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Supplemental Data.

**Ankle fractures:**

**ICD 10 Codes:** S82.301A, S82.301B, S82.301C, S82.302A, S82.302B, S82.302C, S82.309A, S82.309B, S82.309C, S82.391A, S82.391B, S82.391C, S82.392A, S82.392B, S82.392C, S82.399A, S82.399B, S82.399C, S82.51XA, S82.51XB, S82.51XC, S82.52X, S82.52XB, S82.52XC, S82.53, S82.53XA, S82.53XB, S82.53XC, S82.61XA, S82.61XB, S82.61XC, S82.62XA, S82.62XB, S82.62XC, S82.63XA, S82.63XB, S82.63XC, S82.841A, S82.841B, S82.841C, S82.842A, S82.842B, S82.842C, S82.843A, S82.843B, S82.843C, S82.844A, S82.844B, S82.844C, S82.851A, S82.851B, S82.851C, S82.852A, S82.852B, S82.852C, S82.853A, S82.853B, S82.853C, S82.871A, S82.871B, S82.871C, S82.872A, S82.872B, S82.872C, S82.873A, S82.873B, S82.873C

**CPT Codes:** 27766, 27769, 27792, 27814, 27822, 27823, 27826, 27827, 27828, 27826, 27827, 27828

**Ankle fractures Non-union:**

**ICD 10 Codes:** S82.301K, S82.301M, S82.301N, S82.302K, S82.302M, S82.302N, S82.309K, S82.309M, S82.309N, S82.391K, S82.391M, S82.391N, S82.392K, S82.392M, S82.392N, S82.399K, S82.399M, S82.399N, S82.51XK, S82.51XM, S82.51XN, S82.52XK, S82.52XM, S82.52XN, S82.53XK, S82.53XM, S82.53XN, S82.61XK, S82.61XM, S82.61XN, S82.62XK, S82.62XM, S82.62XN, , S82.63XK, S82.63XM, S82.63XN, S82.841K, S82.841M, S82.841N, S82.842K, S82.842M, S82.842N, S82.843K, S82.843M, S82.843N, , S82.851K, S82.851M, S82.851N, S82.852K, S82.852M, S82.852N, S82.853K, S82.853M, S82.853N, , S82.871K, S82.871M, S82.871N, S82.871K, S82.871M, S82.871N, S82.872K, S82.872M, S82.872N, S82.873K, S82.873M, S82.873N

**CPT Codes:** 27720, 27722, 27724, 27726

**Tibial plateaus:**

**ICD 10 Codes:** S82.101A, S82.101B, S82.101C, S82.102A, S82.102B, S82.102C, S82.109A, S82.109B, S82.109C, S82.121A, S82.121B, S82.121C, S82.122A, S82.122B, S82.122C, S82.123A, S82.123B, S82.123C, S82.131A, S82.131B, S82.131C, S82.132A, S82.132B, S82.132C, S82.133A, S82.133B, S82.133C, S82.141A, S82.141B, S82.141C, S82.142A, S82.142B, S82.142C, S82.143A, S82.143B, S82.143C, S82.191A, S82.191B, S82.191C, S82.192A, S82.192B, S82.192C, S82.199A, S82.199B, S82.199C

**CPT Codes:** 27535, 27536

**Tibial plateaus non-union:**

**ICD 10 Codes:** S82.101K, S82.101M, S82.101N, S82.102K, S82.102M, S82.102N, S82.109K, S82.109M, S82.109N, S82.121K, S82.121M, S82.121N, S82.122K, S82.122M, S82.122N, S82.123K, S82.123M, S82.123N, S82.131K, S82.131M, S82.131N, S82.132K, S82.132M, S82.132N, S82.133K, S82.133M, S82.133N, K, M, N, S82.141K, S82.141M, S82.141N, S82.142K, S82.142M, S82.142N, S82.143K, S82.143M, S82.143N, S82.191K, S82.191M, S82.191N, S82.192A, S82.192B, S82.192C, S82.199K, S82.199M, S82.199N

**CPT Codes:** 27720, 27722, 27724

### **Femoral shaft:**

**ICD 10 Codes:** S72.301A, S72.301B, S72.301C, S72.302A, S72.302B, S72.302C, S72.309A, S72.309B, S72.309C, S72.321A, S72.321B, S72.321C, S72.322A, S72.322B, S72.322C, S72.323A, S72.323B, S72.323C, S72.324A, S72.324B, S72.324C, S72.325A, S72.325B, S72.325C, S72.326A, S72.326B, S72.326C, S72.331A, S72.331B, S72.331C, S72.332A, S72.332B, S72.332C, S72.333A, S72.333B, S72.333C, S72.334A, S72.334B, S72.334C, S72.335A, S72.335B, S72.335C, S72.336A, S72.336B, S72.336C, S72.341A, S72.341B, S72.341C, S72.342A, S72.342B, S72.342C, S72.343A, S72.343B, S72.343C, S72.344A, S72.344B, S72.344C, S72.345A, S72.345B, S72.345C, S72.346A, S72.346B, S72.346C, S72.351A, S72.351B, S72.351C, S72.352A, S72.352B, S72.352C, S72.353A, S72.353B, S72.353C, S72.354A, S72.354B, S72.354C, S72.355A, S72.355B, S72.355C, S72.356A, S72.356B, S72.356C, S72.361A, S72.361B, S72.361C, S72.362A, S72.362B, S72.362C, S72.363A, S72.363B, S72.363C, S72.364A, S72.364B, S72.364C, S72.365A, S72.365B, S72.365C, S72.366A, S72.366B, S72.366C, S72.391A, S72.391B, S72.391C, S72.392A, S72.392B, S72.392C, S72.399A, S72.399B, S72.399C.

**CPT Codes:** 27506

### **Femoral shaft non-union:**

**ICD 10 Codes:** S72.301K, S72.301M, S72.301N, S72.302K, S72.302M, S72.302N, S72.309K, S72.309M, S72.309N, S72.321K, S72.321M, S72.321N, S72.322K, S72.322M, S72.322N, S72.323K, S72.323M, S72.323N, S72.324K, S72.324M, S72.324N, S72.325K, S72.325M, S72.325N, S72.326K, S72.326M, S72.326N, S72.331K, S72.331M, S72.331N, S72.332K, S72.332M, S72.332N, S72.333K, S72.333M, S72.333N, S72.334K, S72.334M, S72.334N, S72.335K, S72.335M, S72.335N, S72.336K, S72.336M, S72.336N, S72.341K, S72.341M, S72.341N, S72.342K, S72.342M, S72.342N, S72.343K, S72.343M, S72.343N, S72.344K, S72.344M, S72.344N, S72.345K, S72.345M, S72.345N, S72.346K, S72.346M, S72.346N, S72.351K, S72.351M, S72.351N, S72.352K, S72.352M, S72.352N, S72.353K, S72.353M, S72.353N, S72.354K, S72.354M, S72.354N, S72.355K, S72.355M, S72.355N, S72.356K, S72.356M, S72.356N, S72.361K, S72.361M, S72.361N, S72.362K, S72.362M, S72.362N, S72.363K, S72.363M, S72.363N, S72.364K, S72.364M, S72.364N, S72.365K, S72.365M, S72.365N, S72.366K, S72.366M, S72.366N, S72.391K, S72.391M, S72.391N, S72.392K, S72.392M, S72.392N, S72.399K, S72.399M, S72.399N.

**CPT Codes:** 27450, 27470, 27472

### **Tibial shaft:**

**ICD 10 Codes:** S82.201A, S82.201B, S82.201C, S82.202A, S82.202B, S82.202C, S82.221A, S82.221B, S82.221C, S82.222A, S82.222B, S82.222C, S82.223A, S82.223B, S82.223C, S82.209A, S82.209B, S82.209C, S82.231A, S82.231B, S82.231C, S82.232A, S82.232B, S82.232C, S82.233A, S82.233B, S82.233C, S82.241A, S82.241B, S82.241C, S82.242A, S82.242B, S82.242C, S82.243A, S82.243B, S82.243C, S82.251A, S82.251B, S82.251C, S82.252A, S82.252B, S82.252C, S82.253A, S82.253B, S82.253C, S82.254A, S82.254B, S82.254C, S82.255A, S82.255B, S82.255C, S82.256A, S82.256B, S82.256C, S82.261A, S82.261B, S82.261C, S82.262A, S82.262B, S82.262C, S82.263A, S82.263B, S82.263C, S82.264A, S82.264B, S82.264C, S82.265A, S82.265B, S82.265C, S82.266A, S82.266B, S82.266C, S82.291A, S82.291B, S82.291C, S82.292A, S82.292B, S82.292C, S82.299A, S82.299B, S82.299C.

**CPT Codes:** 27759

### **Tibial Shaft Non-union**

**ICD 10 Codes:** S82.201K, S82.201M, S82.201N, S82.202K, S82.202M, S82.202N, S82.209K, S82.209M, S82.209N, S82.221K, S82.221M, S82.221N, S82.222K, S82.222M, S82.222N, S82.223K, S82.223M, S82.223N, S82.231K, S82.231M, S82.231N, S82.232K, S82.232M, S82.232N, S82.233K, S82.233M, S82.233N, S82.241K, S82.241M, S82.241N, S82.242K, S82.242M, S82.242N, S82.243K, S82.243M, S82.243N, S82.251K, S82.251M, S82.251N, S82.252K, S82.252M, S82.252N, S82.253K, S82.253M, S82.253N, S82.254K, S82.254M, S82.254N, S82.255K, S82.255M, S82.255N, S82.256K, S82.256M, S82.256N, S82.261K, S82.261M, S82.261N, S82.262K, S82.262M, S82.262N, S82.263K, S82.263M, S82.263N, S82.264K, S82.264M, S82.264N, S82.265K, S82.265M, S82.265N, S82.266K, S82.266M, S82.266N, S82.291K, S82.291M, S82.291N, S82.292K, S82.292M, S82.292N, S82.299K, S82.299M, S82.299N.

**CPT Codes:** 27720, 27722, 27724, 27725

### **Intertrochanteric:**

**ICD 10 Codes:** S72.141A, S72.141B, S72.141C, S72.142A, S72.142B, S72.142C, S72.143A, S72.143B, S72.143C, S72.144A, S72.144B, S72.144C, S72.145A, S72.145B, S72.145C, S72.146A, S72.146B, S72.146C.

**CPT Codes:** 27244, 27245

### **Intertrochanteric Non-unions:**

**ICD10 Codes:** S72.141K, S72.141M, S72.141N, S72.142K, S72.142M, S72.142N, S72.143K, S72.143M, S72.143N, S72.144K, S72.144M, S72.144N, S72.145K, S72.145M, S72.145N, S72.146K, S72.146M, S72.146N.

**CPT Codes:** 27165, 27170, 27470, 27472

## Upper Extremity

### Forearm Fracture

#### ICD10 Codes:

##### Ulna:

S52.201, S52.201A, , S52.201B, S52.201C, S52.202A, S52.202B, S52.202C; S52.209A, S52.209B, S52.209C; S52.221A, S52.221B, S52.221C; S52.222A, S52.222B, S52.222C; S52.223A, S52.223B, S52.223C, S52.231A, S52.231B, S52.231C; S52.232A, S52.232B, S52.232C; S52.233A, S52.233B, S52.233C; S52.241A, S52.241B, S52.241C; S52.242A, S52.242B, S52.242C; S52.243A, S52.243B, S52.243C; S52.251A, , S52.251B, , S52.251C, S52.252A, S52.252B, S52.252C; S52.253A, S52.253B, S52.253C, S52.254A, S52.254B, S52.254C; S52.255A, S52.255B, S52.255C; S52.256A, S52.256B, S52.256C; S52.261A, S52.261B, S52.261C; S52.262A, S52.262B, S52.262C; S52.263A, S52.263B, S52.263C; S52.271A, S52.271B, S52.271C; S52.272A, S52.272B, S52.272C; S52.279A, S52.279B, S52.279C; S52.291A, S52.291B, S52.291C; S52.292A, S52.292B, S52.292C; S52.299A, S52.299B, S52.299C.

##### Radius:

S52.301A, S52.301B, S52.301C, S52.302A, S52.302B, S52.302C; S52.309A, S52.309B, S52.309C; S52.321A, S52.321B, S52.321C; S52.322A, S52.322B, S52.322C; S52.323A, S52.323B, S52.323C; S52.331A, S52.331B, S52.331C; S52.332A, S52.332B, S52.332C; S52.333A, S52.333B, S52.333C; S52.341, S52.341A, S52.341B, S52.341C; S52.342A, S52.342B, S52.342C; S52.343A, S52.343B, S52.343C; S52.351A, S52.351B, S52.351C; S52.352A, S52.352B, S52.352C; S52.353A, S52.353B, S52.353C; S52.354A, S52.354B, S52.354C; S52.355A, S52.355B, S52.355C; S52.356A, S52.356B, S52.356C; S52.361A, S52.361B, S52.361C; S52.362A, S52.362B, S52.362C; S52.363A, S52.363B, S52.363C; S52.371A, S52.371B, S52.371C; S52.372A, S52.372B, S52.372C; S52.379A, S52.379B, S52.379C; S52.391A, S52.391B, S52.391C; S52.392A, S52.392B, S52.392C; S52.399A, S52.399B, S52.399C.

**CPT Codes ORIF:** 25515, 25525, 25526, 25545, 25574, 25575

#### Forearm Fracture (non-union):

##### Ulna:

S52.201K, , S52.201M, , S52.201N; S52.202K, S52.202M, S52.202N; S52.209K, S52.209M, S52.209N; S52.221K, S52.221M, S52.221N; S52.222K, S52.222M, S52.222N; S52.223K, S52.223M, S52.223N; S52.231K, S52.231M, S52.231N; S52.232K, S52.232M, S52.232N; S52.233K, S52.233M, S52.233N; S52.241K, S52.241M, S52.241N; S52.242K, S52.242M, S52.242N; S52.243K, S52.243M, S52.243N; , S52.251K, , S52.251M, , S52.251N; S52.252K, S52.252M, S52.252N; S52.253K, S52.253M, S52.253N; S52.254K, S52.254M, S52.254N; S52.255K, S52.255M, S52.255N; S52.256K, S52.256M, S52.256N; S52.261K, S52.261M, S52.261N; S52.262K, S52.262M, S52.262N; S52.263K, S52.263M, S52.263N;

S52.271K, S52.271M, S52.271N; S52.272K, S52.272M, S52.272N; S52.279K, S52.279M, S52.279N;  
S52.291K, S52.291M, S52.291N; S52.292K, S52.292M, S52.292N; S52.299K, S52.299M, S52.299N.

Radius:

S52.301K, , S52.301M, , S52.301N; S52.302K, S52.302M, S52.302N; S52.309K, S52.309M, S52.309N;  
S52.321K, S52.321M, S52.321N; S52.322K, S52.322M, S52.322N; S52.323K, S52.323M, S52.323N;  
S52.331K, S52.331M, S52.331N; S52.332K, S52.332M, S52.332N; S52.333K, S52.333M, S52.333N;  
S52.341K, S52.341M, S52.341N; S52.342K, S52.342M, S52.342N; S52.343K, S52.343M, S52.343N;  
S52.351K, , S52.351M, S52.351N; S52.352K, S52.352M, S52.352N; S52.353K, S52.353M, S52.353N;  
S52.354K, S52.354M, S52.354N; S52.355K, S52.355M, S52.355N; S52.356K, S52.356M, S52.356N;  
S52.361K, S52.361M, S52.361N; S52.362K, S52.362M, S52.362N; S52.363K, S52.363M, S52.363N;  
S52.371K, S52.371M, S52.371N; S52.372K, S52.372M, S52.372N; S52.379K, S52.379M, S52.379N;  
S52.391K, S52.391M, S52.391N; S52.392K, S52.392M, S52.392N; S52.399K, S52.399M, S52.399N.

**Forearm Fracture Nonunion:25400, 25405, 25415, 25420**

### **Humeral Shaft Fractures**

**ICD10 Codes:** S42.301A, S42.301B, S42.301C; S42.302A, S42.302B, S42.302C; S42.309A, S42.309B,  
S42.309C; S42.321A, S42.321B, S42.321C; S42.322A, S42.322B, S42.322C, S42.323A, S42.323B,  
S42.323C; S42.324A , S42.324B, S42.324C; S42.331A, S42.331B, S42.331C; S42.332A, S42.332B,  
S42.332C; S42.333A, S42.333B, S42.333C; S42.241A, S42.241B, S42.241C; S42.242A, S42.242B,  
S42.242C; S42.243A, S42.243B, S42.243C; S42.351A, S42.351B, S42.351C; S42.352A, S42.352B,  
S42.352C; S42.353A, S42.353B, S42.353C; S42.354A, S42.354B, S42.354C; S42.355A, S42.355B,  
S42.355C; S42.356A, S42.356B, S42.356C, S42.361A, S42.361B, S42.361C; S42.362A, S42.362B,  
S42.362C, S42.363A, S42.363B, S42.363C, S42.391A, S42.391B, S42.391C, S42.392A, S42.392B,  
S42.392C, S42.399A, S42.399B, S42.399C.

**CPT Codes ORIF: 24515**

**CPT Codes IM: 24516**

### **Humeral Shaft Non-union**

**ICD10 Codes:** S42.301K, S42.301M, S42.301N; S42.302K, S42.302M, S42.302N; S42.309K,  
S42.309M, S42.309N; S42.321K, S42.321M, S42.321N; S42.322K, S42.322M, S42.322N; S42.323K,  
S42.323M, S42.323N; S42.324K, S42.324M, S42.324N; S42.331K, S42.331M, S42.331N; S42.332K,  
S42.332M, S42.332N; S42.333K, S42.333M, S42.333N; S42.241K, S42.241M, S42.241N; S42.242K,  
S42.242M, S42.242N; S42.243K, S42.243M, S42.243N; S42.351K, S42.351M, S42.351N; S42.352K,  
S42.352M, S42.352N; S42.353K, S42.353M, S42.353N; S42.354K, S42.354M, S42.354N; S42.355K,  
S42.355M, S42.355N; S42.356K, S42.356M, S42.356N; S42.361K, S42.361M, S42.361N; S42.362K,  
S42.362M, S42.362N; S42.363K, S42.363M, S42.363N; S42.391K, S42.391M, S42.391N; S42.392K,  
S42.392M, S42.392N; S42.399K, S42.399M, S42.399N.

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NO INCREASED RISK OF NONUNION WITH BISPHOSPHONATE USE IN A MEDICARE CLAIMS COHORT FOLLOWING OPERATIVELY  
TREATED LONG-BONE FRACTURES

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**CPT Codes:** 24430, 24435