# Vascular Access Device Management and Infusion Administration


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# Disclosures

Speaker affiliations:

- Tricia declares that her previous employer, and current employer (Griffith University and University of Queensland) has received monies on her behalf form 3M, Bbraun,  BD Medical, and Medical Specialties Australia for educational consultancies
- Samantha Keogh declares that her employer (QUT) has received monies on her behalf form BD Medical and ITL Biomedical for educational consultancies.
- Barb Nickel is a consultant and member of speaker's bureau for BD Medical, and a member of an Advisory Board for Baxter Healthcare

All conflicts of interest have been resolved.

Contact hours are awarded after attending the educational activity and completion of the educational activity evaluation.

The Infusion Nurses Society is approved as a provider of continuing nursing education by the California Board of Registered Nursing, provider #CEP14209. Upon completion of this session, the attendee will be awarded 1 contact hour.

This certificate must be retained by the attendee for a period of 4 years.

# Consider Implicit Bias

Please take a moment to reflect upon how our attitudes or internalized stereotypes may impact patients that require infusate administration and vascular access device management.

“Implicit bias” means the attitudes or internalized stereotypes that affect nurses’ perceptions, actions, and decisions in an unconscious manner, that exist and often contribute to unequal treatment of people based on race, ethnicity, gender identity, sexual orientation, age, disability, and other characteristics that contribute to health disparities.

(CA Bill 241)

# Learning Objectives

At the conclusion of this session, participants will be able to:

- Describe evidence-based strategies for peripheral and central VAD securement.
- Discuss flushing and locking techniques to promote patency and reduce infection risk.
- Describe the current evidence guiding management of needleless connectors
- Identify strategies to provide accurate dose delivery of infusion medications and solutions

# Vascular Access Device Management

- Large Section including 10 critical Standards:
  - 33-Filtration
  - 34-Needleless Connectors
  - 35-Other Add Ons
  - 36-VAD Securement
  - 37-Site Protection and Joint Stabilization
  - 38-Flushing/Locking
  - 39-VAD Post-Insertion Care (new title)
  - 40-Administration Set Management
  - 41-Blood Sampling
  - 42-VAD Removal
- Standards in highlighted above will be reviewed today

- A critical related Standard is #57—Infusion Medication and Solution Administration
  - Multiple areas of overlapping content between Administration Set Management and Infusion Med/Solution Administration are now addressed in a table format:
    - Clinical situation
    - Factors to Consider
    - Practice Recommendation
  - This is included in the Medication/Solution Standard but cross—referenced where appropriate

# Standard 36: Vascular Access Device (VAD) Securement

## Standard

36.1 VADs are secured to prevent complications associated with VAD dislodgement and VAD motion at the insertion site.

36.2 Methods used to secure the VAD do not interfere with the ability to routinely assess and monitor the access site or impede vascular circulation or delivery of the prescribed therapy.

# VAD Securement - definitions

| Securement | Definition |
|---|---|
| **Adhesive securement device (ASD)** | an adhesive-backed device that adheres to the skin with a mechanism to hold the vascular access device (VAD) in place; a separate dressing is placed over the ASD. Both the dressing and ASD must be removed and replaced at specific intervals during the VAD dwell time. |
| **Integrated securement device (ISD)** | a device that combines a dressing with securement functions; includes transparent, semipermeable window, and a bordered fabric collar with built-in securement technology. |
| **Subcutaneous anchor securement system (SASS):** | a securement device that anchors the VAD in place via flexible feet/posts that are placed just beneath the skin; these act to stabilize the catheter right at the point of insertion. A separate dressing is placed over the SASS. The SASS does not need to be changed at regular intervals when the dressing is changed; it can remain in place if there are no associated complications. |
| **Tissue adhesive (TA)** | a medical-grade cyanoacrylate glue that can seal the insertion site and temporarily bond the catheter to the skin at the point of insertion and under the catheter hub. Depending on the chemical makeup, TA may be reapplied at each dressing change. Various formulations of TA for wound closure are commercially available including first generation N-Butyl-2- cyanoacrylate (quick drying, rigid/brittle), second generation 2-octyl-cyanoacrylate (longer dry time, more flexible) and N-Butyl-2octyl cyanoacrylate formation (increased tensile strength and flexibility) with an additional indication for vascular access securement. Each TA formulation has varied properties and the clinical decision to use should be based on research outcomes relative to the chosen product. |

# Standard 36: Practice recommendations

- Use any of the suggested securement products (ASD, TA, SASS) or an ISD in addition to the primary dressing
- Consider the patient (age, skin turgor, behavior, previous skin injury), device type (peripheral v central), length of dwell (day v prolonged), any drainage at insertion site, and environment when choosing securement options.
- Avoid use of sutures
- Evaluate a combination approach to securement
- Do NOT use rolls of nonsterile tape
    - Consider increased risk of pathogenic bacteria

# Practice recommendations – PIVC and midline

- Evaluate the use of securement options such as TA/ISD for enhanced catheter securement, particularly in high-risk patients e.g. difficult intravenous access (DIVA) and prolonged catheter dwell
  - Conflicting results in adults and pediatrics – consider patient population
  - ASD has not been found to effectively enhance PIVC securement
- Various formulations of TA – know the product and its potential risk profile
- Use a securement method in addition to the primary dressing or an ISD to secure midlines – committee consensus (URGENT - clinical trials required)

# Central venous catheters including PICC, tunneled cuffed and tunneled non-cuffed

- Use an ASD, ISD, SASS or TA for peripherally inserted central catheters (PICCs) as an alternative to sutures
- Increasing number of observational studies report superiority of SASS compared to ASD to secure PICC and tunneled non-cuffed CVC – more RCT's required to increase level of evidence.
  - One small RCT in adult patients demonstrated reduced dislodgement and nursing time to complete dressing change
- The National Institute for Clinical Excellence (NICE) in UK advocate for improved patient safety and cost benefit of SASS, particularly for use in > 15 days

# Central venous catheters including PICC, tunneled cuffed and tunneled non-cuffed

- Use TA as an adjunct to securement, seals the site and prolongs time to first dressing change
  - Consider the studies and product used when assessing utility in your patient cohort and complication profile.
- Remain vigilant in use of TA in neonatal population
  - existing evidence weak due to few prospective clinical trials
- Non-tunneled CVC securement remains challenging
  - Few studies
  - Use of TA and ISD, in conjunction with sutures remains most promising compared to ASD and traditional sutures alone - URGENT need for more robust clinical trials

# Arterial catheter securement

- Consider innovative securement strategies such as TA or keyhole dressing (foam bordered dressing with clear membrane window) in addition to the primary dressing
  - Both have demonstrated reduced failure compared to keyhole dressing alone or primary dressing

# Standard 36: Practice recommendations

- Do not use rolled bandages (with or without elastic) as they do not adequately secure the VAD and limits visibility and ability to assess insertion site
  - Use tubular sleeve to provide additional stabilization
  - Exception include patients with skin disorders such as pediatric epidermolysis bullosa, and burns – these conditions may necessitate use of tubular gauze mesh rather than conventional securement
  - Single-center observational study demonstrate effectiveness of SASS in this patient population; however, studies are small and should be used with caution in this vulnerable patient population.

# Standard 36: Practice recommendations

- Assess securement with each dressing change and reapply as appropriate
  - ASD requires replacement at each dressing change
  - TA should be reapplied if safe to do so.  Consider which formation of TA was used in various studies that report adverse skin complications with reapplication of TA.
  - SASS does not require replacement at each dressing change, however assess integrity of skin and device at each dressing change
- Be aware of catheter associated skin injury (use in conjunction with SOP 52 – catheter associated skin injury - CASI)
  - Risk factors include oedema, age, joint movement
  - Apply barrier solutions prior to dressing and securement to reduce the risk of CASI

# Standard 36: Practice recommendations

- Never re-advance a dislodged VAD into the vein
  - Secure VAD at current position
  - Assess the new tip location and determine appropriateness to continue (e.g. infusion therapy – central/peripheral)
  - Or replace the existing catheter

# Standard 38: Flushing and Locking

Definitions

- **Flushing** is the act of moving fluids, medications, blood, and blood products out of the vascular access device into the bloodstream; used to assess and maintain patency and prevent precipitation due to solution/medication incompatibility.
- **Locking** is the instillation of a solution into a vascular access device (VAD) used to maintain patency in between VAD use and/or reduce risk of catheter-associated blood- stream infection.
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# **Flushing & Locking:** Underlying theory

Regular flushing and locking aims to:

- Prevent mixing of incompatible drugs and fluids
- Reduce build-up of fibrin, proteins and biological material.
- Assist with assessment and early detection of complications

# **Flushing & Locking:** Practice recommendations

- Infection control, including of ANTT
- Device and patient assessment
- Single dose systems
- Commercially prepared prefilled syringes
- Optimal technique
- Optimal solution

# Device and patient assessment

- Gentle aspiration - blood return Y/N?
- Site assessment - localized pain, infiltration or inflammation
- Add-on device assessment – clamps, kinks or blockages
- Gentle injection - resistance Y/N?
- Site assessment - localized pain, infiltration or inflammation

Outcome:

- VAD patency established – continue use
- VAD patency not established – discontinue use, remove/replace

# Why prefilled syringes?

- Reduced risk of fluid or device contamination
- Improved medication safety due to pre-labelling
- Reduced reflux due to positive pressure plunger
- Reduced risk of cannula/vessel injury
  - syringe has 10mL properties with appropriate PSI regardless of volume
- Reduced risk of needlestick injury
- Time saving
- Reduced waste

# Flushing technique

- Positive-pressure technique - reduce reflux
- Correct flushing/clamping sequence - reduce reflux
- Gentle pulsatile technique
  - prevent build up fibrin, drug precipitate and disrupt biofilm
  - minimize vessel (endothelial) injury and platelet activation
- Frequency
  - pre & post medication or blood transfusion administration, or
  - PIVC – at least Q24h or consider removal
  - CVADs – variable, depending on type and use

# Flush and lock solution

- Flushing solution – 0.9% Sodium Chloride
- Locking solution
  - Adults – 0.9%Sodium Chloride
  - Pediatrics & neonates – 0.9% Normal Saline or Heparinized Saline (0.5 to 10 units/mL)
  - CVADs non-tunneled, PICCs
  - CVADs non-tunnelled, TIVADs
- Antimicrobial lock – high risk population, long term device

***Aspiration of all lock solutions prior to administration

# Standard 34: Needleless Connectors

## Definition and purpose:

- A luer-locking needleless connector is used to connect syringes and/or administration sets to a VAD hub or other injection site to eliminate use of needles and reduce needlestick injuries

# **Needleless connectors:** Practice recommendations

- Infection control, including of ANTT
- Product knowledge and familiarity
- Key characteristics
- NC decontamination
- NC replacement

# Needleless connector characteristics

- All connectors have some reflux – know your product!
- Key characteristics of NC associated with ⬇ bacterial transfer & biofilm formation
  - Split septum
  - Minimal seal length
  - Internal cannula
  - Low internal surface area and volume
  - Minimal displacement
  - Simple fluid pathway

# NC Decontamination

- Solution - 70% IPA or CHG & 70%
  - Consider access, drying time, cost device appropriateness
- Active decontamination
  - Vigorous manual scrub, straight line with pressure X2, 5-15 secs
- Passive decontamination
  - ⬆ compliance, ⬆ effectiveness, ⬇ complications
- Replace as clinically indicated or with admin set

# Standard 57: Infusion medication/solution administration

- Related content from Standard 40-Administration Set Management
  - **Sorption:**
    - **AD**sorption---interaction of the drug with the surface of the tubing/container
    - **AB**sorption—drug penetration inside of the infusion system
  - **Leaching:** solute becomes detached or extracted from the carrier substance
  - **Shedding:** particle release from an infusate container, tubing or filter
  - **Intermittent Administration Set:** primary or secondary set that is disconnected from the initial access point and left disconnected, then sterilely capped for reuse
  - **Intermittent Infusion:** small volume given by manual push or short (eg. 30-60 min) infusion
  - **Continuous administration set:** primary or secondary set that remains connected to the VAD for the duration of the infusion or until the scheduled set change occurs.
    - May be disconnected briefly and reconnected aseptically (eg blood sampling, transfer to a different lumen)
  - **Continuous infusion:** controlled method of administration over at least several hours or longer without interruption

# Standard 57:  Infusion medication/solution administration

- Related content from Standard 40-Administration Set Management
  - Administration Set Change:
    - Recommendations for admin sets for lipids, parenteral nutrition, blood/blood products unchanged
    - Regular infusate primary and secondary tubing:  change administration set according to manufacturer instructions for use, up to every 7 days or as clinically indicated (eg. contamination, new VAD, change in concentration)
    - Intermittent tubing remains every 24 hours

# Removal When Clinically Indicated

**Key Definition: Removal when clinically indicated**

- Effective removal when clinically indicated is predicated on:
  - Accurate and consistent VAD assessment based on patient and infusate risk
  - Adherence to ANTT principles (refer to Standard 19, *Aseptic Non Touch Technique, ANTT©*)
  - Early recognition and management of complications.
- Remove the VAD when:
  - It is no longer clinically needed; evaluation of this should occur at least daily and with each VAD assessment (inpatient), or with each outpatient event
  - There has been a suspected contamination of a Key-Site or Key-Part
  - It has evidence of:
    - a complication that cannot be readily resolved (eg, lack of blood return due to mechanical obstruction that cannot be consistently and readily restored) or
    - a complication that might indicate the need for VAD removal (eg, edema, erythema, leakage, skin color and temperature changes, patient report of pain or discomfort with and without flushing or infusion, palpable chord)
  - it is no longer functioning in an optimal fashion or contains substances that may impact patient safety (eg, precipitate, blood products that cannot be cleared by flush).

# Standard 57:  Infusion medication/solution administration

- Related content from Standard 40-Administration Set Management
  - Administration Set Change:
    - Regular infusate primary and secondary tubing:  change administration set according to manufacturer instructions for use, up to every 7 days or as clinically indicated (eg. contamination, new VAD, change in concentration)
    - Intermittent tubing remains every 24 hours
    - Replace solution containers and administration sets used for PN (TNA and amino acid/dextrose formulations) and lipids every 24 hours; replace administration sets used for ILE with each new infusion. Hang time for PN should not exceed 24 hours

| Secondary Intermittent Tubing | More than one concurrent infusion running | Patient mobility, confusion | High risk medication requiring immediate delivery | Multiple compatible medications infused in the same lumen of VAD | Syringe pump delivery |
|---|---|---|---|---|---|
| Small volume always on secondary tubing with compatible carrier | Trace/label all lines | Secondary securement measures | Always on a primary line with nothing attached | Take every precaution to reduce share volume | Optimize syringe size, tubing volume and drug library entries |
| Consider consistent process for all piggyback medications | Do not leave a paused medication connected to the VAD | Caution with entanglement, strangulation | Change tubing with change in concentration | Parallel extension set recommended | Ensure proper syringe pump height for accurate delivery |
| Ensure full dose is delivered | Monitor tubing length and infusion rate variances | Brief disconnection of lines should be done by trained caregiver | Avoid connection to hemodynamic lines to prevent bolus/delays | Recognize impact of changes of delivery for one medication on others | Consistent process to change tubing, syringe to ensure consistent delivery |

# Standard 57: Infusion medication/solution administration

# VAD Securement - References


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# California Board of Nursing: Implicit Bias

In accordance with Assembly Bill 241, 16 CCR 1451.2, as a Continuing Education Provider (CEP) for the California Board of Registered Nursing, all INS continuing educational sessions shall address at least one or in combination of the following:

(1)Examples of how implicit bias affects perceptions and treatment decisions of registered nurses leading to health disparities in health outcomes.

(2)Strategies to address how unintended biases in decision making may contribute to health care disparities by shaping behavior and producing differences in medical treatment along lines of race, ethnicity, gender identity, sexual orientation, age, socioeconomic status, or other characteristics.