

Out-of-Pocket Spending for Health Care After COVID-19 Hospitalization

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In a survey of US patients who survived after COVID-19 hospitalization, one-fourth of respondents reported moderate financial stress or greater, and one-tenth reported using most or all of their savings.¹ During the winter of 2021, US COVID-19 hospitalizations surged, owing to the Omicron variant.² Given the potential for future hospitalization surges, protecting the financial health of COVID-19 survivors remains a key policy goal.

To achieve this goal, an important first step is to identify the drivers of financial stress among COVID-19 survivors. Findings of prior studies suggest that many patients require extensive care after discharge from COVID-19 hospitalization, including nursing facility care, readmissions, and care for new comorbidities.^{3,4} However, the degree to which postdischarge care contributes to financial stress among COVID-19 survivors is unclear. To address this gap, we used national data to assess out-of-pocket spending during the 180 days after discharge among privately insured and Medicare Advantage patients hospitalized for COVID-19 between March and June 2020.

METHODS

Data Source

In July 2021, we conducted a retrospective cohort analysis of 2020 data from Optum's deidentified Clinformatics Data Mart. This database contains medical and pharmacy claims from 17 million patients with private insurance and Medicare Advantage in all US states. Claims through December 31, 2020, were available at the time of analysis. Because data were deidentified, the institutional review board of the University of Michigan Medical School exempted analyses from human subjects review; informed consent was not required.

Sample

To identify the study cohort, we first identified hospitalizations (1) for privately insured and Medicare Advantage patients who had a primary diagnosis of COVID-19 (*International Classification of Diseases, Tenth Revision, Clinical Modification [ICD-10-CM]*

ABSTRACT

OBJECTIVES: Many patients report financial stress following hospitalization for COVID-19. Although many COVID-19 survivors require extensive care after discharge, the degree to which this care contributes to financial stress is unclear. Using national data, we assessed out-of-pocket spending during the 180 days after discharge among patients hospitalized for COVID-19.

STUDY DESIGN: Retrospective cohort analysis of Optum's deidentified Clinformatics Data Mart, a national database of medical and pharmacy claims.

METHODS: Among privately insured and Medicare Advantage patients hospitalized for COVID-19 between March and June 2020, we calculated median out-of-pocket spending during the 180 days after discharge. For comparison, we repeated this calculation among patients hospitalized for pneumonia.

RESULTS: Of 7932 patients with COVID-19 included in analyses, 2061 (26.0%) had private insurance. Among privately insured and Medicare Advantage patients, median (25th-75th percentile) out-of-pocket spending after discharge was \$287 (\$59-\$842) and \$271 (\$63-\$783), respectively. Out-of-pocket spending exceeded \$2000 for 10.9% and 9.3% of these patients, respectively. Among privately insured and Medicare Advantage patients hospitalized for pneumonia, median (25th-75th percentile) out-of-pocket spending after discharge was \$276 (\$62-\$836) and \$570 (\$181-\$1466). Out-of-pocket spending exceeded \$2000 for 12.1% and 17.2% of these patients, respectively.

CONCLUSIONS: For most patients hospitalized for COVID-19, postdischarge care may not be a major source of financial stress. Although this is reassuring, our findings also suggest that a sizable minority of COVID-19 survivors have substantial out-of-pocket spending after discharge. These survivors could be particularly vulnerable to financial toxicity if they also receive bills for the hospitalization owing to the expiration of insurer cost-sharing waivers. Insurers should consider this possibility when deciding whether to reinstate cost-sharing waivers for COVID-19 hospitalizations.

Am J Manag Care. 2022;28(8):398-402. doi:10.37765/ajmc.2022.88852

diagnosis code U071) and (2) that began and ended between March 1 and June 30, 2020. We limited analyses to each patient's first hospitalization during this period. We excluded patients without continuous enrollment during the 180 days after discharge, patients whose insurer was not primary, and patients with postdischarge out-of-pocket spending exceeding \$16,300, which was the maximum allowed for family plans under the Affordable Care Act in 2020 (to account for possible data entry error).⁵

Study Outcomes

We calculated mean and median out-of-pocket spending (sum of deductibles, coinsurance, and co-payments) across all medical and pharmacy claims during the 180 days after discharge. To assess the distribution of out-of-pocket spending, we calculated the proportion of patients in each payer population with out-of-pocket spending exceeding \$2000, which is an amount equal to approximately 1 SD above the mean. To identify the major sources of postdischarge out-of-pocket spending, we calculated out-of-pocket spending in 14 service categories: additional hospitalizations (whether related to COVID-19 or not), nursing facility admissions, outpatient care (eg, office visits), emergency department visits, radiology, laboratory, diagnostic and therapeutic procedures (eg, colonoscopy or surgery), physical/occupational/speech/respiratory therapy, home health and hospice care, transportation, clinician-administered medications (eg, infusions), durable medical equipment and supplies, pharmacy-dispensed prescriptions, and miscellaneous. These categories were based on the Agency for Healthcare Research and Quality's Clinical Classification Software for Services and Procedures algorithm (see [eAppendix](#) [available at [ajmc.com](#)] for details).⁶

For comparison, we repeated analyses among patients hospitalized for bacterial pneumonia. These patients had a hospitalization that had a primary diagnosis of bacterial pneumonia (*ICD-10-CM* diagnosis code J13-J18) and began and ended between March 1 and June 30, 2020. We limited analyses to each patient's first hospitalization during this period and applied the same exclusion criteria as above. To avoid overlap, we excluded patients with pneumonia who were also in the main sample of patients with COVID-19.

Statistical Analyses

Within payer types, we compared mean postdischarge out-of-pocket spending between patients with COVID-19 and patients with pneumonia using a 1-part generalized linear model with a log link and Poisson variance function, the latter of which was chosen based on the modified Park test.⁷ Models adjusted for age group, sex, Census region of residence, and month of admission. The analyses used SAS version 9.4 (SAS Institute), Stata version 15.1 MP (StataCorp), and 2-sided hypothesis tests with $\alpha = 0.05$.

TAKEAWAY POINTS

- ▶ Using national data, we estimated out-of-pocket spending during the 180 days after discharge among patients hospitalized for COVID-19 between March and June 2020.
- ▶ Median out-of-pocket spending for privately insured and Medicare Advantage patients was \$287 and \$271, respectively. This spending exceeded \$2000 for approximately 1 in 10 patients.
- ▶ Although postdischarge care is likely not a major source of financial stress for most COVID-19 survivors, the costs of this care can sometimes be substantial.
- ▶ As most insurers have stopped waiving cost sharing for COVID-19 hospitalizations, survivors could increasingly receive sizable bills both for the hospitalization and for postdischarge care, potentially resulting in financial toxicity.

RESULTS

Sample

We identified 12,365 patients who had an initial hospitalization with a primary diagnosis code for COVID-19 between March 1 and June 30, 2020. We excluded 4400 patients without continuous enrollment during the 180 days after discharge, 31 patients whose insurer was not primary, and 2 patients with postdischarge out-of-pocket spending exceeding \$16,300. In total, we excluded 4433 (35.9%) patients, leaving 7932 patients. [Table 1](#) shows sample characteristics. Of the 7932 patients, 2061 (26.0%) had private insurance.

For the comparison group, we identified 10,475 patients who had an initial hospitalization with a primary diagnosis code for bacterial pneumonia between March 1 and June 30, 2020. We excluded 2780 patients without continuous enrollment during the 180 days after discharge, 12 patients whose insurer was not primary, 7 patients with postdischarge out-of-pocket spending exceeding \$16,300, and 50 patients who overlapped with the main sample of patients with COVID-19. In total, we excluded 2849 (27.2%) patients, leaving 7626 patients. Of these patients, 865 (11.3%) had private insurance (see [Table 1](#) for characteristics of patients with pneumonia).

Out-of-Pocket Spending for Postdischarge Care

Among privately insured and Medicare Advantage patients hospitalized for COVID-19, mean (SD) out-of-pocket spending across all medical and pharmacy claims during the 180 days after discharge was \$746 (\$1210) and \$724 (\$1292), respectively. Median (25th-75th percentile) out-of-pocket spending was \$287 (\$59-\$842) and \$271 (\$63-\$783). Out-of-pocket spending exceeded \$2000 for 225 (10.9%) privately insured and 544 (9.3%) Medicare Advantage patients. For both payer populations, additional hospitalizations, procedures, and pharmacy-dispensed drugs accounted for the 3 highest shares of out-of-pocket spending ([Table 2](#)).

Among privately insured and Medicare Advantage patients with pneumonia, mean (SD) out-of-pocket spending after discharge was \$822 (\$1490) and \$1114 (\$1534). Median (25th-75th percentile) out-of-pocket spending was \$276 (\$62-\$836) and \$570 (\$181-\$1466).

Out-of-pocket spending exceeded \$2000 for 105 (12.1%) privately insured and 1116 (17.2%) Medicare Advantage patients with pneumonia. Compared with privately insured patients with COVID-19, privately

TABLE 1. Characteristics of Patients Hospitalized for COVID-19 and Bacterial Pneumonia Between March and June 2020, Optum Clinformatics Data Mart

	COVID-19 (n = 7932) ^a		Bacterial pneumonia (n = 7626) ^a	
	Privately insured	Medicare Advantage	Privately insured	Medicare Advantage
Number of patients	2061	5871	865	6761
Age in years, n (%)				
0-17	10 (0.5%)	0 (0.0%)	91 (10.5%)	0 (0.0%)
18-34	205 (9.9%)	15 (0.3%)	84 (9.7%)	13 (0.2%)
35-54	904 (43.9%)	203 (3.5%)	270 (31.2%)	246 (3.6%)
55-64	711 (34.5%)	532 (9.1%)	255 (29.5%)	759 (11.2%)
65-74	176 (8.5%)	2260 (38.5%)	91 (10.5%)	2110 (31.2%)
75-85	41 (2.0%)	2044 (34.8%)	43 (5.0%)	2415 (35.7%)
≥86	14 (0.7%)	817 (13.9%)	31 (3.6%)	1218 (18.0%)
Sex, n (%)				
Male	1224 (59.4%)	2622 (44.7%)	471 (54.5%)	3071 (45.4%)
Female	836 (40.6%)	3249 (55.3%)	393 (45.4%)	3690 (54.6%)
Unknown	1 (0.0%)	0 (0.0%)	1 (0.1%)	0 (0.0%)
Region, n (%)				
Northeast	342 (16.6%)	1897 (32.3%)	76 (8.8%)	748 (11.1%)
Midwest	588 (28.5%)	1004 (17.1%)	219 (25.3%)	1402 (20.7%)
South	863 (41.9%)	2274 (38.7%)	443 (51.2%)	3544 (52.4%)
West	240 (11.6%)	695 (11.8%)	124 (14.3%)	1067 (15.8%)
Admission month, n (%)				
March	311 (15.1%)	699 (11.9%)	388 (44.9%)	2619 (38.7%)
April	823 (39.9%)	2653 (45.2%)	195 (22.5%)	1542 (22.8%)
May	461 (22.4%)	1419 (24.2%)	158 (18.3%)	1451 (21.5%)
June	466 (22.6%)	1100 (18.7%)	124 (14.3%)	1149 (17.0%)
Length of stay in days, mean (SD)	7.4 (8.6)	9.3 (8.9)	3.8 (3.0)	4.7 (3.8)
Any intensive care unit utilization, ^b n (%)	885 (42.9%)	2440 (41.6%)	277 (32.0%)	2519 (37.3%)

^aFor privately insured patients hospitalized for COVID-19 and those hospitalized for bacterial pneumonia, the distribution of age, sex, region, and month all differed according to χ^2 tests ($P < .05$). The same was true for Medicare Advantage patients hospitalized for COVID-19 and for bacterial pneumonia, with the exception of sex distribution ($P = .41$).

^bDefined as having at least 1 claim during the hospitalization with a revenue code for intensive care unit (0200-0209) or coronary care unit (0210-0219).

insured patients with pneumonia had higher mean out-of-pocket spending after discharge (adjusted difference, pneumonia minus COVID-19: \$66; 95% CI, \$63-\$68). The same was true for Medicare Advantage patients (adjusted difference, pneumonia minus COVID-19: \$481; 95% CI, \$460-\$462).

DISCUSSION

In this national study of 7932 privately insured and Medicare Advantage patients hospitalized for COVID-19 between March and June 2020, median out-of-pocket spending during the 180 days after discharge was \$287 and \$271, respectively. Although most patients with COVID-19 had modest out-of-pocket spending after discharge, this spending was right-skewed. For 10.9% of privately insured and 9.3% of Medicare Advantage patients with COVID-19, postdischarge out-of-pocket spending exceeded \$2000.

Our findings suggest that postdischarge care may not be a major source of financial stress for most COVID-19 survivors. Consequently,

policy efforts to protect the financial health of survivors may be more impactful if they focus on other potential stressors, including job loss.¹ An important caveat, however, is that a sizable minority of survivors in our study had substantial out-of-pocket spending after discharge. These survivors might be particularly vulnerable to financial toxicity if they also receive bills for the hospitalization—bills that are becoming increasingly common because most insurers allowed their cost-sharing waivers for COVID-19 hospitalization to expire by August 2021.^{8,9} Insurers may wish to consider the possibility of financial toxicity when deciding whether to reinstate cost-sharing waivers for COVID-19 hospitalization.

For both privately insured and Medicare Advantage patients, mean out-of-pocket spending after discharge was higher among patients hospitalized for pneumonia compared with COVID-19. A potential explanation is that some postdischarge care for patients with COVID-19, including readmissions for COVID-19, was covered by insurer cost-sharing waivers for COVID-19 hospitalization.^{8,10} Given the increasing expiration of these waivers, the gap in out-of-pocket

TABLE 2. Out-of-Pocket Spending for Health Care in the 180 Days After COVID-19 Hospitalization, Optum Clinformatics Data Mart

Service category ^a	No. of patients with ≥ 1 claim [% of all patients in sample]	Mean (SD) OOP spending per patient in sample	% of all OOP spending	No. of patients with OOP spending for the service category [% of all patients in sample]	Mean (SD) OOP spending among patients with any OOP spending
Privately insured (n = 2061)					
Additional hospitalizations	237 (11.5%)	\$106 (\$638)	14.2%	142 (6.9%)	\$1535 (\$1934)
Nursing facility	82 (4.0%)	\$20 (\$227)	2.7%	50 (2.4%)	\$819 (\$1227)
Outpatient services	1889 (91.7%)	\$89 (\$179)	12.0%	1177 (57.1%)	\$157 (\$214)
Emergency department visits	393 (19.1%)	\$59 (\$293)	7.9%	190 (9.2%)	\$636 (\$754)
Radiology tests	1153 (55.9%)	\$76 (\$285)	10.3%	484 (23.5%)	\$326 (\$515)
Laboratory tests	1556 (75.5%)	\$35 (\$180)	4.7%	590 (28.6%)	\$123 (\$319)
Diagnostic and therapeutic procedures	1098 (53.3%)	\$110 (\$480)	14.7%	526 (25.5%)	\$429 (\$876)
Physical, occupational, speech, respiratory therapy	221 (10.7%)	\$15 (\$172)	2.0%	87 (4.2%)	\$347 (\$772)
Home health and hospice	267 (13.0%)	\$11 (\$85)	1.5%	87 (4.2%)	\$266 (\$326)
Transportation	102 (4.9%)	\$5 (\$56)	0.7%	32 (1.6%)	\$318 (\$326)
Clinician-administered medications	861 (41.8%)	\$8 (\$163)	1.1%	167 (8.1%)	\$132 (\$493)
Durable medical equipment and supplies	1959 (95.1%)	\$16 (\$94)	2.2%	218 (10.6%)	\$156 (\$247)
Pharmacy-dispensed prescriptions	1869 (90.7%)	\$181 (\$320)	24.2%	1693 (82.1%)	\$220 (\$340)
Miscellaneous	976 (47.4%)	\$14 (\$150)	1.9%	106 (5.1%)	\$269 (\$608)
Medicare Advantage (n = 5871)					
Additional hospitalizations	1368 (23.3%)	\$168 (\$624)	23.1%	806 (13.7%)	\$1221 (\$1245)
Nursing facility	1643 (28.0%)	\$74 (\$439)	10.2%	771 (13.1%)	\$563 (\$1093)
Outpatient services	5178 (88.2%)	\$13 (\$32)	1.7%	1405 (23.9%)	\$53 (\$48)
Emergency department visits	1480 (25.2%)	\$18 (\$87)	2.5%	786 (13.4%)	\$134 (\$203)
Radiology tests	3682 (62.7%)	\$45 (\$124)	6.2%	1888 (32.2%)	\$140 (\$186)
Laboratory tests	4978 (84.8%)	\$6 (\$15)	0.8%	1520 (25.9%)	\$21 (\$24)
Diagnostic and therapeutic procedures	4219 (71.9%)	\$106 (\$509)	14.7%	1800 (30.7%)	\$346 (\$873)
Physical, occupational, speech, respiratory therapy	1202 (20.5%)	\$6 (\$55)	0.9%	214 (3.6%)	\$174 (\$231)
Home health and hospice	2456 (41.8%)	\$2 (\$16)	0.2%	118 (2.0%)	\$73 (\$90)
Transportation	1668 (28.4%)	\$37 (\$247)	5.1%	599 (10.2%)	\$365 (\$691)
Clinician-administered medications	2798 (47.7%)	\$24 (\$271)	3.3%	677 (11.5%)	\$209 (\$773)
Durable medical equipment and supplies	5720 (97.4%)	\$23 (\$109)	3.1%	1294 (22.0%)	\$103 (\$214)
Pharmacy-dispensed prescriptions	5259 (89.6%)	\$201 (\$358)	27.7%	4172 (71.1%)	\$283 (\$396)
Miscellaneous	4405 (75.0%)	\$3 (\$29)	0.4%	192 (3.3%)	\$84 (\$138)

OOP, out-of-pocket.

^aSee eAppendix for more details on how service categories were defined.

spending between patients hospitalized for COVID-19 and those hospitalized with pneumonia may now be narrower than in this study.

Strengths and Limitations

This study’s primary strength is its use of a national claims database that includes both privately insured and Medicare Advantage patients. However, the study also has limitations. First, analyses required hospital discharge by June 30, 2020, because a 180-day postdischarge period was needed and because claims were complete only through December 31, 2020, at the time of analysis. Although necessary, this decision excluded patients

with prolonged hospitalizations who may require more intensive postdischarge care than patients in the study. Consequently, analyses likely underestimate out-of-pocket burden among all patients hospitalized for COVID-19. Second, by requiring at least 180 days of continuous enrollment following discharge, analyses excluded patients who disenrolled from insurance. Generalizability of results to these patients is unclear. Third, results may also not generalize to all privately insured and Medicare Advantage patients. Fourth, the database does not include the uninsured, who may have particularly high levels of out-of-pocket spending for postdischarge care.

CONCLUSIONS

Although out-of-pocket spending after discharge from COVID-19 hospitalization is modest for most patients, this spending is substantial for a sizable minority of survivors. For these survivors, financial burden could be further increased if they also receive bills for the hospitalization. To prevent financial toxicity, insurers may wish to consider reinstating cost-sharing waivers for COVID-19 hospitalizations. ■

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Source of Funding: Dr Chua's effort is supported by a career development award from the National Institute on Drug Abuse (grant number 1K08DA048110-01). The funder played no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication.

Prior Publication: The authors previously submitted a preprint examining out-of-pocket spending within 90 days of discharge from COVID-19 hospitalization using a different database (IQVIA PharMetrics Plus for Academics). This preprint is available online at doi:10.1101/2021.06.11.21258766.

Author Disclosures: Dr Conti is an associate editor of *The American Journal of Managed Care*[®]. The authors report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Authorship Information: Concept and design (KPC, RMC); acquisition of data (KPC); analysis and interpretation of data (KPC, RMC, NVB); drafting of the manuscript (KPC, RMC, NVB); critical revision of the manuscript for important

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eAppendix. Details on methodology

Overview

We identified all medical claims and pharmacy claims during the period spanning the date of discharge to the date of discharge plus 90 days. We excluded any medical claims on the date of discharge associated with the confinement identifier of the index COVID-19 hospitalization. We categorized the remaining claims into 14 service categories. Three of these categories were:

- Hospitalization – this category included any medical claims during the 90-day period associated with a subsequent confinement at a hospital (place of service code 21).
- Nursing facility – this category included any medical claims during the 90-day period associated with a subsequent confinement at a skilled nursing facility (place of service code 31). In our sample, there were no confinements during the 90-day period for confinements at facilities other than hospitals or skilled nursing facilities.
- Pharmacy-dispensed prescriptions – this category included all pharmacy claims for prescriptions dispensed at pharmacies.

The other 11 categories captured all non-confinement-related medical claims during the 90-day post-discharge period: outpatient services, emergency department visits, radiology, laboratory, procedures (diagnostic and therapeutic), physical/occupational/speech/respiratory therapy, home health and hospice care, transportation, clinician-administered medications, durable medical equipment and supplies, and miscellaneous (i.e., all non-confinement-related medical claims not assigned to the first 10 categories). To assign claims to the 11 categories, we used a crosswalk between CPT/HCPCS procedure codes and procedure code categories created by the Agency for Healthcare Research and Quality. This crosswalk, called the Clinical Classification Software for Services and Procedures algorithm (v2020-1), is available for download at this link:

https://www.hcup-us.ahrq.gov/toolssoftware/ccs_svcsproc/ccssvcproc.jsp

We made minor modifications to the CCS algorithm, such as assigning some codes in CCS category 227 (consultation, evaluation, and preventative care) to different service categories (e.g., assigning office-based evaluation and management codes to the outpatient services category). The table below displays which CCS categories were included in our service categories.

Service category	CCS Category Number	CCS Category description
Clinician-administered medications	222	Blood and blood product transfusion
Clinician-administered medications	223	Enteral and parenteral nutrition
Clinician-administered medications	224	Cancer chemotherapy
Clinician-administered medications	228	Prophylactic vaccinations and inoculations
Clinician-administered medications	240	Medications (Injections, infusions and other forms)
Durable medical equipment and supplies	241	Visual aids and other optical supplies
Durable medical equipment and supplies	242	Hearing devices and audiology supplies
Durable medical equipment and supplies	243	DME and supplies
Emergency department	227	Consultation, evaluation, and preventative care ^a
Home health and hospice	236	Nonhospital-based care (e.g., home health care, hospice)
Laboratory	205	Arterial blood gases
Laboratory	206	Microscopic examination (bacterial smear, culture, toxicology)
Laboratory	233	Laboratory - Chemistry and Hematology
Laboratory	234	Pathology
Laboratory	235	Other Laboratory
Miscellaneous	227	Consultation, evaluation, and preventative care ^a
Miscellaneous	237	Ancillary Services
Miscellaneous	238	Infertility Services
Miscellaneous	998	CPTs not classified (F codes)
Miscellaneous	999	HCPCS Level II codes not classified
Outpatient services	218	Psychological and psychiatric evaluation and therapy
Outpatient services	219	Alcohol and drug management, treatment, and rehabilitation
Outpatient services	220	Ophthalmologic and otologic diagnosis and treatment
Outpatient services	227	Consultation, evaluation, and preventative care ^a
Outpatient services	245	Telehealth
Physical, occupational, speech, respiratory therapy	212	Diagnostic physical, occupational, and speech therapy
Physical, occupational, speech, respiratory therapy	213	Physical, occupational, and speech therapy exercises; manipulation; and other procedures

Physical, occupational, speech, respiratory therapy	215	Other physical, occupational, and speech therapy and rehabilitation
Physical, occupational, speech, respiratory therapy	217	Other respiratory therapy
Procedures	1	Incision and excision of CNS
Procedures	2	Insertion, replacement, or removal of extracranial ventricular shunt
Procedures	3	Laminectomy, excision intervertebral disc
Procedures	4	Diagnostic spinal tap
Procedures	5	Insertion of catheter or spinal stimulator and injection into spinal canal
Procedures	6	Decompression peripheral nerve
Procedures	7	Other diagnostic nervous system procedures
Procedures	8	Other non-OR or closed therapeutic nervous system procedures
Procedures	9	Other OR therapeutic nervous system procedures
Procedures	10	Thyroidectomy, partial or complete
Procedures	11	Diagnostic endocrine procedures
Procedures	12	Other therapeutic endocrine procedures
Procedures	13	Corneal transplant
Procedures	14	Glaucoma procedures
Procedures	15	Lens and cataract procedures
Procedures	16	Repair of retinal tear, detachment
Procedures	17	Destruction of lesion of retina and choroid
Procedures	18	Diagnostic procedures on eye
Procedures	19	Other therapeutic procedures on eyelids, conjunctiva, cornea
Procedures	20	Other intraocular therapeutic procedures
Procedures	21	Other extraocular muscle and orbit therapeutic procedures
Procedures	22	Tympanoplasty
Procedures	23	Myringotomy
Procedures	24	Mastoidectomy
Procedures	25	Diagnostic procedures on ear
Procedures	26	Other therapeutic ear procedures
Procedures	27	Control of epistaxis
Procedures	28	Plastic procedures on nose
Procedures	29	Oral and Dental Services
Procedures	30	Tonsillectomy and/or adenoidectomy
Procedures	31	Diagnostic procedures on nose, mouth and pharynx
Procedures	32	Other non-OR therapeutic procedures on nose, mouth and pharynx

Procedures	33	Other OR therapeutic procedures on nose, mouth and pharynx
Procedures	34	Tracheostomy, temporary and permanent
Procedures	35	Tracheoscopy and laryngoscopy with biopsy
Procedures	36	Lobectomy or pneumonectomy
Procedures	37	Diagnostic bronchoscopy and biopsy of bronchus
Procedures	38	Other diagnostic procedures on lung and bronchus
Procedures	39	Incision of pleura, thoracentesis, chest drainage
Procedures	40	Other diagnostic procedures of respiratory tract and mediastinum
Procedures	41	Other non-OR therapeutic procedures on respiratory system
Procedures	42	Other OR therapeutic procedures on respiratory system
Procedures	43	Heart valve procedures
Procedures	44	Coronary artery bypass graft (CABG)
Procedures	45	Percutaneous transluminal coronary angioplasty (PTCA)
Procedures	46	Coronary thrombolysis
Procedures	47	Diagnostic cardiac catheterization, coronary arteriography
Procedures	48	Insertion, revision, replacement, removal of cardiac pacemaker or cardioverter/defibrillator
Procedures	49	Other OR heart procedures
Procedures	50	Extracorporeal circulation auxiliary to open heart procedures
Procedures	51	Endarterectomy, vessel of head and neck
Procedures	52	Aortic resection, replacement or anastomosis
Procedures	53	Varicose vein stripping, lower limb
Procedures	54	Other vascular catheterization, not heart
Procedures	55	Peripheral vascular bypass
Procedures	56	Other vascular bypass and shunt, not heart
Procedures	57	Creation, revision and removal of arteriovenous fistula or vessel-to-vessel cannula for dialysis
Procedures	58	Hemodialysis
Procedures	59	Other OR procedures on vessels of head and neck
Procedures	60	Embolectomy and endarterectomy of lower limbs
Procedures	61	Other OR procedures on vessels other than head and neck
Procedures	62	Other diagnostic cardiovascular procedures
Procedures	63	Other non-OR therapeutic cardiovascular procedures
Procedures	64	Bone marrow transplant
Procedures	65	Bone marrow biopsy
Procedures	66	Procedures on spleen
Procedures	67	Other therapeutic procedures, hemic and lymphatic system
Procedures	68	Injection or ligation of esophageal varices

Procedures	69	Esophageal dilatation
Procedures	70	Upper gastrointestinal endoscopy, biopsy
Procedures	71	Gastrostomy, temporary and permanent
Procedures	72	Colostomy, temporary and permanent
Procedures	73	Ileostomy and other enterostomy
Procedures	74	Gastrectomy, partial and total
Procedures	75	Small bowel resection
Procedures	76	Colonoscopy and biopsy
Procedures	77	Proctoscopy and anorectal biopsy
Procedures	78	Colorectal resection
Procedures	79	Local excision of large intestine lesion (not endoscopic)
Procedures	80	Appendectomy
Procedures	81	Hemorrhoid procedures
Procedures	82	Endoscopic retrograde cannulation of pancreas (ERCP)
Procedures	83	Biopsy of liver
Procedures	84	Cholecystectomy and common duct exploration
Procedures	85	Inguinal and femoral hernia repair
Procedures	86	Other hernia repair
Procedures	87	Laparoscopy
Procedures	88	Abdominal paracentesis
Procedures	89	Exploratory laparotomy
Procedures	90	Excision, lysis peritoneal adhesions
Procedures	91	Peritoneal dialysis
Procedures	92	Other bowel diagnostic procedures
Procedures	93	Other non-OR upper GI therapeutic procedures
Procedures	94	Other OR upper GI therapeutic procedures
Procedures	95	Other non-OR lower GI therapeutic procedures
Procedures	96	Other OR lower GI therapeutic procedures
Procedures	97	Other gastrointestinal diagnostic procedures
Procedures	98	Other non-OR gastrointestinal therapeutic procedures
Procedures	99	Other OR gastrointestinal therapeutic procedures
Procedures	100	Endoscopy and endoscopic biopsy of the urinary tract
Procedures	101	Transurethral excision, drainage, or removal urinary obstruction
Procedures	102	Ureteral catheterization
Procedures	103	Nephrotomy and nephrostomy
Procedures	104	Nephrectomy, partial or complete
Procedures	105	Kidney transplant
Procedures	106	Genitourinary incontinence procedures
Procedures	107	Extracorporeal lithotripsy, urinary
Procedures	108	Indwelling catheter
Procedures	109	Procedures on the urethra
Procedures	110	Other diagnostic procedures of urinary tract
Procedures	111	Other non-OR therapeutic procedures of urinary tract
Procedures	112	Other OR therapeutic procedures of urinary tract

Procedures	113	Transurethral resection of prostate (TURP)
Procedures	114	Open prostatectomy
Procedures	115	Circumcision
Procedures	116	Diagnostic procedures, male genital
Procedures	117	Other non-OR therapeutic procedures, male genital
Procedures	118	Other OR therapeutic procedures, male genital
Procedures	119	Oophorectomy, unilateral and bilateral
Procedures	120	Other operations on ovary
Procedures	121	Ligation of fallopian tubes
Procedures	122	Removal of ectopic pregnancy
Procedures	123	Other operations on fallopian tubes
Procedures	124	Hysterectomy, abdominal and vaginal
Procedures	125	Other excision of cervix and uterus
Procedures	126	Abortion (termination of pregnancy)
Procedures	127	Dilatation and curettage (D&C), aspiration after delivery or abortion
Procedures	128	Diagnostic dilatation and curettage (D&C)
Procedures	129	Repair of cystocele and rectocele, obliteration of vaginal vault
Procedures	130	Other diagnostic procedures, female organs
Procedures	131	Other non-OR therapeutic procedures, female organs
Procedures	132	Other OR therapeutic procedures, female organs
Procedures	134	Cesarean section
Procedures	135	Forceps, vacuum, and breech delivery
Procedures	137	Other procedures to assist delivery
Procedures	138	Diagnostic amniocentesis
Procedures	139	Fetal monitoring
Procedures	140	Repair of current obstetric laceration
Procedures	141	Other therapeutic obstetrical procedures including antepartum and postpartum care
Procedures	142	Partial excision bone
Procedures	143	Bunionectomy or repair of toe deformities
Procedures	144	Treatment, facial fracture or dislocation
Procedures	145	Treatment, fracture or dislocation of radius and ulna
Procedures	146	Treatment, fracture or dislocation of hip and femur
Procedures	147	Treatment, fracture or dislocation of lower extremity (other than hip or femur)
Procedures	148	Other fracture and dislocation procedure
Procedures	149	Arthroscopy
Procedures	150	Division of joint capsule, ligament or cartilage
Procedures	151	Excision of semilunar cartilage of knee
Procedures	152	Arthroplasty knee
Procedures	153	Hip replacement, total and partial
Procedures	154	Arthroplasty other than hip or knee
Procedures	155	Arthrocentesis

Procedures	156	Injections and aspirations of muscles, tendons, bursa, joints and soft tissue
Procedures	157	Amputation of lower extremity
Procedures	158	Spinal fusion
Procedures	159	Other diagnostic procedures on musculoskeletal system
Procedures	160	Other therapeutic procedures on muscles and tendons
Procedures	161	Other OR therapeutic procedures on bone
Procedures	162	Other OR therapeutic procedures on joints
Procedures	163	Other non-OR therapeutic procedures on musculoskeletal system
Procedures	164	Other OR therapeutic procedures on musculoskeletal system
Procedures	165	Breast biopsy and other diagnostic procedures on breast
Procedures	166	Lumpectomy, quadrantectomy of breast
Procedures	167	Mastectomy
Procedures	168	Incision and drainage, skin and subcutaneous tissue
Procedures	169	Debridement of wound, infection or burn
Procedures	170	Excision of skin lesion
Procedures	171	Suture of skin and subcutaneous tissue
Procedures	172	Skin graft
Procedures	173	Other diagnostic procedures on skin and subcutaneous tissue
Procedures	174	Other non-OR therapeutic procedures on skin and breast
Procedures	175	Other OR therapeutic procedures on skin and breast
Procedures	176	Other organ transplantation
Procedures	199	Electroencephalogram (EEG)
Procedures	200	Nonoperative urinary system measurements
Procedures	201	Cardiac stress tests
Procedures	202	Electrocardiogram
Procedures	203	Electrographic cardiac monitoring
Procedures	204	Swan-Ganz catheterization for monitoring
Procedures	214	Traction, splints, and other wound care
Procedures	216	Respiratory intubation and mechanical ventilation
Procedures	221	Nasogastric tube
Procedures	225	Conversion of cardiac rhythm
Procedures	229	Nonoperative removal of foreign body
Procedures	230	Extracorporeal shock wave, other than urinary
Procedures	231	Other therapeutic procedures
Procedures	232	Anesthesia
Procedures	244	Gastric bypass and volume reduction
Radiology	177	Computerized axial tomography (CT) scan head
Radiology	178	CT scan chest
Radiology	179	CT scan abdomen
Radiology	180	Other CT scan
Radiology	181	Myelogram

Radiology	182	Mammography
Radiology	183	Routine chest X-ray
Radiology	184	Intraoperative cholangiogram
Radiology	185	Upper gastrointestinal X-ray
Radiology	186	Lower gastrointestinal X-ray
Radiology	187	Intravenous pyelogram
Radiology	189	Contrast aortogram
Radiology	190	Contrast arteriogram of femoral and lower extremity arteries
Radiology	191	Arterio- or venogram (not heart and head)
Radiology	192	Diagnostic ultrasound of head and neck
Radiology	193	Diagnostic ultrasound of heart (echocardiogram)
Radiology	194	Diagnostic ultrasound of gastrointestinal tract
Radiology	195	Diagnostic ultrasound of urinary tract
Radiology	196	Diagnostic ultrasound of abdomen or retroperitoneum
Radiology	197	Other diagnostic ultrasound
Radiology	198	Magnetic resonance imaging
Radiology	207	Radioisotope bone scan
Radiology	208	Radioisotope pulmonary scan
Radiology	209	Radioisotope scan and function studies
Radiology	210	Other radioisotope scan
Radiology	211	Therapeutic radiology
Radiology	226	Other diagnostic radiology and related techniques
Transportation	239	Transportation - patient, provider, equipment

^aProcedure codes in CCS category 227 specific to the emergency department were assigned to “emergency department”; those for outpatient services were assigned to “outpatient services”, and the remainder were assigned to “miscellaneous”