DO YOUR VASCULAR ACCESS PRACTICES REFLECT CURRENT STANDARDS?

Christina Crapisi RN, BSN, VA-BC

Saint Luke’s Vascular Access Specialist
Independent Nurse Consultant for Genentech
“Our standards of care should not result in this type of complication for any of our patients.”

ER visit with ICU admission 5 days after discharge with Sepsis. Consult placed to Vascular Access for PICC placement. Line removed per ID after 6 weeks of OP antibiotic treatment.

ER visit with ICU readmission with Sepsis 9 days after PICC removal. Vascular access placed second PICC for another 6 weeks of OP antibiotics.
WE CAN DO BETTER

- Most common invasive procedure is the PIV with many placed in the ED

- Is this a life-saving medication or solution?

- Is a PIV the best vascular access?

- Does your facility have a vascular access specialist?

- Unfortunately, it is accepted practice that patients tolerate multiple sticks before access is obtained

- Vascular access is not adequately covered in nursing and medical schools. DIVAs!
STANDARDS FOR PIV INSERTION

How many attempts are acceptable?

Do you document each attempt?

DIVA: a person who exudes great style and personality with confidence and expresses their own style and not letting others influence who they are or want to be…

- Difficult IV Access (DIVA)
## COMPREHENSIVE-DIFFICULT IV ACCESS (C-DIVA) SCORE

<table>
<thead>
<tr>
<th>Score</th>
<th>Visual Appearance</th>
<th>Palpable Appearance</th>
<th>History of Difficult Access</th>
<th>Extenuating Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Many visual veins</td>
<td>Many palpable veins</td>
<td>No difficulty</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Few visible veins</td>
<td>Few palpable veins</td>
<td>Some reported difficulty</td>
<td>Pediatric, Severity, Urgent needs</td>
</tr>
<tr>
<td>2</td>
<td>No visible veins</td>
<td>No palpable veins</td>
<td>Severe difficulty as evidenced by previous central lines or PICC's</td>
<td>Comorbidities, Emergency conditions</td>
</tr>
</tbody>
</table>

### Score Range
- 0-3: Low
- 4-5: Medium
- 6+: High

### Action
- 0-3: Obtain IV access
- 4-5: Obtain access with competent practitioner; consider VAS consult
- 6+: Consider emergency intervention (CVC, IO); consult VAS immediately

Derived from A-DIVA score by Van Loon, Puijn, Houterman, & Bouwman
VEIN TRAUMA

**Tunica Intima** - endothelial cells, phlebitis & platelet aggregation, thrombus

**Tunica Media** - nerves, dilatation & constriction – smooth muscle

**Tunica Adventitia** - contains vein

Use smallest gauge to accommodate prescribed therapy
WHO SHOULD GET A PIV?

- Irritant - Inadvertent administration of a non-vesicant medication or fluid into the surrounding tissue
- INS Guidelines is to assess at least every 4 hours

Osmolarity is less than 900 mOsml/L

Duration of therapy (less than 6 days)

Available vascular access sites

Intermittent vesicant therapy

- Vesicant - Inadvertent administration of vesicant medication or fluid into the surrounding tissue
- INS Guidelines is to assess minimally every hour
It is important to recognize that large infiltrations of non-vesicant medications or solutions may also be associated with severe tissue damage.

<table>
<thead>
<tr>
<th>RED LIST</th>
<th>YELLOW LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well-recognized vesicants with multiple citations and reports of tissue damage upon extravasation</td>
<td>Vesicants associated with fewer published reports of extravasation; published drug information and infusate characteristics indicate caution and potential for tissue damage</td>
</tr>
<tr>
<td>Calcium chloride</td>
<td>Acyclovir</td>
</tr>
<tr>
<td>Calcium gluconate</td>
<td>Amiodarone</td>
</tr>
<tr>
<td>Contrast media - nonionic</td>
<td>Arginine</td>
</tr>
<tr>
<td>Dextrose concentration $\geq 12.5%$</td>
<td>Dextrose concentration $\geq 10%$ to $12.5%$</td>
</tr>
<tr>
<td>Dobutamine</td>
<td>Mannitol $\geq 20%$</td>
</tr>
<tr>
<td>Dopamine</td>
<td>NaCl</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>Pentamidine</td>
</tr>
<tr>
<td>Norepinephrine</td>
<td>Pentobarbital sodium</td>
</tr>
<tr>
<td>Parenteral nutrition solutions exceeding 900 mOsm/L</td>
<td>Phenobarbital sodium</td>
</tr>
<tr>
<td>Phenylephrine</td>
<td>Potassium $\geq 60$ mEq/L</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>Vancomycin hydrochloride</td>
</tr>
<tr>
<td>Promethazine</td>
<td></td>
</tr>
</tbody>
</table>
WHO IS AT RISK FOR AN INFILTRATION OR EXTRAVASATION?

- Peripheral sites in the hand, wrist, foot, ankle, cubital fossa and upper arm veins
- Infusions of antibiotics or corticosteroids
- Current infection
- Altered mental status, agitation, sedation
- Impaired circulation issues - diabetes, lymphedema, lupus, peripheral neuropathy, PVD
- Difficult access - obesity, multiple venipunctures, PIV’s placed after first insertion
- Medications that alter pain sensation
- PIV’s indwelling for longer than 24 hours
- Use of deep veins with insufficient catheter length (lack of training)
- Length of injection or infusion time for vesicant medication
- When infusion pump continues to alarm
INFILTRATION  EXTRAVASATION  PREVENTABLE
PREVENTABLE
THE FOREARM IS THE BEST LOCATION FOR A PIV

- Increase dwell time
- Decrease pain with insertion
- Prevent accidental removal
- Decrease risk of occlusions

Antecubital area has high failure rate
NON COMPRESSIBLE THROMBUS FROM PIV

Abnormal Compression
Specially trained clinicians

Forearm vessels visible with ultrasound

Cephalic is superficial

Avoid basilic and brachial veins (midline recommended)

Need at least 50% of catheter within the vessel
CONTRAINDICATIONS FOR PIV PLACEMENT

Lymph node removal

Fistula or graft

End Stage Renal Disease (ESRD) - Use hand veins in non-fistula arm

Hemiparesis

Previous infiltration / phlebitis / trauma

Emergent?
PIV MAINTENANCE STANDARDS

Clinically indicated verses routine rotation

Dressing WNL?

• Change dressing including securement device if loose, soiled or compromised

Pain at site/flushing/medication infusion with or without palpation

Redness, swelling, infiltration, leaking of fluid from puncture site

Resistance with flushing

Remove if no longer needed
DRESSING DISRUPTION AND TAPE USE
PIV MAINTENANCE STANDARDS

Flush before and after use to maintain patency

Use a separate syringe for each lumen/luer access

Antiseptic cleaning wipes and disinfectant caps are single use only
DECREASE INFECTION RISK

Hand hygiene before glove application

Hand hygiene after glove removal

Wear clean gloves when working with vascular access devices

Recommend removal of PIV with central line

SLH Vascular Access Team places USG-PIVs under sterile conditions
• NOT central: 8 or 10 cm in length (3-4 inches)
• Dwell time: 29 days
• Dressing changes: Weekly / PRN
• Phlebotomy: Intermittent
• Power injectable
• Sterile procedure (max barrier)
• Frequent assessments
INFUSION NURSE SOCIETY MIDLINE GUIDELINES

Consider infusate characteristics

Duration of treatment

Medication well tolerated by peripheral veins

Don’t use for continuous vesicant therapy or TPN

Use caution with intermittent vesicants

Use caution because of undetected extravasations

Avoid midline placements when patients have ESRD
WHAT DO ALL THESE LINES HAVE IN COMMON?
PERIPHERALLY INSERTED CENTRAL CATHETER (PICC) 
VERSUS CENTRAL VENOUS CATHETER (CVC)
WHO SHOULD GET A CENTRAL LINE?

Clinically unstable patient with multiple infusates (Noncytotoxic Vesicant List)

Invasive hemodynamic monitoring

Continuous infusion therapy (parental nutrition, fluids & electrolytes, meds, blood products)

Long term intermittent infusion therapy (Antibiotics)

Failed or difficult access including USG-PIV

Episodic chemotherapy more than 3 months
DISTAL SUPERIOR VENA CAVA (DSVC)
ATRIAL CAVAL JUNCTION (ACJ)

Use PCXR when there is no p-wave
CVC TIP LOCATION AND THROMBOSIS RISK
YOUR ASSESSMENT DETERMINES CVC TIP LOCATION

Zero is Zero

Each mark on the catheter is a centimeter

External length (cm) is the insertion site of the catheter

Antimicrobial patch covers about 1 cm

Compare external length to original documented length

Do not “push catheter back” into position (policy link)
<table>
<thead>
<tr>
<th>Line Properties</th>
<th>Placement Date/Time: 12/05/17 1803</th>
<th>Lot Number: rebu2235</th>
<th>Size (Fr): 5 F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line Necessity</td>
<td>Receiving high risk disease</td>
<td>Receiving high risk disease</td>
<td>Receiving high risk disease</td>
</tr>
<tr>
<td>Site Assessment</td>
<td>WDL:Dressing in Place</td>
<td>WDL:Dressing in Place</td>
<td>WDL:Dressing in Place</td>
</tr>
<tr>
<td>External Catheter Length (cm)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Lumen 1 Color</td>
<td>Red</td>
<td>Red</td>
<td>Red</td>
</tr>
<tr>
<td>Lumen 1 Status</td>
<td>Infusing</td>
<td>Infusing</td>
<td>Infusing</td>
</tr>
<tr>
<td>Lumen 1 Patency</td>
<td>Flushing with resistance</td>
<td>Flushing with resistance</td>
<td>Flushing with resistance</td>
</tr>
<tr>
<td>Lumen 2 Color</td>
<td>White</td>
<td>White</td>
<td>White</td>
</tr>
<tr>
<td>Lumen 2 Status</td>
<td>Normal saline locke</td>
<td>Normal saline locke</td>
<td>Normal saline locke</td>
</tr>
<tr>
<td>Lumen 2 Patency</td>
<td>Brisk blood return (3x)</td>
<td>Brisk blood return (3x)</td>
<td>Brisk blood return (3x)</td>
</tr>
<tr>
<td>Lumen 3 Color</td>
<td>Gray</td>
<td>Gray</td>
<td>Gray</td>
</tr>
<tr>
<td>Lumen 3 Status</td>
<td>Normal saline locke</td>
<td>Normal saline locke</td>
<td>Normal saline locke</td>
</tr>
<tr>
<td>Lumen 3 Patency</td>
<td>Brisk blood return (3x)</td>
<td>Brisk blood return (3x)</td>
<td>Brisk blood return (3x)</td>
</tr>
<tr>
<td>Dressing Type</td>
<td>Antimicrobial;Sterile;...</td>
<td>Antimicrobial;Sterile;...</td>
<td>Antimicrobial;Sterile;...</td>
</tr>
<tr>
<td>Dressing Status</td>
<td>Checked;Intact</td>
<td>Checked;Intact</td>
<td>Checked;Intact</td>
</tr>
<tr>
<td>Dressing Intervention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Next Dressing Change Due</td>
<td>12/19/2017</td>
<td>12/19/2017</td>
<td>12/19/2017</td>
</tr>
<tr>
<td>Needleless Connector Change Date Due</td>
<td>12/16/2017</td>
<td>12/16/2017</td>
<td>12/16/2017</td>
</tr>
<tr>
<td>Needleless Connector Changed</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Declotting</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PICC CONTRAINDICATIONS

- Lymph node removal
- Hemiparesis
- Previous infiltration/phlebitis
- Infection (pending blood cultures) CVC?
- Venous thrombus or failed bedside PICC attempts
- Pacemaker or defibrillator
- Fistula or graft (ESRD)
Acute vs Chronic renal disease

- GFR < 60
- Creatinine > 2.0
- Age and acuity of patient

If the patient has HD access, can they give medication after dialysis?

Avoid subclavian vein because risk of central stenosis

Avoid PICC or midline

Consider alternative access: PIV in hand or IJ

Renal clearance if PICC still requested

The gold standard for vascular access in hemodialysis patients is the arteriovenous fistula (AVF)

Arteriovenous grafts (AVG) made of synthetic or biological material are acceptable

Short and long-term tunneled dialysis catheters (TDC) should be avoided, if possible
**IMPLANTABLE VASCULAR ACCESS DEVICE (IVAD)**

**IN USE**
- Access with non-coring needle
- Must have power injectable port with power injectable needle infusion set for power injection
- No resistance with flushing and brisk blood return

**NOT IN USE**
- Access monthly
- Brisk blood return
- Flushes easily
- Pack with 5ml of the 10unit/ml Heparin upon de-access
TUNNELED LINE

Dacron cuff

Weekly/PRN dressing changes until site engrafted (6-8 weeks)

Remove suture 6-8 weeks

Cuff exposed? Replace line

NOT an emergency
CHANGE IMMEDIATELY IF DRESSING BECOMES...

Damp

Loosened

Visibly soiled

Moisture under dressing

Drainage

Blood present

Chlorhexidine 30-seconds scrub and dry
CVC MAINTENANCE STANDARDS

CVC location - IJ verses subclavian

Avoid sutures, recommend stabilization device (stat-lock)

Do not insert catheter to hub

Remove CVC when no longer needed

Avoid PIVs after CVC placement if possible

New tubing recommended after CVC placement
Flush and aspirate for blood return prior to infusions

Flush after infusions to clear blood and medication to prevent occlusions

Flush using a single 10 cc syringe

Use a pulsatile flushing method

All lumens must be patent. If not, treat early (3mls in 3 seconds, with the color and consistency of whole blood)

Troubleshoot
CENTRAL VENOUS CATHETER OCCLUSION

Is the occlusion non-thrombotic?
(NOT blood related)

Is the occlusion thrombotic?
(Blood related)

Always check for a non-thrombotic occlusion

- Check clamps and inspect catheter for kinks
- PICC: compare external centimeter length to external length when catheter was originally placed
- CVC: catheter retraction or tight suture
- IVAD: needle dislodgement
- Check PCXR for catheter tip location (if available)
- Incompatible medications infusing together
- Lipid residue
- Needleless connector debris
- Do sterile dressing change to check for catheter kink
THROMBOTIC OCCLUSIONS (BLOOD RELATED)

Suspect thrombotic occlusion with visible blood in catheter or add on device, inability to aspirate blood, or sluggish flow.

Use thrombolytic agent: Cathflo (Alteplase)

Adult concentration: 2mg in 2ml with Sterile Water

Do not shake – swirl until dissolved

If catheter function is not restored in 2 hours a second dose may be instilled

- **Partial occlusion** - the ability to infuse but not withdraw fluids or the presence of sluggish flow

- **Complete occlusion** - Inability to infuse or aspirate
INFECTION PREVENTION

A: Airborne Exposure
B: IV Solution
C: Needleless Connector
D: Catheter Hub
E: Skin of Patient
F: Skin of Caregiver

Count your access points including any PIVs

Dressing integrity (skin barrier)

We must rethink “just in case” vascular access
DISINFECT EVERY NEEDLELESS CONNECTOR/LUER LOCK

Alcohol swab
15-second scrub and allow to air dry

Chlorohexidine and Alcohol (Prevantics swab)
5-second scrub and allow to dry for 5 seconds

Areas where hub was placed on agar dish
After 2 days of growth

With Alcohol

With Out Alcohol
ONE-IN-FOUR WILL DIE AFTER CLABSI DIAGNOSIS

- Hand hygiene before clean gloves
- Hand hygiene before sterile gloves
- Everyone in room must have hat and mask
- Inserter must have sterile gown, hat, and mask
- Large sterile drape is used
- Chlorohexidine scrub for 30 seconds and allow to dry
WE CAN DO BETTER!

Rethink your own practice
Be accountable
Be a patient advocate

50 people die every day in American hospitals because of complications resulting from their vascular access devices.


• CDC-Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011


• www.kidney.org/professionals/KDOQI/guidelineupHDPDVA/va_guide2.htm

• www.avainfo.org