Chapter 18

Radiography of Pediatric and Geriatric Patients

Learning Objectives

- Demonstrate appropriate levels of communication with children of any age
- Immobilize an infant or toddler for a radiographic examination
- Compare the characteristics of the developing skeleton with those of the mature skeleton

Learning Objectives (Cont'd)

- Formulate exposures for pediatric radiographic techniques
- Identify pediatric radiographic examinations that vary in method from adult examinations
- List and describe three pathologic conditions common to pediatric patients
- List considerations that improve communication and compliance when dealing with older patients

Learning Objectives (Cont'd)

- Describe changes that occur to the skeleton and the soft tissues as a result of aging
- Adjust radiographic exposures appropriately for patients with osteoporosis and/or advanced age
- List signs that suggest the possibility of non-accidental trauma in children and in geriatric patients

Create a Child-Friendly Atmosphere

- Provide furniture that is child-sized
- Offer books, games, or toys to occupy children during the waiting period
- Give children rewards such as stickers

Interacting with Infants and Toddlers

- Infants
  - Feel secure when warm and snug
  - Like to be held firmly yet gently
  - Relate to faces
  - Like eye contact but cannot focus well
  - Respond to soft voices
- Toddlers
  - Are still developing social skills
  - Like to hold onto something familiar
  - Are more comfortable interacting at eye level
  - Like eye contact
  - Respond well to firm but gentle touch

Communicating with Young Children

- Involve child by offering valid choices
- Answer questions simply and honestly
- Praise child for cooperative behavior

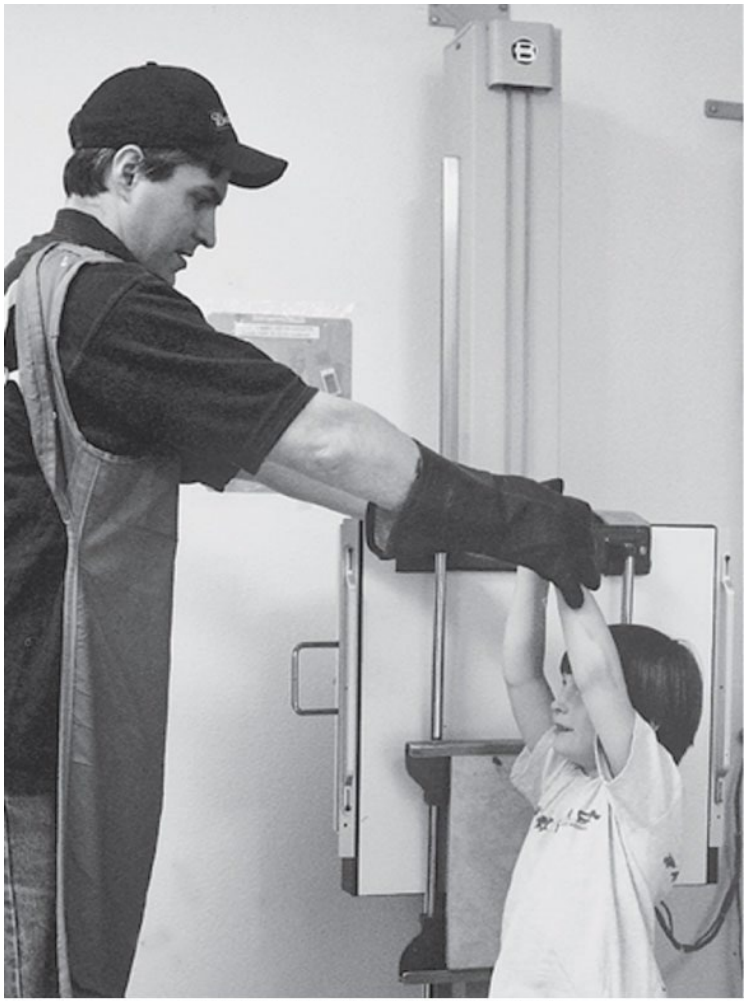
Ehrlich RA, Daly JA: *Patient care in radiography,* ed 7, St Louis, 2009, Mosby.

Communicating with Older Children and Adolescents

- Older Children
  - Have a better understanding of their surroundings and circumstances
  - Respond to humor
  - Are willing to help
  - Appreciate valid choices and honest praise
- Adolescents
  - Behave similarly to adults
  - May have short attention spans
  - May have an exaggerated sense of modesty

Immobilization

- Use immobilization devices to avoid having someone hold a child during an exposure
- If a child must be held:
  - Have a non-occupationally exposed person hold the child
  - Provide appropriate protective apparel for person holding the child



Immobilization Devices

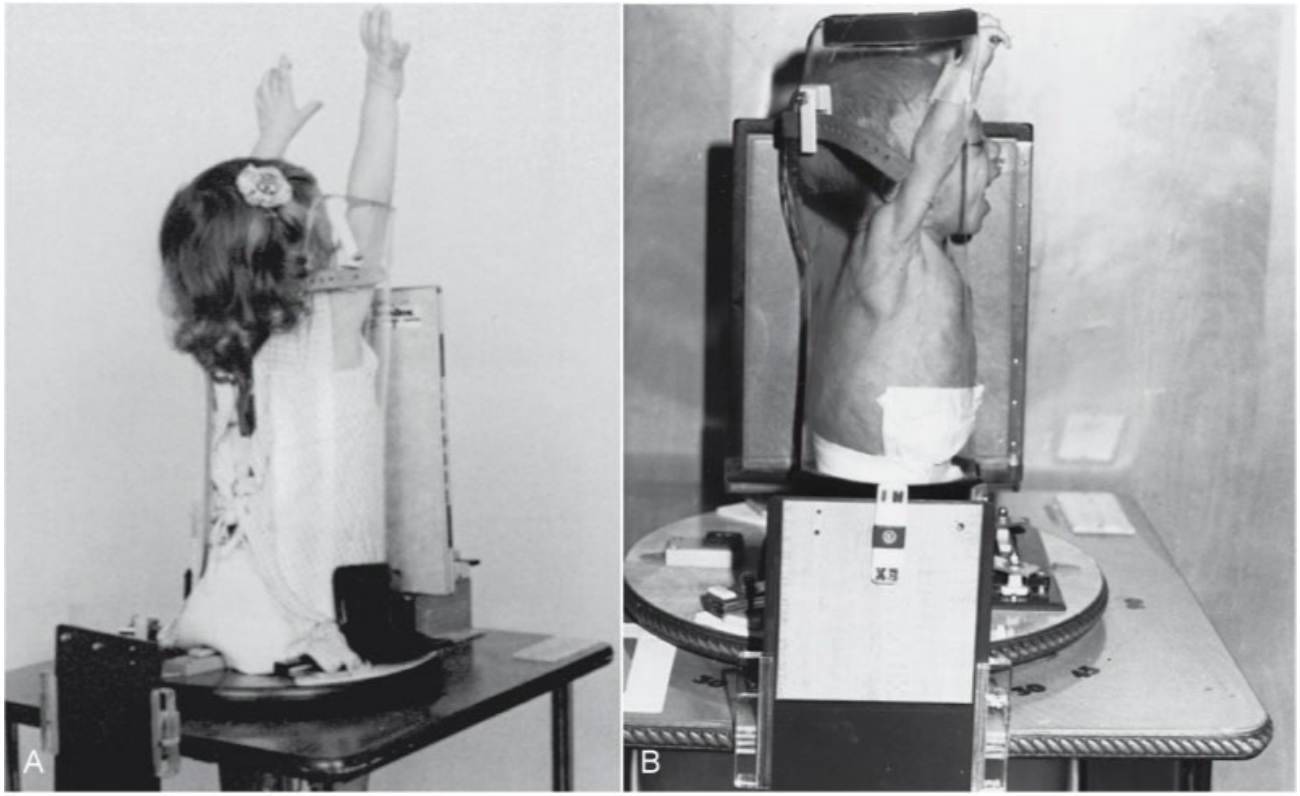
- Compression bands
- Frames/boards with Velcro straps
- Clamps
- Sheets

Olympic Medical, Seattle, Wash.

Ballinger PW, Frank ED: *Merrill's atlas of radiographic positions and radiologic procedures*, ed 10, St Louis, 2003, Mosby.

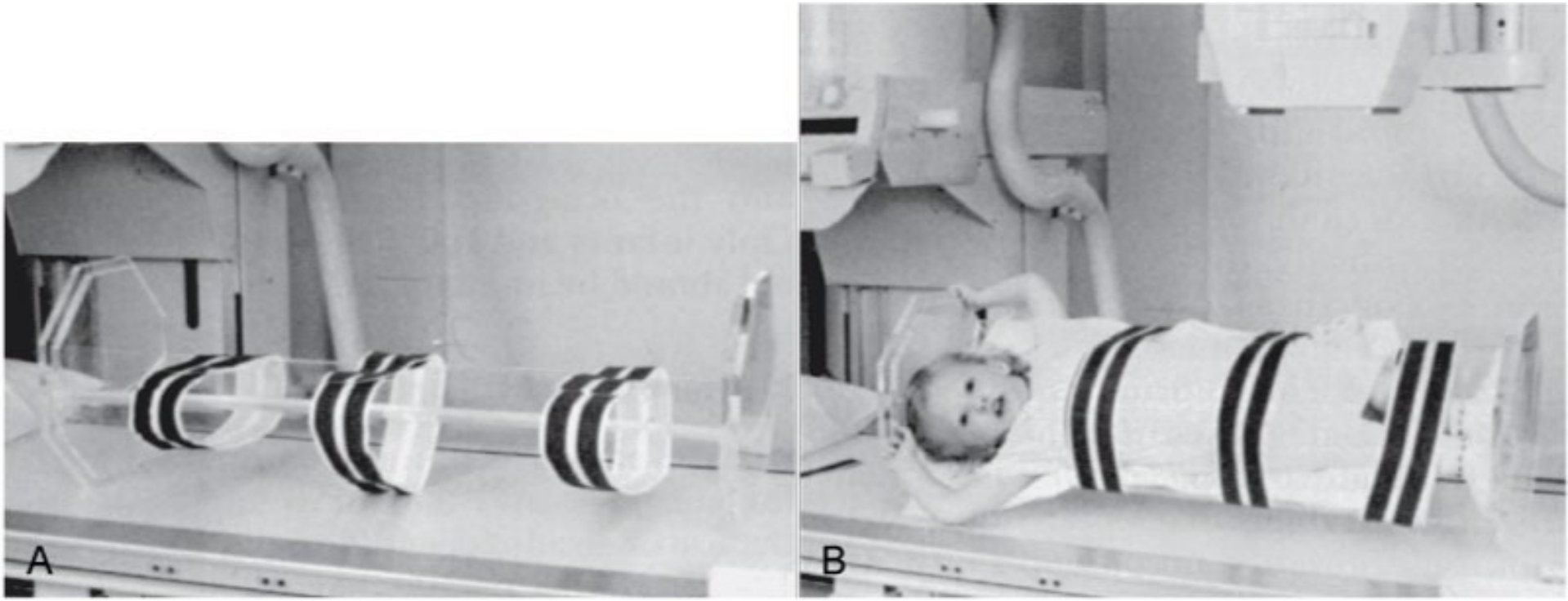
Immobilization Devices (Cont'd)

- Pigg-O-Stat



B, Ehrlich RA, Daly JA: *Patient care in radiography.* ed 7, St Louis, 2009, Mosby.

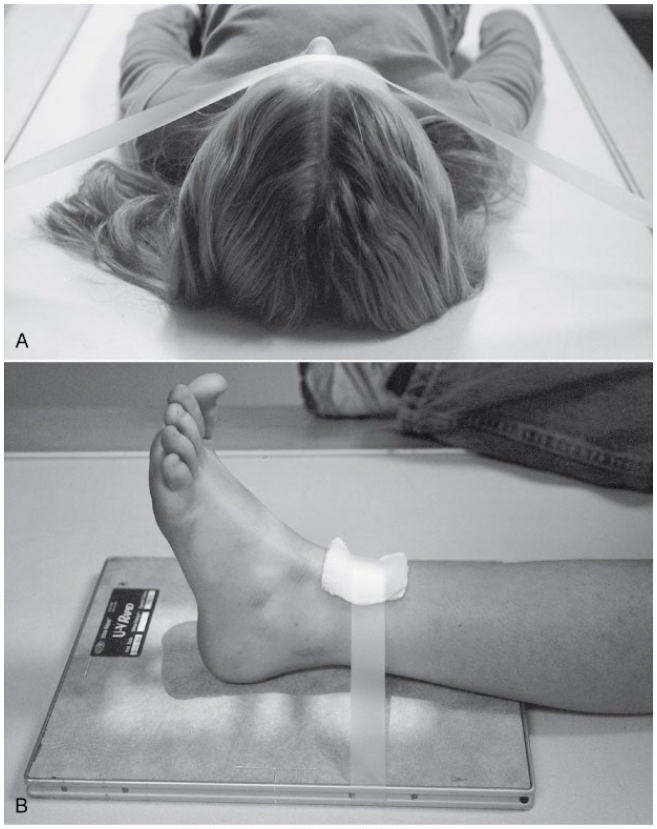
Immobilization Devices (Cont'd)



Adler AM, Carlton RR: *Introduction to radiography and patient care*, ed 4, Philadelphia, 2007, Saunders.

Immobilization Devices (Cont'd)

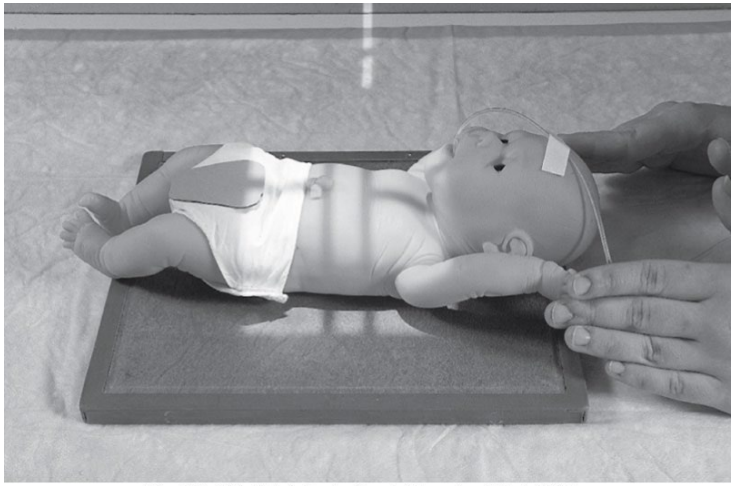
- Tape, stockinette, and sponges



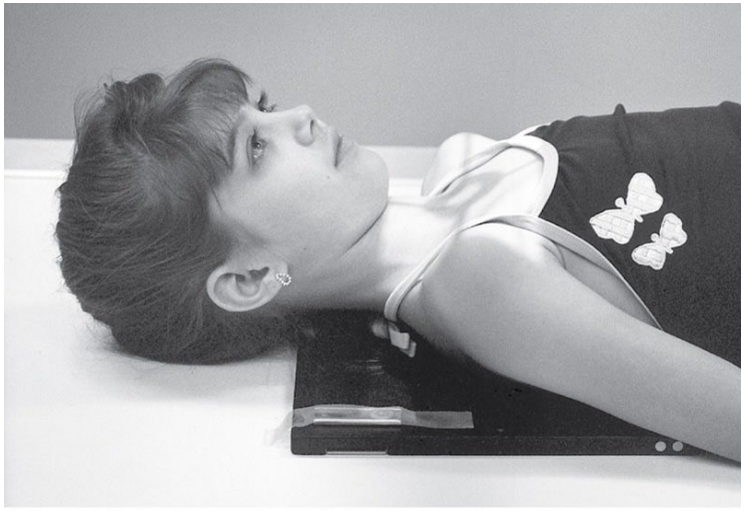
Ehrlich RA, Daly JA: *Patient care in radiography*, ed 7, St Louis, 2009, Mosby.

Pediatric Radiography

- Use shielding
- Select IR appropriate to size of patient and/or body part
- Determine if a comparison (bilateral) study is needed
- Use a grid only when the part is >12 cm in thickness

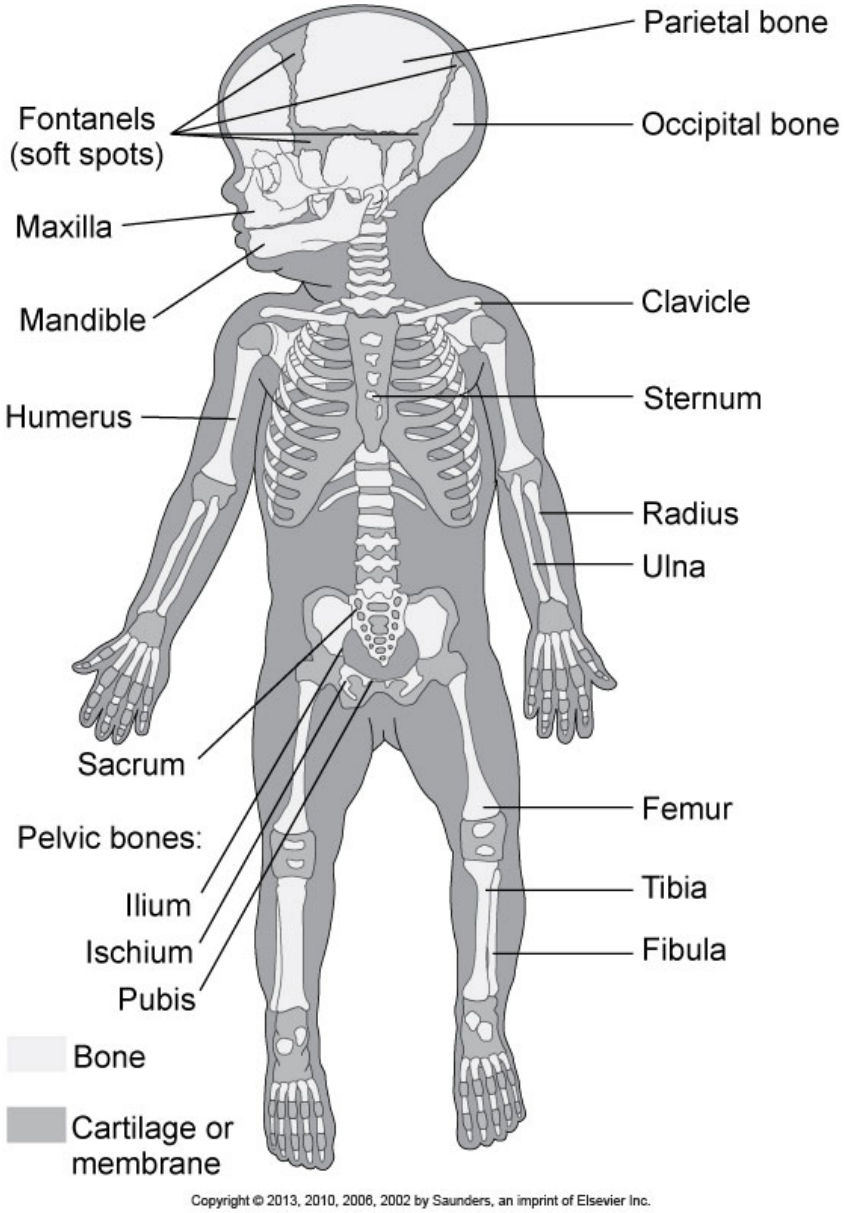


Ballinger PW, Frank ED: *Merrill's atlas of radiographic positions and radiologic procedures*, ed 10, St Louis, 2003, Mosby.



Pediatric Anatomy

- Head is large in proportion to body size
- Spinal curvatures differ depending on age
- Skull and other bony areas are not fully ossified
- Bones are less dense and more easily penetrated by radiation



Pediatric Anatomy

Pediatric

Adult

Formulating Pediatric Exposure Techniques

- Use pediatric technique chart when available
- If pediatric chart is not available:
  - Compare part size to part of similar size on an adult
  - Modify technique chart factors for a small adult by:
    - Decreasing 2 kVp for each centimeter difference in measurement, and
    - Using 80% of the suggested mAs

Formulating Pediatric Exposure Techniques (Cont'd)

- Keep exposure times short to avoid motion blur on image

Pediatric Pathology

- Swallowed or aspirated foreign objects
- Greenstick fractures
- Slipped epiphyses
- Endocrine system malfunctions
- Non-accidental trauma

Ballinger PW, Frank ED: *Merrill's atlas of radiographic positions and radiologic procedures*, ed 10, St Louis, 2003, Mosby.

Geriatric Patients

- Older adults:
  - Are usually mentally alert
  - May have reduced hearing and visual acuity
  - May move slowly and have limited flexibility
  - Appreciate being treated with respect

Ehrlich RA, Daly JA: *Patient care in radiography*, ed 7, St Louis, 2009, Mosby.

Communicating with Patients Who Have Hearing Loss

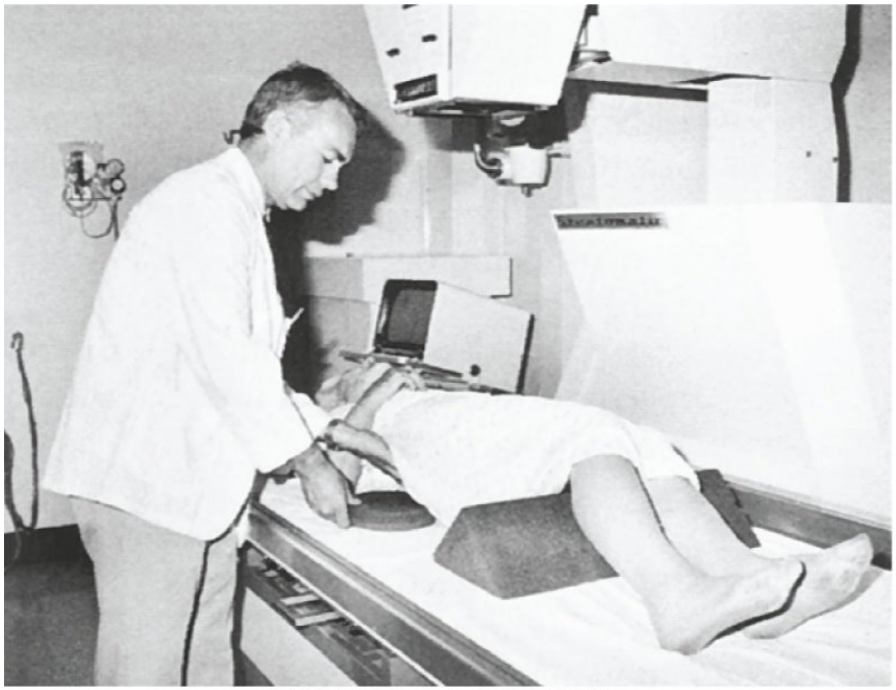
- Gain patient's attention before speaking
- Face the patient directly when speaking
- For patients with hearing loss, speak in a lower tone and louder volume, but don't shout
- Keep background noise to a minimum
- Ask open-ended questions
- Validate understanding by asking the patient to repeat instructions
- Be patient and rephrase instructions when patients have difficulty understanding

Physical Effects of Aging

- Decreased calcium content resulting in porous, radiolucent bones
- Atrophy of muscle tissue
- Loss of skin elasticity and subcutaneous fat
- Fragile veins

Geriatric Radiography

- Allow patients to wear eyeglasses if possible
- Give instructions prior to having patients remove hearing aids
- Use table pads and sponges to protect fragile skin
- Use positive and firm but gentle touch when positioning to avoid injury



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Formulating Geriatric Exposure Techniques

- For patients
  - more than 70 years of age, decrease kilovoltage by 4 to 6 kVp
  - more than 80 years of age, kilovoltage may need to be reduced by up to 10 kVp

Geriatric Pathology

- Osteoarthritis
- Osteoporosis
- Decubitus ulcers
- Heart disease
- Parkinson disease
- Alzheimer disease

Summary

- Use child-sized furniture, toys, and rewards to create a child-friendly atmosphere
- For patients of all ages, use positive touch, make eye contact, and communicate respectfully
- Use immobilization devices to restrain patients
- Never hold a patient during an exposure

Summary (Cont'd)

- If a patient must be held, have a non-occupational worker hold the patient, and provide appropriate protective apparel to that person
- When taking radiographs of children, use shielding, select IR appropriate to size of patient and/or body part, and only use a grid when the part is >12 cm in thickness

Summary (Cont'd)

- The pediatric skeleton has a large head in proportion to body size, spinal curvatures that are absent or less pronounced, bones that are not fully ossified and are less dense
- If a pediatric technique chart is not available, compare part to part of similar size on an adult, or modify technique chart factors for small adult by decreasing 2 kVp/cm difference or using 80% of suggested mAs
- Keep exposure times short to avoid motion

Summary (Cont'd)

- Pediatric pathologic conditions include swallowed or aspirated foreign objects, greenstick fractures, slipped epiphyses, endocrine malfunctions, and non-accidental trauma
- Geriatric patients may have limited movement, flexibility, and sensory abilities
- As people age, bone calcium content is lost, muscles atrophy, skin becomes less elastic, subcutaneous fat decreases, and veins are more fragile

Summary (Cont'd)

- When taking radiographs on geriatric patients, allow them to wear eyeglasses and hearing aids if possible and use table pads and sponges to protect fragile skin
- Depending on age, decrease kilovoltage by 4 to 10 kVp for geriatric patients
- Geriatric pathologic conditions include osteoarthritis, osteopenia, osteoporosis, decubitus ulcers, heart disease, diverticulitis, Parkinson disease, and Alzheimer disease