VITAL SIGNS DURING CHILDHOOD

Routine measurement of a child’s respiratory rate, pulse, temperature, and sometimes blood pressure, is performed on admission and regularly throughout the child’s stay. The frequency of assessment varies according to the institution’s policy, as well any change in the child’s condition. For example, an alteration in color, breathing, muscle tone or behavior, as well as after undergoing invasive procedures, necessitates more frequent vital sign monitoring. Blood pressure may not be routinely assessed, particularly in young children, but will depend on facility guidelines. The American Heart Association recommends routine screening of blood pressure in 3 year olds, and every year thereafter.

GAINING COOPERATION

Although vital sign measurement is not painful, young children may be uncooperative in holding still. Fear of strange equipment is common. Toddlers and preschoolers, because of a poor concept of body integrity, are typically fearful of anything that enters their body, including temperature assessment, as well as examination of the ear by an otoscope or the throat using a tongue blade.

To increase cooperation, as with other procedures, children should be told beforehand, in terms they can understand, what will be done to them. A common mistake when explaining vital sign assessment to young patients is to say, “I’m going to take your temperature (or pulse, etc.).” To young children, who think in literal terms, this may be interpreted as something is going to actually be taken from them. That, in itself, can cause resistance. It is good practice to provide explanations in simple language, such as “I’m going to see how warm you are.” Additionally, adding “okay” to the end of a statement, such as, “I’m going to check how strong your heart is beating now, okay?” should be avoided, although it’s used frequently. The “okay” at the end of the sentence gives the child a choice - one which is not available.

Incorporating play, such as telling the preschooler, “I want to see how strong your muscles are when taking your blood pressure. Hold real still”, is helpful to gain cooperation. Using play to introduce equipment to the child can also be helpful. Letting the young child hold a stethoscope before his or her heart rate is assessed allows the child to become familiar with this threatening looking device. Equipment can also be used first on the child’s doll or stuffed toy, parent and/or healthcare provider. Additionally, allowing the child to “help”, such as by holding an electronic thermometer while his or her temperature is being measured, may also increase cooperation.

TEMPERATURE

Fever is one of the most common symptoms of illness in children. The most common routes for taking the child’s temperature are oral, tympanic, axillary, and rectal. The oral route is highly reliable if the child can cooperate. By age 4, the child can hold an electronic thermometer in the mouth well enough to obtain a reading. The tympanic membrane route is widely used in healthcare settings for assessing temperatures in children of all ages, as well as adults. This route is popular due to the simplicity of its use, rapid measurement, and minimal distress caused to the patient. The tympanic thermometer reflects the pulmonary artery temperature and are now available with smaller speculums, more appropriate for the infant or young child’s ear canal.
The tympanic method is not affected by the presence of ear wax, but it may be affected by vermix in the newborn’s ear. The axillary route is commonly used to measure the temperature of newborns, after the initial rectal temperature, which serves to check for patency of the anus.

Although facility and/or individual pediatrician’s guidelines should be followed, a general recommendation is temperature should be assessed by the rectal route in infants. The age of the infant may vary. For example, some physicians may want rectal temps in infants less than 3 months, 6 months or 1 year of age. Be sure to follow individual guidelines.

The major drawback with rectal temperature measurement is that it is invasive and requires the child to hold still, which is particularly traumatizing for toddlers who don’t like to hold still. Although the risk is low, rectal temperature assessment can result in rectal perforation if not performed correctly. To avoid such a complication, position the infant on his or her back. With the feet held together and the legs elevated, insert the lubricated tip into the anus just until the tip is no longer showing (between 1/2 and 1 inch). Rectal thermometers should never be forced. In certain situations, the rectal route of temperature measurement is contraindicated. For example, if the patient has a cardiac condition, the rectal thermometer could stimulate the vagus nerve in the rectum and cause a cardiac arrhythmia. Also, rectal temperatures are contraindicated in children with diarrhea, as well as those who have undergone bone marrow transplantation or rectal surgery.

Although electronic devices are used in healthcare settings, in many homes mercury thermometers are still in use for children, as well as adults. According to the American Academy of Pediatrics (AAP), mercury thermometers should not be used because if broken, inhaled vapors can cause toxicity. The type of thermometer in the home should be assessed, and if needed, parental teaching provided related to the AAP recommendation.

The normal oral body temperature of a child can vary between 97.7°F (36.5°C) and 99.5°F (37.5°C). Generally, a body temperature of 100.4°F (38°C) or higher, taken by the oral route, is considered medically significant.

**Respirations**

Since crying can significantly increase the rate of breathing, respirations should be assessed before other vital signs, while the child is quiet. In infants and toddlers, since respirations are primarily diaphragmatic, abdominal movements are observable. Since respirations are normally irregular in infants and young children, with periods of intermittent apnea common, respirations should be counted for one full minute. Respiratory rate decreases with age. An interesting trend - four times the respiratory rate is approximately the child’s pulse rate. For example, if the child’s respiratory rate is 24, his or her pulse will be approximately 96 bpm.

**Heart Rate**

A pulse can accurately be assessed radially in most children over 2 years of age. In children under 2, because some peripheral pulses can be difficult to palpate, heart rate should be assessed by auscultation of the apical pulse for one full minute. The apical pulse is assessed over the point of maximum impulse (PMI) on the child’s chest.

In children up to 7 years old, the PMI is usually found at the fourth rib interspace medial to the nipple (the midclavicular line). After age 7 - 8, the PMI is found between the 5 and 6th interspace as it is in the adult. This cardiac impulse can be felt and localized with the fingertip. Due to the rapid change in heart rate with crying or activity, and the need to hear heart sounds clearly to assess for murmurs, or other abnormalities, the heart rate is best assessed when the young child is asleep, using a warm stethoscope. Like respiratory rate, the heart rate also decreases with age.

**Blood Pressure**

Blood pressure is not routinely assessed in younger children, but may be monitored in infants and toddlers with conditions such as heart failure, sepsis or hypovolemia. However, a change in blood pressure typically indicates a very late sign of problems. Therefore, just because a young pediatric patient’s BP is normal, it is not necessarily “stable”.

When the BP is monitored, choosing the correct size cuff is crucial. A cuff that is too large for the child will render a falsely low reading; a cuff too small will give a falsely high reading. The BP cuff should cover approximately 75% of the child’s limb and must be appropriate for the child’s limb circumference. Do not choose a cuff based purely, on the name of the cuff, such as “infant” cuff, since the size of children, within each age group, varies greatly.

BP gradually increases during childhood. Before taking the child’s blood pressure, be aware of a normal BP for age and/or the child’s normal BP from the medical record. The cuff should then be inflated approximately 20-30 mm Hg above the baseline systolic reading. Over-inflating the cuff is painful at any age.

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<th>ASSESSMENT of PEDIATRIC VITAL SIGNS</th>
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Assessed vital signs should be compared with the values obtained recently. Also observe the child. For example, a child with an increased body temperature will usually have flushed skin, increased respiratory and heart rates, malaise and a “glassy” look to the eyes.
1. The heart rate of a 3 month old is most accurately assessed at the:
   a. radial artery.
   b. PMI.
   c. right sternal border.
   d. abdominal aorta.

2. Since toddlers are fearful of anything that goes into their bodies, if at all possible, the rectal route for temperature assessment should not be used in toddlers.
   a. True
   b. False

3. When assessing vital signs of a sleeping 3 year old, which should be measured first?
   a. Blood pressure
   b. Respirations
   c. Temperature
   d. Pulse

4. When assessing the temperature of a 3 month old, which route is most commonly recommended?
   a. Oral
   b. Tympanic
   c. Rectal
   d. Axillary

5. In young children, BP changes are generally a late sign of declining physiologic status.
   a. True
   b. False
6. You are preparing to assess the pulse of a 4 year old. Which of the following is appropriate to tell the child?

   a. “I’m going to take your pulse now.”
   b. “It’s time we measure your heart rate, okay?”
   c. “I’m going to see how fast your heart is beating.”
   d. “I have to count your pulse in your chest.”

7. Prior to assessing the vital signs of a 5 year old, the healthcare provider should do all of the following EXCEPT:

   a. allow the child to play with the equipment, such as the stethoscope.
   b. tell the child what is expected of him or her.
   c. ask the child to help, such as by holding the electronic thermometer.
   d. have another healthcare provider restrain the child.

8. With age, respirations and heart rate decrease in children.

   a. True
   b. False

9. When assessing the pulse of a healthy 18 month old which of the following is important to document? The:

   a. radial rate as compared to the apical rate.
   b. apical heart rate and the child’s activity at the time of assessment.
   c. rate based on 15 seconds of assessment, multiplied times 4.
   d. child’s blood pressure, since BP increases as the heart rate increases.

10. An infant’s respirations are observable in the chest.

    a. True
    b. False