Pediatric health assessment

Learning Objectives

Determine assessment findings that deviate from the normal range for pediatric.
Discuss in steps assessment of child and the family.
Identify pediatric stages
Pediatric systematic assessment

OVERVIEW

Health assessment provides key information needed for diagnosis of patients and for planning of effective care. assessing the child's and family's view of the problem through history and the physical examination and review of diagnostic test results.

PEDIATRIC STAGES:

1. Infancy period: birth to 12 months
   - Neonatal Stage: birth-28 days
   - Infancy Stage: 1-12 months
2. Early childhood Stage:
   - Toddler: 1 - 3years.
   - Preschool: 3 - 6 years.
3. Middle childhood (school age) 6-12 years
4. Late childhood:
   - Pre pubertal: 10 – 13 years.
   - Adolescence: 13 - 21 years

HEALTH ASSESSMENT:

Any assessment involves collecting two kinds of data:

Objective data are obtained through observation and are verifiable. For instance, a red, swollen arm

Subjective data can't be verified by anyone other than the patient; they're gathered solely from the patient's own account—for example, "my head hurts".

1. CHILD HISTORY

- **History Taking**

The format used for history taking can be
(1) direct, in which the nurse asks for information via direct interview with the

informant
(2) indirect, in which the informant supplies the information by completing some type of questionnaire.

Outline of a Pediatric Health History

Identifying Information
(Name, Address, Telephone, Birth date and place, Race or ethnic group, Sex, Religion, Date of interview, Informant)

Chief complaint (CC): To establish the major specific reason for the child's and parents' seeking of health care

Present illness (PI): To obtain all details related to the chief complaint

Past history (PH): To elicit a profile of the child's previous illnesses, injuries, or surgeries

1. Birth history (pregnancy, labor and delivery, perinatal history)
2. Previous illnesses, injuries, or surgeries
3. Allergies
4. Current medications
5. Immunizations
6. Growth and development
7. Habits

Review of systems (ROS): To elicit information concerning any potential health problem (Constitutional, Integument, Eyes, Ears, Nose, Mouth, Throat, Neck, Chest, Respiratory, Cardiovascular, Gastrointestinal, Genitourinary, Gynecologic, Musculoskeletal, Neurologic, Endocrine, Hematologic/lymphatic, Allergic /immunologic, & Psychiatric.

Family medical history: To identify genetic traits or diseases that have familial tendencies and to assess exposure to a communicable disease in a family member and family habits that may affect the child's health, such as smoking and chemical use

Psychosocial history: To elicit information about the child's self-concept, relationships

Family history: To develop an understanding of the child as an individual and as a member of a family and a community

Nutritional assessment: To elicit information on the adequacy of the child's nutritional intake and needs, & Clinical examination

- **Chief Complaint**

The chief complaint is the specific reason for the child's visit to hospital. It may be the theme, with the present illness viewed as the description of the problem.
Elicit the chief complaint by asking open-ended, neutral questions "Why did you come here today?"), be as specific as possible when asking questions.

- **Present Illness**

The history of the present illness is a narrative of the chief complaint from its earliest onset through its progression to the present. Its four major components are the details of onset, a complete interval history, the present status, and the reason for seeking help now.

- **History**
  - **Birth History**

The birth history includes all data concerning
(1) the mother's health during pregnancy, (2) the labor and delivery, and (3) the infant's condition immediately after birth.

  - **Previous Illnesses, Injuries, and Surgeries**

begin with a general statement (e.g., "What other illnesses has your child had?"), ask specifically about colds, earaches, and childhood diseases.
ask about injuries that required medical intervention, surgeries, procedures, and hospitalizations, including the dates of each incident. Focus on injuries (e.g., accidental falls, poisoning, choking, concussion, fracture, or burns) because these may be potential areas for parental guidance.

  - **Allergies**

Ask about commonly known allergic disorders, such as hay fever and asthma; unusual reactions to drugs, food, or latex products; and reactions to other contact agents such as poisonous plants, animals, household products, or fabrics.

  - **Current Medications**

Inquire about current medications, including vitamins, antipyretics (especially aspirin), antibiotics, antihistamines, nutritional supplements, or herbs, essential oils, and homeopathic medications. List all medications, including name, dose, route, schedule, duration, and reasons for use.

  - **Immunizations**

All immunizations are listed, stating the name of the specific disease, the dosage, the date when administered, and any reaction following the immunization.

- **Growth and Development**

1. Review the child's growth, including the following:
   - Measurements of weight, length, and head circumference at birth

- Patterns of growth on the growth chart and any significant deviations from previous percentiles
- Concerns about growth from the family or child

2. Developmental milestones include the following:
- Age of holding up head steadily
- Age of sitting alone without support
- Age of walking without assistance
- Age of saying first words with meaning
- Age of achieving bladder and bowel control
- School performance
- Interactions with other children, peers, and adults

- **Habits**

Habits are an important area to explore.
- Behavior patterns, such as nail biting, thumb sucking, pica (habitual ingestion of nonfood substances), rituals ("security" blanket or toy), and unusual movements (head banging, rocking, overt masturbation, walking on toes)
- Activities of daily living, such as hours of sleep and arising, duration of nighttime sleep and naps, type and duration of exercise, regularity of stools and urination, age of toilet training, and daytime or nighttime bedwetting
- Use or abuse of alcohol, drugs, caffeine, or tobacco

- **Family Health History**

discover any genetic or chronic diseases in the child's family members. Assess for the presence or absence of consanguinity (if anyone in the family is related to their spouse's/partner's family.

- **Psychosocial History**

children's personal status, such as school adjustment and any unusual habits, and the family and home environment. Observe the parent-child relationship for the types of messages sent to children about their coping skills and self-worth.

2. GENERAL APPROACHES TOWARD EXAMINING THE CHILD

- **GROWTH MEASUREMENTS**

Measurement of physical growth in children is a key element in evaluating their health status. Physical growth parameters include weight, height (length), skinfold thickness, arm circumference, and head circumference.

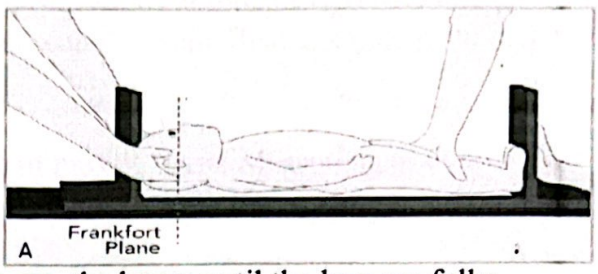
- **Growth Charts**

Growth charts use a series of percentile curves to demonstrate the distribution of body measurements in children. The CDC recommends WHO growth standards be used to monitor growth for infants and children between the ages of 0 and 2 years

old, and for children 2 years old and older.

- **Length**

The term length refers to measurements taken when children are supine (recumbent length). Until children are 24 months old, measure recumbent length using a length board



Because of the normally flexed position during infancy, fully extend the body by (1) holding the head in midline, (2) grasping the knees together gently, and (3) pushing down on the knees until the legs are fully extended and flat against the table. When using a length board, place the head firmly at the top of the board and the heels of the feet firmly against the footboard.

- **Height**

The term height (or stature) refers to the measurement taken when a child is standing upright.

Measure height by having the child, with shoes removed, stand as tall and straight as possible with the head in midline and the line of vision parallel to the ceiling and floor. Be certain the child's back is to the wall or other vertical flat surface, with the head, shoulder blades, buttocks, and heels touching the wall.

- **Weight**

Weight is measured with an appropriately sized electronic or balance beam scale, which measures weight. When birth-to-2-year or birth-to-36-month growth charts are used, children should be weighed nude. Older children are usually weighed while wearing their underpants, a gown, or light clothing, depending on the setting.

Nurses need to be familiar with determining body mass index (BMI), which requires accurate information about the child's weight and height.

BMI = Weight in kilograms ÷ [Height in meters]^2

or

BMI = [Weight in pounds ÷ (Height in inches × Height in inches)] × 703

BMI-for-age and gender is used to identify children and adolescents who are either underweight (<5th percentile), healthy weight (5th to <85th percentile), overweight (≥85th percentile and <95th percentile), or obese (≥95th percentile).

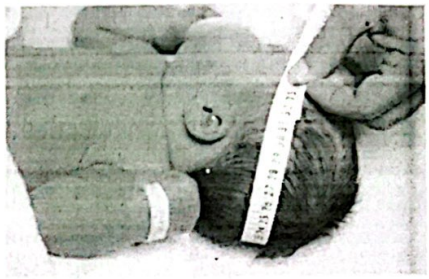
- **Skinfold Thickness and Arm Circumference**

One convenient measure of body fat is skinfold thickness, which is increasingly recommended as a routine measurement. Measure skinfold thickness with special calipers. The most common sites for measuring skinfold thickness are the triceps (most practical for routine clinical use), subscapular, suprailiac, abdomen, and upper thigh.

Arm circumference is an indirect measure of muscle mass. Measurement of arm circumference follows the same procedure as for skinfold thickness except the midpoint is measured with a paper, or steel tape.

- **Head Circumference**

Head circumference is a reflection of brain growth. Measure head circumference in children up to 36 months of age and in any child whose head size is questionable. Measure the head at its greatest front-ooccipital circumference, usually slightly above the eyebrows and pinna of the ears and around the occipital prominence at the back of the skull by use non stretchable tape,



Plot the head size on the appropriate growth chart for head circumference. Generally, head and chest circumferences are equal at about 1 to 2 years of age. During childhood, chest circumference exceeds head size by about 5 to 7 cm (2 to 2.75 inches).

- **PHYSIOLOGIC MEASUREMENTS**

Physiologic measurements, key elements in evaluating physical status of vital functions, include temperature, pulse, respiration, and blood pressure. Compare each physiologic recording with normal values for that age group.

As in most procedures carried out with children, treat older children and adolescents much the same as adults.

For best results in taking vital signs of infants, count respirations first (before the infant is disturbed), take the pulse next, and measure temperature last. If vital signs cannot be taken without disturbing the child, record the child's behavior (e.g., crying) along with the measurement.

The nurse can measure temperature in healthy children at several body sites via oral, rectal, axillary, ear canal (tympanic membrane), temporal artery, or skin route. Range of normal is 97.7°F to 98.6°F (36.5°C to 37°C). Both elevated and decreased temperatures can signal infection.

A satisfactory pulse can be taken radially in children older than 2 years of age. However, in infants and young children, the **apical impulse** (heard through a

stethoscope held to the chest at the apex of the heart) is more reliable for location of pulses). Count the pulse for 1 full minute in infants and young children because of possible irregularities in rhythm.

Count the respiratory rate in children in the same manner as for adult patients. However, in infants, observe abdominal movements because respirations are primarily diaphragmatic. Because the movements are irregular, count them for 1 full minute for accuracy

Blood pressure (BP) should be measured annually in children 3 years of age through adolescence and in children with symptoms of hypertension, children in emergency departments and intensive care units, and high-risk infants

Using the Blood Pressure Tables

1. Use the standard height charts to determine the height percentile.
2. Measure and record the child's systolic blood pressure (SBP) and diastolic blood pressure (DBP).
3. Use the correct gender table for SBP and DBP.
4. Find the child's age on the left side of the table. Follow the age row hori- zontally across the table to the intersection of the line for the height percentile (vertical column).
5. Then find the 50th, 90th, 95th, and 99th percentiles for SBP in the left columns and for DBP in the right columns.
   - BP less than 90th percentile is normal.
   - BP between the 90th and 95th percentiles is prehypertension. In ado- lescents, BP of 120/80 mm Hg or greater is prehypertension, even if this figure is less than the 90th percentile.
   - BP over the 95th percentile may be hypertension.
6. If the BP is over the 90th percentile, the BP should be repeated twice during the same patient encounter, and an average SBP and DBP should be used.
7. If the BP is over the 95th percentile, BP should be staged. If BP is stage 1 (95th to 99th percentile plus 5 mm Hg), BP measurements should be repeated on two more occasions. If hypertension is confirmed, evaluation should proceed. If BP is stage 2 (>99th percentile plus 5 mm Hg), prompt referral should be made for evaluation and therapy. If the patient is symptomatic, immediate referral and treatment are indicated.

- **GENERAL APPEARANCE**

The child's general appearance is a cumulative, subjective impression of the child's physical appearance, state of nutrition, behavior, personality, interactions with parents and nurse (also siblings if present), posture, development, and speech.
Note the facies, the child's facial expression and appearance. For example, the facies may give clues to children who are in pain; have difficulty breathing;
Observe the posture, position, and types of body movement. A child with hearing or vision loss may characteristically tilt the head in an awkward position to hear or see better.
Note the child's hygiene in terms of cleanliness; unusual body odor; the condition of the hair, neck, nails, teeth, and feet; and the condition of the clothing.

- **SKIN**

Assess skin for color, texture, temperature, moisture, turgor, lesions, and rashes. Examination of the skin and its accessory organs primarily involves inspection and palpation.

Normally the skin texture of young children is smooth, slightly dry, and not oily or clammy. Evaluate skin temperature by symmetrically feeling each part of the body and comparing upper areas with lower ones. Note any difference in temperature.

Determine tissue turgor, or elasticity in the skin, by grasping the skin on the abdomen between the thumb and index finger, pulling it taut, and quickly releasing it. Elastic tissue immediately resumes its normal position without residual marks or creases. In children with poor skin turgor, the skin remains suspended or tented for a few seconds before slowly falling back on the abdomen. Skin turgor is one of the best estimates of adequate hydration and nutrition.

Accessory Structures

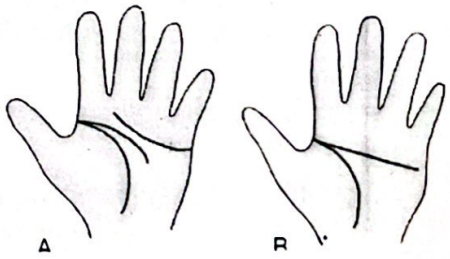
Inspect the hair for color, texture, quality, distribution, and elasticity. Children's scalp hair is usually lustrous, silky, strong, and elastic.

Hair that is stringy, dull, brittle, dry, friable, and depigmented may suggest poor nutrition.

Loss of hair in infants may indicate lying in the same position and may be a cue to counsel parents concerning the child's stimulation needs.

Inspect the hair and scalp for general cleanliness. Examine the scalp for lesions, , evidence of infestation (e.g., lice or ticks), and signs of trauma (scars).

In children who are in puberty, look for growth of secondary hair as a sign of normally pubertal changes. Note precocious or delayed appearance of hair growth which suggestive of hormonal dysfunction.

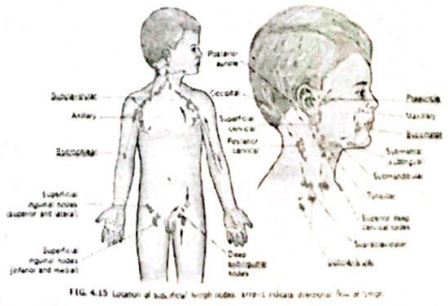


Inspect the nails for color, shape, texture, and quality. Normally the nails are pink, convex, smooth, and hard but flexible (not brittle). The edges, which are usually white, should extend over the fingers. Short, ragged nails are a habitual biting. Uncut, dirty nails are a sign of poor hygiene. The palm normally shows three flexion creases. In some conditions two creases found, such as Down syndrome.

- **LYMPH NODES**

Palpate nodes using the distal portion of the fingers and gently but firmly pressing in a circular motion where nodes are normally present.

During assessment of the nodes in the head and neck, tilt the child's head upward slightly but without tensing the sternocleidomastoid



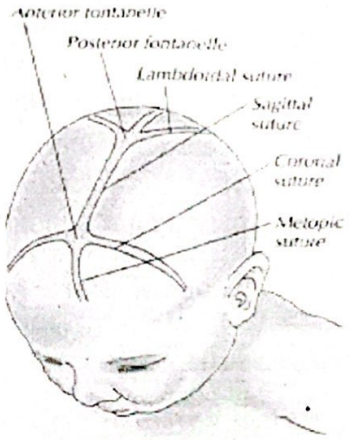
muscles. palpation of the submental, submandibular, tonsillar, and cervical nodes. Assess the inguinal nodes with the child in the supine position. Note size, mobility, temperature, and tenderness. Tender, enlarged, warm, erythematous lymph nodes generally indicate infection or inflammation close to their location.

- **HEAD AND NECK**

Observe the head for general shape and symmetry. Marked asymmetry is usually abnormal and may indicate premature closure of the sutures (craniosynostosis).

Note head control in infants and head posture in older children. By 4 months old, most infants should be able to hold the head erect and in midline when in a vertical position. (After 6 months old, significant head lag strongly indicates cerebral injury and is referred for further evaluation).

Evaluate range of motion by asking the older child to look in each direction (to either side, up, and down) or by manually putting the younger child through each position. Limited range of motion may indicate of injury to the sternocleidomastoid muscle.



Anterior fontanel: is diamond shaped, located at juncture of the two parietal & two frontal bones, closes between 9- 18 months of age. It should be soft, flat & pustule.

Posterior fontanel: is triangular & located between the occipital & parietal bones. It is much smaller than the anterior & close at the end of 2- 3 months, should feel flat & firm. Bulging fontanels at rest are a sign of increased cranial pressure or hydrocephalus. Sunken fontanels are associated most commonly with acute dehydration

Early or late closure is noted because either may be a sign of a pathologic condition.

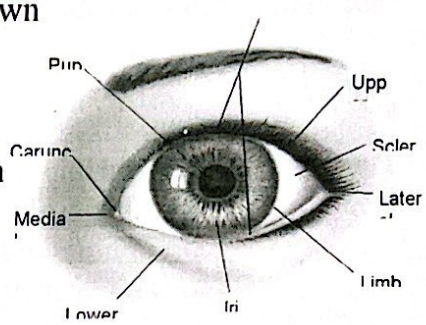
observe the face for symmetry, movement, and general appearance. Ask the child to "make a face" to assess symmetric movement and disclose any degree of paralysis.

inspect the neck for size and palpate its associated structures. The neck is normally short, with skinfolds between the head and shoulders during infancy; however, it lengthens during the next 3 to 4 years. Nuchal rigidity, pain with neck flexion or hyperextension of head, may indicate meningeal irritation and possible meningitis.

- **EYES**

Inspection of External Structures: Inspect the lids for proper placement on the eye (the upper lid should fall near the upper iris). When the eyes are closed, the lids should completely cover the cornea and sclera.

To examine the lower conjunctival sac, pull the lid down while the patient looks up. Normally the conjunctiva appears pink and glossy. Pale conjunctiva indicate anemia.

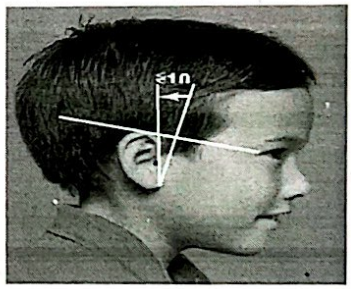


Note any excessive tearing, discharge, or inflammation of the lacrimal apparatus. The cornea, should be clear and transparent.
Compare the pupils for size, shape, and movement. They should be round, clear, and equal. Test their reaction to light by quickly shining a light toward the eye and removing it.
Record normal findings on examination of the pupils as PERRLA, which stands for "Pupils Equal, Round, React to Light, and Accommodation."
Inspect the iris and pupil for color, size, shape, and clarity.
Permanent eye color is usually established by 6 to 12 months of age.

Vision Testing
Several tests are available for assessing vision such: ocular alignment, visual acuity, peripheral vision, and color vision.

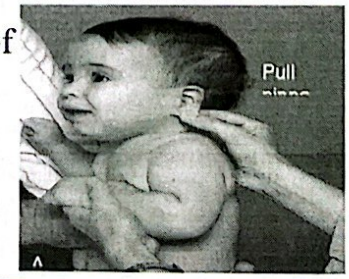
- **EARS**

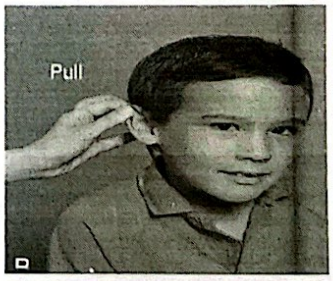
Inspection of External Structures
The outer portion of the ear is called the pinna, or auricle. Measure the height alignment of the pinna by drawing an imaginary line from the outer orbit of the eye to the occiput, or most prominent protuberance of the skull. The top of the pinna should meet or cross this line.



Low-set ears are commonly associated with renal anomalies or cognitive impairment.
Normally the pinna lies within a 10-degree angle of the vertical line.
Normally the pinna extends slightly outward from the skull. Except in newborn infants, ears that are flat against the head or protruding away from the scalp may indicate problems.
Assess the ear for hygiene. An otoscope is not necessary for looking into the external canal to note the presence of cerumen, a waxy substance in the outer portion of the canal. Note any discharge is visible, note its color and odor.

The otoscope permits visualization of the tympanic membrane. Note signs of irritation, foreign bodies, or infection.
For a panoramic view of the tympanic membrane, the infants

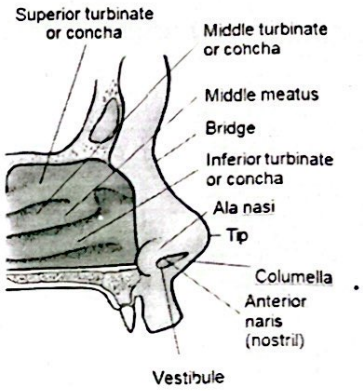




position by pull the pinna down and back. With older children than 3 years of age, pull the pinna up and back toward position. Auditory testing should be appropriate to age, ranging from loud noise to startle reflex for detection of type and degree of hearing loss, if present.

- **NOSE**

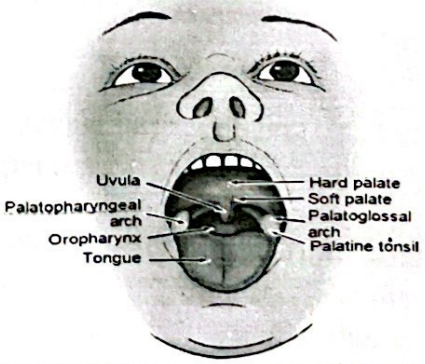
Inspection of External Structures, Compare the placement and alignment of the nose, the nose should lie in the middle of the face, with each side exactly symmetric on both sides of the imaginary line. Note its location, any deviation to one side, and asymmetry in overall size and in diameter of the nares (nostrils).
Observe the alae nasi for any sign of flaring, which indicates respiratory difficulty.



Inspection of Internal Structures, by pushing the tip upward, tilting the head backward. Note the color of the mucosal lining, which is normally redder than the oral membranes, as well as any swelling, discharge, dryness, or bleeding. There should be no discharge from the nose.

- **MOUTH AND THROAT**

Ask the older child to open the mouth wide; For a closer look at the buccal mucosa, or lining of the cheeks.
The lips should be moist, soft, smooth, and pink, or a deeper hue than the surrounding skin. The lips should be symmetric when relaxed or tensed. Assess symmetry when the child talks or cries.



Inspect all areas lined with mucous membranes (inside the lips and cheeks, gingiva, underside of the tongue, palate, and back of the pharynx) for color, any areas of white patches or ulceration, bleeding. The membranes should be bright pink, smooth, glistening, uniform, and moist.

Inspect the teeth for number (deciduous, permanent, or mixed dentition) in each dental arch, for hygiene, and for occlusion or bite. Teeth eruption at 6-8 months called temporary teeth or primary. It fall between age 5-6 years to rise the permanent teeth or secondary.
Discoloration of tooth may be a sign of poor dental hygiene and indicates a need for counseling. Brown spots in the crevices of the crown of the tooth or between the teeth may be **caries** (cavities). Chalky white to yellow or brown areas on the enamel may indicate **fluorosis**. Teeth that appear greenish black may be stained temporarily from ingestion of supplemental iron.

Examine the gums (**gingiva**) surrounding the teeth. The color is normally coral pink, and the surface texture is stippled, similar to the appearance of an orange peel.

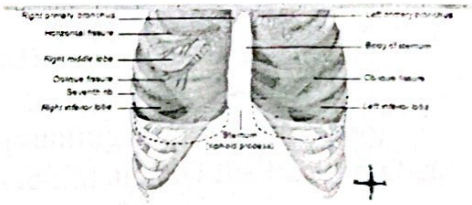
Inspect the tongue for papillae, small projections that contain taste buds and give the tongue its characteristic rough appearance. Note the size and mobility of the tongue. Normally the tip of the tongue should extend to the lips or beyond.

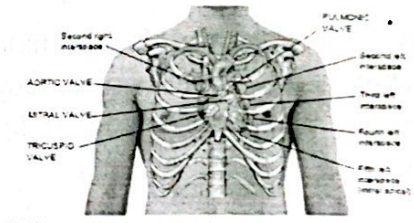
The roof of the mouth consists of the **hard palate**, which is located near the front of the oral cavity, and the **soft palate**, which is located toward the back of the pharynx. Carefully inspect the palates to ensure they are intact (cleft lip and palate).

Examine the oropharynx and note the size and color of the **palatine tonsils**, report any swelling, redness, or white areas on the tonsils.

CHEST

Inspect the chest for size, shape, symmetry, movement, breast development, and the bony landmarks formed by the ribs and sternum.





Measure the size of the chest by placing the measuring tape around the rib cage at the nipple line. For greatest accuracy, take two measurements—one during inspiration and the other during expiration—and record the average. Chest size is important mainly in relation to head circumference.
Always report marked disproportions because most are caused by abnormal head growth, although some may be a result of altered chest shape, such as **barrel chest** (chest is round), **pectus excavatum** (sternum is depressed), or **pectus carinatum** (sternum protrudes outward).
During infancy, the chest's shape is almost circular, with the antero- posterior (front-to-back) diameter equaling the transverse, or lateral (side-to-side), diameter. As the child grows, the chest normally increases in the transverse direction, causing the anteroposterior diameter to be less than the lateral diameter.

Movement of the chest wall should be symmetric bilaterally and coordinated with breathing. In children younger than 6 or 7 years of age, respiratory movement is principally abdominal or diaphragmatic. In older children, particularly girls, respirations are chiefly thoracic. In either case, the chest and abdomen should rise and fall together.

observe the position of the nipples and any evidence of breast development.
Normally the nipples are located slightly lateral to the midclavicular line between the

fourth and fifth ribs. Pubertal breast development usually begins in girls between 8 and 12 years of age. Record early (precocious) or delayed breast development, as well as evidence of any other secondary sexual characteristics.
Assessment for muscles retractions site: (Subcostal, Intercostal, Sub-sternal, supra sternal, Supra-clavicular)
Assess oxygenation: Pink nail beds with crisp capillary refill time and pink mucous membranes and tongue are all signs of adequate oxygenation. Blueness surrounding the mouth (circumoral cyanosis).

- **LUNGS**

The right lung has three lobes and the left lung has only two lobes.
Inspection of the lungs primarily involves observation of respiratory movements.
Evaluate respirations for
(1) rate (number per minute),
(2) rhythm (regular, irregular, or periodic)
(3) depth (deep or shallow)
(4) quality (effortless, automatic, difficult, or labored).

Note the character of breath sounds, such as noisy, grunting, snoring, or heavy.
Evaluate respiratory movements by placing each hand flat against the back or chest with the thumbs in midline along the lower costal margin of the lungs.

Percuss the anterior lung from apex to base, usually with the child in the supine or sitting position. Percuss each side of the chest in sequence to compare the sounds. Resonance is heard over all the lobes of the lungs that are not adjacent to other organs.

Auscultation
Breath sounds are best heard if the child inspires deeply. In the lungs breath sounds are classified as
Normal breathing sound:
1- bronchial sound, heard over the manubrium, characterized by loud, high pitched, expiratory sound duration is longer than inspiratory sound
2- bronchovesicular sound, heard anteriorly over clavicular bone and posteriorly between the scapulae, characterized by Intermediate quality, expiratory sound duration is about equivalent to inspiratory sound.
3- vesicular sound, heard over most of both lungs, characterized by soft, low pitched, expiratory sound duration is shorter than inspiratory sound

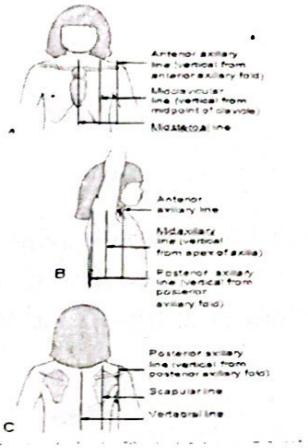
Absent or diminished breath sounds are always an abnormal finding warranting investigation.
Various pulmonary abnormalities produce **adventitious sounds** that are not normally heard over the chest. These sounds occur in addition to normal or abnormal breath sounds. They are classified into two main groups:

(1) **crackles**, which result from the passage of air through fluid or moisture
(2) **wheezes**, which are produced as air passes through narrowed passageways

- **HEART**

About two-thirds of the heart lies within the left side of the rib cage, with the other third on the right side as it crosses the sternum. The heart is positioned in the thorax like a trapezoid:

- Vertically from the second to the fifth rib
- Horizontally from the lower right sternum to the fifth rib at the left midclavicular line



Look at the anterior chest wall from an angle, comparing both sides of the rib cage with each other. Normally they should be symmetric. In children with thin chest walls, a pulsation may be visible.

also consider other findings such as the presence of all pulses (especially the femoral pulses), distended neck veins, clubbing of the fingers, peripheral cyanosis, edema, blood pressure, and respiratory status.

Use palpation to determine the location of the apical impulse (AI), the most lateral cardiac impulse that may correspond to the apex. The AI is found

- At the fifth ICS and LMCL in children older than 7 years of age
- At the fourth ICS and just lateral to the LMCL in children younger than 7 years of age

The point of maximum intensity (PMI), as the name implies, is the area of most intense pulsation. Usually the PMI is located at the same site as the AI, but it can occur elsewhere.

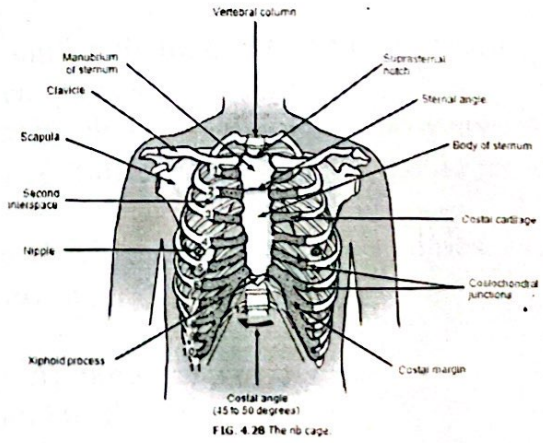


FIG. 4.28 The rib cage.

Assess capillary refill time, an important test for circulation, by pressing the skin lightly on a central site, such as the forehead, or a peripheral site such as the nail beds, to produce a slight blanching. The time it takes for the blanched area to return to its original color is the capillary refill time.

Auscultation

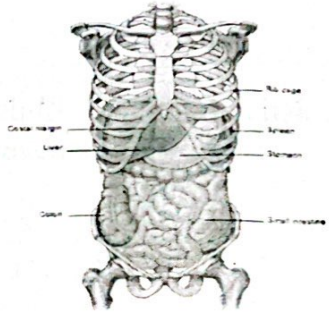
Origin of Heart Sounds, Normally two sounds—S1 and S2—are heard, which correspond, respectively, to the familiar "lub dub" often used to describe the sounds.

Two other heart sounds, S3 and S4, may be produced. S3 is normally heard in some children. S4 is rarely heard as a normal heart sound; it usually indicates the need for further cardiac evaluation.

Evaluate heart sounds for
(1) quality (they should be clear and distinct)
(2) intensity, especially in relation to the location or auscultatory site (they should not be weak or pounding)
(3) rate (they should have the same rate as the radial pulse)
(4) rhythm (they should be regular and even).

- **ABDOMEN**

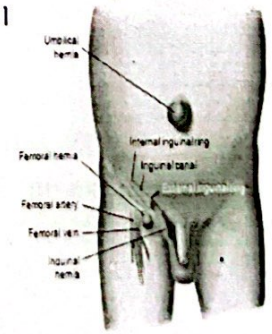
Examination of the abdomen involves inspection, followed by auscultation and then palpation. Experienced examiners may also percuss the abdomen to assess for organomegaly, masses, fluid, and flatus. Perform palpation last because it may distort the normal abdominal sounds.
the abdominal cavity is divided into four quadrants:



- Left upper quadrant
- Left lower quadrant
- Right upper quadrant
- Right lower quadrant

Inspection
Inspect the contour of the abdomen. Normally the abdomen of infants and young children is cylindric and, in the erect position, fairly prominent because of the physiologic lordosis of the spine. In the supine position the abdomen appears flat.
The skin covering the abdomen should be uniformly taut, without wrinkles or creases. Sometimes a stretch marks are seen in obesity.
Observe movement of the abdomen. Normally chest and abdominal movements are synchronous. In infants and thin children **peristaltic waves** may be visible through the abdominal wall.
Examine the umbilicus for size, hygiene, and evidence of any abnormalities, such as hernias. The umbilicus should be flat or only slightly protruding.

Umbilical hernias are common in infants. An **inguinal hernia** is a protrusion through the abdominal wall in the inguinal canal. It occurs mostly in males, is frequently bilateral, and may be visible as a mass in the scrotum. A **femoral hernia**, which occurs more frequently in girls, is felt or seen as a small mass on the anterior surface of the thigh just below the inguinal ligament in the femoral canal.



Auscultation

The most important finding to listen for is **peristalsis**, or **bowel sounds**, which sound like short metallic clicks and gurgles. Record their frequency per minute (e.g., 5 sounds/min). Listen for up to 5 minutes before determining that bowel sounds are absent. Stimulate bowel sounds by stroking the abdominal surface with a fingernail.

Palpation

There are two types of palpation: **superficial palpation**, lightly place your hand against the skin and feel each quadrant, noting any areas of tenderness, muscle tone, and superficial lesions such as cysts.

Deep palpation is for palpating organs and large blood vessels and for detecting masses and tenderness. Palpation usually begins in the lower quadrants and proceeds upward to avoid missing the edge of an enlarged liver or spleen. Except for palpating the liver, successful identification of other organs (e.g., the spleen, kidney, and part of the colon). Report any questionable mass.

The lower edge of the liver is sometimes felt in infants and young children as a superficial mass 1 to 2 cm below the right costal margin.

- **GENITALIA**

In examining the genitalia, wear gloves when touching the child. It might be helpful for the adolescent to know that wearing gloves also prevents skin-to-skin contact.

Male Genitalia

Note the external appearance of the glans and shaft of the penis, the prepuce, the urethral meatus, and the scrotum.

Examine the glans (head of the penis) for signs of swelling, skin lesions, inflammation may indicate sexually transmitted infections.

Carefully inspect the urethral meatus for location and evidence of discharge.

Note the location and size of the scrotum. Palpation of the scrotum includes identification of the testes, inguinal hernias.

Female Genitalia

The examination of female genitalia is limited to inspection and palpation of external structures.

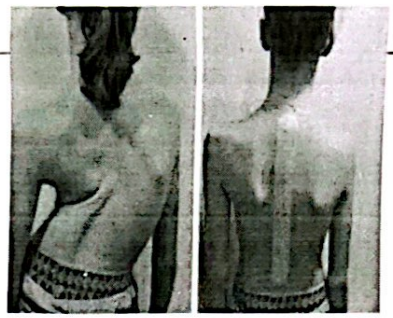
Examine the female genitalia for size and location of the structures of the vulva and the vaginal orifice. The appearance of soft, downy hair along the labia majora is an early sign of sexual maturation.

- **ANUS**

Assess the tone of the anal sphincter by eliciting the anal reflex. Gently scratching the anal area results in an obvious quick contraction of the external anal sphincter. Assess for the imperforated anus.

- **BACK AND EXTREMITIES**

Spine: Note the general curvature of the spine. Normally the back of a newborn is



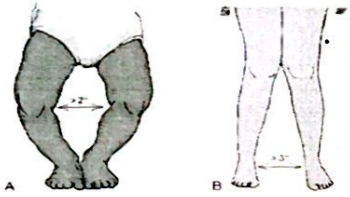
rounded or C shaped from the thoracic and pelvic curves. The development of the cervical and lumbar curves approximates development of various motor skills, such as cervical curvature with head control, and gives the older child the typical double S curve.

Marked curvatures in posture are abnormal. Scoliosis, lateral curvature of the spine, is an important childhood problem, especially in girls. Inspect the back, especially along the spine, for any tufts of hair, dimples, or discoloration.

Extremities

Inspect each extremity for symmetry of length and size; refer any deviation for orthopedic evaluation. Count the fingers and toes to be certain of the normal number. Inspect the arms and legs for temperature and color, which should be equal in each extremity, although the feet may normally be colder than the hands.

Toddlers are usually bowlegged after beginning to walk until all their lower back and leg muscles are well developed. Knock-knee appears as the opposite of bowleg, in that the knees are close together but the feet are spread apart. Knock-knee is normally present in children from about 2 to 7 years of age.



Next inspect the feet. Infants' and toddlers' feet appear flat because the foot is normally wide and the arch is covered by a fat pad.

Elicit the plantar or grasp reflex by exerting firm but gentle pressure with the tip of the thumb against the lateral sole of the foot from the heel upward to the little toe and then across to the big toe. The normal response in children who are walking is flexion of the toes. Babinski sign, dorsiflexion of the big toe and fanning of the other toes, is normal

Evaluate the joints for range of motion. However, routinely investigate the hips in infants for congenital dislocation. Report any evidence of joint immobility or hyperflexibility. Palpate the joints for heat, tenderness, and swelling.

Muscles

Note symmetry and quality of muscle development, tone, and strength. Observe development by looking at the shape and contour of the body in both a relaxed and a tensed state. Estimate tone by grasping the muscle and feeling its firmness when it is relaxed and contracted.

Estimate strength by having the child use an extremity to push or pull against resistance, Arm strength, Hand strength, Leg strength

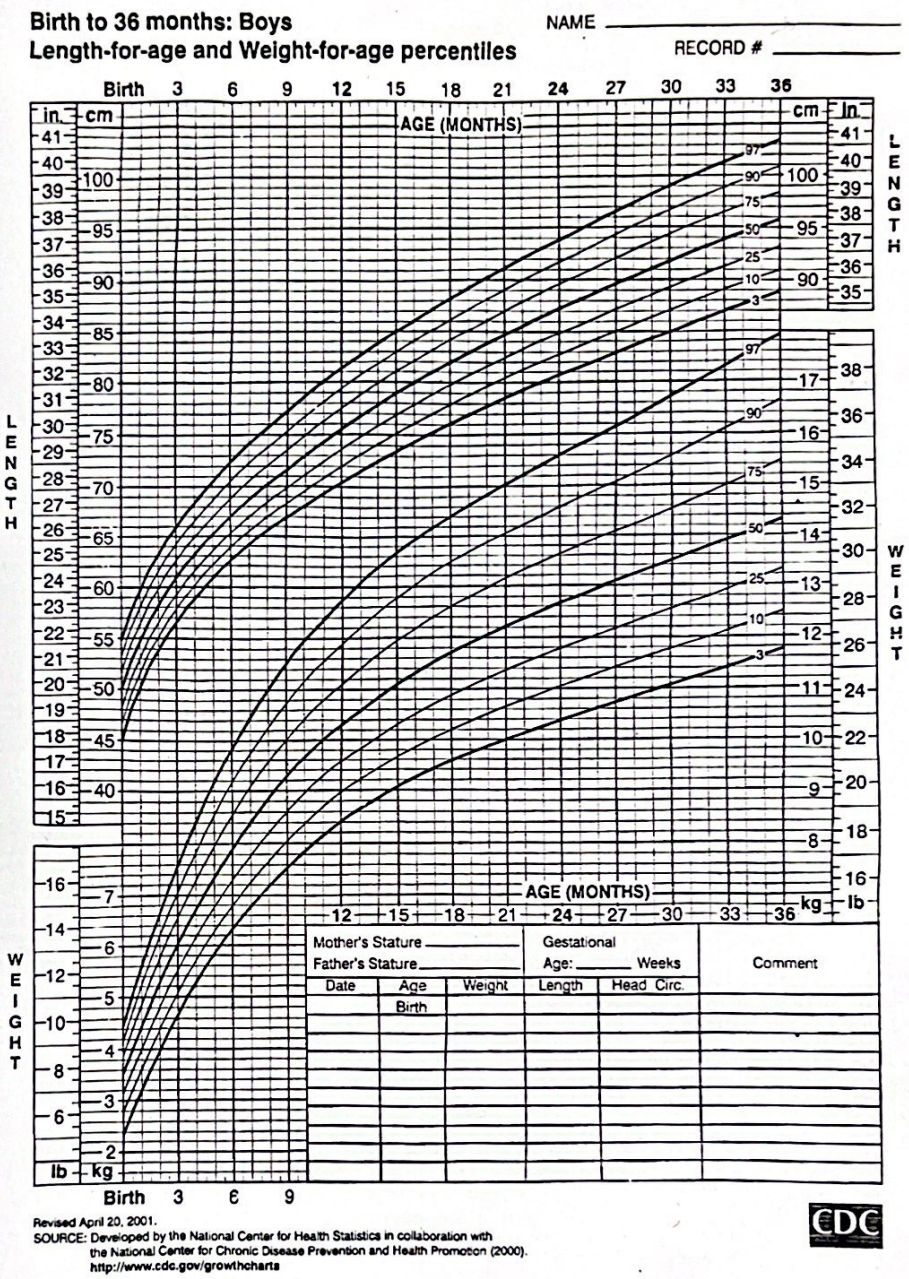


FIGURE A–2 ➢ Physical growth percentiles for length and weight—boys: birth to 36 months.
From Centers for Disease Control and Prevention, 2001. http://www.cdc.gov/growthcharts

Stature-for-age and Weight-for-age percentiles

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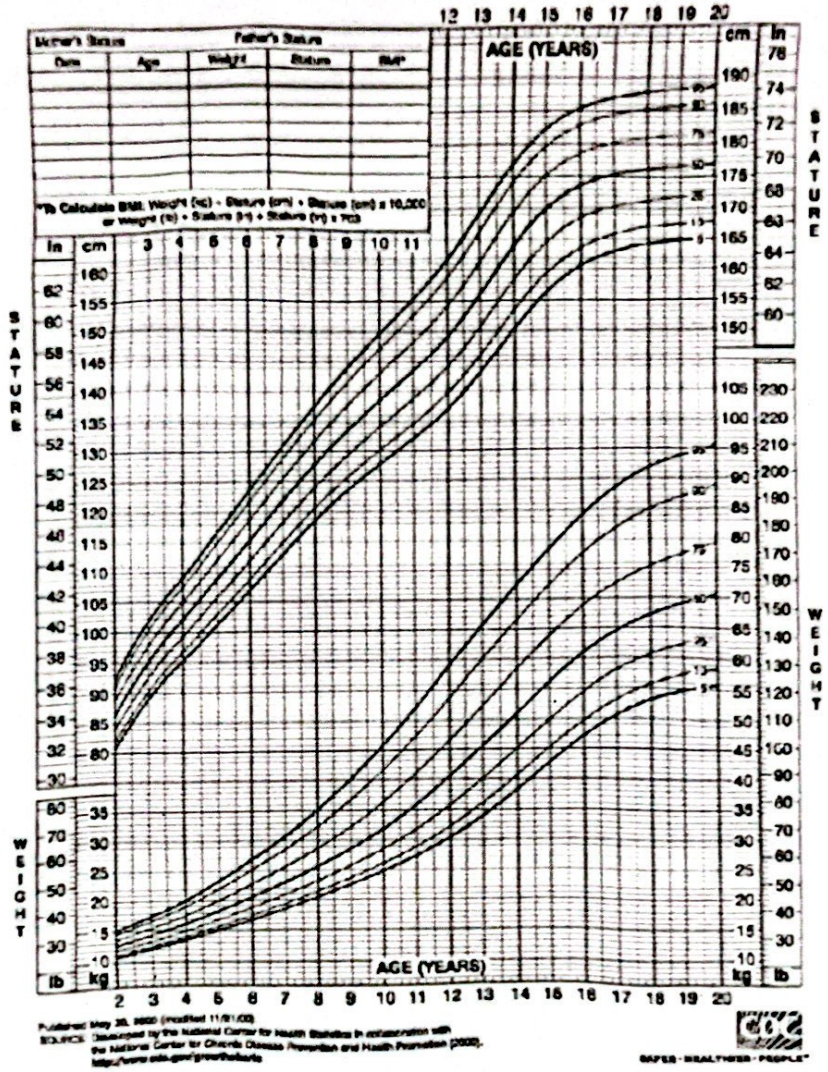

Published May 30, 2000 (modified 11/01/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000). http://www.cdc.gov/growthcharts

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- **NEUROLOGIC ASSESSMENT**

assessment of behavior, sensory testing, and motor function. focuses on a general appraisal of cerebellar function, deep tendon reflexes, and the cranial nerves.

Cerebellar Function

observing the child's posture, body movements, gait, and development of fine and gross motor skills. Tests (e.g., balancing on one foot and the heel-to-toe walk) assess balance. Test coordination by asking the child to reach for tie shoes. Coordination can also be tested by any sequence of rapid, successive movements.

Reflexes

Persistence of primitive reflexes, loss of reflexes, or hyperactivity of deep tendon reflexes is usually a result of a cerebral insult.

Older children can concentrate on the exercise of grasping their two hands in front of them and trying to pull them apart.

Deep tendon reflexes are stretch reflexes of a muscle. The most common deep tendon reflex is the knee jerk reflex, or patellar reflex.

Cranial Nerves

Include the cranial nerve test when examining each system, such as tongue movement and strength, gag reflex, swallowing, cardinal positions of gaze, and position of the uvula during examination of the mouth.

Assessment of Cranial Nerves

I—Olfactory Nerve: Olfactory mucosa of nasal cavity Smell
II—Optic Nerve: Rods and cones of retina, optic nerve Vision
III—Oculomotor Nerve: Extraocular muscles of eye
IV—Trochlear Nerve: Superior oblique muscle
V—Trigeminal Nerve: Muscles of mastication, Sensory
VI—Abducens Nerve: Lateral rectus muscle
VII—Facial Nerve: Muscles for facial expression tongue (sensory)
VIII—Auditory, Acoustic Nerve: Internal ear Hearing and balance
IX—Glossopharyngeal Nerve: Pharynx, tongue Sensory
X—Vagus Nerve: Muscles of larynx, pharynx, gag reflex, and ability to swallow.
XI—Accessory Nerve : Sternocleidomastoid muscles of shoulder
XII—Hypoglossal Nerve: Muscles of tongueHave child move tongue in all directions

Reflexes: is involuntary muscle reaction to a certain type of stimulation, certain sensations or movements are known to produce specific muscular responses.

1. Protective Reflexes: that persist into adulthood are: Blinking R–Cough R – Gag reflex- Sneeze R –Yawn R.
2. Feeding Reflexes: Rooting R- Sucking R- Gag R - Extrusion R- wallowing R.
3. Movement Reflexes: Grasp R - Tonic neck R - Dance or step R. - Crawl R. - Startle R - Babinski R - More R

- **DEVELOPMENTAL ASSESSMENT**

Screening procedures are designed to identify quickly and reliably children whose developmental level is below normal for their age and who therefore require further evaluation.

Developmental screening also provides a means of recording objective measurements of present developmental function for future reference. Developmental assessments can be administered in a variety of settings: home, school, day care center, hospital, practitioner's office, or clinic.

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