly, then weekly conference calls to review team member drafts of each Standard
  • Intensive literature searches, reading, and writing, then revisions to create 1st draft
  • Thousands of emails among team!
• 2015: 2 day meeting to review draft in preparation for peer review
• 2015 Summer: Peer review and final revisions made
Revision Process

- Interprofessional External Review
  - Draft sent to INS members, nurses in other specialties, physicians, pharmacists, lawyers, other types of clinicians, industry partners
  - ~800 comments received from 60 reviewers
  - Committee review and evaluation of each comment
  - Revised the applicable standard, additional literature searches if required
  - Finalized content for editorial review
“Infusion Nursing Standards of Practice” to the “Infusion Therapy Standards of Practice”

• ‘Infusion therapy does not “belong” to one group of clinicians, but it is the responsibility of any clinician who is involved in the practice.’
• Standard 3. Scope of Practice
  • Clear definition of roles, responsibility, and accountability for each clinician in accordance with regulations, organizational policy
  • Collaboration among the healthcare team
  • Address nurses (registered, practical/vocational, advanced practice), unlicensed assistive personnel, radiologic/respiratory technician/technologist/therapist, paramedics

2016 Table of Contents

• Standards – divided into 9 sections
• Appendices
  • Infusion Team Definition
• New illustrations
• Glossary greatly expanded
  • Definitional information from previous document moved to glossary

<table>
<thead>
<tr>
<th>2011</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURSING PRACTICE</td>
<td>Renamed: SECTION ONE: INFUSION THERAPY PRACTICE</td>
</tr>
<tr>
<td>1. Practice Setting</td>
<td>1. Renamed: Patient Care—revised to include standards, ethics, and policies and procedures</td>
</tr>
<tr>
<td>2. Neonatal and Pediatric Patients</td>
<td>2. Renamed: Special Patient Populations—includes neonatal, pediatric, pregnant, and older adult patients</td>
</tr>
<tr>
<td>3. Older Adult Patients</td>
<td>Deleted as separate standard and incorporated in Standard #2</td>
</tr>
<tr>
<td>4. Ethics</td>
<td>Deleted as separate standard and incorporated into Standard #1</td>
</tr>
<tr>
<td>5. Scope of Practice</td>
<td>3. Scope of Practice</td>
</tr>
<tr>
<td>6. Competency and Competency Validation</td>
<td>New Standard: Infusion Team</td>
</tr>
<tr>
<td>7. Quality Improvement</td>
<td>5. Competency Assessment and Validation</td>
</tr>
<tr>
<td>8. Research and Evidence-Based Practice</td>
<td>6. Quality Improvement</td>
</tr>
<tr>
<td>9. Policies, Procedures, and/or Practice Guidelines</td>
<td>Deleted as separate standard and incorporated into Standard #1</td>
</tr>
<tr>
<td>Patient Care</td>
<td>8. Patient Education</td>
</tr>
<tr>
<td>10. Documentation in the Medical Record</td>
<td>9. Informed Consent</td>
</tr>
<tr>
<td></td>
<td>10. Documentation in the Medical Record</td>
</tr>
<tr>
<td>11. Orders for the Initiation and Management of Infusion Therapy</td>
<td>Deleted</td>
</tr>
<tr>
<td>12. Patient Education</td>
<td>Moved to Section One—Standard #8</td>
</tr>
<tr>
<td>13. Informed Consent</td>
<td>Moved to Section One—Standard #9</td>
</tr>
<tr>
<td>14. Plan of Care</td>
<td>Deleted</td>
</tr>
<tr>
<td></td>
<td>11. Adverse and Serious Adverse Events</td>
</tr>
<tr>
<td></td>
<td>12. Product Evaluation, Integrity, and Defect Reporting</td>
</tr>
<tr>
<td></td>
<td>13. Medication Verification</td>
</tr>
<tr>
<td></td>
<td>14. Latex Sensitivity or Allergy</td>
</tr>
<tr>
<td></td>
<td>15. Hazardous Drugs and Waste</td>
</tr>
</tbody>
</table>
Format of the Standards: Standards versus Practice Criteria

• Standards
  • **Expectations** of practice applicable to infusion therapy in all settings
  • Glossary definition:
    • **Standard.** Authoritative statement enunciated and promulgated by the profession by which the quality of practice, service, or education can be judged.

• **Practice Criteria - Evidence-Based Recommendations**
  • Provide specific guidance in the implementation of the corresponding Standard
  • Each Practice Criterion is **rated** as reflecting the **strength of the body of evidence**
  • CHANGE: “Refer to” vs. “See” standard (cross referencing system)
  • It is important to recognize that sources of evidence include those from other professional organizations such as the CDC, the Society for Health Care Epidemiology of America (SHEA), Association for Professionals in Infection Control and Epidemiology (APIC), and the American Society of Parenteral and Enteral Nutrition (A.S.P.E.N.)
“Section” Standards

- Apply to all Standards in the section – ↓ repetition
- Section Standards included in Sections 4--9
- Example Section 7: VAD--Related Complications
  - “To ensure patient safety, the clinician is competent to recognize s/s of VAD--related complications during insertion, management, and removal, and appropriately intervene.”
  - “Prevention, assessment and management ...are addressed in organizational policies, procedures, and/or practice guidelines”
Evidence: Appraised & Rated

- Standards are *not* rated
  - Expectations of practice applicable to infusion therapy in all settings
- Practice Criterion are rated: Based on high quality evidence
  - Reflects the body of evidence available and retrievable at the time of review
  - Rating Scale: I, IA/P, II--V, Regulatory
  - References for each Practice Criterion are listed
## Strength of the Body of Evidence

<table>
<thead>
<tr>
<th>Strength of the Body of Evidence</th>
<th>Evidence Description*</th>
</tr>
</thead>
<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>Evidence from anatomy, physiology, and pathophysiology references 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 directions for use for products or services. Includes standard of practice that is generally accepted but does not have a research basis (eg, patient identification). May also be noted as Committee Consensus, although rarely used.</td>
</tr>
<tr>
<td>Regulatory</td>
<td>Regulatory 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>
</tbody>
</table>

*Sufficient sample size is needed with preference for power analysis adding to the strength of evidence.*
<table>
<thead>
<tr>
<th>Evaluating Evidence</th>
<th>Rating the Strength of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Highest quality used: Research</td>
<td>• When there is evidence</td>
</tr>
<tr>
<td>• Meta--analysis or systematic review</td>
<td>• Individual studies</td>
</tr>
<tr>
<td>• Individual studies and quality of the study</td>
<td>• Body of evidence</td>
</tr>
<tr>
<td>• Non--research</td>
<td>• When high level of evidence has inconclusive findings</td>
</tr>
<tr>
<td>• QI or clinical articles</td>
<td>• When the evidence is minimal</td>
</tr>
<tr>
<td>• Case reports or position papers</td>
<td>• Committee Consensus</td>
</tr>
<tr>
<td>• Textbooks or papers on anatomy / physiology</td>
<td>• Regulatory</td>
</tr>
</tbody>
</table>
“Evidence” of the Evolving Science of Infusion Therapy

• INS Standards 2011
  • Level I evidence – 3.8% of rankings
  • Level V evidence – 67%

• INS Standards 2016
  • Level I evidence – 5.8% of rankings
  • Level V evidence – 46%
  • 350 more references
A LOOK AT SELECTED STANDARDS IN EACH OF THE NINE SECTIONS

Selected excerpts of Standards and Practice Criteria
Section 1: Infusion Therapy Practice
Standard 1. Patient Care

• Standards
  • Applies to all settings where vascular access are placed, managed, or infusion therapies are administered
  • Practices established in organizational policies, procedures, practice guidelines, and/or standardized written protocols/orders
  • Attention to patient safety and quality
    • Individualized, collaborative, culturally sensitive, age appropriate
  • Ethical principles as foundation for decision—making
  • Decisions including device/product selection, are not subject to commercial or other conflicts of interest.
Standard 2. Special Patient Populations

**Standard**

2.1 To ensure patient safety, the clinician providing infusion therapy for special populations (neonatal, pediatric, pregnant, and older adult populations)* is **competent** in clinical management of such populations, including knowledge of **anatomical and physiological differences, safety considerations, implications for vascular access device (VAD) planning and management, and infusion administration.**
Standard 2. Special Patient Populations Practice Criteria

C. Considerations for neonatal and pediatric patients:

1. Recognize **physiologic characteristics** and **effect** on drug and nutrient selection; administration set selection (eg, free of Di[2-ethylhexyl] phthalate [DEHP]); dosage and **volume limitations** with reference to age, height, weight, or body surface area; pharmacologic actions, interactions, side effects, and adverse effects; monitoring parameters; and response to infusion therapy. 2,8-12 (V)

2. **Provide education to the mother regarding the potential impact and risks/benefits** of any medication use during lactation. 13 (V)

3. **Provide care with attention to growth and developmental level;** include nonpharmacological measures for promoting comfort and reducing pain and fears associated with infusion therapy procedures. 2,14,15 (V)
Standard 2. Special Patient Populations Practice Criteria

C. Considerations for neonatal and pediatric patients:

4. Assess for psychosocial and socioeconomic considerations that may affect the plan for infusion therapy. 2 (V)

5. Interact with parents, other family members, or surrogates as members of the patient’s health care team, including provision of patient education, with attention to age, developmental level, health literacy, culture, and language preferences (see Standard 8, Patient Education ). 2,16 (V)

6. Obtain assent from the school-age or adolescent patient as appropriate (see Standard 9, Informed Consent ). 2,17,18 (V)
Standard 4. Infusion Team

- Scope of service to meet patient and organization needs
- VAD insertion and management assigned to individuals/teams with infusion therapy education, training, and validated competency
- Peripheral catheter insertion by team = increased insertion success, decreased hospital acquired BSI, local infection, occlusions, and accidental removals
- Team managing VADs decrease BSI and related costs, phlebitis and infiltration, and increase patient satisfaction
- More studies needed to expand and increase level of evidence ranking
Standard 5. Competency Assessment & Validation

• **Standard**
  
  • As a method of public protection to ensure patient safety, the clinician is competent in the safe delivery of infusion therapy and VAD insertion and/or management within his/her scope of practice.
  
  • Clinician responsible and accountable for attaining and maintaining competence
  
  • Competency assessment and validation is performed initially and on an ongoing basis
Standard 8. Patient Education

• **Practice Criteria**
  
  • Effective educational plan based on identified goals
  
  • Selection of effective ways to validate appropriate knowledge and skill acquisition
  
  • Use of educational resources that are understandable (e.g., health literacy, cultural congruence)
  
  • Ensure web sites used are reputable, usable and accessible
  
  • Advise regarding benefits and challenges (e.g. safety, privacy, misinformation) associated with use of social media to obtain health advice and information
Section 2: Patient & Clinician Safety
Standard 11. Adverse/Serious Adverse Events

- Report adverse events or serious adverse events, or the risk thereof (i.e. “near misses”) associated with VADs or infusion products/devices to the licensed independent practitioner (LIP), appropriate departments.
- Use a standard document to provide objective and specific facts about the adverse event.
- Immediate investigation.
- Responsible disclosure of errors to patients.

Standard 13. Medication Verification

- Medication reconciliation.
- Special safeguards with high alert medications – e.g. standard orders, independent double checks.
- Use of technology when available – e.g. bar code, smart pumps.
Section 3: Infection Prevention
Standard 16. Hand Hygiene
Standard 18. Medical Waste and Sharps Safety
Standard 20. Transmission-Based Precautions
Standard 21. Disinfection of Durable Medical Equipment

From Section Seven: Complications
Standard 49. The clinician implements infection prevention measures with the goal of preventing infusion-and vascular access device (VAD)-related infections.
Standard 17. Compounding & Preparation of Parenteral Solutions & Medications

• New focus on IV push medications based on 2015 paper from the Institute of Safe Medication Practices
• Use IV push in ready-to-administer form
• Do not dilute or reconstitute IV push medications by drawing up in flush syringes (i.e. 0.9% saline)
• Do not withdraw from commercially available cartridge-type syringes
Section 4: Infusion Equipment
Standard 22. Vascular Visualization

• Standard
  • Vascular visualization technology is used in patients with difficult venous access and/or after failed venipuncture attempts

• Practice Criteria
  • Visible lights devices – cold light sources designed for vascular visualization to reduce risk of thermal burns
  • near-infrared (nIR) – aid in locating viable superficial peripheral sites, facilitate more informed decisions about vein selection (e.g., bifurcations, tortuosity of veins)
  • Ultrasound – short peripheral catheter placement in adults and children (I, III), midline catheter placement (V), CVADs (I)
  • With short peripheral placement, catheter length critical (12 cm) to improve survival, decrease risk of infiltration (III)
Standard 22. **Vascular Visualization**

**Practice Standard**

E. Use ultrasonography (US) for short peripheral catheter placement in adult and pediatric patients with difficult venous access. 2 (II)

1. In pediatrics, US significantly reduces the number of venipuncture attempts and procedure time. In adults, US studies show a trend toward fewer venipuncture attempts and reduced risk of peripheral catheter failure. There is significant variation between studies, including use of 1 versus 2 inserters, use of the static versus dynamic techniques, and experience level of the inserters within and between studies. Failure rates of US-guided peripheral catheters vary between studies, with hematoma being the most common complication. 21 (I)
Standard 23. Central Vascular Access Device (CVAD) Tip Location

• Standard
  • Tip location of a CVAD is determined radiographically or by other imaging technologies prior to initiation of infusion therapy or when clinical signs and symptoms suggest tip malposition
  • The CVAD tip location with the greatest safety profile in adults and children is the cavoatrial junction (CAJ)

• Practice Criteria
  • ECG methods – “real time” identification of placement (II)
  • Chest radiograph required in absence of technology used during the procedure (II)
  • Position tip in lower superior vena cava at or near CAJ (II)
  • Lower body insertion sites – inferior vena cava above level of diaphragm (IV)
Section 5: Vascular Access Device Selection & Placement
Standard 26. VAD Planning –
A critically important, fundamental Standard

• Standards:
  • “The appropriate type of VAD is selected to accommodate the patient’s vascular access needs based on the prescribed therapy or treatment regimen; anticipated duration of therapy; vascular characteristics; and patient’s age, comorbidities, history of infusion therapy, preference for VAD location, and ability and resources available to care for the device”
  • Selection of the most appropriate VAD occurs as a collaborative process among the interprofessional team, the patient, and the patient’s caregivers
  • Fewest number of lumens, least invasive, smallest outer diameter
VAD Planning translated into the Policy/Procedure Manual

- “..overarching goal ...choose the least invasive VAD that has the greatest likelihood of reaching end of the planned infusion therapy with the fewest number of replacements and the lowest rate of complications.”

- “Selection of the most appropriate VAD, and site of placement, are critical decisions that impact the clinical outcome as well as the patient experience and satisfaction with care.”

- “..a complex decision that requires critical thinking and analysis; the decision is generally not based on a single factor, such as the drug or solution category of vesicant or irritant.”
Policies and Procedures for Infusion Therapy: Neonate to Adolescent, 2nd edition

- Revised to align with the Infusion Nurse Society’s (INS’) 2016 Infusion Therapy Standards of Practice to serve as a guide to clinical practice.
- The title of this edition has been adapted to recognize the differences not only from the adult population but also within the group itself.
- The format for this edition has been expanded to include both policy and procedures.
- Additional sections have been added consisting of key points, assessment, patient/caregiver education and home care/alternate site implications.
Standard 26. VAD Planning / Short Peripheral/Midline Catheters

- Practice Criteria address:
  - Infusate characteristics, relatively short duration of infusion therapy, availability of sites, need for peripheral vein preservation (IV)
  - Midlines: Consider for longer duration of therapy (e.g. 1--4 weeks, consider replacement issues)
  - Use vascular visualization technology (near infrared, ultrasound) to increase success with patients who have difficult venous access
  - Short peripheral/midlines: Avoid with continuous vesicant, PN, infusates with osmolarity >900 mOsm/L (IV)
  - Smallest gauge – larger than 20 gauge more likely to cause phlebitis
  - Midline – Caution with intermittent vesicant administration
  - Avoid midlines: history of thrombosis, hypercoagulability, vein preservation
Standard 26. VAD Planning / Central VADs

• Practice Criteria:
  • Develop an evidence--based list of indications for CVAD use
  • Recognize risks associated with PICCs – increased incidence of venous thrombosis, CLABSI rates similar to other nontunneled CVADs
  • Use PICCs with caution – patients with cancer, critically ill
  • Measure vein diameter using ultrasound before insertion – choose catheter with catheter to vein ratio of 45% or less

I. Short Peripheral Catheters

B. Select the smallest-gauge peripheral catheter that will accommodate the prescribed therapy and patient need 1,4 : (V)

2. Consider a 22- to 24- gauge catheter for neonates, pediatric patients, and older adults to minimize insertion-related trauma. 1-4 (V)
Standard 27. Site Selection

• Practice Criteria -- Short Peripheral Catheters (adults)
  • Use site most likely to last the full length of the prescribed therapy, using the forearm to increase dwell time, decrease pain during dwell time, promote self-care, and prevent accidental removal and occlusions. (IV)
  • Do not use lower extremity veins unless necessary due to risk of tissue damage, thrombophlebitis, and ulceration. (IV)
  • Discuss arm preference for VAD site selection, including a recommendation to use sites in the nondominant arm. (V)
  • Ultrasound for short peripheral catheter placement in adult and pediatric patients with difficult venous access and/or after failed venipuncture attempts (see Standard 22, *Vascular visualization*). (I)
Standard 27. Site Selection

Practice Criteria

I. Peripheral Venous Access via Short Peripheral Catheters

B. For pediatric patients:

1. Use the venous site most likely to last the full length of the prescribed therapy, considering veins in the hand, forearm, and upper arm below the axilla. Avoid the antecubital area, which has a higher failure rate.
2. For infants and toddlers, also consider veins of the scalp, and if not walking, the foot.
3. Avoid the hand or fingers, or the thumb/finger used for sucking.
4. Avoid veins in the right arm of infants and children after procedures treating congenital cardiac defects that may have decreased blood flow to the subclavian artery. 5,12-15 (V)
Practice Criteria

B. Perform skin antisepsis prior to insertion:

1. Use povidone-iodine, >0.5% chlorhexidine in alcohol solution, or aqueous chlorhexidine solution.

2. Use both aqueous and alcohol-based chlorhexidine with caution in preterm neonates, low-birthweight neonates, and within the first 14 days of life, due to risks of chemical burns to the skin. Systemic absorption has been reported due to skin immaturity; however, systemic effects are not documented. Studies have not established the safest and most effective chlorhexidine solution in neonates. Use all chlorhexidine antiseptic agents with caution in infants under 2 months of age.

3. Avoid the use of tincture of iodine due to the potential deleterious effect on the neonatal thyroid gland. 4,6-11 (I)
Standard 33.
Vascular Access Site Preparation & Device Placement

• **Practice Criteria (CVAD)**
  
  • Implement **central line bundle** when placing CVADs (I)
  
  • Ensure **adherence to proper technique through use and completion of a standardized checklist** .. completion of checklist to be done by someone other than the CVAD inserter

  • Measure upper arm circumference before PICC insertion and when clinically indicated to assess presence of edema and possible DVT. Take measurement 10 cm above AC

  • **Safest available placement technique** (Seldinger, modified Seldinger, new techniques) – new procedures added to INS Policy and Procedure Manual
Standard 33. Vascular Access Site Preparation & Device Placement

• Practice Criteria

  • Preferred skin antiseptic agent >0.5% chlorhexidine in alcohol
  • Use with caution in premature infants and those under 2 months of age
  • Maintain aseptic technique with short peripheral catheter placement
  • New pair of disposable, non-sterile gloves in conjunction with “no-touch” technique – do not touch insertion site after skin antisepsis

• **Committee Consensus:** Consider increased attention to aseptic technique, including strict attention to skin antisepsis and use of sterile gloves....lack of evidence comparing BSI rates with or without use of sterile gloves, longer dwell times have raised concerns regarding risk for BSI ..furthermore contamination of nonsterile gloves is documented”

• Consider use of maximal sterile barrier precautions with midline catheter insertion (V)
Standard 33. Vascular Access Site Preparation & Device Placement

• Practice Criteria

• Make no more than 2 attempts at short peripheral catheter placement per clinician; limit total attempts to no more than 4. “Multiple unsuccessful attempts cause patient pain, delay treatment, limit future vascular access, increase cost, and increase risk for complications. Patients with difficult vascular access require a careful assessment of VAD needs and collaboration with the health care team to discuss appropriate options.” (IV)
# Device Planning

<table>
<thead>
<tr>
<th>Topic: What is patient’s need?</th>
<th>Device example:</th>
<th>How long will patient require device? Per standard 26 (page S51)</th>
</tr>
</thead>
</table>
| My patient requires peripheral vascular access | ![BD Autoguard™ Family of Shielded IV Catheters](image) | • PIV: 0 to 6 days  
• Midline: 1 to 4 weeks |
| My patient requires central vascular access (non-tunneled device) | ![Device Image](image) | • CVL: Emergent placement; remove when clinically indicated  
• PICC: based on length of treatment, medications |
| My patient requires central vascular access (tunneled device) | ![Device Image](image) | • Hickman, Broviac, Port-a-Cath or Hemodialysis catheter: Long term usage plan |
Section 6: Vascular Access Device Management
Section 6: Vascular Access Device Management

Standard 34. Needleless Connectors
Standard 35. Filtration
Standard 36. Add-on Device
Standard 37. VAD Stabilization
Standard 38. Joint Stabilization
Standard 39. Site Protection
Standard 40. Flushing & Locking
Standard 41. VAD Assessment, Care, Dressing Changes
Standard 42. Administration Set Changes
Standard 43. Phlebotomy
Standard 44. VAD Removal

More information about Section 6 - VAD Management can be found in 3M Health Care Academy online course with free charge.
Standard 34. Needleless Connectors

- **Practice Criteria**
  - Need for NC between the VAD hub and administration set used for continuous infusions is unknown. Primary purpose of NCs is eliminating needles and risk for needle stick injury with intermittent infusions
  - NCs are potential sites for *intraluminal microbial contamination* – need for careful adherence to infection prevention practices
  - Vigorous **mechanical scrub** prior to each access using 70% alcohol, iodophors, >0.5% chlorhexidine in alcohol
  - Duration of scrub time dependent on design of NC and properties of disinfectant -- **range 5--60 seconds** – more research needed
  - **Disinfectant supplies readily available at bedside**
Standard 34. Needleless Connectors

• Practice Criteria
  • Passive disinfection caps have been shown to reduce intraluminal microbial contamination and reduce CLABSI – use with peripheral catheters limited evidence but should be considered
  • One time use items-- discard after removal (V)
  • Committee Consensus: After removal, multiple accesses of the VAD may be required to administer a medication (eg, flush syringes and administration sets) and require additional disinfection before each entry. Scrubbing time, technique, and agents for disinfection of the needleless connector between subsequent connections is unknown due to a lack of research. Consider using a vigorous 5-- to 15—second scrub time with each subsequent entry into the VAD, depending upon the needleless connector design.
Catheter maintenance: intra-luminal protection for needleless connectors

- “Clinician is asking about needleless disinfection caps…”
- “How do I apply/use disinfection caps?”
- “Does the patient’s I.V. tubing ports need protection?”

**Infusion Therapy Standard 34**

- Use of **passive disinfecting caps** containing disinfection agent (IPA 70%) shown to reduce intraluminal microbial contamination and reduce rates of CLABSIs
- Use of disinfection caps on PIVs has limited evidence but should be considered
- Ensure disinfecting supplies are readily available at bedside to facilitate staff compliance with needleless connector disinfection (Level V)
Standard 37. VAD Stabilization

- Stabilize and secure vascular access devices (VADs) to prevent VAD complications and unintentional loss of access.
- Practice Criteria
  - Consider use of an engineered stabilization device (ESD)
  - **NEW Glossary Term: Engineered Stabilization Device.** A device or system placed subcutaneously or topically; specifically designed and engineered to control movement at the catheter hub.
  - Movement at the catheter hub increases the risk for phlebitis, infiltration, and risk for accidental dislodgement
  - Tape and sutures are not an effective alternative to an ESD
- Stabilization Options
  - Peripheral catheter
    - Integrated stabilization feature on the peripheral catheter hub in conjunction with a bordered polyurethane securement dressing
    - Standard, round hub catheter in combination with an adhesive ESD
    - Tissue adhesives – require further study
  - PICC options
    - Adhesive based ESDs are safer than sutures, reduce risk of complications
Standard 37. VAD Stabilization

- Practice Criteria
  - Do not use rolled bandages, with or without elastic properties, to secure any type of VAD because they:
    - Do not adequately secure the VAD
    - Can obscure signs and symptoms of complications
    - Can impair circulation or the flow of infusion.
  - The presence of skin disorders that contradict the use of medical adhesives (ie, pediatric epidermolysis bullosa; toxic epidermal necrolysis) may necessitate the use of tubular gauze mesh rather than adhesive ESD.
Standard 37. VAD Stabilization

• Practice Criteria
  • Be aware of the risk of medical adhesive related skin injury (MARS) associated with the use of adhesive--based ESDs.
  • Assess skin when the device is changed; anticipate potential risk for skin injury due to age, joint movement and presence of edema.
  • Apply barrier solutions to skin exposed to the adhesive dressing to reduce the risk of MARS. Do not use tincture of benzoin due to increased risk of MARS because it may increase the bonding of adhesives to skin causing skin injury when the adhesive--based ESD is removed.
Infusion Therapy Standard 37:

- Consider use of an **engineered stabilization device** to stabilize and secure VADs as inadequate stabilization and securement can cause unintentional dislodgement and complications requiring premature VAD removal.
- Sutures are associated with needle-stick injury, in addition to supporting the growth of biofilm and increasing the risk of catheter-related bloodstream infections (Level II, Regulatory)
- ESDs promote consistent practice among all clinicians, reduce VAD motion that can lead to complications, reduce interruption of needed infusion therapy, and may decrease cost of care (Level IV)
- Do not rely on VAD dressings (i.e. standard, non-bordered transparent semi-permeable membrane (TSM) dressings, gauze and tape dressings as a means for VAD stabilization as there is insufficient evidence supporting their benefits as stabilization devices (Level I)
Does my patient’s vascular access site need a stabilization or securement device?

Infusion Therapy Standard 37

- Do not rely on VA device dressings (standard, non-bordered transparent semipermeable membrane (TSM)) dressings, gauze and tape dressings as a means of stabilization as there is insufficient evidence supporting their benefits as stabilization devices (Level I)
- For PIV consider: (1) Integrated stabilization on PIV catheter hub with a bordered polyurethane securement dressing or (2) a standard round hub PIV in combination with an adhesive engineered stabilization device* (ESD) (Level III)
- Use of a bordered polyurethane securement dressing alone on a PIV with a traditional hub allowed more PIVs to reach 72 hours of dwell with fewer needing restarts; however, more data are needed (Level V)
Site Care: MARSNI and Barrier Solutions/Films

- How do I help my clinician prevent skin complications such as MARSNI?
- The patient has fragile skin?

Infusion Therapy Standard 37:

Practice Criteria A: Effect of adhesive ESD on PIV complication rates is unclear *more research is necessary* due to lack of RTC (Level IV)

- Assess skin when the device is changed; anticipate potential risk for skin injury due to age, joint movement, and presence of edema. (Level IV)
- Apply barrier solutions to skin exposed to the adhesive dressings to reduce the risk of MARSNI. (Level I)
- Change the adhesive-based ESD based on manufacturer's directions for use (Level IV)
- Decisions about most appropriate method for VAD stabilization and securement include patient age, skin turgor and integrity, previous adhesive skin injury and types of drainage from insertion site (Level IV)
TABLE 4.

Recommended Procedures for Applying and Removing Adhesive-Containing Products

**Application**

Ensure that the area is clean and dry.

Clip hair if necessary.

Apply an alcohol-free skin barrier film to protect at-risk skin.

Allow all preps to dry thoroughly before applying the adhesive product.

Apply the adhesive product without tension, pulling, or stretching. If desired, an edge could be folded over to form a tab to facilitate removal.

Smooth the adhesive product into place with firm gentle pressure, avoiding gaps and wrinkles.

Use gentle, stretchable adhesive products if edema/movement is anticipated, considering the direction of the stretch when securing the product.

If compression is needed, stretch the adhesive over the dressing only and press remaining tape onto skin without tension.
Standard 39. Site Protection

Practice Criteria

A. Specific patient populations including pediatric, elderly, or those with cognitive dysfunction are at risk of accidental VAD dislodgment or patient removal of the VAD. Consider **VAD site or line protection methods** (such as clear plastic domes) for the duration of the VAD, and if all other measures have been tried or have failed, physical immobilization devices (such as soft devices restraining a hand or hands). All patients may need temporary VAD site protection from water, other contaminants, or movement due to activities of daily living. 1-13 (V)
Standard 40. Flushing And Locking

• Standard
  • VADs are flushed and aspirated for a blood return prior to each infusion to assess catheter function and prevent complications
  • VADs are flushed after each infusion to clear the infused medication from the catheter lumen, thereby reducing the risk of contact between incompatible medications
  • VAD is locked after completion of final flush to decrease risk of intraluminal occlusion and CR—BSI depending on solution used
Standard 40. Flushing And Locking

Practice Criteria

G. Lock short peripheral catheters immediately following each use.
   2. In neonates and pediatrics, use heparin 0.5 units to 10 units per mL or preservative-free 0.9% sodium chloride (USP). Outcome data in these patient populations are controversial. 25,26 (II)

M. Apply the following recommendations for neonates and pediatrics.
   1. Use a continuous infusion of heparin 0.5 units per kg for all CVADs in neonates.
   2. Use continuous infusion of heparin 0.25 to 1 unit per mL (total dose of heparin 25-200 units per kg per day) for umbilical arterial catheters in neonates to prevent arterial thrombosis.
   3. Use heparin 5 units per mL, 1 mL per hour as a continuous infusion for neonates and children with peripheral arterial catheters (see Standard 30, Umbilical Catheters ). 29 (II)
Standard 41.
VAD Assessment, Care, & Dressing Changes

• Practice Criteria
  • Visually inspect system with each infusion intervention ... for clarity of the infusate; integrity of the system (ie, leakage, luer connections secure) and of the dressing; correct infusate; accurate flow rate; and for expiration dates of the infusate and administration set. (V)
  • CVADs and midline catheters: assess at least daily. (V)
  • Short peripheral catheters: assess minimally at least every 4 hours; every 1 to 2 hours for patients who are critically ill/sedated or have cognitive deficits; hourly for neonatal/pediatric patients; and more often for patients receiving infusions of vesicant medications. (V)
  • Assess skin underneath dressing. Anticipate potential risk for skin injury due to age, joint movement, and presence of edema. Be aware of the risk of MARSI associated with the use of adhesive--based engineered stabilization devices (ESD)
Standard 41. VAD Assessment, Care, & Dressing Changes

• Practice Criteria

• Committee Consensus Recommendation: Perform dressing changes on short peripheral catheters if the dressing becomes damp, loosened, and/or visibly soiled and at least every 5 to 7 days

• Use chlorhexidine-impregnated dressings over CVADs to reduce infection risk when the extraluminal route is the primary source of infection. Even when organizations show a low baseline central line-associated bloodstream infection (CLABSI) rate, further reduction in CLABSI rate has been demonstrated with use of chlorhexidine-impregnated dressings. The efficacy of chlorhexidine dressings in long-term CVAD use, beyond 14 days when intraluminal sources of infection are the primary source, has not been shown.

• Consider use of chlorhexidine dressings with peripheral arterial catheters.

• Consider bathing patients over 2 months of age with a 2% chlorhexidine preparation on a daily basis if other CLABSI prevention strategies have not been effective.
Standard 41. Vascular Access Device (VAD) Assessment, Care, And Dressing Changes

F. Perform skin antisepsis as part of the site care procedure:

1. The preferred skin antiseptic agent is >0.5% chlorhexidine in alcohol solution. 3-5,9,10 (I)

2. If there is a contraindication to alcoholic chlorhexidine solution, tincture of iodine, an iodophor (povidone-iodine), or 70% alcohol may also be used. 3,5 (I)

3. Allow any skin antiseptic agent to fully dry prior to dressing placement; with alcoholic chlorhexidine solutions, for at least 30 seconds; for iodophors, for at least 1.5 to 2 minutes. 3,5,11 (V)

4. Use chlorhexidine with care in premature infants and infants under 2 months of age due to risks of skin irritation and chemical burns. 3-5,12-14 (IV)

5. For pediatric patients with compromised skin integrity, remove dried povidone-iodine with sterile 0.9% sodium chloride (USP) or sterile water. 15 (V)
Catheter Care: Anti-microbial Protection

Infusion Therapy Standard 41
- Assess the Vascular Access Device skin junction site and surround area for redness, tenderness, swelling, and drainage by visual inspection and palpation through the intact dressing
- Use CHG impregnated dressings over CVADs to reduce infection risk when extraluminal route is primary source of infection (Level I)

“Do I need to apply a securement device AND dressing to my patient’s central line?”
## Summary

<table>
<thead>
<tr>
<th>Reduce the Risk of VAD Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prior to VAD Placement</strong></td>
</tr>
<tr>
<td>• Attention to VAD planning: Collaborative process, choose least invasive VAD, fewest number of lumens, consider use of visualization technology</td>
</tr>
<tr>
<td>• Attention to site selection: Avoid areas of flexion &amp; lower extremities</td>
</tr>
<tr>
<td><strong>During VAD Placement</strong></td>
</tr>
<tr>
<td>• Hand hygiene</td>
</tr>
<tr>
<td>• Skin preparation: Clean skin, appropriate skin antisepsis</td>
</tr>
<tr>
<td>• Aseptic technique</td>
</tr>
<tr>
<td>• Central line bundle interventions during CVAD</td>
</tr>
<tr>
<td><strong>During VAD Dwell time</strong></td>
</tr>
<tr>
<td>• Assessment</td>
</tr>
<tr>
<td>• Maintenance of an intact dressing</td>
</tr>
<tr>
<td>• VAD Stabilization ---joint stabilization if VAD must be in area of flexion</td>
</tr>
<tr>
<td>• Routine skin antisepsis/dressing changes</td>
</tr>
<tr>
<td>• Antiseptic dressings</td>
</tr>
<tr>
<td>• Needleless connector disinfection/caps</td>
</tr>
<tr>
<td>• Administration set changes/appropriate use of filtration</td>
</tr>
</tbody>
</table>
Standard 43. Phlebotomy

III. Blood Sampling via a Vascular Access Device

C. Use the discard or push-pull (ie, mixing) methods for obtaining a sample from CVADs. No studies of these specific techniques are found for peripheral or midline catheters. Apply these additional factors based on patient age and type of CVAD.

1. A 3-mL discard volume produces the same measurement outcomes when compared to a 5-mL discard volume in multiple types of CVADs in a pediatric population. The exception to this discard volume is coagulation studies obtained from a CVAD exposed to heparin. 51 (IV)

D. Short peripheral catheters

1. Consider obtaining a blood sample from an indwelling short peripheral catheter for pediatric patients, adults with difficult venous access, presence of bleeding disorders, and the need for serial tests. Infusing solutions should be stopped for at least 2 minutes prior to obtaining the blood sample; waste 1 to 2 mL of blood before obtaining the sample. 55-58 (IV)
Standard 44: Vascular Access Device (VAD) Removal

• Practice Criteria

• Remove the short peripheral catheter if it is no longer included in the plan of care or has not been used for 24 hours or more. (IV)

• Remove short peripheral and midline catheters when clinically indicated, based on findings from site assessment and/or clinical signs and symptoms of systemic complications. s/s of complications with or without infusion through the catheter include, but are not limited, to the presence of:
  • Any level of pain and/or tenderness with or without palpation.
  • Changes in color (erythema or blanching).
  • Changes in skin temperature (hot or cold).
  • Edema.
  • Induration.
  • Leakage of fluid or purulent drainage from the puncture site.
  • Other types of dysfunction (eg, resistance when flushing, absence of a blood return). (I)
Section 7: Vascular Access Device-Related Complications
Standards

- Address clinician competence in recognition of signs and symptoms of complications during insertion, VAD management, and VAD removal

Includes the following:

- Phlebitis
- Infiltration/extravasation
- Nerve injuries
- CVAD occlusion
- Infection
- Air embolism
- Catheter damage
- CVAD associated venous thrombosis
- CVAD malposition
Standard 45. Phlebitis

E. Use a standardized phlebitis scale or definition, which is valid, reliable, and clinically feasible. The population for which the scale is appropriate should be identified as adult or pediatric.

1. Two phlebitis scales have demonstrated validity and reliability in some studies and have been used for adult patients. Recent evidence recommends further study for valid and reliable assessment tools. 6,12,36-39 (I)
The Phlebitis Scale (Table 1) has concurrent validity, interrater reliability, and is clinically feasible. 8 (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>
<tr>
<td>5</td>
<td>All of the following signs are evident:</td>
</tr>
<tr>
<td></td>
<td>Pain along path of cannula</td>
</tr>
<tr>
<td></td>
<td>Erythema</td>
</tr>
<tr>
<td></td>
<td>Induration</td>
</tr>
<tr>
<td></td>
<td>Palpable venous cord</td>
</tr>
<tr>
<td></td>
<td>Pyrexia</td>
</tr>
</tbody>
</table>

Visual Infusion Phlebitis (VIP) Scale (Table 2) has content validity, interrater reliability, and is clinically feasible. 6,40 (IV)
Standard 47. Nerve Injuries

- Standard
  - During peripheral venipuncture and catheter dwell time, reports of paresthesia--type pain require immediate removal of the VAD.
  - During the insertion or dwell of CVADs, clinicians will maintain a high index of suspicion for nerve injuries when the patient complains of respiratory difficulty or unusual presentations of pain or discomfort.

- Practice Criteria
  - Review the patient’s medication list for systemic anticoagulant medication(s) prior to making a puncture in a vein or artery.
  - Do not use subcutaneous probing techniques or multiple passes of the needle or catheter when performing any puncture procedure as this increases risk of nerve damage. (V)
  - Immediate removal of a peripheral catheter when patient reports paresthesia type pain during dwell time – fluid accumulation can lead to nerve compression injury.
Standard 48. Central Vascular Access Device Occlusion

• Revised Standard
• Regularly assess for patency and proper function as defined by the ability to flush the catheter without resistance and the ability to yield a blood return
• NEW Glossary Term: Blood Return. A component of VAD patency assessment; blood that is the color and consistency of whole blood upon aspiration.

• Investigate/evaluate potential causes: external mechanical causes, precipitation based on the type(s) of administered medications or solutions, thrombotic occlusions based on visible blood in catheter or add-on devices, inability to aspirate blood, sluggish flow.

• Internal mechanical causes may include pinch-off syndrome, secondary CVAD malposition, and catheter-associated venous thrombosis
Implications

• As an evidence-based document, the INS Standards are influential in promoting the best practice for patients who require vascular access devices and infusion therapy in all practice settings and across the globe.

• The risk for complications (e.g. infection, air embolism, infiltration/extravasations, phlebitis, nerve injuries, catheter damage) is reduced with adherence to the Standards through:
  • Selection and placement of the most appropriate VAD for the patient
  • VAD placement using appropriate technology by competent clinicians
  • Appropriate VAD care and management by competent clinicians
  • Appropriate infusions via an appropriate VAD
  • Monitoring of the VAD and infusion therapy
So… what can you do to promote implementation in your clinical setting?

• Identify your own learning needs and seek out education
• Make sure key competency assessments are in place
• Act as a change agent: identify problems/inconsistencies in practice, ensure that policies and procedures are sound and based on standards
• Participate in the evaluation of infusion—related technologies and products
• Participate in quality improvement activities such as root cause analysis for investigations into sentinel events
• Participate in research activities that advance nursing knowledge and in critically evaluating, interpreting, and implementing research findings into practice – Ask questions!
Thank you
FREE Online Education -
1. Google search: “3M Healthcare Academy”
2. [http://us.3mlearning.co.uk/](http://us.3mlearning.co.uk/)