

2.06 INTRAVENOUS ACCESS AND PHLEBOTOMY

Introduction

Intravenous (IV) line placement is the most common procedure performed on hospitalized children. Common indications include fluid resuscitation, parenteral medication, or nutrition delivery. Pediatric hospitalists should be knowledgeable about obtaining peripheral IV access in all pediatric patients and IV or intraosseous (IO) access in critically ill patients. Although not a requirement, many pediatric hospitalists may also obtain skills in the placement of central venous catheters and peripherally inserted central catheters (PICC). Pediatric hospitalists may also be called upon to obtain venous and arterial blood samples from pediatric patients. Preparation and counseling of the patient and family/caregivers, along with the appropriate use of pharmacologic and nonpharmacologic anxiolysis and pain control, can create the environment needed for a successful procedure.

Knowledge

Pediatric hospitalists should be able to:

- List the indications for IV access, such as rehydration, resuscitation, parenteral administration of medications or nutrition, and others.
- Compare and contrast the risks and benefits of using peripheral versus central sites for IV access, including indications and complications for each.
- Describe the indications, risks, benefits, and alternatives for PICC placement, including prolonged medication and/or nutrition needs.
- Compare and contrast risks and benefits of PICC versus midline central catheters and appropriate indications for each.
- Describe common complications of both peripheral and central IV access, including infiltration, bleeding, infection, and venous thrombosis.
- State the indications and contraindications for IO access.
- Discuss how factors such as age, disease process, and individual patient anatomy influence the choice of IV site.
- Summarize current literature and national best practices regarding avoidance of catheter-related bloodstream infections.
- Discuss strategies to minimize the number of IV attempts and common complications from multiple IV attempts.
- Describe use of modalities, such as vein-finding illuminators and ultrasound guidance, which can lead to higher rates of procedural success.
- Review the common radiographic modalities used to assess proper PICC placement and function.
- Review the options for procedural pain and sedation management by age and developmental stage, including pharmacologic and nonpharmacologic interventions.
- Review the indications for subspecialty consultation for IV access or blood sampling.
- Describe the contraindications for use of certain venous sites for IV access or phlebotomy (such as hemodialysis cath-

eters, limb with neurovascular compromise, jugular vein with a neighboring ventriculo-peritoneal shunt, and others.)

- List the indications for arterial blood sampling.
- Describe the proper method for and common complications of obtaining venous and arterial blood samples.

Skills

Pediatric hospitalists should be able to:

- Perform a pre-procedural evaluation to determine risks and benefits of IV placement.
- Assess the need for and order appropriate pain and sedation medication and nonmedication interventions.
- Demonstrate the ability to obtain IV access on children of all ages via accessing appropriate personnel or safe performance of the procedure, according to local practice parameters.
- Obtain venous and arterial blood sampling (phlebotomy), with and without IV access, via accessing appropriate personnel or safe performance of the procedure, according to local practice parameters.
- Identify proper techniques for holding and calming patients before, during, and after access attempts and educate other healthcare providers in those techniques.
- Adhere to infection control practices.
- Utilize available modalities where available, such as vein-finding illuminators and ultrasound guidance, to achieve higher rates of procedural success.
- Demonstrate proficiency with intraosseous needle placement as evidenced by successful insertion of the IO needle in a simulated mock code situation.
- Identify barriers to efficient, effective IV access and engage subspecialists, including interventional radiology, anesthesiology, and surgery, to assist as appropriate.
- Identify common complications of IVs and blood sampling and respond with appropriate actions.
- Identify and initiate actions to limit unnecessary intravenous access or sampling by using strategies such as batching of lab tests, transition to oral medication, enteral rehydration, discouraging routine daily lab draws, and daily documentation of need for intravenous access.
- Obtain central venous access and PICCs when indicated via accessing appropriate consultants or safe performance of the procedure, according to local practice parameters.
- Demonstrate proficiency in addressing complications associated with peripheral and central lines (such as infiltrations, clots, displacements, and others) by prompt identification of the problem, initiation of indicated therapy, and consultation with appropriate subspecialists as indicated.

Attitudes

Pediatric hospitalists should be able to:

- Exemplify effective communication with patients and the family/caregivers regarding the indications for, and risks, benefits, and steps of the procedure.
- Role model and advocate for safety during procedures, by strict adherence to infection control practices and use of the “time-out for safety” verification process.

- Acknowledge the importance of revising the IV access plan as appropriate given patient and system limitations.
- Recognize the importance of limiting attempts at IV access in young children, with a need for an alternative plan when indicated.

Systems Organization and Improvement

In order to improve efficiency and quality within their organizations, pediatric hospitalists should:

- Lead, coordinate, or participate in the development and implementation of cost-effective, safe, evidence-based procedures and policies for IV access, adhering to national guidelines for infection control.
- Collaborate with hospital administration and clinical leaders to ensure adherence to modern procedural sedation and pain control guidelines, including limiting IV access at-

tempts when an alternative plan is clinically feasible.

- Lead, coordinate, or participate in the development and implementation of a system for review of the efficacy, efficiency, and outcomes of intravenous access procedures.
- Lead, coordinate, or participate in the development and implementation of a system for review of family/caregiver and healthcare provider satisfaction related to venous access procedures.

References

1. Nadel FM, Beno S, Frey AM. Vascular Access. In: Zaoutis LB, Chiang VW. Eds. *Comprehensive Pediatric Hospital Medicine*, 2nd ed. New York, NY: McGraw-Hill Education, 2017: 1049-1055.
2. Westergaard B, Classen V, Walther-Larsen S. Peripherally inserted central catheters in infants and children - indications, techniques, complications and clinical recommendations. *Acta Anaesthesiol Scand*. 2013;57(3):278-287. <https://doi.org/0.1111/aas.12024>.