

In The Name of God



(A PROJECT OF NEW LIFE COLLEGE OF NURSING KARACHI)

**UNIT 13:
ASSESSMENT OF THE
PEDIARTRIC CLIENT**

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Objectives.

- By the end of the unit, the learner will be able to:
- Discuss how children differ in structure and function from adults and how these differences affect physical assessment.
- Explain components of pediatric history.
- Evaluate the growth and developmental patterns of infants, toddlers, preschoolers, school goers and adolescents.
- Describe how to assess the neurological system in the pediatric client.
- Differentiate health assessment norms and variations for infants, and children.
- Identify common examination techniques/skills for pediatric health assessment

- Structure and Function
- Subjective Data—Health History Questions
- Objective Data—The Physical Exam
- Abnormal Findings

Anatomic and physiologic characteristics of infants and children

- Children and infants are not only smaller than adults, but also significantly different physiologically.
- Knowledge of pediatric anatomic and physiologic differences will aid in recognizing normal variations found during the physical examination.
- It also assists with understanding the different physiologic responses children have to illness and injury.

Body surface area large for weight, making infants susceptible to hypothermia.

All brain cells present at birth; myelination and further development of nerve fibers occur during first year.

Anterior fontanelle and open sutures palpable up to about 18 months. Posterior fontanelle closes between 2 and 3 months.

Head proportionately larger, making child susceptible to head injury.

Tongue large relative to small nasal and oral airway passages.

Higher metabolic rate, higher oxygen needs, higher caloric needs.

Short, narrow trachea in children under 5 years makes them susceptible to foreign body obstruction.

Until puberty, percentage of cartilage in ribs is higher, making them more flexible and compliant.

Until late school age and adolescence, cardiac output is rate dependent not stroke volume dependent, making heart rate more rapid.

Until about 10 years, there is a faster respiratory rate, fewer and smaller alveoli, and less lung volume. Tidal volume is proportional to weight (7 to 10 mL/kg).

Abdomen offers poor protection for the liver and spleen, making them susceptible to trauma.

Up to about 4 or 5 years, diaphragm is primary breathing muscle. CO_2 is not effectively expired when child is distressed, making child susceptible to metabolic acidosis.

Until 12 to 18 months of age, kidneys do not concentrate urine effectively and do not exert optimal control over electrolyte secretion and absorption.

Until puberty, bones are soft and more easily bent and fractured.

Muscles lack tone, power, and coordination during infancy. Muscles are 25% of weight in infants versus 40% in adults.

Until later school age, proportion of body weight in water is larger, with more water in extracellular spaces. Daily water exchange rate is much higher.

Blood volume is weight dependent: 80 mL/kg.

Children are not just small adults. There are important anatomic and physiologic differences between children and adults that will change based on a child's growth and development.

Subjective Data— Health History Questions

TABLE 35-2 ❀ **Birth History**

Prenatal	<ul style="list-style-type: none"> ■ Mother's age, health during pregnancy, prenatal care, weight gained, special diet, expected date of birth ■ Details of illnesses, x-ray findings, hospitalizations, medications, complications, and timing during pregnancy ■ Prior obstetric history
Antenatal—description of birth	<ul style="list-style-type: none"> ■ Site of birth (hospital, home, birthing center) ■ Labor induced or spontaneous, length of labor, time/duration or rupture of membranes ■ Vaginal or cesarean birth, forceps or suction used, vertex or breech position ■ Gestation at birth, single or multiple birth
Condition of baby at birth	<ul style="list-style-type: none"> ■ Weight, Apgar score, cried immediately ■ Need for incubator, oxygen, suctioning, ventilator ■ Any abnormalities detected, meconium staining
Postnatal	<ul style="list-style-type: none"> ■ Difficulties in the nursery—feeding, respiratory difficulties, jaundice, cyanosis, rashes ■ Length of hospital stay, special nursery, home with mother ■ Breast- or bottle-fed, weight lost/gained in hospital ■ Medical care needed in first week—readmission to hospital

Conti....

TABLE 35-3 ❖ **Familial or Hereditary Diseases**

Infectious diseases	Tuberculosis, HIV, hepatitis, varicella
Heart disease	Heart defects, myocardial infarctions, hypertension, hyperlipidemia, sudden childhood deaths
Allergic disorders	Eczema, hay fever, or asthma
Eye disorders	Glaucoma, cataracts, vision loss
Ear disorders	Hearing loss
Hematologic disorders	Sickle cell anemia, thalassemia, G6PD deficiency, leukemia
Lung disorders	Cystic fibrosis
Cancer	Type, early age of onset
Endocrine disorders	Diabetes mellitus, hypothyroidism, hyperthyroidism
Mental disorders	Mental retardation, epilepsy, Huntington chorea, psychiatric disorders
Musculoskeletal disorders	Arthritis, muscular dystrophy
Gastrointestinal disorders	Ulcers, colitis, kidney disease
Problem pregnancies	Repeated miscarriages, stillbirths
Learning problems	Attention deficit disorder, Down syndrome

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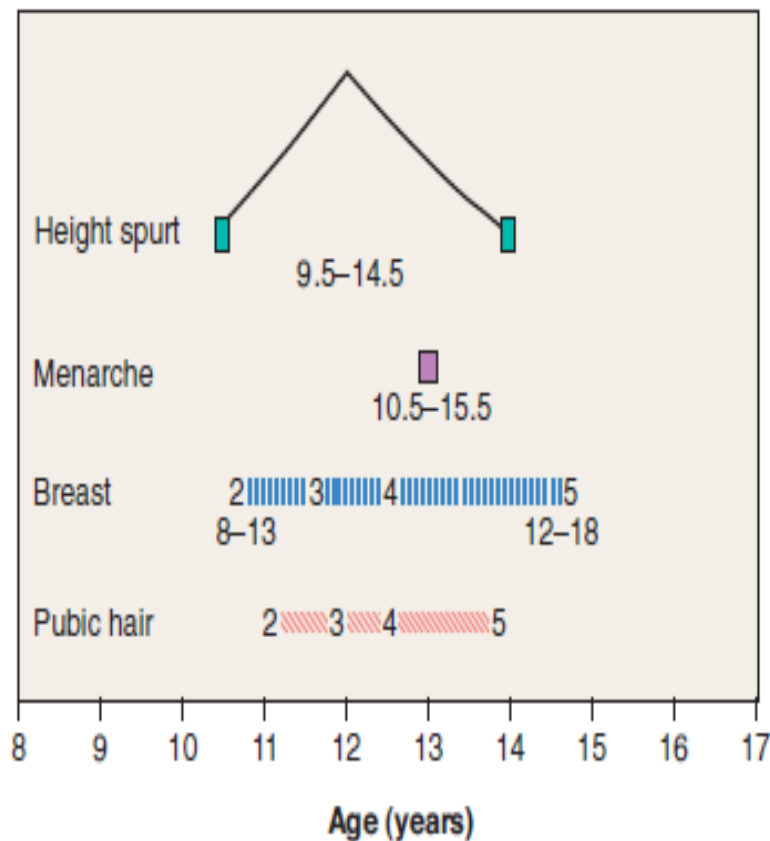
TABLE 35-4 ❖ **Review of Systems**

Body Systems	Examples of Problems to Identify
General	General growth pattern, overall health status, ability to keep up with other children or tires easily with feeding or activity, fever, sleep patterns Allergies, type of reaction (hives, rash, respiratory difficulty, swelling, nausea), seasonal or with each exposure
Skin and lymph	Rashes, dry skin, itching, changes in skin color or texture, tendency for bruising, swollen or tender lymph glands
Hair and nails	Hair loss, changes in color or texture, use of dye or chemicals on hair Abnormalities of nail growth or color
Head	Headaches
Eyes	Vision problems, squinting, crossed eyes, lazy eye, wears glasses, eye infections, redness, tearing, burning, rubbing, swelling eyelids
Ears	Ear infections, frequent discharge from ears, or tubes in ears Hearing loss (no response to loud noises or questions, inattentiveness, was hearing test ever done?), hearing aids or cochlear implant
Nose and sinuses	Nosebleeds, nasal congestion, colds with runny nose, sinus pain or infections Nasal obstruction, difficulty breathing, snoring at night
Mouth and throat	Mouth breathing, difficulty swallowing, sore throats, strep infections, mouth odor Tooth eruption, cavities, braces Voice change, hoarseness, speech problems

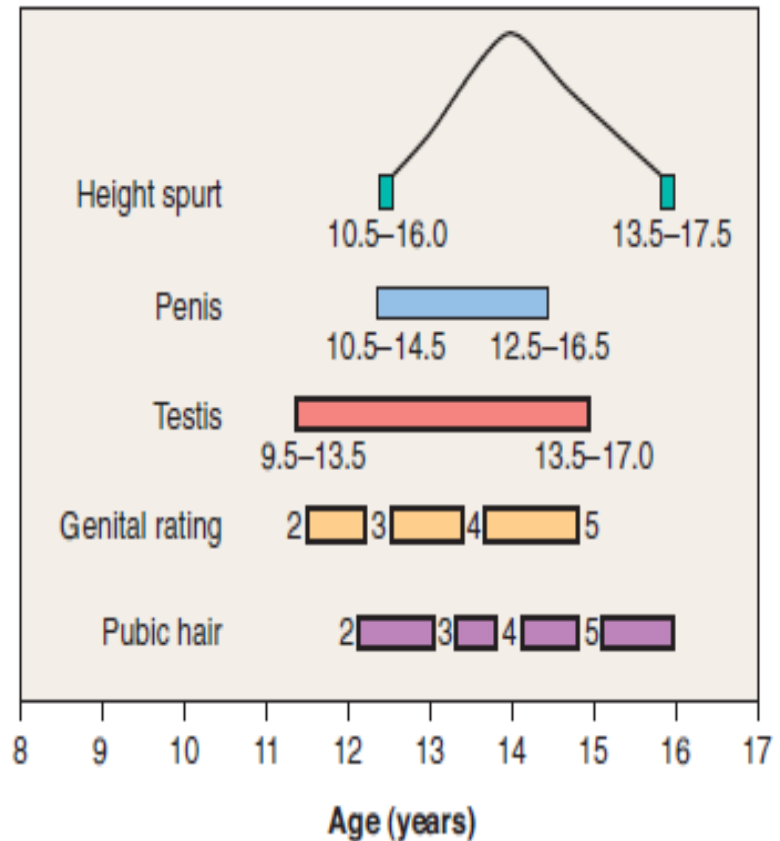
Conti....

Cardiac and hematologic	Heart murmur, anemia, hypertension, cyanosis, edema, rheumatic fever, chest pain
Chest and respiratory	Trouble breathing, choking episodes, cough, wheezing, cyanosis, exposure to tuberculosis, other infections
Gastrointestinal	Bowel movements, frequency, color, regularity, consistency, discomfort, constipation or diarrhea, abdominal pain, bleeding from rectum, flatulence Nausea or vomiting, appetite
Urinary	Frequency, urgency, dysuria, dribbling, strength of urinary stream Toilet trained—age when day and night dryness attained, enuresis
Reproductive	For pubescent children
Female	Menses onset, amount, duration, frequency, discomfort, problems; vaginal discharge, breast development
Male	Puberty onset, emissions, erections, pain or discharge from penis, swelling or pain in testicles
Both	Sexual activity, use of contraception, sexually transmitted diseases
Musculoskeletal	Weakness, clumsiness, poor coordination, balance, tremors, abnormal gait, painful muscles or joints, swelling or redness of joints, fractures
Neurologic	Brain or head injuries Seizures, fainting spells, dizziness, numbness Learning problems, attention span, hyperactivity, memory problems

● FIGURE 35-35



A



B

Sexual maturity rating—approximate timing of developmental changes. The numbers indicate stages of development. Range of ages during which some changes occur is indicated by the inclusive numbers below them. **A**, Females. **B**, Males.

Used with permission from Marshall, W. A., & Tanner, J. M. (1969). *Archives of Disease in Childhood*, 44, 291.

Objective Data—The Physical Exam



NURSING PRACTICE

Following are the specific examination techniques:

Inspection. Purposeful observation of the child's physical features and behaviors. Physical feature characteristics include size, shape, color, movement, position, and location. Detection of odors is also a part of inspection.

Palpation. Use of touch to identify characteristics of the skin, internal organs, and masses. Characteristics include texture, moistness, tenderness, temperature, position, shape, consistency, and mobility of masses and organs. The palmar surface of the fingers and finger pads helps determine position, size, consistency, and masses. The ulnar surface of the hand is best to detect vibrations.

Auscultation. Listening to sounds produced by the airway, lungs, stomach, heart, and blood vessels to identify their characteristics. Auscultation is usually performed with a stethoscope to enhance the sounds heard.

Percussion. Striking the surface of the body, either directly or indirectly, to set up vibrations that reveal the density of underlying tissues and borders of internal organs.

INSPECTION OF THE SKIN

- Skin Color, Temperature, Texture, Moistness



NURSING PRACTICE

The degree of dehydration, or weight loss caused by dehydration, can be estimated from the time it takes tented skin to return to its natural contour (Seidel, Ball, Dains et al., 2003).

Weight Loss from Dehydration

< 5%
5% to 8%
9% to 10%
> 10%

Time to Return to Normal

< 2 sec
2 to 3 sec
3 to 4 sec
> 4 sec

Primary Skin Lesions associated Condition



Lesion Name: Macule

Description:

Flat, nonpalpable, diameter <1 cm ($\frac{1}{2}$ in.)

Example: Freckle, rubella, rubeola, petechiae



Lesion Name: Patch

Description:

Macule, diameter >1 cm ($\frac{1}{2}$ in.)

Example: Vitiligo, Mongolian spot

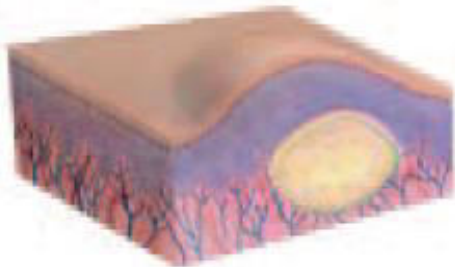


Lesion Name: Papule

Description:

Elevated, firm, diameter <1 cm ($\frac{1}{2}$ in.)

Example: Warts, pigmented nevi

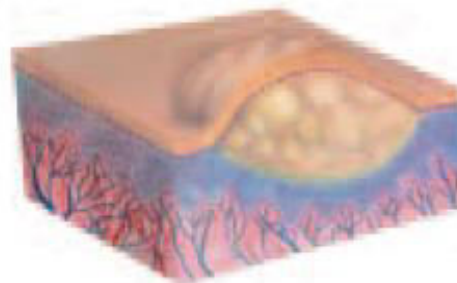


Lesion Name: Nodule

Description:

Elevated, firm, deeper in dermis than papule, diameter 1-2 cm ($\frac{1}{2}$ in.-1 in.)

Example: Erythema nodosum

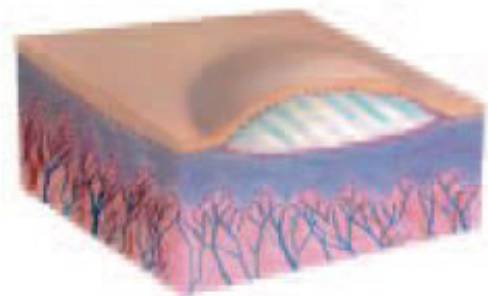


Lesion Name: Tumor

Description:

Elevated, solid, diameter >2 cm (1 in.)

Example: Neoplasm, hemangioma



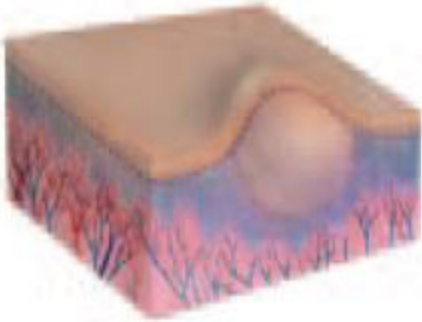
Lesion Name: Vesicle

Description:

Elevated, filled with fluid, diameter <1 cm ($\frac{1}{2}$ in.)

Example: Early chicken pox, herpes simplex

Primary Skin Lesions associated Condition

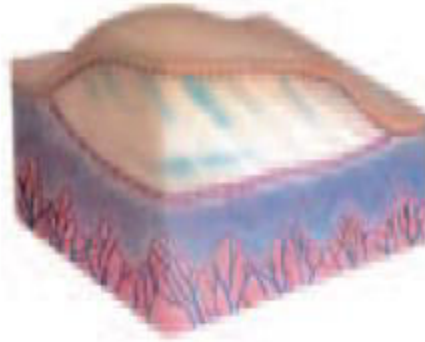


Lesion Name: Pustule

Description:

Vesicle filled with purulent fluid

Example: Impetigo, acne

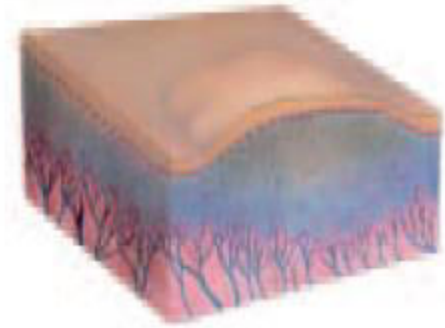


Lesion Name: Bulla

Description:

Vesicle diameter >1 cm ($\frac{1}{2}$ in.)

Example: Burn blister



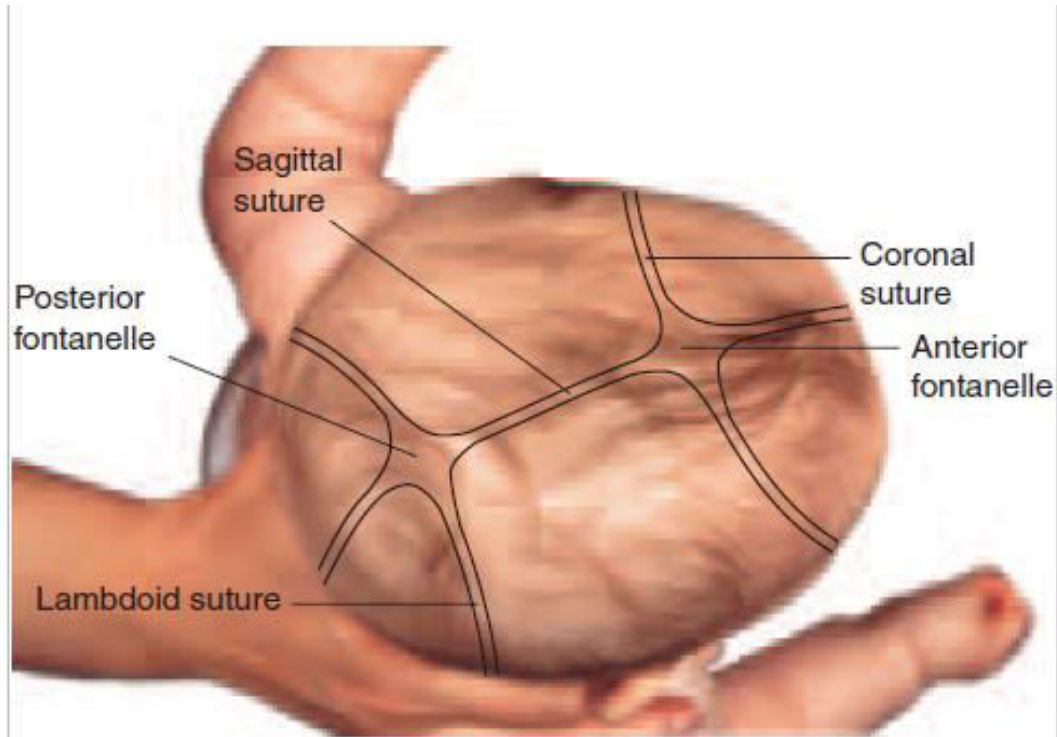
Lesion Name: Wheal

Description:

Irregular elevated solid area of edematous skin

Example: Urticaria, insect bite

Sutures



The sutures are separations between the bones of the skull that have not yet joined. The fontanelles are formed at the intersection of these sutures where bone has not yet formed. Fontanelles are covered by tough membranous tissue that protects the brain. The posterior fontanelle closes between 2 and 3 months. The anterior fontanelle and sutures are palpable up to the age of 18 months.

Assessing the chest for shape, movement, respiratory effort, and lung function

TABLE 35-10 ✦ **Normal Respiratory Rate Ranges for Each Age Group**

Age	Respiratory Rate per Minute
Newborn	30-60
1 year	20-40
3 years	20-30
6 years	16-22
10 years	16-20
17 years	12-20

Assessing the heart for heart sounds and function

TABLE 35-12 ✦ **Normal Heart Rates for Children of Different Ages**

Age	Heart Rate Range (beats/min)	Average Heart Rate (beats/min)
Newborns	100-170	120
Infants to 2 years	80-130	110
2-6 years	70-120	100
6-10 years	70-110	90
10-16 years	60-100	85

Conti...



GROWTH AND DEVELOPMENT

The location of the apical impulse changes as the child's rib cage grows. In children under 7 years old, it is located in the fourth intercostal space just medial to the left midclavicular line. In children over 7 years old, it is located in the fifth intercostal space at the left midclavicular line.

Conti....

TABLE 35-13 ✦ **Identification of the Listening Sites for Auscultation of the Quality and Intensity of Heart Sounds**

Heart Sound	Locations Best Heard	Where Heard Softly
S ₁	Apex of the heart Tricuspid area Mitral area	Base of the heart Aortic area Pulmonic area
S ₂	Base of the heart Aortic area Pulmonic area	Apex of the heart Tricuspid area Mitral area
Physiologic splitting	Pulmonic area	
S ₃	Mitral area	

Conti...



NURSING PRACTICE

Following are guidelines for grading the intensity of a murmur:

Intensity	Description
Grade I	Barely heard in a quiet room
Grade II	Quiet, but clearly heard
Grade III	Moderately loud, no thrill palpated
Grade IV	Loud, a thrill is usually palpated
Grade V	Very loud, a thrill is easily palpated
Grade VI	Heard without the stethoscope in direct contact with the chest wall

Assessing the musculoskeletal system for bone and joint structure, movement, and muscle strength

GROWTH AND DEVELOPMENT

Palpate the clavicles of the newborn from the sternum to the shoulder. These bones are often fractured during the birth process. A mass and crepitus may indicate a fracture.

TABLE 35-15 ✦ **Selected Gross Motor Milestones for Age**

Gross Motor Milestones	Age Attained
Rolls over from prone to supine position	4 months
Sits without support	8 months
Pulls self to standing position	10 months
Walks around room holding onto objects	11 months
Walks alone well	15 months
Kicks ball	24 months
Jumps in place	30 months
Throws ball overhand	36 months

Note: From Frankenburg, W. K., Dodds, J., Archer, P., Shapiro, H., & Bresnick, B. (1992). The Denver II: A major revision and restandardization of the Denver Developmental Screening Test. *Pediatrics*, 89, 91-97. Reproduced with permission from *Pediatrics*, Figure 2, © 1992.

Conti....

TABLE 35-16 ✦ **Normal Development of Posture and Spinal Curves**

Age	Posture and Spinal Curves
2-3 months	Holds head erect when held upright; thoracic kyphosis when sitting.
6-8 months	Sits without support; spine is straight.
10-15 months	Walks independently; straight spine.
Toddler	Protruding abdomen; lumbar lordosis.
School-age child	Height of shoulders and hips is level; balanced thoracic convex and lumbar concave curves.

Conti....

TABLE 35-17 ❖ **Expected Language Development for Age**

Language Milestones	Age Attained
Understands Mama and Dada	10 months
Says Mama, Dada, 2 other words; imitates animal sounds	12 months
4-6 word vocabulary, points to desired objects	13-15 months
7-20 word vocabulary, points to 5 body parts	18 months
2-word combinations	20 months
3-word sentences, plurals	36 months

Note: From Capute, A. J., Shapiro, B. K., & Palmer, R. B. (1987). Marking the milestones of language development. *Contemporary Pediatrics*, 4, 24-41.

Conti....

TABLE 35-18 ✦ **Expected Balance Development for Age**

Balance Milestones	Age Attained
Stands without support briefly	12 months
Walks alone well	15 months
Walks backwards	2 years
Balances on 1 foot for 5 seconds	4 years
Hops on 1 foot, heel-toe walking	5 years
Heel-toe walking backwards	6 years

Conti....

TABLE 35-19 ❖ **Expected Fine Motor Development for Age**

Fine Motor Milestones	Age Attained
Transfers objects between hands	7 months
Picks up small objects	10 months
Feeds self with cup and spoon	12 months
Scribbles with crayon or pencil	18 months
Builds 2-block tower	24 months
Builds 4-block tower	30 months
Unfastens front buttons	36 months

Note: From Frankenburg, W. K., Dodds, J., Archer, P., Shapiro, H., & Bresnick, B. (1992). The Denver II: A major revision and restandardization of the Denver Developmental Screening Test. *Pediatrics*, 89, 91-97. Reproduced with permission from *Pediatrics*, Table 2, © 1992.

Cranial nerve function



A



B



C



D

Tests of coordination. **A**, Finger-to-nose test. Ask the child to close the eyes and touch his or her nose, alternating the index fingers of the hands. **B**, Finger-to-finger test. Ask the child to alternately touch his or her nose and your index finger with his or her index finger. Move your hand to several positions within the child's reach to test pointing accuracy. Repeat the test with the child's other hand. **C**, Heel-to-shin test. Ask the child to rub his or her leg from the knee to the ankle with the heel of the other foot. Repeat the test with the other foot. This test is normally performed without hesitation or inappropriate placement of the foot. **D**, Rapid alternating motion test. Ask the child to rapidly rotate his or her wrist so the palm and dorsum of the hand alternately pat the thigh. Repeat the test with the other hand. Hesitating movements are abnormal. Mirroring movements of the hand not being tested indicate a delay in coordination skill refinement.

Cranial nerve function

TABLE 35-20 ✦ **Age-Specific Procedures for Assessment of Cranial Nerves in Infants and Children**

Cranial Nerve ^a	Assessment Procedure and Normal Findings ^b
I Olfactory	<p>Infant: Not tested.</p> <p>Child: Not routinely tested. Give familiar odors to child to smell, one naris at a time. <i>Identifies odors such as orange, peanut butter, and chocolate.</i></p>
II Optic	<p>Infant: Shine a bright light in eyes. <i>A quick blink reflex and dorsal head flexion indicates light perception.</i></p> <p>Child: Test vision and visual fields if cooperative. <i>Visual acuity appropriate for age.</i></p>
III Oculomotor } IV Trochlear } VI Abducens }	<p>Infant: Shine a penlight at the eyes and move it side to side. <i>Focuses on and tracks the light to each side.</i></p> <p>Child: Move an object through the six cardinal points of gaze. <i>Tracks object through all fields of gaze.</i></p> <p>All ages: Inspect eyelids for drooping. Inspect pupillary response to light. <i>Eyelids do not droop and pupils are equal size and briskly respond to light.</i></p>
V Trigeminal	<p>Infant: Stimulate the rooting and sucking reflex. <i>Turns head toward stimulation at side of mouth and sucking has good strength and pattern.</i></p> <p>Child: Observe the child chewing a cracker. Touch forehead and cheeks with cotton ball when eyes are closed. <i>Bilateral jaw strength is good. Child pushes cotton ball away.</i></p>
VII Facial	<p>All ages: Observe facial expressions when crying, smiling, frowning, etc. <i>Facial features stay symmetric bilaterally.</i></p>
VIII Acoustic	<p>Infant: Produce a loud sound near the head. <i>Blinks in response to sound, moves head toward sound or freezes position.</i></p> <p>Child: Use a noisemaker near each ear or whisper words to be repeated. <i>Turns head toward sound and repeats words correctly.</i></p>
IX Glossopharyngeal } X Vagus }	<p>Infant: Observe swallowing during feeding. <i>Good swallowing pattern.</i></p> <p>All ages: Elicit gag reflex. <i>Gags with stimulation.</i></p>
XI Spinal accessory	<p>Infant: Not tested.</p> <p>Child: Ask child to raise the shoulders and turn the head side to side against resistance. <i>Good strength in neck and shoulders.</i></p>
XII Hypoglossal	<p>Infant: Observe feeding. <i>Sucking and swallowing are coordinated.</i></p> <p>Child: Tell the child to stick out the tongue. Listen to speech. <i>Tongue is midline with no tremors. Words are clearly articulated.</i></p>

^aBracketed nerves are tested together.

^bItalic indicates normal findings.

Critical Concept Review

LEARNING OBJECTIVES

CONCEPTS

Describe the elements of a health history for an infant or child of different ages.

Historical data to collect includes:

1. Chief complaint.
2. History of the present illness or injury.
3. Past history.
4. Current health status.
5. Review of systems.
6. Family history.
7. Psychosocial data.
8. Developmental data.

(continued)

Identify communication strategies to improve the quality of historical data collected.

1. Introduce self, including purpose of interview.
2. Provide privacy, including confirmation confidentiality.
3. Use open-ended questions.
4. Ask one question at a time.
5. Direct question to the child when appropriate.
6. Be honest with the child and family.
7. Obtain feedback from parents to confirm understanding.

Describe strategies to gain cooperation of a young child for assessment.

1. Allow the young child to stay in caretaker's lap for most of the examination.
2. Allow the young child to hold and examine any equipment before it is used on the child.
3. Avoid the use of any quick, jerky movements when performing assessments.

Describe the differences in sequence of the physical assessment for infants, children, and adolescents.

1. Any painful or frightening procedures (examination of throat and ears) should be delayed until the end of the physical assessment of the infant and young child.
2. Physical examination of the school-age child should proceed in a head-to-toe fashion, with the exception of the genitalia examination (should be done last).
3. The physical examination of the adolescent may be completed without the presence of the parent, especially the examination of the genitalia.

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Modify physical assessment techniques according to the age and developmental stage of the child.

Infants and toddlers:

1. Head circumference is required until age 3.
2. Palpate fontanelles until closure.
3. Assess vision and hearing response with the use of toys and familiar objects.
4. Perform the abdominal examination with the infant and toddler on the lap of the caregiver and use distraction.
5. Use direct percussion of the chest to evaluate resonance.

Preschooler:

1. Ask young child to show teeth to begin assessment of the mouth and throat.
2. Gently pry teeth apart with a tongue depressor if teeth remain clenched.
3. Use familiar objects and words easily recognized to assess vision and hearing.
4. Males should sit "tailor fashion" to assess genitalia.

Adolescent:

1. Assess breast development in both males and females.

Determine the sexual maturity rating of males and females based upon physical signs of secondary sexual characteristics present.

The sexual maturity rating (SMR) for:

1. Females: Average of breast development and pubic hair (Tanner stages).
2. Males: Average of genital development and pubic hair (Tanner stages).

Recognize at least five important signs of a serious alteration in health condition that require urgent nursing intervention.

1. Altered level of consciousness.
2. Bradycardia.
3. Tachypnea (greater than 60 breaths per minute).
4. Pain.
5. Signs of dehydration (no tears, dry mucous membranes, doughy skin turgor, sunken fontanelle, increased urine concentration).
6. Stridor.
7. Retractions.
8. Cyanosis.

References.

- Bicklay, L. S. (1999). *Bates' guide to physical examination and history taking* (7th ed). Philadelphia: J.B. Lippincott.
- Weber, J. & Kelley, J.(2007). *Health assessment in nursing* (3rd ed). Williams & Wilkins: Lippincott.