An important component of pediatric patient safety is medication administration. However, medication administration can be a challenge for children and healthcare professionals, as well as parents. Regardless of the route, many factors must be considered to ensure the child’s safety. Verifying the dosage ordered, as well as two identifiers on the child’s ID band prior to administration, are key safety measures. Additionally, gaining the child’s cooperation is essential. However, children’s ability to cooperate depends on many factors, including their age, growth and development, previous experience with various medication routes, as well as the approach taken by the healthcare professional.

This newsletter will highlight guidelines for preparing children prior to administration of medications. Population-specific and safety considerations related to administration of oral and IM medications will be discussed, as well as implications for the healthcare provider.

SUCCESSFUL PEDIATRIC MEDICATION ADMINISTRATION

Age and developmental level commonly affect a child’s response to and ability to cooperate with medication administration. Regardless of the route of administration, planning interventions to gain the child’s cooperation is key.

- Prepare children and/or parents. Tell toddlers and older children what is expected of them, right before it is to be done. Don’t say, “I’m going to go get your shot now.” That will only increase anxiety.
- Incorporate play, such as “I need you to hold real still like a statue while I do this”, is helpful. Be calm and positive – saying loudly “Hold still!” is frightening.
- Offer choices only when one is available. Adding okay to the end of a statement -“I need you to take your medicine now, OKAY?” is not an option. However, asking the preschooler, “Do you want to hold the cup or should I?”, is appropriate and involves the child.
- Keep equipment, such as IM syringes and needles, as well as IV equipment, out of the child’s sight, while you are explaining what is to be done. If not, the child will focus on the equipment and not what you are saying.
- Be honest. If a medication tastes bad or administration will be painful, tell the child. An injection does not feel like a mosquito bite. Also, don’t refer to a medicine as candy, such as, “It tastes just like peppermints.” This is a safety issue. When the child gets home he or she may drink all the “peppermints” at once.
- Expect success. Don’t bribe or threaten the child. Give the child a chance to cooperate. If two healthcare providers walk in the child’s room and hold him or her down for a venipuncture, the child will obviously fight back. However, explaining, “Sally is here just in case you need a little help holding still” is helpful.
- Don’t involve the parents if the child does need human restraint. Parents should be seen as comforters.

POPULATION-SPECIFIC CONSIDERATIONS

ORAL: The oral route is the most common and preferred route for administering medications to children of all ages. However, to ensure safe and successful administration, careful consideration needs to be given to the age-appropriateness of the oral preparation, measurement and the method of administration. The appropriate form of oral medication, solid or liquid, depends on the child’s age and developmental level. It is generally not until 5 to 6 years of age that children are able to swallow a tablet or capsule. Commercially-prepared elixirs are the safest form of oral medication for infants, toddlers and many preschoolers. Most liquid forms are colorful, as well as palatable. Any unpleasant taste may be disguised by mixing the liquid medication with a small amount of non-essential food, such as syrup, jam, or from the pharmacy, a medication flavoring. However, honey should not be used with infants because of the risk of botulism. Liquid preparations, as well as crushed pills or the contents of capsules, should not be mixed with essential foods, such as applesauce. There is a chance an aversion will develop to that food.
For newborns and small infants, 0.5 ml is the maximum volume of medication that can usually be tolerated per injection site. Dosages for liquid preparations are commonly prescribed in teaspoons, or fractions thereof, as well as tablespoons. Molding plastic medicine cups are accurate in measuring larger doses of liquids, such as one tablespoon. However, the most accurate means for measuring small amounts of medication is in milliliters with a plastic, disposable, needleless syringe. If a medication, such as liquid vitamins, comes with a calibrated dropper, it is the most accurate measure. In some facilities, syringes may be prefilled, however, it is commonly up to the healthcare professional to accurately measure liquid dosages. For small children, the plastic syringe, the smallest possible, provides a reliable measurement tool, as well as a convenient means for administering the medication. The smallest syringe possible should be used, such as a tuberculin syringe for doses less than 1cc. Placing the syringe alongside the child’s tongue, halfway back to avoid stimulating the gag reflex, and administering ½ - 1 ml of medication at a time, is effective. If an infant refuses to swallow the medication, gently stroking his or her throat will stimulate swallowing. Alternating sides of the tongue may be necessary, if the child “catches on”. It is also helpful to have a medicine cup available to re-feed any medication that is spit out onto the lip or chin.

When administering oral medication to children of any age, care must be taken to prevent aspiration. The child should be held or positioned in a semi-reclining or upright position. Medication should never be administered while the child is crying. If a young child refuses to open his or her mouth during medication administration, the child’s mouth should never be forcefully opened. Nor should the child’s nose ever be held, so the child will open his or her mouth to breathe.

Infants and older children are usually cooperative during oral medication administration. However, toddlers have difficulty even holding still. Parents may be a great resource in administering oral medication to children who are uncooperative. Most have had previous experience with their child, or will need to in the future.

INTRANUSCULAR INJECTIONS

Although pediatric medications, such as for pain management, are no longer routinely administered intramuscularly, this route is still indicated at times. For example, the majority of immunizations in childhood are given intramuscularly. By 2 years of age, children may receive 20 injections, with multiple injections in one visit. “Shots” are a traumatic experience for most children.

The child’s muscle mass and development dictates the maximum volume to be injected per site, site selection and needle size. Maximum volume: As children’s muscles develop, a greater volume of medication can usually be tolerated per injection site. For newborns and small infants, 0.5 ml is the maximum amount recommended per injection site. And, 1 ml is the maximum recommended amount to be administered in a single site for small children. In older children, such as school-agers, a well-developed muscle mass may tolerate 2 ml of medication per site. However, these amounts vary depending on the size of the child.

Site Selection: Muscle mass, which increases with age and mobility, is an important consideration when choosing an appropriate injection site. It is not until the child has been walking for one full year that sufficient muscle mass has developed to allow for a variety of injection sites to be used. The average age of walking is 13 months. It is imperative to determine the time at which the infant or toddler walked independently and to add one year to that, to determine if the gluteus maximus site is safe. Until that time, two sites are most appropriate:

**Vastus Lateralis muscle**, located in the middle, lateral, one-third of the anterior thigh, is an appropriate injection site for children of all ages. It is used primarily as the preferred injection site for infants and toddlers. There are no important nerves or blood vessels in the vastus lateralis muscle. **Ventralgluteal muscle**, the gluteus medius muscle, is located on the hip between the anterior superior iliac spine and the posterior iliac crest. Placing the palm of your hand over the greater trochanter (hip joint), index finger over the anterior superior iliac tubercle, and middle finger along the posterior iliac crest, will locate this landmark. Injecting perpendicularly into the center of the “V”, formed by the separated fingers, is the gluteus medius muscle. Although many healthcare professionals are generally inexperienced with this site, many believe the ventrogluteal site is the site of choice for IM injections in patients of all ages. The ventrogluteal site is relatively free of major nerves and blood vessels. Injecting into the gluteus medius muscle is also believed to be the least painful site. Needle size: Depending on the child’s muscle mass a 1 - 1½” needle may be used. IM injections are given at a 90° angle. To decrease pain, if possible, change the needle after drawing up the medication and before administration. A sharp needle hurts less. Be sure to prime the needle before administration.

Preparing the child and practicing age-appropriate techniques for safe medication administration aid in success and safety. Gaining the child’s cooperation is essential.

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**KEY DEVELOPMENTAL CONSIDERATIONS**

**TODDLERS**, because of a poor understanding of body integrity, object to anything that enters their body, whether it is painful or not. This includes ear drops.

**PRESCHOOLERS** also have a poor understanding of body integrity, as well as a vivid imagination. They fear the inside of their bodies will leak out through a hole in their skin, such as after an injection or an IV is discontinued. Band-aids® are key to prevent such “leakage”.

**SCHOOL-AGERS** commonly use stalling behaviors, such as “Please wait for my Mom”, to postpone administration of medications by painful routes.

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1 TEASPOON = 5 ML
1 TABLESPOON = 15 ML
1. Deon, 8 months old, is to receive 0.4 ml of a drug. The healthcare professional prepares to accurately measure the prescribed dose using which device?
   a. plastic medicine cup
   b. tuberculin syringe
   c. 3 ml syringe
   d. 5 ml syringe

2. Deon resists opening his mouth. The healthcare provider should:
   a. put the medication in his bottle, which only contains 2 ounces of formula.
   b. mix the medication with a small amount of honey to disguise the taste.
   c. put the medication in his baby food.
   d. squirt the medication with a syringe alongside his tongue.

3. Two year old, Shelby, shakes her head “No”, when offered her oral medication. The healthcare provider should tell her:
   a. “It tastes good, just like bubble gum.”
   b. “If you don’t take this, I’ll have to give you a shot.”
   c. “Let’s let Mommy help.”
   d. “If you take it, then I’ll bring you a surprise.”

4. When administering a tablespoon of oral medication to an uncooperative young preschool child, the healthcare provider should:
   a. administer it when the child is crying and his or her mouth is open.
   b. say, “It’s time for your medication now, okay?”
   c. hold the child’s nose and administer it when the child opens his or her mouth to breathe.
   d. ask the child, “Do you want to hold the medicine cup or do you want me to?”

5. Most children can typically first safely swallow solid forms of oral preparations at 5-6 years of age.
   a. True
   b. False
6. Bethany, 4 years old, is to receive a booster immunization. To increase Bethany’s cooperation, before administration, the healthcare professional plans to:

   a. prepare her for the injection prior to going to draw it up.
   b. let her see the syringe as she positions herself.
   c. ask Bethany’s mother to help restrain her.
   d. tell her what will be done and what is expected of her.

7. Which of the following interventions would help decrease the pain associated with Bethany’s intramuscular injection?

   a. Use the largest diameter needle possible.
   b. After drawing up the med, change the needle prior to administration.
   c. Avoid aspirating for blood prior to injecting the medication intramuscularly.
   d. Don’t prime the needle prior to administration.

8. Bethany’s mother asks, “I have a 6 month old son. When will his butt be able to be used for his baby shots?” The healthcare provider responds:

   a. “Oh, it could be used now. Just tell the nurse that you prefer that site at his next visit.”
   b. “Once he’s been walking for one full year, that muscle should be developed enough.”
   c. “Usually sometime around when he enters school. This site hurts less.”
   d. “That site can only be used for the smallest amounts of medication.”

9. Four year old, Sam, is to have his IV discontinued. What age-specific response is expected?

   a. Uses stalling behaviors, such as asking, “Please wait for my father.”
   b. Insists on a band-aid, fearing his “guts will leak out.”
   c. Fears being immobilized.
   d. Shows passive ways of coping.

10. The maximum amount recommended per injection site for 4 year old Bethany is how many ml?

    a. 0.5
    b. 1
    c. 2
    d. 3