

**TABLE E-1 Codes Used to Identify Lumbar Fusion Procedures in NIS and NSQIP**

Codes	Description
NIS ICD-9 Procedure	
81.06	Lumbar and lumbosacral fusion of the anterior column, anterior technique
81.07	Lumbar and lumbosacral fusion of the posterior column, lateral transverse process technique
81.08	Lumbar and lumbosacral fusion of the anterior column, posterior technique
NSQIP CPT	
22533	Arthrodesis, lateral extracavitary technique, including minimal discectomy to prepare interspace (other than for decompression); lumbar
22558	Arthrodesis, anterior interbody technique, including minimal discectomy to prepare interspace (other than for decompression); lumbar
22612	Arthrodesis, posterior or posterolateral technique, single level; lumbar (with or without lateral transverse technique)
22630	Arthrodesis, posterior interbody technique, including laminectomy and/or discectomy to prepare interspace (other than for decompression), single interspace; lumbar
22633	Arthrodesis, combined posterior or posterolateral technique with posterior interbody technique, including laminectomy and or discectomy sufficient to prepare interspace (other than for decompression), single interspace and level; lumbar

**TABLE E-2 Data Elements from NIS and NSQIP Used to Identify Cases with Comorbidities**

Comorbidity	NIS ICD-9 Code(s) or Variables*	NSQIP Variables
Anemia	"cm_anemdef" (deficiency anemia); "cm_bldloss" (chronic blood loss anemia)	"prhct" (preoperative hematocrit)†
Chronic obstructive pulmonary disease	491.xx (chronic bronchitis); 492.x (emphysema); 496 (chronic airway obstruction)	"hxcpod" (history of severe chronic obstructive pulmonary disease)
Coagulopathy	"cm_coag" (coagulopathy)	"bleeddis" (bleeding disorders)
Diabetes	"cm_dm" (diabetes, uncomplicated); "cm_dmcx" (diabetes, with chronic complications)	"diabetes" (diabetes mellitus with oral agents or insulin)
Hypertension	"cm_htn_c" (hypertension)	"hypermed" (hypertension requiring medication)
Morbid obesity	278.01 (morbid obesity [BMI of $\geq 40$ kg/m <sup>2</sup> ]); V85.3 (morbid obesity [BMI of $\geq 40$ kg/m <sup>2</sup> ])	"height" (height); "weight" (weight)‡
Non-morbid obesity	278.00 (obesity [BMI of 30 to 39.9 kg/m <sup>2</sup> ]); V85.4 (obesity [BMI of 30 to 39.9 kg/m <sup>2</sup> ])	"height" (height); "weight" (weight)§
Peripheral vascular disease	"cm_perivasc" (peripheral vascular disorder)	"hxpvd" (history of revascularization or amputation); "restpain" (rest pain or gangrene)

\*Data elements used in NIS were ICD-9 codes or directly reported comorbidity variables (variables starting with "cm\_"). The directly reported comorbidity variables are summaries of ICD-9 codes using a proprietary algorithm. "x" is a wildcard digit (can be from 0 to 9). BMI = body mass index.

†The patient was considered to have anemia if the preoperative hematocrit (variable named "prhct") was <41% for male patients or <36% for female patients. ‡The patient was considered to have morbid obesity if BMI was  $\geq 40.0$  kg/m<sup>2</sup>. §The patient was considered to have non-morbid obesity if BMI was 30.0 to 39.9 kg/m<sup>2</sup>.

**TABLE E-3 Data Elements from NIS and NSQIP Used to Identify Cases with Adverse Events**

Adverse Event	NIS ICD-9 Codes or Variables*	NSQIP Variables
Acute kidney injury	584.x (acute kidney failure)	"noprenafi" (acute renal failure, postoperative); "nrenainsf" (progressive renal insufficiency, postoperative)
Cardiac arrest	427.5 (cardiac arrest); 427.41 (ventricular fibrillation)	"ncdarrest" (cardiac arrest requiring cardiopulmonary resuscitation, postoperative); "typeintoc" (cardiac arrest requiring cardiopulmonary resuscitation, intraoperative)
Death	"died" (death)	"death" (death)
Deep vein thrombosis	453.2 (venous embolism and thrombosis of the inferior vena cava); 453.3 (venous embolism and thrombosis of the renal vein); 453.4x (acute venous embolism and thrombosis of unspecified deep vessels of lower extremity); 453.82 (acute venous embolism and thrombosis of deep veins of upper extremity); 453.84 (acute venous embolism and thrombosis of axillary veins); 453.85 (acute venous embolism and thrombosis of subclavian veins); and 453.86 (acute venous embolism and thrombosis of internal jugular veins)	"nothdvt" (deep vein thrombosis, with or without inflammation, postoperative)
Myocardial infarction	410.xx (acute myocardial infarction)	"ncdmi" (myocardial infarction, postoperative); "typeintoc" (myocardial infarction, intraoperative)
Peripheral nerve injury	953.x (injury to nerve roots and spinal plexus); 954.x (injury to other nerve(s) of trunk, excluding shoulder and pelvic girdles); 955.x (injury to peripheral nerve(s) of shoulder girdle and upper limb); 956.x (injury to peripheral nerve(s) of pelvic girdle and lower limb)	"nneurodef" (peripheral nerve injury, postoperative)
Pneumonia	480.x (viral pneumonia); 481 (pneumococcal pneumonia); 482.xx (other bacterial pneumonia); 483.x (pneumonia due to other specified organism); 484.x (pneumonia in infectious diseases classified elsewhere); 485 (bronchopneumonia, organism unspecified); 486 (pneumonia, organism unspecified)	"noupneumo" (pneumonia, postoperative)
Pulmonary embolism	415.1 (pulmonary embolism and infarction)	"npulembol" (pulmonary embolism, postoperative)
Sepsis	038.xx (septicemia); 112.5 (disseminated candidiasis); 785.52 (septic shock); 995.91 (sepsis); 995.92 (severe sepsis)	"nothsyseps" (sepsis, postoperative); "nothseshock" (septic shock, postoperative)
Stroke	997.02 (iatrogenic cerebrovascular infarction or hemorrhage); 430 (subarachnoid hemorrhage); 431 (intracerebral hemorrhage); 433.01 (occlusion and stenosis of precerebral arteries with cerebral infarction); 433.11 (occlusion and stenosis of carotid artery with cerebral infarction); 433.21 (occlusion and stenosis of vertebral artery with cerebral infarction); 433.31 (occlusion and stenosis of multiple and bilateral precerebral arteries with cerebral infarction); 433.81 (occlusion and stenosis of other specified precerebral artery with cerebral infarction); 433.91 (occlusion and stenosis of unspecified precerebral artery with cerebral infarction); 434.01 (cerebral thrombosis with cerebral infarction); 434.11 (cerebral embolism with cerebral infarction); 434.91 (cerebral artery occlusion, unspecified with cerebral infarction)	"ncnscva" (stroke or cerebrovascular accident, postoperative)

*continued*

TABLE E-3 (continued)		
Adverse Event	NIS ICD-9 Codes or Variables*	NSQIP Variables
Surgical site infection	998.5x (postoperative infection not elsewhere classified); 996.67 (infection and inflammatory reaction due to other internal orthopedic device, implant, or graft)	"nsupinfec" (superficial surgical site infection, postoperative); "nwndinf" (deep surgical site infection, postoperative); "norgspcssi" (organ or space surgical site infection, postoperative)
Postoperative intubation	96.01 (insertion of nasopharyngeal airway); 96.02 (insertion of oropharyngeal airway); 96.03 (insertion of esophageal obturator airway); 96.04 (insertion of endotracheal tube); 96.05 (other intubation of respiratory tract); 96.7x (other continuous invasive mechanical ventilation)	"nreintub" (unplanned intubation, postoperative); "typeintoc" (unplanned intubation, intraoperative); "nfailwean" (on ventilator more than forty-eight hours, postoperative)
Urinary tract infection	599.0 (urinary tract infection)	"nurninfec" (urinary tract infection, postoperative)
Wound disruption	998.3x (disruption of operation wound)	"ndehis" (wound disruption, postoperative)
* "x" is a wildcard digit (can be from 0 to 9).		