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POSITION PAPER

Minimum Education and Training for Pediatric and Neonatal IV Insertion for all Clinicians



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Position Paper

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Introduction / Summary:

Intravenous (IV) insertion is a common procedure for hospitalized pediatric patients and first-attempt success rates range from 64% to 74% with an average of 2.1 attempts.^{1,2} Timely and successful access can be challenging in the pediatric patient due to small or fragile veins, younger age, obesity, and patient activity.³⁻⁶

Healthcare providers caring for pediatric patients require specialized education, training, and competencies for safe delivery of care.⁷⁻⁹ Blended learning strategies, which include evidence-based education and hands-on training, have been shown to be effective for initial and ongoing competency assessment.¹⁰ Establishing a vascular access curriculum to include patient assessment, vessel anatomy and physiology, proper device selection, vein selection, appropriate catheter size and length, imaging modalities, insertion techniques, securement, dressing, and documentation is essential.

Confirming competency in a simulated environment provides a safe environment to develop necessary technical and critical thinking skills.^{7,10} Knowledge of developmental levels, venipuncture pain management options, comfort hold, and distraction is necessary for pediatric and neonatal patients.¹¹

Background / Problem:

Pediatric and neonatal IV insertion requires a high level of skill for a successful procedure.⁶ Young patients report needle pain and fear as one of the most stressful times during a hospitalization.^{1,11} Education and IV insertion training is limited at many institutions for pediatric and neonatal patients. Specialized knowledge and critical thinking improve IV insertion success rates. Standardized education, training, and simulation have been shown to decrease the number of IV insertion attempts.^{9,10} Collaboration with the care team and provider on proper device selection promotes vessel preservation, reduces unnecessary procedures, reduces the use of resources and cost.³



In June 2020, The Michigan Appropriateness Guide for Intravenous Catheters in Pediatrics (miniMAGIC) established core concepts including vessel preservation, harm minimization, and inclusion of patient preference in device decision making.¹² The miniMAGIC guide provides criteria for appropriate device selection and should be considered as a guide for neonates, infants, children, and adolescents.¹²

Children experiencing needlestick pain benefit from procedural support. Distraction interventions are effective in reducing pain and distress and can be used in every setting a child would receive care. A wide variety of distractors are successful in supporting children and should be utilized.¹³⁻¹⁵ Despite a large body of evidence supporting its use to decrease pain and anxiety with procedures distraction is not consistently used for children.¹⁴

Different distractions are more effective when tailored to the appropriate developmental stage. An effective distractor stimulates the senses, is easily implemented, offers active engagement, and is interesting enough to compete with a potentially painful stimulus.¹⁶ Non-pharmacological interventions can be low cost, effective, and utilized by any healthcare worker. Parents can also be taught how to coach their children through a procedure, but the literature reports parents may not be as effective in distracting the child.^{13, 16}

The Association for Vascular Access (AVA) recommendations:

Practice Recommendations

Minimum education and training for the insertion of pediatric peripheral IV (PIV) catheters should include the following considerations:

1. Include appropriate device selection considerations by age and condition with understanding when it is and is not appropriate to use a PIV. (See sample Pediatric PIVC Minimum Competency Checklist.)
2. Utilize a training program that includes an evidence-based comprehensive overview of peripheral intravenous insertion techniques, complications, and assessment.
3. Initial skill competency of PIV insertion should be conducted in a simulated environment.
4. Essential components to training should include:
 - a. Assessment of the patient for appropriate vessels and site selection based on age, type and length of therapy, developmental level, activity, and patient preference.
 - b. Use of a standardized, evidence-based device algorithm to select the most appropriate device. Collaborate with care team, provider, and patient/family for shared decision making.
 - c. Pre-procedural education and preparation with patient and family for IV insertion. Plan should be individualized based on the age, developmental level, culture, and previous experiences with IV insertion.
 - d. Avoid veins in an area of flexion.



- e. Avoid veins in the lower extremity in crawling/walking patients.
 - e. Use of proper size IV catheter and length based on the vessel size, depth, and location.
 - f. Use of real-time vessel visualization modalities (ultrasound, near-infrared, transillumination technology) during IV insertion.¹⁷
 - g. Securement of IV catheter with manufactured securement products and dressings to reduce the risk of catheter complications.
5. Use of pharmacological (numbing cream, needle-free jet injection, vapocoolant spray) and nonpharmacological techniques to reduce anxiety and pain during venipuncture attempts. Distraction and comfort positioning techniques need to match the age and developmental level and culture of the child. Suggested baseline support modalities by patient age should include:
- a. Neonates and infants:
 - i. The environment of the infant and the intervention work together to decrease pain in infants and neonates. Reducing light and noise and clustering care for the infant helps support the patient.
 - ii. Non-nutritive sucking.
 - iii. Skin to skin contact.
 - iv. Swaddling the infant decreases pain responses.¹⁴
 - v. Mirrors, wave drums, rattles, and soft toys are useful tools to engage and distract the child.¹⁵
 - b. Toddler to preschool age:
 - i. Explaining the procedure and allowing the child to ask questions can be helpful to prep the child for a painful procedure.
 - ii. Active distraction includes blowing bubbles, interactive toys with light and sound, and interactive books.¹⁵
 - iii. Distracting interactive questions that engage the child's attention such as asking about family members, pets, favorite toys can help direct attention from the needlestick.¹⁴
 - iv. Having a parent hold the child in their lap can also provide support and comfort.
 - c. School-aged children
 - i. Age appropriate information can help a child better understand the need for the procedure.
 - ii. School-aged children do well when offered a choice when applicable such as where they want to sit and would they prefer to watch the procedure or look away.

iii. Breathing techniques, singing, blowing bubbles, or playing on an electronic device can help provide support.^{14, 15}

iv. Engaging the child in an interactive book such as a search and find book is also effective in diverting attention.

d. Adolescents

i. Older children benefit from distraction as much as younger children.

ii. Standardly offering distraction in a private setting gives the option for an adolescent to select support methods without potentially being embarrassed in front of parents and peers.

iii. Adolescents can choose the type of distraction they would prefer including active conversations, playing on electronic devices, breathing techniques, and music.^{14, 15}

6. Competency assessment of healthcare provider's training effectiveness should be monitored and documented following training and at ongoing intervals. Assessment should include insertion success and patient outcomes. Deficiencies should be addressed through additional training.

Summary:

Successfully completing pediatric PIV insertion is a multifactorial process that involves a skilled clinician with an understanding of the best practice evidence to provide safe, age-appropriate care. Minimum recommendations for healthcare provider proficiency with pediatric IV insertion and critical thinking skills are essential in this commonly performed invasive procedure. Evidence-based education, policies, and procedures are expected for clinicians to remain competent with IV insertion in pediatric patients. Data collection, review of adverse events, and performing a gap analysis are all measures to meet performance expectations. Certification in vascular access, continuing education, and advancing knowledge by attending educational events may enhance patient outcomes and safety for the patient and the healthcare provider.

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About the authors:

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Mary Beth Hovda Davis has been practicing as a pediatric nurse since 2006, specializing in vascular access since 2008. She is a Nursing Practice Leader for pediatric vascular access at the University of Iowa Stead Family Children's Hospital. She currently serves as the chair of the Pediatric Neonatal Special Interest Group (PediNeoSIG) for the Association of Vascular Access (AVA). She graduated with her BSN from the University of Iowa College of Nursing and attained her Masters in Nursing Education from Mount Mercy University in 2012. She is currently enrolled at the University of Iowa PhD program with a research focus on pediatric vascular access.

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Darcy Doellman is a vascular access specialist and clinical manager for the Vascular Access Team (VAT) at Cincinnati Children's Hospital. Darcy is involved with all aspects of vascular access which includes clinical practice, education, policy and procedures, and research for neonatal, pediatric, and adult patients. Darcy is certified in both infusion therapy and vascular access and is a former President of the Association for Vascular Access. She is widely published in professional journals and a co-author of the 2012 National Home Infusion Association Central Line Guidelines, 2016 Infusion Standards, and a reviewer for the 2015 National Association for Neonatal Nurses PICC Guidelines. Darcy has a Bachelor of Science in Nursing from Capital University in Columbus, Ohio and a Master's Degree in Nursing from the University of Phoenix.

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Ms. Pitts has been a Pediatric Registered Nurse since 1998. She developed the pediatric vascular access team at St. Joseph's Children's Hospital (Tampa, FL) and is a vascular access nurse on the team. She is the Director of Healthcare Strategy & Innovation for B. Braun USA (Bethlehem, PA). Stockholder, AngioDynamics, Inc. (Latham, NY). Board of Directors for Navi Technologies (Melbourne, Australia). She is a former Director-at-Large for The Association of Vascular Access Board of Directors, served as the Interim-President of the AVA Foundation, and is a past president of the Pediatric Special Interest Group (PediSIG). Ms. Pitts has multiple publications specifically related to pediatric vascular access, is an international speaker on vascular access, and was awarded the 2018 Janet Pettit Scholar Award in Neonatal and Pediatric Vascular Access.

Disclaimer: This document is meant to serve as a basis for evidence-based decision making. Nothing contained within this position paper should take the place of following a medical devices approved instructions for use provided by the manufacturer.



The Association for Vascular Access (AVA) was founded in 1985 to promote the emerging vascular access specialty. Today, AVA stands at the forefront of protecting and saving lives via establishing best practices and promoting patient advocacy. AVA's multidisciplinary membership advances research, provides professional and public education to shape practice and enhance patient outcomes, and partners with the device manufacturing community to bring about evidence-based innovations in vascular access. To learn more or join www.joinAVAnow.com.

The Pediatric Neonatal Special Interest Group (PediNeoSIG) was established as a multidisciplinary group of practitioners dedicated to best practice in the science of vascular access for children, infants, and neonates as a SIG of AVA.

Adopted by: AVA Board of Directors and Pediatric Neonatal Special Interest Group (PediNeoSIG)
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