1. Which pediatric elbow fracture is most commonly seen in the absence of a joint effusion?
   A. Supracondylar
   B. Lateral condyle
   C. Radial neck
   D. Olecranon

   Correct Answer: C

   Rationale
   In the absence of a joint effusion, the two most common pediatric fractures identified include radial neck and medial epicondyle fractures. The radial neck is partly extra-articular and the medial epicondyle is extra-articular. Thus, effusions are not always seen unless there are additional fractures and/or associated dislocation.

   Answer A is incorrect. Explanation: Supracondylar fractures are typically associated with a joint effusion.

   Answer B is incorrect. Explanation: Lateral condylar fractures are typically associated with a joint effusion.

   Answer D is incorrect. Explanation: Olecranon fractures are typically associated with a joint effusion.

References

2. Which of the following is true regarding supracondylar fractures?
   A. In a 2014 study by Bisset & Crowe, the least commonly missed elbow fracture by pediatric radiologists was a supracondylar fracture.
   B. The anterior humeral line normally passes through the anterior 1/3 of the capitellum in the majority of children.
   C. Supracondylar fractures are the second most common pediatric elbow fractures.
   D. The anterior humeral line may not be as accurate in younger children.

   Correct Answer: D

   Rationale
   The anterior humeral line may not be as accurate in younger children. In children < 5 years old, the anterior humeral line may normally intersect either the anterior or middle 1/3 of the capitellum.
Answer A is incorrect. Explanation: In a 2014 study by Bisset & Crowe, the most commonly missed elbow fracture by pediatric radiologists was a supracondylar fracture.

Answer B is incorrect. Explanation: The anterior humeral line normally passes through the middle 1/3 of the capitellum in the majority of normal children.

Answer C is incorrect. Explanation: Supracondylar fractures are the most common pediatric elbow fracture.

References

Mistakes by Pediatric Radiologists in MSK Interpretations
James E. Crowe, MD

3. In cases of Monteggia fracture-dislocation which is the most frequently missed fracture?
   A. Angulated fracture proximal ulna
   B. Angulated fracture of the radius
   C. Angulated fractures of both bones
   D. Bowing fracture of the ulna

   Correct Answer: D

Rationale
Answers A, B and C are incorrect. Angulated fractures are not missed.

References

4. Which of the following is unlikely to be obvious on a lateral view of the ankle?
   A. Subtalar coalition
   B. Calcaneonavicular coalition
   C. Osteochondral lesion of the talus
   D. Calcaneal cyst

   Correct Answer: C
Rationale

References

Bone Age: Beyond G+P
David B. Larson, MD, MBA

5. Which of the following methods should be used to assess bone age for patients under 3 years of age?
   A. Greulich and Pyle method
   B. Tanner-Whitehouse method
   C. Hemi-skeleton method
   D. BoneXpert method

   Correct Answer: C

Rationale
Hemi-skeleton methods are more accurate than hand-based methods in children under 3 years. Answer A is incorrect. Explanation: The Greulich and Pyle method is less reliable in children under 3 because of lack of and variability in ossification centers of the hand. Answer B is incorrect. Explanation: The Tanner-Whitehouse method, also based on hand radiographs, is not reliable in children under 3 years of age for the same reason. Answer C is incorrect. Explanation: BoneXpert is an automated bone age assessment tool, based on the Tanner-Whitehouse method.

References

6. Which of the following methods requires the radiologist to score twenty different ossification centers in the hand and wrist?
   A. Greulich and Pyle method
   B. Tanner-Whitehouse method
   C. Hemi-skeleton method
   D. BoneXpert method

   Correct Answer: B
Rationale
Answer A is incorrect. Explanation: The Greulich and Pyle method is based on a visual comparison to standard radiographs of the hand and wrist. Answer C is incorrect. Explanation: The hemi-skeleton method is based on summing the ossification centers of the left hemi-skeleton in young children. Answer D is incorrect. Explanation: BoneXpert is an automated bone age assessment tool, based on the Tanner-Whitehouse method, that requires no manual data entry.

References

Bone Density: Is DR Adequate?
Jeannette M. Perez-Rossello, MD

7. Quantitative computed tomography densitometry (QCT)?
   A. Is a 2-Dimensional technique
   B. Quantifies areal BMD
   C. Measures cortical and trabecular compartments separately
   D. Reported in g/cm2

   Correct Answer: C

Rationale
QCT measures cortical and trabecular compartments separately. Answer A is incorrect. Explanation: QCT is a 3-Dimensional technique. Answer B is incorrect. Explanation: QCT measures true volumetric BMD. Answer D is incorrect. Explanation: Reported in g/cm3

Reference

8. Dual-energy X-ray absorptiometry (DXA):
   A. Relatively high radiation exposure
   B. 3-Dimensional measurement
   C. Not affected by soft-tissue composition or body fat
   D. Does not account for growth related variations

   Correct Answer: D

Rationale
Explanation: DXA does not account for growth related variations, this is a limitation in the pediatric population, where bones are growing and changing in shape. Answer A is incorrect. Explanation: DXA has low radiation exposure. Answer B is incorrect. Explanation: DXA is a 2-dimensional, areal measurement. Answer C is incorrect. Explanation: Soft tissues and fat affect DXA results.
How to Read a Pediatric DEXA
Adina Alazraki, MD, FAAP

9. Regarding Dual Xray Absorptiometry:
   A. The diagnosis of osteoporosis can be made based on the DXA result alone.
   B. The T score is reported in pediatric DXA as a measure of the bone density loss since birth.
   C. DXA is a volumetric density measurement.
   D. The DXA-derived bone mineral density (BMD) is based on the two-dimensional projected area of a three-dimensional structure.

   **Correct Answer: D**

Rationale
The DXA-derived bone mineral density (BMD) is based on the two-dimensional projected area of a three-dimensional structure. Answer A is incorrect. Explanation: The diagnosis must take into account other factors including normative databases, age, gender, height, etc. Answer B is incorrect. Explanation: The T score is used in adults as a measure of bone loss since adulthood and is not applicable to pediatric patients. Answer C is incorrect. Explanation: DXA is a two-dimensional representation of a three-dimensional structure and is therefore an areal measurement rather than a true volumetric measure.

Reference

10. Factors that influence BMD for in the development of normative pediatric datasets include age, gender, ethnicity and physiologic maturity. The most common causes for misdiagnosis include all BUT:
   A. Use of T-scores
   B. Inappropriate normative datasets
   C. Inattention to short stature
   D. Scoliosis

   **Correct Answer: D**

Rationale
Answer A is incorrect. Explanation: T scores compare bone loss from adulthood and should not be used in pediatrics. The Z score compares BMD to age matched controls. Answer B is incorrect. Explanation: Age matched controls and normative data matched to the patient is very important for accurate measurements. Answer C is incorrect. Explanation: Height should be recorded for all patients and accounted for in the reporting.

Reference
11. The line marked in blue on the left image and marked with the arrow on the right image represents
   A. The median ridge
   B. The trochlear floor
   C. The crossing line
   D. The terminal sulcus
   
   **Correct Answer: B**
   
   **Rationale**
   Answer A is incorrect. Explanation: The median ridge is the ventral margin of the medial femoral condyle. Answer C is incorrect. Explanation: The crossing line occurs when the trochlear floor intersects the ventral margin of the femoral condyle. Answer D is incorrect. Explanation: The terminal sulcus is the normal contour indentation of the lateral femoral condyle.

   **Reference**

12. Which of these is not a radiographic finding seen with acetabular retroversion?
   A. The crossover sign
   B. The ischial spine sign
   C. Medial posterior wall sign
   D. Lateral displacement of the physeal scar
   
   **Correct Answer: D**
   
   **Rationale**
   Answers A, B, and C are incorrect. Explanation: The crossover sign, ischial spine sign, and medial posterior wall sign are all indicators of acetabular retroversion.

   **Reference**
   1. Tannast et al., AJR 2007; 188:1540-1552.