Nationwide analysis of case volume and outcomes in cardiac surgery during the COVID-19 pandemic

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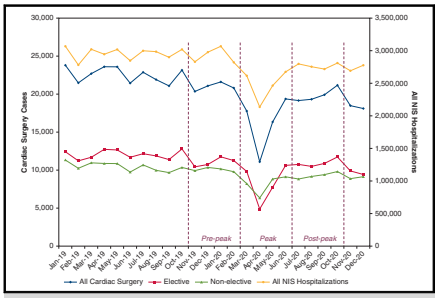

Cardiac surgery case volume rapidly recovered shortly after the onset of the pandemic.

CENTRAL MESSAGE

The rapid recovery in cardiac surgery case volume and excellent patient outcomes during the COVID-19 pandemic may be a testament to the resilience of cardiac surgery programs in the United States.

At the onset of the COVID-19 pandemic, escalated demand for hospital resources and mandated deferral of nonessential medical procedures had significant potential to influence the field of cardiac surgery. Using a large national database, we evaluated the hypothesis that cardiac surgery case volume and patient outcomes were preserved in the United States at the onset of the pandemic.

PATIENTS AND METHODS

The Nationwide Inpatient Sample from 2019 to 2020 was queried for patients aged 18 years and older undergoing coronary artery bypass, valve, or aortic surgeries using International Classification of Diseases, 10th Revision, codes (Table E1). Discharge weights were utilized to generate national estimates. Total cardiac surgery case volume was calculated for 3 periods relative to the initial COVID-19 wave: pre-peak (November 2019-February 2020), peak (March-June 2020) and post-peak (July-October 2020). Percent change in peak and post-peak case volume was calculated relative to pre-peak baseline. Surgeries were also stratified by elective/nonelective status and volumes were compared. Index admission mortality and complications (Table E2) were compared for patients in 2019 and 2020 before and after propensity score matching (PSM) (Appendix E1). Elixhauser Comorbidity Index (ECI) was calculated to summarize preoperative risk factors. As hospitalizations in the first quarter of 2020 were decreased compared with 2019, patients operated on during this time of either year were excluded to control for this difference. Thus, outcomes were compared between years only for cardiac surgeries during April through December. The institutional review board at our institution deemed this study exempt with a waiver of individual consent.

RESULTS

Overall, 83,870 patients underwent cardiac surgery during the pre-peak period, which declined to by −23% (64,580) during the peak period before recovering to −5.1% (79,580) during the post-peak period. Elective cardiac surgery volume experienced a greater peak decrease and a greater post-peak recovery (pre: 44,130, peak: −25% [33,025], post: −1% [43,805]) compared with nonelective volume (pre: 40,170, peak: −19% [32,525], post: −7% [37,185]) (Figure 1).

During 2019, 196,955 patients with mean ECI of 7.11 ± 6.94 underwent cardiac surgery compared with 161,040 with mean ECI of 7.22 ± 6.97 during 2020 ($P < .01$) (Table E3). Index mortality was significantly higher in 2020 (3.1%) versus 2019 (2.7%) ($P < .01$); however, overall complications were not significantly different. Following PSM, there was no difference in ECI (2019: 7.22 ± 6.97 and 2020: 7.30 ± 7.01; $P = .18$) (Table E4). Index admission mortality in 2020 (3.0%) was not significantly different from 2019 (2.8%) ($P = .19$), and there remained no significant difference in overall complications (Table 1). However, hospital costs per patient were significantly higher in 2020 compared with 2019 ($P < .01$). Additionally, compared with 2019 (20.7%), discharges to skilled nursing facilities (SNF) were significantly lower in 2020

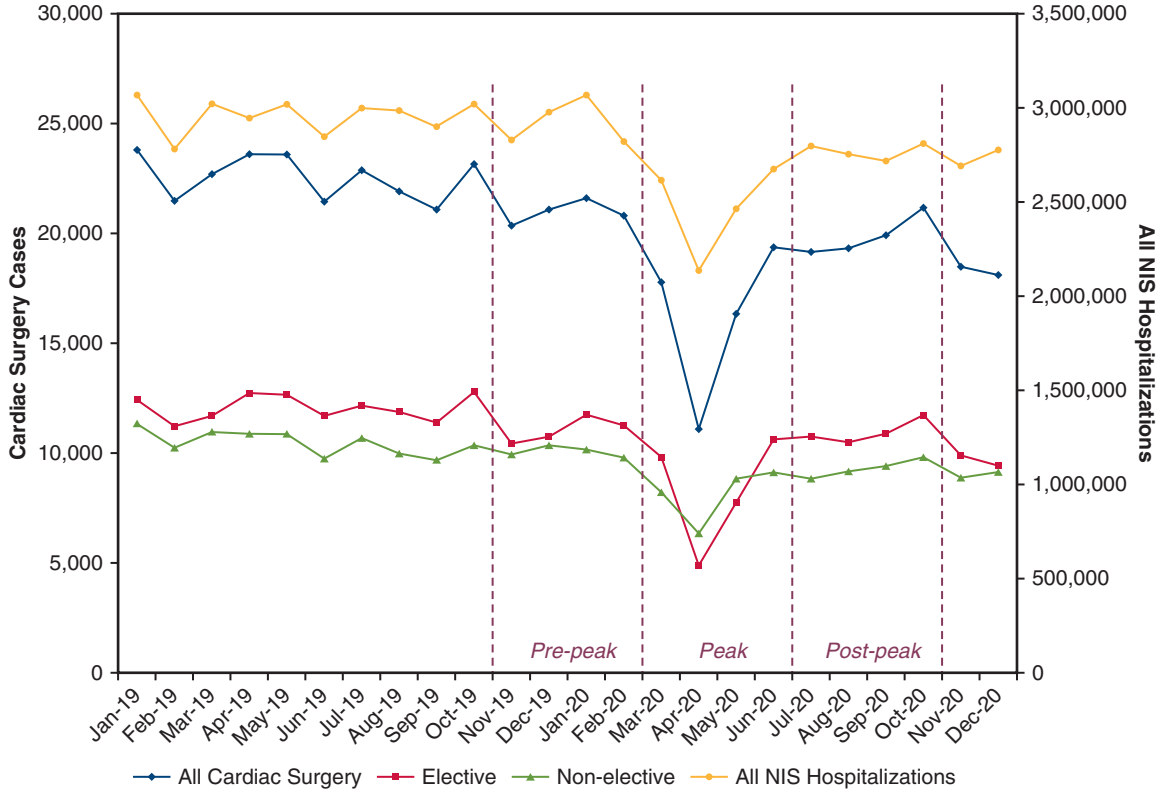

FIGURE 1. Overall hospitalization and cardiac surgery volume per month during 2019 and 2020. Dashed *red lines* denote the pre-peak (November 2019 to February 2020), peak (March to June 2020) and post-peak (July to October 2020) periods defined relative to the initial COVID-19 pandemic wave. The peak period was defined as it encompassed the World Health Organization's pandemic declaration in March 2020 and the Centers for Medicare and Medicaid Services call for deferral of nonessential medical services during April 2020. Additionally, there was a major decrease in overall Nationwide Inpatient Sample (*NIS*) hospitalizations during the peak period. Cardiac surgery volume experienced an initial peak period decline followed by a rapid recovery in the post-peak period.

(15.6%), whereas discharges home (2019: 75.7% and 2020: 80.3%) were significantly higher ($P < .01$).

DISCUSSION

Despite paucity of actionable data at the onset of the pandemic, national leadership from the American Association for Thoracic Surgery and Society of Thoracic Surgeons expediently crafted guidelines for the safe delivery of emergency and elective cardiac surgeries during the COVID-19 pandemic.[1-3] This potentially contributed to the ability to rapidly recover to near-baseline cardiac surgical volume soon after the onset of the pandemic. Before PSM, patients who underwent cardiac surgery in 2020 had higher baseline risk, as measured by ECI, and higher mortality. This may reflect the influence of deferral of lower-risk, less urgent cases in accordance with institutional and national policies. After controlling for differences in preoperative risk profiles, there were no significant differences in mortality or morbidity between years. Additionally, individual institutions answered this call to action by sharing their experiences delivering cardiac surgical services early in the pandemic.[4] Critically, a very early experience from the epicenter in New York City allowed others to learn from their successes and failures.[5] However, increased hospital costs in 2020 may reflect increased utilization of costly resources to establish the patient and provider safety needed to ensure favorable outcomes.

Furthermore, despite a population with higher preoperative risk, discharges home increased during 2020. Although initially necessary due to limited SNF availability during the pandemic, this could be a lesson for future discharge planning. Reconsideration of criteria for discharge to SNF may allow more patients to safely return to the comfort of home while reducing costs to patients and resource utilization.

These results may be a testament to the influence of strong institutional leadership, professional society guidance, and dissemination of best practices on the field of cardiac surgery during the COVID-19 pandemic. Additionally, this study may demonstrate that reflection on the response to public health emergencies may potentially hold valuable lessons that could improve future patient care.

TABLE 1. Index admission mortality, complications, discharge dispositions, and costs

Outcome	Before propensity score matching				After propensity score matching			
	2019		2020		2019		2020	
	n = 196,955		n = 161,040		n = 159,000		n = 159,000	
	n	%	n	%	n	%	n	%
Index admission mortality*	5330	2.7	5015	3.1	4410	2.8	4715	3.0
Overall complications	74,815	38.0	63,140	39.2	61,445	38.6	62,845	39.5
Stroke	9275	4.7	8230	5.1	7610	4.8	8045	5.1
Pneumonia	19,085	9.7	17,470	10.8	15,985	10.1	16,945	10.7
Renal failure requiring dialysis	3675	1.9	3295	2.0	3040	1.9	3085	1.9
Respiratory failure	22,530	11.4	19,245	12.0	18,470	11.6	18,910	11.9
Pulmonary embolism/deep venous thrombosis	2845	1.4	2745	1.7	2360	1.5	2615	1.6
Gastrointestinal bleeding	6200	3.1	5425	3.4	5160	3.2	5300	3.3
Nongastrointestinal bleeding	6870	3.5	5960	3.7	5695	3.6	5815	3.7
Transfusion required	32,310	16.4	26,885	16.7	26,365	16.6	26,410	16.6
Delirium	4965	2.5	4455	2.8	4160	2.6	4370	2.7
Surgical site infection/sepsis*	6675	3.4	6505	4.0	5905	3.7	6140	3.9
Discharge location†								
Home	149,070	75.7	129,300	80.3	119,870	75.4	128,150	80.6
Skilled nursing facility	40,685	20.7	25,045	15.6	33,115	20.8	24,510	15.4
Short-term rehabilitation facility	1555	0.8	1315	0.8	1330	0.8	1275	0.8
Other	5625	2.9	5350	3.3	4670	2.9	5035	3.2
Hospital costs per admission (US$)†								
Mean ± SD	60,649 ± 51,142		66,790 ± 57,684		61,650 ± 52,503		66,076 ± 55,978	
Median (IQR)	48,086 (36,216, 67,602)		51,985 (38,828, 74,539)		48,609 (36,529, 68,599)		51,762 (38,707, 74,702)	

Mortality and complications during index admissions before and after propensity score matching of patients undergoing cardiac surgery in 2019 and 2020. Outcomes were analyzed and compared only for patients undergoing cardiac surgeries during April through December of each year to control for the significant decrease in hospitalizations during the first quarter of 2020 compared with the first quarter of 2019. IQR: Updated to 25th, 75th percentile bounds in table. *Significant ($P < .01$) before propensity score matching but not significant after. †Significant ($P < .01$) both before and after propensity score matching.

Conflict of Interest Statement

The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

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APPENDIX E1. PROPENSITY SCORE MATCHING METHODS

Propensity score matching (PSM) was conducted between cohorts of patients who underwent cardiac surgery from April to December of 2019 and April to December of 2020. A 1:1 greedy matching algorithm with a caliper of 0.1 of the pooled standard deviation of the logit propensity score was applied. Ideal matching was verified using the standardized differences of the propensity scores to evaluate the balance of covariates pre- and postmatching, ensuring that the matching factor did not exceed 10% of the logit of the propensity score. For all covariates, χ^2 tests were performed. Variables utilized in the PSM algorithm were patient age, cardiac surgery procedure type (coronary artery bypass graft, valve, aortic, combination) and elective/nonelective surgery status, as well as select Elixhauser comorbidities, including congestive heart failure, arrhythmia, complicated diabetes, fluid and electrolyte imbalance, obesity, renal failure, and coagulopathy. Comorbidities were selected to emphasize clinical relevance while avoiding overmatching. Variables for PSM were selected if they were significantly different between the unmatched cohorts.

TABLE E1. International Classification of Diseases, 10th revision (ICD10) codes for included cardiac surgeries

Variable	ICD10 code
Coronary artery bypass grafting	02100, 02110, 02120, 02130
Aortic valve replacement or repair	02QF0ZZ, 02RF07Z, 02RF08Z, 02RF0JZ, 02RF0KZ
Mitral valve replacement or repair	02QG0ZE, 02QG0ZZ, 02RG07Z, 02RG08Z, 02RG0JZ, 02RG0KZ
Tricuspid valve replacement or repair	02QJ0ZG, 02QJ0ZZ, 02RJ07Z, 02RJ08Z, 02RJ0JZ, 02RJ0KZ
Pulmonic valve replacement or repair	02QH0ZZ, 02RH07Z, 02RH08Z, 02RH0JZ, 02RH0KZ
Aortic procedures	02BW0ZZ, 02BX0ZZ, 02QX0ZZ, 02QW0ZZ, 02RX07Z, 02RX08Z, 02RX0JZ, 02RX0KZ, 02RW07Z, 02RW08Z, 02RW0JZ, 02RW0KZ

TABLE E2. International Classification of Diseases, 10th revision (ICD10) codes for complications

Complication	ICD10 code
Stroke	G43601 G43609 G43611 G43619 I6300 I63011 I63012 I63013 I63019 I6302 I63031 I63032 I63033 I63039 I6309 I6310 I63111 I63112 I63113 I63119 I6312 I63131 I63132 I63133 I63139 I6319 I6320 I63211 I63212 I63213 I63219 I6322 I63231 I63232 I63233 I63239 I6329 I6330 I63311 I63312 I63313 I63319 I63321 I63322 I63323 I63329 I63331 I63332 I63333 I63339 I63341 I63342 I63343 I63349 I6339 I6340 I63411 I63412 I63413 I63419 I63421 I63422 I63423 I63429 I63431 I63432 I63433 I63439 I63441 I63442 I63443 I63449 I6349 I6350 I63511 I63512 I63513 I63519 I63521 I63522 I63523 I63529 I63531 I63532 I63533 I63539 I63541 I63542 I63543 I63549 I6359 I636 I638 I6381 I6389 I639 I6930 I6931 I69310 I69311 I69312 I69313 I69314 I69315 I69318 I69319 I69320 I69321 I69322 I69323 I69328 I69331 I69332 I69333 I69334 I69339 I69341 I69342 I69343 I69344 I69349 I69351 I69352 I69353 I69354 I69359 I69361 I69362 I69363 I69364 I69365 I69369 I69390 I69391 I69392 I69393 I69398 I6980 I6981 I69810 I69811 I69812 I69813 I69814 I69815 I69818 I69819 I69820 I69821 I69822 I69823 I69828 I69831 I69832 I69833 I69834 I69839 I69841 I69842 I69843 I69844 I69849 I69851 I69852 I69853 I69854 I69859 I69861 I69862 I69863 I69864 I69865 I69869 I69890 I69891 I69892 I69893 I69898 I6990 I6991 I69910 I69911 I69912 I69913 I69914 I69915 I69918 I69919 I69920 I69921 I69922 I69923 I69928 I69931 I69932 I69933 I69934 I69939 I69941 I69942 I69943 I69944 I69949 I69951 I69952 I69953 I69954 I69959 I69961 I69962 I69963 I69964 I69965 I69969 I69990 I69991 I69992 I69993 I69998
Pulmonary embolism and deep venous thrombosis	I2602 I2609 I2692 I2693 I2694 I2699 I824 I8262
Prolonged mechanical ventilation	5A1945Z 5A1955Z
Tracheostomy	0B113F4
Pneumonia	A0103 A0222 A202 A212 A221 A310 A3791 A430 A481 B012 B052 B0681 B250 B371 B380 B381 B382 B390 B391 B392 B583 B59 B7781 J120 J121 J122 J123 J1281 J1289 J129 J13 J14 J150 J151 J1520 J15211 J15212 J1529 J153 J154 J155 J156 J157 J158 J159 J160 J168 J180 J181 J188 J189 J690 J691 J698 J851 J930 J9311 J9381 J9382 J9383 J939
Surgical site infection	T8140 T8141 T8142 T8143 T8149 A49
Sepsis	T8144 A419 R6520 R6521
Acute kidney injury requiring dialysis	N170 N171 N172 N178 N179 N990 N19 AND 5A1D00Z 5A1D60Z 5A1D70Z 5A1D80Z 5A1D90Z EXCLUDING Z992
Gastrointestinal bleeding	K921 K922 K31811 I8501 I8511 K2211 K2971 K2901 K2961 K2991 K250 K252
Nongastrointestinal bleeding	I974 I976 T82837 D683 D699 I230 I312 S26.0 K66.1 R58
Transfusion required	30230N0 30230N 30233N0 30233N1 30240N0 30240N1 30243N0 30243N1 30250N0 30250N1 30253N0 30253N1 30260N0 30260N1 30263N0 30263N1 30273N1 30277N1 30230H0 30230H1 30233H0 30233H1 30240H0 30240H1 30243H0 30243H1 30250H0 30250H1 30253H0 30253H1 30260H0 30260H1 30263H0 30263H1 30273H1 30277H1
Noncentral nervous system peripheral thromboembolism	I7401 I7409 I7410 I7411 I7419 I742 I743 I744 I745 I748 I749 I75011 I75012 I75013 I75019 I75021I75022 I75023 I75029 I7581 I7589
Pericardial effusion	I313
Fluid overload	E8770 E8779
Pacemaker placement	02H40JZ 02H40KZ 02H40MZ 02H40NZ 02H43JZ 02H43KZ 02H43MZ 02H43NZ 02H44JZ 02H44KZ 02H44MZ 02H44NZ 02H60JZ 02H60KZ 02H60MZ 02H60NZ 02H63JZ 02H63KZ 02H63MZ 02H63NZ 02H64JZ 02H64KZ 02H64MZ 02H64NZ 02H70JZ 02H70KZ 02H70MZ 02H70NZ 02H73JZ 02H73KZ 02H73MZ 02H73NZ 02H74JZ 02H74KZ 02H74MZ 02H74NZ 02HK0JZ 02HK0KZ 02HK0MZ 02HK0NZ 02HK3JZ 02HK3KZ 02HK3MZ 02HK3NZ 02HK4JZ 02HK4KZ 02HK4MZ 02HK4NZ 02HL0JZ 02HL0KZ 02HL0MZ 02HL0NZ 02HL3JZ 02HL3KZ 02HL3MZ 02HL3NZ 02HL4JZ 02HL4KZ 02HL4MZ 02HL4NZ 02HN0JZ 02HN0KZ 02HN0MZ 02HN3JZ 02HN3KZ 02HN3MZ 02HN4JZ 02HN4KZ 02HN4MZ 0JH604Z 0JH605Z 0JH606Z 0JH607Z 0JH608Z 0JH609Z 0JH60AZ 0JH60PZ 0JH634Z 0JH635Z 0JH636Z 0JH637Z 0JH638Z 0JH639Z 0JH63AZ 0JH63PZ 0JH804Z 0JH805Z 0JH806Z 0JH807Z 0JH808Z 0JH809Z 0JH80AZ 0JH80PZ 0JH834Z 0JH835Z 0JH836Z 0JH837Z 0JH838Z 0JH839Z 0JH83AZ 0JH83PZ
Heart failure	I0981 I110 I130 I501 I5020 I5021 I5022 I5023 I5030 I5031 I5032 I5033 I5040 I5041 I5042 I5043 I50810 I50811 I50812 I50813 I50814 I5082 I5083 I5084 I5089 I509

TABLE E3. Patient characteristics and comorbidities before propensity score matching

Outcome	2019 (April-December) (n = 196,955)		2020 (April-December) (n = 161,040)		*P* value
	n	%	n	%	
Race					.99
White	149,450	75.9	122,160	75.9	
Black	14,825	7.5	12,020	7.5	
Hispanic	14,190	7.2	11,620	7.2	
Other	18,490	9.4	15,240	9.5	
Age (y)					.05
18-44	9235	4.7	8220	5.1	
45-54	21,010	10.7	17,315	10.8	
55-64	53,630	27.2	45,030	28.0	
65-74	72,665	36.9	58,330	36.2	
75+	40,415	20.5	32,145	20.0	
Sex					.29
Male	142,505	72.4	117,165	72.8	
Female	54,450	27.6	43,875	27.2	
Admission status					.03
Nonelective	91,915	46.7	78,120	48.5	
Elective	104,680	53.1	82,620	51.3	
Missing	0	0	0	0	
Type of procedure					.86
Coronary artery bypass graft only	133,560	67.8	108,835	67.6	
Valve only	32,315	16.4	26,440	16.4	
Aortic only	5670	2.9	5020	3.1	
Combination	25,410	12.9%	20,745	12.9	
Median household income					.20
First quartile	52,500	26.7	52,500	26.4	
Second quartile	50,450	25.6	44,965	27.9	
Third quartile	49,255	25.0	38,070	23.6	
Fourth quartile	41,300	21.0	33,060	20.5	
Missing	0	0	0	0	
Insurance					.36
Medicaid	15,795	8.0	15,795	8.7	
Medicare	106,215	53.9	85,215	52.9	
Other	7250	3.7	6280	3.9	
Private	62,080	31.5%	51,095	31.7	
Uninsured	5615	52.9	4505	2.8	
Hospital region					.99
Northeast	34,935	17.7	28,005	17.4	
Midwest	45,980	23.3	37,825	23.5	
South	81,325	41.3	66,680	41.4	
West	34,715	17.6	28,530	17.7	
Hospital location/teaching status					.97
Rural	4670	2.4%	4150	2.6	
Urban/nonteaching	22,330	11.3	18,255	11.3	
Urban/teaching	169,955	86.3	138,635	86.1	
Hospital bed size					.90
Small	23,055	11.7	17,585	10.9	
Medium	48,205	24.5	40,095	24.9	
Large	125,695	63.8	103,360	64.2	

(Continued)

TABLE E3. Continued

Outcome	2019 (April-December) (n = 196,955)		2020 (April-December) (n = 161,040)		*P* value
	n	%	n	%	
Hospital ownership					.97
Government	15,790	8.0	13,030	8.1	
Private not-profit	157,010	79.7	127,550	79.2	
Private, invest-own	24,155	12.3	20,460	12.7	
Elixhauser comorbidities					
AIDS	315	0.2	305	0.2	.37
Alcohol abuse	6865	3.5.	5460	3.4	.55
Arrhythmia	96,945	49.2	83,105	51.6	< .01
Deficiency anemia	28,755	14.6	24,830	15.4	.17
Rheumatoid arthritis	5015	2.5	4145	2.6	.82
Blood loss anemia	1815	0.9	1410	0.9	.74
Congestive heart failure	3560	1.8	3990	2.5	<.01
Chronic lung disease	41,715	21.2	34,330	21.3	.77
Coagulopathy	55,405	28.1	48,835	30.3	.06
Depression	18,970	9.6	16,115	10.0	.21
Diabetes mellitus, uncomplicated	24,400	12.4	18,755	11.6	.13
Diabetes mellitus, complicated	58,655	29.8	50,020	31.1	.02
Drug abuse	5205	2.6	4685	52.9	.10
Hypertension	107,010	54.3	84,610	52.5	<.01
Hypothyroidism	22,770	11.6	18,765	11.7	.74
Liver disease	6195	3.1	5880	3.7	<.01
Lymphoma	880	0.4	730	0.5	.90
Fluid and electrolyte imbalance	81,485	41.4	71,615	44.5	.03
Metastatic cancer	575	0.3	495	0.3	.72
Neurological disorders	12,015	6.1	10,000	6.2	.59
Obesity	55,020	27.9	48,305	30.0	<.01
Paralysis	5655	2.9	4895	3.0	.23
Peripheral vascular disease	31,545	16.0	27,710	17.2	.03
Psychoses	3755	1.9	3200	2.0	.47
Pulmonary circulation disorders	555	0.3	829	0.5	<.01
Renal failure	37,480	19.0	25,805	16.0	<.01
Solid tumor without metastasis	2245	1.1	2185	1.4	.02
Peptic ulcer disease	1570	0.8	1475	0.9	.11
Valvular disease	2320	1.2	2335	1.4	<.01
Weight loss	9070	4.6	7940	4.9	.35

TABLE E4. Patient characteristics and comorbidities after propensity score matching

Outcome	2019 (April-December) (n = 159,000)		2020 (April-December) (n = 159,000)		*P* value
	n	%	n	%	
Race					.99
White	120,765	76.0	120,710	75.9	
Black	11,605	7.3	11,850	7.5	
Hispanic	11,505	7.2	11,465	7.2	
Other	15,125	9.5	14,975	9.4	
Age (y)					.93
18-44	7850	4.9	8015	5.0	
45-54	16,815	10.6	17,135	10.8	
55-64	44,685	28.1	444,455	28.0	
65-74	57,905	36.4	57,590	36.2	
75 +	31,745	20.0	31,805	20.0	
Sex					.06
Male	114,670	721	115,855	72.9	
Female	44,330	27.9	43,145	27.1	
Admission status					.82
Nonelective	77,040	48.5	76,735	48.3	
Elective	81,960	51.5	82,265	51.7	
Missing	0	0	0	0	
Type of procedure			0		.63
Coronary artery bypass graft only	108,970	68.5	0	0	
Valve only	25,110	15.8	0	0	
Aortic only	4645	2.9	0	0	
Combination	20,275	12.8%	0	0	
Median household income					.24
First quartile	42,480	26.7	41,930	26.4	
Second quartile	40,895	25.7	44,415	27.9	
Third quartile	39,705	25.0	37,600	23.6	
Fourth quartile	33,110	20.8	32,620	20.5	
Missing	0	0	0	0	
Insurance					.78
Medicaid	13,110	8.2	13,665	8.6	
Medicare	84,490	53.1	84,225	53.0	
Other	5855	3.7	6185	3.9	
Private	50,860	32.0	50,465	31.7	
Uninsured	4685	2.9	4460	2.8	
Hospital region					.99
Northeast	28,090	17.7	27,730	17.4	
Midwest	37,495	23.6	37,270	23.4	
South	65,765	41.4	65,840	41.4	
West	27,650	17.4	28,160	17.7	
Hospital location/teaching status					.95
Rural	3740	2.4	4115	2.6	
Urban/nonteaching	17,905	11.3	18,050	11.4	
Urban/teaching	137,355	86.4	136,835	86.1	
Hospital bed size					.89
Small	18,540	11.7	17,360	10.9	
Medium	38,555	24.2	39,650	24.9	
Large	101,905	64.1	101,990	64.1	

(Continued)

TABLE E4. Continued

Outcome	2019 (April-December) (n = 159,000)		2020 (April-December) (n = 159,000)		*P* value
	n	%	n	%	
Hospital ownership					.95
Government	12,780	8.0	12,875	8.1	
Private not-profit	127,030	79.9	126,030	79.3	
Private, invest-own	19,190	12.1	20,095	12.6	
Elixhauser comorbidities					
AIDS	230	0.1	300	0.2	.19
Alcohol abuse	5800	3.6	5405	3.4	.14
Arrhythmia	81,115	51.0	81,115	51.0	.67
Deficiency anemia	22,885	14.4	24,465	15.4	.10
Rheumatoid arthritis	3995	2.5	4110	2.6	.58
Blood loss anemia	1460	0.9	1390	0.9	.76
Congestive heart failure	3345	2.1	3360	2.1	.94
Chronic lung disease	34,060	21.4	33,805	21.3	.74
Coagulopathy	47,890	30.1	47,620	29.9	.89
Depression	15,300	9.6	15,895	10.0	.24
Diabetes mellitus, uncomplicated	19,430	12.2	18,650	11.7	.32
Diabetes mellitus, complicated	48,955	30.8	48,895	30.8	.95
Drug abuse	4415	2.8	4580	2.9	.54
Hypertension	84,310	53.0	83,865	52.7	.69
Hypothyroidism	18,280	11.5	18,550	11.7	.55
Liver disease	5135	3.2	5755	3.6	.02
Lymphoma	725	0.5	730	0.5	.94
Fluid and electrolyte imbalance	69,835	43.9	69,895	44.0	.98
Metastatic cancer	505	0.3	480	0.3	.73
Neurological disorders	9685	6.1	9860	6.2	.60
Obesity	46,615	29.3	47,335	29.8	.49
Paralysis	4565	2.9	4805	3.0	.30
Peripheral vascular disease	25,710	16.2	27,295	17.2	.08
Psychoses	3090	1.9	3170	2.0	.67
Pulmonary circulation disorders	510	0.3	760	0.5	<.01
Renal failure	25,450	16.0	25,740	16.2	.60
Solid tumor without metastasis	1800	1.1	2165	1.4	.01
Peptic ulcer disease	1295	0.8	1440	0.9	.25
Valvular disease	2105	1.3	2085	1.3	.90
Weight loss	7615	4.8	7660	4.8	.93