

Supplementary Table 1. Surgical subcategories used and the surgical procedures they include

Surgical subcategory	ICD-9 code	Surgical procedure(s)
Ventricular shunt to extracranial site	0231	Ventricle to nasopharynx shunt, ventriculomastoid anastomosis
Craniotomy and craniectomy; reopening of craniotomy site	0123	-
Other incision of brain	0139	Amygdalohippocampotomy, drainage of intracerebral hematoma, incision of brain NOS Excludes: division of cortical adhesions
Other craniectomy	0124	Cranial (decompression, exploration, trephination), craniotomy NOS, craniotomy with removal of (epidural abscess, extradural hematoma, foreign body of skull) Excludes: removal of foreign body with incision into brain
Incision of cerebral meninges	0131	Drainage of (intracranial hygroma, subarachnoid abscess (cerebral), subdural empyema)
Insertion of implantable heart assist system	3766	Axial flow heart assist system, diagonal pump heart assist system, left ventricular assist device, pulsatile heart assist system, right ventricular assist device, rotary pump heart assist system, transportable implantable heart assist system, ventricular assist device not otherwise specified Excludes: implant of pulsation balloon, implantation of total internal biventricular heart replacement system (artificial heart), insertion of percutaneous external heart assist device
Open heart valvuloplasty of aortic valve without replacement	3511	-
Open and other replacement of aortic valve with tissue graft	3521	Repair of aortic valve with tissue graft (autograft, heterograft, homograft)
Implant of pulsation balloon	3761	-
(Aorto)coronary bypass of three coronary arteries	3613	-
Endovascular removal of obstruction from head and neck vessel(s)	3974	Endovascular embolectomy, endovascular thrombectomy of pre-cerebral and cerebral vessels, mechanical embolectomy or thrombectomy Excludes: endarterectomy of intracranial vessels and other vessels of head and neck, occlusive endovascular repair of head or neck vessels, open embolectomy or thrombectomy
Extracranial-intracranial vascular bypass	3928	-
Clipping of aneurysm	3951	Excludes: clipping of arteriovenous fistula
Endarterectomy; other vessels of head and neck	3812	Extirpation of matter from: right/left common carotid artery, right/left internal carotid artery, right/left external carotid artery, right/left vertebral artery, facial artery, right/left temporal artery, right/left thyroid artery
Percutaneous transluminal coronary angioplasty	0066	Balloon angioplasty of coronary artery, coronary atherectomy, percutaneous coronary angioplasty NOS
Heart transplantation	3751	-
Combined heart-lung transplantation	336	-
Bilateral lung transplantation	3352	Double-lung transplantation, <i>en bloc</i> transplantation
Other transplant of liver	5059	Exclude: auxiliary hepatic transplantation leaving patient's own liver <i>in situ</i>
Pancreatic transplant NOS	5280	-
Reopening of recent thoracotomy site	3403	-
Other and unspecified pneumonectomy	3259	Excludes: thoracoscopic pneumonectomy
Other lobectomy of lung	3249	Excludes: thoracoscopic lobectomy of lung
Decortication of lung	3451	Excludes: thoracoscopic decortication of lung
Thoracoscopic excision of lesion or tissue of lung	3220	Thoracoscopic wedge resection
Partial excision of pituitary gland, transfrontal approach	0761	Cryohypophysectomy, partial transfrontal approach, division of hypophyseal stalk transfrontal approach, excision of lesion of pituitary (hypophysis) transfrontal approach, hypophysectomy subtotal transfrontal approach, infundibulotomy hypophyseal transfrontal approach Excludes: biopsy of pituitary gland transfrontal approach
Partial excision of pineal gland	0753	Excludes: biopsy of pineal gland
Division of thyroid isthmus	0691	Transection of thyroid isthmus
Unilateral adrenalectomy	0722	Adrenalectomy NOS Excludes: excision of remaining adrenal gland

Supplementary Table 1. Continued

Surgical subcategory	ICD-9 code	Surgical procedure(s)
Complete thyroidectomy	064	Excludes: complete substernal thyroidectomy
Open total intra-abdominal colectomy	4582	-
Open and other left hemicolectomy	4575	Excludes: proctosigmoidectomy, second stage Mikulicz operation
Exploratory laparotomy	5411	Excludes: exploration incidental to intra-abdominal surgery
Other partial resection of small intestine	4562	Duodenectomy, ileectomy, jejunectomy Excludes: duodenectomy with synchronous pancreatectomy, resection of cecum and terminal ileum
Cholecystectomy	5122	Excludes: laparoscopic cholecystectomy
Other removal or destruction of corneal lesion	1149	Excision of cornea NOS Excludes: biopsy of cornea
Other extracapsular extraction of lens	1359	Exclude: extracapsular extraction of lens by temporal inferior route
Other repair of retinal detachment	1459	Exclude: repair of retinal detachment with diathermy, cryotherapy, xenon arc photocoagulation, laser photocoagulation, photocoagulation of unspecified type
Other operations on vitreous	1479	Exclude: open sky technique, removal of vitreous, anterior approach, aspiration of vitreous by posterior sclerotomy, mechanical vitrectomy by anterior/posterior approach, injection of vitreous substitute
Suture of corneal laceration	1151	-
Total splenectomy	415	Splenectomy NOS
Radical excision of periaortic lymph nodes	4052	-
Biopsy of lymphatic structure	4011	-
Radical neck dissection, unilateral	4041	-
Excision of axillary lymph node	4023	-
Amputation above knee	8417	Amputation of leg through femur, amputation of thigh, conversion of below-knee amputation into above-knee amputation, supracondylar above-knee amputation
Atlas-axis spinal fusion	8101	Craniocervical fusion by (anterior, transoral, or posterior technique), C1-C2 fusion by (anterior, transoral, or posterior technique), occiput C2 fusion by (anterior, transoral, or posterior technique)
Other amputation below knee	8415	Amputation of leg through tibia and fibula NOS
Partial hip replacement	8152	Bipolar endoprosthesis
Open reduction of fracture with internal fixation; femur	7935	Excludes: that for separation of epiphysis
Nephroureterectomy	5551	Nephroureterectomy with bladder cuff, total nephrectomy (unilateral) Excludes: removal of transplanted kidney
Percutaneous nephrostomy without fragmentation	5503	Nephrostolithotomy (nephroscopic), percutaneous removal of kidney stone(s) by: (basket extraction, forceps extraction [nephroscopic]), pyelostolithotomy (nephroscopic), with placement of catheter down ureter Excludes: percutaneous removal by fragmentation, repeat nephroscopic removal during current episode
Radical cystectomy	5771	Pelvic exenteration in male, removal of (bladder, prostate, seminal vesicles, and fat), removal of (bladder, urethra, and fat in a female) Excludes: that as part of pelvic exenteration in female
Other transurethral excision or destruction of lesion or tissue of bladder	5749	Endoscopic resection of bladder lesion Excludes: transurethral biopsy of bladder, transurethral fistulectomy
Control of (postoperative) hemorrhage of bladder	5793	-
Other transurethral prostatectomy	6029	Excision of median bar by transurethral approach, transurethral electrovaporization of prostate, transurethral enucleative procedure, transurethral prostatectomy NOS, transurethral resection of prostate
Control of (postoperative) hemorrhage of prostate	6094	Coagulation of prostatic bed, cystoscopy for control of prostatic hemorrhage
Radical prostatectomy	605	Prostatovesiculectomy, radical prostatectomy by any approach Excludes: cystoprostatectomy
Unilateral orchiectomy	623	Orchidectomy (with epididymectomy) NOS

Supplementary Table 1. Continued

Surgical subcategory	ICD-9 code	Surgical procedure(s)
Removal of both testes at same operative episode	6241	Bilateral orchidectomy NOS
Low cervical cesarean section	741	Lower uterine segment cesarean section
Other and unspecified total abdominal hysterectomy	6849	-
Other removal of both ovaries and tubes at same operative episode	6561	Excludes: that by laparoscope
Laparoscopic total abdominal hysterectomy	6841	Total laparoscopic hysterectomy
Classical cesarean section	740	Transperitoneal classical cesarean section
Fat graft of skin and subcutaneous tissue	8687	Replacement of subcutaneous tissue and fascia for (scalp, face, neck, chest, back, buttock, abdomen, perineum, pelvic region, arms, hands, legs, feet) with autologous tissue substitute percutaneous approach, extraction of subcutaneous tissue and fascia for (scalp, face, neck, chest, back, buttock, abdomen, perineum, pelvic region, arms, hands, legs, feet) percutaneous approach
Bilateral simple mastectomy	8542	Bilateral complete mastectomy
Removal of implant of breast	8594	-
Other free skin graft to other sites	8669	Excludes: heterograft, homograft
Homograft to skin	8666	Graft to skin of amnionic membrane from donor skin from donor
Sphenoidectomy	2264	-
Incision of multiple nasal sinuses	2253	-
Sphenoidotomy	2252	-
Control of epistaxis by ligation of ethmoidal arteries	2104	-
Ethmoidectomy	2263	-

ICD-9, International Classification of Diseases, 9th revision; NOS, not otherwise specified.