

Appendix

TABLE E-1 Codes (and Definitions) in Humana Database Used for Study Inclusion and Exclusion of Patients Who Underwent TKA, THA, or 1 to 2-Level PLF

Inclusion	
TKA	
ICD-9-P-8154	Total knee replacement
ICD-9-D-71596	Osteoarthritis, unspecified whether generalized or localized, lower leg
ICD-9-D-71536	Osteoarthritis, localized, not specified whether primary or secondary, lower leg
ICD-9-D-71516	Osteoarthritis, localized, primary, lower leg
ICD-9-D-71590	Osteoarthritis, unspecified whether generalized or localized, site unspecified
CPT-27447	Arthroplasty, knee, condyle and plateau; medial AND lateral compartments with or without patella resurfacing (total knee arthroplasty)
THA	
ICD-9-P-8151	Hip joint replacement
ICD-9-D-71595	Osteoarthritis, unspecified whether generalized or localized, pelvic region and thigh
ICD-9-D-71535	Osteoarthritis, localized, not specified whether primary or secondary, pelvic region and thigh
ICD-9-D-71515	Osteoarthritis, localized, primary, pelvic region and thigh
ICD-9-D-71590	Osteoarthritis, unspecified whether generalized or localized, site unspecified
CPT-27130	Arthroplasty, acetabular and proximal femoral prosthetic replacement (total hip arthroplasty), with or without autograft or allograft
PLF	
ICD-9-P-8107	Lumbar and lumbosacral fusion of the posterior column, posterior technique
ICD-9-P-8108	Lumbar and lumbosacral fusion of the anterior column, posterior technique
ICD-9-P-8162	Fusion or refusion of 2-3 vertebrae
ICD-9-D-72402	Spinal stenosis, lumbar region, without neurogenic claudication
ICD-9-D-7384	Acquired spondylolisthesis
ICD-9-D-72252	Degeneration of lumbar or lumbosacral intervertebral disc
ICD-9-D-72210	Displacement of lumbar intervertebral disc without myelopathy
ICD-9-D-7213	Lumbosacral spondylosis without myelopathy
ICD-9-D-7244	Thoracic or lumbosacral neuritis or radiculitis, unspecified
ICD-9-D-75612	Spondylolisthesis
ICD-9-D-72403	Spinal stenosis, lumbar region, with neurogenic claudication
Exclusion	
TKA/THA/PLF: coexisting or prior diagnoses/procedures	
ICD-9-D-8208	Closed fracture of unspecified part of neck of femur
ICD-9-D-71695	Arthropathy, unspecified, pelvic region and thigh
ICD-9-D-7140	Rheumatoid arthritis
ICD-9-D-82009	Other closed transcervical fracture of neck of femur
ICD-9-D-9596	Hip and thigh injury
ICD-9-D-E8859	Fall from other slipping, tripping, or stumbling
ICD-9-D-75563	Other congenital deformity of hip (joint)
ICD-9-D-82021	Closed fracture of intertrochanteric section of neck of femur
ICD-9-D-82100	Closed fracture of unspecified part of femur
ICD-9-D-82000	Closed fracture of intracapsular section of neck of femur, unspecified
ICD-9-D-82003	Closed fracture of base of neck of femur
ICD-9-D-73314	Pathologic fracture of neck of femur
ICD-9-D-9053	Late effect of fracture of neck of femur
ICD-9-D-82020	Closed fracture of trochanteric section of neck of femur
ICD-9-D-8080	Closed fracture of acetabulum
ICD-9-D-8209	Open fracture of unspecified part of neck of femur
ICD-9-D-8088	Closed unspecified fracture of pelvis
ICD-9-D-82101	Closed fracture of shaft of femur

ICD-9-D-99644	Peri-prosthetic fracture around prosthetic joint
ICD-9-P-7935	Open reduction of fracture with internal fixation, femur
ICD-9-P-7915	Closed reduction of fracture with internal fixation, femur
ICD-9-P-0080	Revision of knee replacement, total (all components)
ICD-9-P-0074	Hip bearing surface, metal-on-polyethylene
ICD-9-P-0077	Hip bearing surface, ceramic-on-polyethylene
ICD-9-P-0075	Hip bearing surface, metal-on-metal
ICD-9-P-8152	Partial hip replacement
ICD-9-P-8086	Other local excision or destruction of lesion of joint, knee
ICD-9-P-0070	Revision of hip replacement, both acetabular and femoral components
ICD-9-P-7865	Removal of implanted devices from bone, femur
ICD-9-P-0081	Revision of knee replacement, tibial component
ICD-9-P-8456	Insertion or replacement of (cement) spacer
ICD-9-P-8006	Arthrotomy for removal of prosthesis without replacement, knee
ICD-9-P-7855	Internal fixation of bone without fracture reduction, femur
ICD-9-P-0082	Revision of knee replacement, femoral component
ICD-9-P-0071	Revision of hip replacement, acetabular component
ICD-9-P-8005	Arthrotomy for removal of prosthesis without replacement, hip
ICD-9-P-0073	Revision of hip replacement, acetabular liner and/or femoral head only
ICD-9-P-0083	Revision of knee replacement, patellar component
ICD-9-P-0084	Revision of total knee replacement, tibial insert (liner)
ICD-9-P-0076	Hip bearing surface, ceramic-on-ceramic
ICD-9-P-0072	Revision of hip replacement, femoral component
ICD-9-D-3241	Intraspinal abscess
ICD-9-D-34400	Quadriplegia, unspecified
ICD-9-D-3441	Paraplegia
ICD-9-D-34460	Cauda equina syndrome without mention of neurogenic bladder
ICD-9-D-34461	Cauda equina syndrome with neurogenic bladder
ICD-9-D-7210	Cervical spondylosis without myelopathy
ICD-9-D-7211	Cervical spondylosis with myelopathy
ICD-9-D-72141	Spondylosis with myelopathy, thoracic region
ICD-9-D-7220	Displacement of cervical intervertebral disc without myelopathy
ICD-9-D-72211	Displacement of thoracic intervertebral disc without myelopathy
ICD-9-D-72271	Intervertebral disc disorder with myelopathy, cervical region
ICD-9-D-72272	Intervertebral disc disorder with myelopathy, thoracic region
ICD-9-D-72283	Postlaminectomy syndrome, lumbar region
ICD-9-D-7230	Spinal stenosis in cervical region
ICD-9-D-72401	Spinal stenosis, thoracic region
ICD-9-D-73028	Unspecified osteomyelitis, other specified sites
ICD-9-D-73730	Scoliosis [and kyphoscoliosis], idiopathic
ICD-9-D-73739	Other kyphoscoliosis and scoliosis
ICD-9-D-8052	Closed fracture of dorsal [thoracic] vertebra without mention of spinal cord injury
ICD-9-D-8054	Closed fracture of lumbar vertebra without mention of spinal cord injury
ICD-9-D-V454	Arthrodesis status
ICD-9-P-8102	Other cervical fusion of the anterior column anterior technique
ICD-9-P-8103	Other cervical fusion of the posterior column posterior technique
ICD-9-P-8104	Dorsal and dorsolumbar fusion of the anterior column anterior technique
ICD-9-P-8105	Dorsal and dorsolumbar fusion of the posterior column, posterior technique
ICD-9-P-8106	Lumbar and lumbosacral fusion of the anterior column, anterior technique
ICD-9-P-8163	Fusion or refusion of 4-8 vertebrae
ICD-9-P-8164	Fusion or refusion of 9 or more vertebrae

TABLE E-2 ICD-9 and 10 and CPT Codes Used to Identify Primary Outcome Measures in Humana Database

Code	Definition
ED visits	
CPT-99281	Emergency department visit for the evaluation and management of a patient which requires these 3 key components: a problem focused history; a problem focused examination; and straightforward medical decision making. Counseling and/or coordination of care with other providers or agencies are provided consistent with the nature of the problem(s) and the patient's and/or family's needs. Usually the presenting problem(s) are self-limited or minor.
CPT-99282	Emergency department visit for the evaluation and management of a patient which requires these 3 key components: an expanded problem focused history; an expanded problem focused examination; and medical decision making of low complexity. Counseling and/or coordination of care with other providers or agencies are provided consistent with the nature of the problem(s) and the patient's and/or family's needs. Usually the presenting problem(s) are of low to moderate severity.
CPT-99283	Emergency department visit for the evaluation and management of a patient which requires these 3 key components: an expanded problem focused history; an expanded problem focused examination; and medical decision making of moderate complexity. Counseling and/or coordination of care with other providers or agencies are provided consistent with the nature of the problem(s) and the patient's and/or family's needs. Usually the presenting problem(s) are of moderate severity.
CPT-99284	Emergency department visit for the evaluation and management of a patient which requires these 3 key components: a detailed history; a detailed examination; and medical decision making of moderate complexity. Counseling and/or coordination of care with other providers or agencies are provided consistent with the nature of the problem(s) and the patient's and/or family's needs. Usually the presenting problem(s) are of high severity and require urgent evaluation by the physician but do not pose an immediate significant threat to life or physiologic function.
CPT-99285	Emergency department visit for the evaluation and management of a patient which requires these 3 key components within the constraints imposed by the urgency of the patient's clinical condition and/or mental status: a comprehensive history; a comprehensive examination; and medical decision making of high complexity. Counseling and/or coordination of care with other providers or agencies are provided consistent with the nature of the problem(s) and the patient's and/or family's needs. Usually the presenting problem(s) are of high severity and pose an immediate significant threat to life or physiologic function.
Pain diagnosis on ED encounter	
TKA	
ICD-10-D-G8918	Other acute postprocedural pain
ICD-10-D-M25561	Pain in right knee
ICD-10-D-M25562	Pain in left knee
ICD-10-D-M25569	Pain in unspecified knee
ICD-10-D-M79609	Pain in unspecified limb
ICD-10-D-R52	Pain unspecified
ICD-9-D-33818	Other acute postoperative pain
ICD-9-D-71946	Pain in joint lower leg
ICD-9-D-7295	Pain in limb
ICD-9-D-78096	Generalized pain
THA	
ICD-10-D-G8918	Other acute postprocedural pain
ICD-10-D-M25551	Pain in right hip
ICD-10-D-M25552	Pain in left hip

ICD-10-D-M25559	Pain in unspecified hip
ICD-10-D-M79609	Pain in unspecified limb
ICD-10-D-R52	Pain unspecified
ICD-9-D-33818	Other acute postoperative pain
ICD-9-D-33819	Other acute pain
ICD-9-D-71945	Pain in joint pelvic region and thigh
ICD-9-D-7295	Pain in limb
PLF	
ICD-10-D-G8918	Other acute postprocedural pain
ICD-10-D-M5410	Radiculopathy site unspecified
ICD-10-D-M5416	Radiculopathy lumbar region
ICD-10-D-M5417	Radiculopathy lumbosacral region
ICD-10-D-M5430	Sciatica unspecified side
ICD-10-D-M545	Low back pain
ICD-10-D-M792	Neuralgia and neuritis unspecified
ICD-10-D-M79609	Pain in unspecified limb
ICD-10-D-M961	Postlaminectomy syndrome not elsewhere classified
ICD-10-D-R52	Pain unspecified
ICD-9-D-33818	Other acute postoperative pain
ICD-9-D-33819	Other acute pain
ICD-9-D-72283	Postlaminectomy syndrome lumbar region
ICD-9-D-7242	Lumbago
ICD-9-D-7243	Sciatica
ICD-9-D-7244	Thoracic or lumbosacral neuritis or radiculitis unspecified
ICD-9-D-7245	Backache unspecified
ICD-9-D-7292	Neuralgia neuritis and radiculitis unspecified
ICD-9-D-7295	Pain in limb
ICD-9-D-72989	Other musculoskeletal symptoms referable to limbs
Fall	
ICD-10-D-W19XXA	Unspecified fall, initial encounter
ICD-10-D-Z9181	History of falling
ICD-9-D-E8889	Unspecified fall
ICD-9-D-V1588	History of fall
DVT/PE	
ICD-10-D-I2699	Other pulmonary embolism without acute cor pulmonale
ICD-10-D-I82409	Acute embolism and thrombosis of unspecified deep veins of unspecified lower extremity
ICD-10-D-T8481XA	Embolism due to internal orthopaedic prosthetic devices implants and grafts initial encounter
ICD-9-D-41511	Iatrogenic pulmonary embolism and infarction
ICD-9-D-41519	Other pulmonary embolism and infarction
ICD-9-D-45340	Acute venous embolism and thrombosis of unspecified deep vessels of lower extremity
ICD-9-D-45341	Acute venous embolism and thrombosis of deep vessels of proximal lower extremity
ICD-9-D-45342	Acute venous embolism and thrombosis of deep vessels of distal lower extremity
ICD-9-D-4539	Other venous embolism and thrombosis of unspecified site
Wound dehiscence and infection	
TKA	
ICD-10-D-S81009A	Unspecified open wound unspecified knee initial encounter
ICD-10-D-T8131XA	Disruption of external operation (surgical) wound not elsewhere classified initial encounter
ICD-10-D-T814XXA	Infection following a procedure initial encounter

ICD-10-D-T8189XA	Other complications of procedures not elsewhere classified initial encounter
ICD-10-D-T8450XA	Infection and inflammatory reaction due to unspecified internal joint prosthesis initial encounter
ICD-9-D-6826	Cellulitis and abscess of leg except foot
ICD-9-D-6829	Cellulitis and abscess of unspecified sites
ICD-9-D-6869	Unspecified local infection of skin and subcutaneous tissue
ICD-9-D-71106	Pyogenic arthritis lower leg
ICD-9-D-8910	Open wound of knee leg [except thigh] and ankle without mention of complication
ICD-9-D-99666	Infection and inflammatory reaction due to internal joint prosthesis
ICD-9-D-99832	Disruption of external operation (surgical) wound
ICD-9-D-99859	Other postoperative infection
ICD-9-D-99883	Non-healing surgical wound
THA	
ICD-10-D-L03119	Cellulitis of unspecified part of limb
ICD-10-D-L0390	Cellulitis unspecified
ICD-10-D-S71009A	Unspecified open wound unspecified hip initial encounter
ICD-10-D-T8131XA	Disruption of external operation (surgical) wound not elsewhere classified initial encounter
ICD-10-D-T814XXA	Infection following a procedure initial encounter
ICD-10-D-T8450XA	Infection and inflammatory reaction due to unspecified internal joint prosthesis initial encounter
ICD-9-D-6829	Cellulitis and abscess of unspecified sites
ICD-9-D-71105	Pyogenic arthritis pelvic region and thigh
ICD-9-D-71195	Unspecified infective arthritis pelvic region and thigh
ICD-9-D-8900	Open wound of hip and thigh without mention of complication
ICD-9-D-8901	Open wound of hip and thigh complicated
ICD-9-D-99666	Infection and inflammatory reaction due to internal joint prosthesis
ICD-9-D-99667	Infection and inflammatory reaction due to other internal orthopaedic device implant and graft
ICD-9-D-99832	Disruption of external operation (surgical) wound
ICD-9-D-99851	Infected postoperative seroma
ICD-9-D-99859	Other postoperative infection
ICD-9-D-99883	Non-healing surgical wound
PLF	
ICD-10-D-G061	Intraspinal abscess and granuloma
ICD-10-D-L0390	Cellulitis unspecified
ICD-10-D-S31000A	Unspecified open wound of lower back and pelvis without penetration into retroperitoneum initial encounter
ICD-10-D-T8130XA	Disruption of wound unspecified initial encounter
ICD-10-D-T8131XA	Disruption of external operation (surgical) wound not elsewhere classified initial encounter
ICD-10-D-T814XXA	Infection following a procedure initial encounter
ICD-10-D-T847XXA	Infection and inflammatory reaction due to other internal orthopaedic prosthetic devices implants and grafts initial encounter
ICD-9-D-3241	Intraspinal abscess
ICD-9-D-6829	Cellulitis and abscess of unspecified sites
ICD-9-D-8760	Open wound of back without mention of complication
ICD-9-D-8761	Open wound of back complicated
ICD-9-D-99667	Infection and inflammatory reaction due to other internal orthopaedic device implant and graft
ICD-9-D-99830	Disruption of wound unspecified

ICD-9-D-99832	Disruption of external operation (surgical) wound
ICD-9-D-99851	Infected postoperative seroma
ICD-9-D-99859	Other postoperative infection
ICD-9-D-99883	Non-healing surgical wound
Systemic infection and sepsis	
ICD-10-D-A419	Sepsis unspecified organism
ICD-10-D-J189	Pneumonia unspecified organism
ICD-10-D-R5082	Postprocedural fever
ICD-10-D-R509	Fever unspecified
ICD-9-D-0389	Unspecified septicemia
ICD-9-D-486	Pneumonia organism unspecified
ICD-9-D-78060	Fever unspecified
ICD-9-D-78062	Postprocedural fever
ICD-9-D-99591	Sepsis
Revision surgery	
TKA	
ICD-10-P-0SWC0JZ	Revision of synthetic substitute in right knee joint, open approach
ICD-10-P-0SWCXJZ	Revision of synthetic substitute in right knee joint, external approach
ICD-10-P-0SWD09Z	Revision of liner in left knee joint, open approach
ICD-10-P-0SWD0JZ	Revision of synthetic substitute in left knee joint, open approach
ICD-10-P-0SWDXJZ	Revision of synthetic substitute in left knee joint, external approach
ICD-9-P-0080	Revision of knee replacement total (all components)
ICD-9-P-0081	Revision of knee replacement tibial component
ICD-9-P-0082	Revision of knee replacement femoral component
ICD-9-P-0084	Revision of total knee replacement tibial insert (liner)
ICD-9-P-8155	Revision of knee replacement not otherwise specified
ICD-9-P-8456	Insertion or replacement of (cement) spacer
THA	
ICD-9-P-0070	Revision of hip replacement both acetabular and femoral components
ICD-9-P-0071	Revision of hip replacement acetabular component
ICD-9-P-0072	Revision of hip replacement femoral component
ICD-9-P-0073	Revision of hip replacement acetabular liner and/or femoral head only
ICD-9-P-8456	Insertion or replacement of (cement) spacer
ICD-10-P-0SW90JZ	Revision of synthetic substitute in right hip joint, open approach
ICD-10-P-0SW9XJZ	Revision of synthetic substitute in right hip joint, external approach
ICD-10-P-0SWB0JZ	Revision of synthetic substitute in left hip joint, open approach
ICD-10-P-0SWBXJZ	Revision of synthetic substitute in left hip joint, external approach
PLF	
ICD-9-P-0302	Reopening of laminectomy site
ICD-9-P-0309	Other exploration and decompression of spinal canal
ICD-9-P-8137	Refusion of lumbar and lumbosacral spine posterior column posterior technique
ICD-9-P-8138	Refusion of lumbar and lumbosacral spine anterior column posterior technique
ICD-10-P-00JU0ZZ	Inspection of spinal canal, open approach