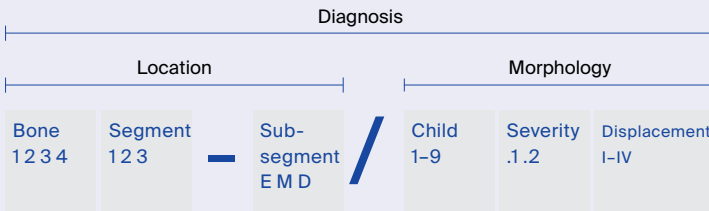


Overall structure

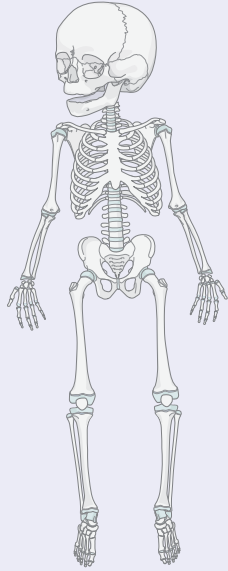
The overall structure of the classification system is based on fracture location and morphology. The fracture location is related to the four long bones and their respective segments and subsegments. The morphology of the fracture is documented by a subsegment-specific child code, a severity code, as well as an additional code for displacement of specific fractures.



“Research into the healing patterns of pediatric fractures assumes a common language that must be the prerequisite for comprehensive documentation as the basis for treatment and research”.
Theddy Slongo, 2007

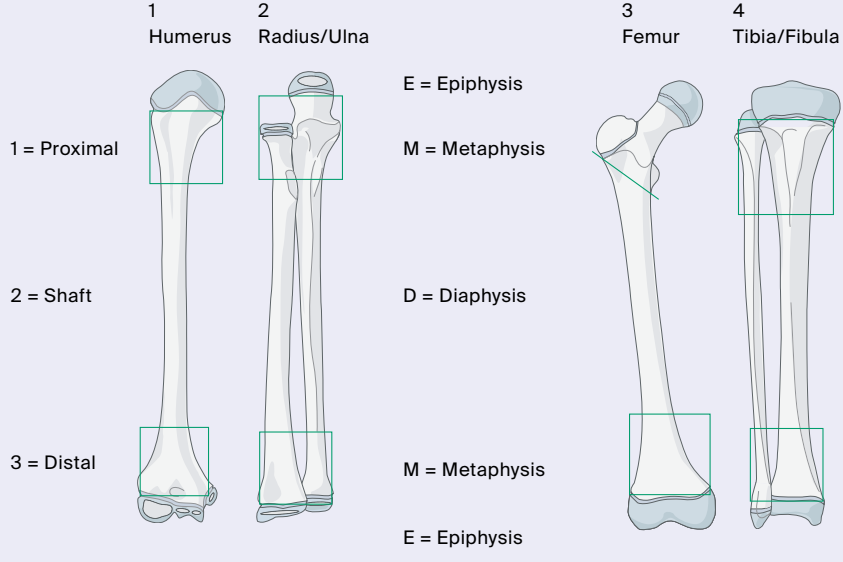
Location

The bones, and the segments within the bones, follow a coding scheme similar to that in adults, but the identification of segments differs from adults. Malleolar fractures are coded as distal tibia/fibula fractures.



The three segments can be defined as:
Segment 1: Proximal: including subsegments epiphysis (E) and metaphysis (M)
Segment 2: Shaft/diaphysis (D)
Segment 3: Distal: including subsegments metaphysis (M) and epiphysis (E)

Epiphyseal fractures (E) involve the epiphysis and respective growth plates (physis). The classification of epiphyseal fractures is in part based on the Salter-Harris system and this is referred to where appropriate. Metaphyseal fractures (M) are identified through the position of a square whose side has the same length as the widest part of the physis in question. The center of the fracture lines must be located in the square. For the pairs of bones radius/ulna and tibia/fibula, both bones must be included in the square. This square definition is not applied to the proximal femur, where metaphyseal fractures are located between the physis of the head and the intertrochanteric line.



1 Humerus

11-E Proximal epiphyseal

11-E/1.1	11-E/2.1	11-E/3.1	11-E/4.1	11-E/8.1
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11-E/1.1 Simple separation/Salter-Harris I
11-E/2.1 Separation with metaphyseal wedge/Salter-Harris II
11-E/3.1 Epiphyseal/Salter-Harris III
11-E/4.1 Epi-metaphyseal/Salter-Harris IV
11-E/8.1 Intraarticular flake fracture

11-M Proximal metaphyseal

11-M/2.1	11-M/3.1
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11-M/2.1 Torus/buckle metaphyseal
11-M/3.1 Complete metaphyseal

12-D Diaphyseal

12-D/4.1	12-D/5.1
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12-D/4.1 Transverse ($\leq 30^\circ$) diaphyseal
12-D/5.1 Oblique or spiral ($> 30^\circ$) diaphyseal

3 Femur

31-E Proximal epiphyseal

31-E/1.1	31-E/2.1	31-E/7.1	31-E/8.1
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31-E/1.1 Simple separation (SUFE/SCFE)/Salter-Harris I
31-E/2.1 Separation (SUFE/SCFE) with metaphyseal wedge/Salter-Harris II
31-E/7.1 Ligament avulsion (ligam. capitis femoris)
31-E/8.1 Flake fracture

31-M Proximal metaphyseal/femoral neck

31-M/2.1 I	31-M/3.1 I	31-M/2.1 II	31-M/3.1 II	31-M/2.1 III	31-M/3.1 III	31-M/7.1
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31-M/2.1 I Incomplete mid-cervical
31-M/3.1 I Complete mid-cervical
31-M/2.1 II Incomplete basocervical
31-M/3.1 II Complete basocervical
31-M/2.1 III Incomplete trans-trochanteric
31-M/3.1 III Complete trans-trochanteric
31-M/7.1 Ligament avulsion of greater OR lesser trochanter

32-D Diaphyseal

32-D/4.1	32-D/5.1
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32-D/4.1 Complete transverse ($\leq 30^\circ$)
32-D/5.1 Complete oblique or spiral ($> 30^\circ$)

2 Radius/Ulna

21-E Proximal epiphyseal/radial head

Isolated fractures of the radius

21r-E/1.1	21r-E/2.1	21r-E/3.1	21r-E/4.1
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21r-E/1.1 Simple separation radial head/Salter-Harris I
21r-E/2.1 Separation radial head with metaphyseal wedge/Salter-Harris II
21r-E/3.1 Epiphyseal radial head/Salter-Harris III
21r-E/4.1 Epi-metaphyseal radial head/Salter-Harris IV

21-M Proximal metaphyseal/radial neck/ulna

Isolated fractures of the ulna

21r-M/2.1	21r-M/3.1	21u-M/2.1	21u-M/3.1	21u-M/7.1
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21r-M/2.1 Torus/buckle metaphyseal radial neck
21r-M/3.1 Complete metaphyseal radial neck
21u-M/2.1 Torus/buckle metaphyseal olecranon
21u-M/3.1 Complete metaphyseal olecranon
21u-M/7.1 Avulsion of the olecranon apophysis

22-D Diaphyseal

22-D/1.1	22-D/2.1	22-D/4.1	22-D/5.1	22-D/6.1	22-D/7.1
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22-D/1.1 Bowing radius and ulna
22-D/2.1 Greenstick radius and ulna
22-D/4.1 Complete forearm transverse ($\leq 30^\circ$) radius and ulna
22-D/5.1 Complete forearm oblique or spiral ($> 30^\circ$) radius and ulna
22-D/6.1 Monteggia lesion, ulna
22-D/7.1 Galeazzi lesion, radius

23-M Distal metaphyseal

23-M/2.1	23-M/3.1
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23-M/2.1 Torus/buckle metaphyseal, radius and ulna
23-M/3.1 Complete metaphyseal radius and ulna

23-E Distal epiphyseal

23-E/1.1	23-E/2.1	23-E/3.1	23-E/4.1	23-E/7.1
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23-E/1.1 Simple separation/Salter-Harris I radius and ulna
23-E/2.1 Separation with metaphyseal wedges/Salter-Harris II radius and ulna
23-E/3.1 Epiphyseal/Salter-Harris III radius and ulna
23-E/4.1 Epi-metaphyseal/Salter-Harris IV radius and ulna
23-E/7.1 Radio-ulnar ligament avulsion

Paired bones

Except for the known Monteggia and Galeazzi lesions, when paired bones radius/ulna or tibia/fibula are fractured with the same child pattern, a single classification code should be used with the severity code defining the worst of the two bones. When a single bone is fractured, a small letter describing that bone (ie, "r", "u", "t" or "f") should be added after the segment code (eg, the code "22u" identifies an isolated diaphyseal fracture of the ulna).

When the paired bones radius/ulna or tibia/fibula are fractured with different child patterns (eg, a complete fracture of the radius and a bowing fracture of the ulna), each bone must be coded separately, including the corresponding small letter (22r-D/5.1 & 22u-D/1.1).

Frequent fracture combinations in paired bones

Radius/Ulna	Tibia/Fibula
21r-M/3.1 III, 21u-M/3.1 22r-D/5.1, 22u-D/1.1 23r-E/2.1, 23u-E/7.1 23r-M/2.1, 23u-M/3.1 23r-M/2.1, 23u-E/7.1	41t-E/2.1, 41f-M/3.1 42t-D/4.1, 42f-D/1.1 42t-D/5.2, 42f-D/2.1 43t-E/4.1, 43f-E/1.1 43t-E/4.2, 43f-E/1.1 43t-E/2.1, 43f-M/3.1

Complete radial neck Type III and olecranon fracture complete
Simple oblique or spiral complete radius and bowing of the ulna
Radial Salter-Harris II and fracture of the ulnar styloid
Torus/buckle of the radius and complete metaphyseal ulna
Torus/buckle of the radius and fracture of the ulnar styloid

Radius/Ulna	Tibia/Fibula
41t-E/2.1, 41f-M/3.1 42t-D/4.1, 42f-D/1.1 42t-D/5.2, 42f-D/2.1 43t-E/4.1, 43f-E/1.1 43t-E/4.2, 43f-E/1.1 43t-E/2.1, 43f-M/3.1	41t-E/2.1, 41f-M/3.1 42t-D/4.1, 42f-D/1.1 42t-D/5.2, 42f-D/2.1 43t-E/4.1, 43f-E/1.1 43t-E/4.2, 43f-E/1.1 43t-E/2.1, 43f-M/3.1

Proximal lower leg Salter-Harris II tibia and complete metaphyseal fibula
Complete diaphyseal tibia and bowing of the fibula
Multifragmentary diaphyseal tibia and greenstick fibula
Combined fracture: Salter-Harris III tibia and Salter-Harris I fibula
Multifragmentary epiphyseal fracture tibia Salter-Harris III and Salter-Harris I fibula
Distal lower leg Salter-Harris II tibia and complete metaphyseal fibula

Severity

A grade of fracture severity distinguishes between simple (.1), and wedge or complex (.2). Only simple fractures are presented in this poster.

.1 Simple	.2 Wedge or complex
Two main fragments	Two main fragments and at least one intermediate fragment