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Appendix 1. Procedures included in current study by subspecialty

CPT code	CPT Description
Sports	
23000	Removal of subdeltoid calcareous deposits, open
23120	Claviclectomy; partial
23130	Acromioplasty or acromionectomy, partial, with or without coracoacromial ligament release
23405	Tenotomy, shoulder area; single tendon
23410	Repair of ruptured musculotendinous cuff (eg, rotator cuff) open; acute
23412	Repair of ruptured musculotendinous cuff (eg, rotator cuff) open; chronic
23415	Coracoacromial ligament release, with or without acromioplasty
23420	Reconstruction of complete shoulder (rotator) cuff avulsion, chronic (includes acromioplasty)
23430	Tenodesis of long tendon of biceps
23440	Resection or transplantation of long tendon of biceps
23615	Open treatment of proximal humeral (surgical or anatomical neck) fracture, includes internal fixation, when performed, includes repair of tuberosity(s), when performed;
23700	Manipulation under anesthesia, shoulder joint, including application of fixation apparatus (dislocation excluded)
24105	Excision, olecranon bursa
24305	Tendon lengthening, upper arm or elbow, each tendon
24310	Tenotomy, open, elbow to shoulder, each tendon
24358	Tenotomy, elbow, lateral or medial (eg, epicondylitis, tennis elbow, golfer's elbow); debridement, soft tissue and/or bone, open

24359	Tenotomy, elbow, lateral or medial (eg, epicondylitis, tennis elbow, golfer's elbow); debridement, soft tissue and/or bone, open with tendon repair or reattachment
27000	Tenotomy, adductor of hip, percutaneous (separate procedure)
27050	Arthrotomy, with biopsy; sacroiliac joint
27062	Excision; trochanteric bursa or calcification
27305	Fasciotomy, iliotibial (tenotomy), open
27306	Tenotomy, percutaneous, adductor or hamstring; single tendon (separate procedure)
27385	Suture of quadriceps or hamstring muscle rupture; primary
27407	Repair, primary, torn ligament and/or capsule, knee; cruciate
27430	Quadricepsplasty (eg, Bennett or Thompson type)
27435	Capsulotomy, posterior capsular release, knee
29055	Application, cast; shoulder spica
29805	Arthroscopy, shoulder, diagnostic, with or without synovial biopsy (separate procedure)
29806	Arthroscopy, shoulder, surgical; capsulorrhaphy
29807	Arthroscopy, shoulder, surgical; repair of SLAP lesion
29819	Arthroscopy, shoulder, surgical; with removal of loose body or foreign body
29820	Arthroscopy, shoulder, surgical; synovectomy, partial
29821	Arthroscopy, shoulder, surgical; synovectomy, complete
29822	Arthroscopy, shoulder, surgical; debridement, limited
29823	Arthroscopy, shoulder, surgical; debridement, extensive
29824	Arthroscopy, shoulder, surgical; distal claviclectomy including distal articular surface (Mumford procedure)
29825	Arthroscopy, shoulder, surgical; with lysis and resection of adhesions, with or without manipulation

- 29826 Arthroscopy, shoulder, surgical; decompression of subacromial space with partial acromioplasty, with coracoacromial ligament (ie, arch) release, when performed (List separately in addition to code for primary procedure)
- 29827 Arthroscopy, shoulder, surgical; with rotator cuff repair
- 29828 Arthroscopy, shoulder, surgical; biceps tenodesis
- 29830 Arthroscopy, elbow, diagnostic, with or without synovial biopsy (separate procedure)
- 29838 Arthroscopy, elbow, surgical; debridement, extensive
- 29861 Arthroscopy, hip, surgical; with removal of loose body or foreign body
- 29862 Arthroscopy, hip, surgical; with debridement/shaving of articular cartilage
- 29870 Arthroscopy, knee, diagnostic, with or without synovial biopsy (separate procedure)
- 29873 Arthroscopy, knee, surgical; with lateral release
- 29875 Arthroscopy, knee, surgical; synovectomy, limited (eg, plica or shelf resection) (separate procedure)
- 29876 Arthroscopy, knee, surgical; synovectomy, major, 2 or more compartments (eg, medial or lateral)
- 29877 Arthroscopy, knee, surgical; debridement/shaving of articular cartilage (chondroplasty)
- 29879 Arthroscopy, knee, surgical; abrasion arthroplasty (includes chondroplasty where necessary) or multiple drilling or microfracture
- 29880 Arthroscopy, knee, surgical; with meniscectomy (medial AND lateral, including any meniscal shaving) including debridement/shaving of articular cartilage
- 29881 Arthroscopy, knee, surgical; with meniscectomy (medial OR lateral, including any meniscal shaving) including debridement/shaving of articular cartilage
- 29884 Arthroscopy, knee, surgical; with lysis of adhesions, with or without manipulation (separate procedure)

- 29888 Arthroscopically aided anterior cruciate ligament repair/augmentation or reconstruction
- 29889 Arthroscopically aided posterior cruciate ligament repair/augmentation or reconstruction
- 29914 Arthroscopy, hip, surgical; with femoroplasty (ie, treatment of cam lesion)
- 29915 Arthroscopy, hip, surgical; with acetabuloplasty (ie, treatment of pincer lesion)
- 29916 Arthroscopy, hip, surgical; with labral repair

Joint

- 27275 Manipulation, hip joint, requiring general anesthesia
- 27350 Patellectomy or hemipatellectomy
- 27437 Arthroplasty, patella; without prosthesis
- 27442 Arthroplasty, femoral condyles or tibial plateau(s), knee;
- 27446 Arthroplasty, knee, condyle and plateau; medial OR lateral compartment
- 27570 Manipulation of knee joint under general anesthesia (includes application of traction or other fixation devices)

Hand/Elbow

- 15736 Muscle, myocutaneous, or fasciocutaneous flap; upper extremity
- 24685 Open treatment of ulnar fracture, proximal end (eg, olecranon or coronoid process)
- 29105 Application of long arm splint (shoulder to hand)
- 29125 Application of short arm splint (forearm to hand); static
- 29130 Application of finger splint; static
- 29848 Endoscopy, wrist, surgical, with release of transverse carpal ligament
- 64718 Neuroplasty and/or transposition; ulnar nerve at elbow
- 64719 Neuroplasty and/or transposition; ulnar nerve at wrist
- 64721 Neuroplasty and/or transposition; median nerve at carpal tunnel
- 64820 Sympathectomy; digital arteries, each digit

64836 Suture of 1 nerve; ulnar motor

Foot/Ankle

20550 Injection(s); single tendon sheath, or ligament, aponeurosis (eg, plantar "fascia")

27600 Decompression fasciotomy, leg; anterior and/or lateral compartments only

27601 Decompression fasciotomy, leg; posterior compartment(s) only

27603 Incision and drainage, leg or ankle; deep abscess or hematoma

27606 Tenotomy, percutaneous, Achilles tendon (separate procedure); general anesthesia

27614 Biopsy, soft tissue of leg or ankle area; deep (subfascial or intramuscular)

27618 Excision, tumor, soft tissue of leg or ankle area, subcutaneous; less than 3 cm

27619 Excision, tumor, soft tissue of leg or ankle area, subfascial (eg, intramuscular); less than 5 cm

27640 Partial excision (craterization, saucerization, or diaphysectomy), bone (eg, osteomyelitis); tibia

27641 Partial excision (craterization, saucerization, or diaphysectomy), bone (eg,

27650 Repair, primary, open or percutaneous, ruptured Achilles tendon;

27654 Repair, secondary, Achilles tendon, with or without graft

27659 Repair, flexor tendon, leg; secondary, with or without graft, each tendon

27685 Lengthening or shortening of tendon, leg or ankle; single tendon (separate procedure)

27687 Gastrocnemius recession (eg, Strayer procedure)

27690 Transfer or transplant of single tendon (with muscle redirection or rerouting);

27691 Transfer or transplant of single tendon (with muscle redirection or rerouting); deep

27692 Transfer or transplant of single tendon (with muscle redirection or rerouting); each additional tendon (List separately in addition to code for primary procedure)

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| 27695 | Repair, primary, disrupted ligament, ankle; collateral |
| 27698 | Repair, secondary, disrupted ligament, ankle, collateral (eg, Watson-Jones procedure) |
| 27788 | Closed treatment of distal fibular fracture (lateral malleolus); with manipulation |
| 27792 | Open treatment of distal fibular fracture (lateral malleolus), includes internal fixation, when performed |
| 27860 | Manipulation of ankle under general anesthesia (includes application of traction or other fixation apparatus) |
| 28002 | Incision and drainage below fascia, with or without tendon sheath involvement, foot; single bursal space |
| 28003 | Incision and drainage below fascia, with or without tendon sheath involvement, foot; multiple areas |
| 28008 | Fasciotomy, foot and/or toe |
| 28010 | Tenotomy, percutaneous, toe; single tendon |
| 28035 | Release, tarsal tunnel (posterior tibial nerve decompression) |
| 28039 | Excision, tumor, soft tissue of foot or toe, subcutaneous; 1.5 cm or greater |
| 28043 | Excision, tumor, soft tissue of foot or toe, subcutaneous; less than 1.5 cm |
| 28045 | Excision, tumor, soft tissue of foot or toe, subfascial (eg, intramuscular); less than 1.5 cm |
| 28060 | Fasciectomy, plantar fascia; partial (separate procedure) |
| 28080 | Excision, interdigital (Morton) neuroma, single, each |
| 28088 | Synovectomy, tendon sheath, foot; extensor |
| 28090 | Excision of lesion, tendon, tendon sheath, or capsule (including synovectomy) (eg, cyst or ganglion); foot |
| 28092 | Excision of lesion, tendon, tendon sheath, or capsule (including synovectomy) (eg, cyst or ganglion); toe(s), each |
| 28100 | Excision or curettage of bone cyst or benign tumor, talus or calcaneus; |

28104	Excision or curettage of bone cyst or benign tumor, tarsal or metatarsal, except talus or calcaneus;
28108	Excision or curettage of bone cyst or benign tumor, phalanges of foot
28110	Ostectomy, partial excision, fifth metatarsal head (bunionette) (separate procedure)
28112	Ostectomy, complete excision; other metatarsal head (second, third or fourth)
28113	Ostectomy, complete excision; fifth metatarsal head
28114	Ostectomy, complete excision; all metatarsal heads, with partial proximal phalangectomy, excluding first metatarsal (eg, Clayton type procedure)
28118	Ostectomy, calcaneus;
28119	Ostectomy, calcaneus; for spur, with or without plantar fascial release
28120	Partial excision (craterization, saucerization, sequestrectomy, or diaphysectomy) bone
28122	Partial excision (craterization, saucerization, sequestrectomy, or diaphysectomy) bone
28124	Partial excision (craterization, saucerization, sequestrectomy, or diaphysectomy) bone
28126	Resection, partial or complete, phalangeal base, each toe
28150	Phalangectomy, toe, each toe
28153	Resection, condyle(s), distal end of phalanx, each toe
28160	Hemiphalangectomy or interphalangeal joint excision, toe, proximal end of phalanx, each
28175	Radical resection of tumor; phalanx of toe
28192	Removal of foreign body, foot; deep
28200	Repair, tendon, flexor, foot; primary or secondary, without free graft, each tendon
28202	Repair, tendon, flexor, foot; secondary with free graft, each tendon (includes obtaining
28208	Repair, tendon, extensor, foot; primary or secondary, each tendon
28222	Tenolysis, flexor, foot; multiple tendons
28225	Tenolysis, extensor, foot; single tendon

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| 28226 | Tenolysis, extensor, foot; multiple tendons |
| 28230 | Tenotomy, open, tendon flexor; foot, single or multiple tendon(s) (separate procedure) |
| 28232 | Tenotomy, open, tendon flexor; toe, single tendon (separate procedure) |
| 28234 | Tenotomy, open, extensor, foot or toe, each tendon |
| 28240 | Tenotomy, lengthening, or release, abductor hallucis muscle |
| 28250 | Division of plantar fascia and muscle (eg, Steindler stripping) (separate procedure) |
| 28260 | Capsulotomy, midfoot; medial release only (separate procedure) |
| 28270 | Capsulotomy; metatarsophalangeal joint, with or without tenorrhaphy, each joint (separate procedure) |
| 28272 | Capsulotomy; interphalangeal joint, each joint (separate procedure) |
| 28285 | Correction, hammertoe (eg, interphalangeal fusion, partial or total phalangectomy) |
| 28288 | Ostectomy, partial, exostectomy or condylectomy, metatarsal head, each metatarsal head |
| 28289 | Correction of deformity of first long bone at toe joint |
| 28290 | Correction, hallux valgus (bunion), with or without sesamoidectomy; simple exostectomy (eg, Silver type procedure) |
| 28291 | Correction of rigid deformity of first joint of big toe using implant |
| 28292 | Correction, hallux valgus (bunion), with or without sesamoidectomy; Keller, McBride, or Mayo type procedure |
| 28293 | Correction, hallux valgus (bunion), with or without sesamoidectomy; resection of joint with implant |
| 28295 | Correction of bunion |
| 28296 | Correction, hallux valgus (bunion), with or without sesamoidectomy; with metatarsal osteotomy (eg, Mitchell, Chevron, or concentric type procedures) |
| 28297 | Correction, hallux valgus (bunion), with or without sesamoidectomy; Lapidus-type procedure |

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| 28298 | Correction, hallux valgus (bunion), with or without sesamoidectomy; by phalanx osteotomy |
| 28299 | Correction, hallux valgus (bunion), with or without sesamoidectomy; by double osteotomy |
| 28300 | Osteotomy; calcaneus (eg, Dwyer or Chambers type procedure), with or without |
| 28306 | Osteotomy, with or without lengthening, shortening or angular correction, metatarsal; first metatarsal |
| 28307 | Osteotomy, with or without lengthening, shortening or angular correction, metatarsal; first metatarsal with autograft (other than first toe) |
| 28308 | Osteotomy, with or without lengthening, shortening or angular correction, metatarsal; other than first metatarsal, each |
| 28309 | Osteotomy, with or without lengthening, shortening or angular correction, metatarsal; multiple (eg, Swanson type cavus foot procedure) |
| 28310 | Osteotomy, shortening, angular or rotational correction; proximal phalanx, first toe (separate procedure) |
| 28312 | Osteotomy, shortening, angular or rotational correction; other phalanges, any toe |
| 28313 | Reconstruction, angular deformity of toe, soft tissue procedures only (eg, overlapping) |
| 28315 | Sesamoidectomy, first toe (separate procedure) |
| 28470 | Closed treatment of metatarsal fracture; without manipulation, each |
| 28606 | Percutaneous skeletal fixation of tarsometatarsal joint dislocation, with manipulation |
| 28645 | Open treatment of metatarsophalangeal joint dislocation, includes internal fixation, when performed |
| 28666 | Percutaneous skeletal fixation of interphalangeal joint dislocation, with manipulation |
| 28715 | Arthrodesis; triple |
| 28725 | Arthrodesis; subtalar |
| 28730 | Arthrodesis, midtarsal or tarsometatarsal, multiple or transverse; |

28750	Arthrodesis, great toe; metatarsophalangeal joint
28755	Arthrodesis, great toe; interphalangeal joint
28820	Amputation, toe; metatarsophalangeal joint
28825	Amputation, toe; interphalangeal joint
29425	Application of short leg cast (below knee to toes); walking or ambulatory type
29445	Application of rigid total contact leg cast
29515	Application of short leg splint (calf to foot)
29540	Strapping; ankle and/or foot
29550	Strapping; toes
29580	Strapping; Unna boot
29581	Application of multi-layer compression system; leg (below knee), including ankle and
29893	Repair of fibrous tissue of foot using an endoscope
29897	Arthroscopy, ankle (tibiotalar and fibulotalar joints), surgical; debridement, limited
29898	Arthroscopy, ankle (tibiotalar and fibulotalar joints), surgical; debridement, extensive
64632	Destruction by neurolytic agent; plantar common digital nerve
64702	Neuroplasty; digital, 1 or both, same digit
64726	Decompression; plantar digital nerve

Spine

22102	Partial removal of spine bone and growth at lower spinal column
22103	Partial removal of spine bone and growth in spinal column
22505	Manipulation of spine under anesthesia
22511	Injection of bone cement into body of middle spine bone accessed through the skin using imaging guidance
22513	Injection of bone cement into body of middle spine bone accessed through the skin using imaging guidance
22514	Injection of bone cement into body of lower spine bone accessed through the skin using imaging guidance

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| 22551 | Arthrodesis, anterior interbody, including disc space preparation, discectomy, osteophyctomy and decompression of spinal cord and/or nerve roots; cervical below |
| 22612 | Arthrodesis, posterior or posterolateral technique, single level; lumbar (with lateral transverse technique, when performed) |
| 22867 | Insertion of stabilizing or separating device into lower spine at single level with open decompression |
| 22869 | Insertion of stabilizing or separating device into lower spine at single level |
| 27279 | Fusion sacroiliac joint through the skin or minimally invasive using image guidance |
| 62287 | Aspiration of lower spine disc |
| 62380 | Decompression of spinal cord and/or nerve root in lower back using endoscope |
| 63005 | Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (eg, spinal stenosis), 1 or 2 vertebral segments; lumbar, except for spondylolisthesis |
| 63020 | Laminotomy (hemilaminectomy), with decompression of nerve root(s), including |
| 63030 | Laminotomy (hemilaminectomy), with decompression of nerve root(s), including partial facetectomy, foraminotomy and/or excision of herniated intervertebral disc; 1 interspace, lumbar |
| 63042 | Laminotomy (hemilaminectomy), with decompression of nerve root(s), including partial facetectomy, foraminotomy and/or excision of herniated intervertebral disc, reexploration, single interspace; lumbar |
| 63045 | Laminectomy, facetectomy and foraminotomy (unilateral or bilateral with |

63047	Laminectomy, facetectomy and foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root[s], [eg, spinal or lateral recess stenosis]), single vertebral segment; lumbar
63056	Transpedicular approach with decompression of spinal cord, equina and/or nerve root
0275T	Removal of lower spine bone for decompression of neural elements using imaging guidance
Other	
11012	Debridement including removal of foreign material at the site of an open fracture and/or an open dislocation (eg, excisional debridement); skin, subcutaneous tissue, muscle fascia, muscle, and bone
15734	Muscle, myocutaneous, or fasciocutaneous flap; trunk
15738	Muscle, myocutaneous, or fasciocutaneous flap; lower extremity
15740	Flap; island pedicle requiring identification and dissection of an anatomically named axial vessel
15750	Flap; neurovascular pedicle
15760	Graft; composite (eg, full thickness of external ear or nasal ala), including primary closure, donor area
15770	Graft; derma-fat-fascia
20005	Incision and drainage of soft tissue abscess, subfascial (ie, involves the soft tissue below the deep fascia)
20200	Biopsy, muscle; superficial
20205	Biopsy, muscle; deep
20225	Biopsy, bone, trocar, or needle; deep (eg, vertebral body, femur)
20240	Biopsy, bone, open; superficial (eg, ilium, sternum, spinous process, ribs, trochanter of femur)
20245	Biopsy, bone, open; deep (eg, humerus, ischium, femur)
20520	Removal of foreign body in muscle or tendon sheath; simple
20551	Injection of tendon attachment to bone

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| 20600 | Arthrocentesis, aspiration and/or injection, small joint or bursa (eg, fingers, toes); without ultrasound guidance |
| 20604 | Aspiration and/or injection of small joint or joint capsule with recording and reporting using ultrasound guidance |
| 20605 | Arthrocentesis, aspiration and/or injection, intermediate joint or bursa (eg, temporomandibular, acromioclavicular, wrist, elbow or ankle, olecranon bursa); without ultrasound guidance |
| 20606 | Aspiration and/or injection of intermediate joint or joint capsule with recording and reporting using ultrasound guidance |
| 20610 | Arthrocentesis, aspiration and/or injection, major joint or bursa (eg, shoulder, hip, knee, subacromial bursa); without ultrasound guidance |
| 20611 | Aspiration and/or injection of major joint or joint capsule with recording and reporting using ultrasound guidance |
| 20650 | Insertion of wire or pin with application of skeletal traction, including removal (separate procedure) |
| 20670 | Removal of implant; superficial (eg, buried wire, pin or rod) (separate procedure) |
| 20680 | Removal of implant; deep (eg, buried wire, pin, screw, metal band, nail, rod or plate) |
| 20690 | Application of a uniplane (pins or wires in 1 plane), unilateral, external fixation system |
| 20692 | Application of a multiplane (pins or wires in more than 1 plane), unilateral, external fixation system (eg, Ilizarov, Monticelli type) |
| 20694 | Removal, under anesthesia, of external fixation system |
| 20900 | Bone graft, any donor area; minor or small (eg, dowel or button) |
| 20902 | Bone graft, any donor area; major or large |
| 20924 | Tendon graft, from a distance (eg, palmaris, toe extensor, plantaris) |
| 20926 | Tissue grafts, other (eg, paratenon, fat, dermis) |

21552	Excision, tumor, soft tissue of neck or anterior thorax, subcutaneous; 3 cm or greater
21555	Excision, tumor, soft tissue of neck or anterior thorax, subcutaneous; less than 3 cm
21556	Excision, tumor, soft tissue of neck or anterior thorax, subfascial (eg, intramuscular); less than 5 cm
21925	Biopsy, soft tissue of back or flank; deep
21930	Excision, tumor, soft tissue of back or flank, subcutaneous; less than 3 cm
21931	Excision, tumor, soft tissue of back or flank, subcutaneous; 3 cm or greater
21933	Excision, tumor, soft tissue of back or flank, subfascial (eg, intramuscular); 5 cm or greater
27194	Closed treatment of pelvic ring fracture, dislocation, diastasis or subluxation; with manipulation, requiring more than local anesthesia
27198	Closed treatment of fracture and/or dislocation of pelvis and/or sacrum with manipulation
64704	Neuroplasty; nerve of hand or foot
64708	Neuroplasty, major peripheral nerve, arm or leg, open; other than specified
64712	Neuroplasty, major peripheral nerve, arm or leg, open; sciatic nerve
64714	Neuroplasty, major peripheral nerve, arm or leg, open; lumbar plexus
64722	Decompression; unspecified nerve(s) (specify)
64727	Internal neurolysis, requiring use of operating microscope (List separately in addition to code for neuroplasty) (Neuroplasty includes external neurolysis)
64774	Excision of neuroma; cutaneous nerve, surgically identifiable
64782	Excision of neuroma; hand or foot, except digital nerve
64783	Excision of neuroma; hand or foot, each additional nerve, except same digit (List separately in addition to code for primary procedure)

64784	Excision of neuroma; major peripheral nerve, except sciatic
64787	Implantation of nerve end into bone or muscle (List separately in addition to neuroma excision)
64795	Biopsy of nerve
J7321	Hyaluronan or derivative, hyalgan or supartz, for intra-articular injection, per dose
J7323	Hyaluronan or derivative, euflexxa, for intra-articular injection, per dose
J7324	Hyaluronan or derivative, orthovisc, for intra-articular injection, per dose
J7325	Hyaluronan or derivative, synvisc or synvisc-one, for intra-articular injection, 1 mg
J7327	Hyaluronan or derivative, monovisc, for intra-articular injection, per dose

Supplementary Table 1. Geographic Variation in Medicare Volume, Utilization, and Reimbursement for Orthopedic Procedures Performed in ASCs (2012-2017)

	Metropolitan area				U.S. Census Region					National
	Major Metro Area	Non-Major Metro Area	Rural	P value	Midwest	Northeast	South	West	P value	
All Orthopedic Procedures										
ASCs (n)	1231	641	548	< 0.001	485	328	961	639	< 0.001	2413
Total Procedures (n)	806,951	657,822	450,133	-	377,184	222,429	817,759	497,534	-	1,914,905
Procedure Utilization (per 10,000)	77.0	91.3	71.1	< 0.001	77.4	44.9	97.6	85.6	< 0.001	79.7
Avg. Medicare Payment (USD)	\$722	\$712	\$678	< 0.001	\$680	\$708	\$687	\$809	< 0.001	\$671
Sports										
ASCs (n)	508	320	273	-	215	140	432	312	-	1099
Total Procedures (n)	252,874	225,576	154,245	-	108,888	64,940	292,732	166,135	-	632,694
Procedure Utilization (per 10,000)	24.1	31.3	24.4	< 0.001	22.3	13.1	35.0	28.6	< 0.001	26.3
Avg. Medicare Payment (USD)	\$1,067	\$1,018	\$1,016	< 0.001	\$1,013	\$1,083	\$970	\$1,153	< 0.001	\$1,037
Joint										
ASCs (n)	629	373	313	-	264	176	513	359	-	1312
Total Procedures (n)	3,707	2,699	1,373	-	2,550	312	2,854	2,063	-	7,779
Procedure Utilization (per 10,000)	0.4	0.4	0.2	< 0.001	0.5	0.1	0.3	0.4	0.008	0.3
Avg. Medicare Payment (USD)	\$4,623	\$3,567	\$4,492	< 0.001	\$4,261	\$2,134	\$4,219	\$4,537	< 0.001	\$4,234
Hand										
ASCs (n)	554	367	282	-	260	175	470	295	-	1200
Total Procedures (n)	275,591	254,395	168,859	-	148,193	105,748	297,139	147,765	-	698,845
Procedure Utilization (per 10,000)	26.3	35.3	26.7	< 0.001	30.4	21.4	35.5	25.4	< 0.001	29.1
Avg. Medicare Payment (USD)	\$601	\$573	\$556	< 0.001	\$555	\$604	\$557	\$634	< 0.001	\$580
Foot/Ankle										
ASCs (n)	493	306	229	-	215	127	415	267	-	1024
Total Procedures (n)	153,301	82,298	51,127	-	47,831	25,677	106,052	107,166	-	286,726
Procedure Utilization (per 10,000)	14.6	11.4	8.1	< 0.001	9.8	5.2	12.7	18.4	< 0.001	11.9
Avg. Medicare Payment (USD)	\$363	\$546	\$486	0.002	\$540	\$448	\$514	\$313	0.134	\$437
Spine										
ASCs (n)	84	66	53	-	38	9	96	59	-	202

Total Procedures (n)	4,265	4,328	2,987	-	1,867	408	5,369	3,936	-	11,580
Procedure Utilization (per 10,000)	0.4	0.6	0.5	< 0.001	0.4	0.1	0.6	0.7	0.009	0.5
Avg. Medicare Payment (USD)	\$2,422	\$2,701	\$2,244	0.242	\$2,295	\$3,678	\$2,281	\$2,716	0.311	\$2,481
Other										
ASCs (n)	1012	561	477	-	428	290	800	526	-	2044
Total Procedures (n)	117,213	88,526	71,542	-	67,855	25,344	113,613	70,469	-	277,281
Procedure Utilization (per 10,000)	11.2	12.3	11.3	< 0.001	13.9	5.1	13.6	12.1	< 0.001	11.5
Avg. Medicare Payment (USD)	\$127	\$121	\$141	< 0.001	\$99	\$111	\$118	\$181	< 0.001	\$129

USD, United States Dollar (\$); n, total number of ASC facilities or total number of procedures performed

Supplementary Table 2a, 2b. Trends in Annual ASC (a) and non-ASC (b) Procedure Volume, by Subspecialty Category (2012-2017)

Procedure Category & CPT code	CPT Description	Volume (Total Medicare Procedures)						% Overall Change	CAGR (%)
		2012	2013	2014	2015	2016	2017		
Sports									
29881	Arthroscopy, knee, surgical; with meniscectomy (medial OR lateral, including any meniscal shaving) including debridement/shaving of articular cartilage	24,901	24,794	23,015	23,083	23,478	21,451	-13.9	-2.8
29880	Arthroscopy, knee, surgical; with meniscectomy (medial AND lateral, including any meniscal shaving) including debridement/shaving of articular cartilage	20,159	19,822	18,810	18,482	18,764	17,375	-13.8	-2.8
29827	Arthroscopy, shoulder, surgical; with rotator cuff repair	14,533	16,850	18,586	19,879	21,253	22,187	15.9	3.2
Joint									
27446	Arthroplasty, knee, condyle and plateau; medial OR lateral compartment	268	522	853	897	1,331	1,452	441.8	88.4
27570	Manipulation of knee joint under general anesthesia (includes application of traction or other fixation devices)	293	331	373	288	385	446	52.2	10.4
27275	Manipulation, hip joint, requiring general anesthesia	90	31	41	-	-	49	-45.6	-9.1
Hand									
64721	Neuroplasty and/or transposition; median nerve at carpal tunnel	41,776	42,467	41,488	42,265	44,183	44,180	5.8	1.2
26055	Tendon sheath incision (eg, for trigger finger)	28,996	31,489	31,662	33,454	36,475	37,123	28.0	5.6
29848	Endoscopy, wrist, surgical, with release of transverse carpal ligament	12,220	13,455	13,644	14,537	15,882	16,710	36.7	7.3
Foot/Ankle									
28285	Correction, hammertoe (eg, interphalangeal fusion, partial or total phalangectomy)	25,573	25,482	23,412	21,530	21,273	20,763	-18.8	-3.8
29581	Application of multi-layer compression system; leg (below knee), including ankle and foot	5,352	7,429	7,700	9,456	11,825	12,205	128.0	25.6
28270	Capsulotomy; metatarsophalangeal joint, with or without tenorrhaphy, each joint (separate procedure)	3,699	3,683	3,353	3,069	3,248	2,618	-29.2	-5.8

Spine									
63047	Laminectomy, facetectomy and foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root[s], [eg, spinal or lateral recess stenosis]), single vertebral segment; lumbar	-	-	-	853	1,161	1,436	68.3	13.7
63030	Laminotomy (hemilaminectomy), with decompression of nerve root(s), including partial facetectomy, foraminotomy and/or excision of herniated intervertebral disc; 1 interspace, lumbar	-	-	-	497	708	726	46.1	9.2
22514	Percutaneous vertebral augmentation, including cavity creation (fracture reduction and bone biopsy included when performed) using mechanical device (e.g., kyphoplasty), 1 vertebral body, unilateral or bilateral cannulation, inclusive of all imaging guidance; lumbar	-	-	-	355	250	250	-29.6	-5.9
Other									
20610	Arthrocentesis, aspiration and/or injection, major joint or bursa (eg, shoulder, hip, knee, subacromial bursa); without ultrasound guidance	25,116	26,255	26,678	29,396	35,152	36,550	45.5	9.1
20680	Removal of implant; deep (eg, buried wire, pin, screw, metal band, nail, rod or plate)	4,547	4,703	5,344	5,160	5,755	6,024	32.5	6.5
J7325	Hyaluronan or derivative, synvisc or synvisc-one, for intra-articular injection, 1 mg	1,760	5,504	4,320	2,437	912	816	-53.6	-10.7

Procedure Category & CPT code	CPT Description	Volume (Total Medicare Procedures)						% Overall Change	CAGR (%)
		2012	2013	2014	2015	2016	2017		
Sports									
29881	Arthroscopy, knee, surgical; with meniscectomy (medial OR lateral, including any meniscal shaving) including debridement/shaving of articular cartilage	29,066	28,390	25,390	25,433	25,007	22,132	-23.9	-4.8

29880	Arthroscopy, knee, surgical; with meniscectomy (medial AND lateral, including any meniscal shaving) including debridement/shaving of articular cartilage	25,220	23,966	21,724	20,552	20,408	18,614	-26.2	-5.2
29827	Arthroscopy, shoulder, surgical; with rotator cuff repair	46,275	50,788	53,851	56,844	60,051	62,372	34.8	7.0
Joint									
27446	Arthroplasty, knee, condyle and plateau; medial OR lateral compartment	10,124	12,387	12,773	12,387	14,252	14,422	42.5	8.5
27570	Manipulation of knee joint under general anesthesia (includes application of traction or other fixation devices)	1,051	927	1,089	927	1,072	1,142	8.7	1.7
27275	Manipulation, hip joint, requiring general anesthesia	313	32	160	32	92	105	-66.5	-13.3
Hand									
64721	Neuroplasty and/or transposition; median nerve at carpal tunnel	71,807	73,544	72,777	73,691	76,504	77,256	7.6	1.5
26055	Tendon sheath incision (eg, for trigger finger)	40,502	45,953	47,806	52,718	57,173	59,916	47.9	9.6
29848	Endoscopy, wrist, surgical, with release of transverse carpal ligament	20,834	21,385	22,207	23,340	25,996	27,244	30.8	6.2
Foot/Ankle									
28285	Correction, hammertoe (eg, interphalangeal fusion, partial or total phalangectomy)	34,136	35,510	30,662	28,622	28,177	26,744	-21.7	-4.3
29581	Application of multi-layer compression system; leg (below knee), including ankle and foot	97,831	95,213	86,490	89,664	96,692	103,482	5.8	1.2
28270	Capsulotomy; metatarsophalangeal joint, with or without tenorrhaphy, each joint (separate procedure)	11,851	12,506	11,112	11,172	10,715	9,795	-17.3	-3.5
Spine									
63047	Laminectomy, facetectomy and foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root[s], [eg, spinal or lateral recess stenosis]), single vertebral segment; lumbar	121,062	128,725	139,429	138,298	144,902	139,517	15.2	3.0

63030	Laminotomy (hemilaminectomy), with decompression of nerve root(s), including partial facetectomy, foraminotomy and/or excision of herniated intervertebral disc; 1 interspace, lumbar	24,881	24,843	24,392	22,544	21,302	18,304	-26.4	-5.3
22514	Percutaneous vertebral augmentation, including cavity creation (fracture reduction and bone biopsy included when performed) using mechanical device (e.g., kyphoplasty), 1 vertebral body, unilateral or bilateral cannulation, inclusive of all imaging guidance; lumbar	-	-	-	10,898	11,304	11,282	3.5	0.7
Other									
20610	Arthrocentesis, aspiration and/or injection, major joint or bursa (eg, shoulder, hip, knee, subacromial bursa); without ultrasound guidance	5,648,942	5,804,205	5,873,858	5,247,623	5,435,998	5,426,913	-3.9	-0.8
20680	Removal of implant; deep (eg, buried wire, pin, screw, metal band, nail, rod or plate)	12,238	14,110	13,822	14,110	14,383	14,979	22.4	4.5
J7325	Hyaluronan or derivative, synvisc or synvisc-one, for intra-articular injection, 1 mg	9,597,243	8,179,380	8,503,357	8,179,380	7,900,862	7,506,667	-21.8	-4.4

Supplementary Table 3. Top 10 Orthopedic Procedures Ranked by Total ASC Volume (2012-2017)

Rank	CPT code	CPT Description	Procedure Category	Total Procedures (n)	Avg Payment per Case (USD)
1	64721	Neuroplasty and/or transposition; median nerve at carpal tunnel	Hand/Elbow	256,359	\$558
2	26055	Incision of tendon covering	Hand/Elbow	199,199	\$436
3	20610	Arthrocentesis, aspiration and/or injection, major joint or bursa (eg, shoulder, hip, knee, subacromial bursa); without ultrasound guidance	Other	179,147	\$19
4	29881	Arthroscopy, knee, surgical; with meniscectomy (medial OR lateral, including any meniscal shaving) including debridement/shaving of articular cartilage	Sports	140,722	\$928
5	28285	Correction, hammertoe (eg, interphalangeal fusion, partial or total phalangectomy)	Foot/Ankle	138,033	\$492
6	29880	Arthroscopy, knee, surgical; with meniscectomy (medial AND lateral, including any meniscal shaving) including debridement/shaving of articular cartilage	Sports	113,412	\$943
7	29827	Arthroscopy, shoulder, surgical; with rotator cuff repair	Sports	113,288	\$1,750
8	29848	Endoscopy, wrist, surgical, with release of transverse carpal ligament	Hand/Elbow	86,448	\$761
9	29824	Arthroscopy, shoulder, surgical; distal claviclectomy including distal articular surface (Mumford procedure)	Sports	68,947	\$817
10	29581	Application of multi-layer compression system; leg (below knee), including ankle and	Foot/Ankle	53,967	\$42

USD, United States Dollar (\$); n, total number of procedures performed

Supplementary Table 4. Top 10 Orthopedic ASC Procedures Ranked by Average Medicare Payment per Case (2012-2017)

Rank	CPT code	CPT Description	Procedure Category	Total Procedures (n)	Avg Payment (USD)*
1	27279	Fusion sacroiliac joint through the skin or minimally invasive using image guidance	Spine	203	\$9,737
2	22869	Insertion of stabilizing or separating device into lower spine at single level	Spine	506	\$8,381
3	22867	Insertion of stabilizing or separating device into lower spine at single level with open decompression	Spine	71	\$7,995
4	27446	Arthroplasty, knee, condyle and plateau; medial OR lateral compartment	Joints	5,323	\$6,041
5	22551	Arthrodesis, anterior interbody, including disc space preparation, discectomy, osteophytectomy and decompression of spinal cord and/or nerve roots; cervical below	Spine	678	\$5,603
6	23615	Open treatment of proximal humeral (surgical or anatomical neck) fracture, includes internal fixation, when performed, includes repair of tuberosity(s), when performed;	Sports	11	\$5,592
7	22612	Arthrodesis, posterior or posterolateral technique, single level; lumbar (with lateral transverse technique, when performed)	Spine	91	\$3,811
8	20692	Application of a multiplane (pins or wires in more than 1 plane), unilateral, external fixation system (eg, Ilizarov, Monticelli type)	Other	17	\$3,181
9	28725	Arthrodesis; subtalar	Foot/Ankle	23	\$2,825

10	62380	Decompression of spinal cord and/or nerve root in lower back using endoscope	Spine	84	\$2,795
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USD, United States Dollar (\$); n, total number of procedures performed

* Average payment amounts represent reimbursement for CPT code claim and does not capture total reimbursement for multi-code procedures.