Appendix 1

Fracture case identification from Medicare records

The approach used to identify non-skull fracture cases from Medicare records was based on methods developed by Ray et al [20], Taylor et al [21] and Curtis et al [22]. Cases were defined using relevant International Classification of Disease (ICD), Healthcare Common Procedure Coding System ( HCPCS) or Current Procedural Terminology (CPT) codes for the years 1991-2007 [24, 25]. Definitions of fracture of the hip (proximal femur), humerus, radius and spine have been previously published (see supplementary appendix to reference 26), and are not described in this Appendix.

**1. Ankle fracture:**

*A. Medpar inpatient hospital/skilled nursing facility file*: ICD 9 diagnosis code for fracture of ankle (824.xx).

*B. Carrier and Outpatient files:*  ICD diagnosis of fracture of ankle (824.xx) **PLUS** HCPCS/CPT code for ankle fracture reduction (27600, 27762, 27764, 27766, 27768-69, 27786, 27788, 27792, 27792, 27808, 27810, 27812, 27818, 27820, 27822-23).

**2. Clavicle fracture:**

*A. Medpar inpatient hospital/skilled nursing facility file*: ICD 9 diagnosis code for fracture of clavicle (810.xx).

*B. Carrier and Outpatient files:*  ICD diagnosis of fracture of clavicle (810.xx) **PLUS** HCPCS/CPT code for clavicle fracture reduction (23500, 23505, 23510, 23515).

**3. Femur (distal and shaft)**

*A. Medpar inpatient hospital/skilled nursing facility file*: ICD 9 diagnosis code for fracture of other and unspecified parts of femur (821.xx) or pathological fracture of other specified part of femur (733.15).

*B. Carrier and Outpatient files:*  ICD 9 diagnosis code for fracture of other and unspecified parts of femur (821.xx) or pathological fracture of other specified part of femur (733.15) **PLUS**  HCPCS/CPT code for distal femur or femur shaft fracture reduction (27500, 27501, 27502, 27503, 27504, 27506, 27507, 27508, 27509, 27510, 27511, 27512, 27513, 27514).

**4. Foot fracture:**

*A. Medpar inpatient hospital/skilled nursing facility file*: ICD 9 diagnosis code for fracture of foot (825.xx) or foot phalanges (826.xx).

*B. Carrier and Outpatient files:*  ICD diagnosis of fracture of foot (825.xx) or foot phalanges (826.xx) **PLUS**  HCPCS/CPT code for foot fracture reduction (28400, 28405-06, 28410, 28415, 28420, 28430, 28435-36, 28440, 28445, 28450, 28455, 28456, 28460, 28465, 28470, 28475, 28476, 28480, 28485, 28490, 28495, 28496, 28500, 28505, 28510, 28515, 28520, 28525, 28530-31).

**5. Hand fracture:**

*A. Medpar inpatient hospital/skilled nursing facility file*: ICD 9 diagnosis code for fracture of carpal bones (814.xx) , metacarpal bones (815.xx), hand phalanges(816.xx) or multiple fractures of hand bones (817.xx).

*B. Carrier and Outpatient files:*  ICD diagnosis of fracture of carpal bones (814.xx), metacarpal bones (815.xx), hand phalanges (816.xx) or multiple fractures of hand bones (817.xx) **PLUS** HCPCS/CPT code for hand fracture reduction (25622, 25624, 25626, 25628, 25630, 25635, 25645, 25680, 25685, 26600, 26605, 26607, 26608, 26610, 26615, 26645, 26650, 26655, 26660, 26665, 26720, 26725, 26727, 26730, 26735, 26740, 26742-44, 26746, 26750, 26755-56, 26760, 26765).

**6. Hip fracture (proximal femur):** See reference 40 for details.

**7. Humerus fracture:** See reference 40 for details.

**8. Patella fracture:**

*A. Medpar inpatient hospital/skilled nursing facility file*: ICD 9 diagnosis code for fracture of patella (822.xx).

*B. Carrier and Outpatient files:*  ICD diagnosis of fracture of patella (8225.xx) **PLUS** HCPCS/CPT code for patella fracture reduction (27520, 27522, 27524).

**9. Pelvis fracture:**

*A. Medpar inpatient hospital/skilled nursing facility file*: ICD 9 diagnosis code for fracture of pelvis (808.xx).

*B. Carrier and Outpatient files:*  ICD diagnosis of fracture of pelvis (808.xx) **PLUS** HCPCS/CPT code for pelvis fracture reduction (27210, 27211, 27212, 27214, 27215, 27216, 27217, 27218, 27220, 27222, 27224, 27225, 27226, 27227, 27228, 27193, 27194).

**10. Radius fracture:** See reference 40 for details.

**11. Rib/sternum fracture:**

*A. Medpar inpatient hospital/skilled nursing facility file*: ICD 9 diagnosis code for fracture of ribs or sternum (807.0x--807.4x).

*B. Carrier and Outpatient files:* ICD 9 diagnosis code for fracture of ribs or sternum (807.0x-807.4x). **PLUS**  HCPCS/CPT code for rib/sternum fracture reduction (21800, 21805, 21810, 21820, 21825).

**12. Sacrum/coccyx fracture:**

*A. Medpar inpatient hospital/skilled nursing facility file*: ICD 9 diagnosis code for fracture of sacrum and coccyx (805.6-805.7x and 806.6x--806.7x).

*B. Carrier and Outpatient files:*  ICD 9 diagnosis code for fracture of sacrum and coccyx (805.6-805.7x and 806.6x-806.7x)  **PLUS**  HCPCS/CPT code for sacrum/coccyx fracture reduction

(27190, 27191, 27192, 27200, 27202)

**13. Scapula fracture:**

*A. Medpar inpatient hospital/skilled nursing facility file*: ICD 9 diagnosis code for fracture of scapula (811.xx).

*B. Carrier and Outpatient files:* : ICD 9 diagnosis code for fracture of scapula (811.xx) **PLUS**  HCPCS/CPT code for scapula fracture reduction (23570, 23575, 23580, 23585).

**14. Spine fracture:** See reference 40 for details.

**15. Tibia/fibula fracture:**

*A. Medpar inpatient hospital/skilled nursing facility file*: ICD 9 diagnosis code for fracture of tibia/fibula (823.xx) or pathological fracture of tibia/fibula (733.16).

*B. Carrier and Outpatient files:*  ICD diagnosis of fracture of tibia/fibula (823.xx) or pathological fracture of tibia/fibula (733.16) **PLUS**. HCPCS/CPT code for tibia/fibula fracture reduction (27530, 27532, 27534-38, 27540, 27750, 27752 27754, 27756, 27758, 27759, 27780-82, 27784, 27800,27802, 27804, 27806, 27825-28)

**16. Exclusions for care of previous fracture or other bone diseases, neoplasm and hip arthroplasty for arthritis:**

1.Concurrent ICD-9 code indicating care for a previous fracture or other bone disease: late effects of fracture (905.1, 905.2, 905.3, 905.4,905.5), implant complication (codes 996.4, 996.6, 996.7, E878.1), bone cyst (733.2), injury other nonspecified (959) aseptic necrosis (733.4), malunion of bone (773.8), other disorders of bone or cartilage (733.9), malignant neoplasm of bone or unspecified site (170, 170.6, 199.1) or fracture follow-up care (V540, V664, V670, V674). For spine fracture cases, additional exclusions for neoplasms were made (140-165, 170-176,179-208, 228.09, 238, 238.6, 239.2).

2. Concurrent ICD codes indicating hip arthroplasty (81.51. 81.52, 81.53, 81.59) and arthritis (715).

Appendix 2

Supplementary Tables

|  |  |  |
| --- | --- | --- |
| Table A. Sample exclusions by survey |  |  |
|  | NHANES III | NHANES 1999-2004 |
| *Eligible sample:* |  |  |
| Adults age 65+ years who were interviewed in NHANES | 5252 | 4349 |
|  |  |  |
| *Exclusions from eligible sample:* |  |  |
|  |  |  |
| Not examined at baseline | 1160 | 539 |
|  |  |  |
| Self-reported hip, wrist or spine fracture at any age prior to baseline | 548 | 538 |
|  |  |  |
| Prior non-skull fracture based on Medicare records generated before baseline examination | 39 | 86 |
|  |  |  |
| Fracture cases with concurrent codes indicating care for a previous fracture or other bone diseases | 40 | 8 |
|  |  |  |
| Ineligible for linkage to CMS Medicare denominator file1 | 101 | 454 |
|  |  |  |
| Eligible but not linked to CMS Medicare denominator file | 141 | 46 |
|  |  |  |
| Enrolled in HMO at time of baseline examination | 115 | 542 |
|  |  |  |
| Decedents whose death certificate lacked cause of death information | 30 | 6 |
|  |  |  |
| Missing diabetes diagnosis or HbA1C at baseline | 100 | 76 |
|  |  |  |
| *Total excluded* | 2274 | 2295 |
|  |  |  |
| *Final analytic sample* | **2978** | **2054** |

1 Respondents were ineligible for linkage to CMS administrative records if they were missing key identification data and/or if they did not provide their Social Security or Medicare number at baseline or did not have a Social Security number verified by the Social Security Administration's Enumeration Verification System.

|  |  |  |  |
| --- | --- | --- | --- |
| Table B. Distribution of non-skull fractures by skeletal site | | |  |
| Pooled NHANES III and NHANES 1999-2004 cohort age 65 years and older | | | |
| Skeletal site | n | Percent | SE |
|  |  |  |  |
| Ankle | 25 | 3.2 | 0.62 |
| Clavicle | 7 | -- | -- |
| Femur (excluding proximal femur) | 9 | 1.3a | 0.47a |
| Foot | 32 | 4.0 | 0.78 |
| Hand | 28 | 3.0 | 0.65 |
| Hip (proximal femur) | 298 | 38.0 | 2.12 |
| Humerus | 57 | 7.1 | 0.88 |
| Patella | 11 | -- | -- |
| Pelvis | 29 | 4.1 | 0.93 |
| Radius | 122 | 17.5 | 1.64 |
| Rib and sternum | 45 | 6.6 | 1.38 |
| Sacrum and coccyx | 3 | -- | -- |
| Scapula | 0 | -- | -- |
| Spine | 17 | 2.3 | 0.64 |
| Tibia and fibular | 67 | 9.6 | 1.2 |
| Total | 750 |  |  |
| amay be statistically unreliable, standard error/percent = 30-39% | | |  |
| -- statistically unreliable, standard error/percent > 40% | | |  |
|  |  |  |  |