

Introduction to Pediatric IV Insertion Curriculum



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About the Author



Kasey Carlson has been a Registered Nurse for 19 years. She holds a master's degree in Nursing Education from the University of Wisconsin – Eau Claire and taught associate degree nursing for over 13 years. She also has a second master's degree in Learning Design and Technology from San Diego State University. She currently is a Curriculum Technology Manager with Adtalem Global Education. Ms. Carlson also specializes in healthcare simulation curriculum design.

Introduction to Pediatric IV Insertion

This curriculum accompanying the manikin will help students learn about the insertion of pediatric intravenous (IV) catheters.

Curriculum Structure

The *Introduction to Pediatric IV Insertion* curriculum is composed of the following parts. Approximate times are included.

Lesson	Title	Approximate Time
One	FOCUS: Part 1 - Developing Awareness of Patient-Focused Care	10 minutes
One	FOCUS: Part 2 - Anatomy (Review Venous Anatomy)	10 minutes
One	LEARN: Introduction to Pediatric IV Insertion Slide Presentation	20 minutes
One	REVIEW: Practice and Assessment of Pediatric IV Insertion	30 minutes
	Total	1-1½ hours

Lesson Structure

Each lesson begins with a Lesson Overview, Lesson Objectives, and a Lesson at a Glance table which lists the lesson activities, materials required, suggested preparation steps, and approximate class time.

Lesson Sections

The actual lesson follows the overview, which will contain some of the sections described below.

FOCUS

Every lesson begins with a FOCUS activity intended to capture participants' attention. This may be in the form of a small or large class discussion, a game, a review of previous lesson information, or a demonstration. During this activity, participants are introduced to the topic of the lesson.

LEARN

The LEARN activity in each lesson varies in its presentation mode. It may be a slide presentation, group activity, or demonstration.

REVIEW

The majority of lessons end with a REVIEW activity intended to briefly review the lesson's key messages or main points.

Lesson One – Introduction to Pediatric IV Insertion

Lesson Overview

In this lesson, students will learn about insertion of pediatric intravenous (IV) catheters.

Lesson Objectives

After completing this lesson, participants will be able to:

- Define key terms associated with IV insertions
- Locate veins subject to IV insertions
- Explain pediatric considerations when inserting an IV
- Perform the steps to inserting an IV
- Explain how to document IV insertions

Pre-Lesson Knowledge

- Vascular anatomy

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS: Part 1	• <i>Introduction to Pediatric IV Insertion (Focus on Empathy)</i> worksheet • <i>Introduction to Pediatric IV Insertion (Focus on Empathy) Instructor Resource</i>	1. Print/photocopy <i>Introduction to Pediatric IV Insertion (Focus on Empathy)</i> worksheet (one per participant)	10 minutes
FOCUS: Part 2	• <i>Introduction to Pediatric IV Insertion (Focus on Anatomy)</i> worksheet • <i>Introduction to Pediatric IV Insertion (Focus on Anatomy) Instructor Resource</i>	1. Print/photocopy <i>Introduction to Pediatric IV Insertion (Focus on Anatomy)</i> worksheet (one per participant)	10 minutes
LEARN	• <i>Introduction to Pediatric IV Insertion</i> slide presentation • Pediatric manikin	1. Prepare <i>Introduction to Pediatric IV Insertion</i> slide presentation for viewing	20 minutes
REVIEW	• <i>Introduction to Pediatric IV Insertion Check-Off (Instructor Resource)</i> • <i>Introduction to Pediatric IV Insertion Check-Off</i> worksheet • <i>Introduction to Pediatric IV Insertion Quiz</i> • <i>Introduction to Pediatric IV Insertion Quiz - Answer Key</i> • Pediatric manikin • IV catheters • IV start kit • Clean gloves • Hand sanitizer or access to soap/sink	1. Print/photocopy <i>Introduction to Pediatric IV Insertion Check-Off</i> worksheet and <i>Introduction to Pediatric IV Insertion Quiz</i> (one per participant) 2. Get the supplies ready for the lesson	30 minutes

Instructor Note: For the Focus and Review activities, the instructor may choose to have students complete both or one of the two activities. Focus activities may also be completed prior to class.

Lesson One – Introduction to Pediatric IV Insertion

FOCUS: Part 1 – Developing Awareness of Patient-Focused Care

10 minutes

Purpose:

This activity will help students develop an awareness of patient-focused care.

Materials:

- *Introduction to Pediatric IV Insertion (Focus on Empathy)* worksheet
- *Introduction to Pediatric IV Insertion (Focus on Empathy) Instructor Resource*

Facilitation Steps:

1. Distribute the *Introduction to Pediatric IV Insertion (Focus on Empathy)* worksheets prior to or at the start of the class.
2. Have the *Introduction to Pediatric IV Insertion (Focus on Empathy) Instructor Resource* available.
3. Have students read through the information and complete the *Introduction to Pediatric IV Insertion (Focus on Empathy)* worksheet.
4. Have students pair up upon completion and share answers.

Introduction to Pediatric IV Insertion (Focus on Empathy)

READ the following:

Two hundred million IVs are inserted in the United States annually. Approximately 90% of people admitted to a hospital have an IV line inserted.

In a recent survey of 122 nurses, 61% worry that at least one patient will dislodge or remove an IV during the shift, and 64% say IV dislodgement happens at least once a week.

REFLECT on the statistics above.

- How do you think an IV becomes dislodged or accidentally removed?
- If 90% of patients need IVs, how do you think a child feels about being repeatedly poked with a needle? How do you think the parent feels?
- How would you explain an IV to a small child?

SHARE your thoughts with a peer:

Lineus Medical. (2015). Vascular access and IV dislodgement info. Retrieved from <http://lineusmed.com/clinical-info/>

Introduction to Pediatric IV Insertion (Focus on Empathy) Instructor Resource

READ the following:

Two hundred million IVs are inserted in the United States annually. Approximately 90% of people admitted to a hospital have an IV line inserted.

In a recent survey of 122 nurses, 61% worry that at least one patient will dislodge or remove an IV during the shift, and 64% say IV dislodgement happens at least once a week.

REFLECT on the statistics above.

- How do you think an IV becomes dislodged or accidentally removed?
Accidentally – caught on something (bed, clothing, etc.)
Purposefully – patient pulled it out, or there was a complication and the IV needed to be removed and replaced
- If 90% of patients need IVs, how do you think a child feels about being repeatedly poked with a needle? How do you think the parent feels?
Every effort is made to maintain IVs. Therapeutic communication with the patient and family is important.
- How would you explain an IV to a small child?
Patients have the legal right to refuse treatment if consequences have fully been explained, and the patient acknowledges the risks. Risks can include an interruption in treatment or an inability to treat. The patient may have to take medications or fluids through a different route.

SHARE your thoughts with a peer:

Lineus Medical. (2015). Vascular access and IV dislodgement info. Retrieved from <http://lineusmed.com/clinical-info/>

Lesson One – Introduction to Pediatric IV Insertion

FOCUS: Part 2 – Anatomy (Review Venous Anatomy)

10 minutes

Purpose:

This activity will help students identify parts of the venous anatomy.

Materials:

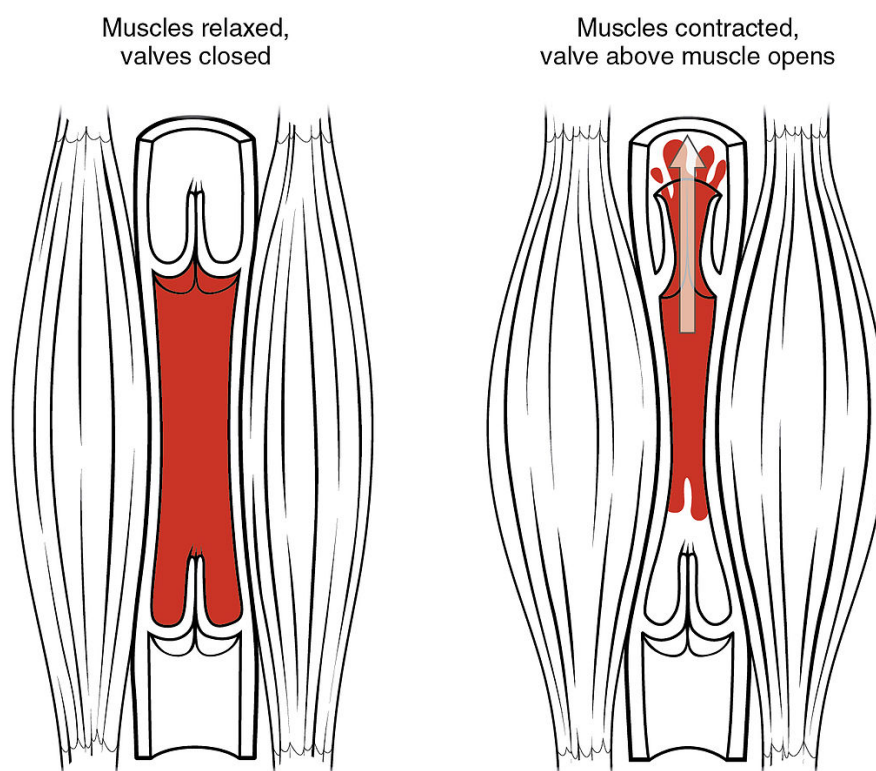
- *Introduction to Pediatric IV Insertion (Focus on Anatomy)* worksheet
- *Introduction to Pediatric IV Insertion (Focus on Anatomy)* Instructor Resource

Facilitation Steps:

1. Distribute the *Introduction to Pediatric IV Insertion (Focus on Anatomy)* worksheets prior to or at the start of the class.
2. Have the *Introduction to Pediatric IV Insertion (Focus on Anatomy)* Instructor Resource available.
3. Have students read through the information and complete the *Introduction to Pediatric IV Insertion (Focus on Anatomy)* worksheet.
4. Have students pair up upon completion and share answers.

Introduction to Pediatric IV Insertion (Focus on Anatomy) Instructor Resource

Exercise: Reflect on what you know about the vascular system. Review the picture and answer the questions below.

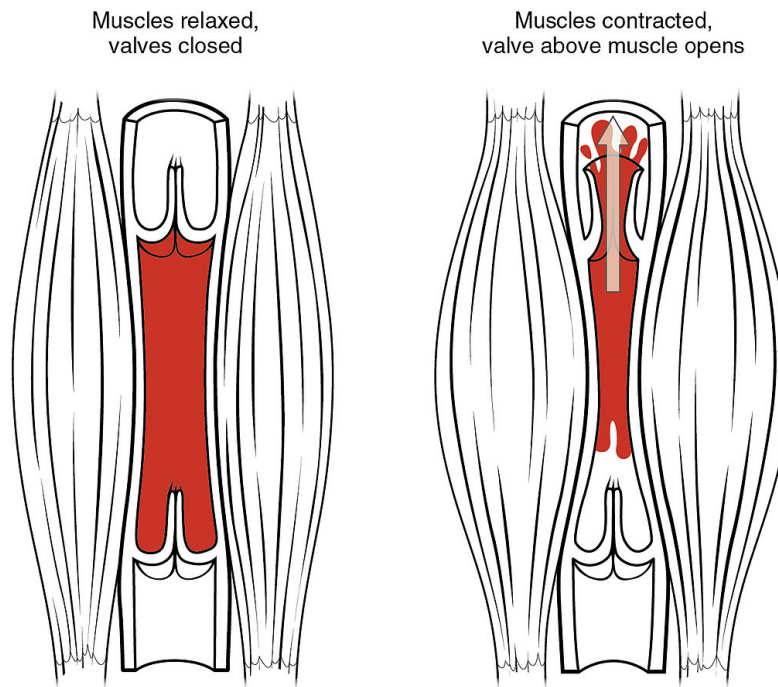


1. What do you think happens if an intravenous catheter bumps up against a valve?
The rubbing of the catheter on the valve can cause discomfort and impede the flow of fluids through the IV.
2. Why are venous catheters used more than arterial catheters?
Venous catheters contain less pressure than the arterial catheters system, thus resulting in less bleeding and complications.
3. What do you think an intravenous catheter feels like once in place? Do you think it depends on location?
Discomfort can come from location. It is important to select a location that is in a straight, non-branching superficial vein. IV access is more common in the extremities, especially the hands.

By OpenStax College [CC BY 3.0 (<http://creativecommons.org/licenses/by/3.0>)], via Wikimedia Commons. Retrieved from https://upload.wikimedia.org/wikipedia/commons/3/3f/2114_Skeletal_Muscle_Vein_Pump.jpg

Introduction to Pediatric IV Insertion (Focus on Anatomy)

Exercise: Reflect on what you know about the vascular system. Review the picture and answer the questions below.



1. What do you think happens if an intravenous catheter bumps up against a valve?
2. Why are venous catheters used more than arterial catheters?
3. What do you think an intravenous catheter feels like once in place? Do you think it depends on location?

By OpenStax College [CC BY 3.0 (<http://creativecommons.org/licenses/by/3.0/>)], via Wikimedia Commons. Retrieved from https://upload.wikimedia.org/wikipedia/commons/3/3f/2114_Skeletal_Muscle_Vein_Pump.jpg

Lesson One – Introduction to Pediatric IV Insertion

LEARN: Introduction to Pediatric IV Insertion Slide Presentation

20 minutes

Purpose:

Participants will receive a thorough introduction to insertion of intravenous (IV) catheters.

Materials:

- *Introduction to Pediatric IV Insertion* slide presentation
- Pediatric manikin

Facilitation Steps:

1. Share the following information with students as you show the slide presentation.

Slide 1: Introduction Slide

Slide 2: Review the concepts in administering medications/fluids – rights of medication administration. Discuss the right drug or solution, right dose and concentration, right patient, right route, right date and time, and the right documentation. Ask students to think of conditions needing intravenous (IV) therapy (i.e. dehydration, surgery, etc.)

Slide 3: Source: *Welcome To The Jungle* at English Wikipedia [CC BY 3.0] (<http://creativecommons.org/licenses/by/3.0>), via Wikimedia Commons. Retrieved from https://upload.wikimedia.org/wikipedia/commons/2/25/Cellular_Fluid_Content.jpg

When replacing fluids in the body via the IV route, it is important to know the differences between the fluids in the body. When IV therapy is administered, it can be to replenish intracellular or extracellular fluids.

Instructor note: You may review osmolarity.

Slide 4: Examples of isotonic: dextrose 5% in water (D5W), 0.9% sodium chloride (0.9% NaCl), Lactated Ringer's (LR) solution

Examples of hypotonic: 0.45% sodium chloride (half NS) (0.45% NaCl)

Examples of hypertonic: dextrose 10% in water (D10W), 3%-5% sodium chloride (3%-5% NaCl)

IV fluids can also be mixed with medications or electrolytes. It is important to know the type of fluids and any additives in case the fluid is incompatible.

Slide 5: When selecting the appropriate VAD, consider a patient's prescribed therapy, length of treatment, duration the device remains in place, vascular integrity, patient preference, and the resources available to care for the device.

Instructor note: This module concentrates on the short-term types.

Slide 6: Review parts with actual needles being used.

Slide 7: Select the smallest gauge and length possible to administer the prescribed therapy. Depending on the age, pediatrics can have a 24-22-gauge catheter.

Slide 8: There are many factors that affect the ability to place an IV. When working with children, it is important to address the fears and beliefs of the parent or guardian as well.

Ask students how they would deal with some of these factors

Slide 9: Toddlers are in the phase of mobility, discovery, separation anxiety, and basic language. They have just learned to understand the word "no." It is important to tell the child what you are doing using simple terms. Offer comfort items such as a favorite stuffed animal and/or use

distractions. Have a reward for the child for cooperative behavior. Parents, guardians, or staff will need to assist with positioning.

Slide 10: Preschoolers are similar to toddlers, but at this age, they may be more curious about the equipment. They may have a fear of the procedure or the loss of blood. Use imaginative play to ease these fears and enlist the help of the parent or guardian if needed.

Slide 11: School age children can understand the procedure at an age-appropriate level. Let the child have control over who is present in the room. Don't tell the child to be brave. The child's reaction will be based off of prior experience.

Slide 12: Supplies can vary if a solution is to be hung after IV insertion.

Slide 13: IV insertion can be a painful procedure, so the use of local anesthetics is encouraged. According to the Infusion Therapy Standards of Practice published by the Infusion Nurses Society (INS) in 2016, local anesthesia should be provided prior to all pediatric vascular access procedures. Check your facility's policy. The gauge of the needle should be age appropriate. Complete a self-check of your skills and approach. How comfortable are you with pediatric IV starts? How comfortable are you with children? Is it possible you may need to ask someone else with more experience to complete the order? Make sure you have educated not only the child but the parent/guardian as well. If the parent/guardian is uncomfortable around needles and/or blood, other assistance may be needed.

Slide 14: Confirm healthcare provider's order for type and amount of IV fluid, medication additives, infusion rate, and length of therapy. Follow rights of medication administration. Check the drug reference book or ask the pharmacist about IV fluid potential incompatibilities and side effects. Identify the patient by asking for their name and date of birth. If too young, compare the patient's ID band with the

information in patient's chart. Assess the child's mood and behavior when explaining the procedure. Make sure there are no contraindicated conditions or sites. Always wash hands prior to contact with a patient.

Slide 15: For toddlers and preschool children, position them on the parent or guardian's lap in an upright position. Most children under the age of 6 need someone to hold their arm still. Make sure the child's opposite hand and arm movement is being limited as they may try to grab at you or the equipment.

Veins on the dorsal and ventral surfaces of the arms (e.g., cephalic, basilic, or median) can be used. Avoid the lateral surface of the wrist due to potential nerve damage.

Choose a site that will not interfere with patient's activities of daily living, use of assist devices, or planned procedures.

You may have students apply tourniquets to each other to view the veins.

Apply a tourniquet 4-5 finger widths above the potential site. The tourniquet blocks venous return, causing veins to dilate for easier visibility. It is important that it does not block arterial blood flow. Tourniquets left on for longer than 1 minute may cause complications.

Use local anesthesia once the site is confirmed.

Slide 16: When preparing the supplies, consider the age of the child. For younger children, keep the equipment out of reach. For older children, ask if they want to see the equipment or watch the procedure. This will help you indicate their comfort level. Prepare the child using age appropriate techniques. Demonstrate on manikin.

According to the Infusion Nursing Standards of Practice, a single nurse should not make more than two attempts at initiating IV access. After two attempts, the nurse should have another nurse attempt the insertion.

Slide 17: Dressings may differ per facility. Follow agency policy.

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Label the dressing including date and time of IV insertion, gauge size and length, and initials. The site may have to be wrapped to prevent the child from removing the IV. Reward the child before leaving.

Slide 18: See Table 1 Phlebitis Scale from the Infusion Nursing Standards of Practice.

<https://source.yiboshi.com/20170417/1492425631944540325.pdf>

Slide 19: Use an infusion therapy flow sheet when available.

Slide 20: Closing Slide

Lesson One – Introduction to Pediatric IV Insertion

REVIEW: Practice and Assessment of Pediatric IV Insertion

30 minutes

Purpose:

Participants will practice insertion of intravenous (IV) catheters and then complete a quiz to assess mastery.

Materials:

- *Introduction to Pediatric IV Insertion Check-Off (Instructor Resource)*
- *Introduction to Pediatric IV Insertion Check-Off* worksheet
- *Introduction to Pediatric IV Insertion Quiz*
- *Introduction to Pediatric IV Insertion Quiz – Answer Key*
- Pediatric manikin
- IV catheters
- IV start kit
- Clean gloves
- Hand sanitizer or access to soap/sink

Facilitation Steps:

1. Give students the *Introduction to Pediatric IV Insertion* worksheet.
2. Access the *Introduction to Pediatric IV Insertion Check-Off (Instructor Resource)*. Following the steps on the check-off page, demonstrate pediatric IV insertion on the manikin.
3. Following the steps on their *Introduction to Pediatric IV Insertion* worksheet, have students practice IV insertion on the manikin.
4. Hand out the *Introduction to Pediatric IV Insertion Quiz* to students. Give them a couple of minutes to complete it.
5. Have students self-check or peer check their answers as you share them from the *Introduction to Pediatric IV Insertion Quiz - Answer Key*.

Introduction to Pediatric IV Insertion Check-Off (Instructor Resource)

PREPARATION:

Supplies:

- Hand sanitizer or access to soap and sink
- IV catheter (butterfly, over the needle catheter)
- IV start kit supplies
- Clean gloves
- Extension set with needleless connection device (also called saline lock, IV plug, or adapter)
- Prefilled 5-mL syringe with 0.9% normal saline solution
- Alcohol pads
- Needle disposal container

***May also include IV fluids if desired. You may place the students in pairs to incorporate a parent role.

After the demonstration, have students practice IV insertion on the manikin using the following steps:

1.	Verify written order from provider to determine type and amount of IV fluid, medication additives, infusion rate, and length of therapy	
2.	Complete rights of medication administration (if fluids are being used)	
3.	Gather supplies needed	
4.	Knock, enter room, and provide for privacy	
5.	Identify yourself with name and title (student nurse, etc.)	
6.	Wash your hands with sanitizer or soap and water	
7.	Identify patient; verify this information	
8.	Explain the procedure appropriately to the patient and parent	
9.	State that you are placing patient in an appropriate position and extending the patient's arm	
10.	Explain what age appropriate techniques will be used (example: distraction)	
11.	Prepare supplies (open kit, flush extension set with saline)	
12.	Apply tourniquet 4-5 finger widths above the antecubital area	

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13.	Palpate radial pulse to confirm arterial blood flow	
14.	Locate a vein that is visible, straight, and distal	
15.	Release tourniquet; verbalize use of local anesthetic or other pain management method	
16.	Wash hands and apply clean gloves	
17.	Cleanse site with swab	
18.	Reapply tourniquet 4 to 6 inches above anticipated insertion site	
19.	Anchor vein by placing thumb below site	
20.	Prepare patient for the needle stick	
21.	Enter the vein at a 10-30-degree angle	
22.	Verbalize observation of blood flashback	
23.	Lower catheter until flush with skin and advance catheter	
24.	Stabilize catheter and release tourniquet	
25.	Remove needle and connect extension tubing	
26.	Verbalize slow flush of the IV and set slowly	
27.	Secure catheter with dressing and label	
28.	Secure extension tubing	
29.	Discard used needle into sharps container	
30.	Remove gloves and wash hands	
31.	Provide for patient comfort and safety; reward patient	
32.	Document procedure	
	Score	

Optional: Evaluate the student's ability to complete IV insertion using the above steps. You may score via points or satisfactory/unsatisfactory.

Introduction to Pediatric IV Insertion Check-Off

Practice insertion of an IV on the manikin using the following steps:

Verify written order from provider to determine type and amount of IV fluid, medication additives, infusion rate, and length of therapy
Complete rights of medication administration (if fluids are being used)
Gather supplies needed
Knock, enter room, and provide for privacy
Identify yourself with name and title (student nurse, etc.)
Wash your hands with sanitizer or soap and water
Identify patient; verify this information
Explain the procedure appropriately to the patient and parent
State that you are placing patient in an appropriate position and extending the patient's arm
Explain what age appropriate techniques will be used (example: distraction)
Prepare supplies (open kit, flush extension set with saline)
Apply tourniquet 4-5 finger widths above the antecubital area
Palpate radial pulse to confirm arterial blood flow
Locate a vein that is visible, straight, and distal
Release tourniquet; verbalize use of local anesthetic or other pain management method
Wash hands and apply clean gloves
Cleanse site with swab
Reapply tourniquet 4 to 6 inches above anticipated insertion site
Anchor vein by placing thumb below site

Introduction to Pediatric IV Insertion

Prepare patient for the needle stick
Enter the vein at a 10-30-degree angle
Verbalize observation of blood flashback
Lower catheter until flush with skin and advance catheter
Stabilize catheter and release tourniquet
Remove needle and connect extension tubing
Verbalize slow flush of the IV and set slowly
Secure catheter with dressing and label
Secure extension tubing
Discard used needle into sharps container
Remove gloves and wash hands
Provide for patient comfort and safety; reward patient
Document procedure

Name: _____ Class: _____

Introduction to Pediatric IV Insertion Quiz

Select the best answer to the following multiple-choice questions:

1. The healthcare provider has ordered an IV for a 3-year-old. Which of the following gauges would be appropriate for this therapy?
 - a. 16-gauge
 - b. 18-gauge
 - c. 24-gauge
 - d. 28-gauge

2. A patient is dehydrated and needs a hypotonic solution. Which of the following would the nurse select?
 - a. Dextrose 5% in water
 - b. 0.9% Sodium chloride
 - c. Lactated Ringer's
 - d. 0.45% Sodium chloride

3. Which of the following sites are contraindicated for IV placement?
 - a. Ventral surface of the arm
 - b. Dorsal surface of the hand
 - c. Lateral surface of the wrist
 - d. Distal surface of the hand

4. The nurse is reviewing the patient's history before IV insertion. Which medical history is pertinent to this procedure?
 - a. History of appendectomy
 - b. Clotting disorder
 - c. Sinus infection
 - d. History of tonsillectomy

5. The patient with an IV is complaining of pain at the insertion site. The nurse finds that there is redness along the path of the vein, and it is warm. What is this condition called?
 - a. Infiltration
 - b. Phlebitis
 - c. Infection
 - d. Hemorrhage

Introduction to Pediatric IV Insertion Quiz – Answer Key

1. The healthcare provider has ordered an IV for a 3-year-old. Which of the following gauges would be appropriate for this therapy?
 - a. 16-gauge
 - b. 18-gauge
 - c. 24-gauge**
 - d. 28-gauge

The pediatric range is 22-24 gauge. A younger child would need a smaller gauge.

2. A patient is dehydrated and needs a hypotonic solution. Which of the following would the nurse select?
 - a. Dextrose 5% in water
 - b. 0.9% Sodium chloride
 - c. Lactated Ringer's
 - d. 0.45% Sodium chloride**

Choices b and c are isotonic. Choice a is hypertonic.

3. Which of the following sites are contraindicated for IV placement?
 - a. Ventral surface of the arm
 - b. Dorsal surface of the hand
 - c. Lateral surface of the wrist**
 - d. Distal surface of the hand

Avoid the lateral surface of the wrist because of the potential for nerve damage.

4. The nurse is reviewing the patient's history before IV insertion. Which medical history is pertinent to this procedure?
 - a. History of appendectomy
 - b. Clotting disorder**
 - c. Sinus infection
 - d. History of tonsillectomy

A clotting disorder could increase the chances of excessive bleeding at the site.

5. The patient with an IV is complaining of pain at the insertion site. The nurse finds that there is redness along the path of the vein, and it is warm. What is this condition called?
 - a. Infiltration
 - b. Phlebitis**
 - c. Infection
 - d. Hemorrhage

Phlebitis is defined as pain, warmth, and tenderness at IV site with redness along the path of the vein.

Sources

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