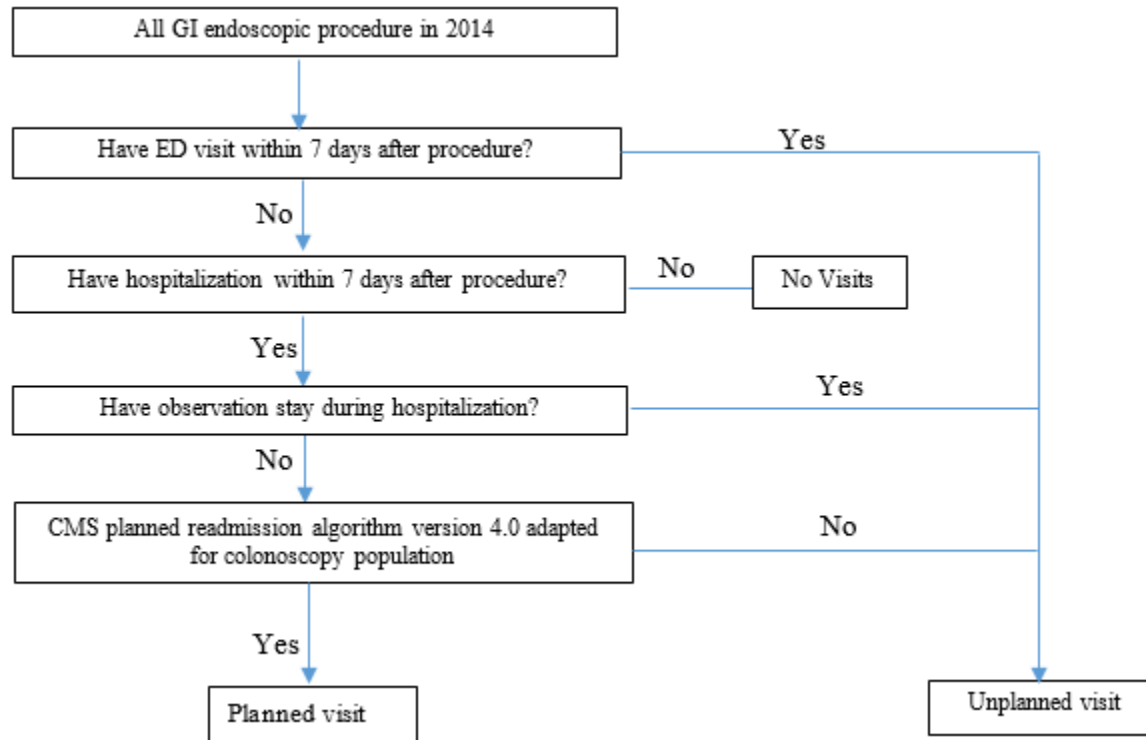


Appendices

Appendix Figure 1. Flow chart of identification of planned and unplanned visits



CMS planned readmission algorithm (pages 18 and 51): <https://www.cms.gov/Medicare/Quality-Initiatives-Patient-assessment-Instruments/HospitalQualityInits/Measure-Methodology.html>

Appendix Table 1. CPT/HCPCS codes for colonoscopy

Category	CPT/HCPCS	Description
Screening colonoscopy	G0105	Colorectal cancer screening; colonoscopy on individual at high risk
	G0121	Colorectal cancer screening; colonoscopy on individual not meeting criteria for high risk
	45378*	Colonoscopy, flexible, proximal to splenic flexure; diagnostic, with or without collection of specimen(s) by brushing or washing, with or without colon decompression (separate procedure)
	Any CPT code of colonoscopy accompanied by the HCPCS modifier "PT"	Colorectal cancer screening test, converted to diagnostic test or other procedure
	Any CPT code of colonoscopy accompanied by the CPT modifier "33"	The primary purpose of the service is the delivery of an evidence-based service in accordance with a U.S. Preventive Services Task Force A or B rating in effect and other preventive services identified in preventive services mandates (legislative or regulatory)
Non-invasive	G0105	Colorectal cancer screening; colonoscopy on individual at high risk
	G0121	Colorectal cancer screening; colonoscopy on individual not meeting criteria for high risk
	45378	Colonoscopy, flexible, proximal to splenic flexure; diagnostic, with or without collection of specimen(s) by brushing or washing, with or without colon decompression (separate procedure)
	45391	Colonoscopy, flexible, proximal to splenic flexure; with endoscopic ultrasound examination
Invasive	45379	Colonoscopy, flexible, proximal to splenic flexure; with removal of foreign body
	45380	Colonoscopy, flexible, proximal to splenic flexure; with biopsy, single or multiple
	45381	Colonoscopy, flexible, proximal to splenic flexure; with directed submucosal injection(s), any substance
	45382	Colonoscopy, flexible, proximal to splenic flexure; with control of bleeding (eg, injection, bipolar cautery, unipolar cautery, laser, heater probe, stapler, plasma coagulator)
	45383	Colonoscopy, flexible, proximal to splenic flexure; with ablation of tumor(s), polyp(s), or other lesion(s) not amenable to removal by hot biopsy forceps, bipolar cautery or snare technique

Category	CPT/HCPCS	Description
	45384	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s), or other lesion(s) by hot biopsy forceps or bipolar cautery
	45385	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s), or other lesion(s) by snare technique
	45386	Colonoscopy, flexible, proximal to splenic flexure; with dilation by balloon, 1 or more strictures
	45387	Colonoscopy, flexible, proximal to splenic flexure; with transendoscopic stent placement (includes predilation)
	45392	Colonoscopy, flexible, proximal to splenic flexure; with transendoscopic ultrasound guided intramural or transmural fine needle aspiration/biopsy(s)

*For California, Florida, and Georgia where CPT modifiers were not reported, the CPT code 45378 alone was considered a screening colonoscopy. For New York, Nebraska, and Vermont where CPT modifiers were reported, the CPT code 45378 was considered a screening colonoscopy only when accompanied by a “33” or “PT” modifier.

Appendix Table 2. CPT/HCPCS codes for upper gastrointestinal endoscopy

Invasiveness	CPT/HCPCS	Description
Non-invasive	43191	Esophagoscopy, rigid, transoral; diagnostic, including collection of specimen(s) by brushing or washing when performed (separate procedure)
	43197	Esophagoscopy, flexible, transnasal; diagnostic, includes collection of specimen(s) by brushing or washing when performed (separate procedure)
	43200	Esophagoscopy, flexible, transoral; diagnostic, including collection of specimen(s) by brushing or washing, when performed (separate procedure)
	43235	Esophagogastroduodenoscopy, flexible, transoral; diagnostic, including collection of specimen(s) by brushing or washing, when performed (separate procedure)
	43252	Esophagogastroduodenoscopy, flexible, transoral; with optical endomicroscopy
Invasive	43192	Esophagoscopy, rigid, transoral; with directed submucosal injection(s), any substance
	43193	Esophagoscopy, rigid, transoral; with biopsy, single or multiple
	43194	Esophagoscopy, rigid, transoral; with removal of foreign body
	43195	Esophagoscopy, rigid, transoral; with balloon dilation (less than 30 mm diameter)
	43196	Esophagoscopy, rigid, transoral; with insertion of guide wire followed by dilation over guide wire
	43198	Esophagoscopy, flexible, transnasal; with biopsy, single or multiple
	43201	Esophagoscopy, flexible, transoral; with directed submucosal injection(s), any substance
	43202	Esophagoscopy, flexible, transoral; with biopsy, single or multiple
43204	Esophagoscopy, flexible, transoral; with injection sclerosis of esophageal varices	

Invasiveness	CPT/HCPCS	Description
	43205	Esophagoscopy, flexible, transoral; with band ligation of esophageal varices
	43211	Esophagoscopy, flexible, transoral; with endoscopic mucosal resection
	43212	Esophagoscopy, flexible, transoral; with placement of endoscopic stent (includes pre- and post-dilation and guide wire passage, when performed)
	43213	Esophagoscopy, flexible, transoral; with dilation of esophagus, by balloon or dilator, retrograde (includes fluoroscopic guidance, when performed)
	43214	Esophagoscopy, flexible, transoral; with dilation of esophagus with balloon (30 mm diameter or larger) (includes fluoroscopic guidance, when performed)
	43215	Esophagoscopy, flexible, transoral; with removal of foreign body
	43216	Esophagoscopy, flexible, transoral; with removal of tumor(s), polyp(s), or other lesion(s) by hot biopsy forceps or bipolar cautery
	43217	Esophagoscopy, flexible, transoral; with removal of tumor(s), polyp(s), or other lesion(s) by snare technique
	43220	Esophagoscopy, flexible, transoral; with transendoscopic balloon dilation (less than 30 mm diameter)
	43226	Esophagoscopy, flexible, transoral; with insertion of guide wire followed by passage of dilator(s) over guide wire
	43227	Esophagoscopy, flexible, transoral; with control of bleeding, any method
	43229	Esophagoscopy, flexible, transoral; with ablation of tumor(s), polyp(s), or other lesion(s) (includes pre- and post-dilation and guide wire passage, when performed)
	43233	Esophagogastroduodenoscopy, flexible, transoral; with dilation of esophagus with balloon (30 mm diameter or larger) (includes fluoroscopic guidance, when performed)
	43236	Esophagogastroduodenoscopy, flexible, transoral; with directed submucosal injection(s), any substance
	43239	Esophagogastroduodenoscopy, flexible, transoral; with biopsy, single or multiple
	43240	Esophagogastroduodenoscopy, flexible, transoral; with transmural drainage of pseudocyst (includes placement of transmural drainage catheter[s]/stent[s], when performed, and endoscopic ultrasound, when performed)
	43241	Esophagogastroduodenoscopy, flexible, transoral; with insertion of intraluminal tube or catheter
	43243	Esophagogastroduodenoscopy, flexible, transoral; with injection sclerosis of esophageal/gastric varices
	43244	Esophagogastroduodenoscopy, flexible, transoral; with band ligation of esophageal/gastric varices
	43245	Esophagogastroduodenoscopy, flexible, transoral; with dilation of gastric/duodenal stricture(s) (eg, balloon, bougie)
	43246	Esophagogastroduodenoscopy, flexible, transoral; with directed placement of

Invasiveness	CPT/HCPCS	Description
		percutaneous gastrostomy tube
	43247	Esophagogastroduodenoscopy, flexible, transoral; with removal of foreign body
	43248	Esophagogastroduodenoscopy, flexible, transoral; with insertion of guide wire followed by passage of dilator(s) through esophagus over guide wire
	43249	Esophagogastroduodenoscopy, flexible, transoral; with transendoscopic balloon dilation of esophagus (less than 30 mm diameter)
	43250	Esophagogastroduodenoscopy, flexible, transoral; with removal of tumor(s), polyp(s), or other lesion(s) by hot biopsy forceps or bipolar cautery
	43251	Esophagogastroduodenoscopy, flexible, transoral; with removal of tumor(s), polyp(s), or other lesion(s) by snare technique
	43254	Esophagogastroduodenoscopy, flexible, transoral; with endoscopic mucosal resection
	43255	Esophagogastroduodenoscopy, flexible, transoral; with control of bleeding, any method
	43257	Esophagogastroduodenoscopy, flexible, transoral; with delivery of thermal energy to the muscle of lower esophageal sphincter and/or gastric cardia, for treatment of gastroesophageal reflux disease
	43266	Esophagogastroduodenoscopy, flexible, transoral; with placement of endoscopic stent (includes pre- and post-dilation and guide wire passage, when performed)
	43270	Esophagogastroduodenoscopy, flexible, transoral; with ablation of tumor(s), polyp(s), or other lesion(s) (includes pre- and post-dilation and guide wire passage, when performed)

Appendix Table 3. CPT/HCPCS codes for comparative procedures

CPT/HCPCS	Description
G0202	Screening mammography, producing direct digital image, bilateral, all views
77057	Screening mammography, bilateral (2-view film study of each breast)
<u>G0102</u>	Prostate cancer screening, <u>digital rectal examination</u>
<u>G0103</u>	Prostate cancer screening, <u>prostate specific antigen test</u>
52000	Cystoscopy, <u>Cystourethroscopy (separate procedure)</u>
52001	Cystoscopy, <u>Cystourethroscopy with irrigation and evacuation of multiple obstructing clots</u>
52005	Cystoscopy, <u>Cystourethroscopy, with ureteral catheterization, with or without irrigation, instillation, or ureteropyelography, exclusive of radiologic service</u>
52007	Cystoscopy, <u>Cystourethroscopy, with ureteral catheterization, with or without irrigation, instillation, or ureteropyelography, exclusive of radiologic service; with brush biopsy of ureter and/or renal pelvis</u>
52010	Cystoscopy, <u>Cystourethroscopy, with ejaculatory duct catheterization, with or without irrigation, instillation, or duct radiography, exclusive of radiologic service</u>
31622	<u>Bronchoscopy, rigid or flexible, including fluoroscopic guidance, when performed; diagnostic, with cell washing, when performed (separate procedure)</u>
<u>31623 – 31651</u>	<u>Bronchoscopy, rigid or flexible, including fluoroscopic guidance, when performed; with other diagnostic or therapeutic procedures</u>

Appendix Table 4. ICD-9-CM codes for infections

ICD-9-CM code	Description
001 – 136	Infectious and parasitic diseases, excluding 136.1
<i>Inflammatory diseases of the central nervous system</i>	
320	Bacterial meningitis
321	Meningitis due to other organisms (fungi, virus, trypanosomiasis)
323.0-323.4	Encephalitis, myelitis, and encephalomyelitis
323.61	Infectious acute disseminated encephalomyelitis (ADEM)
<i>Diseases of the circulatory system</i>	
421.0	Acute and subacute bacterial endocarditis
421.1	Acute and subacute infective endocarditis in diseases classified elsewhere
<i>Diseases of respiratory system</i>	
460-466	Acute respiratory infections
480-488	Pneumonia and influenza
511.1	Pleurisy with effusion, with mention of a bacterial cause other than tuberculosis
<i>Diseases of digestive system</i>	
566	Abscess of anal and rectal regions
567	Peritonitis and retroperitoneal infections
<i>Diseases of genitourinary system</i>	
590	Infections of kidney
<i>Supplementary classification of factors influencing health status and contact with health services</i>	
V09	Infection with drug-resistant microorganisms

Appendix Table 5. ICD-9-CM codes for aspiration pneumonia

ICD-9-CM code	Description
507.0	Pneumonitis due to inhalation of food or vomitus
507.8	Pneumonitis due to other solids and liquids
482.89	Pneumonia due to other specified bacteria
482.9	Bacterial pneumonia, unspecified
483.8	Pneumonia due to other specified organism

Appendix Table 6. Characteristics of ambulatory surgery centers of California, Florida, New York, Georgia, Nebraska, and Vermont

	California		Florida		New York		Georgia		Nebraska		Vermont		
State Population ^a as of July 1, 2014	38,802,500		19,893,297		19,746,227		10,097,343		1,881,503		626,562		
Number of ASCs by specialty													
	Non-freestanding	Freestanding	Non-freestanding	Freestanding	Non-freestanding	Freestanding	Non-freestanding	Freestanding	Non-freestanding	Freestanding	Non-freestanding	Freestanding	
Number of All ASCs	353	35	221	392	252	120	134	88	14				
N Perform GI endoscopy	334	13	211	211	213	65	104	87	10				
N Perform Colonoscopy	330	11	209	190	208	63	95	86	10				
% Multispecialty ^b	87.0%	63.6%	94.7%	44.2%	89.4%	19.1%	74.7%	70.9%	100.0%				
N Perform EGD	326	11	211	202	207	62	98	85	10				
% Multispecialty	88.0%	63.6%	93.8%	45.3%	88.5%	16.1%	73.5%	70.6%	100.0%				
Volume Profile by Endoscopy Type													
Screening colonoscopy volume	Median	149	262	443	1,517	202	740	155	29	354			
	Min-Max	1 – 3,045	1 – 1,518	1 – 1,324	1 – 4,252	1 – 3,214	1 – 10,525	2 – 1,258	1 – 885	41 – 1,468			
	Total	88,156	5,610	46,333	140,110	77,812	67,918	23,740	7,327	5,062			
Non-screening colonoscopy volume	Median	202	302	280	1,031	677	1,599	222	108	654			
	Min-Max	1 – 4,173	3 – 2,978	1 – 4,053	1 – 7,597	1 – 4,254	6 – 7,045	1 – 2,129	2 – 2,355	215 – 7,115			
	Total	153,637	10,717	99,987	263,398	190,070	129,420	34,148	18,831	13,932			
EGD volume	Median	235	275	412	851	547	1,362	226	50	377			
	Min-Max	1 – 3,588	5 – 1,130	1 – 4,631	1 – 5,944	1 – 4,437	3 – 5,725	1 – 2,696	1 – 2,763	70 – 2,956			
	Total	146,783	4,919	129,311	240,542	169,285	117,330	41,417	17,492	6,059			
Patient characteristics													
N, % of patients within a state		N	%	N	%	N	%	N	%	N	%	N	%
Total Number of patients that had a colonoscopy or EGD		361,161		780,347		682,459		92,386		38,983		24,554	
Age	0-9	1,422	0.4%	3,076	0.4%	3,980	0.6%	558	0.6%	844	2.2%	121	0.5%
	10-19	3,780	1.1%	7,670	1.0%	9,623	1.4%	1,183	1.3%	1,328	3.4%	278	1.1%
	20-29	9,817	2.7%	18,458	2.4%	27,061	4.0%	2,627	2.8%	1,290	3.3%	583	2.4%
	30-39	17,712	4.9%	33,374	4.3%	40,768	6.0%	5,184	5.6%	2,096	5.4%	866	3.5%
	40-49	33,787	9.4%	68,803	8.8%	77,243	11.3%	10,280	11.1%	3,378	8.7%	1,995	8.1%
	50-59	114,096	31.6%	211,096	27.1%	213,439	31.3%	26,161	28.3%	11,151	28.6%	8,403	34.2%
	60-69	101,745	28.2%	224,638	28.8%	181,531	26.6%	25,441	27.5%	9,884	25.4%	7,735	31.5%
	70-79	57,448	15.9%	160,712	20.6%	99,713	14.6%	15,858	17.2%	6,395	16.4%	3,744	15.3%
	80 or above	21,354	5.9%	52,520	6.7%	29,101	4.3%	5,094	5.5%	2,617	6.7%	829	3.4%

		California		Florida		New York		Georgia		Nebraska		Vermont	
Sex	Male	162,226	44.9%	340,755	43.7%	302,902	44.4%	39,003	42.2%	17,860	45.8%	11,552	47.0%
	Female	198,935	55.1%	439,592	56.3%	379,557	55.6%	53,383	57.8%	21,123	54.2%	13,002	53.0%
Race	White	207,636	57.5%	552,183	70.8%	441,668	64.7%	64,899	70.2%	38,893	100% ^c	24,133	98.3%
	Black	17,753	4.9%	70,314	9.0%	71,311	10.5%	22,847	24.8%			106	0.4%
	Hispanic	78,402	21.7%	136,136	17.5%	72,518	10.6%	2,102	2.3%			26	0.1%
	Asian or Pacific Islander	41,758	11.6%	8,852	1.1%	25,348	3.7%	1,232	1.3%			174	0.7%
	Native American	2,747	0.8%	942	0.1%	2,023	0.3%	155	0.2%			37	0.2%
	Other	12,865	3.6%	11,920	1.5%	69,591	10.2%	1,151	1.3%			78	0.3%
Hospitalization within 30 days prior	Yes	5,404	1.5%	11,009	1.4%	7,062	1.0%	1,894	2.0%	832	2.1%	221	0.9%
	No	355,757	98.5%	769,338	98.6%	675,397	99.0%	90,492	98.0%	38,151	97.9%	24,333	99.1%
Gastrointestinal endoscopic procedure in ASC within 30 days prior	Yes	6,692	1.9%	21,973	2.8%	23,772	3.5%	2,591	2.8%	846	2.2%	388	1.6%
	No	354,469	98.2%	758,374	97.2%	658,687	96.5%	89,795	97.2%	38,137	97.8%	24,166	98.4%
Elixhauser score	0	210,337	58.2%	608,606	78.0%	497,957	73.0%	35,782	38.7%	24,088	61.8%	17,214	70.1%
	1	77,596	21.5%	103,327	13.2%	106,058	15.5%	25,004	27.1%	8,393	21.5%	4,731	19.3%
	2 or above	73,228	20.3%	68,414	8.8%	78,444	11.5%	31,600	34.2%	6,502	16.7%	2,609	10.6%

ASC: Ambulatory surgery center; GI: Gastrointestinal; EGD: Esophagogastroduodenoscopy

^a Population statistics were queried from United States Census Bureau:

https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=PEP_2016_PEPANNRES&src=pt

^b Multispecialty ASC is defined as an ASC where both GI and non-GI endoscopies (bronchoscopy or cystoscopy) are performed.

^c Imputed based on majority in the statewide ZIP codes because variable was not available in the state datasets.

Appendix Table 7. Rates of 7-day unplanned visit related to aspiration pneumonia after colonoscopy, esophagogastroduodenoscopy (EGD) or screening mammography at an ambulatory surgery center, 2014

Aspiration pneumonia (ICD-9-CM codes)	Screening colonoscopy (N=462,068)		Non-screening colonoscopy (N=914,140)		EGD (N=873,138)		Screening mammography (N=647,212)	
	N of visits	Rate/1,000 procedures	N of visits	Rate/1,000 procedures	N of visits	Rate/1,000 procedures	N of visits	Rate/1,000 procedures
Aspiration pneumonia (507.0, 507.8, 482.89, 482.9, 483.8)	40	0.087	89	0.097	291	0.333	10	0.015
Pneumonitis due to inhalation of food or vomitus (507.0)*	34	0.074	82	0.090	273	0.313	6	0.009
Pneumonitis due to other solids and liquids (507.8)	1	0.002	0	0	1	0.001	0	0
Pneumonia due to other specified bacteria (482.89)	0	0	0	0	1	0.001	0	0
Bacterial pneumonia, unspecified (482.9)	5	0.011	7	0.008	15	0.017	3	0.005
Pneumonia due to other specified organism (483.8)	0	0	0	0	2	0.002	1	0.002

Appendix Table 8. 7-day infection-related unplanned visit rates (by infection site and anesthesia method) after colonoscopy or esophagogastroduodenoscopy (EGD) at an ambulatory surgery center in the state of New York*, 2014

Infection (ICD-9-CM codes)	Screening colonoscopy (N=145,693)				Non-screening colonoscopy (N=319,078)				EGD (N=286,296)				Screening mammography (N=72,588)	
	General Anesthesia (N=13,270)		No general anesthesia (N=132,423)		General Anesthesia (N=41,976)		No general anesthesia (N=277,102)		General Anesthesia (N=41,040)		No general anesthesia (N=245,256)		No general anesthesia (N=72,588)	
	N of visits	Rate/1,000 procedures	N of visits	Rate/1,000 procedures	N of visits	Rate/1,000 procedures	N of visits	Rate/1,000 procedures	N of visits	Rate/1,000 procedures	N of visits	Rate/1,000 procedures	N of visits	Rate/1,000 procedures
7-day infection-related unplanned visits	7	0.528	93	0.702	42	1.001	348	1.256	108	2.652	506	2.070	74	1.019
Infections of gastrointestinal system (001-009, 566-567)	0	0	8	0.060	14	0.334	57	0.206	22	0.535	65	0.265	9	0.124
Intestinal infectious diseases (001-009)	0	0	4	0.030	9	0.214	31	0.112	16	0.389	41	0.167	5	0.069
Abscess of anal and rectal regions (566)	0	0	2	0.015	1	0.024	3	0.011	0	0	2	0.008	3	0.041
Peritonitis and retroperitoneal infections (567)	0	0	3	0.023	4	0.095	23	0.083	6	0.146	22	0.090	1	0.014
Infections of respiratory system (460-466, 480-488, 511.1)	5	0.377	46	0.347	17	0.405	143	0.516	44	1.071	192	0.790	39	0.537
Pneumonia (480-486)	3	0.226	22	0.166	9	0.214	56	0.202	20	0.487	107	0.444	12	0.165
Influenza (487-488)	0	0	5	0.038	0	0	7	0.025	0	0	8	0.033	0	0
Acute respiratory infections (460-466)	2	0.151	19	0.143	8	0.191	82	0.296	24	0.584	78	0.318	27	0.372
Septicemia (038)	0	0	12	0.091	11	0.262	61	0.220	16	0.414	110	0.452	3	0.041
Infections of genitourinary system (590)	0	0	2	0.015	2	0.048	12	0.043	3	0.073	11	0.045	1	0.014
Infectious/bacterial endocarditis (421.0, 421.1)	0	0	0	0	0	0	1	0.004	0	0	1	0.004	0	0
Infections of central nervous system (320, 321, 323.0-323.2, 323.4, 323.61)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Information on anesthesia utilization was only available for New York.