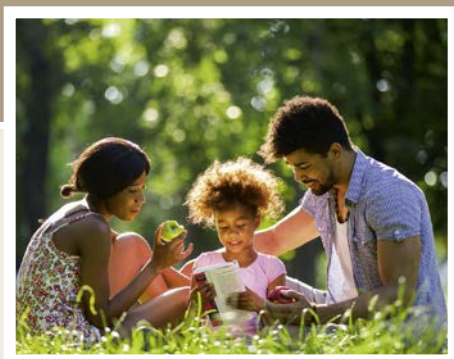

4

# Communication and Physical Assessment of the Child and Family

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http://evolve.elsevier.com/wong/essentials

## CONCEPTS

- Communication
- Assessment

## GUIDELINES FOR COMMUNICATION AND INTERVIEWING

The most widely used method of communicating with parents on a professional basis is the interview process. Unlike social conversation, **interviewing** is a specific form of goal-directed communication. As nurses converse with children and adults, they focus on the individuals to determine the kind of persons they are, their usual mode of handling problems, whether they need help, and the way they react to counseling. Developing interviewing skills requires time and practice but following some guiding principles can facilitate this process. An organized approach is most effective when using interviewing skills in patient assessment and patient teaching.

## ESTABLISHING A SETTING FOR COMMUNICATION

### Appropriate Introduction

Introduce yourself and ask the name of each family member who is present and how they would like to be addressed. Address parents or other adults by their appropriate titles, such as "Mr." and "Mrs.," unless they specify a preferred name. Record the preferred name in the medical record. Using formal address or their preferred names conveys respect and regard for the parents or other caregivers (Ball, Dains, Flynn, et al., 2018).

At the beginning of the visit, include children in the interaction by asking them their name, preferred name, age, and other information. Nurses often direct all questions to adults even when children are old enough to speak for themselves. This only terminates one extremely valuable source of information—the patient. When including children, follow the general rules for communicating with children outlined in Nursing Care Guidelines: Communicating With Children later in the chapter.

### Assurance of Privacy and Confidentiality

The place where the nurse conducts the interview is almost as important as the interview itself. The physical environment should allow for as much privacy as possible with distractions (e.g., interruptions, noise, or other visible activity) kept to a minimum. At times it will be necessary to turn off a television, radio, or mobile phone. The environment should also have some play provision for young children to keep them occupied during the parent-nurse interview (Fig. 4.1). Parents who are constantly interrupted by their children are unable to concentrate fully and tend to give brief answers to finish the interview as quickly as possible.

**Confidentiality** is another essential component of the initial phase of the interview. Because the interview is usually shared with other members of the health care team or the teacher (in the case of students), be certain to inform the family of the limits regarding confidentiality. If confidentiality is a concern in a situation, such as when talking to a parent suspected of child abuse or a teenager contemplating suicide, deal with this directly and inform the person that in such instances confidentiality cannot be ensured. However, the nurse judiciously protects information of a confidential nature.

## COMPUTER PRIVACY AND APPLICATIONS IN NURSING

The use of computer technology to store and retrieve health information has become widespread; most institutions now maintain electronic health records for patients. The health care community is increasingly concerned about the privacy and security of this health information, and all nurses are engaged in protecting confidentiality of health care records. Any person accessing confidential health information is charged with managing safeguards for disclosure, including password protection to prevent violation of patient privacy and confidentiality.

**Fig. 4.1** A child plays while the nurse interviews parents.

### BOX 4.1 Telephone Triage Guidelines

Date and time
Background
- Name, age, sex, contact information
- Chronic illness
- Allergies, current medications, treatments, or recent immunizations

Chief complaint
General symptoms
- Severity
- Duration
- Other symptoms
- Pain

Systems review
Steps taken
- Advised to call emergency medical services (911)
- Advised to go to emergency department
- Advised to see practitioner (today, tomorrow, or later appointment)
- Advised regarding home care
- Advised to call back if symptoms worsen or fail to improve

**Resources for Telephone Triage Protocols**

- Beaulieu, R., & Jumphreys, J. (2008). Evaluation of a telephone advice nurse in a nursing faculty managed pediatric community clinic. *Journal of Pediatric Health Care, 22*(3), 175–181.
- Marklund, B., Ström, M., Månsson, J., et al. (2007). Computer-supported telephone nurse triage: An evaluation of medical quality and costs. *Journal of Nursing Management, 15*, 180–187.
- Schmitt, B. D. (2012). *Pediatric telephone protocols: Office version (14th ed.).* Elk Grove Village, IL: American Academy of Pediatrics.
- Simonsen, S. M. (2001). *Telephone assessment: Guidelines for practice* (2nd ed.). St Louis, MO: Mosby.

## TELEPHONE TRIAGE AND COUNSELING

**Telephone triage** care management has increased access to high-quality health care services and empowered parents to participate in their child's health care. Consequently, patient satisfaction has improved significantly. Unnecessary emergency department and clinic visits have decreased, saving health care costs and time (with less absence from work) for families in need of health care.

Telephone triage is more than "just a phone call" because a child's life is a high price to pay for poorly managed or incompetent telephone assessment skills. Typically, guidelines for telephone triage include asking screening questions; determining when to immediately refer to emergency medical services (dial 911) or the emergency department; and determining when to refer to same-day appointments, appointments in 24 to 72 hours, appointments in 4 days or more, or home care (Box 4.1). Successful outcomes are based on the consistency and accuracy of the information provided. A systematic review of 49 studies where nurses triaged calls found that the appropriateness of a decision and subsequent compliance often varied (Blank, Coster, O'Cathain, et al., 2012). A meta-analysis of 13 studies provided further insight and found that patient compliance with triage recommendations were influenced by the quality of provider communication (Purc-Stephenson & Thrasher, 2012). The importance of nurse-patient communication is reinforced as an essential aspect of telephone triage training. Training of communication skills that are patient and family-centered and specifically address active listening and advising skills offers the greatest opportunity for success. Assessment skills used in direct nurse-patient interactions are not directly transferable to the telephone and provide further support for training in decision-making skills for phone triage (Purc-Stephenson & Thrasher, 2010). Evidence-based clinical protocols for telephone triage can provide a structured method for assessment (Stacey, Macartney, Carley, et al., 2013).

# COMMUNICATING WITH FAMILIES

## COMMUNICATING WITH PARENTS

Although the parent and the child are separate and distinct individuals, the nurse's relationship with the child is frequently mediated by the parent, particularly with younger children. For the most part, nurses acquire information about the child by direct observation and through communication with the parents. Usually it can be assumed that because of the close contact with the child, the parent gives reliable information. Assessing the child requires input from the child (verbal and nonverbal), information from the parent, and the nurse's own observations of the child and interpretation of the relationship between the child and the parent. When children are old enough to be active participants in their own health care, the parent becomes a collaborator.

### Encouraging Parents to Talk

Interviewing parents offers the opportunity to determine not only the child's health and developmental status but also information about factors that influence the child's life. Whatever the parent sees as a problem should be a concern of the nurse. These problems are not always easy to identify. Nurses need to be alert for clues and signals by which a parent communicates worries and anxieties. Careful phrasing with broad, open-ended questions (e.g., "What is Andy eating now?") provides more information than several single-answer questions (e.g., "Is Andy eating what the rest of the family eats?").

Sometimes the parent will take the lead without prompting. At other times it may be necessary to direct another question based on an observation, such as "Joseph seems unhappy today." or "How do you feel when Joseph cries?" If the parent appears to be tired or distraught, consider asking, "What do you do to relax?" or "What help do you have with the children?" A comment such as "You handle Jamey very well. What kind of experience have you had with babies?" to new parents who appear comfortable with their first child gives positive reinforcement and provides an opening for questions they might have on the infant's care. Often all that is required to keep parents talking is a nod or saying "yes" or "uh-huh."

### Directing the Focus

Directing the focus of the interview while allowing maximum freedom of expression is one of the most difficult goals in effective communication. One approach is the use of open-ended or broad questions followed by guiding statements. For example, if the parent proceeds to list the other children by name, say, "Tell me their ages, too." If the parent continues to describe each child in depth, which is not the purpose of the interview, redirect the focus by stating, "Let's talk about the other children later. You were beginning to tell me about Rachel's activities at school." This approach conveys interest in the other children but focuses the assessment on the patient.

### Listening and Cultural Awareness

Listening is the most important component of effective communication. When the purpose of listening is to understand the person being interviewed, it is an active process that requires concentration and attention to all aspects of the conversation—verbal, nonverbal, and abstract. Major blocks to listening are environmental distraction and premature judgment.

Although it is necessary to make some preliminary judgments, listen with as much objectivity as possible by clarifying meanings and attempting to see the situation from the parent's point of view. Effective interviewers consciously control their reactions and responses and the techniques they use (see Cultural Considerations box).

## CULTURAL CONSIDERATIONS

### *Interviewing Without Judgment*

It is easy to inject one's own attitudes and feelings into an interview. Often nurses' own prejudices and assumptions, which may include racial, religious, and cultural stereotypes, influence their perceptions of a parent's behavior. What the nurse may interpret as a parent's passive hostility or lack of interest may be shyness or an expression of anxiety. For example, in Western cultures, eye contact and directness are signs of paying attention. However, in many non-Western cultures, including that of American Indians, directness (e.g., looking someone in the eye) is considered rude. Children are sometimes taught to avert their gaze and to look down when being addressed by an adult, especially one with authority. Nurses must make judgments about "listening," as well as verbal interactions, with an appreciation of cultural differences. Nurses must phrase questions in a neutral mode and avoid assumptions about culture without first validating with a parent (Ball, Dains, Flynn, et al., 2018).

Careful listening relies on the use of clues, verbal leads, or signals from the interviewee to move the interview along. Frequent references to an area of concern, repetition of certain key words, or a special emphasis on something or someone serve as cues to the interviewer for the direction of inquiry. Concerns and anxieties are often mentioned in a casual, offhand manner. Even though they are casual, they are important and deserve scrutiny to identify problem areas. For example, a parent who is concerned about a child's habit of bedwetting may casually mention that the child's bed was "wet this morning."

## Using Silence

Silence as a response is often one of the most difficult interviewing techniques to learn. The interviewer requires a sense of confidence and comfort to allow the interviewee space in which to think without interruptions. Silence permits the interviewee to sort out thoughts and feelings and search for responses to questions. Silence can also be a cue for the interviewer to go more slowly, reexamine the approach, and not push too hard (Ball, Dains, Flynn, et al., 2018).

Sometimes it is necessary to break the silence and reopen communication. Do this in a way that encourages the person to continue talking about what is considered important. Breaking a silence by introducing a new topic or by prolonged talking essentially terminates the interviewee's opportunity to use the silence. Suggestions for breaking the silence include statements such as the following:

- "Is there anything else you wish to say?"
- "I see you find it difficult to continue; how may I help?"
- "I don't know what this silence means. Perhaps there is something you would like to put into words but find difficult to say."

## Being Empathic

**Empathy** is the capacity to understand what another person is experiencing from within that person's frame of reference; it is often described as the ability to put oneself in another's shoes. The essence of empathic interaction is accurate understanding of another's feelings. Empathy differs from **sympathy**, which is having feelings or emotions similar to those of another person rather than understanding those feelings.

## Providing Anticipatory Guidance

The ideal way to handle a situation is to deal with it before it becomes a problem. The best preventive measure is anticipatory guidance. Traditionally, **anticipatory guidance** focused on providing families with information on normal growth and development and nurturing childrearing practices. For example, one of the most significant areas in pediatrics is injury prevention. Beginning prenatally, parents need specific instructions on home safety. Because of the child's maturing developmental skills, parents must implement home safety changes early to minimize risks to the child.

Unprepared parents can be disturbed by many normal developmental changes, such as a toddler's diminished appetite, negativism, altered sleeping patterns, and anxiety toward strangers. The chapters on health promotion provide nurses with information for counseling parents. However, anticipatory guidance should extend beyond giving general information to empowering families to use the information as a means of building competence in their parenting abilities (Dosman & Andrews, 2012). To achieve this level of anticipatory guidance, the nurse should do the following:

- Base interventions on needs identified by the family, not by the professional.
- View the family as competent or as having the ability to be competent.
- Provide opportunities for the family to achieve competence.

## Avoiding Blocks to Communication

A number of blocks to communication can adversely affect the quality of the helping relationship. The interviewer introduces many of these blocks, such as giving unrestricted advice or forming prejudged conclusions. Another type of block occurs primarily with the interviewees and concerns **information overload**. When individuals receive too much information or information that is overwhelming, they often demonstrate signs of increasing anxiety or decreasing attention. Such signals should alert the interviewer to give less information or to clarify what has been said. Box 4.2 lists some of the more common blocks to communication, including signs of information overload.

## Communicating With Families Through an Interpreter

Sometimes communication is impossible because two people speak different languages. In this case, it is necessary to obtain information through a third party: an interpreter. When using an interpreter, the nurse follows the same interviewing guidelines. Specific guidelines for using an interpreter are given in the Nursing Care Guidelines box.

## NURSING CARE GUIDELINES

### *Using an Interpreter*

- Explain to the interpreter the reason for the interview and the type of questions that will be asked.
- Clarify whether a detailed or brief answer is required and whether the translated response can be general or literal.
- Introduce the interpreter to the family and allow some time before the interview for them to become acquainted.
- Communicate directly with family members when asking questions to reinforce interest in them and to observe nonverbal expressions, but do not ignore the interpreter.

*Continued*

## NURSING CARE GUIDELINES—cont'd

### *Using an Interpreter*

- Pose questions to elicit only one answer at a time, such as "Do you have pain?" rather than "Do you have any pain, tiredness, or loss of appetite?"
- Refrain from interrupting family members and the interpreter while they are conversing.
- Avoid commenting to the interpreter about family members, because they may understand some English.
- Be aware that some medical words, such as *allergy,* may have no similar word in another language; avoid medical jargon whenever possible.
- Be aware that cultural differences may exist regarding views on puberty, sex, marriage, or pregnancy.
- Allow time after the interview for the interpreter to share something that he or she thought could not be said earlier; ask about the interpreter's impression of nonverbal clues to communication and family members' reliability or ease in revealing information.
- Arrange for the family to speak with the same interpreter on subsequent visits whenever possible.

## BOX 4.2 Blocks to Communication

**Communication Barriers (Nurse)**

Socializing
Giving unrestricted and sometimes unsought advice
Offering premature or false reassurance
Giving overencouragement
Defending a situation or opinion
Using stereotyped comments or clichés
Using complex medical language
Limiting expression of emotion by asking directed, closed-ended questions
Asking leading questions that suggest only "correct" answers
Interrupting and finishing the person's sentence
Talking more than the interviewee
Forming prejudged conclusions
Deliberately changing the focus

**Signs of Information Overload (Patient)**

Long periods of silence
Wide eyes and fixed facial expression
Constant fidgeting or attempting to move away
Nervous habits (e.g., tapping, playing with hair)
Sudden interruptions (e.g., asking to go to the bathroom)
Looking around
Yawning, eyes drooping
Frequently looking at a watch or clock
Attempting to change the topic of discussion

Communicating with families through an interpreter requires sensitivity to cultural, legal, and ethical considerations (see Cultural Considerations box). In some cultures, class differences between the interpreter and the family may cause the family to feel intimidated and less inclined to offer information. Therefore it is important to choose the interpreter carefully and provide time for the interpreter and family to establish rapport.

## CULTURAL CONSIDERATIONS

### *Using Children as Interpreters*

When no one else is readily available to interpret, there may be temptation to use a bilingual child within the family as an interpreter. However, the use of children in health care interpreting is strongly discouraged because they are often not mature enough to understand health care questions, answers, or messages (American Academy of Pediatrics, 2019). Children may inadvertently commit interpretive errors, such as inaccuracies, omissions, or substitutions. In addition, children can be adversely affected by serious or sensitive information that may be discussed. In some cultures, using a child as an interpreter is considered an insult to an adult because children are expected to show respect by not questioning their elders. Note that some institutions prohibit the use of children as interpreters; check institutional policy for compliance. If a trained on-site or community-based interpreter is not available, a *language line* using a telephonic interpreter may be an option.

In obtaining informed consent through an interpreter, the nurse should fully inform the family of all aspects of the procedure to which they are consenting. Issues of confidentiality may arise when family members related to another patient are asked to interpret for the family, thus revealing sensitive information that may be shared with other families on the unit. With increased sensitivity toward patient rights and confidentiality, many institutions now require consent forms translated in the patient's primary language.

## NURSING ALERT

When using translated materials, such as a health history form, be certain the informant is literate in the foreign language.

## COMMUNICATING WITH CHILDREN

Although the greatest amount of verbal communication is usually carried out with the parent, do not exclude the child during the interview. Pay attention to infants and younger children through play or by occasionally directing questions or remarks to them. Include older children as active participants so that they can share their own experiences and perspectives.

In communication with children of all ages, the nonverbal components of the communication process convey the most significant messages. It is difficult to disguise feelings, attitudes, and anxiety when relating to children. They are alert to surroundings and attach meaning to every gesture and move that is made; this is particularly true of very young children.

Active attempts to make friends with children before they have had an opportunity to evaluate an unfamiliar person tend to increase their anxiety. Continue to talk to the child and parent but go about activities that do not involve the child directly, thus allowing the child to observe from a safe position. If the child has a special toy or doll, "talk" to the doll first. Ask simple questions, such as "Does your teddy bear have a name?" to ease the child into conversation. Other guidelines for communicating with children are provided in the Nursing Care Guidelines box. Specific guidelines for preparing children for procedures are provided in Chapter 20.

## NURSING CARE GUIDELINES

### *Communicating With Children*

- Allow children time to feel comfortable.
- Avoid sudden or rapid advances, broad smiles, extended eye contact, and other gestures that may be seen as threatening.
- Talk to the parent if the child is initially shy.
- Communicate through transition objects (e.g., dolls, puppets, stuffed animals) before questioning a young child directly.
- Give older children the opportunity to talk without the parents present.
- Assume a position that is at eye level with the child (Fig. 4.2).
- Speak in a quiet, unhurried, and confident voice.
- Speak clearly, be specific, and use simple words and short sentences.
- State directions and suggestions positively.
- Offer a choice only when one exists.
- Be honest with children.
- Allow children to express their concerns and fears.
- Use a variety of communication techniques.

**Fig. 4.2** The nurse assumes position at the child's level.

## Communication Related to Development of Thought Processes

The normal development of language and thought offers a frame of reference for communicating with children. Thought processes progress from sensorimotor to perceptual to concrete and finally to abstract, formal operations. An understanding of the typical characteristics of these stages provides the nurse with a framework to facilitate social communication.

### Infancy

Because they are unable to use words, infants primarily use and understand nonverbal communication. Infants communicate their needs and feelings through nonverbal behaviors and vocalizations that can be interpreted by someone who is around them for a sufficient time. Infants smile and coo when content and cry when distressed. Crying is provoked by unpleasant stimuli from inside or outside, such as hunger, pain, body restraint, or loneliness. Adults interpret this to mean that an infant needs something and consequently try to alleviate the discomfort by meeting their physical needs, speaking softly, and communicating through touch.

Infants respond to adults' nonverbal behaviors. They become quiet when they are cuddled, rocked, or receive other forms of gentle physical contact. They receive comfort from the sound of a soft voice even though they do not understand the words that are spoken. Until infants reach the age at which they experience stranger anxiety, they readily respond to any firm, gentle handling and quiet, calm speech. Loud, harsh sounds and sudden movements are frightening.

**Fig. 4.3** A young child may take the expression "a little stick in the arm" literally.

### Early Childhood

Children younger than 5 years old are **egocentric**. They see things only in relation to themselves and from their point of view. Therefore focus communication on them. Tell them what they can do or how they will feel. Experiences of others are of no interest to them. It is futile to use another child's experience in an attempt to gain the cooperation of small children. Allow them to touch and examine articles with which they will come in contact. A stethoscope bell will feel cold; palpating a neck might tickle. Although they have not yet acquired sufficient language skills to express their feelings and wants, toddlers can effectively use their hands to communicate ideas without words. They push an unwanted object away, pull another person to show them something, point, and cover the mouth that is saying something they do not wish to hear.

Everything is direct and concrete to small children. They are unable to work with abstractions and interpret words literally. Analogies escape them because they are unable to separate reality from fantasy. For example, they attach literal meaning to such common phrases as "two-faced," "sticky fingers," and "coughing your head off." Children who are told they will get "a little stick in the arm" may not be able to envision an injection (Fig. 4.3). Therefore use simple, direct language rather than phrases that might be misinterpreted by a small child.

### School-Age Years

Younger school-age children rely less on what they see and more on what they know when faced with new problems. They want explanations and reasons for everything but require no verification beyond that. They are interested in the functional aspect of all procedures, objects, and activities. They want to know why an object exists, why it is used, how it works, and the intent and purpose of its user. They need to know what is going to take place and why it is being done to them specifically. For example, to explain a procedure such as taking blood pressure, show the child how squeezing the bulb pushes air into the cuff and makes the "arrow" move. Let the child operate the bulb. An explanation for the procedure might be as simple as "I want to see how far the arrow moves when the cuff squeezes your arm." Consequently, the child becomes an enthusiastic participant.

School-age children have a heightened concern about body integrity. Because of the special importance they place on their body, they are sensitive to anything that constitutes a threat or suggestion of injury to it. This concern extends to their possessions, so they may appear to overreact to loss or threatened loss of treasured objects. Encouraging children to communicate their needs and voice their concerns enables the nurse to provide reassurance, to dispel myths and fears, and to implement activities that reduce their anxiety. For example, if a shy child dislikes being the center of attention, ignore that child by talking and relating to other children in the family or group. When children feel more comfortable, they will usually interject personal ideas, feelings, and interpretations of events.

### Adolescence

As children move into adolescence, they fluctuate between child and adult thinking and behavior. They are riding a current that is moving them rapidly toward a maturity that may be beyond their coping ability. Therefore when tensions rise, they may seek the security of the more familiar and comfortable expectations of childhood. Anticipating these shifts in identity allows the nurse to adjust the course of interaction to meet the needs of the moment. No single approach can be relied on consistently, and encountering cooperation, hostility, anger, bravado, and a variety of other behaviors and attitudes is common. It is as much a mistake to regard an adolescent as an adult with an adult's wisdom and control as it is to assume that a teenager has the concerns and expectations of a child.

Interviewing an adolescent presents some special issues. The first may be whether to talk with the adolescent alone or with the adolescent and parents together. If the parents and teenager are together, talking with the adolescent first has the advantage of immediately identifying with the young person, thus fostering the interpersonal relationship. However, talking with the parents initially may provide insight into the family relationship. In either case, give both parties an opportunity to be included in the interview. If time is limited (e.g., during history taking), clarify this at the onset to avoid appearing to "take sides" by talking more with one person than with the other.

Another dilemma in interviewing adolescents is that two views of a problem frequently exist: the teenager's and the parents'. Clarification of the problem is a major task. However, providing both parties an opportunity to discuss their perceptions in an open and unbiased atmosphere can, by itself, be therapeutic. Demonstrating positive communication skills can help families with adolescents to communicate more effectively (see Nursing Care Guidelines box).

## NURSING CARE GUIDELINES

***Communicating With Adolescents***

**Build a Foundation**

Spend time together.
Encourage expression of ideas and feelings.
Respect their views.
Tolerate differences.
Praise good points.
Respect their privacy.
Set a good example.

**Communicate Effectively**

Give undivided attention.
Listen, listen, listen.
Be courteous, calm, honest, and open minded.
Try not to overreact. If you do, take a break.
Avoid judging or criticizing.
Avoid the "third degree" of continuous questioning.
Choose important issues when taking a stand.
After taking a stand:

- Think through all options.
- Make expectations clear.

## COMMUNICATION TECHNIQUES

Nurses use a variety of verbal techniques to encourage communication. Some of these techniques are useful to pose questions or explore concerns in a less threatening manner. Others can be presented as word games, which are often well received by children. However, for many children and adults, talking about feelings is difficult, and verbal communication may be more stressful than supportive. In such instances, use several nonverbal techniques to encourage communication.

Box 4.3 describes both verbal and nonverbal techniques. Because of the importance of play in communicating with children, play is discussed more extensively in the next section. Any of the verbal or nonverbal techniques can give rise to strong feelings that surface unexpectedly. Be prepared to handle them or to recognize when issues go beyond your ability to deal with them. At that point, consider an appropriate referral.

### Play

Play is a universal language of children. It is one of the most important forms of communication and can be an effective technique in relating to them. The nurse can often pick up on clues about physical, intellectual, and social developmental progress from the form and complexity of a child's play behaviors. Play requires minimum equipment or none at all. Many providers use therapeutic play to reduce the trauma of illness and hospitalization (see Chapter 19) and to prepare children for therapeutic procedures (see Chapter 20).

Because their ability to perceive precedes their ability to transmit, infants respond to activities that register with their physical senses. Patting, stroking, and other skin play convey messages. Repetitive actions, such as stretching infants' arms out to the side while they are lying on their back and then folding the arms across the chest or raising and revolving the legs in a bicycling motion, will elicit pleasurable sounds. Colorful items to catch the eye or interesting sounds, such as a ticking clock, chimes, bells, or singing, can be used to attract infants' attention.

## BOX 4.3 Creative Communication Techniques With Children

### Verbal Techniques

#### *"I" Messages*

Relate a feeling about a behavior in terms of "I."
Describe effect behavior had on the person.
Avoid use of "you."
"You" messages are judgmental and provoke defensiveness.

**Example:** "You" message: "You are being uncooperative about doing your treatments."

**Example:** "I" message: "I am concerned about how the treatments are going because I want to see you get better."

#### *Third-Person Technique*

Express a feeling in terms of a third person ("he," "she," "they"). This is less threatening than directly asking children how they feel because it gives them an opportunity to agree or disagree without being defensive.

**Example:** "Sometimes when a person is sick a lot, he feels angry and sad because he cannot do what others can." Either wait silently for a response or encourage a reply with a statement, such as "Did you ever feel that way?"

This approach allows children three choices: (1) to agree and, one hopes, express how they feel; (2) to disagree; or (3) to remain silent, which means they probably have such feelings but are unable to express them at that time.

#### *Facilitative Response*

Listen carefully and reflect back to patients the feelings and intent of their statements.
Responses are empathic and nonjudgmental and legitimize the person's feelings.
Formula for facilitative responses: "You feel _____ because _____."

**Example:** If child states, "I hate coming to the hospital and getting needles," a facilitative response is "You feel unhappy because of all the things that are done to you."

#### *Storytelling*

Use the language of children to probe areas of their thinking while bypassing conscious inhibitions or fears.
The simplest technique is asking children to relate a story about an event, such as "being in the hospital."
Other approaches:

- Show children a picture of a particular event, such as a child in a hospital with other people in the room, and ask them to describe the scene.
- Cut out comic strips, remove words, and have child add statements for scenes.

#### *Mutual Storytelling*

Reveal the child's thinking and attempt to change his or her perceptions or fears by retelling a somewhat different story (more therapeutic approach than storytelling).
Begin by asking the child to tell a story about something; then tell another story that is similar to the child's tale but with differences that help the child in problem areas.

**Example:** Child's story is about going to the hospital and never seeing his or her parents again. Nurse's story is also about a child (using different names but similar circumstances) in a hospital whose parents visit every day, but in the evening after work, until the child is better and goes home with them.

#### *Bibliotherapy*

Use books in a therapeutic and supportive process.
Provide children with an opportunity to explore an event that is similar to their own but sufficiently different to allow them to distance themselves from it and remain in control.
General guidelines for using bibliotherapy are:

1. Assess the child's emotional and cognitive development in terms of readiness to understand the book's message.
2. Be familiar with the book's content (intended message or purpose) and the age for which it is written.
3. Read the book to the child if the child is unable to read.
4. Explore the meaning of the book with the child by having the child:
   - Retell the story.
   - Read a special section with the nurse or parent.
   - Draw a picture related to the story and discuss the drawing.
   - Talk about the characters.
   - Summarize the moral or meaning of the story.

#### *Dreams*

Dreams often reveal unconscious and repressed thoughts and feelings.
Ask the child to talk about a dream or nightmare.
Explore with the child what meaning the dream could have.

#### *"What If" Questions*

Encourage child to explore potential situations and to consider different problem-solving options.

**Example:** "What if you got sick and had to go the hospital?" Children's responses reveal what they know already and what they are curious about, providing an opportunity for them to learn coping skills, especially in potentially dangerous situations.

#### *Three Wishes*

Ask, "If you could have any three things in the world, what would they be?"
If the child answers, "That all my wishes come true," ask the child for specific wishes.

#### *Rating Game*

Use some type of rating scale (numbers, sad to happy faces) to have the child rate an event or feeling.

**Example:** Instead of asking youngsters how they feel, ask how their day has been "on a scale of 1 to 10, with 10 being the best."

#### *Word Association Game*

State key words and ask children to say the first word they think of when they hear the word.
Start with neutral words and then introduce more anxiety-producing words, such as "illness," "needles," "hospitals," and "operation."
Select key words that relate to some relevant event in the child's life.

#### *Sentence Completion*

Present a partial statement and have the child complete it. Some sample statements are:

- The thing I like best (least) about school is _____.
- The best (worst) age to be is _____.
- The most (least) fun thing I ever did was _____.
- The thing I like most (least) about my parents is _____.
- The one thing I would change about my family is _____.
- If I could be anything I wanted, I would be _____.
- The thing I like most (least) about myself is _____.

#### *Pros and Cons*

Select a topic, such as "being in the hospital," and have the child list "five good things and five bad things" about it.
This is an exceptionally valuable technique when applied to relationships, such as things family members like and dislike about each other.

*Continued*

## BOX 4.3 Creative Communication Techniques With Children—cont'd

### Nonverbal Techniques

#### *Writing*

Writing is an alternative communication approach for older children and adults.

Specific suggestions include:

- Keep a journal or diary.
- Write down feelings or thoughts that are difficult to express.
- Write "letters" that are never mailed (a variation is making up a "pen pal" to write to).

Keep an account of the child's progress from both a physical and an emotional viewpoint.

#### *Drawing*

Drawing is one of the most valuable forms of communication—both nonverbal (from looking at the drawing) and verbal (from the child's story of the picture).

Children's drawings tell a great deal about them because they are projections of their inner selves.

Spontaneous drawing involves giving the child a variety of art supplies and providing the opportunity to draw.

Directed drawing involves a more specific direction, such as "draw a person" or the "three themes" approach (state three things about the child and ask the child to choose one and draw a picture).

#### *Guidelines for Evaluating Drawings*

Use spontaneous drawings and evaluate more than one drawing whenever possible.

Interpret the drawings by considering other available information about the child and family, including the child's age and stage of development.

Interpret the drawings as a whole rather than focusing on specific details of the drawings.

Consider individual elements of the drawings that may be significant:

- Sex of figure drawn first: Usually relates to the child's perception of his or her own sex role
- Size of individual figures: Expresses importance, power, or authority
- Order in which figures are drawn: Expresses priority in terms of importance
- Child's position in relation to other family members: Expresses feelings of status or alliance
- Exclusion of a member: May denote feeling of not belonging or desire to eliminate
- Accentuated parts: Usually express concern for areas of special importance (e.g., large hands may be a sign of aggression)
- Absence of or rudimentary arms and hands: Suggest timidity, passivity, or intellectual immaturity; tiny, unstable feet may express insecurity; hidden hands may mean guilt feelings
- Placement of drawing on the page and type of stroke: Free use of paper and firm, continuous strokes express security, whereas drawings restricted to a small area and lightly drawn in broken or wavering lines may be signs of insecurity
- Erasures, shading, or crosshatching: Expresses ambivalence, concern, or anxiety with a particular area

#### *Magic*

Use simple magic tricks to help establish rapport with child, encourage compliance with health interventions, and provide effective distraction during painful procedures.

Although the "magician" talks, no verbal response from the child is required.

#### *Play*

Play is the universal language and "work" of children.

It tells a great deal about children because they project their inner selves through the activity.

Spontaneous play involves giving child a variety of play materials and providing the opportunity to play.

Directed play involves a more specific direction, such as providing medical equipment or a dollhouse for focused reasons, such as exploring the child's fear of injections or exploring family relationships.

Older infants respond to simple games. The old game of peek-a-boo is an excellent means of initiating communication with infants while maintaining a "safe," nonthreatening distance. After this intermittent eye contact, the nurse is no longer viewed as a stranger but as a friend. This can be followed by touch games. Clapping an infant's hands together for pat-a-cake or wiggling the toes for "this little piggy" delights an infant or small child. Talking to a foot or other part of the child's body is another effective tactic. Much of the nursing assessment can be carried out with the use of games and simple play equipment while the infant remains in the safety of the parent's arms or lap.

The nurse can capitalize on the natural curiosity of small children by playing games, such as "Which hand do you take?" and "Guess what I have in my hand," or by manipulating items such as a flashlight or stethoscope. Finger games are useful. More elaborate materials, such as puppets and replicas of familiar or unfamiliar items, serve as excellent means of communicating with small children. The variety and extent are limited only by the nurse's imagination.

# HISTORY TAKING

## PERFORMING A HEALTH HISTORY

The format used for history taking may be (1) **direct**, in which the nurse asks for information via direct interview with the informant; or (2) **indirect**, in which the informant supplies the information by completing some type of questionnaire. The direct method is superior to the indirect approach or a combination of both. However, because time is limited, the direct approach is not always practical. If the nurse cannot use the direct approach, he or she should review the parents' written responses and question them regarding any unusual answers. The categories listed in Box 4.4 encompass children's current and past health status and information about their psychosocial environment.

### Identifying Information

Much of the identifying information may already be available from other recorded sources. However, if the parent and child seem anxious, use this opportunity to ask about such information to help them feel more comfortable.

#### Informant

One of the important elements of identifying information is the **informant**, the person or persons who furnish the information. Record (1) who the person is (child, parent, or other), (2) an impression of reliability and willingness to communicate, and (3) any special circumstances such as the use of an interpreter or conflicting answers by more than one person.

### Chief Complaint

The **chief complaint** is the specific reason for the child's visit to the clinic, office, or hospital. It may be the theme, with the present illness

## BOX 4.4 Outline of a Pediatric Health History

**Identifying information**

1. Name
2. Address
3. Telephone
4. Birth date and place
5. Race or ethnic group
6. Sex
7. Religion
8. Date of interview
9. Informant

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

**History of present illness (HPI):** To obtain all details related to the chief complaint

**Past medical history (PMH):** 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

1. Constitutional
2. Integument
3. Eyes
4. Ears
5. Nose
6. Mouth
7. Throat
8. Neck
9. Chest
10. Respiratory
11. Cardiovascular
12. Gastrointestinal
13. Genitourinary
14. Gynecologic
15. Musculoskeletal
16. Neurologic
17. Endocrine
18. Hematologic/lymphatic
19. Allergic/immunologic
20. 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

**Sexual history:** To elicit information concerning the child's sexual concerns or activities and any pertinent data regarding adults' sexual activity that influences the child

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

1. Family composition
2. Home and community environment
3. Occupation and education of family members
4. Cultural and religious traditions
5. Family function and relationships

**Nutritional assessment:** To elicit information on the adequacy of the child's nutritional intake and needs

1. Dietary intake
2. Clinical examination

viewed as the description of the problem. Elicit the chief complaint by asking open-ended, neutral questions (e.g., "What seems to be the matter?" "How may I help you?" or "Why did you come here today?"). Avoid labeling-type questions (e.g., "How are you sick?" or "What is the problem?"). It is possible that the reason for the visit is not an illness or problem.

### History of Present Illness

The history of the present illness[a] is a narrative of the chief complaint from its 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. The focus of the present illness is on all factors relevant to the main problem, even if they have disappeared or changed during the onset, interval, and present.

### Analyzing a Symptom

Because pain is often the most characteristic symptom denoting the onset of a physical problem, it is used as an example for analysis of a symptom. Assessment includes type, location, severity, duration, and influencing factors (see Nursing Care Guidelines box; see also Chapter 5, Pain Assessment).

[a]The term *illness* is used in its broadest sense to denote any problem of a physical, emotional, or psychosocial nature. Actually, it is a history of the chief complaint.

## NURSING CARE GUIDELINES

### *Analyzing the Symptom: Pain*

**Type**

Be as specific as possible. With young children, asking the parents how they know the child is in pain may help describe its type, location, and severity. For example, a parent may state, "My child must have a severe earache because she pulls at her ears, rolls her head on the floor, and screams. Nothing seems to help." Help older children describe the "hurt" by asking them if it is sharp, throbbing, dull, or stabbing. Record whatever words they use in quotes.

**Location**

Be specific. "Stomach pain" is too general a description. Children can better localize the pain if they are asked to "point with one finger to where it hurts" or to "point to where mommy or daddy would put a Band-Aid." Determine if the pain radiates by asking, "Does the pain stay there or move? Show me with your finger where the pain goes."

*Continued*

## NURSING CARE GUIDELINES—cont'd

### *Analyzing the Symptom: Pain*

#### Severity

Severity is best determined by finding out how it affects the child's usual behavior. Pain that prevents a child from playing, interacting with others, sleeping, and eating is most often severe. Assess pain intensity using a rating scale, such as a numeric or Wong-Baker FACES Pain Rating Scale (see Chapter 5).

#### Duration

Include the duration, onset, and frequency. Describe these in terms of activity and behavior, such as "pain reported to last all night; child refused to sleep and cried intermittently."

#### Influencing Factors

Include anything that causes a change in the type, location, severity, or duration of the pain: (1) precipitating events (those that cause or increase the pain), (2) relieving events (those that lessen the pain, such as medications), (3) temporal events (times when the pain is relieved or increased), (4) positional events (standing, sitting, lying down), and (5) associated events (meals, stress, coughing).

## Past Medical History

The history contains information relating to all previous aspects of the child's health status and concentrates on several areas that are ordinarily passed over in the history of an adult, such as birth history, detailed feeding history, immunizations, and growth and development. Because this section includes a great deal of information, use a combination of open-ended and fact-finding questions. For example, begin interviewing for each section with an open-ended statement (e.g., "Tell me about your child's birth") to provide the informants the opportunity to relate what they think is most important. Ask fact-finding questions related to specific details whenever necessary to focus the interview on certain topics.

### 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. Because prenatal influences have significant effects on a child's physical and emotional development, a thorough investigation of the birth history is essential. Because parents may question what relevance pregnancy and birth have on the child's present condition, particularly if the child is past infancy, explain why such questions are included. An appropriate statement may be, "I will be asking you some questions about your pregnancy and ____'s [refer to child by name] birth. Your answers will give me a more complete picture of his [or her] overall health."

### Previous Illnesses, Injuries, and Surgeries

When inquiring about past illnesses, begin with a general question (e.g., "What other illnesses has your child had?"). Because parents are most likely to recall serious health problems, ask specifically about colds, earaches, and childhood diseases, such as measles, rubella (German measles), chickenpox, mumps, pertussis (whooping cough), diphtheria, tuberculosis, scarlet fever, strep throat, recurrent ear infections, influenza, gastroesophageal reflux, tonsillitis, or allergic manifestations.

In addition to illnesses, ask about injuries that required medical intervention, surgeries, procedures, and hospitalizations, including the dates and diagnoses of each incident. Focus on injuries (e.g., accidental falls, poisoning, choking, concussion, fractures, 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. If asked appropriate questions, most people can give reliable information about drug reactions (see Nursing Care Guidelines box).

## NURSING CARE GUIDELINES

### *Taking an Allergy History*

- Has your child ever taken any prescription or over-the-counter medications that have disagreed with him or her or caused an allergic reaction? If yes, can you remember the name(s) of this medication(s)?
- Can you describe the reaction?
- Was the medication taken by mouth (as a tablet or syrup), or was it an injection?
- How soon after starting the medication did the reaction happen?
- How long ago did this happen?
- Did anyone tell you it was an allergic reaction, or did you decide for yourself?
- Has your child ever taken this medication, or a similar one, again? If yes, did your child experience the same problems?
- Have you told the physicians or nurses about your child's reaction or allergy?

## NURSING ALERT

Information about allergic reactions to drugs or other products is essential. Failure to document a serious reaction places the child at risk if the agent is given.

### Current Medications

Inquire about current medications, including vitamins, antipyretics (especially aspirin), antibiotics, antihistamines, decongestants, nutritional supplements, or herbs, essential oils, and homeopathic medications. List all medications, including name, dose, schedule, duration, and reasons for use. Often parents are unaware of a medication's actual name. Whenever possible, ask the parents to bring the containers with them to the next visit, or ask for the name of the pharmacy and call for a list of all the child's recent prescription medications. However, this list will not include over-the-counter medications, which are important to know.

### Immunizations

A record of all immunizations is essential. Because many parents are unaware of the exact name and date of each immunization, sources of information include the child's health care provider, the child's school record, and the state's centralized immunization registry. All immunizations and "boosters" are listed, stating (1) the name of the specific disease, (2) the number of injections, (3) the dosage (sometimes lesser amounts are given if a reaction is anticipated), (4) the date administered, and (5) the occurrence of any reaction following immunization. Children should be screened for contraindications and precautions before every vaccine is administered (see Chapter 6, Immunizations).

### Dietary History

Because parental concerns are common and nursing interventions are important in ensuring optimum nutrition, the dietary history is discussed in detail in the Nutritional Assessment section later in this chapter.

### BOX 4.5 Habits to Explore During a Health Interview

- 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
- Unusual disposition; response to frustration
- Use or abuse of alcohol, drugs, coffee, or tobacco

## Growth and Development

Review the child's growth, including:

- 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

Developmental milestones include:

- 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
- Present grade in school
- School performance
- If the child has a best friend
- Interactions with other children, peers, and adults

Use specific and detailed questions when inquiring about each developmental milestone. For example, "sitting up" can mean many different activities, such as sitting propped up, sitting in someone's lap, sitting with support, sitting up alone but in a hyperflexed position for assisted balance, or sitting up unsupported with the back slightly rounded. A clue to misunderstanding the requested activity may be an unusually early age of achievement (see Chapter 3, Developmental Assessment).

## Habits

Habits are an important area to explore (Box 4.5). Parents frequently express concerns during this part of the history. Encourage their input by saying, "Please tell me any concerns you have about your child's habits, behavior, activities, or development." Investigate further any concerns that parents express.

One of the most common concerns relates to sleep. Many children develop a normal sleep pattern, and all that is required during the assessment is a general overview of nighttime sleep and nap schedules. However, some children develop sleep problems (see Chapters 10 and 13, Sleep Problems). When sleep problems occur, the nurse needs a more detailed sleep history to guide appropriate interventions.

Habits related to use of chemicals apply primarily to older children and adolescents. If a youngster admits to smoking, drinking, or using drugs, ask about the quantity and frequency. Questions such as "Many kids your age are experimenting with drugs and alcohol; have you ever had any drugs or alcohol?" may give more reliable data than questions such as "How much do you drink?" or "How often do you drink or take drugs?" Clarify that "drinking" includes all types of alcohol, including beer and wine. When quantities such as a "glass" of wine or a "can" of beer are given, ask about the size of the container.

If older children deny use of chemical substances, inquire about past experimentation. Asking, "You mean you never tried to smoke or drink?" implies that the nurse expects some such activity, and the youngster may be more inclined to answer truthfully. Be aware of the confidential nature of such questioning, the adverse effect that the parents' presence may have on the adolescent's willingness to answer, and the fact that self-reporting may not be an accurate account of chemical abuse.

### BOX 4.6 Anticipatory Guidance: Sexuality

**12 to 14 Years Old**

Have the adolescent identify a supportive adult with whom to discuss sexuality issues and concerns.
Discuss the advantages of delaying sexual activity.
Discuss making responsible decisions regarding normal sexual feelings.
Discuss the roles of gender, peer pressure, and the media in sexual decision making.
Discuss contraceptive options (advantages and disadvantages).
Provide education regarding sexually transmitted infections (STIs), including human immunodeficiency virus (HIV) infection; clarify risks and discuss condoms.
Discuss abuse prevention, including avoiding dangerous situations, the role of drugs and alcohol, and the use of self-defense.
Have the adolescent clarify his or her values, needs, and ability to be assertive.
If the adolescent is sexually active, discuss limiting partners, use of condoms, and contraceptive options.
Have a confidential interview with the adolescent (including a sexual history).
Discuss the evolution of sexual identity and expression.
Discuss breast examination or testicular examination.

**15 to 18 Years Old**

Support delaying sexual activity.
Discuss alternatives to intercourse.
Discuss "When are you ready for sex?"
Clarify values; encourage responsible decision making.
Discuss consequences of unprotected sex: early pregnancy and STIs, including HIV infection.
Discuss negotiating with partner and barriers to safer sex.
If the adolescent is sexually active, discuss limiting partners, use of condoms, and contraceptive options.
Emphasize that sex should be safe and pleasurable for both partners.
Have a confidential interview with the adolescent.
Discuss concerns about sexual expression and identity.

Data from Wright, K. (1997). Anticipatory guidance: Developing a healthy sexuality. *Pediatric Annals, 26*(Suppl. 2), S142–S144, C3; Fonseca, H., & Greydanus, D. (2007). Sexuality in the child, teen and young adult: Concepts for the clinician. *Primary Care: Clinics in Office Practice, 34*, 275–292.

## Sexual History

The sexual history is an essential component of adolescents' health assessment. The history uncovers areas of concern related to sexual activity, alerts the nurse to circumstances that may indicate the need for screening for sexually transmitted infections or testing for pregnancy, and provides information related to the need for sexual health counseling, such as safer sex practices. Box 4.6 gives guidelines for anticipatory guidance topics for parents and adolescents.

One approach to initiating a conversation about sexual concerns is to begin with a history of peer interactions. Open-ended statements (e.g., "Tell me about your social life" or "Who are your closest friends?") generally lead to a discussion of dating and sexual issues. To probe further, include questions about the adolescent's attitudes

on such topics as sex education, "going steady," "living together," and premarital sex. Phrase questions to reflect concern rather than judgment or criticism of sexual practices.

In any conversation regarding sexual history, be aware of the language used in either eliciting or conveying sexual information. For example, avoid asking whether the adolescent is "sexually active," because this term is broadly defined. "Are you having sex with anyone?" is probably the most direct and best understood question. Because same-sex experimentation may occur, refer to all sexual contacts in nongender terms, such as "partners," rather than "girlfriends" or "boyfriends."

## Family Health History

The family health history is used primarily to discover any genetic or chronic diseases affecting the child's family members. Assess for the presence or absence of consanguinity (if anyone in the family is related to their spouse's or partner's family). Family health history is generally confined to first-degree relatives (parents, siblings, grandparents, and immediate aunts and uncles). Information includes age, marital status, health status, cause of death if deceased, and any evidence of conditions, such as early heart disease, stroke, sudden death from unknown cause, hypercholesterolemia, hypertension, cancer, diabetes mellitus, obesity, congenital anomalies, inherited diseases, allergies, asthma, seizures, tuberculosis, abnormal bleeding, sickle cell disease, cognitive impairment, hearing or visual deficits, and psychiatric disorders (e.g., depression, psychosis, emotional problems). Confirm the accuracy of the reported disorders by inquiring about the symptoms, course, treatment, and sequelae of each diagnosis.

### Geographic Location

One of the important areas to explore when assessing the family health history is geographic location, including the birthplace and travel to different areas in or outside of the country, for identification of possible exposure to endemic diseases. Include current and past housing, whether the family rents or owns, whether the family resides in an urban or rural location, the age of the home, and whether there are significant threats such as molds or pests within the housing structure. Although the primary interest is the child's temporary residence in various localities, also inquire about close family members' travel, especially during tours of military service or business trips.

## Family Structure

Assessment of the family, both its structure and its function, is an important component of the history-taking process. Because the quality of the functional relationship between the child and family members is a major factor in emotional and physical health, family assessment is discussed separately and in greater detail apart from the more traditional health history.

**Family assessment** is the collection of data about the composition of the family and the relationships among its members. In its broadest sense, **family** refers to all those individuals who are considered by the family member to be significant to the nuclear unit, including relatives, friends, and social groups (e.g., daycare, school, church). Although family assessment is not family therapy, it can and frequently is therapeutic. Involving family members in discussing family characteristics and activities can provide insight into family dynamics and relationships.

Because of the time involved in performing an in-depth family assessment as presented here, be selective in deciding when knowledge of family function may facilitate nursing care (see Nursing Care Guidelines box). During brief contacts with families, a full assessment is not appropriate, and screening with one or two questions from each category may reflect the health of the family system or the need for additional assessment.

### NURSING CARE GUIDELINES

***Initiating a Comprehensive Family Assessment***

Perform a comprehensive assessment on:

- Children receiving comprehensive well-child care
- Children experiencing major stressful life events (e.g., chronic illness, disability, parental divorce, family separation, death of a family member)
- Children requiring extensive home care
- Children with developmental delays
- Children with repeated accidental injuries and those with suspected child abuse
- Children with behavioral or physical problems that could be caused by family dysfunction

The most common method of eliciting information on the family structure is to interview family members. The principal areas of concern are family composition, home and community environment, occupation and education of family members, and cultural and religious traditions (Box 4.7).

## Psychosocial History

The traditional medical history includes a personal and social section that concentrates on children's personal status, such as school adjustment and any unusual habits, and the family and home environment. Because several personal aspects are covered under development and habits, only those issues related to children's ability to cope and their self-concept are presented here.

Through observation, obtain a general idea of how children handle themselves in terms of confidence in dealing with others, answering questions, and coping with new situations. Observe the parent-child relationship for the types of messages sent to children about their coping skills and self-worth. Do the parents treat the child with respect, focusing on strengths, or is the interaction one of constant reprimands with emphasis on weaknesses and faults? Do the parents help the child learn new coping strategies or support the ones the child uses?

Parent-child interactions also convey messages about body image. Do the parents label the child and body parts (e.g., "bad boy," "skinny legs," or "ugly scar")? Do the parents handle the child gently, using soothing touch to calm an anxious child, or do they treat the child roughly, using force or restraint to make the child obey? If the child touches certain parts of the body, such as the genitalia, do the parents make comments that suggest a negative connotation?

With older children, many of the communication strategies discussed earlier in this chapter are useful in eliciting more definitive information about their coping and self-concept. Children can name or write down five things they like and dislike about themselves. The nurse can use sentence completion statements, such as "The thing I like best (or worst) about myself is _____"; "If I could change one thing about myself, it would be _____"; or "When I am scared, I _____."

## Review of Systems

The review of systems is a specific review of each body system, following an order similar to that used in a physical examination (see Nursing Care Guidelines box). Often the history of the present illness provides a complete review of the system involved in the chief complaint. Because asking questions about other body systems may appear irrelevant to the parents or child, precede the questioning with an explanation of why the data are necessary (similar to the explanation concerning the relevance of the birth history) and reassure the parents that the child's main problem has not been forgotten.

## BOX 4.7 Family Assessment Interview

### General Guidelines

Schedule the interview with the family at a time that is most convenient for all parties; include as many family members as possible; clearly state the purpose of the interview.

Begin the interview by asking each person's name and their relationships to one another.

Restate the purpose of the interview and the objective.

Keep the initial conversation general to put members at ease and to learn the "big picture" of the family.

Identify major concerns and reflect these back to the family to be certain that all parties receive the same message.

Terminate the interview with a summary of what was discussed and a plan for additional sessions, if needed.

### Structural Assessment Areas

#### *Family Composition*

Immediate members of the household (names, ages, and relationships)

Significant extended family members

Previous marriages, separations, death of spouses, or divorces

#### *Home and Community Environment*

Type of dwelling, number of rooms, occupants

Sleeping arrangements

Number of floors, accessibility of stairs and elevators

Adequacy of utilities

Safety features (fire escape, smoke and carbon monoxide detectors, guardrails on windows, use of car restraint)

Environmental hazards (e.g., chipped paint, poor sanitation, pollution, heavy street traffic)

Availability and location of health care facilities, schools, play areas

Relationship with neighbors

Recent crises or changes in home

Child's reaction and adjustment to recent stresses

#### *Occupation and Education of Family Members*

Types of employment

Work schedules

Work satisfaction

Exposure to environmental or industrial hazards

Sources of income and adequacy

Effect of illness on financial status

Highest degree or grade level attained

#### *Cultural and Religious Traditions*

Religious beliefs and practices

Cultural and ethnic beliefs and practices

Language spoken in home

Assessment questions include the following:

- Does the family identify with a religious or ethnic group? Are both parents from that group?
- How is religious or ethnic background part of family life?
- What special religious or cultural traditions are practiced in the home (e.g., food choices and preparation)?
- Where were family members born, and how long have they lived in this country?
- What language does the family speak most frequently?
- Do they speak and understand English?
- What do they believe causes health or illness?
- What religious or ethnic beliefs influence the family's perception of illness and its treatment?
- What methods are used to prevent or treat illness?
- How does the family know when a health problem needs medical attention?
- Who does the family contact when a member is ill?
- Does the family rely on cultural or religious healers or remedies? If so, ask them to describe the type of healer or remedy.
- Who does the family go to for support (clergy, medical healer, relatives)?
- Does the family experience discrimination because of their race, beliefs, or practices? Ask them to describe.

### Functional Assessment Areas

#### *Family Interactions and Roles*

*Interactions* refer to ways in which family members relate to each other. The chief concern is the amount of intimacy and closeness among the members, especially spouses.

*Roles* refer to behaviors of people as they assume a different status or position.

Observations include the following:

- Family members' responses to each other (cordial, hostile, cool, loving, patient, short tempered)
- Obvious roles of leadership versus submission
- Support and attention shown to various members

Assessment questions include the following:

- What activities does the family perform together?
- Who do family members talk to when something is bothering them?
- What are family members' household chores?
- Who usually oversees what is happening with the children, such as at school or health care?
- How easy or difficult is it for the family to change or accept new responsibilities for household tasks?

#### *Power, Decision Making, and Problem Solving*

*Power* refers to individual member's control over others in family; it is manifested through family decision making and problem solving.

Chief concern is clarity of boundaries of power between parents and children.

One method of assessment involves offering a hypothetical conflict or problem, such as a child failing school, and asking family how they would handle this situation.

Assessment questions include the following:

- Who usually makes the decisions in the family?
- If one parent makes a decision, can the child appeal to the other parent to change it?
- What input do children have in making decisions or discussing rules?
- Who makes and enforces the rules?
- What happens when a rule is broken?

#### *Communication*

Communication is concerned with clarity and directness of communication patterns.

Further assessment includes periodically asking family members if they understood what was just said and to repeat the message.

Observations include the following:

- Who speaks to whom
- If one person speaks for another or interrupts
- If members appear uninterested when certain individuals speak
- If there is agreement between verbal and nonverbal messages

Assessment questions include the following:

*Continued*

## BOX 4.7 Family Assessment Interview—cont'd

- How often do family members wait until others are through talking before "having their say?"
- Do parents or older siblings tend to lecture and preach?
- Do parents tend to "talk down" to the children?

***Expression of Feelings and Individuality***

Expressions are concerned with personal space and freedom to grow, with limits and structure needed for guidance.

Observing patterns of communication offers clues to how freely feelings are expressed.

Assessment questions include the following:

- Is it okay for family members to get angry or sad?
- Who gets angry most of the time? What do they do?
- If someone is upset, how do other family members try to comfort this person?
- Who comforts specific family members?
- When someone wants to do something, such as try out for a new sport or get a job, what is the family's response (offer assistance, discouragement, or no advice)?

## NURSING CARE GUIDELINES

### *Review of Systems*

**Constitutional:** Overall state of health, fatigue, recent or unexplained weight gain or loss (period of time for either), contributing factors (change of diet, illness, altered appetite), exercise tolerance, fevers (time of day), chills, night sweats (unrelated to weather conditions), general ability to carry out activities of daily living

**Integument:** Pruritus, pigment or other color changes (including birthmarks), acne, eruptions, rashes (location), bruises, petechiae, excessive dryness, general texture, tattoos or piercings, disorders or deformities of nails, hair growth or loss, excess body hair, hair color change (for adolescents, use of hair dyes or other potentially toxic substances, such as hair straighteners)

**Eyes:** No eye contact in an infant after 8 weeks of age, head tilt or face turn, visual problems (behaviors indicative of poor vision, such as bumping into objects, clumsiness, sitting close to television, holding a book close to face, writing with head near desk, squinting, rubbing the eyes, bending head in an awkward position), crossed eyes or lazy eye (strabismus), eye infections, edema of lids, excessive tearing, photophobia, use of glasses or contact lenses, date of last vision examination

**Ears:** Earaches, ear discharge, evidence of hearing loss (ask about behaviors, such as the need to repeat requests, loud speech, lack of response to noises, inattentive behavior), results of any previous auditory testing

**Nose:** Nosebleeds (epistaxis), constant or frequent runny or stuffy nose, nasal obstruction (difficulty breathing through nose), alteration or loss of sense of smell

**Mouth:** Mouth breathing, gum bleeding, number of teeth and pattern of eruption and loss, toothaches, tooth brushing, use of fluoride, difficulty with teething (symptoms), last visit to dentist (especially if temporary dentition is complete)

**Throat:** Sore throats, difficulty swallowing, choking, hoarseness or other voice irregularities

**Neck:** Pain, limitation of movement, stiffness, difficulty holding head straight (torticollis), thyroid enlargement, enlarged nodes or other masses

**Chest:** Breast enlargement, discharge, masses; for adolescent girls, ask about breast self-examination

**Respiratory:** Chronic cough, wheezing, shortness of breath at rest or on exertion, difficulty breathing, snoring, sputum production, infections (pneumonia, tuberculosis), skin reaction from tuberculin testing

**Cardiovascular:** Cyanosis or fatigue on exertion, history of heart murmur or rheumatic fever, tachycardia, syncope, edema

**Gastrointestinal:** Appetite, nausea, vomiting (not associated with eating; may be indicative of brain tumor or increased intracranial pressure), abdominal pain, jaundice or yellowing skin or sclera, belching, flatulence, distention, diarrhea, constipation, recent change in bowel habits, blood in stools

**Genitourinary:** Pain on urination, frequency, hesitancy, urgency, hematuria, nocturia, polyuria, enuresis, unpleasant odor to urine, force of stream, discharge, change in size of scrotum, date and result of last urinalysis; for adolescents, sexually transmitted infection and type of treatment; for adolescent boys, ask about testicular self-examination

**Gynecologic:** Menarche (date of and age at the first occurrence of menstruation), date of last menstrual period, regularity or problems with menstruation, vaginal discharge, pruritus; if sexually active, type of contraception, sexually transmitted infection and type of treatment; if sexually active with weakened immune system or if 21 years old and older, date and result of last Papanicolaou (Pap) smear; obstetric history (as discussed under birth history, when applicable)

**Musculoskeletal:** Weakness, clumsiness, lack of coordination, unusual movements, scoliosis, back pain, joint pain or swelling, muscle pains or cramps, abnormal gait, deformity, fractures, serious sprains, activity level

**Neurologic:** Headaches, seizures, tremors, tics, dizziness, head injury (specific details), loss of consciousness episodes, loss of memory, developmental delays or concerns

**Endocrine:** Intolerance to heat or cold, excessive thirst or urination, excessive sweating, salt craving, rapid or slow growth, signs of early or late puberty (regardless of age)

**Hematologic/lymphatic:** Easy bruising or bleeding, anemia, date and result of last blood count, blood transfusions, swollen or painful lymph nodes (cervical, axillary, inguinal)

**Allergic/immunologic:** Allergic responses, anaphylaxis, eczema, rhinitis, unusual sneezing, autoimmunity, recurrent infections, infections associated with unusual complications

**Psychiatric:** General affect, anxiety, depression, mood changes, hallucinations, attention span, tantrums, behavior problems, suicidal ideation, substance abuse

Begin the review of a specific system with a broad statement (e.g., "How has your child's general health been?" or "Has your child had any problems with his eyes?"). If the parent states that the child has had problems with some body function, pursue this with an encouraging statement, such as "Tell me more about that." If the parent denies any problems, query for specific symptoms (e.g., "Any headaches, bumping into objects, or squinting?"). If the parent confirms the absence of such symptoms, record positive statements in the history, such as "Mother denies headaches, bumping into objects, and squinting." In this way, anyone who reviews the health history is aware of exactly what symptoms were investigated.

## NUTRITIONAL ASSESSMENT[b]

### DIETARY INTAKE

To best understand a child's health and growth pattern, the nurse needs to assess the child's nutritional status. Obtaining a dietary intake history is an essential component of a nutritional assessment, but it can be one of the most difficult factors to assess due to variance in both types and portions of food consumed. A diet recall of children and adolescents is prone to error, with underreporting being commonplace. Difficulties also lie in cross-cultural communication where people of different ethnic origin may have difficulty adequately describing foods unique to their culture's cuisine. Despite these obstacles, a dietary evaluation is a vital element of the child's health assessment and should be approached in a neutral, judgment-free way for most accurate results.

The **Dietary Reference Intakes (DRIs)** are a set of four evidence-based nutrient reference values that provide quantitative estimates of nutrient intake for use in assessing and planning dietary intake (US Department of Agriculture, National Agricultural Library, 2014). The specific DRIs are:

**Estimated Average Requirement (EAR):** Estimated to meet the nutrient requirement of half of healthy individuals for a specific age and gender group

**Recommended Dietary Allowance (RDA):** Sufficient to meet the nutrient requirement of nearly all healthy individuals for a specific age and gender group

**Adequate Intake (AI):** Based on estimates of nutrient intake by healthy individuals

**Tolerable Upper Intake Level (UL):** Highest nutrient intake level likely to pose no risk of adverse health effects

The US Department of Agriculture has an online interactive DRI tool that health care professionals can use to calculate nutrient requirements based on age, gender, height, weight, and activity, although it is important to note that individual requirements may vary (available at http://fnic.nal.usda.gov/fnic/interactiveDRI/).

Fig. 4.4 illustrates ChooseMyPlate.gov, which describes the five food groups that form the foundation for a healthy diet. MyPlate Kids' Place provides resources that promote healthy meal planning and physical activity. Specific questions used to conduct a nutritional assessment are given in Box 4.8. Every nutritional assessment should begin with a **dietary history**. The questions used by the nurse for a child's dietary history during periods of rapid growth and development should elicit a response that is detailed and specific, and questions may be adapted as the child grows in age. The overview elicited from the dietary history can be helpful in evaluating food frequency records. The history is also concerned with financial and cultural factors that influence food selection and preparation (see Cultural Considerations box).

### CLINICAL EXAMINATION OF NUTRITION

A significant amount of information regarding nutritional deficiencies comes from a clinical examination, especially from assessing the child's growth, skeletal development, skin, hair, nails, eyes, mouth, and teeth. Hair, skin, and mouth are vulnerable because of the rapid turnover of epithelial and mucosal tissue. Table 4.1 summarizes some clinical signs of possible nutritional deficiencies. If suspicious signs are found, they must be confirmed with both dietary and biochemical data. Failure to thrive is discussed in Chapter 10. Obesity and eating disorders are discussed in Chapter 16.

**Anthropometry**, an essential parameter of nutritional status, is the measurement of height (length), weight, head circumference, proportions, skinfold thickness, and arm circumference in children. Height and head circumference reflect quality of nutrition over longer periods of time, whereas weight, skinfold thickness, arm circumference, muscle, and fat stores reflect present nutritional status and are prone to rapid change depending on overall dietary intake. Skinfold thickness is a measurement of the body's fat content, as approximately half of the body's total fat stores are directly beneath the skin. The mid-upper arm circumference is correlated with measurements of total muscle mass. Because muscle serves as the body's major protein reserve, this measurement is considered an index of the body's protein stores and therefore is one objective factor to

[b]Caroline C. Weeks, BS, BA, RDN, LD, updated this section.

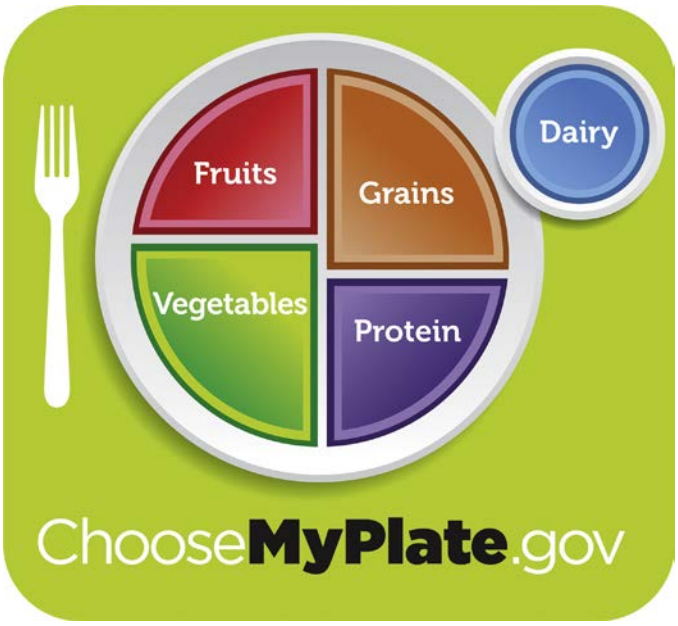


**Fig. 4.4** MyPlate advocates building a healthy plate by making half of one's plate fruits and vegetables and the other half grains and lean protein. Avoiding oversized portions, making half of grains whole grains and drinking fat-free or low-fat (1%) milk are among the recommendations for a healthy diet. (From US Department of Agriculture, Center for Nutrition Policy and Promotion. [2015]. *MyPlate*.http://www.ChooseMyPlate.gov.)

### CULTURAL CONSIDERATIONS

#### *Food Practices*

Because cultural practices are prevalent in food preparation, consider carefully the questions that are asked and the judgments made during counseling. For example, some cultures, such as Hispanic, African American, and American Indian, include many vegetables, legumes, and starches in their diet that together provide sufficient essential amino acids even though the actual amount of meat or dairy protein is low.

The simplest method of assessing daily intake is the 24-hour recall. This involves the child or parent recalling the approximate portion of all foods and liquids consumed in the most recent 24-hour period. This method is most beneficial when history represents a typical day's intake. To increase accuracy of a patient or family's report of portion sizes consumed, it is helpful to use three-dimensional (3D) food models or pictures. In general, this method is most useful in providing *qualitative* information about the child's diet.

To further improve the reliability of the daily recall, the family can complete a food diary by recording every food and liquid consumed for a certain number of days in some sort of chart or log. A 3-day record consisting of 2 weekdays and 1 weekend day is representative for most people. Providing specific charts to record intake can improve overall patient compliance and follow-up.

## BOX 4.8 Assessment of Nutritional Intake

**Estimated Average Requirement (EAR):** Used to examine the possibility of inadequacy.

**Recommended Dietary Allowance (RDA):** Dietary intake at or above this level usually has a low probability of inadequacy.

**Adequate Intake (AI):** Dietary intake at or above this level usually has a low probability of inadequacy.

**Tolerable Upper Intake Level (UL):** Dietary intake above this level usually places an individual at risk of adverse effects from excessive nutrient intake.

### Dietary History

What are the family's usual mealtimes?
Do family members eat together or at separate times?
Are there distractions such as TV or electronics during mealtimes?
Who does the family grocery shopping and meal preparation?
How much money is spent to buy food each week?
How are most foods prepared—baked, broiled, fried, other?
How often does the family or your child eat out?
- What kinds of restaurants do you go to?
- What kinds of food does your child typically eat at restaurants?

Does your child eat breakfast regularly?
Where does your child eat lunch?
What are your child's favorite foods, beverages, and snacks?
- What are the average amounts eaten per day?
- What foods are artificially sweetened?
- What are your child's snacking habits?
- When are sweet foods usually eaten?
- What are your child's tooth brushing habits?

Do you notice your child waking during the night to eat?
What special cultural practices are followed? What ethnic foods are eaten?
What foods and beverages does your child dislike?
How would you describe your child's usual appetite (hearty eater, picky eater)?
What are your child's feeding habits (breast, bottle, cup, spoon, eats by self, needs assistance, any special devices)?
Does your child take vitamins or other supplements? Do they contain iron or fluoride?
Does your child have any known or suspected food allergies? Is your child on a special diet?
Has your child lost or gained weight recently? How much?
Are there any feeding problems (excessive fussiness, spitting up, colic, difficulty sucking or swallowing)?
Are there any dental problems or appliances, such as braces, that affect eating?
What types of exercise does your child do regularly?
Is there a family history of cancer, diabetes, heart disease, high blood pressure, gastrointestinal disease, eating disorders, or obesity?

### Additional Questions for Infants

What was the infant's birth weight? When did it double? Triple?
Was the infant premature?
Are you breastfeeding or have you breastfed your infant? How long?
- How long does a typical breastfeeding session last?
- Does the infant nurse from both breasts?

If you use a formula, what is the brand?
- How are you preparing the formula?
- How many ounces does the infant drink at a time? How often?

Have you introduced cow's milk? If so, what kind (whole, low fat, skim)?
- At what age did you start?
- How many ounces does the infant drink a day?

Do you give your infant extra fluids (water, juice)?
If the infant takes a bottle to bed at nap or nighttime, what is in the bottle?
At what age did the child start cereal, vegetables, meat or other protein sources, fruit or juice, finger food, and table food?
Do you make your own baby food or use commercial foods, such as infant cereal?
Has the infant had an allergic reaction to any food(s)? If so, list the foods and describe the reaction.
Does the infant spit up frequently; have unusually loose stools; or have hard, dry stools? If so, how often?
How often do you feed your infant?
Does your infant show eagerness to eat?
Does the infant take a vitamin or mineral supplement? If so, what type?

Modified from Murphy, S. P., & Poos, M. I. (2002). Dietary reference intakes: Summary of applications in dietary assessment. *Public Health Nutrition, 5*(Suppl. 6A), 843–849.

## TABLE 4.1 Nutrition-Focused Clinical Findings

| Normal Findings | Abnormal Findings | Possible Nutrient Deficiencies |
|---|---|---|
| **Physical Growth** | | |
| Normal weight gain and linear growth for age and gender | Weight loss, poor weight gain, linear growth failure | Protein, fat, calories, zinc, iodine, sodium, other essential nutrients |
| Normal skeletal development without obvious deformity | Kyphosis, genu varum (bowing of extremities) or genu valgum (knock knees), rickets, history of nontraumatic fractures | Calcium, vitamin D, phosphorus |
| **Skin** | | |
| Smooth, slightly dry to touch, elastic and firm, absence of lesions, uniform color appropriate to genetic background | Dry, rough, scaly | Vitamin A, essential fatty acids |
| | Dermatitis | Essential fatty acids, zinc, niacin, riboflavin, tryptophan |
| | Petechiae | Riboflavin, vitamin C |
| | Delayed wound healing | Vitamin C, zinc |
| | Scaly dermatitis on exposed surfaces | Riboflavin, vitamin C, zinc, niacin, tryptophan |
| | Wrinkled, flabby | Niacin |
| | Crusted lesions around orifices, especially nares | Protein, calories, zinc |
| | Poor turgor | Water, sodium |
| | Depigmentation | Protein, calories |
| | Pallor (anemia) | Iron, folic acid; vitamins $B_{12}$, C, and E (in premature infants); pyridoxine |

**TABLE 4.1 Nutrition-Focused Clinical Findings—cont'd**

| Normal Findings | Abnormal Findings | Possible Nutrient Deficiencies |
|---|---|---|
| **Hair** | | |
| Lustrous, silky smooth, strong, elastic, distributed symmetrically | Stringy, friable, dull, dry, thin | Protein, calories, zinc, biotin, essential fatty acids |
| | Alopecia | Protein, calories, zinc, biotin, essential fatty acids, selenium |
| | Depigmentation | Protein, calories, copper |
| | Raised areas around hair follicles | Vitamin C |
| **Nails** | | |
| Symmetric and smooth | Transverse lines | Protein |
| | Flaky | Magnesium |
| | Poorly blanched | Vitamins A and D |
| | Brittle nails, spooning | Iron |
| **Eyes** | | |
| Clear, bright, moist | Dull, dry with Bitot spots (buildup of keratin superficially in the conjunctiva) | Vitamin A |
| Good night vision | Night blindness | Vitamin A |
| Conjunctiva—pink, glossy, tolerates light exposure | Burning, itching, photophobia | Riboflavin |
| **Mouth** | | |
| Lips—smooth, moist, darker color than skin, absence of lesions | Fissures and inflammation at corners | Riboflavin |
| | Dry, swollen | Vitamins $B_6$ and $B_{12}$, iron, folate, riboflavin, niacin |
| Gums—firm, pink, stippled | Spongy, friable, inflamed, bluish red or black, bleed easily | Vitamin C |
| Mucous membranes—bright pink, smooth, moist | Stomatitis | Niacin |
| | Dry mucous membranes | Water, zinc |
| Tongue—moist pink with slightly rough texture, no lesions, normal taste sensation | Glossitis (swollen, inflamed, smooth, and dark red) | Niacin, riboflavin, folate, vitamins $B_6$ and $B_{12}$, iron |
| | Diminished taste sensation | Zinc |
| Teeth—uniform white color, smooth, intact; normal eruption begins at 4-12 months | Defective enamel | Vitamins A, C, and D; calcium; phosphorus |
| | Caries | Fluoride, vitamin D |
| | Delayed dentition | Malnutrition |

Adapted from Green Corkins, K., & Teague, E. E. (2017). Pediatric nutrition assessment: Anthropometrics to zinc. *Nutrition in Clinical Practice, 32*(1), 40–51; National Institutes of Health, Office of Dietary Supplements. (n.d.). Vitamin and mineral fact sheets. Retrieved from https://ods.od.nih.gov/factsheets/list-VitaminsMinerals/

consider when diagnosing pediatric malnutrition. Ideally, growth measurements are recorded over time, and comparisons are made regarding the velocity of growth and weight gain based on previous and present values.

Numerous **biochemical tests** may be used, when needed, to complement a clinical nutritional assessment. The most common laboratory studies to assess children for undernutrition are hemoglobin, red blood cell indices, ferritin, albumin, and prealbumin. When albumin or prealbumin is low, inflammatory markers such as C-reactive protein can help determine if levels are reduced due to an inflammatory process or infection, or due to inadequate substrate. Other labs may be needed based on history and physical findings. For obese children, fasting serum glucose, lipids, and liver function studies may be performed to assess for complications.

## EVALUATION OF NUTRITIONAL ASSESSMENT

After collecting the data needed for a thorough nutritional assessment, evaluate the findings to plan appropriate counseling. From the data, assess whether the child is malnourished, at risk for becoming malnourished, well-nourished with adequate reserves, or overweight or obese.

Analyze the daily food diary for the variety and amounts of foods suggested in MyPlate (see Fig. 4.4). For example, if the list includes no vegetables, inquire about this rather than assuming that the child dislikes vegetables, because it is possible that none were served that day. Also, evaluate the information in terms of the family's ethnic practices and financial resources. Encouraging increased protein intake with additional meat is not always feasible for families on a limited budget and may conflict with food practices that use meat sparingly, such as in Asian meal preparation.

# GENERAL APPROACHES TO EXAMINING THE CHILD

## SEQUENCE OF THE EXAMINATION

Ordinarily, the sequence for examining patients follows a head-to-toe direction. The main function of such a systematic approach is to

provide a general guideline for assessment of each body area to avoid omitting segments of the examination. The standard recording of data also facilitates exchange of information among different professionals. In examining children, this orderly sequence is frequently altered to accommodate the child's developmental needs, although the examination is recorded following the head-to-toe model. Using developmental and chronologic age as the main criteria for assessing each body system accomplishes several goals:

- Minimizes stress and anxiety associated with assessment of various body parts
- Fosters a trusting nurse-child-parent relationship
- Allows for maximum preparation of the child
- Preserves the essential security of the parent-child relationship, especially with young children
- Maximizes the accuracy and reliability of assessment findings

## PREPARATION OF THE CHILD

Although the physical examination consists of painless procedures, for some children the use of a tight arm cuff, probes in the ears and mouth, pressure on the abdomen, and a cold piece of metal to listen to the chest are stressful. Therefore the nurse should use the same considerations discussed in Chapter 20 for preparing children for procedures. In addition to that discussion, general guidelines related to the examining process are given in the Nursing Care Guidelines box.

### NURSING CARE GUIDELINES

***Performing Pediatric Physical Examination***

Perform the examination in an appropriate, nonthreatening area:
- Have room well lit and decorated with neutral colors.
- Have room temperature comfortably warm.
- Place all strange and potentially frightening equipment out of sight.
- Have some toys and games available for child.
- If possible, have rooms decorated and equipped for children of different ages.
- Provide privacy, especially for school-age children and adolescents.
- Provide time for play and becoming acquainted.

Observe behaviors that signal child's readiness to cooperate:
- Talking to the nurse
- Making eye contact
- Accepting the offered equipment
- Allowing physical touching
- Choosing to sit on the examining table rather than parent's lap

If signs of readiness are not observed, use the following techniques:
- Talk to parent while essentially "ignoring" child; gradually focus on child or a favorite object, such as a doll.
- Make complimentary remarks about child, such as about his or her appearance, dress, or a favorite object.
- Tell a funny story or play a simple magic trick.
- Have a nonthreatening "friend" available, such as a hand puppet to "talk" to child for the nurse (see Fig. 4.26A).

If child refuses to cooperate, use the following techniques:
- Assess reason for uncooperative behavior; consider that a child who is unduly afraid may have had a traumatic experience.
- Try to involve child and parent in process.
- Avoid prolonged explanations about examining procedure.
- Use a firm, direct approach regarding expected behavior.
- Perform examination as quickly as possible.
- Have attendant gently restrain child.
- Minimize any disruptions or stimulation.
- Limit number of people in room.
- Use isolated room.
- Use quiet, calm, confident voice.

Begin the examination in a nonthreatening manner for young children or children who are fearful:
- Use activities that can be presented as games, such as test for cranial nerves (see Table 4.11) or parts of developmental screening tests (see Chapter 3).
- Use approaches such as Simon Says to encourage child to make a face, squeeze a hand, stand on one foot, and so on.
- Use paper-doll technique:
  1. Lay child supine on an examining table or floor that is covered with a large sheet of paper.
  2. Trace around child's body outline.
  3. Use body outline to demonstrate what will be examined, such as drawing a heart and listening with a stethoscope before performing activity on the child.

If several children in the family will be examined, begin with the most cooperative child to model desired behavior.

Involve the child in examination process:
- Provide choices, such as sitting on table or in parent's lap.
- Allow child to handle or hold equipment.
- Encourage child to use equipment on a doll, family member, or examiner.
- Explain each step of the procedure in simple language.

Examine child in a comfortable and secure position:
- Sitting on parent's lap
- Sitting upright if in respiratory distress

Proceed to examine the body in an organized sequence (usually head to toe) with the following exceptions:
- Alter sequence to accommodate needs of children of different ages (Table 4.2).
- Examine painful areas last.
- In an emergency, examine vital functions (airway, breathing, and circulation) and injured area first.

Reassure child throughout the examination, especially about bodily concerns that arise during puberty.

Discuss findings with family at the end of the examination.

Praise child for cooperation during the examination; give a reward such as a small toy or sticker.

The physical examination should be as pleasant as possible, as well as educational. The paper-doll technique is a useful approach to teaching children about the body part that is being examined (Fig. 4.5). At the conclusion of the visit, the child can bring home the paper doll as a memento.

Table 4.2 summarizes guidelines for positioning, preparing, and examining children at various ages. Because the child may not fit precisely into one age category, it may be necessary to vary the approach after a preliminary assessment of the child's developmental achievements and needs. Even with the best approach, many toddlers are uncooperative and inconsolable for much of the physical examination. However, some seem intrigued by the new surroundings and unusual equipment and respond more like preschoolers than toddlers. Likewise, some early preschoolers may require more of the "security

**Fig. 4.5** Using the paper-doll technique to prepare a child for physical examination.

measures" used with younger children, such as continued parent-child contact, and fewer of the preparatory measures used with preschoolers, such as playing with the equipment before and during the actual examination (Fig. 4.6).

## PHYSICAL EXAMINATION

Although the approach to and sequence of the physical examination differ according to the child's age and development, the following discussion outlines the traditional model for physical assessment. The focus includes all pediatric age-groups (see Chapter 7 for a detailed discussion of a newborn assessment). Because the physical examination is a vital part of preventive pediatric care, Fig. 4.7 gives a schedule for periodic health visits.

## 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

**TABLE 4.2 Age-Specific Approaches to Physical Examination During Childhood**

| Position | Sequence | Preparation |
|---|---|---|
| **Infant** | | |
| Before able to sit alone: supine or prone, preferably in parent's lap; before 4-6 months, can place on examining table<br>After able to sit alone: sitting in parent's lap whenever possible; if on table, place with parent in full view | If quiet, auscultate heart, lungs, and abdomen.<br>Record heart and respiratory rates.<br>Palpate and percuss same areas.<br>Proceed in usual head-to-toe direction.<br>Perform traumatic procedures last (eyes, ears, mouth [while crying]).<br>Elicit reflexes as body part is examined.<br>Elicit Moro reflex last. | Completely undress if room temperature permits.<br>Leave diaper on male infant.<br>Gain cooperation with distraction, bright objects, rattles, talking.<br>Smile at infant; use soft, gentle voice.<br>Use pacifier (if used) or bottle with feeding (if bottle feeding).<br>Enlist parent's aid for restraining to examine ears, mouth.<br>Avoid abrupt, jerky movements. |
| **Toddler** | | |
| Sitting on parent's lap or standing by parent<br>Prone or supine in parent's lap | Inspect body area through play: "Count fingers," "tickle toes."<br>Use minimum physical contact initially.<br>Introduce equipment slowly.<br>Auscultate, percuss, palpate whenever quiet.<br>Perform traumatic procedures last (same as for infant). | Have parent remove outer clothing.<br>Remove underwear as body part is examined.<br>Allow toddler to inspect equipment; demonstrating use of equipment is usually ineffective.<br>If uncooperative, perform procedures quickly.<br>Use restraint when appropriate; request parent's assistance.<br>Talk about examination if cooperative; use short phrases.<br>Praise for cooperative behavior. |
| **Preschool Child** | | |
| Prefer standing or sitting<br>Usually cooperative prone or supine<br>Prefer parent's closeness | If cooperative, proceed in head-to-toe direction.<br>If uncooperative, proceed as with toddler. | Request self-undressing.<br>Allow to wear underwear if shy.<br>Offer equipment for inspection; briefly demonstrate use.<br>Make up story about procedure (e.g., "I'm seeing how strong your muscles are" [blood pressure]).<br>Use paper-doll technique.<br>Give choices when possible.<br>Expect cooperation; use positive statements (e.g., "Open your mouth."). |

*Continued*

**TABLE 4.2 Age-Specific Approaches to Physical Examination During Childhood—cont'd**

| Position | Sequence | Preparation |
|---|---|---|
| **School-Age Child** | | |
| Prefer sitting<br>Cooperative in most positions<br>Younger child prefers parent's presence<br>Older child may prefer privacy | Proceed in head-to-toe direction.<br>May examine genitalia last in older child. | Respect need for privacy.<br>Request self-undressing.<br>Allow to wear underwear.<br>Give gown to wear.<br>Explain purpose of equipment and significance of procedure, such as otoscope to see tympanic membrane, which is necessary for hearing.<br>Teach about body function and care. |
| **Adolescent** | | |
| Same as for school-age child<br>Offer option of parent's presence | Same as older school-age child.<br>May examine genitalia last. | Allow to undress in private.<br>Give gown.<br>Expose only area to be examined.<br>Respect need for privacy.<br>Explain findings during examination (e.g., "Your muscles are firm and strong.").<br>Matter-of-factly comment about sexual development (e.g., "Your breasts are developing as they should be.").<br>Emphasize normalcy of development.<br>Examine genitalia as any other body part; may leave to end. |

**Fig. 4.6** Preparing children for physical examination.

circumference. Values for these growth parameters are plotted on percentile charts, and the child's measurements in percentiles are compared with those of the general population.

## Growth Charts

Growth charts use a series of percentile curves to demonstrate the distribution of body measurements in children. The Centers for Disease Control and Prevention recommend that the World Health Organization growth standards be used to monitor growth for infants and children between the ages of 0 and 2 years. Because breastfeeding is the recommended standard for infant feeding, the World Health Organization growth charts are used; they reflect growth patterns among children who were predominately breastfed for at least 4 months and are still breastfeeding at 12 months old. The Centers for Disease Control and Prevention growth charts (http://www.cdc.gov/growthcharts) are used for children 2 years old and older.

Children whose growth may be questionable include:

- Children whose height and weight percentiles are widely disparate (e.g., height in the 10th percentile and weight in the 90th percentile, especially with above-average skinfold thickness)
- Children who fail to follow the expected growth velocity in height and weight
- Children who show a sudden increase or decrease in a previously steady growth pattern (i.e., crossing two major percentile lines, especially after 3 years old)
- Children who are short in the absence of short parents

Because growth is a continuous but uneven process, the most reliable evaluation lies in comparing growth measurements over time because they reflect change. It is important to remember that same-age, same-gender children (whether short, average, or tall in stature) should grow at similar rates (Fig. 4.8).

## Length

The term **length** refers to measurements taken when children are supine (also referred to as **recumbent length**). Until children are 24 months old and able to stand alone (or 36 months old if using a chart for birth to 36 months), measure recumbent length using a length board and two measurers (Fig. 4.9A; see Translating Evidence Into Practice box). 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. Place the head touching the headboard and the footboard firmly against the heels of both feet. A tape measure should not be used to measure the length of infants and children due to inaccuracy and unreliability (Foote, 2014; Foote, Brady, Burke, et al., 2011). Measure length to the last completed millimeter or $\frac{1}{16}$ inch. Measure more than once and record the average length.

| | INFANCY | | | | | | | | EARLY CHILDHOOD | | | | | | | MIDDLE CHILDHOOD | | | | | | ADOLESCENCE | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGE | Prenatal | Newborn | 3-5 d | By 1 mo | 2 mo | 4 mo | 6 mo | 9 mo | 12 mo | 15 mo | 18 mo | 24 mo | 30 mo | 3 y | 4 y | 5 y | 6 y | 7 y | 8 y | 9 y | 10 y | 11 y | 12 y | 13 y | 14 y | 15 y | 16 y | 17 y | 18 y |
| HISTORY Initial/Interval | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| MEASUREMENTS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Length/Height and Weight | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Head Circumference | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | | | |
| Weight for Length | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | |
| Body Mass Index | | | | | | | | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Blood Pressure | | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| SENSORY SCREENING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vision | | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ● | ● | ● | ● | ★ | ● | ★ | ● | ★ | ● | ★ | ★ | ● | ★ | ★ | ★ |
| Hearing | | ● | ● | ← | → | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ● | ● | ● | ★ | ● | ★ | ● | ← | | ● | → | ← | ● | → | |
| DEVELOPMENTAL/BEHAVIORAL HEALTH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Developmental Screening | | | | | | | | ● | | | ● | | ● | | | | | | | | | | | | | | | | |
| Autism Spectrum Disorder Screening | | | | | | | | | | | ● | ● | | | | | | | | | | | | | | | | | |
| Developmental Surveillance | | ● | ● | ● | ● | ● | ● | | ● | ● | | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Psychosocial/Behavioral Assessment | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Tobacco, Alcohol, or Drug Use Assessment | | | | | | | | | | | | | | | | | | | | | | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ |
| Depression Screening | | | | | | | | | | | | | | | | | | | | | | | ● | ● | ● | ● | ● | ● | ● |
| Maternal Depression Screening | | | | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| PHYSICAL EXAMINATION | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| PROCEDURES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Newborn Blood | | ● | ● | ← | → | | | | | | | | | | | | | | | | | | | | | | | | |
| Newborn Bilirubin | | ● | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Critical Congenital Heart Defect | | ● | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Immunization | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Anemia | | | | | | ★ | | | ● | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ |
| Lead | | | | | | | ★ | ★ | ● ★ | | ★ | ● ★ | | ★ | ★ | ★ | ★ | | | | | | | | | | | | |
| Tuberculosis | | | | ★ | | | ★ | | ★ | | | ★ | | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ |
| Dyslipidemia | | | | | | | | | | | | ★ | | | ★ | | ★ | | ★ | ← | → | | ★ | ★ | ★ | ★ | ★ | | |
| Sexually Transmitted Infections | | | | | | | | | | | | | | | | | | | | | | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ |
| HIV | | | | | | | | | | | | | | | | | | | | | | ★ | ★ | ★ | ★ | ← | | → | |
| Cervical Dysplasia | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ORAL HEALTH | | | | | | | ● | ● | ★ | | ★ | ★ | ★ | ★ | ★ | ★ | ★ | | | | | | | | | | | | |
| Fluoride Varnish | | | | | | | ← | | | | ● | → | | | | | | | | | | | | | | | | | |
| Fluoride Supplementation | | | | | | | ★ | ★ | ★ | | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | | |
| ANTICIPATORY GUIDANCE | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

KEY: ● = to be performed ★ = risk assessment to be performed with appropriate action to follow, if positive ← ● → = range during which a service may be provided

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**Fig. 4.7** Preventive pediatric health care chart. (Adapted from American Academy of Pediatrics Committee on Practice and Ambulatory Medicine, Bright Futures Periodicity Schedule Workgroup. [2015]. *2015 Recommendations for pediatric preventive pediatric health care*. Retrieved from https://www.aap.org/en-us/professional-resources/practice-support/Periodicity/Periodicity%20Schedule_FINAL.pdf)

**Fig. 4.8** These children of identical age (8 years) are markedly different in size. The child on the left, of Asian descent, is at the 5th percentile for height and weight. The child on the right is above the 95th percentile for height and weight. However, both children demonstrate normal growth patterns.

## TRANSLATING EVIDENCE INTO PRACTICE

### *Linear Growth Measurement in Pediatrics*

#### Ask the Question

##### *PICOT Question*

In children, what are the best instruments and techniques to measure linear growth (length and height)?

#### Search for the Evidence

##### *Search Strategies*

Search selection criteria: English language, research-based and review articles and expert opinion from databases, anthropometric and endocrinology textbooks, contact with experts in the field, and informal discovery

Key terms: Length, height, stature, infant, child, adolescent, measurement, instrument, length board, stadiometer, calibration, technique, accuracy, reliability, diurnal variation

Exclusion criteria: Other types of anthropometric measurements, adults

##### *Databases Used*

MEDLINE, CINAHL, COCHRANE, EMBASE, OCLC, ERIC, National Guideline Clearinghouse (AHRQ)

#### Critical Appraisal of the Evidence

An interdisciplinary team systematically and critically appraised the evidence to develop these clinical practice recommendations using an evidence-based practice rating scheme (Foote, Brady, Burke, et al., 2009; Foote, Brady, Burke, et al., 2011; US Preventive Services Task Force, 1996).

Measure recumbent length in children younger than 24 to 36 months old and in children who cannot stand alone (Foote, 2014; Foote, Brady, Burke, et al., 2011) (see Fig. 4.9A).

- Use a length board with these components: Flat, horizontal surface with stationary headboard and smoothly movable footboard, both at 90-degree angles to the horizontal surface, and attached ruler marked in millimeter and/or 1/16-inch increments. Tape measures alone, which are inaccurate and unreliable, should never be used.
- Cover length board with clean, soft, thin cloth or paper.
- Remove all clothing and shoes. Remove or loosen diaper. Remove hair ornaments on crown of head.
- Two measurers are required to accomplish correct positioning; one measurer (assistant) can be a parent or other caregiver when procedures are explained and understood.
- Place child supine on length board. Never leave unattended.
- Assistant holds head in midline with crown of head against headboard, compressing the hair.
- Position head in the Frankfort vertical plane (imaginary line from the lower border of the orbit through the highest point of the auditory meatus; the line is parallel to the headboard and perpendicular to the length board).
- Lead measurer positions the body on length board with one hand placed on both legs to fully extend the body.
- Ensure that head remains against headboard, shoulders and hips are not rotated, back is not arched, and legs are not bent. Reposition as necessary.
- Using the other hand, lead measurer moves footboard against heels of both feet with toes pointing upward.
- Read measurement to the last completed millimeter or 1/16 inch.
- Reposition the child and repeat procedure. Measure at least twice (ideally three times). Average the measurements for the final value. Record immediately.

Measure height in children 24 to 36 months old and older who can stand alone well (Foote, 2014; Foote, Brady, Burke, et al., 2011) (see Fig. 4.9B).

- Use a stadiometer with these components: Vertical surface to stand against, footboard or firm surface to stand on, movable horizontal headboard at 90-degree angle to the vertical surface, and attached ruler marked in millimeter and/or 1/16-inch increments. Wall charts and flip-up horizontal bars (floppy-arm devices) mounted to weighing scales, which are inaccurate and unreliable, should never be used.
- Remove shoes and heavy outer clothing. Remove hair ornaments and undo hairstyles (e.g., braids or buns) on crown of head.
- Stand child on flat surface with back against vertical surface of stadiometer.
- Weight is evenly distributed on both feet with heels together.
- Occiput, scapulae, buttocks, and heels are in contact with vertical surface.
- Encourage child to maintain fully erect position with positional lordosis minimized, knees fully extended, and heels flat. Reposition as necessary.
- Child continues normal breathing with shoulders relaxed and arms hanging down freely.
- Position head in the horizontal Frankfort plane (imaginary line from the lower border of the orbit through the highest point of the auditory meatus; the line is parallel to the headboard and perpendicular to the vertical surface).
- Move headboard down to crown of head, compressing the hair.
- Read measurement at eye level (to avoid parallax error) to the last completed millimeter or 1/16 inch.
- Reposition the child and repeat procedure. Measure at least twice (ideally three times). Average the measurements for the final value. Record immediately.

Special considerations (Foote, 2014; Foote, Brady, Burke, et al., 2009; Lohman, Roche, & Martorell, 1988).

- Some children, such as those who are obese, may not be able to place their occiput, scapulae, buttocks, and heels all in one vertical plane while maintaining their balance, so use at least two of the four contact points.
- If a child has a leg length discrepancy, place a block or wedge of suitable height under the shortest leg until the pelvis is level and both knees are fully extended before measuring height. To measure length, keep the legs together and measure to the heel of the longest leg.
- Children with special health care needs may require alternative measurements, such as arm span, crown-to-rump length, sitting height, knee height, or other segmental lengths. In general, when recumbent length is measured in a child with spasticity or contractures, measure the side of the body that is unaffected or less affected.
- Always document the presence of any condition that may interfere with an accurate and reliable measurement.

Quality control measures (Foote, 2014; Foote, Brady, Burke, et al., 2009; Foote, Brady, Burke, et al., 2011; Foote, Kirouac, & Lipman, 2015).

- Personnel who measure the growth of infants, children, and adolescents need proper education. Competency should be demonstrated. Refresher sessions should occur when a lack of standardization occurs.
- Length boards and stadiometers must be assembled and installed properly and calibrated at regular intervals (ideally daily, at least monthly, and every time they are moved) due to frequent inaccuracy and the variability between different instruments. Calibration can be performed by measuring a rod of known length and adjusting the instrument accordingly.
- All children should be measured at least twice (ideally three times) during each encounter. The measurements should agree within 0.5 cm (ideally 0.3 cm). Use the mean value. If the variation exceeds the limit of agreement, measure again and use the mean of the measures in closest agreement. If none of the measures are within the limit of agreement, then (1) have another measurer assist, (2) check technique, and (3) consider another education session.
- Children between 24 and 36 months of age may have length and/or height measured. Standing height is less than recumbent length due to gravity and compression of the spine. Plot length measurements on a length curve and height measurements on a height curve to avoid misinterpreting the growth pattern.

## TRANSLATING EVIDENCE INTO PRACTICE—cont'd

***Linear Growth Measurement in Pediatrics***

### Apply the Evidence: Nursing Implications

Growth is well established as an important and sensitive indicator of health in children. Abnormal growth is a common consequence of many conditions; therefore its measurement can be a useful warning of possible pathology. In a study of 55 primary care practices within 8 geographic areas in the United States, only 30% of children were measured accurately due to faulty instruments and casual techniques; an educational intervention increased measurement accuracy to 70% (Lipman, Hench, Benyi, et al., 2004). Measurement error influences growth assessment and can result in delayed evaluation and treatment of some children, as well as apparent growth deviation in others who are growing normally (Foote, 2014; Foote, Kirouac, & Lipman, 2015). There is good evidence with strong recommendations for using length boards and stadiometers, the described measurement techniques, and the quality control measures. There is fair evidence to recommend procedures for children with special needs (Foote, Brady, Burke, et al., 2009; Lohman, Roche, & Martorell, 1988).

### Quality and Safety Competencies: Evidence-Based Practice[a]

#### *Knowledge*

Differentiate clinical opinion from research and evidence-based summaries.

Describe the appropriate instruments and techniques to obtain accurate and reliable linear growth measurements of children.

#### *Skills*

Base individualized care plan on patient values, clinical expertise, and evidence.

Integrate evidence into practice by using the instruments and techniques for linear growth measurement in clinical care.

#### *Attitudes*

Value the concept of evidence-based practice as integral to determining best clinical practice.

Appreciate strengths and weaknesses of evidence for measuring the linear growth of children.

### References


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[a] Adapted from the Quality and Safety Education for Nurses Institute.

## Height

The term **height** (or **stature**) refers to the measurement taken when a child is standing upright. Wall charts and flip-up horizontal bars (floppy-arm devices) mounted to weighing scales should not be used to measure the height of children (Foote, 2014; Foote, Brady, Burke, et al., 2011). These devices are not steady and do not maintain a right angle to the vertical ruler, preventing an accurate and reliable height. Measure height by having the child, with the 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 (see discussion of the *Frankfort plane* in the Translating Evidence into Practice box). Be certain the child's back is to the wall or other vertical flat surface, with the occiput, scapulae, buttocks, and heels touching the vertical surface and the medial malleoli touching if possible (see Fig. 4.9B). Check for and correct slumping of the shoulders, positional lordosis, bending of the knees, or raising of the heels.

### ! NURSING ALERT

Normally, height is less if measured in the afternoon than in the morning due to diurnal variation (related to gravity and compression of the spine). The time of day when measurements are taken should be recorded (Foote, Brady, Burke, et al., 2009). For children in whom there are concerns about growth, serial measurements should be taken at the same time of day, when possible, to establish an accurate growth velocity.

For the most accurate measurement, use a wall-mounted unit (**stadiometer**; see Fig. 4.9B). To improvise a flat, vertical surface for measuring height, attach a paper or metal tape or yardstick to the wall, position the child adjacent to the tape, and place a 3D object, such as a thick book or empty box, on top of the head. Rest the side of the object firmly against the wall to form a right angle. Measure height to the last completed millimeter or 1/16 inch. Measure more than once and record the average height.

## Weight

Weight is measured with an appropriately sized electronic or balance beam scale, which measures weight to the nearest 10 g (0.35 oz) for infants and 100 g (0.22 pound) for children. Before weighing the child, balance the scale by setting it at 0 and noting if the balance registers at exactly 0 or in the middle of the mark. If the end of the balance beam rises to the top or bottom of the mark, more or less weight, respectively, is needed. Some scales are designed to self-correct, but others need to be recalibrated according to the manufacturer instructions. Scales vary in their accuracy; infant scales tend to be more accurate than adult platform scales, and newer scales tend to be more accurate than older ones, especially at the upper levels of weight measurement. Weighing more than once and recording the average weight is preferred. Another option is for two nurses to take the weight independently; if there is a discrepancy, take a third reading and use the mean of the measurements in closest agreement.

Take measurements in a comfortably warm room. When the 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 underwear, a gown, or light clothing, depending on the setting. However, always respect the privacy of children. If the child must be weighed wearing some type of special device, such as a prosthesis or an armboard for an intravenous device, note this when recording the weight. Children who are measured for recumbent length are usually weighed on an infant scale and placed in a lying or sitting position. Children should be weighed while lying, sitting, or standing in the center of the scale bed. When weighing a young child, place your hand slightly above the infant or young child to prevent him or her from accidentally falling off the scale (Fig. 4.10A) or stand close

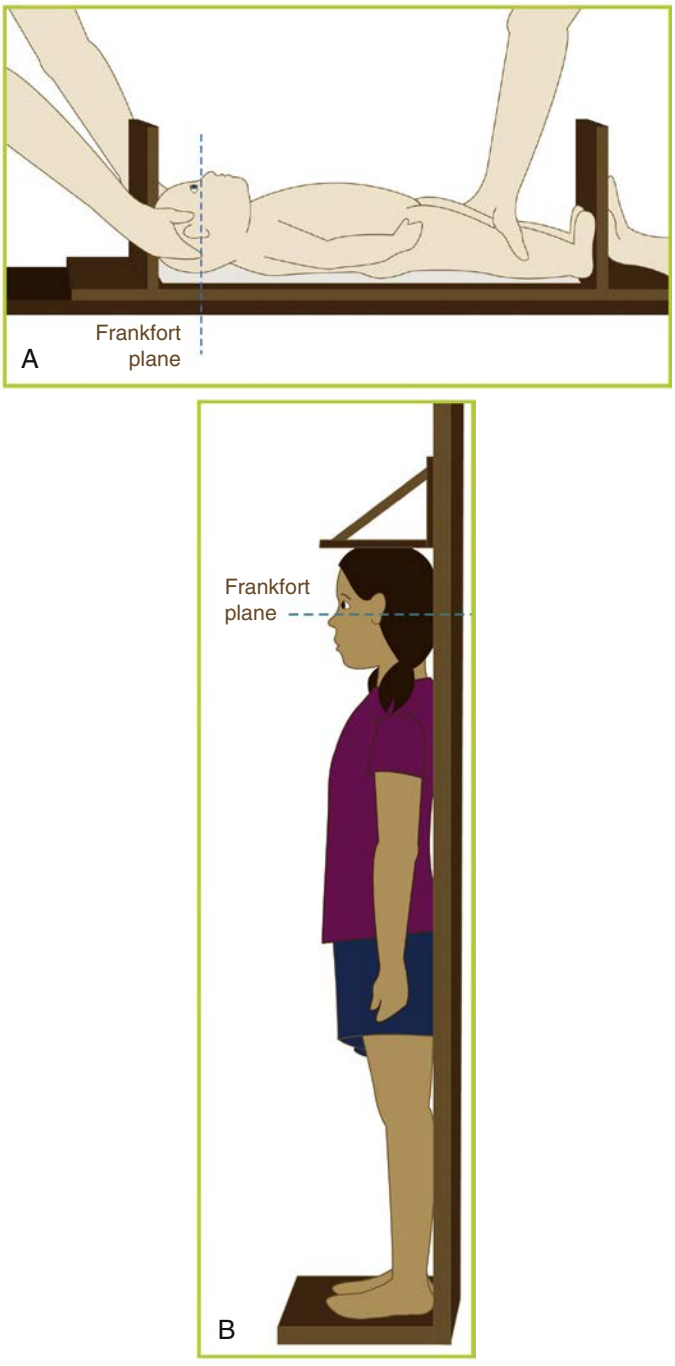


**Fig. 4.9** Measurement of linear growth. **A,** Infant. **B,** Child. (Courtesy Jan M. Foote, Blank Children's Hospital, Des Moines, IA.)

to the toddler, ready to prevent a fall (see Fig. 4.10B). For maximum asepsis, cover the scale with a clean sheet of paper between each child's weight measurement.

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

$$\text{BMI} = \text{Weight in kilograms} \div [\text{Height in meters}]^2$$

Or

$$\text{BMI} = [\text{Weight in pounds} \div (\text{Height in inches} \times \text{Height in inches})] \times 703$$


**Fig. 4.10** **A,** Infant on scale. **B,** Toddler on scale. Note the presence of the nurse to prevent falls. (**B,** Courtesy Paul Vincent Kuntz, Texas Children's Hospital, Houston, TX.)

With the increasing number of overweight and obese children in the United States, the BMI charts are a critical component of children's physical assessment.

**! NURSING ALERT**

BMI for sex and age may be used to identify children and adolescents who are either underweight (<5th percentile), healthy weight (5th percentile to <85th percentile), overweight (≥85th percentile and <95th percentile), or obese (≥95th percentile). Weight per length may be used to identify concerns in infants and other young children whose length (rather than height) is measured.

## Skinfold Thickness and Arm Circumference

Measures of relative weight and stature cannot distinguish between adipose (fat) tissue and muscle. One convenient measure of body fat is **skinfold thickness**, which is increasingly recommended as a routine measurement. Measure skinfold thickness with special calipers, such as the Lange calipers. The most common sites for measuring skinfold thickness are the triceps (most practical for routine clinical use), subscapular, suprailiac, abdomen, and upper thigh. For greatest reliability, follow the exact procedure for measurement and record the average of at least two measurements of one site.

**Fig. 4.11** Measurement of head circumference. (From Seidel, H. M., Ball, J. W., Dains, J. E., et al. [1999]. *Mosby's guide to physical examination* [4th ed.]. St Louis, MO: Mosby.)

**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. Place the tape vertically along the posterior aspect of the upper arm from the acromial process and to the olecranon process; half of the measured length is the midpoint used to measure the arm circumference. World Health Organization growth curves are available for triceps skinfold and arm circumference measurements.

### Head Circumference

Head circumference reflects brain growth. Measure head circumference in children up to 36 months old and in any child whose head size is questionable. Measure the head at its greatest frontooccipital circumference, usually slightly above the eyebrows and pinna of the ears and around the occipital prominence at the back of the skull (Fig. 4.11). Use a paper or nonstretchable tape, or insert-a-tape, marked in millimeter or 1/16-inch increments because a cloth tape can stretch and give a falsely small measurement. Because head shape can affect the location of the maximum circumference and movement of the infant or child can interfere with the measurement, more than one measurement is necessary to obtain the most accurate measure. Measure head circumference to the last completed millimeter or 1/16-inch.

Plot the head size on the appropriate growth chart under head circumference. Generally, head circumference is larger than chest circumference in most newborns. The head and chest circumferences approximate each other around 12 months of age. Later in childhood, chest circumference exceeds head size by about 5 to 7 cm (2 to 2.75 inches). For newborns, see Chapter 7, Physical Assessment.

## 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. In addition, compare the values taken on preceding health visits with present recordings. For example, a falsely elevated blood pressure (BP) reading may not indicate hypertension if previous recent readings have been within normal limits. The isolated recording may indicate some stressful event in the child's life.

As in most procedures carried out with children, treat older children and adolescents much the same as adults. However, give special consideration to preschool children (see Atraumatic Care box). For best results in taking vital signs of infants, count respirations first (before the infant is disturbed), take the pulse next, and then measure temperature. If vital signs cannot be taken without disturbing the child, record the child's behavior (e.g., crying) along with the measurement.

### ATRAUMATIC CARE

***Reducing Young Children's Fears***

Young children, especially preschoolers, fear intrusive procedures because of their poorly defined body boundaries. Therefore avoid invasive procedures, such as measuring rectal temperature, whenever possible. Also avoid using the word "take" when measuring vital signs, because young children interpret words literally and may think that their temperature or other function will be taken away. Instead, say, "I want to know how warm you are."

### BOX 4.9 Recommended Temperature Screening Routes in Infants and Children

**Birth to 2 Years Old**
Axillary
Rectal—if definitive temperature reading is needed for infants older than 1 month of age

**2 to 5 Years Old**
Axillary
Tympanic
Oral—when child can hold thermometer under tongue
Rectal—if definitive temperature reading is needed

**Older Than 5 Years Old**
Oral
Axillary
Tympanic
Temporal artery

### Temperature

Temperature is the measure of heat content within an individual's body. The **core temperature** most closely reflects the temperature of the blood flow through the carotid arteries to the hypothalamus. Core temperature is relatively constant despite wide fluctuations in the external environment. When a child's temperature is altered, receptors in the skin, spinal cord, and brain respond in an attempt to achieve **normothermia**, a normal temperature state. In pediatrics, there is a lack of consensus regarding what temperature constitutes normothermia for every child. For rectal temperatures in children, 37°C to 37.5°C (98.6°F to 99.5°F) is an acceptable range, where heat loss and heat production are balanced. For neonates, a core body temperature between 36.5°C and 37.6°C (97.7°F and 99.7° F) is a desirable range. In the neonate, obtain temperature measurements for monitoring adequacy of thermoregulation, not just for fever; therefore temperature measurements in each infant should be carefully considered in the context of the purpose and the environment.

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 (Box 4.9). For the ill child, other sites for temperature measurement have been investigated. Skin temperature sensors are most often used for neonates and infants placed in radiant heat warmers or incubators. The pulmonary artery is the closest to the hypothalamus and best reflects the core temperature (Batra, Saha, & Faridi, 2012). Other sites used are the distal esophagus, urinary bladder, and nasopharynx (Box 4.10). All of these methods are invasive and difficult to use in clinical practice.

Temperature measured by rectal thermometry is considered closest to core temperature, but it has some drawbacks. Tympanic membrane thermometry for children older than 2 years of age and temporal artery thermometry in all age-groups are taking precedence over

## BOX 4.10 Alternative Temperature Measurement Sites for Ill Children

### Skin
A probe is placed on the skin to determine heat output in response to changes in the patient's skin temperature.
Skin temperature sensors are most often used for neonates and infants placed in radiant heat warmers or isolettes (using servo control feature of the apparatus). In turn, the heater unit warms to a set point to maintain the infant's temperature within a specified range.
ThermoSpot is an example of a device allowing continuous thermal monitoring in neonates.

### Urinary Bladder
A thermistor or thermocouple is placed within the indwelling bladder catheter. The catheter tip immersed in the bladder provides a continuous temperature read-out on the bedside monitor.
This is not a true measure of core temperature but responds better than rectal and skin temperatures to core body changes.
Because of thermistor sizes, this method is unusable with neonates and small infants.

### Pulmonary Artery
A catheter is placed into the heart to obtain a reading in the pulmonary artery.
It is used in critical care settings or operating rooms only in patients requiring aggressive monitoring.
Catheters are not available in sizes for neonates or small infants.

### Esophageal Site
A probe is inserted into the lower third of the esophagus at the level of the heart.
This is used in critical care settings or operating rooms.
Several companies have esophageal stethoscopes with temperature probe monitors for patients in the operating room that show a continuous temperature reading.

### Nasopharyngeal Site
A probe is inserted into the nasopharynx, posterior to the soft palate, and provides an estimate of hypothalamic temperature.
This is used in critical care settings or operating rooms.

Data from Kumar, P. R., Nisarga, R., & Gowda, B. (2004). Temperature monitoring in newborns using ThermoSpot. *Indian Journal of Pediatrics, 71*(9), 795–796; Martin, S. A., & Kline, A. M. (2004). Can there be a standard for temperature measurement in the pediatric intensive care unit? *AACN Clinical Issues, 15*(2), 254–266; Maxton, F. J. C., Justin, L., & Gilles, D. (2004). Estimating core temperature in infants and children after cardiac surgery: A comparison of six methods. *Journal of Advanced Nursing, 45*(2), 214–222.

other methods (Batra & Goyal, 2013; Batra, Saha, & Faridi, 2012). One of the most important influences on the accuracy of temperature is improper temperature-taking technique. Detailed discussion of temperature-taking methods and visual examples of proper techniques are given in Table 4.3. For a critical review of the evidence on temperature-taking methods, see the Translating Evidence into Practice box.

## TRANSLATING EVIDENCE INTO PRACTICE

### *Temperature Measurement in Pediatrics*

#### Ask the Question
##### *PICOT Question*
In infants and children, what is the most accurate method for measuring temperature in febrile children?

#### Search for the Evidence
##### *Search Strategies*
Clinical research studies related to this issue were identified by searching for English publications with preference for studies in the past 15 years for infant and child populations; comparisons with gold standard: rectal thermometry.

##### *Databases Used*
PubMed, Cochrane Collaboration, MD Consult, Joanna Briggs Institute, National Guideline Clearinghouse (AHRQ), TRIP Database Plus, PedsCCM, BestBETs

#### Critical Appraisal of the Evidence
- **Rectal temperature:** Rectal measurement remains the clinical gold standard for the precise diagnosis of fever in infants and children compared with other methods (Fortuna, Carney, Macy, et al., 2010; Holzhauer, Reith, Sawin, et al., 2009). However, this procedure is more invasive and is contraindicated for infants younger than 1 month old due to risk of rectal perforation (Batra, Saha, & Faridi, 2012). Children with neutropenia, recent rectal surgery, diarrhea, or anorectal lesions or those who are receiving chemotherapy (cancer treatment usually affects the mucosa and causes neutropenia) should not undergo rectal thermometry.
- **Oral temperature (OT):** OT indicates rapid changes in core body temperature, but accuracy may be an issue compared with the rectal site (Batra, Saha, & Faridi, 2012). OTs are considered the standard for temperature measurement, but they are contraindicated in children who have an altered level of consciousness, are receiving oxygen, are mouth breathing, are experiencing mucositis, had recent oral surgery or trauma, or are younger than 5 years old (El-Radhi & Barry, 2006). Limitations of OTs include the effects of ambient room temperature and recent oral intake (Martin & Kline, 2004).
- **Axillary temperature:** This is inconsistent and insensitive in infants and children older than 1 month of age (Falzon, Grech, Caruana, et al., 2003; Stine, Flook, & Vincze, 2012). A systematic review of 20 studies concluded that axillary thermometers showed variation in findings and are not a good method for accurate temperature assessment (Craig, Lancaster, Williamson, et al., 2000). In neonates with fever, the axillary temperature should not be used interchangeably with rectal measurement (Hissink Muller, van Berkel, & de Beaufort, 2008). It can be used as a screening tool for fever in young infants (Batra, Saha, & Faridi, 2012).
- **Ear (aural) temperature:** A meta-analysis of 101 studies comparing tympanic membrane temperatures with rectal temperatures in children concluded that the tympanic method demonstrated a wide range of variability (Craig, Lancaster, Taylor, et al., 2002). Other published reviews found poor sensitivity using infrared ear thermometry (Devrim, Kara, Ceyhan, et al., 2007; Dodd, Lancaster, Craig, et al., 2006). Diagnosis of fever without a focus should not be made based on tympanic thermometry (Batra, Saha, & Faridi, 2012; Devrim, Kara, Ceyhan, et al., 2007; Dodd, Lancaster, Craig, et al., 2006). However, a recent systematic review and meta-analysis of 31 studies found the accuracy of tympanic thermometry in diagnosing fever was high and cautiously recommended its use (Zhen, Xia, Ya Jun, et al., 2015).
- **Temporal artery temperature (TAT):** TAT is not predictable for fever in young children but can be used as a screening tool for detecting fever lower than 38°C (100.4°F) in children 3 months to 4 years old (Al-Mukhaizeem, Allen, Komar,

## TRANSLATING EVIDENCE INTO PRACTICE—cont'd

### *Temperature Measurement in Pediatrics*

et al., 2004; Callanan, 2003; Forrest, Juliano, Conley, et al., 2017; Fortuna, Carney, Macy, et al., 2010; Hebbar, Fortenberry, Rogers, et al., 2005; Hoffman, Etwaru, Dreisinger, et al., 2013; Holzhauer, Reith, Sawin, et al., 2009; Hudson Moore, Dagenhart Carrigan, Solomon, et al., 2015; Odinaka, Edelu, Nwolisa, et al., 2014; Schuh, Komar, Stephens, et al., 2004; Titus, Hulsey, Heckman, et al., 2009). However, a study by Batra and Goyal (2013) found that TAT correlated better with rectal temperature than axillary and tympanic measures in a group of 50 afebrile children between the ages of 2 and 12 years.

#### Apply the Evidence: Nursing Implications

- No single site used for temperature assessment provides unequivocal estimates of core body temperature.
- Studies show that the axillary and tympanic measures demonstrate poor agreement when these modes are compared with more accurate core temperature methods. The differences are more evident as temperature increases, regardless of age.
- TAT is not predictable for fever and should be used only as a screening tool in young children.
- When an accurate method for obtaining a correct reflection of core temperature is needed, the rectal temperature is recommended in younger children, and the oral route is recommended in older children.

For infants younger than 1 month of age, axillary temperatures are recommended for screening.

#### Quality and Safety Competencies: Evidence-Based Practice[a]

##### *Knowledge*

Differentiate clinical opinion from research and evidence-based summaries.

Demonstrate understanding of thermometry selection based on the developmental age of the child.

##### *Skills*

Base individualized care plan on patient values, clinical expertise, and evidence.

Integrate evidence into practice by using the correct type of thermometry to screen for fever compared with measures used for accurate determination of the degree of fever.

##### *Attitudes*

Value the concept of evidence-based practice as integral to determining best clinical practice.

Recognize strengths and weaknesses of evidence for the most accurate method for measuring temperature and fever in infants and children.

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[a] Adapted from the Quality and Safety Education for Nurses Institute.

## TABLE 4.3 Temperature Measurement Locations for Infants and Children

| Temperature Site | |
|---|---|
| **Oral** | |
| Place tip under tongue in right or left posterior sublingual pocket, not in front of tongue. Have child keep mouth closed without biting on thermometer.<br>Pacifier thermometers measure intraoral or supralingual temperature and are available but lack support in the literature.<br>Several factors affect mouth temperature: Eating and mastication, hot or cold beverages, mouth breathing, and ambient temperature. |  |

*Continued*

## TABLE 4.3 Temperature Measurement Locations for Infants and Children—cont'd

| Temperature Site | |
|---|---|
| **Axillary**<br>Place tip under arm in center of axilla and keep close to skin, not clothing. Hold child's arm firmly against side. Temperature may be affected by poor peripheral perfusion (results in lower value), clothing or swaddling, use of radiant warmer, or amount of brown fat in cold-stressed neonate (results in higher value).<br>Advantages: Avoids intrusive procedure and eliminates risk of rectal perforation. |  |
| **Ear Based (Aural)**<br>Insert small infrared probe deeply into ear canal to allow sensor to obtain measurement from tympanic membrane.<br>Size of probe (most are 8 mm) may influence accuracy of result. In young children this may be a problem because of small diameter of ear canal.<br>Proper placement of ear is controversial related to whether the pinna should be pulled in manner similar to that used during otoscopy. |  |
| **Rectal**<br>Place well-lubricated tip at maximum 2.5 cm (1 inch) into rectum for children and 1.5 cm (0.6 inch) for infants; securely hold thermometer close to anus.<br>Child may be placed in side-lying, supine, or prone position (i.e., supine with knees flexed toward abdomen); cover penis because procedure may stimulate urination. A small child may be placed prone across parent's lap. |  |
| **Temporal Artery**<br>An infrared sensor probe scans across forehead, capturing heat from arterial blood flow.<br>Temporal artery is only artery close enough to skin's surface to provide access for accurate temperature measurement. |  |

Data from Martin, S. A., & Kline, A. M. (2004). Can there be a standard for temperature measurement in the pediatric intensive care unit? *AACN Clinical Issues, 15*(2), 254–266; Falzon, A., Grech, V., Caruana, B., et al. (2003). How reliable is axillary temperature measurement? *Acta Paediatrica, 92*(3), 309–313. Oral, axillary, rectal, and temporal artery images courtesy Paul Vincent Kuntz, Texas Children's Hospital, Houston, TX.

## BOX 4.11 Types of Thermometers Used to Measure Temperature in Infants and Children

### Electronic Thermometer

Temperature is sensed with an electronic component called thermistor mounted at the tip of a plastic and stainless steel probe, which is connected to an electronic recorder. A disposable plastic cover is used for infection control.
Temperature measurement appears on digital display within 60 seconds.
The probe can be placed in the mouth, axilla, or rectum.

### Infrared Thermometer

Thermal radiation is measured from the axilla, ear canal, or tympanic membrane.
Temperature measurement appears on the digital display in approximately 1 second.
Three types are available for ear-based use: tympanic, ear canal, and arterial heat balance via the ear canal (AHBE).
Often these devices are all inappropriately referred to as *tympanic thermometers*.
Temperatures measured in this way reflect arterial (bloodstream) temperature.

### Ear-Based Temperature Sensor

Although this is frequently used in pediatric settings (especially ambulatory clinics), debate on the reliability of ear-based thermometry in screening febrile children continues.
Most models use "offsets" for internal calculations that transform ear temperature into supposedly equivalent oral or rectal temperatures.

### Ear Sensor (LighTouch LTX)

This measures the infrared heat energy radiating from ear canal opening, scans ear canal for highest temperature reading, and then calculates arterial temperature (correlates highly with core or internal body temperature).
It is available in two sizes; the smaller size of LighTouch Pedi-Q is for infants and toddlers.

### Axillary Sensor (LighTouch LTN)

This measures the infrared heat energy radiating from the axilla.
It can be used on wet skin; in incubators; or under radiant heaters, warming pads, or other heat sources.

### Digital Thermometer

A probe is connected to a microprocessor chip, which translates signals into degrees and sends temperature measurement to digital display.
It is used like an oral electronic thermometer and can be used for measuring oral, rectal, and axillary temperature.
It is more accurate and easier to read but somewhat more expensive than a plastic strip thermometer.

### Liquid Crystal Skin Contact Thermometer (Chemical Dot Thermometer)

This single-use, disposable, flexible thermometer has a specific chemical mixture in each circle that changes color to measure temperature increments of $^{2}/_{10}$ degree.
There are two types:

1. Kept in mouth (1 minute), axilla (3 minutes), or rectum (3 minutes); color change is read 10 to 15 seconds after removing the thermometer
2. Wearable, continuous-use thermometer, which is placed under axilla; may be read within 2 to 3 minutes after placement and continuously thereafter; discard and replace every 48 hours

The most frequently used temperature measurement devices in infants and children include the following:

**Electronic intermittent thermometers** measure the patient's temperature at oral, rectal, and axillary sites and are used as primary diagnostic indicators

**Infrared thermometers** measure the patient's temperature by collecting emitted thermal radiation from a particular site (e.g., ear canal [tympanic membrane])

**Electronic continuous thermometers** measure the patient's temperature during the administration of general anesthesia, treatment of hypothermia or hyperthermia, and other situations that require continuous monitoring

Box 4.11 provides a detailed description of these devices.

**! NURSING ALERT**

The belief that oral temperature can be estimated by adding 1°C to the temperature taken in the axilla is incorrect. Axillary temperature is lower than oral temperature, but the difference varies too widely for a standard conversion. Do not add a degree to the finding obtained by taking a temperature by the axillary route.

## Pulse

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 (see Fig. 4.33 for location of pulses). Count the pulse for 1 full minute in infants and young children because of possible irregularities in rhythm. However, when frequent apical rates are necessary, use shorter counting times (e.g., 15- or 30-second intervals). For greater accuracy, measure the apical rate while the child is asleep; record the child's behavior along with the rate. Grade pulses according to the criteria in Table 4.4. Compare radial and femoral pulses at least once during infancy to detect the presence of circulatory impairment, such as coarctation of the aorta.

**TABLE 4.4 Grading of Pulses**

| Grade | Description |
|---|---|
| 0 | Not palpable |
| +1 | Difficult to palpate, thready, weak, easily obliterated with pressure |
| +2 | Difficult to palpate, may be obliterated with pressure |
| +3 | Easy to palpate, not easily obliterated with pressure (normal) |
| +4 | Strong, bounding, not obliterated with pressure |

## Respiration

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 (see also the Chest section later in this chapter).

## Blood Pressure

BP should be measured annually in children 3 years old through adolescence and in children with underlying renal, adrenal, or cardiovascular disease; children with risk factors for hypertension; children in emergency departments and intensive care units; and high-risk infants (National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents, 2004).

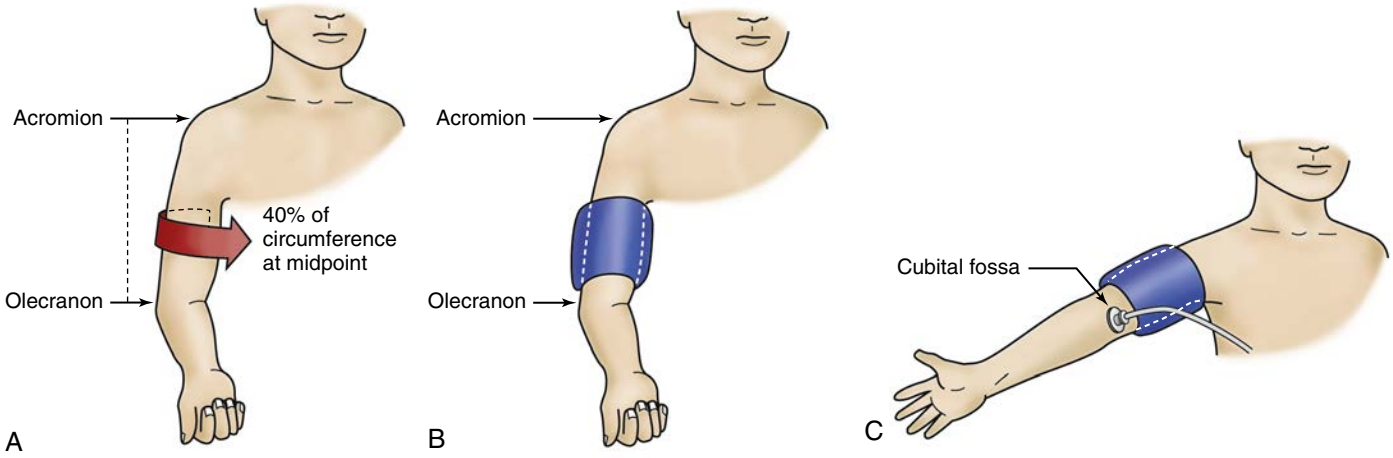


**Fig. 4.12** Determination of proper cuff size. **A,** Cuff bladder width should be approximately 40% of circumference of arm measured at a point midway between olecranon and acromion. **B,** Cuff bladder length should cover 80% to 100% of arm circumference. **C,** Blood pressure (BP) should be measured with the cubital fossa at the heart level. The arm should be supported. The stethoscope bell is placed over the brachial artery pulse proximal and medial to the cubital fossa and below the bottom edge of the cuff. (From National Institutes of Health, National Heart, Lung, and Blood Institute. [1996]. *Update on the Task Force Report [1987] on high blood pressure in children and adolescents: A working group report from the National High Blood Pressure Education Program.* NIH Pub No 96-3790. Bethesda, MD: Author.)

Auscultation remains the gold standard method of BP measurement in children under most circumstances. Use of the automated devices is acceptable for BP measurement in newborns and young infants, in whom auscultation is difficult, and in the intensive care setting where frequent BP measurement is needed.

Oscillometric devices measure mean arterial BP and then calculate systolic and diastolic values. The algorithms used by companies are proprietary and differ from company to company and device to device. These devices can yield results that vary widely when one is compared with another, and they do not always closely match BP values obtained by auscultation. An elevated BP reading obtained with an automated or oscillometric device should be repeated using auscultation.

BP readings using oscillometry, such as Dinamap, are generally higher (10 mm Hg higher) than measurements using auscultation (Park, Menard, & Schoolfield, 2005). Differences between Dinamap and auscultatory readings prevent the interchange of the readings by the two methods.

## Selection of Cuff

No matter what type of noninvasive technique is used, the most important factor in accurately measuring BP is the use of an appropriately sized cuff (**cuff size** refers only to the inner inflatable bladder, not the cloth covering). A technique to establish an appropriate cuff size is to choose a cuff with a bladder width that is at least 40% of the arm circumference midway between the olecranon and the acromion. This will usually be a cuff bladder that covers 80% to 100% of the circumference of the arm (Fig. 4.12). Cuffs that are either too narrow or too wide affect the accuracy of BP measurements. If the cuff size is too small, the reading on the device is falsely high. If the cuff size is too large, the reading is falsely low.

Using limb circumference for selecting cuff width more accurately reflects direct arterial blood pressure (BP) than using limb length because this method considers variations in arm thickness and the amount of pressure required to compress the artery. For measurement on sites other than the upper arms, use the limb circumference, although the shape of the limb (e.g., conical shape of the thigh) may prevent appropriate placement of the cuff and inaccurately reflect intra-arterial BP (Table 4.5).

When using a site other than the arm, BP measurements using noninvasive techniques may differ. Generally, systolic BP in the lower extremities (thigh or calf) is greater than pressure in the upper extremities, and systolic BP in the calf is higher than that in the thigh (Schell, Briening, Lebet, et al., 2011) (Fig. 4.13).

**TABLE 4.5 Recommended Dimensions for Blood Pressure Cuff Bladders**

| Age | Width (cm) | Length (cm) | Maximum Arm Circumference (cm)[a] |
|---|---|---|---|
| Newborn | 4 | 8 | 10 |
| Infant | 6 | 12 | 15 |
| Child | 9 | 18 | 22 |
| Small adult | 10 | 24 | 26 |
| Adult | 13 | 30 | 34 |
| Large adult | 16 | 38 | 44 |
| Thigh | 20 | 42 | 52 |

[a]Calculated so that largest arm would still allow bladder to encircle arm by at least 80%.

From National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. (2004). The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. *Pediatrics, 114*(Suppl. 2, 4th report), 555–576.

**! NURSING ALERT**

When taking blood pressure (BP), use an appropriately sized cuff. When the correct size is not available, use an oversized cuff rather than an undersized one or use another site that more appropriately fits the cuff size. Do not choose a cuff based on the name of the cuff (e.g., an "infant" cuff may be too small for some infants).

## NURSING ALERT

Compare BP in the upper and lower extremities to detect abnormalities, such as coarctation of the aorta, in which the lower extremity pressure is less than the upper extremity pressure.

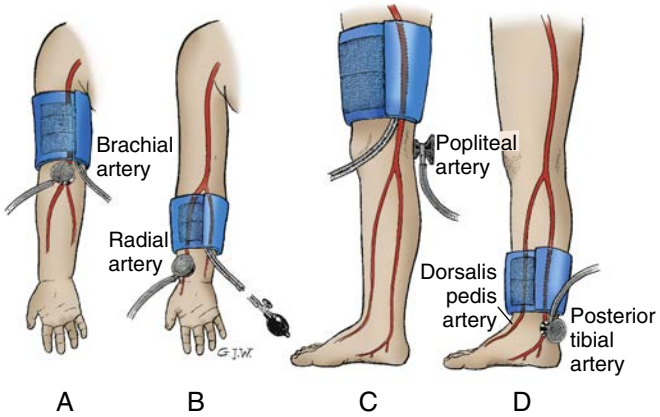


**Fig. 4.13** Sites for measuring blood pressure. **A,** Upper arm. **B,** Lower arm or forearm. **C,** Thigh. **D,** Calf or ankle.

### Measurement and Interpretation

Measuring and interpreting BP in infants and children requires attention to correct procedure because (1) limb sizes vary and cuff selection must accommodate the circumference; (2) excessive pressure on the antecubital fossa affects the Korotkoff sounds; (3) children easily become anxious, which can elevate BP; and (4) BP values change with age and growth. In children and adolescents, determine the normal range of BP. BP standards that are based on gender, age, and height provide a more precise classification of BP according to body size. This approach avoids misclassifying children who are very tall or very short. The BP tables (http://www.nhlbi.nih.gov/files/docs/guidelines/child_tbl.pdf) include the 50th, 90th, 95th, and 99th percentiles (with standard deviations) by gender, age, and height.

To use the tables in a clinical setting, determine the height percentile by using the Centers for Disease Control and Prevention growth charts (http://www.cdc.gov/growthcharts). The child's measured systolic BP and diastolic BP are compared with the numbers provided in the table (boys or girls) according to the child's age and height percentile. The child is **normotensive** if the BP is below the 90th percentile. If the BP is at or above the 90th percentile, repeat the BP measurement to verify an elevated BP. BP measurements between the 90th and 95th percentiles indicate prehypertension and necessitate reassessment and consideration of other risk factors. In addition, if an adolescent's BP is more than 120/80 mm Hg, consider the patient prehypertensive, even if this value is below the 90th percentile. This BP level typically occurs for systolic BP at 12 years old and for diastolic BP at 16 years old. If the child's BP (systolic or diastolic) is at or above the 95th percentile, the child may be hypertensive, and the measurement must be repeated on at least two occasions to confirm diagnosis (National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents, 2004) (see Nursing Care Guidelines box).

## NURSING CARE GUIDELINES

### *Using the Blood Pressure Tables*

1. Use the standard height charts to determine the height percentile.
2. Measure and record the child's systolic BP and diastolic BP.
3. Use the correct gender table for systolic BP and diastolic BP.
4. Find the child's age on the left side of the table. Follow the age row horizontally 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 systolic BP in the left columns and for diastolic BP in the right columns.
   - BP less than 90th percentile is normal.
   - BP between the 90th and 95th percentiles is prehypertension. In adolescents, 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, and an average systolic BP and diastolic BP 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.

*BP,* Blood pressure.

From National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents (2004). The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. *Pediatrics, 114*(Suppl. 2, 4th report), 555–576.

### Orthostatic Hypotension

**Orthostatic hypotension (OH)**, also called *postural hypotension* or *orthostatic intolerance,* often manifests as **syncope** (fainting), **vertigo** (dizziness), or lightheadedness and is caused by decreased blood flow to the brain (**cerebral hypoperfusion**). Normally blood flow to the brain is maintained at a constant level by compensating mechanisms that regulate systemic BP. When one assumes a sitting or standing position from a supine or recumbent position, peripheral capillary vasoconstriction occurs, and blood that was pooling in the lower vasculature is returned to the heart for redistribution to the head and remainder of the body. When this mechanism fails or is slow to respond, the person may experience vertigo or syncope. One of the most common causes of OH is hypovolemia, which may be induced by medications such as diuretics, vasodilator medications, and prolonged immobility or bed rest. Other causes of OH include dehydration, diarrhea, emesis, fluid loss from sweating and exertion, alcohol intake, dysrhythmias, diabetes mellitus, sepsis, and hemorrhage.

BP measurements taken with the child first supine and then standing (at least 2 minutes in each position) may demonstrate variability and assist in the diagnosis of OH. The child with a sustained drop in systolic BP of more than 20 mm Hg or in diastolic BP of more than 10 mm Hg after standing for 2 minutes without an increase in heart rate of more than 15 beats/min most likely has an autonomic deficit. Nonneurogenic causes of OH have a compensatory increase in pulse of more than 15 beats/min, as well as a drop in BP, as noted previously. For children and adolescents with vertigo, lightheadedness, nausea, syncope, diaphoresis, and pallor, it is important to monitor BP and heart rate to determine the original cause. BP is an important diagnostic measurement in children and adolescents and must be a part of the routine monitoring of vital signs.

**! NURSING ALERT**

Published norms for blood pressure (BP) are valid only if you use the same method of measurement (auscultation and cuff size determination) in clinical practice.

## 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. Although the nurse records general appearance at the beginning of the physical examination, it encompasses all the observations of the child during the interview and physical assessment.

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; feel frightened, discontented, or unhappy; are mentally delayed; or are acutely ill.

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. A child in pain may favor a body part. The child with low self-esteem or a feeling of rejection may assume a slumped, careless, and apathetic pose. Likewise, a child with confidence, a feeling of self-worth, and a sense of security usually demonstrates a tall, straight, well-balanced posture. While observing such body language, do not interpret too freely but rather record objectively.

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. Such observations are excellent clues to possible instances of neglect, inadequate financial resources, housing difficulties (e.g., no running water), or lack of knowledge concerning children's needs.

Behavior includes the child's personality, activity level, reaction to stress, requests, frustration, interactions with others (primarily the parent and nurse), degree of alertness, and response to stimuli. Some mental questions that serve as reminders for observing behavior include the following:

- What is the child's overall personality?
- Does the child have a long attention span, or is he or she easily distracted?
- Can the child follow two or three commands in succession without the need for repetition?
- What is the child's response to delayed gratification or frustration?
- Does the child use eye contact during conversation?
- What is the child's reaction to the nurse and family members?
- Is the child quick or slow to grasp explanations?

## SKIN

Assess skin for color, texture, temperature, moisture, turgor, lesions, acne, and rashes. Examination of the skin and its accessory organs primarily involves inspection and palpation. Touch allows the nurse to assess the texture, turgor, and temperature of the skin. The normal color in light-skinned children varies from a milky white and rose to a deeply hued pink. Dark-skinned children, such as those of American Indian, Hispanic, or African descent, have inherited various brown, red, yellow, olive green, and bluish tones in their skin. Asian persons have skin that is normally of a yellow tone. Several variations in skin color can occur, some of which warrant further investigation. The types of color change and their appearance in children with light or dark skin are summarized in Table 4.6.

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.

**TABLE 4.6 Differences in Color Changes of Racial Groups**

| Description | Appearance in Light Skin | Appearance in Dark Skin |
|---|---|---|
| **Cyanosis**—bluish tone through skin; reflects reduced (deoxygenated) hemoglobin | Bluish tinge, especially in palpebral conjunctiva (lower eyelid), nail beds, earlobes, lips, oral membranes, soles, and palms | Ashen gray lips and tongue |
| **Pallor**—paleness; may be sign of anemia, chronic disease, edema, or shock | Loss of rosy glow in skin, especially face | Ashen gray appearance in black skin<br>More yellowish-brown color in brown skin |
| **Erythema**—redness; may be result of increased blood flow from climatic conditions, local inflammation, infection, skin irritation, allergy, or other dermatoses, or may be caused by increased numbers of red blood cells as compensatory response to chronic hypoxia | Redness easily seen anywhere on body | Much more difficult to assess; rely on palpation for warmth or edema |
| **Ecchymosis**—large, diffuse areas, usually black and blue, caused by hemorrhage of blood into skin; typically result of injuries | Purplish to yellow-green areas; may be seen anywhere on skin | Very difficult to see unless in mouth or conjunctiva |
| **Petechiae**—same as ecchymosis except for size: small, distinct, pinpoint hemorrhages ≤2 mm in size; can denote some type of blood disorder, such as leukemia | Purplish pinpoints most easily seen on buttocks, abdomen, and inner surfaces of arms or legs | Usually invisible except in oral mucosa, conjunctiva of eyelids, and conjunctiva covering eyeball |
| **Jaundice**—yellow staining of skin usually caused by bile pigments | Yellow staining seen in sclerae of eyes, skin, fingernails, soles, palms, and oral mucosa | Most reliably assessed in sclerae, hard palate, palms, and soles |

## Accessory Structures

Inspection of the accessory structures of the skin may be performed while examining the skin, scalp, or extremities. Inspect the hair for color, texture, quality, distribution, and elasticity. Children's scalp hair is usually lustrous, silky, strong, and elastic. Genetic factors affect the appearance of hair. For example, the hair of African American children is usually curlier and coarser than that of white children. Hair that is stringy, dull, brittle, dry, friable, and depigmented may suggest poor nutrition. Record any bald or thinning spots. 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. Persons in some ethnic groups condition their hair with oils or lubricants that, if not thoroughly washed from the scalp, clog the sebaceous glands, causing scalp infections. Examine the scalp for lesions, scaliness, evidence of infestation (e.g., lice or ticks), and signs of trauma (e.g., ecchymosis, masses, or scars).

In children who are approaching puberty, look for growth of secondary hair as a sign of normally progressing pubertal changes. Note premature or delayed appearance of hair growth because although not always suggestive of hormonal dysfunction, it may be of great concern to the early-maturing child or late-maturing adolescent.

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. Dark-skinned individuals may have more deeply pigmented nail beds. Short, ragged nails are typical of habitual biting. Uncut, dirty nails are a sign of poor hygiene.

The palm normally shows three flexion creases (Fig. 4.14A). In some conditions such as Down syndrome, the two distal horizontal creases may be fused to form a single horizontal crease (the single palmar crease, or transpalmar crease) (see Fig. 4.14B). If grossly abnormal lines or folds are observed, sketch a picture to describe them and refer the finding to a specialist for further investigation.

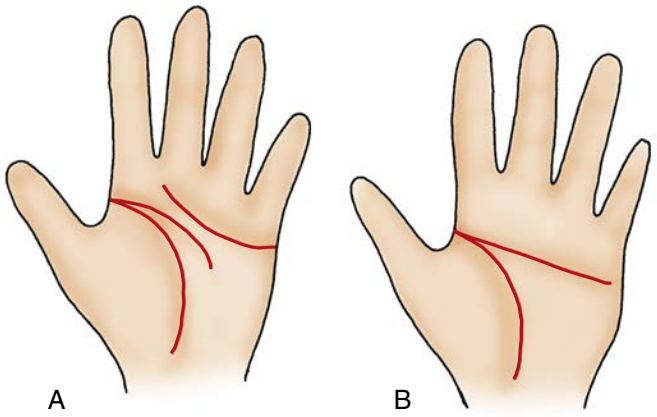


**Fig. 4.14** Examples of flexion creases on palm. A, Normal. B, Transpalmar crease.

## LYMPH NODES

Lymph nodes are usually assessed during examination of the part of the body in which they are located. The body's lymphatic drainage system is extensive. Fig. 4.15 shows the usual sites for palpating accessible lymph nodes.

Palpate nodes using the distal portion of the fingers and gently but firmly pressing in a circular motion along the regions 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 or trapezius muscles. This position facilitates palpation of the **submental**, **submandibular**, **tonsillar**, and **cervical nodes**. Palpate the **axillary nodes** with the child's arms relaxed at the sides

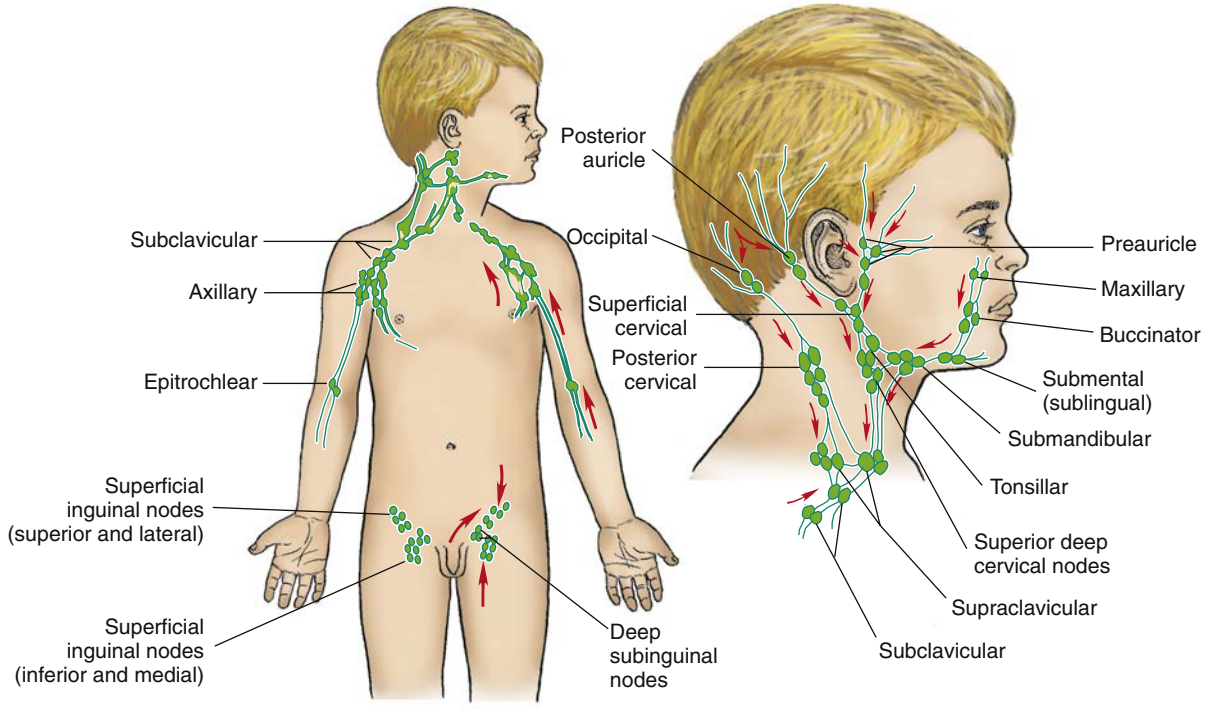


**Fig. 4.15** Location of superficial lymph nodes. *Arrows* indicate directional flow of lymph.

but slightly abducted. Palpate the **inguinal nodes** with the child in the supine position. Note size, mobility, temperature, and tenderness, as well as reports by the parents regarding any visible change of enlarged nodes. In children, small, nontender, movable nodes are usually normal. Tender, enlarged, warm, erythematous lymph nodes generally indicate infection or inflammation close to their location. Report such findings for further investigation.

## HEAD AND NECK

Observe the head for general shape and symmetry. A flattening of one part of the head, such as the occiput, may indicate that the child continually lies in this position. Marked asymmetry is usually abnormal and may indicate premature closure of the sutures (**craniosynostosis**).

**! NURSING ALERT**

After 6 months old, significant head lag strongly indicates cerebral injury and is referred for further evaluation.

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.

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 **torticollis**, in which the child holds the head to one side with the chin pointing toward the opposite side as a result of a congenital disorder or injury to the sternocleidomastoid muscle.

**! NURSING ALERT**

Hyperextension of the head (**opisthotonos**) with pain on flexion is a serious indication of meningeal irritation and is referred for immediate medical evaluation.

Palpate the skull for patent sutures, fontanels, fractures, and swellings. Normally the posterior fontanel closes by 2 months old, and the anterior fontanel fuses between 12 and 18 months old. Early or late closure is noted, because either may be a sign of a pathologic condition.

While examining the head, 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. Note any unusual facial proportion, such as an unusually high or low forehead; wide- or close-set eyes; or a small, receding chin.

In addition to assessment of the head and neck for movement, 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.

**! NURSING ALERT**

If any masses are detected in the neck, report them for further investigation. Large masses can block the airway.

## EYES

### Inspection of External Structures

Inspect the lids for proper placement on the eye. When the eye is open, the upper lid should fall near the upper iris. Note any structural anomaly (e.g., ptosis, hemangioma). When the eyes are closed, the lids should completely cover the cornea and sclera (Fig. 4.16).

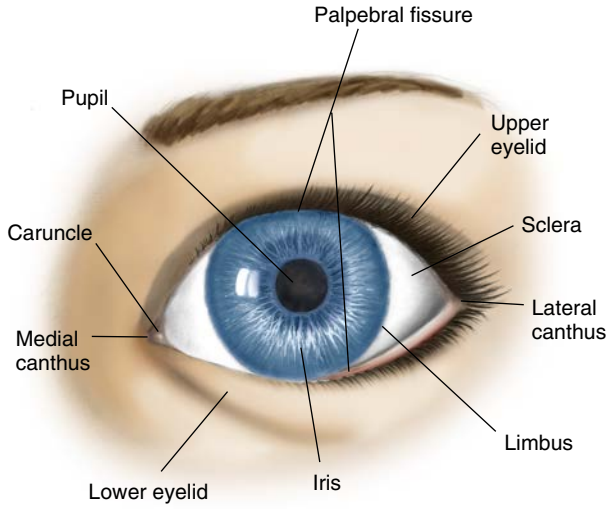


**Fig. 4.16** External structures of the eye.

Determine the general slant of the **palpebral fissures** or lids by drawing an imaginary line through the two points of the medial canthus and the lateral canthus of the eyes and aligning each eye on the line. Usually the palpebral fissures lie fairly horizontal (the lateral canthus may lie about 1 mm higher than the medial canthus). Slight upward or downward slanting of palpebral fissures normally occurs on a familial basis. However, in Asians, the slant is normally upward.

Also inspect the inside lining of the lids, the **palpebral conjunctivae**. To examine the lower conjunctival sac, pull the lid down while the child looks up. To evert the upper lid, hold the upper lashes and gently pull down and forward as the child looks down. Normally the conjunctiva appears pink and glossy. Vertical yellow striations along the edge are the **meibomian glands**, or **sebaceous glands**, near the hair follicle. Located in the medial canthus and situated on the inner edge of the upper and lower lids is a tiny opening, the **lacrimal punctum**. Note any excessive tearing, discharge, or inflammation of the lacrimal apparatus.

The **bulbar conjunctiva**, which covers the eye up to the limbus, or junction of the cornea and sclera, should be transparent. The sclera, or white covering of the eyeball, should be clear. Tiny black marks in the sclera of heavily pigmented individuals are normal.

The **cornea**, or covering of the iris and pupil, should be clear and transparent. Record opacities, because they can be signs of scarring or ulceration, which can interfere with vision. The best way to test for opacities is to illuminate the eyeball by shining a light at an angle (**obliquely**) toward the cornea.

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. As the light approaches, the pupils should constrict; as the light fades, the pupils should dilate. Test the pupil for any response of **accommodation** by having the child look at a bright, shiny object at a distance and quickly moving the object toward the face. The pupils should constrict as the object is brought near the eyes. 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 old. While inspecting the iris and pupil, look for the lens. Normally the lens is not visible through the pupil.

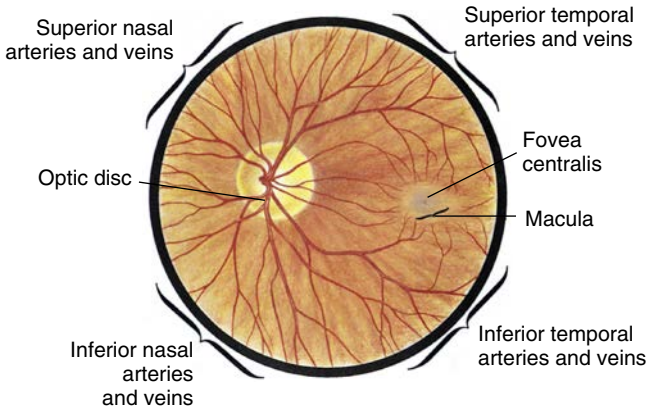


**Fig. 4.17** Structures of fundus. (From Ball, J. W., Dains, J. E., Flynn, J. A., et al. [2014]. *Seidel's guide to physical examination* [8th ed.]. St Louis, MO: Elsevier.)

## Inspection of Internal Structures

The ophthalmoscope permits visualization of the interior of the eyeball with a system of lenses and a high-intensity light. The lenses permit clear visualization of eye structures at different distances from the nurse's eye and correct visual acuity differences in the examiner and child. A dark room, with a dim light source, facilitates the examination because the pupils will enlarge. Use of the ophthalmoscope requires practice to know which lens setting produces the clearest image.

The ophthalmic and otic heads are often interchangeable on one "body" or handle, which encloses the power source—either disposable or rechargeable batteries. The nurse should practice changing the heads, which snap on and are secured with a quarter turn, and replacing the batteries and light bulbs. Nurses who may not be directly involved in this aspect of physical assessment in some settings are often responsible for ensuring that the instruments function properly.

### Preparing the Child

The nurse can prepare the child for the ophthalmoscopic examination by showing the child the instrument, demonstrating the light source and how it shines in the eye, and explaining the reason for darkening the room. For infants and young children who do not respond to such explanations, it is best to use distraction to encourage them to keep their eyes open. Forcibly parting the eyelids results in an uncooperative, watery-eyed child and a frustrated nurse. Usually, with some practice, the nurse can elicit a red reflex almost instantly while approaching the child and may also gain a momentary inspection of the blood vessels, macula, or optic disc.

### Funduscopic Examination

Fig. 4.17 shows the structures of the back of the eyeball, or the **fundus**. The fundus is immediately apparent as the **red reflex**. The intensity of the color increases in darkly pigmented individuals.

**! NURSING ALERT**

A brilliant, uniform red reflex is an important sign because it rules out many serious defects of the cornea, aqueous chamber, lens, and vitreous chamber. Absent, white, dull, or asymmetric red reflexes warrant further investigation.

As the ophthalmoscope is brought closer to the eye, the most conspicuous feature of the fundus is the **optic disc**, the area where the blood vessels and optic nerve fibers enter and exit the eye. The disc is orange to creamy pink with a pale center and lighter in color than the surrounding fundus. Normally, it is round or vertically oval.


**Fig. 4.18** A, Corneal light reflex test demonstrating orthophoric eyes. B, Pseudostrabismus. Inner epicanthal folds cause the eyes to appear misaligned; however, the corneal light reflexes fall perfectly symmetrically. (From Gleason, C. A. & Juul, S. E. [2018]. Avery's diseases of the newborn [10th ed.]. Philadelphia, PA: Elsevier.)

After locating the optic disc, inspect the area for blood vessels. The central retinal artery and vein appear in the depths of the disc and emanate outward with visible branching. The veins are darker and about one-fourth larger than the arteries. Normally, the branches of the arteries and veins cross one another.

Other structures include the **macula**, the area of the fundus with the greatest concentration of visual receptors, and in the center of the macula, a minute glistening spot of reflected light called the **fovea centralis**; this is the area of most perfect vision.

## Vision Screening

The US Preventive Services Task Force (2017) recommends vision screening for the presence of amblyopia and its risk factors for all children 3 to 5 years old. Several tests are available for assessing vision. This discussion focuses on ocular alignment, visual acuity, peripheral vision, and color vision. Chapter 18 discusses behavioral and physical signs of visual impairment. Nurses can provide accurate vision screening with appropriate training (Mathers, Keyes, & Wright, 2010).

### Ocular Alignment

Normally, by 3 to 4 months old, children can fixate on one visual field with both eyes simultaneously (binocularity). In **strabismus**, or cross-eye, one eye deviates from the point of fixation. If the misalignment is constant, the weak eye becomes "lazy," and the brain eventually suppresses the image produced by that eye. If strabismus is not detected and corrected by 4 to 6 years old, blindness from disuse, known as **amblyopia**, may result.

Tests commonly used to detect misalignment are the corneal light reflex and the cover tests. To perform the **corneal light reflex test**, or **Hirschberg test**, shine a penlight or the light of the ophthalmoscope directly into the patient's eyes, while he or she is looking straight ahead, from a distance of about 40.5 cm (16 inches). If the eyes are **orthophoric**, or normal, the light falls symmetrically within each pupil (Fig. 4.18A). If the light falls

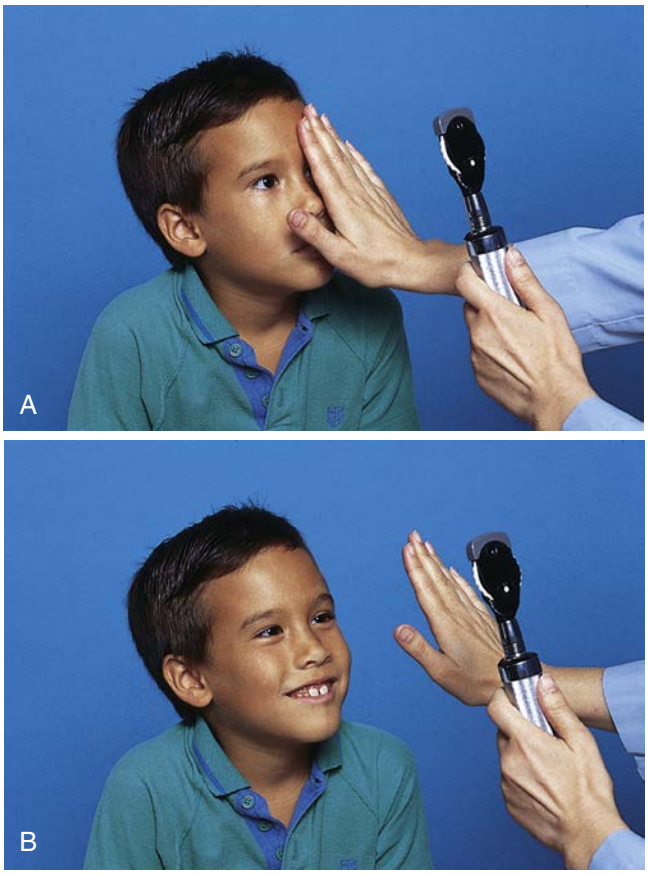


**Fig. 4.19** Alternate cover test to detect amblyopia in a patient with strabismus. A, The eye is occluded, and the child is fixating on the light source. B, If the eye does not move when uncovered, the eyes are aligned.

off-center in one eye, the eyes are misaligned. **Epicanthal folds**, excess folds of skin that extend from the roof of the nose to the inner termination of the eyebrow and that partially or completely overlap the inner canthus of the eye, may give a false impression of misalignment (**pseudostrabismus**) (see Fig. 4.18B). Epicanthal folds are often found in Asian children.

In the **cover test**, one eye is covered, and the movement of the uncovered eye is observed while the child looks at a near (33 cm [13 inches]) or distant (6 m [20 feet]) object. If the uncovered eye does not move, it is aligned. If the uncovered eye moves, a misalignment is present because when the stronger eye is temporarily covered, the misaligned eye attempts to fixate on the object.

In the **alternate cover test**, occlusion shifts back and forth from one eye to the other, and movement of the eye that was covered is observed as soon as the occluder is removed while the child focuses on a point in front of him or her (Fig. 4.19). If normal alignment is present, shifting the cover from one eye to the other will not cause the eye to move. If misalignment is present, eye movement will occur when the cover is moved. This test takes more practice than the other cover test because the occluder must be moved back and forth quickly and accurately to see the eye move. Because deviations can occur at different ranges, it is important to perform the cover tests at both close and far distances.

**! NURSING ALERT**

The cover test is usually easier to perform if the examiner uses his or her hand rather than a card-type occluder (see Fig. 4.19). Attractive occluders fashioned like an ice cream cone or happy-face lollipop cut from cardboard are also well received by young children.

## Visual Acuity Screening in Children

The most common test for measuring visual acuity is an eye chart, such as the **Sloan letter chart**, which consists of lines of letters of decreasing size. The child stands with his or her heels at a line 10 feet away from the chart. When screening for visual acuity in children, the nurse tests the child's right eye first by covering the left. Children who wear glasses should be screened with them on. Tell the child to keep both eyes open during the examination. If the child fails to read the current line, move up the chart to the next larger line. Continue up the chart until the child can read the line. Then begin moving down the chart again until the child fails to read the line. To pass each line, the child must correctly identify a simple majority of symbols on the line. Repeat the procedure, covering the right eye. Handheld charts are used for screening near vision. Table 4.7 provides a list of visual screening tests for children and guidelines for referral.

For children unable to read letters and numbers, optotypes (figures or letters of different sizes) are used. The LEA Symbols consist of four figures, and the child calls them what he or she wants to call them. The HOTV test consists of a wall chart composed of the letters H, O, T, and V. The child is given a board containing a large H, O, T, and V. The examiner points to a letter on the wall chart, and the child matches the correct letter on the board held in his or her hand. The LEA Symbols and HOTV are preferred screening tests for preliterate children.

## Visual Acuity Screening in Infants and Difficult-to-Test Children

In newborns, vision is tested mainly by checking for **light perception** by shining a light into the eyes and noting responses, such as pupillary constriction, blinking, following the light to midline, increased alertness, or refusal to open the eyes after exposure to the light. Although the simple maneuver of checking light perception and eliciting the pupillary light reflex indicates that the anterior half of the visual apparatus is intact, it does not confirm that the infant can see. In other words, this test does not assess whether the brain receives the visual message and interprets the signals.

Another test of visual acuity is the infant's ability to fix on and follow a target. Although any brightly colored or patterned object can be used, the human face is excellent. Hold the infant upright while moving your face slowly from side to side. Other signs that may indicate visual loss or other serious eye problems include fixed pupils, strabismus, constant nystagmus, the setting-sun sign, and slow lateral movements. Unfortunately, it is difficult to test each eye separately; the presence of such signs in one eye could indicate unilateral blindness.

Special tests are available for testing infants and other difficult-to-test children to assess visual acuity or confirm blindness. For example, in **visually evoked potentials**, the eyes are stimulated with a bright light or pattern, and electrical activity to the visual cortex is recorded through scalp electrodes.

Evidence supports the use of elective instrument-based vision screening, primarily photoscreening and autorefraction, in children 12 months old until the child can reliably read an eye chart (Donahue, Baker, Committee on Practice and Ambulatory Medicine, et al., 2016; Miller, Lessin, American Academy of Pediatrics Section on Ophthalmology, et al., 2012). Neither instrument measures visual acuity itself but rather measures risk factors for vision problems. Photoscreening uses optical images of the eye's red reflex to estimate refractive error, media opacity, ocular alignment, and other factors putting a child at risk for amblyopia. Handheld autorefraction is used to evaluate the refractive error of each eye.

**! NURSING ALERT**

If visual fixation and following are not present by 3 months old, further ophthalmologic evaluation is necessary.

**TABLE 4.7 Pediatric Vision Assessment**

| Assessment | Ages | | | | | | When to be Concerned |
|---|---|---|---|---|---|---|---|
| | Newborn-6 mos | 6-12 mos | 1-3 yrs | 3-4 yrs | 4-5 yrs | Every 1-2 yrs after 5 yrs | |
| Assess for red light reflex | • | • | • | • | • | • | No reflex, dull, white, looks opaque, unequal |
| Exam outside of eye | • | • | • | • | • | • | Structure abnormality (e.g., swelling, drooping) |
| Examine pupils | • | • | • | • | • | • | Irregular shape, unequal size, slow reaction to light |
| Assess for corneal light reflex | | • | • | • | • | • | Unequal when looking at both eyes |
| Perform cover test | | | | • | • | • | One eye is covered, and uncovered eye is observed for shift in fixation |
| Assess ability to focus and follow | infant ≥3 mos | • | • | • | • | • | Unable to fix and follow |
| Evaluate visual acuity | | | | • | • | • | 20/50 or worse in either eye or 2 lines of differences between the eyes |
| | | | | | • | • | 20/40 or worse in either eye |

Adapted From Hagan, J. F., Shaw, J. S. (Eds.). (2017). *Bright futures: Guidelines for health supervision of infants, children and adolescents* (4th ed.). Elk Grove Village, IL: American Academy of Pediatrics.

### Peripheral Vision

In children who are old enough to cooperate, estimate **peripheral vision**, or the visual field of each eye, by having the children fixate on a specific point directly in front of them while an object, such as a finger or a pencil, is moved from beyond the field of vision into the range of peripheral vision. As soon as children see the object, have them say, "Stop." At that point, measure the angle from the anteroposterior axis of the eye (straight line of vision) to the peripheral axis (point at which the object is first seen). Check each eye separately and for each quadrant of vision. Normally children see about 50 degrees upward, 70 degrees downward, 60 degrees nasalward, and 90 degrees temporally. Limitations in peripheral vision may indicate blindness from damage to structures within the eye or to any of the visual pathways.

### Color Vision

The tests available for color vision include the Ishihara test and the Hardy-Rand-Rittler test. Each consists of a series of cards (pseudoisochromatic) containing a color field composed of spots of a certain "confusion" color. Against the field is a number or symbol similarly printed in dots but of a color likely to be confused with the field color by a person with a **color vision deficit**. As a result, the figure or letter is invisible to an affected individual but is clearly seen by a person with normal vision.

## EARS

### Inspection of External Structures

The entire external ear is called the **pinna**, or **auricle**; one is located on each side of the head. 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 genetic syndromes. Measure the angle of the pinna by drawing a perpendicular line from the imaginary horizontal line and aligning the pinna next to this mark. Normally the pinna lies within a 10-degree angle of the vertical line (Fig. 4.20). If it falls outside this area, record the deviation and look for other anomalies.

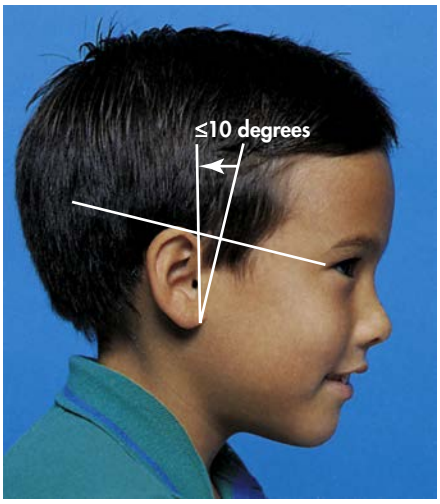


**Fig. 4.20** Ear alignment.

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. Flattened ears in an infant may suggest a frequent side-lying position and, just as with isolated areas of hair loss, may be a clue to investigate parents' understanding of the child's stimulation needs.

Inspect the skin surface around the ear for small openings, extra tags of skin, sinuses, or earlobe creases. If a sinus is found, note this because it may represent a fistula that drains into some area of the neck or ear. Note an earlobe crease, if found, because it may be associated with a rare syndrome. However, having one small abnormality is not uncommon and is often not associated with a serious condition. Cutaneous tags represent no pathologic process but may cause parents concern in terms of the child's appearance.

Also assess the ears for hygiene. An otoscope is not necessary for looking into the external ear canal to note the presence of **cerumen**, a waxy substance produced by the ceruminous glands in the outer

portion of the ear canal. Cerumen is usually yellow-brown and soft. If an otoscope is used and any discharge is visible, note its color and odor. Avoid transmitting potentially infectious material to the other ear or to another child by hand washing and using disposable specula or sterilizing reusable specula between each examination.

## Inspection of Internal Structures

The head of the otoscope permits visualization of the tympanic membrane by use of a bright light, a magnifying glass, and a speculum. Some otoscopes have an attachment for a pneumonic device to insert air into the ear canal to determine membrane compliance (movement). The speculum, which is inserted into the external ear canal, comes in a variety of sizes to accommodate different ear canal widths. The largest speculum that fits comfortably into the ear is used to achieve the greatest area of visualization. The lens, or magnifying glass, is movable, allowing the examiner to insert an object, such as a curette, into the ear canal through the speculum while still viewing the structures through the lens.

### Positioning the Child

Before beginning the otoscopic examination, position the child properly and gently restrain (child sits on parent's lap, and parent holds child's body and head) if necessary. Older children usually cooperate and do not need restraint. However, prepare them for the procedure by allowing them to play with the instrument, demonstrating how it works, and stressing the importance of remaining still. A helpful suggestion is to let them observe you examining the parent's ear. Restraint is needed for younger children because the ear examination often upsets them (see Atraumatic Care box).

**ATRAUMATIC CARE**

***Reducing Distress From Otoscopy in Young Children***

Make examining the ear a game by explaining that you are looking for a "bunny" in the ear. This kind of make-believe is an absorbing distraction and usually elicits cooperation. After examining the ear, clarify that "looking for a bunny" was only pretend and thank the child for letting you look in his or her ear. Another great distraction technique is asking the child to put a finger on the opposite ear to keep the light from getting out.

As you insert the speculum into the meatus, move it around the outer rim to accustom the child to the feel of something entering the ear. If examining a painful ear, examine the unaffected ear first, then return to the painful ear and touch a nonpainful part of the affected ear first. By this time, the child is usually less fearful of anything causing discomfort to the ear and will cooperate more.

For their protection and safety, restrain infants and toddlers for the otoscopic examination. There are two general positions of restraint. In one, the child is seated sideways in the parent's lap with one arm hugging the parent and the other arm at the side. The ear to be examined is toward the nurse. With one hand the parent holds the child's head firmly against his or her chest and hugs the child with the other arm, thereby securing the child's free arm (Fig. 4.21). Examine the ear using the same procedure for holding the otoscope as described later.

The other position involves placing the child on the side, back, or abdomen with the arms at the side and the head turned so that the ear to be examined points toward the ceiling. Lean over the child, use the upper part of the body to restrain the arms and upper trunk movements, and use the examining hand to stabilize the head. This position is practical for young infants and for older children who need minimum restraint, but it may not be feasible for other children who protest vigorously. For safety, enlist the parent's or an assistant's help in immobilizing the head by firmly placing one hand above the ear and the other on the child's side, abdomen, or back.

**Fig. 4.21** Position for a young child for a pneumatic otoscopic examination where a puff of air is introduced into the ear canal.

**Fig. 4.22** Positioning the head by tilting it toward the opposite shoulder for full view of the tympanic membrane.

With cooperative children, examine the ear with the child in a side-lying, sitting, or standing position. One disadvantage to standing is that the child may "walk away" as the otoscope enters the ear canal. If the child is standing or sitting, tilt the head slightly toward the child's opposite shoulder to achieve a better view of the tympanic membrane (eardrum) (Fig. 4.22).

With the thumb and forefinger of the free hand, grasp the auricle. For the two positions of restraint, hold the otoscope upside down at the junction of its head and handle with the thumb and index finger. Place the other fingers against the skull to allow the otoscope to move with the child in case of sudden movement. In examining a cooperative child, hold the handle with the otic head upright or upside down. Use the dominant hand to examine both ears or reverse hands for each ear, whichever is more comfortable.

Before using the otoscope, visualize the external ear and the tympanic membrane as being superimposed on a clock (Fig. 4.23). The numbers are important geographic landmarks. Introduce the speculum into the meatus between the 3 and 9 o'clock positions in a downward and forward position. Because the ear canal is curved, the speculum does not permit a panoramic view of the tympanic membrane unless the ear canal is straightened. In infants, the ear canal curves upward. Therefore pull the pinna down and back (toward the 6 to 9 o'clock range for the right ear and toward the 3 to 6 o'clock range for the left ear) to straighten the ear canal (Fig. 4.24A). With older children, usually those older than 3 years of age, the ear canal curves downward and forward. Therefore pull the pinna up and back (toward a 2 o'clock position for the left ear and toward a 10 o'clock position for the right ear) (see Fig. 4.24B). If you have difficulty visualizing the tympanic membrane, try repositioning the head, introducing the speculum at a different angle, and pulling the pinna in a slightly different direction. Do not insert the speculum past the cartilaginous (outermost) portion of the ear canal, usually a distance of 0.60 to 1.25 cm (0.23 to 0.5 inch) in older children. Insertion of the speculum into the posterior or bony portion of the ear canal causes pain.

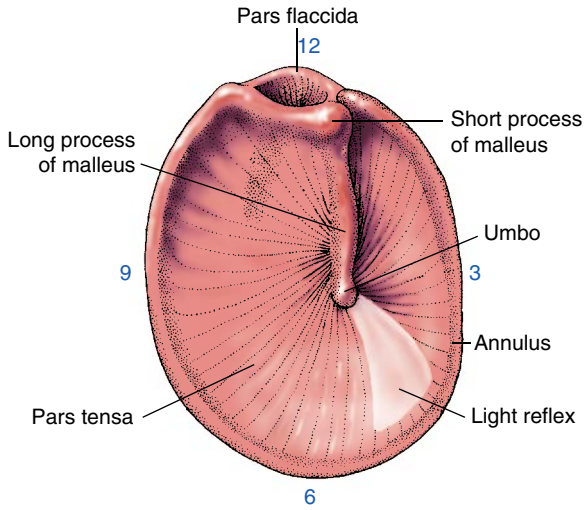


**Fig. 4.23** Landmarks of the right tympanic membrane. (From Ignatavicius, D. D., & Workman, M. L. [2013]. *Medical-surgical nursing: Patient-centered collaborative care* [7th ed.]. St Louis, MO: Saunders.)

In neonates and young infants, the walls of the ear canal are pliable and floppy because of the underdeveloped cartilaginous and bony structures. Therefore the very small 2-mm speculum usually needs to be inserted deeper into the ear canal than in older children. Exercise great care not to damage the walls or tympanic membrane. For this reason, only an experienced examiner should insert an otoscope into the ears of very young infants.

## Otoscopic Examination

As you introduce the speculum into the external ear canal, inspect the walls of the ear canal, the color of the tympanic membrane, the light reflex, and the usual landmarks of the bony prominences of the middle ear. The walls of the external auditory ear canal are pink, although they are more pigmented in dark-skinned children. Minute hairs are evident in the outermost portion, where cerumen is produced. Note signs of irritation, foreign bodies, or infection.

Foreign bodies in the ear are common in children and range from erasers to beans. Symptoms may include pain, discharge, and affected hearing. Remove soft objects, such as paper or insects, with forceps. Remove small, hard objects, such as pebbles, with a suction tip, a hook, or irrigation. However, irrigation is contraindicated if the object is vegetative matter, such as beans or pasta, which swells when in contact with fluid.

**! NURSING ALERT**

If there is any doubt about the type of object in the ear and the appropriate method to remove it, refer the child to the appropriate practitioner.

The **tympanic membrane** is a translucent, light pearly pink or gray. Note marked erythema (which may indicate suppurative otitis media); a dull, nontransparent grayish color (sometimes suggestive of serous otitis media); or ashen gray or white areas (signs of scarring from a previous perforation). A black area usually suggests a perforation of the membrane that has not healed.

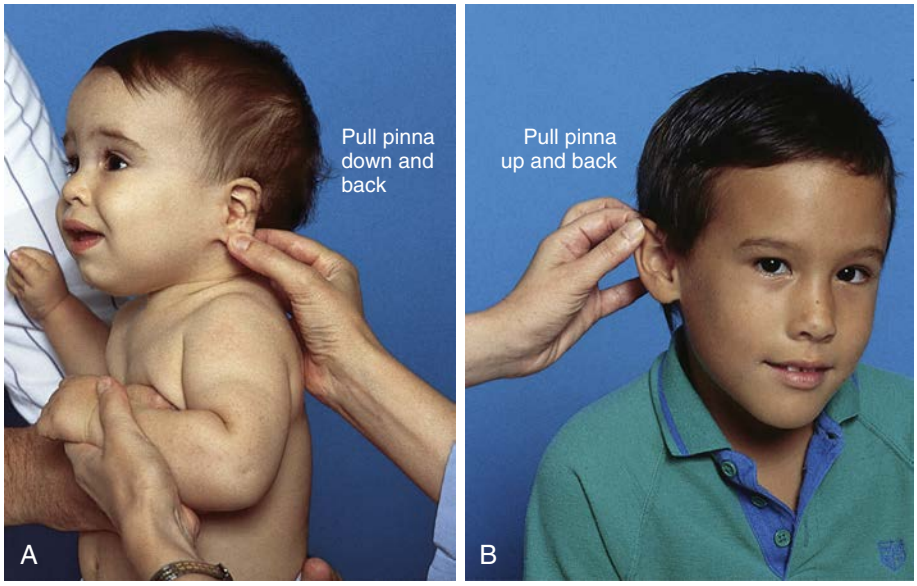


**Fig. 4.24** Positioning for visualizing the tympanic membrane **(A)** in an infant and **(B)** in a child older than 3 years of age.

**TABLE 4.8 Auditory Tests for Infants and Children**

| Age | Auditory Test | Type of Measurement | Procedure |
|---|---|---|---|
| Newborns | Auditory brainstem response (ABR) | Electrophysiologic measurement of activity in auditory nerve and brainstem pathways | Placement of electrodes on child's head detects auditory stimuli presented though earphones one ear at a time. |
| Infants | Behavioral audiometry | Used to observe behavior in response to certain sounds heard through speakers or earphones | The child's responses to the sounds heard are observed. |
| Toddlers | Play audiometry | Uses an audiometer to transmit sounds at different volumes and pitches | The toddler is asked to do something with a toy (e.g., touch a toy, move a toy) every time the sound is heard. |
| Children and adolescents | Pure tone audiometry | Uses an audiometer that produces sounds at different volumes and pitches in the child's ears | The child is asked to respond in some way when the tone is heard in the earphone. |
| | Tympanometry (also called *impedance* or *admittance*) | Determines how the middle ear is functioning and detects any changes in pressure in the middle ear | A soft plastic tip is placed over the ear canal, and the tympanometer measures tympanic membrane movement when the pressure changes. |
| All ages | Evoked optoacoustic emissions (EOAE) | Physiologic test specifically measuring cochlear (outer hair cell) response to presentation of stimulus | Small probe containing sensitive microphone is placed in ear canal for stimulus delivery and response detection. |

The characteristic tenseness and slope of the tympanic membrane cause the light of the otoscope to reflect at about the 5 o'clock position (in the right ear) or the 7 o'clock position (in the left ear). The **light reflex** is a fairly well-defined, cone-shaped reflection, which normally points away from the face.

The **bony landmarks** of the tympanic membrane are formed by the **umbo**, or tip of the malleus. It appears as a small, round, opaque, concave spot near the center of the tympanic membrane. The **manubrium** (long process or handle) of the malleus appears to be a whitish line extending from the umbo upward to the margin of the membrane. At the upper end of the long process near the 1 o'clock position (in the right ear) or 11 o'clock position (in the left ear) is a sharp, knoblike protuberance, representing the **short process** of the malleus. Note the absence or distortion of the light reflex, or loss or abnormal prominence of any of these landmarks.

### Auditory Testing

Several types of hearing tests are available and recommended for screening in infants and children (Table 4.8). The American Academy of Pediatrics recommends pure tone audiometry testing at 500, 1000, 2000, and 4000 Hz, with children failing if they cannot hear the tones at 20 dB (Harlor, Bower, & Committee on Practice and Ambulatory Medicine, Section on Otolaryngology—Head and Neck Surgery, 2009). Universal newborn hearing screening is available in all US states. The nurse must operate under a high index of suspicion for those children who may have conditions associated with hearing loss, whose parents are concerned about hearing loss, and who may have developed behaviors that indicate auditory impairment. Chapter 18 discusses types of hearing loss, causes, clinical manifestations, and appropriate treatment.

## NOSE

### Inspection of External Structures

Compare the placement and alignment of the nose by drawing an imaginary vertical line from the center point between the eyes down to the notch of the upper lip. 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). The bridge of the nose is sometimes flat in Asian and African American children. Observe the **alae nasi** for any sign of flaring, which indicates respiratory difficulty. Always report any flaring of the alae nasi. Fig. 4.25 illustrates the external landmarks and internal structures of the nose.

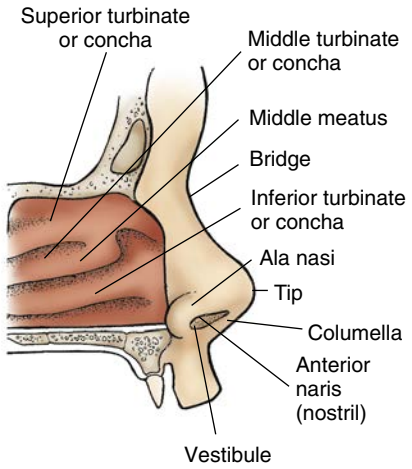


**Fig. 4.25** External landmarks and internal structures of the nose.

### Inspection of Internal Structures

Inspect the **anterior vestibule** of the nose by pushing the tip upward, tilting the head backward, and illuminating the cavity with a flashlight or otoscope without the attached ear speculum. 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.

On looking deeper into the nose, inspect the **turbinates**, or **concha**, plates of bone that jut into the nasal cavity and are enveloped by the mucous membranes. The turbinates greatly increase the surface area of the nasal cavity as air is inhaled. The spaces or channels between the turbinates are called the **meatus** and correspond to each of the three turbinates. Normally, the front end of the inferior and middle turbinate and the middle meatus are seen. They should be the same color as the lining of the vestibule.

Inspect the **septum**, which should divide the vestibules equally. Note any deviation, especially if it causes an occlusion of one side of the nose. A perforation may be evident within the septum. If this is suspected, shine the light of the otoscope into one naris and look for admittance of light to the other. Because olfaction is an important function of the nose, testing for smell may be done at this point or as part of cranial nerve assessment (see Table 4.11).

## MOUTH AND THROAT

With a cooperative child, the nurse can accomplish almost the entire examination of the mouth and throat without the use of a tongue blade. Ask the child to open the mouth wide; to move the tongue in different directions for full visualization; and to say "ahh," which depresses the tongue for full view of the back of the mouth (tonsils, uvula, and oropharynx). For a closer look at the **buccal mucosa**, or lining of the cheeks, ask children to use their fingers to move the outer lip and cheek to one side (see Atraumatic Care box).

### ATRAUMATIC CARE

***Encouraging Opening the Mouth for Examination***

- Perform the examination in front of a mirror.
- Let the child first examine someone else's mouth, such as the parent's, the nurse's, or a puppet's (Fig. 4.26A), and then examine child's mouth.
- Instruct the child to tilt the head back slightly, breathe deeply through the mouth, and hold the breath; this action lowers the tongue to the floor of the mouth without the use of a tongue blade.
- Lightly brushing the palate with a cotton swab also may open the mouth for assessment.


**Fig. 4.26** A, Encouraging a child to cooperate. B, Positioning a child for examination of the mouth.

Infants and toddlers usually resist attempts to keep the mouth open. Because inspecting the mouth is upsetting, leave it for the end of the physical examination (along with examination of the ears) or do it during episodes of crying. However, the use of a tongue blade (preferably flavored) to depress the tongue may be needed. Place the tongue blade along the side of the tongue, not in the center back area where the gag reflex is elicited. Fig. 4.26B illustrates proper positioning of the child for the oral examination.

The major structure of the exterior of the mouth is the lips. 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.

### Inspection of Internal Structures

The major structures that are visible within the oral cavity and oropharynx are the mucosal lining of the lips and cheeks, gums (or gingiva), teeth, tongue, palate, uvula, tonsils, and posterior oropharynx (Fig. 4.27). 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, petechiae, bleeding, sensitivity, and moisture. 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 (see also Chapter 9, Teething). Discoloration of tooth enamel with obvious **plaque** (whitish coating on the surface of the teeth) is 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** (excessive fluoride ingestion). Teeth

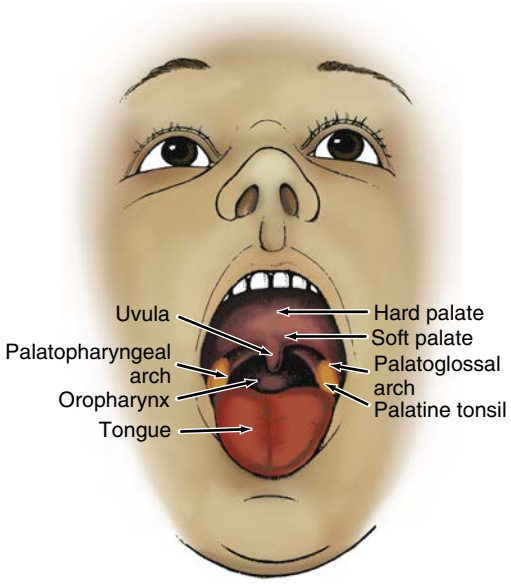


**Fig. 4.27** Interior structures of the mouth.

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 that of an orange peel. In dark-skinned children, the gums are more deeply colored, and a brownish area is often observed along the gum line.

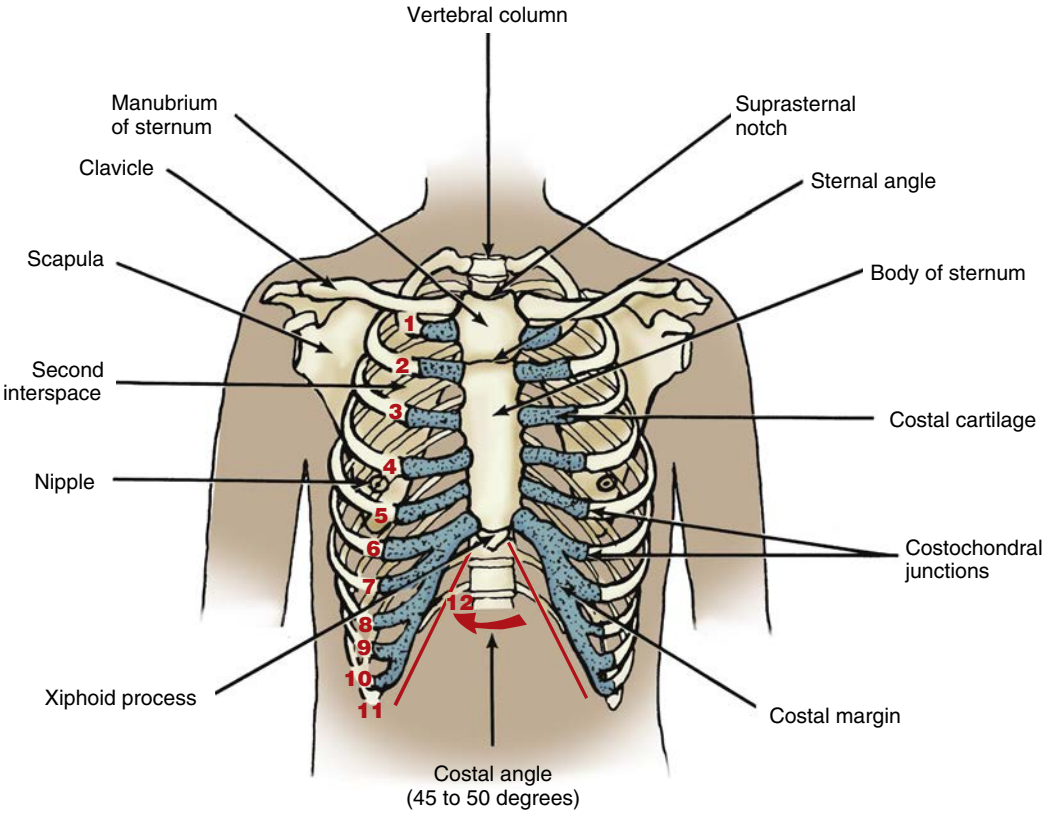


**Fig. 4.28** The rib cage.

Inspect the tongue for papillae, small projections that contain several 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 and has a small midline protrusion called the **uvula**. Carefully inspect the palates to ensure that they are intact. The arch of the palate should be dome shaped. A narrow, flat roof or a high, arched palate affects the placement of the tongue and can cause feeding and speech problems. Test movement of the uvula by eliciting a gag reflex. It should move upward to close off the nasopharynx from the oropharynx.

Examine the oropharynx and note the size and color of the **palatine tonsils**. They are normally the same color as the surrounding mucosa, glandular rather than smooth in appearance, and barely visible over the edge of the palatoglossal arches. The size of the tonsils varies considerably during childhood. However, 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. The **rib cage** consists of 12 ribs on each side and the sternum, or breastbone, located in the midline of the trunk (Fig. 4.28). The **sternum** is composed of three main parts. The **manubrium**, the uppermost portion, can be felt at the base of the neck at the **suprasternal notch**. The largest segment of the sternum is the body, which forms the **sternal angle (angle of Louis)** as it articulates with the manubrium. At the end of the body is a small, movable process called the **xiphoid**. The angle of the costal margin as it attaches to the sternum is called the **costal angle** and is normally about 45 to 50 degrees. These bony structures are important landmarks in the location of ribs and **intercostal spaces (ICSs)**, which are the spaces between the ribs. They are numbered according to the rib directly above the space. For example, the space immediately below the second rib is the second ICS.

The **thoracic cavity** is also divided into segments by drawing imaginary lines on the chest and back. Fig. 4.29 illustrates the anterior, lateral, and posterior divisions.

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 (see Head Circumference earlier in this chapter). 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 anteroposterior (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. Note the angle made by the lower costal margin and the sternum and palpate the junction of the ribs with the costal cartilage (costochondral junction) and sternum, which should be fairly smooth.

Movement of the chest wall should be symmetric bilaterally and coordinated with breathing. During inspiration, the chest rises and expands, the diaphragm descends, and the costal angle increases. During expiration, the chest falls and decreases in size, the diaphragm rises, and the costal angle narrows (Fig. 4.30). In children younger than 6 or 7 years old, respiratory movement is principally abdominal or diaphragmatic. In older children, particularly girls,

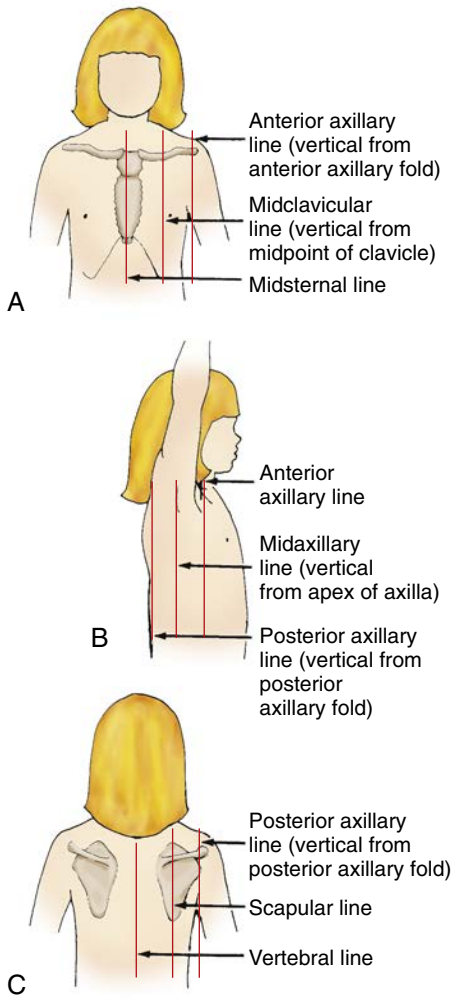


**Fig. 4.29** Imaginary landmarks of the chest. A, Anterior. B, Right lateral. C, Posterior.

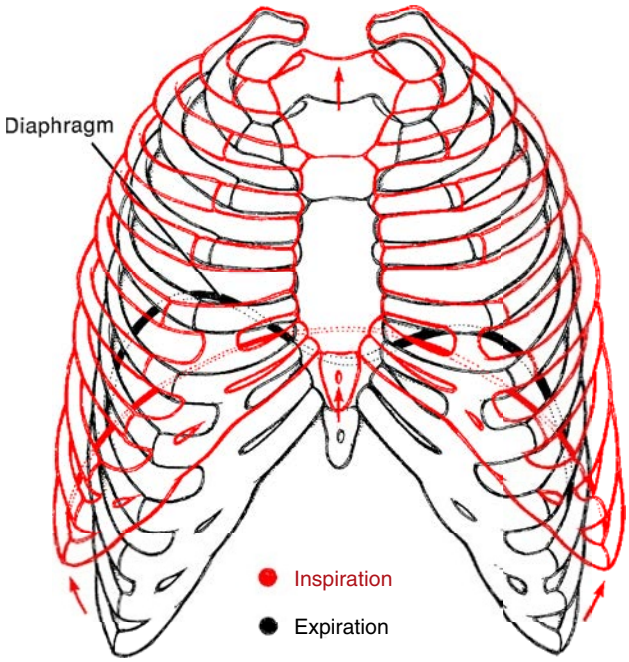


**Fig. 4.30** Movement of the chest during respiration.

respirations are chiefly thoracic. In either case, the chest and abdomen should rise and fall together. Always report any asymmetry of movement.

While inspecting the skin surface of the chest, 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. Note symmetry of nipple placement and normal configuration of a darker pigmented areola surrounding a flat nipple in prepubertal children.

Pubertal breast development usually begins in girls between 8 and 12 years of age (see Chapter 15). Record early (precocious) or delayed breast development, as well as evidence of any other secondary sexual characteristics. In males, breast enlargement (**gynecomastia**) may be caused by hormonal or systemic disorders but more commonly is a result of adipose tissue from obesity or a transient body change during early puberty. In either situation, investigate the child's feelings about breast enlargement.

In adolescent girls who have achieved sexual maturity, palpate the breasts for evidence of any masses or hard nodules. Use this opportunity to discuss the importance of routine breast self-examination. Emphasize that most palpable masses are benign to decrease any fear or concern that results when a mass is felt.

## LUNGS

The lungs are situated inside the thoracic cavity, with one lung on each side of the sternum. Each lung is divided into an **apex**, which is slightly pointed and rises above the first rib; a **base**, which is wide and concave and rides on the dome-shaped diaphragm; and a **body**, which is divided into lobes. The right lung has three lobes: the right superior (upper) lobe, right middle lobe, and right inferior (lower) lobe. The left lung has only two lobes, the left superior (upper) and left inferior (lower) lobes, because of the space occupied by the heart (Fig. 4.31).

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), and (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. The child should be sitting during this procedure and, if cooperative, should take several deep breaths. During respiration, your hands will move with the chest wall. Assess the amount and speed of respiratory excursion and note any asymmetry of movement.

Experienced examiners may percuss 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. When percussing the posterior lung, the procedure and sequence are the same, although the child should be sitting. Resonance is heard over all the lobes of the lungs that are not adjacent to other organs. Record and report any deviation from the expected sound.

### Auscultation

Auscultation involves using the stethoscope to evaluate breath sounds (see Nursing Care Guidelines box). Breath sounds are best heard if the child inspires deeply (see Atraumatic Care box). In the lungs, breath sounds are classified as vesicular, bronchovesicular, or bronchial (Box 4.12).

## NURSING CARE GUIDELINES

### *Effective Auscultation*

- Make certain child is relaxed and not crying, talking, or laughing. Record if child is crying.
- Check that room is comfortable and quiet.
- Warm stethoscope before placing it against skin.
- Apply firm pressure on chest piece but not enough to prevent vibrations and transmission of sound.
- Avoid placing stethoscope over hair or clothing, moving it against the skin, breathing on tubing, or sliding fingers over chest piece, which may cause sounds that falsely resemble pathologic findings.
- Use a symmetric and orderly approach to compare sounds on each side.

## ATRAUMATIC CARE

### *Encouraging Deep Breaths*

- Ask child to "blow out" the light on an otoscope or pocket flashlight; discreetly turn off the light on the last try so that child feels successful.
- Place a cotton ball in child's palm; ask child to blow the ball into the air and have parent catch it.
- Hold a tissue in front of child and ask child to blow the tissue in the air.
- Have child blow a pinwheel, a party horn, or bubbles.

Absent or diminished breath sounds are always an abnormal finding warranting investigation. Fluid, air, or solid masses in the pleural space interfere with the conduction of breath sounds. Diminished breath sounds in certain segments of the lung can alert the nurse to pulmonary areas that may benefit from chest physiotherapy. Increased breath sounds after pulmonary therapy indicate improved passage of air through the respiratory tract. Box 4.13 lists terms used to describe various respiration patterns.

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, and (2) **wheezes**, which are produced as air passes through narrowed passageways, regardless of the cause, such as exudate, inflammation, spasm, or tumor. Considerable practice with an experienced mentor is necessary to differentiate the various types of lung sounds. Often it is best to describe the type of sound heard in the lungs rather than trying to label it. Always report any abnormal sounds for further medical evaluation.

## HEART

The heart is situated in the thoracic cavity between the lungs in the mediastinum and above the diaphragm (Fig. 4.32). 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** along the right sternal border (RSB) from the second to the fifth rib

**Horizontally** (long side) from the lower right sternum to the fifth rib at the left midclavicular line (LMCL)

**Diagonally** from the left sternal border (LSB) at the second rib to the LMCL at the fifth rib

**Horizontally** (short side) from the RSB and LSB at the second ICS—base of the heart

Inspection is easiest when the child is sitting in a semi-Fowler position. 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. Because comprehensive evaluation of cardiac function is not limited to the heart, also consider other findings, such as the presence of all

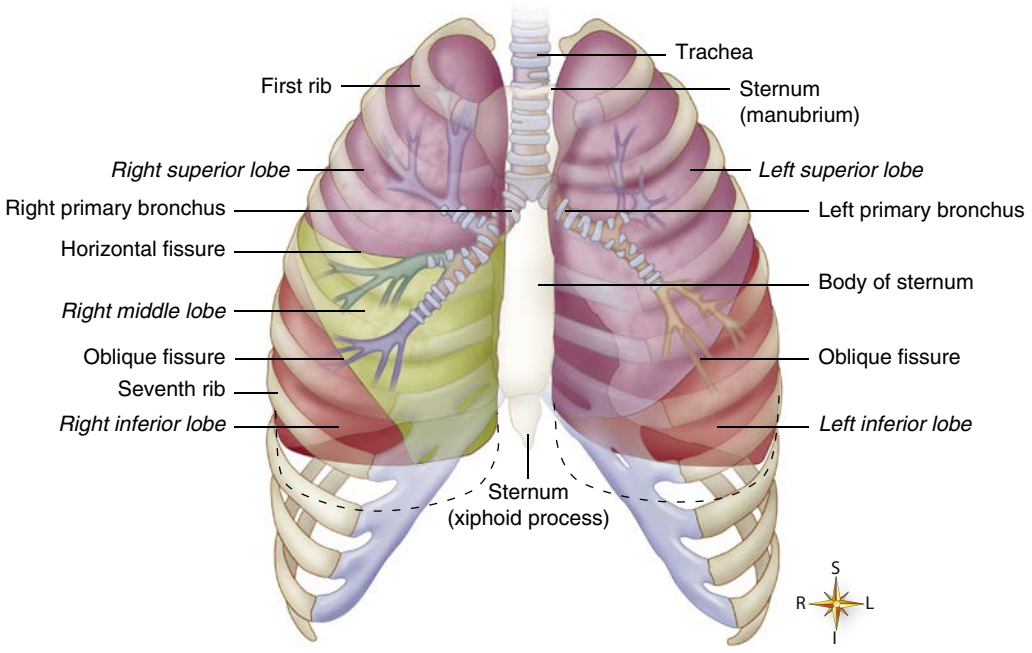


**Fig. 4.31** Location of the lobes of the lungs within the thoracic cavity. (From Patton, K. T., & Thibodeau, G. A. [2013]. *Anatomy and physiology* [8th ed.]. St Louis, MO: Mosby.)

## BOX 4.12 Classification of Normal Breath Sounds

**Vesicular Breath Sounds**

Heard over the entire surface of the lungs, except for the upper intrascapular area and the area beneath the manubrium.
Inspiration is louder, longer, and higher pitched than expiration.
The sound is a soft, swishing noise.

**Bronchovesicular Breath Sounds**

Heard over the manubrium and in the upper intrascapular regions where the trachea and bronchi bifurcate.
Inspiration is louder and higher pitched than in vesicular breathing.

**Bronchial Breath Sounds**

Heard only over the trachea near the suprasternal notch.
The inspiratory phase is short, and the expiratory phase is long.

## BOX 4.13 Various Patterns of Respiration

**Tachypnea:** Increased rate
**Bradypnea:** Decreased rate
**Dyspnea:** Distress during breathing
**Apnea:** Cessation of breathing
**Hyperpnea:** Increased depth
**Hypoventilation:** Decreased depth (shallow) and irregular rhythm
**Hyperventilation:** Increased rate and depth
**Kussmaul respiration:** Hyperventilation, gasping and labored respiration; usually seen in diabetic coma or other states of respiratory acidosis
**Cheyne-Stokes respiration:** Gradually increasing rate and depth with periods of apnea
**Biot respiration:** Periods of hyperpnea alternating with apnea (similar to Cheyne-Stokes except that depth remains constant)
**Seesaw (paradoxic) respirations:** Chest falls on inspiration and rises on expiration
**Agonal:** Last gasping breaths before death

pulses (especially the femoral pulses) (Fig. 4.33), distended neck veins, clubbing of the fingers, peripheral cyanosis, edema, blood pressure, and respiratory status.

Use palpation to determine the location of the **apical pulse (AP)**, the most lateral cardiac impulse that may correspond to the apex. The AP 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

Although the AP gives a general idea of the size of the heart (with enlargement, the apex is lower and more lateral), its normal location is variable, making it an unreliable indicator of heart size.

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 AP, but it can occur elsewhere. For this reason, the two terms should not be used synonymously.

Assess the **capillary refill time**, an important test for circulation, by pressing the pad of a fingertip between the nurse's thumb and forefinger for 5 seconds at moderate pressure at an ambient temperature of 68°F to 77°F (Fleming, Gill, Van den Bruel, et al., 2016). The time it takes for the blanched area to return to its original color is the capillary refill time.

**! NURSING ALERT**

Capillary refill should be brisk—2 seconds or less. Prolonged refill of 3 seconds or more is an important warning sign.

## Auscultation

### Origin of Heart Sounds

The heart sounds are produced by the opening and closing of the valves and the vibration of blood against the walls of the heart and vessels. Normally, two sounds—$S_1$ and $S_2$—are heard, which correspond, respectively, to the familiar "lub dub" often used to describe the sounds. $S_1$ is caused by closure of the **tricuspid** and **mitral valves** (sometimes called the **atrioventricular valves**). $S_2$ is the result of closure of the **pulmonic** and **aortic valves** (sometimes called **semilunar**

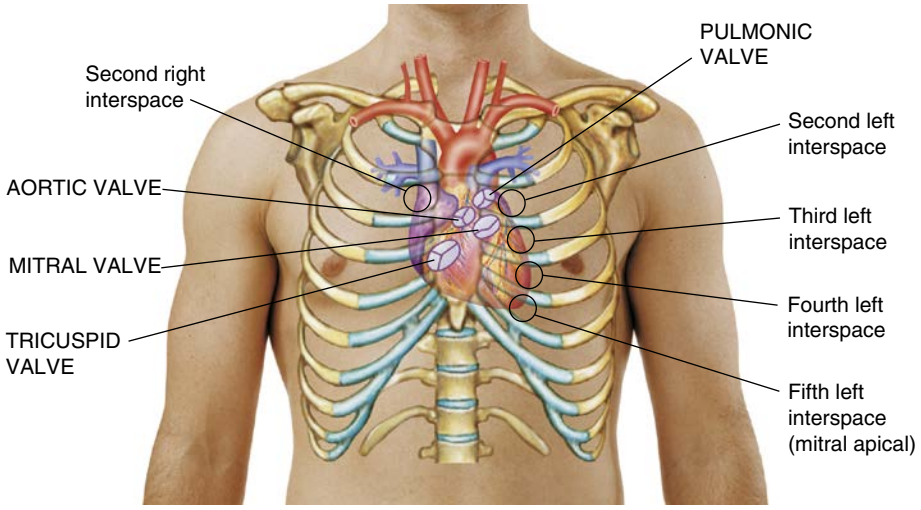


**Fig. 4.32** Position of the heart within the thorax. (From Ball, J. W., Dains, J. E., Flynn, J. A., et al. [2014]. *Seidel's guide to physical examination* [8th ed.]. St Louis, MO: Elsevier.)

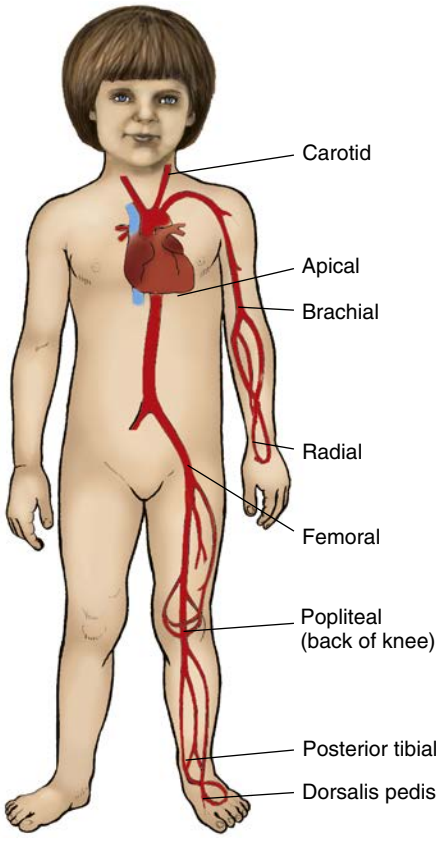


**Fig. 4.33** Location of pulses.

valves). Normally the split of the two sounds in $S_2$ is distinguishable and widens during inspiration. **Physiologic splitting** is a significant normal finding.

**! NURSING ALERT**

Fixed splitting, in which the split in $S_2$ does not change during inspiration, is an important diagnostic sign of atrial septal defect.

Two other heart sounds, $S_3$ and $S_4$, may be produced. $S_3$ is normally heard in some children; $S_4$ is rarely heard as a normal heart sound; it usually indicates the need for further cardiac evaluation.

### Differentiating Normal Heart Sounds

Fig. 4.34 illustrates the approximate anatomic position of the valves within the heart chambers. Note that the anatomic location of valves does not correspond to the area where the sounds are heard best. The auscultatory sites are located in the direction of the blood flow through the valves.

Normally $S_1$ is louder at the apex of the heart in the mitral and tricuspid area, and $S_2$ is louder near the base of the heart in the pulmonic and aortic area (Table 4.9). Listen to each sound by inching down the chest. Auscultate the following areas for sounds, such as murmurs, which may radiate to these sites: sternoclavicular area above the clavicles and manubrium, area along the sternal border, area along the left midaxillary line, and area below the scapulae.

**NURSING TIP** To distinguish between $S_1$ and $S_2$ heart sounds, simultaneously palpate the carotid pulse with the index and middle fingers and listen to the heart sounds; $S_1$ is synchronous with the carotid pulse.

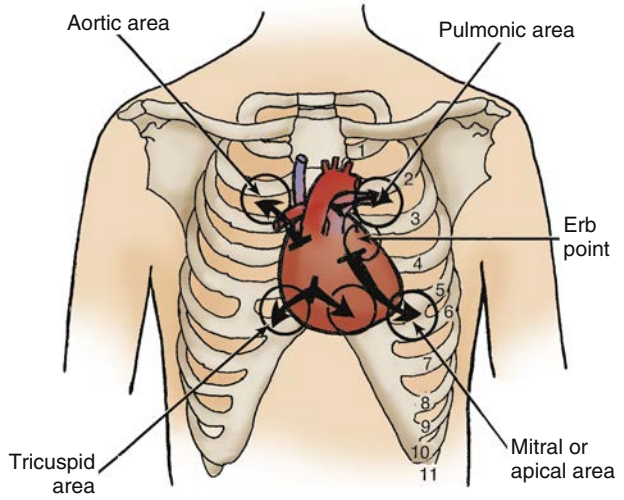


**Fig. 4.34** Direction of heart sounds for anatomic valve sites and areas *(circled)* for auscultation.

Auscultate the heart with the child in at least two positions: sitting and reclining. If adventitious sounds are detected, further evaluate them with the child standing, sitting and leaning forward, and lying on the left side. For example, atrial sounds such as $S_4$ are heard best with the person in a recumbent position and usually fade if the person sits or stands.

Evaluate heart sounds for (1) quality (they should be clear and distinct, not muffled, diffuse, or distant); (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); and (4) **rhythm** (they should be regular and even). An arrhythmia that occurs normally in many children is **sinus arrhythmia**, in which the heart rate increases with inspiration and decreases with expiration. Differentiate this rhythm from a truly abnormal arrhythmia by having children hold their breath. In sinus arrhythmia, cessation of breathing causes the heart rate to remain steady.

### Heart Murmurs

Another important category of the heart sounds is **murmurs**, which are produced by vibrations within the heart chambers or in the major arteries from the back-and-forth flow of blood. (For a more detailed discussion, see Chapter 23, Cardiovascular Dysfunction). Murmurs are classified as:

**Innocent:** No anatomic or physiologic abnormality exists.

**Functional:** No anatomic cardiac defect exists, but a physiologic abnormality (e.g., anemia) is present.

**Organic:** A cardiac defect with or without a physiologic abnormality exists.

The description and classification of murmurs are skills that require considerable practice and training. In general, recognize murmurs as distinct swishing sounds that occur in addition to the normal heart sounds and record the (1) location, or the area of the heart in which the murmur is heard best; (2) time of the occurrence of the murmur within the $S_1$–$S_2$ cycle; (3) intensity (evaluate in relation to the child's position); and (4) loudness. Table 4.10 lists the usual subjective method of grading the loudness or intensity of a murmur.

## ABDOMEN

Examination of the abdomen involves inspection followed by auscultation and then palpation. Experienced examiners may also percuss the

**TABLE 4.9 Sequence of Auscultating Heart Sounds[a]**

| Auscultatory Site | Chest Location | Characteristics of Heart Sounds |
|---|---|---|
| Aortic area | Second right ICS close to sternum | $S_2$ heard louder than $S_1$; aortic closure heard loudest |
| Pulmonic area | Second left ICS close to sternum | Splitting of $S_2$ heard best, normally widens on inspiration; pulmonic closure heard best |
| Erb point | Third left ICS close to sternum | Frequent site of innocent murmurs and those of aortic or pulmonic origin |
| Tricuspid area | Fourth right and left ICSs close to sternum | $S_1$ heard as louder sound preceding $S_2$ ($S_1$ synchronous with carotid pulse) |
| Mitral or apical area | Fifth ICS, LMCL (fourth ICS and lateral to LMCL in infants) | $S_1$ heard loudest; splitting of $S_1$ may be audible because mitral closure is louder than tricuspid closure<br>$S_1$ heard best at beginning of expiration with child in recumbent or left side-lying position; occurs immediately after $S_2$; sounds like word $S_1$ $S_2$ $S_3$: "Ken-tuc-ky"<br>$S_4$ heard best during expiration with child in recumbent position (left side-lying position decreases sound); occurs immediately before $S_1$; sounds like word $S_4$ $S_1$ $S_2$: "Ten-nes-see" |

[a]Use both diaphragm and bell chest pieces when auscultating heart sounds. Bell chest piece is necessary for low-pitched sounds of murmurs, $S_3$, and $S_4$.
*ICS,* Intercostal space; *LMCL,* left midclavicular line.

**TABLE 4.10 Grading the Intensity of Heart Murmurs**

| Grade | Description |
|---|---|
| I | Very faint; barely heard in a quiet room; often not heard if child sits up |
| II | Quiet but clearly heard; slightly louder than grade I; audible in all positions |
| III | Moderately loud; no thrill palpated |
| IV | Loud; accompanied by a thrill |
| V | Very loud; heard with the stethoscope barely touching the chest; accompanied by a thrill |
| VI | Heard without the stethoscope in direct contact with the chest wall; often heard with the human ear close to the chest; accompanied by a thrill |

abdomen to assess for organomegaly, masses, fluid, and flatus. Perform palpation last because it may distort the abdominal sounds. Knowledge of the anatomic placement of the abdominal organs is essential to differentiate normal, expected findings from abnormal ones (Fig. 4.35).

For descriptive purposes, the abdominal cavity is divided into four quadrants by drawing a vertical line midway from the sternum to the symphysis pubis and a horizontal line across the abdomen through the umbilicus. The sections are named:

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

## Inspection

Inspect the contour of the abdomen with the child erect and supine. 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. A midline protrusion from the xiphoid to the umbilicus or symphysis pubis is usually **diastasis recti**, or failure of the rectus abdominis muscles to join in utero. In a healthy child, a midline protrusion is usually a variation of normal muscular development.

**! NURSING ALERT**

A tense, board-like abdomen is a serious sign of paralytic ileus and intestinal obstruction.

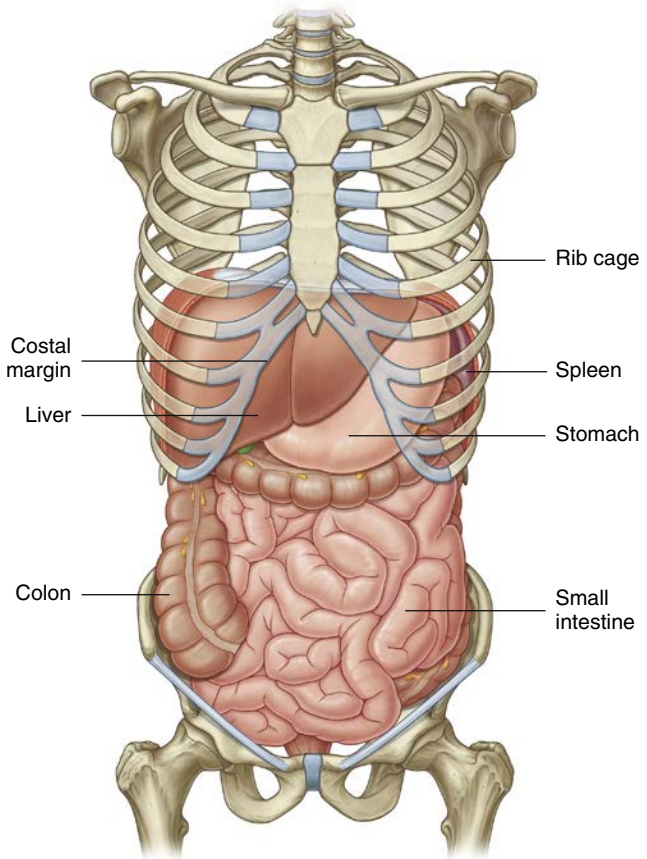


**Fig. 4.35** Location of structures in the abdomen. (From Drake, R. L., Vogl, W., & Mitchell, A. W. M. [2015]. *Gray's anatomy for students* [3rd ed.]. New York, NY: Churchill Livingstone.)

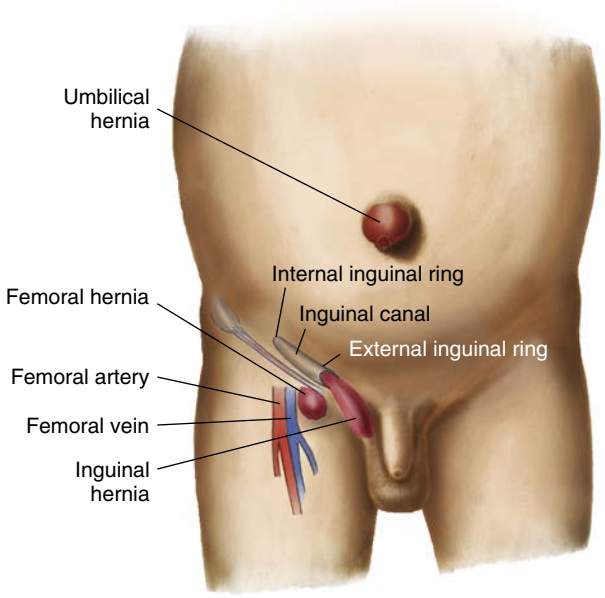


**Fig. 4.36** Location of hernias.

The skin covering the abdomen should be uniformly taut, without wrinkles or creases. Sometimes silvery, whitish striae (stretch marks) are seen, especially if the skin has been stretched as in obesity. Superficial veins are usually visible in light-skinned, thin infants, but distended veins are an abnormal finding.

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; they are best observed by standing at eye level to and across from the abdomen. Always report this finding.

Examine the umbilicus for size, hygiene, and evidence of any abnormalities, such as hernias. The umbilicus should be flat or only slightly protruding. If a herniation is present, palpate the sac for abdominal contents and estimate the approximate size of the opening. **Umbilical hernias** are common in infants, especially in African American children.

Hernias may exist elsewhere on the abdominal wall (Fig. 4.36). An **inguinal hernia** is a protrusion of peritoneum through the abdominal wall in the inguinal canal. It occurs mostly in boys, is frequently bilateral, and may be visible as a mass in the scrotum. To locate a hernia, slide the little finger into the external inguinal ring at the base of the scrotum and ask the child to cough. If a hernia is present, it will hit the tip of the finger.

### ! NURSING TIP

If the child is too young to cough, have the child blow on a tissue or laugh to raise the intra-abdominal pressure sufficiently to demonstrate the presence of an inguinal hernia.

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 (a potential space medial to the femoral artery). Feel for a hernia by placing the index finger of your right hand on the child's right femoral pulse (left hand for left pulse) and the middle finger flat against the skin toward the midline. The ring finger lies over the femoral canal, where the herniation occurs. Palpation of hernias in the pelvic region is often part of the genital examination.

## 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. Report absence of bowel sounds or hyperperistalsis, because either usually denotes a gastrointestinal disorder.

## Palpation

There are two types of palpation: superficial and deep. For **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. Because superficial palpation is often perceived as tickling, use several techniques to minimize this sensation and relax the child (see Atraumatic Care box). Admonishing the child to stop laughing only draws attention to the sensation and decreases cooperation.

### ATRAUMATIC CARE

***Promoting Relaxation During Abdominal Palpation***

- Position child comfortably, such as in a semireclining position in the parent's lap, with knees flexed.
- Warm your hands before touching the skin.
- Use distraction, such as telling stories or talking to child.
- Teach child to use deep breathing and to concentrate on an object.
- Give infant a bottle or pacifier.
- Begin with light, superficial palpation and gradually progress to deeper palpation.
- Palpate any tender or painful areas last.
- Have child hold the parent's hand and squeeze it if palpation is uncomfortable.
- Use the nonpalpating hand to comfort the child, such as placing the free hand on child's shoulder while palpating abdomen.
- To minimize sensation of tickling during palpation:
  - Have children "help" with palpation by placing one of their hands over the palpating hand.
  - Have them place a hand on the abdomen with the fingers spread wide apart and palpate between their fingers.

**Deep palpation** is for palpating organs and large blood vessels and for detecting masses and tenderness that were not discovered during superficial palpation. 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) requires considerable practice with mentored supervision. 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 (0.4 to 0.8 inch) below the right costal margin (the distance is sometimes measured in fingerbreadths). Normally the liver descends during inspiration as the diaphragm moves downward. Do not mistake this downward displacement as a sign of liver enlargement.

### ! NURSING ALERT

If the liver is palpable 3 cm (1.2 inch) below the right costal margin or the spleen is palpable more than 2 cm (0.8 inch) below the left costal margin, these organs are enlarged—a finding that is always reported for further medical investigation.

Palpate the **femoral pulses** by placing the tips of two or three fingers (index, middle, or ring) along the inguinal ligament about midway between the iliac crest and symphysis pubis. Feel both pulses simultaneously to make certain they are equal and strong (Fig. 4.37).

**! NURSING ALERT**

Absence of femoral pulses is a significant sign of coarctation of the aorta and is referred for evaluation.

## GENITALIA

Examination of genitalia conveniently follows assessment of the abdomen while the child is still supine. In examining the genitalia, wear gloves when touching the child and adolescent. The examination should be performed in the presence of a parent, guardian, or another health care professional. The best approach is to examine the genitalia matter-of-factly, placing no more emphasis on this part of the assessment than on any other segment. It helps relieve children's and parents' anxiety by telling them the results of the findings; for example, the nurse might say, "Everything looks fine here." In adolescents, inspection of the genitalia may be left to the end of the examination.

**Fig. 4.37** Palpating for femoral pulses.

If it is necessary to ask questions, such as about discharge or difficulty urinating, respect the child's privacy by covering the lower abdomen with the gown or underpants. To prevent embarrassing interruptions, keep the door or curtain closed and post a "do not disturb" sign. Have a drape ready to cover the genitalia if someone enters the room.

The genital examination is an excellent time for eliciting questions or concern about body function or sexual activity. Also use this opportunity to increase or reinforce the child's knowledge of reproductive anatomy by naming each body part and explaining its function. This part of the health assessment is an opportune time to teach about appropriate and inappropriate touch and, in adolescent boys, testicular self-examination.

### Male Genitalia

Note the external appearance of the **glans** (head of the penis), the **prepuce** (foreskin), the **shaft** (portion between the perineum and prepuce), the urethral meatus, and the scrotum (Fig. 4.38). The **penis** is generally small in infants and young boys until puberty, when it begins to increase in both length and width. In an obese child, the penis often looks abnormally small because of the folds of adipose tissue partially covering it at the base. Be familiar with normal pubertal growth of the external male genitalia to compare the findings with the expected sequence of maturation (see Chapter 15).

Examine the glans and shaft of the penis for signs of swelling, skin lesions, inflammation, or other irregularities. Any of these signs may indicate underlying disorders, especially sexually transmitted infections.

Carefully inspect the **urethral meatus** for location and evidence of discharge. Normally it is centered at the tip of the glans. Also note pubic hair distribution. Normally, before puberty, no pubic hair is present. Soft, downy hair at the base of the penis is an early sign of pubertal maturation. In older adolescents, hair distribution is diamond shaped from the umbilicus to the anus.

Note the location and size of the **scrotum**. The scrotum hangs freely from the perineum behind the penis, and the left scrotum normally hangs lower than the right. In infants, the scrotum appears large in relation to the rest of the genitalia. The skin of the scrotum is loose and highly rugated (wrinkled). During early adolescence, the skin normally becomes redder and thinner. In dark-skinned boys, the scrotum is usually more deeply pigmented.

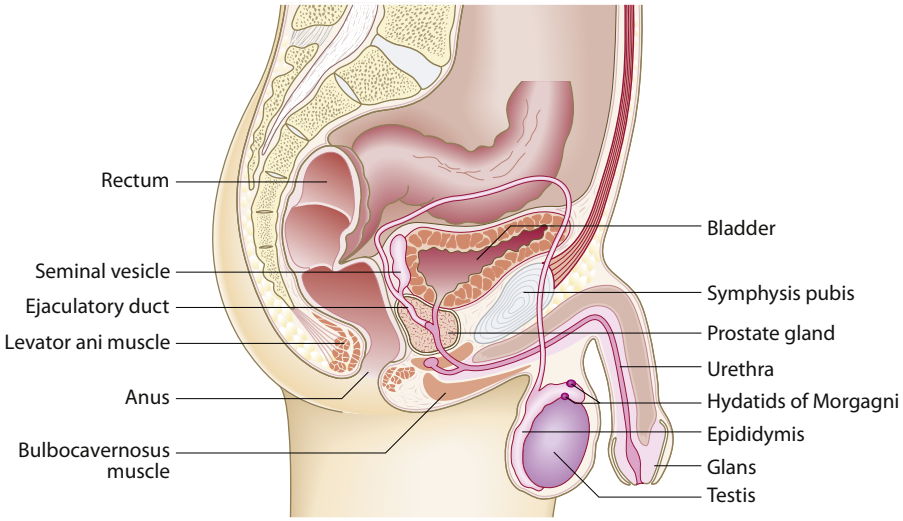


**Fig. 4.38** Major structures of genitalia in an uncircumcised postpubertal male. (From Douglas, G., Nicol, F., & Robertson, C. [2013]. *Macleod's clinical examination* [13th ed.]. Philadelphia, PA: Elsevier.)

Palpation of the scrotum includes identification of the testes, epididymis, and, if present, inguinal hernias. Before puberty, the two **testes** are felt as small, ovoid bodies less than 2.5 cm (1 inch) in length and less than 4 ml in volume—one in each scrotal sac. They do not enlarge until puberty (see Chapter 15). Pubertal testicular development normally begins in boys between 9 and 13 years old. Record early (precocious) or delayed pubertal development, as well as evidence of any other secondary sexual characteristics.

When palpating for the presence of the testes, avoid stimulating the **cremasteric reflex**, which is stimulated by cold, touch, emotional excitement, or exercise. This reflex pulls the testes higher into the pelvic cavity. Several measures are useful in preventing the cremasteric reflex during palpation of the scrotum. First, warm the hands. Second, if the child is old enough, examine him in a tailor or "Indian" position, which stretches the muscle, preventing its contraction (Fig. 4.39A). Third, block the normal pathway of ascent of the testes by placing the thumb and index finger over the upper part of the scrotal sac along the inguinal canal (see Fig. 4.39B). If there is any question concerning the existence of two testes, place the index and middle fingers in a scissors fashion to separate the right and left scrota. If, after using these techniques, you have not palpated the testes, feel along the inguinal canal and perineum to locate masses that may be undescended testes. Report any failure to palpate the testes for further evaluation.

## Female Genitalia

The examination of female genitalia is limited to inspection and palpation of external structures. If a vaginal examination is required, the nurse should make an appropriate referral unless he or she is qualified to perform the procedure.

A convenient position for examination of the genitalia involves placing the young child supine on the examining table or in a semireclining position on the parent's lap with the feet supported on your knees as you sit facing the child. Divert the child's attention from the examination by instructing her to try to keep the soles of her feet pressed against each other. Separate the labia majora with the thumb and index finger and retract outward to expose the labia minora, urethral meatus, and vaginal orifice.

Examine the female genitalia for size and location of the structures of the **vulva**, or **pudendum** (Fig. 4.40). The **mons pubis** is a pad of

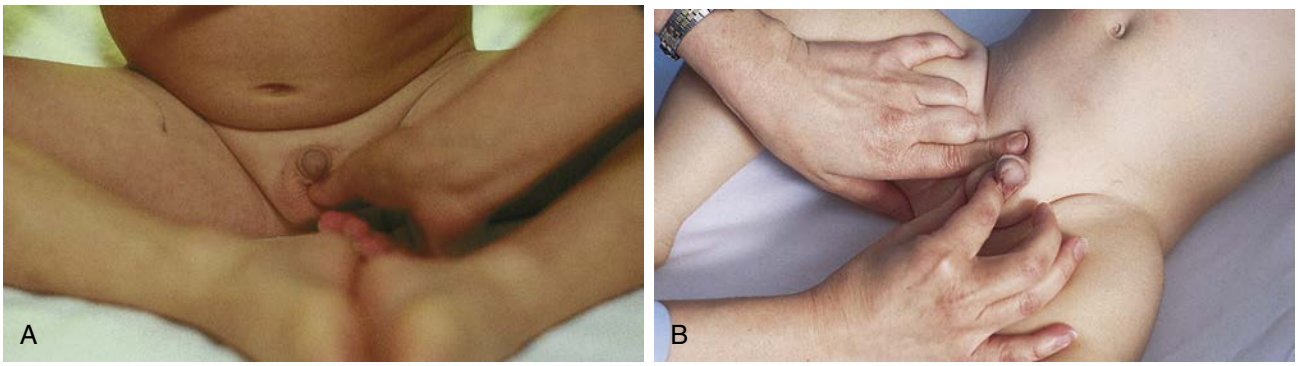


**Fig. 4.39** **A,** Preventing the cremasteric reflex by having the child sit in the tailor position. **B,** Blocking the inguinal canal during palpation of the scrotum for descended testes.

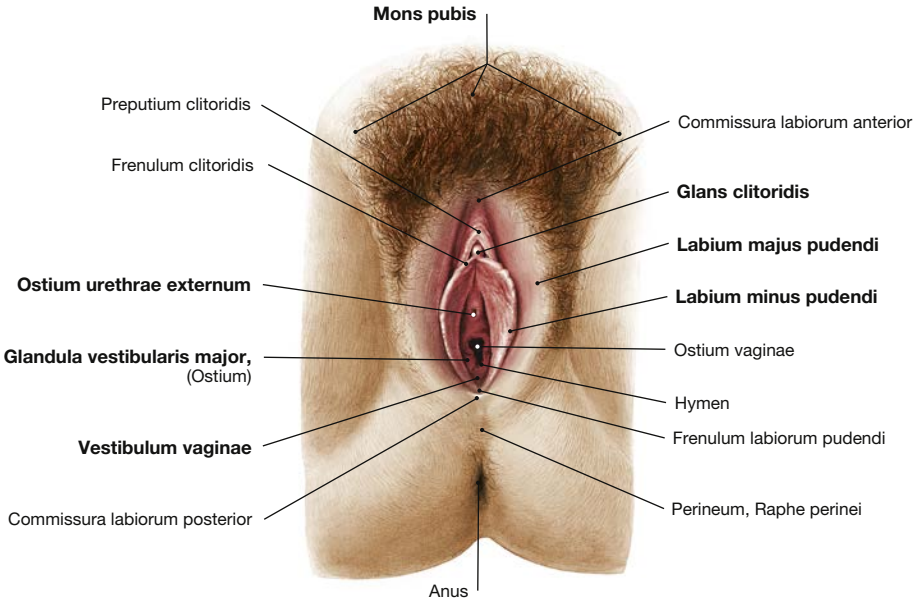


**Fig. 4.40** External structures of the genitalia in a postpubertal female. The labia are spread to reveal deeper structures. (From Paulsen, F., & Waschke, J. [2014]. *Sobotta atlas of human anatomy* [Vol. 2, 15th ed.]. Munich, Germany: Elsevier.)

adipose tissue over the symphysis pubis. At puberty, the mons is covered with hair, which extends along the labia. The usual pattern of female hair distribution is an inverted triangle. The appearance of soft, downy hair along the labia majora is an early sign of sexual maturation. Note the size and location of the **clitoris**, a small, erectile organ located at the anterior end of the labia minora. It is covered by a small flap of skin, the **prepuce**.

The **labia majora** are two thick folds of skin running posteriorly from the mons to the posterior commissure of the vagina. Internal to the labia majora are two folds of skin called the **labia minora**. Although the labia minora are usually prominent in newborns, they gradually atrophy, which makes them almost invisible until their enlargement during puberty. The inner surface of the labia should be pink and moist. Note the size of the labia and any evidence of fusion, which may suggest labial adhesion or male scrota. Normally, no masses are palpable within the labia.

The **urethral meatus** is located posterior to the clitoris and is surrounded by the Skene glands and ducts. Although not a prominent structure, the meatus appears as a small V-shaped slit. Note its location, especially if it opens from the clitoris or inside the vagina. Gently palpate the glands, which are common sites of cysts and sexually transmitted lesions.

The **vaginal orifice** is located posterior to the urethral meatus. Its appearance varies depending on individual anatomy and sexual activity. Ordinarily, examination of the vagina is limited to inspection. In virgins, a thin crescent-shaped or circular membrane, called the **hymen**, may cover part of the vaginal opening. In some instances, it completely occludes the orifice. After rupture, small rounded pieces of tissue called **caruncles** remain. Although an imperforate hymen denotes lack of penile intercourse, a perforate one does not necessarily indicate sexual activity.

**! NURSING ALERT**

In girls who have been circumcised, the genitalia will appear different. Do not show surprise or disgust but note the appearance and discuss the procedure with the child and/or parent (see also Chapter 2, Cultural Considerations "Circumcision").

Surrounding the vaginal opening are **Bartholin glands**, which secrete a clear, mucoid fluid into the vagina for lubrication during intercourse. Palpate the ducts for cysts. Also note the discharge from the vagina, which is usually clear, white, or slightly yellow with odor.

## ANUS

After examination of the genitalia, it is easy to identify the anal area, although the child should be placed on the abdomen or side. Note the general firmness of the **buttocks** and symmetry of the **gluteal folds**. Assess the tone of the anal sphincter by eliciting the **anal reflex (anal wink)**. Gently scratching the anal area results in an obvious quick contraction of the external anal sphincter.

## 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 older children the typical double S curve.

Marked curvatures in posture are abnormal. **Scoliosis**, lateral curvature of the spine, is an important childhood problem, and more common in girls. Although scoliosis may be identified by observing and palpating the spine and noting a sideways displacement, more objective tests include:

- With the child (clothed in a gown that is open in the back, with underwear that exposes the iliac crests and posterior and anterior superior iliac spines) bending forward from the waist so that the back is parallel to the floor with knees straight and arms hanging freely, observe from the back, noting thoracic and/or lumbar asymmetry.
- With the child standing erect, observe from behind, noting asymmetry of the shoulders, scapulae, waistline, and hips or distance that the arms hang from the trunk.

Inspect the back, especially along the spine, for any tufts of hair, dimples, or discoloration. Mobility of the vertebral column is easy to assess in most children because of their tendency to be in constant motion during the examination. However, you can test mobility by asking the child to sit up from a prone position or to do a modified sit-up exercise.

Movement of the cervical spine is an important diagnostic sign of neurologic problems, such as meningitis. Normally movement of the head in all directions is effortless.

**! NURSING ALERT**

Hyperextension of the neck and spine, or *opisthotonos,* which is accompanied by pain when the head is flexed, is always referred for immediate evaluation.

### 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. This is so often taken for granted that an extra digit (**polydactyly**) or fusion of digits (**syndactyly**) may go unnoticed.

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.

Assess the shape of bones. There are several variations of bone shape in children. Although many of them cause parents concern, most are benign and require no treatment. **Bowleg**, or **genu varum**, is lateral bowing of the tibia. It is clinically present when the child stands with an outward bowing of the legs, giving the appearance of a bow. Usually, there is an outward curvature of both femur and tibia (Fig. 4.41A). Toddlers are usually bowlegged after beginning to walk until

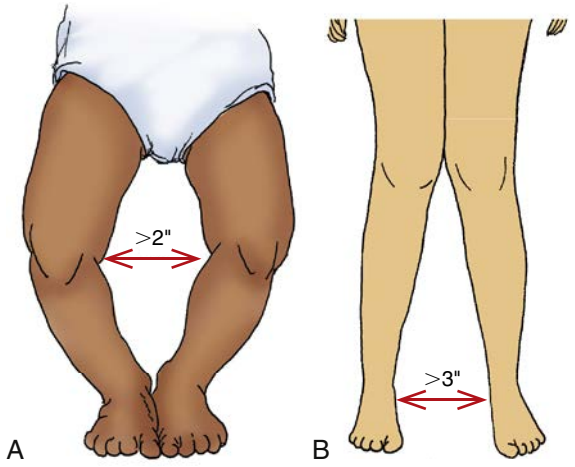


**Fig. 4.41** A, Genu varum. B, Genu valgum.

all of their lower back and leg muscles are well developed. Unilateral or asymmetric bowlegs that are present beyond 2 to 3 years old, particularly in African American children, may represent pathologic conditions requiring further investigation.

**Knock-knee**, or **genu valgum**, appears as the opposite of bowleg, in that the knees are close together but the feet are spread apart. It is determined clinically by using the same method as for genu varum but by measuring the distance between the medial malleoli, which normally should be less than 7.5 cm (3 inches) (see Fig. 4.41B). Knock-knee is normally present in children from about 2 to 7 years old. Knock-knee that is excessive, asymmetric, accompanied by short stature, or evident in a child nearing puberty requires further evaluation.

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. Development of the arch occurs naturally from the action of walking. Normally at birth the feet are held in a valgus (outward) or varus (inward) position. To determine whether a foot deformity at birth is a result of intrauterine position or development, scratch the outer, then inner, side of the sole. If the foot position is self-correctable, it will assume a right angle to the leg. As the child begins to walk, the feet turn outward less than 30 degrees and inward less than 10 degrees.

Toddlers have a "toddling" or broad-based gait, which facilitates walking by lowering the center of gravity. As the child reaches preschool age, the legs are brought closer together. By school age, the walking posture is much more graceful and balanced.

The most common gait problem in young children is **pigeon toe**, or **toeing in**, which usually results from torsional deformities, such as internal tibial torsion (abnormal rotation or bowing of the tibia). Tests for tibial torsion include measuring the thigh–foot angle, which requires considerable practice for accuracy.

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 during infancy but abnormal after about 1 year old or when locomotion begins (see Fig. 7.8).

### Joints

Evaluate the joints for range of motion. Normally this requires no specific testing if you have observed the child's movements during the examination. However, routinely investigate the hips in infants for congenital dislocation by checking for subluxation of the hip (see Chapter 29). Report any evidence of joint immobility or hyperflexibility. Palpate the joints for heat, tenderness, and swelling. These signs, as well as redness over the joint, warrant further investigation.

### 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. A common site for testing tone is the biceps muscle of the arm. Children are usually willing to "show me your muscles" by clenching their fists.

Estimate strength by having the child use an extremity to push or pull against resistance, as in the following examples:

**Arm strength:** Child holds the arms outstretched in front of the body and tries to raise and lower the arms while downward and upward pressure, respectively, is applied.

**BOX 4.14 Tests for Cerebellar Function**

**Finger-to-nose test:** With the child's arm extended, ask the child to touch the nose with the index finger with the eyes open and then closed.

**Heel-to-shin test:** Have the child stand and run the heel of one foot down the shin or anterior aspect of the tibia of the other leg, both with the eyes open and then closed.

**Romberg test:** Have the child stand with the eyes closed and heels together; falling or leaning to one side is abnormal and is called the Romberg sign.

**Hand strength:** Child shakes hands with nurse and squeezes one or two fingers of the nurse's hand.

**Leg strength:** Child sits on a table or chair with the legs dangling and tries to raise and lower the legs while downward and upward pressure, respectively, is applied.

Note symmetry of strength in the extremities, hands, and fingers, and report evidence of **paresis**, or weakness.

## NEUROLOGIC ASSESSMENT

The assessment of the nervous system is the broadest and most diverse part of the examination process because every human function, both physical and emotional, is controlled by neurologic impulses. Much of the neurologic examination has already been discussed, such as assessment of behavior, sensory testing, and motor function. The following focuses on a general appraisal of cerebellar function, deep tendon reflexes, and the cranial nerves.

### Cerebellar Function

The cerebellum controls balance and coordination. Much of the assessment of cerebellar function is included in 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 a toy, button clothes, tie shoes, or draw a straight line on a piece of paper (provided the child is old enough to do these activities). Coordination can also be tested by any sequence of rapid, successive movements, such as quickly touching each finger with the thumb of the same hand.

Several tests for cerebellar function can be performed as games (Box 4.14). When a Romberg test is done, stay beside the child if there is a possibility that he or she might fall. School-age children should be able to perform these tests, although in the finger-to-nose test, preschoolers normally can bring the finger only within 5 to 7.5 cm (2 to 3 inches) of the nose. Difficulty in performing these exercises indicates a poor sense of position (especially with the eyes closed) and incoordination (especially with the eyes open).

### Reflexes

Testing reflexes is an important part of the neurologic examination. Persistence of primitive reflexes (see Chapter 7), loss of reflexes, or hyperactivity of deep tendon reflexes is usually a result of a cerebral insult.

Elicit reflexes by using the rubber head of the reflex hammer, edge of the stethoscope diaphragm, flat of the finger, or side of the hand. If the child is easily frightened by equipment, use your hand or finger. Although testing reflexes is a simple procedure, the child may inhibit the reflex by unconsciously tensing the muscle. To avoid tensing, distract younger children with toys or talk to them. Older children can concentrate on the exercise of grasping their two

**Fig. 4.42** Testing for the triceps reflex. The child is placed supine, with the forearm resting over the chest, and the triceps tendon is struck. *Alternate procedure:* The child's arm is abducted with the upper arm supported and the forearm allowed to hang freely. The triceps tendon is struck. Normal response is partial extension of the forearm.

**Fig. 4.43** Testing for the biceps reflex. The child's arm is held by placing the partially flexed elbow in the examiner's hand with the thumb over the antecubital space. The examiner's thumbnail is struck with a hammer. Normal response is partial flexion of the forearm.

hands in front of them and trying to pull them apart. This diverts their attention from the testing and causes involuntary relaxation of the muscles.

**Deep tendon reflexes** are stretch reflexes of a muscle. The most common deep tendon reflex is the **knee jerk reflex**, or **patellar reflex** (sometimes called the **quadriceps reflex**). Figs. 4.42 to 4.45 illustrate the reflexes normally elicited. Report any diminished or hyper-reflexive response for further evaluation.

## Cranial Nerves

Assessment of the cranial nerves is an important area of neurologic assessment (Fig. 4.46; Table 4.11). With young children, present the tests as games to foster trust and security at the beginning of the examination. Include the cranial nerve test when examining each system, such as cardinal positions (extraocular movements) of gaze (Fig. 4.47) during examination of the eyes and tongue movement and strength, gag reflex, swallowing, and position of the uvula during examination of the mouth.

**Fig. 4.44** Testing for the patellar, or knee-jerk, reflex using distraction. The child sits on the edge of the examining table (or on the parent's lap) with the lower legs flexed at the knee and dangling freely. The patellar tendon is tapped just below the kneecap. Normal response is partial extension of the lower leg.

**Fig. 4.45** Testing for the Achilles reflex. The child should be in the same position as for the knee-jerk reflex. The foot is supported lightly in the examiner's hand, and the Achilles tendon is struck. Normal response is plantar flexion of the foot (the foot pointing downward).

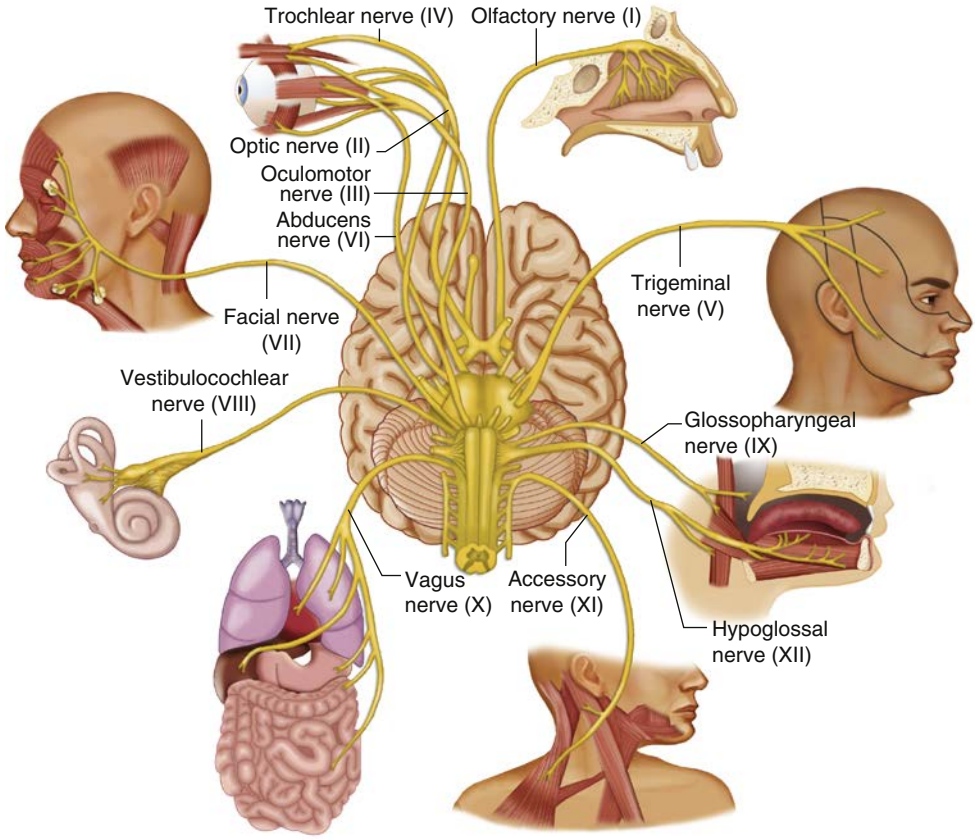


**Fig. 4.46** Cranial nerves. (From Patton, K. T., & Thibodeau, G. A. [2013]. *Anatomy and physiology* [8th ed.]. St Louis, MO: Mosby.)

## TABLE 4.11 Assessment of Cranial Nerves

| Description and Function | Tests |
|---|---|
| **I—Olfactory Nerve** | |
| Olfactory mucosa of nasal cavity<br>Smell | With eyes closed, have child identify odors, such as orange, chocolate, alcohol from a swab, or other smells; test each nostril separately. |
| **II—Optic Nerve** | |
| Rods and cones of retina, optic nerve<br>Vision | Check for perception of light, visual acuity, peripheral vision, color vision, and normal optic discs. |
| **III—Oculomotor Nerve** | |
| Extraocular muscles of eye:<br>• Superior rectus—moves eyeball up and in<br>• Inferior rectus—moves eyeball down and in<br>• Medial rectus—moves eyeball nasally<br>• Inferior oblique—moves eyeball up and out | Have child follow an object (toy) or light in six cardinal positions of gaze (see Fig. 4.47). |
| Pupil constriction and accommodation | Assess for PERRLA (Pupils Equal, Round, React to Light, and Accommodation). |
| Eyelid closing | Check for proper placement of eyelid. |
| **IV—Trochlear Nerve** | |
| Superior oblique (SO) muscle—moves eye down and out | Have child look down and in (see Fig. 4.47). |
| **V—Trigeminal Nerve** | |
| Muscles of mastication | Have child bite down hard and open jaw; test symmetry and strength. |
| Sensory—face, scalp, nasal and buccal mucosa | With child's eyes closed, see if child can detect light touch in mandibular and maxillary regions. Test corneal and blink reflex by touching cornea lightly with a whisk of cotton ball twisted into a point (approach from side so that the child does not blink before cornea is touched). |

## TABLE 4.11 Assessment of Cranial Nerves—cont'd

| Description and Function | Tests |
|---|---|
| **VI—Abducens Nerve** | |
| Lateral rectus (LR) muscle—moves eye temporally | Have child look toward temporal side (see Fig. 4.47). |
| **VII—Facial Nerve** | |
| Muscles for facial expression | Have child smile, frown, make funny face, or show teeth to see symmetry of expression. |
| Anterior two-thirds of tongue (sensory) | Have child identify sweet or salty solution; place each taste on anterior section and sides of protruding tongue; if child retracts tongue, solution will dissolve toward posterior part of tongue. |
| **VIII—Auditory, Acoustic, or Vestibulocochlear Nerve** | |
| Internal ear<br>Hearing and balance | Test hearing; whisper words in each ear to be repeated; note any loss of equilibrium or presence of vertigo. |
| **IX—Glossopharyngeal Nerve** | |
| Pharynx, tongue | Stimulate posterior pharynx with a tongue blade; child should gag. |
| Posterior third of tongue<br>Sensory | Test sense of sour or bitter taste on posterior segment of tongue. |
| **X—Vagus Nerve** | |
| Muscles of larynx, pharynx, some organs of gastrointestinal system, sensory fibers of root of tongue, heart, and lung | Note hoarseness of voice, gag reflex, and ability to swallow.Check that uvula is in midline; when stimulated with tongue blade, it should deviate upward and to stimulated side. |
| **XI—Accessory Nerve** | |
| Sternocleidomastoid and trapezius muscles of shoulder | Have child shrug shoulders while applying mild pressure; with examiner's palms placed laterally on child's cheeks, have child turn head against opposing pressure on either side; note symmetry and strength. |
| **XII—Hypoglossal Nerve** | |
| Muscles of tongue | Have child move tongue in all directions; have child protrude tongue as far as possible; note any midline deviation.<br>Test strength by placing tongue blade on one side of tongue and having child move it away. |

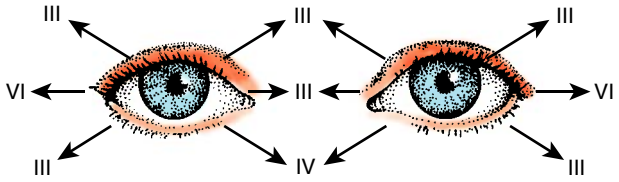


**Fig. 4.47** Checking extraocular movements in the six cardinal positions indicates the functioning of cranial nerves III, IV, and VI. (From Ignatavicius, D. D., & Workman, L. M. [2016]. *Medical-surgical nursing: Patient-centered collaborative care* [8th ed.]. St Louis, MO: Elsevier.)

## CLINICAL JUDGMENT AND NEXT-GENERATION NCLEX® EXAMINATION-STYLE QUESTIONS

1. The parents of a young infant have arrived for a well child visit. The nurse begins the interview and notices that the mother becomes extremely anxious with the interview questions. Since blocks to communication can adversely affect the child's care, the nurse must look for and recognize clues that indicate communication may be less than optimal. The possible blocks to communication that may interfere with a successful interview during the well child visit are shown below. **Select all that apply.**
   **A.** Long periods of silence before answering a question.
   **B.** Sudden, frequent interruptions during the interview.
   **C.** Concern is raised about the child's feeding schedule.
   **D.** Nervous habits that distract from the interview.
   **E.** Questions are asked by both the mother and father.

2. The nurse is communicating with a 6-year-old girl hospitalized for pneumonia. She needs to take the child's blood pressure and is selecting the blood pressure cuff for the assessment. **Choose the *most likely* options for the information missing from the statements below by selecting from the list of options provided.** The nurse recognizes that when measuring blood pressure in the upper arm, a blood pressure cuff with a bladder width equal to __1__ of the upper arm circumference most accurately reflects __2__ pressure.

| OPTIONS for 1 | OPTIONS for 2 |
|---|---|
| 20% | radial arterial |
| 30% | radial venous |
| 40% | dorsal arterial |
| 50% | popliteal venous |
| 60% | brachial arterial |

3. Organized approaches to performing a physical examination on a child is important. The orderly sequence may be altered to accommodate the child's developmental needs. **For each physical examination assessment approach below, use an X to indicate whether the approach is Effective, Ineffective, or Unrelated.**

| Nursing Action: Approach to Physical Examination | Effective | Ineffective | Unrelated |
|---|---|---|---|
| With toddlers, restraints help keep the child still and requesting a parent's assistance is inappropriate. | | | |
| An infant's physical examination is always done head to toe, similarly to the adult. | | | |
| When examining a preschooler, giving a choice of which body parts to examine first may be helpful in gaining the child's cooperation. | | | |
| Giving explanations about body systems can make adolescents nervous due to their egocentricities. | | | |
| With an adolescent it is best to have a parent present during the examination. | | | |
| The parent's knowledge of stethoscopes can help with cooperation during the examination | | | |

4. Growth measurement is a key element to assess the health status in children. One measurement is linear growth measurement. What is essential in the nursing actions listed below, for the nurse to understand to appropriately perform this technique? **Use an X for the nursing actions listed below that are Indicated (appropriate or necessary), Contraindicated (could be harmful), or Non-Essential (makes no difference or not necessary).**

| Nursing Action | Indicated | Contraindicated | Non-Essential |
|---|---|---|---|
| Understand the difference in measurement for children who can stand alone and for those who must lie recumbent. | | | |
| Use a stadiometer to measure infant length. | | | |
| Two measurers are required for a recumbent child. | | | |
| Reposition the child and repeat the procedure. Measure at least twice (ideally three times). Average the measurements for the final value. | | | |
| Demonstrate competency when measuring the growth of infants, children, and adolescents. Refresher sessions should be taken when a lack of standardization occurs. | | | |
| Understand the difference in BMI in children versus adults. | | | |

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