

# Neonatal Vascular Access: Pearls, Proficiency and Innovation in Practice

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## Abstract

Establishing vascular access is one of the most frequently performed procedures in the neonatal intensive care unit (NICU). Thus, it is imperative that we apply best-practice in our approach to these vital lines. This poster will address the some of the latest evidence in neonatal vascular access (peripheral and central) including vein preservation/selection, device options, current insertion recommendations, skin antisepsis and site dressing. Recommendations for vascular access training and professional advancement are outlined as well as the power of advancing practice through the impact of vascular access data collection to improve patient outcomes.

## Objective

Do you have neonatal vascular access questions but not enough time to find the answers? Don't like reading studies for the answers you need? You want and need the evidence but you would rather be taking care of your patients. This poster will provide a concise primer on what every clinician needs to know to improve their vascular access practice

## The evidence, experts and organizations

The current evidence presented in this poster is based on the extensive work of these groups that drive the vascular access and infusion therapy practice. The latest Infusion Therapy Standards of Practice by INS released in 2016 is extensively cited. INS has long provided the framework that guides clinical vascular access and infusion practice. For all patients, at any age, these are your "go to" resources for bringing excellence in vascular access. These organizations are truly multidisciplinary whose members include industry leaders, RNs, RCPs, dietitians, APRNs, and MDs with specialties in vascular access, anesthesiology, radiology and cardiothoracic surgery.

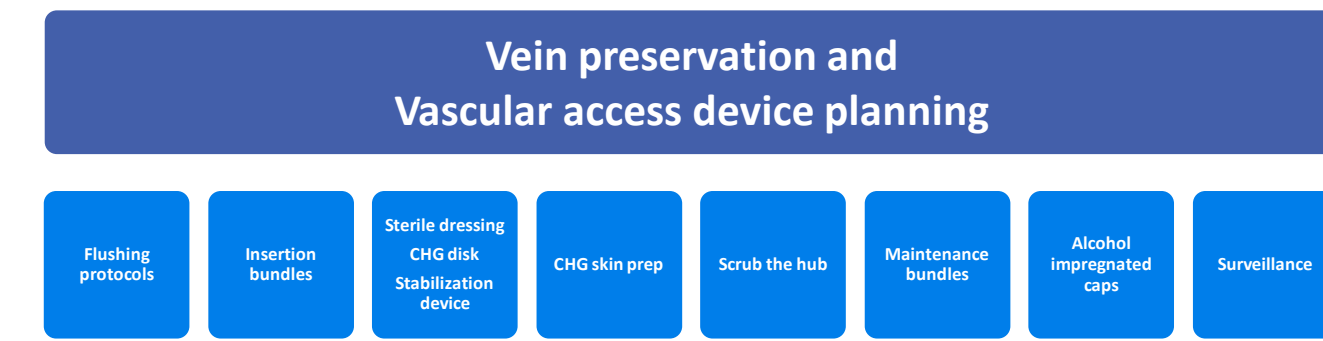


## Institutional process improvement

Standards > Policies > Practice = Alignment

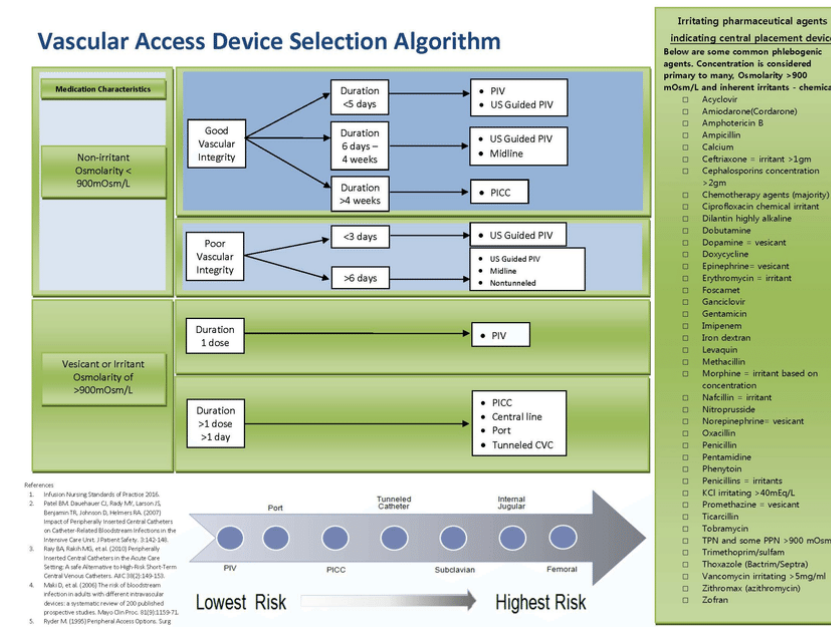
- Audit your unit's current vascular access process. Does it align with published evidenced-based guidelines? Are you using current available technology, equipment? Feedback should lead to improvement – new products/practice and an attitude of "is there a better way to do this?" Work with manufacturers. They are not the enemy and can help!
- Implement change, make it sustainable, work with impediments to change
- Consider an outside consultant to evaluate your practice
- Collect your peripherally inserted central catheter (PICC) data metrics and compare to the literature. Share and publish your outcomes!

## One standard of care for all vascular access devices



## The right venous access, the right patient, the right time

It is critical that your hospital utilizes competent clinicians in the use and placement of all vascular access devices with knowledge to assess each patient on **admission** as to the appropriate device. A vascular access device selection algorithm should be used.<sup>1,2</sup>

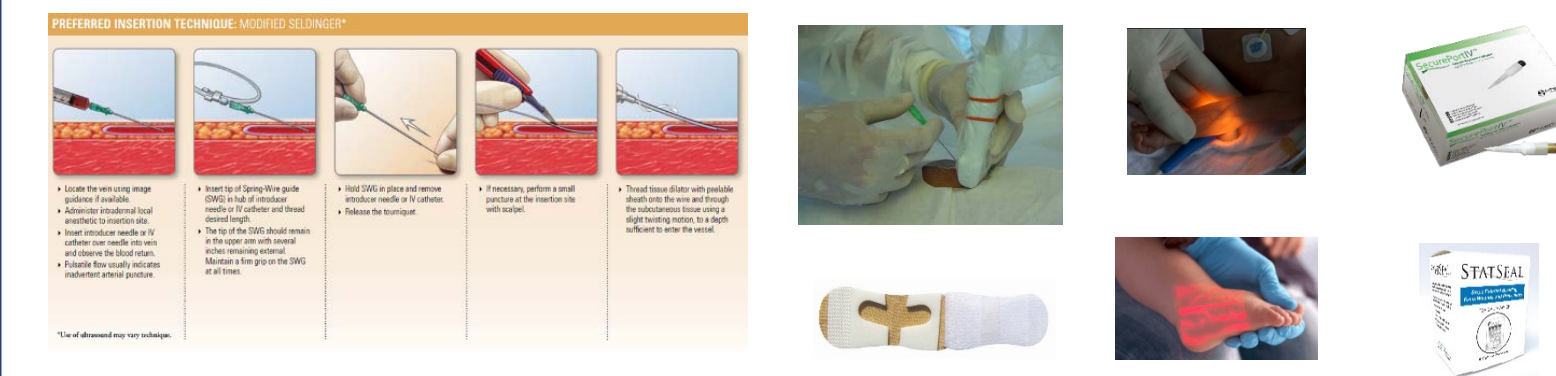


- Communicate between the treatment team the specific patient factors that affect vascular access
- Select the least invasive device with the lowest risk to last duration of treatment
- Select the device with the least number of lumens
- Insert using the Central Line Insertion Checklist using a Central Line Bundle
- Assess device **daily** to evaluate the health of the vessel, functionality, and need
- Remove the device as soon as no longer medically necessary<sup>2</sup>
- Do not routinely replace PICCs<sup>3</sup>
- Consider limiting umbilical venous catheter dwell time to 7 to 14 days, and umbilical arterial catheter to no more than 5 days<sup>3</sup>

## New technologies, new evidence, new products

Ten takeaways from the latest 2016 INS Standards of Practice:<sup>2</sup>

- Use the smallest gauge size for PIVs and PICCs to preserve vessel health. There is evidence that longer PIV catheters help reduce the risk of catheter failure and extend dwell time<sup>4</sup>
- Limit attempts: no more than **two** attempts per any one nurse and limit on the total number of attempts to **four**
- Properly secure: do not rely on just a transparent dressing. Use a stabilization device. It will decrease the risk of catheter migration, the risk of complications, and prolongs the life of the device. Use a skin barrier solution to reduce the risk of medical adhesive-related skin injury (MARS)
- Use CHG-impregnated dressing over central venous catheters (CVCs) and perform skin antisepsis with > 0.5 % chlorhexidine gluconate (CHG) for all vascular access sites (caveat for use in preterm infants)
- Consider passive disinfecting caps (needleless connectors) to maintain a closed IV infusion system
- Replace primary and secondary administration sets used to administer solutions other than lipid, TPN, blood products **no more frequently than every 96 hours**. The infusion set should be changed whenever a new PIV or CVC is placed
- All vascular devices are flushed prior to and after medication infusion and at least daily to assess functionality.
- Dressing: change CVC dressings at least every 7 days or when damp, non-adherent, or visibly soiled. Change gauze dressings every 2 days.
- Consider the use of a hemostatic agent at the PICC site after insertion to reduce bleeding if other methods (eg, pressure) fail after PICC insertion
- Use near-infrared or transillumination when venous access is difficult. Use ultrasound (US) guidance for PIV and US and MST for PICC placement



Ultrasound technology is standard for PICC insertions in children and adults with insertion success rates >90%. It reduces insertion related complications. Using US with MST further increases success with less vein trauma. MST and US is the emerging standard for neonatal PICC insertions and PIVs

## Avoiding PICC complications and tips for success

PICC post insertion complications are the lowest of all CVCs.<sup>5</sup> Complications can be avoided by using insertion and maintenance bundles, the proper device based on infant's weight and vein size, proper tip position, use of a securement device, and daily assessment of line function.

Trim the catheter: To the shortest possible length to prevent migration, improve securement, reduce resistance to flow. Follow the instructions for use (IFU) for the device.<sup>6</sup>

Proper tip placement: Non-central tips are 8x more likely to have a complication.<sup>10</sup> Subclinal thrombosis is 60% higher in tips that lie in axillary, brachiocephalic and subclavian veins in adults.<sup>7</sup> Below is target tip location for neonates:  
upper extremity PICC: lower 1/2 to 1/3 of SVC or RA/SVC junction<sup>2,6,8,9</sup>  
lower extremity PICC: IVC/ RA just above diaphragm. T8-T10<sup>6,10</sup>  
If you are unable to get central tip location pull the line back outside of the thoracic cavity a use it as a "midline". Manage the catheter as long peripheral IV rather than a central line.<sup>6</sup>

There are data that show PICCs have up to a 50% chance of inward migration within 24hrs after insertion as well as during the dwell time. Obtain an x ray to confirm tip placement after each line adjustment, within 24hrs after insertion, and at regular intervals during dwell time.<sup>2,6,11,12,17</sup>

Appropriate size catheter: The external diameter of the catheter should be < 1/3 the internal diameter of the vein if measuring using ultrasound.<sup>13</sup>

Mechanical phlebitis: Do not abruptly remove the line. Apply warm compresses. It usually resolved itself within 24-72 hours.<sup>14</sup>

Flushing: Perform at least daily to assess line function and prevent occlusion. Use a 5-10ml syringe (smaller syringe sizes can generate pressures as high as 300 psi) with volumes twice the volume of the catheter using pulse-pause technique.<sup>6</sup>

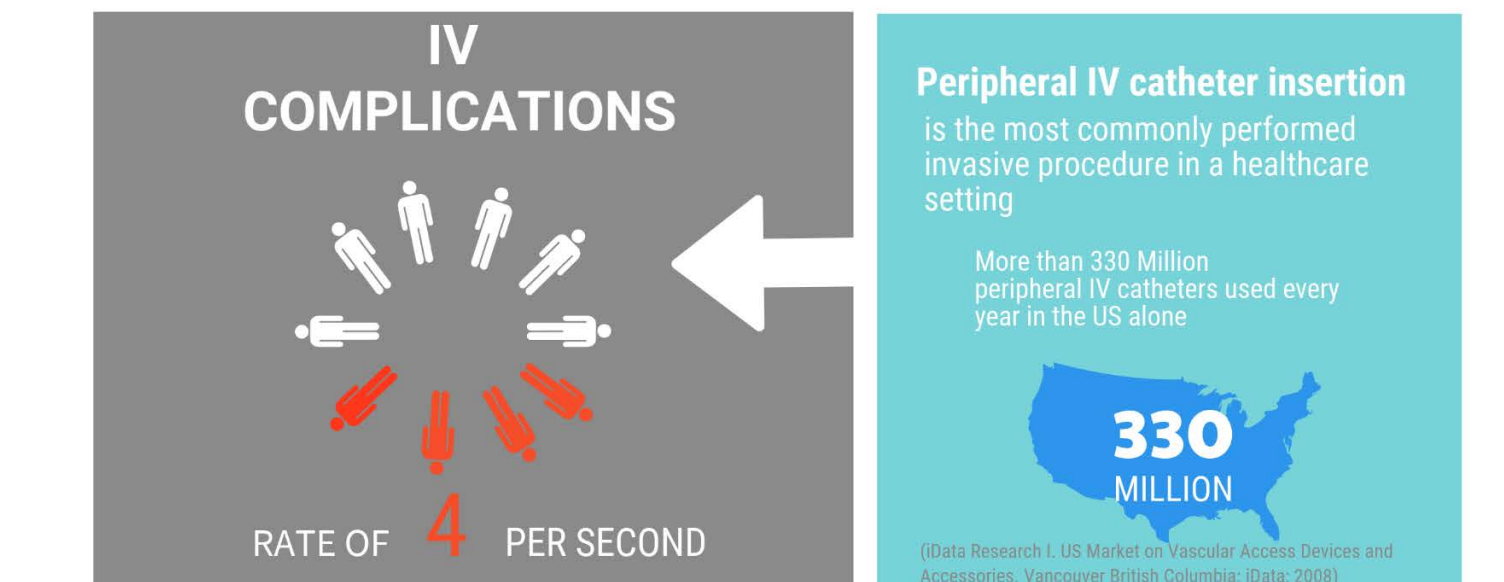
Catheter salvage is preferred over catheter removal for CVAD occlusions.<sup>2,1</sup> In 4 catheters may become occluded.<sup>15</sup> Alteplase works in restoring line function and is cheaper than inserting a new line. Use it! For precipitate occlusion use HCL.<sup>16</sup>

Blood sampling/transfusion: Anecdotal reports of success using 2 fr PICCs. This area needs more research

## Peripheral IVs

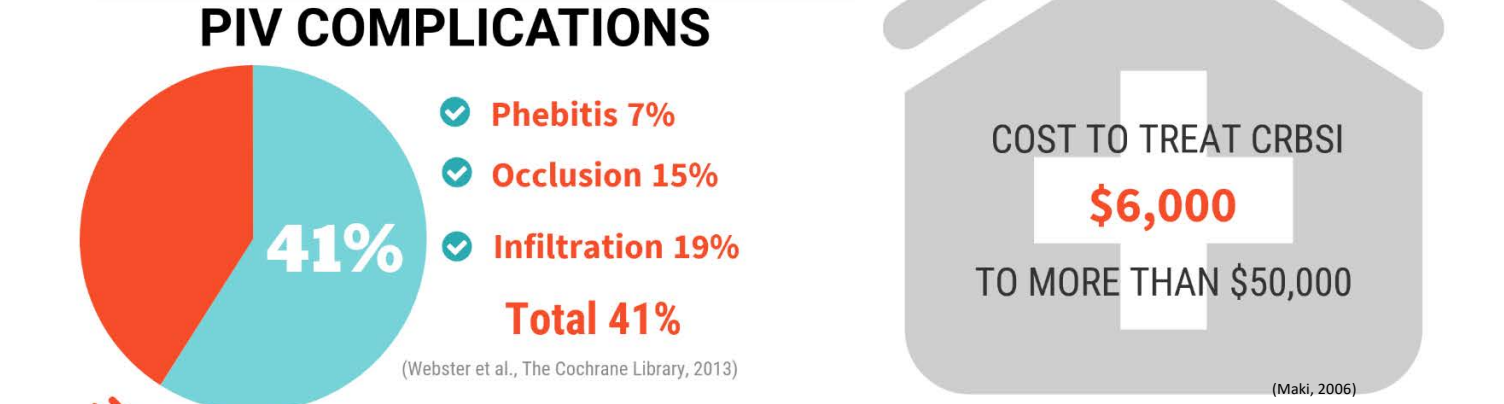
### REDUCE RISK ON EVERY IV START

PERIPHERAL IV CATHETER (PIV) COMPLICATIONS  
>40% of traditional peripheral IV catheters develop complications within 72 hours and require a "re-start" with another catheter before treatment is complete (Rickard et al., The Lancet, 2012)

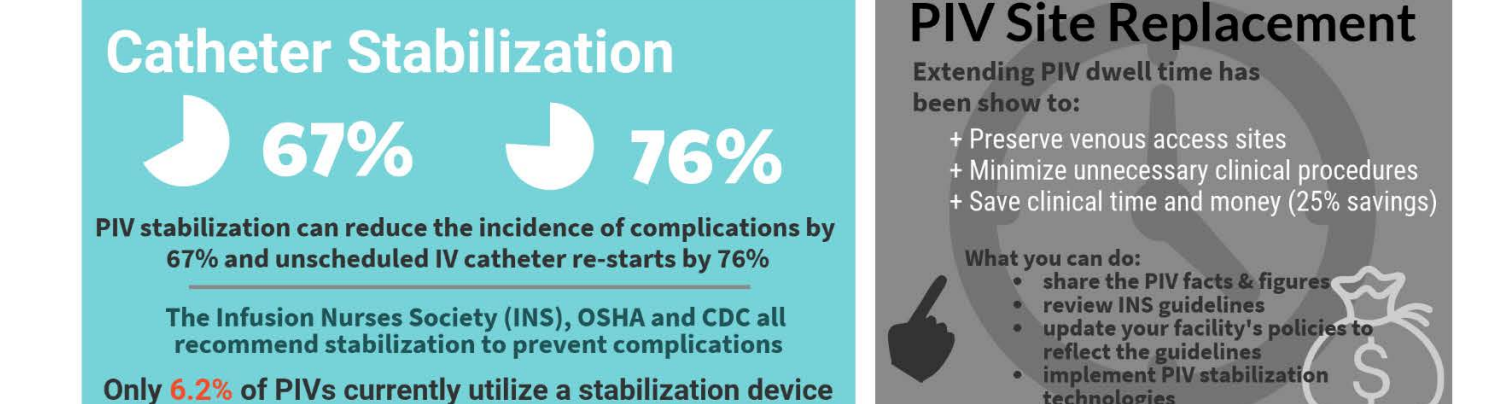


Peripheral IV catheter insertion is the most commonly performed invasive procedure in a healthcare setting  
More than 330 Million peripheral IV catheters used every year in the US alone  
330 MILLION  
(Data Research: US Market on Vascular Access Devices and Accessories, Vancouver British Columbia, 2008)

PATIENT IMPLICATIONS  
+ Discomfort and pain  
+ Prolonged hospitalization  
+ Extended use of IV antibiotics  
+ Possible surgical intervention  
+ And even death



41% of PIVs do not last 72 hours. Improved PIV stabilization is key to achieving longer dwell times



What you can do:  
+ share the PIV facts & figures  
+ review INS guidelines  
+ update your facility's policies to reflect the guidelines  
+ implement PIV stabilization technologies

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