

Impact of COVID-19 on Cancer Care: How the Pandemic Is Delaying Cancer Diagnosis and Treatment for American Seniors

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PURPOSE While the immediate care and access disruptions associated with the COVID-19 pandemic have received growing attention in certain areas, the full range of gaps in cancer screenings and treatment is not yet well understood or well documented throughout the country comprehensively.

METHODS This study used a large medical claims clearinghouse database representing 5%-7% of the Medicare fee-for-service population to characterize changes in the utilization of cancer care services and gain insight into the impact of COVID-19 on the US cancer population, including identification of new patients, gaps in access to care, and disruption of treatment journeys.

RESULTS In March-July 2020, in comparison with the baseline period of March-July 2019, there is a substantial decrease in cancer screenings, visits, therapy, and surgeries, with variation by cancer type and site of service. At the peak of the pandemic in April, screenings for breast, colon, prostate, and lung cancers were lower by 85%, 75%, 74%, and 56%, respectively. Significant utilization reductions were observed in April for hospital out-patient evaluation and management (E&M) visits (-74%), new patient E&M visits (-70%), and established patient E&M visits (-60%). A decrease in billing frequency was observed for the top physician-administered oncology products, dropping in both April (-26%) and July (-31%). Mastectomies were reduced consistently in April through July, with colectomies similarly reduced in April and May and prostatectomies dipping in April and July.

CONCLUSION The current impact of the COVID-19 pandemic on cancer care in the United States has resulted in decreases and delays in identifying new cancers and delivery of treatment. These problems, if unmitigated, will increase cancer morbidity and mortality for years to come.

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INTRODUCTION

In late January 2020, the first cases of COVID-19 were diagnosed by the medical community in the United States, with the 7-day moving average number of new daily cases in the United States peaking in mid-April.¹ In response to the increase in COVID-19 prevalence in the United States, the Centers for Disease Control and Prevention (CDC) implemented guidelines to diminish exposure, several states issued stay-at-home orders to reduce transmission risk, and across the country, individuals were encouraged to shelter in place, particularly those considered high risk for COVID-19, such as the elderly and immunocompromised.² Many healthcare providers accommodated short-term adjustments to cancer care delivery, such as temporarily discontinuing nonemergent cancer screenings, shifting the delivery of care to telehealth, and delaying surgeries and other in-office cancer services to reduce transmission risk, build hospital capacity in

anticipation of increasing rates of coronavirus infections, and comply with state regulations and guidelines from the CDC, Centers for Medicare and Medicaid Services (CMS), and professional societies.³⁻⁷ Professional societies have released guidance to amend care guidelines to compensate for these changes, such as beginning systemic therapy first to permit surgery to be delayed.⁸

By the end of September 2020, more than 7 million people in the United States had been infected with COVID-19.⁹ Given the focus on preserving health system capacity and also protecting high-risk patients from exposure to the virus, oncology patients have faced increased challenges in accessing care. The pandemic has resulted in substantial decreases in cancer screening, cancer management visits, and cancer surgeries, although variably by disease type across the country.¹⁰⁻¹⁴ An April analysis of 20 healthcare institutions part of the COVID and Cancer

ASSOCIATED CONTENT

Appendix

Author affiliations and support information (if applicable) appear at the end of this article.

Accepted on October 15, 2020 and published at ascopubs.org/journal/cci on November 30, 2020: DOI <https://doi.org/10.1200/CCI.20.00134>

CONTEXT

Key Objective

The COVID-19 pandemic is causing catastrophic changes to cancer care. This study including more than 6 million Medicare beneficiaries used a large claims database representing 5%-7% of the Medicare fee-for-service population to characterize changes in cancer care and gain insight into the impact of COVID-19 on the US cancer population.

Knowledge Generated

In March-July 2020 in comparison with 2019, there was a substantial decrease in cancer screenings, biopsies, surgeries, office visits, and therapy with variation by cancer type and site of service. At the peak of the pandemic in April, screenings for breast, colon, prostate, and lung cancers were lower by 85%, 75%, 74%, and 56%, respectively.

Relevance

Significant utilization reductions were observed in April for hospital outpatient evaluation and management (E&M) visits (-74%), new patient E&M visits (-70%), and established patient E&M visits (-60%). A decrease in the utilization of top physician-administered oncology products was observed, dropping in both April (-26%) and July (-31%).

Research Network reported decreases in cancer encounters by 40%-50% for lung, colorectal, hematologic, breast, and prostate cancers as well as melanoma.¹⁵ Patients with cancer have reported delays in receiving cancer care, including follow-up clinic appointments and cancer therapies, such as radiation, infusion therapies, and surgical tumor removal.^{16,17}

Although the stay-at-home orders were lifted across the country in May and June, the utilization of certain oncology services continues to lag behind 2019 levels, and the lasting impact on disease progression, cancer morbidity, and mortality remains unclear. The United Kingdom recently projected that delays in diagnosis and treatment may increase mortality from breast, colorectal, and lung cancers by as much as 9.6%, 16.6%, and 5.3%, respectively, after 5 years.¹⁸

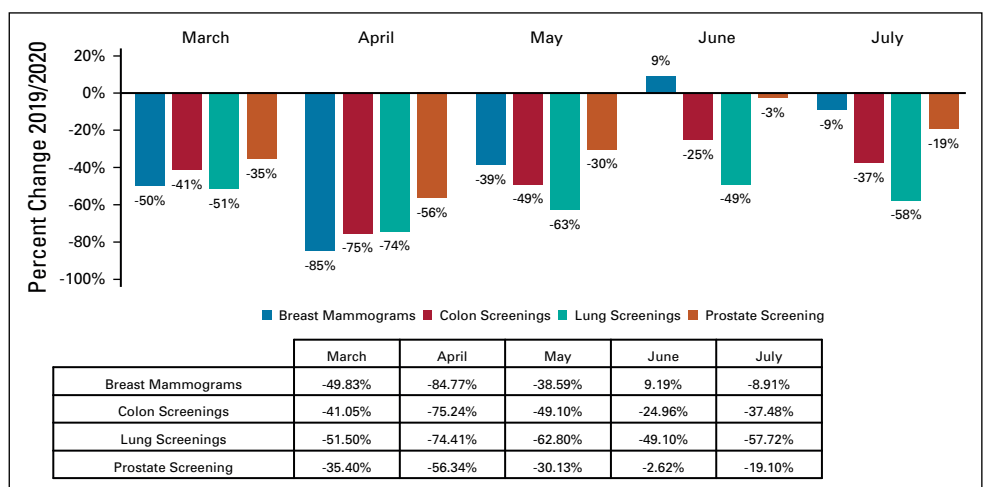
How pervasive these changes are throughout the country is underappreciated. Our analysis sought to describe these trends of decreased utilization of cancer related services and explore their variability from month to month during the

pandemic relative to utilization trends observed in 2019. In particular, by characterizing trends in cancer screenings and treatments, we hope to gain insight into potential solutions to better support seniors with cancer in the United States during the COVID-19 pandemic.

METHODS

This retrospective analysis assessed whether variation in health service utilization was significantly impacted by the COVID-19 stay-at-home orders during the first half of 2020. To accomplish this task, data were sourced from a proprietary provider clearinghouse registry comprising approximately 5%-7% of all Medicare fee-for-service (FFS) claims that were submitted for adjudication between January 1, 2019, and July 31, 2020, inclusive. Included in the database are CMS-1450 claims from institutional providers, such as hospital-based cancer centers and hospital outpatient departments, and CMS-1500 claims from noninstitutional or professional providers, such as independent physician offices. Because of the additional regulatory and billing flexibilities finalized by the CMS

FIG 1. Relative change in billing frequencies for select cancer screening procedures (March-July 2019/2020). Billing frequencies were determined by the following procedure codes: breast mammograms (77061, 77062, 77063, 77065, 77066, 77067); colon screening (45330, 81528, 82270, 82272, 82274, G0104, G0105, G0121, G0328); lung screening (31624, G0296, G0297); prostate screening (G0103).



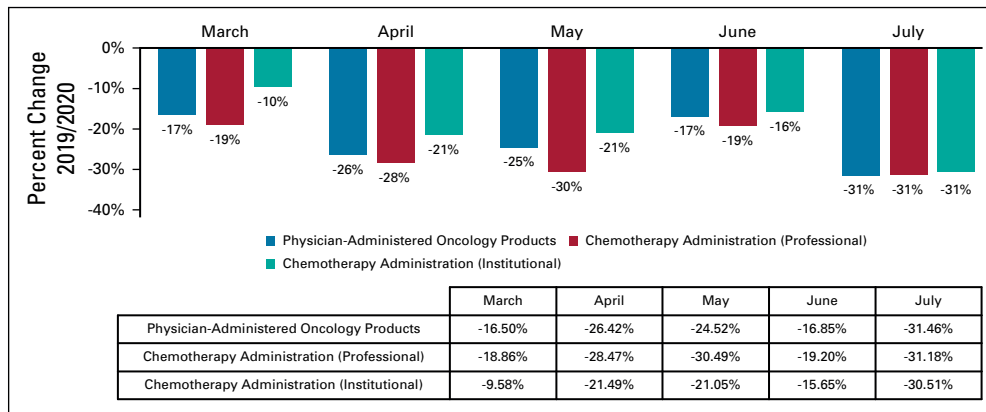


FIG 2. Relative change in billing frequencies for select physician-administered oncology products (at any site of services) and relative change in chemotherapy administration (by the site of service) (March-July 2019/2020). Billing frequency of the top 23 physician-administered oncology products (and respective biosimilars) as determined by 2018 Medicare Part B spend: Prolia/Xgeva, Neupogen (Zarxio, Nivestym), Somatuline Depot, Aloxi, Neulasta (Fulphila, Udenyca, Ziextenzo), Tecentriq, Bendeka, Avastin (Mvasi, Zirabev), Velcade, Adcetris, Kyprolis, Erbitux, Cyclophosphamide, Darzalex, Yervoy, Abraxane, Keytruda, Opdivo, Alimta, Perjeta, Rituxan (Truxima, Ruxience), Kadcyla, Herceptin (Ontruzant, Hersuma, Ogivri, Trazimera, Kanjinti).

during the public health emergency, setting of care was determined using the claim type rather than the site of service modifier, particularly for services delivered via telehealth. The full data set was then limited to claims that were (1) incurred during the first 7 months (January-July) of each year and (2) specific to targeted cancer-related services of interest, including diagnostic screening (eg, breast and colon), physician office visits, hospitalizations, surgeries, and infusion therapies administered in an outpatient setting. For each procedure or service category, the number of

procedures billed by each rendering provider was tracked and trended, and the mean change in volume (2019 v2020) was estimated and compared, statistically, using a Wilcoxon rank-sum test (Appendix Tables A1-A5). All data manipulation and statistical analyses were carried out using SAS 9.4 (SAS Institute, Cary, NC), assuming a *P* value (α) of .05.

RESULTS

A total of 6,227,474 Medicare FFS claims were captured by the analysis. Significant decreases in screening for breast,

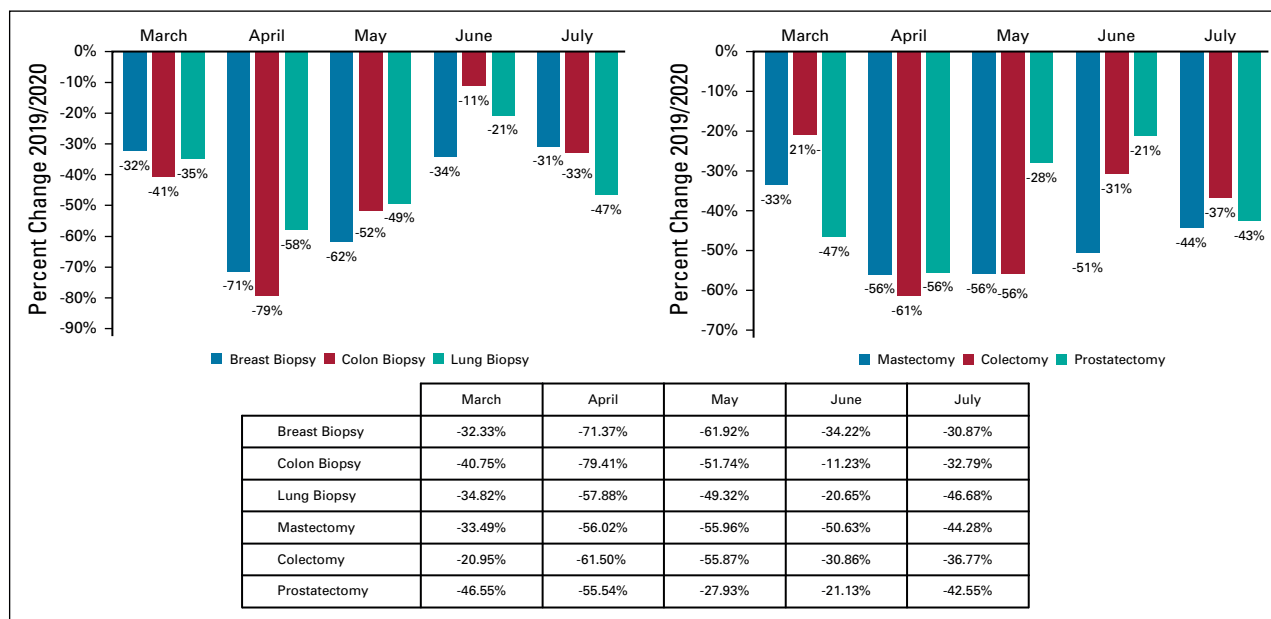
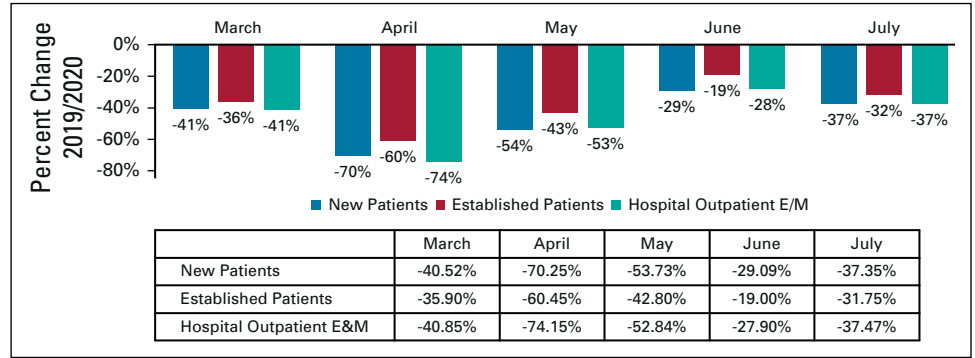


FIG 3. Relative change in billing frequencies for cancer-related biopsies and surgeries (March-July 2019/2020). Billing frequencies were classified by type of claim and identified by the following procedure codes: chemotherapy injection (96401, 96402, 96405, 96409); chemotherapy infusion (96413, 96415-96417); and chemotherapy administration (96420, 96425).

FIG 4. Relative change in billing frequencies for cancer-related evaluation and management (E&M) services (March–July 2019/2020). Billing frequencies were determined using a subset of highest-volume procedure codes for each of the following services: breast biopsy (19081–19085); colon biopsy (44389, 45380); lung biopsy (32405, 39402).



colon, prostate, and lung cancers were observed in 2020 compared with 2019, with the most significant reduction occurring in April for mammograms (–85%) and lung (–75%), colon (–74%), and prostate (–56%) screenings (Table and Fig 1). A decrease in billing frequency was observed for the top physician-administered oncology products, dropping in both April (–26%) and July (–31%) (Table and Fig 2). Similarly, billing for chemotherapy administration services in both the professional and institutional settings dropped in April and May as well as in July (–28% and –21% in April, –30% and –21% in May, –31% and –31% in July, respectively) (Table and Fig 2). Reductions in cancer biopsies were also observed in both April and July for breast (–71% and –31%), colon (–79% and –33%), and lung (–58% and –47%) biopsies (Table and Fig 3). Mastectomies were reduced consistently in April through July, with colectomies similarly reduced in April and May and prostatectomies dipping in April and July (Table and Fig 3).

Significant utilization reductions were observed in patient evaluation and management (E&M) visits, with the greatest reduction in April hospital outpatient E&M visits (–74%) (Table and Fig 4). Drops in utilization were higher for new patient E&M visits (–70% in April) than established patient E&M visits (–60% in April) (Table and Fig 4). Cancer-related hospitalizations also declined in March (–30%), April (–41%), May (–36%), June (–31%), and July (–38%). Institutional providers experienced greater reductions in delivery of cancer care, with the greatest reduction in E&M visits in April among institutional providers

and professional providers (–71% v –61%, respectively) (Table and Fig 5). Moreover, even with the expanded use of telemedicine, the delivery of E&M services via telehealth was only able to mitigate the drop in E&M utilization in April from –73% to –58% (Table and Fig 6). Utilization of telehealth has been almost entirely driven by professional providers, who delivered approximately 95% of telehealth E&M services in April through July.

DISCUSSION

The COVID-19 pandemic and associated stay-at-home orders established across the US limited patient access to in-person care and, in turn, impacted patients’ ability to receive cancer care. Reduced access caused significant short-term disruptions in care delivery and, as an unintended consequence, may have long-term morbidity and survival implications for patients who missed cancer screenings and surgeries during this period. Delays in diagnosis can allow cancer to grow and progress to a more advanced stage, resulting in higher mortality rates.

Institutional providers have had greater reductions in delivery of cancer care, likely because of more limited supply of hospital resources caused by an influx of acutely ill patients with COVID-19 and patient reluctance to visit hospital outpatient clinics amid concerns regarding the transmission of COVID-19. Similarly, physician offices and other noninstitutional provider settings have struggled to adapt to state-specific reopening requirements and overcome patient fears about COVID-19 exposure. Overall, institutional settings of care experienced greater decreases

FIG 5. Relative change in billing frequencies for cancer-related evaluation and management (E&M) services by setting of care (March–July 2019/2020). Billing frequencies were determined using a subset of highest-volume procedure codes for each of the following services: mastectomy (19301–19303, 19307); colectomy (44139, 44140, 44143, 44160, 44204, 44205, 44207, 44213); prostatectomy (52601, 52648, 55821, 55840, 55866).

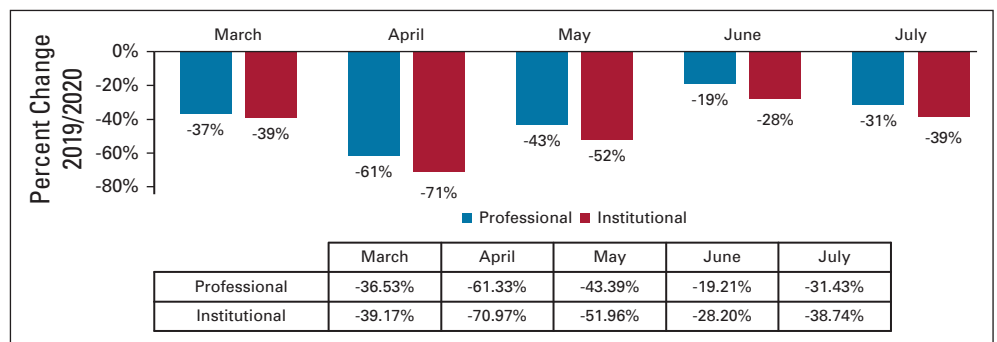
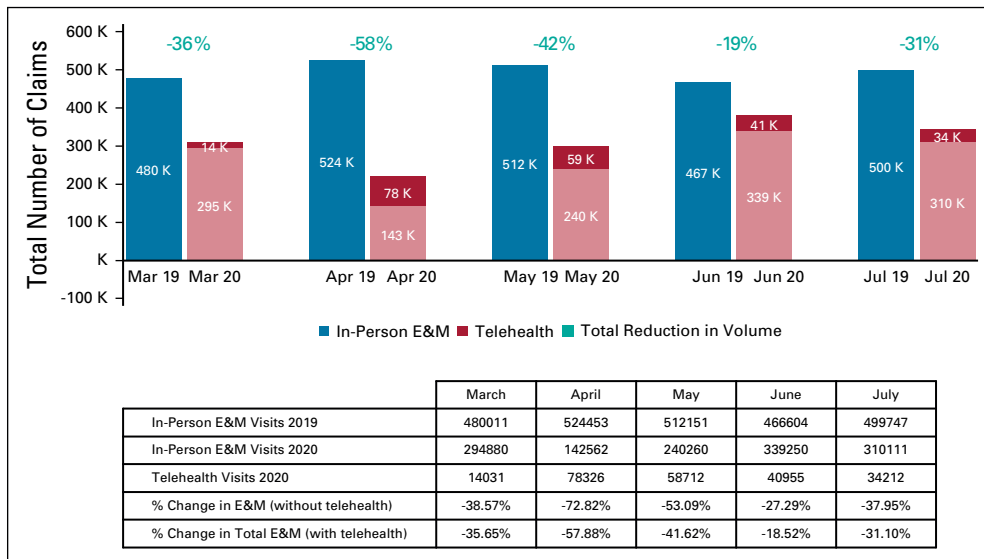


FIG 6. Total number of claims for cancer-related in-office evaluation and management (E&M) v telehealth E&M services and relative change in billing frequencies (March-July 2019/2020). Billing frequencies were determined by the following procedure codes: new patient E&M (99201-99205); established patient E&M (99211-99215); hospital outpatient (G0463).



in care delivery and were unable to adopt telehealth services to the same extent as providers in professional settings of care. This difference could be due to, among other factors, the overwhelming strain of COVID-19 on limited hospital resources and the ability of smaller community oncology providers to adapt quickly to changing care dynamics while maintaining connections with existing patients.

The COVID-19 pandemic has therefore impacted cancer care delivery. Fewer patients are undergoing screenings, with many providers and patients choosing to reschedule or completely forego screenings during the months of the pandemic, leading to fewer cancer diagnoses. This is particularly true for cancers that rely on routine preventive screenings to detect a large portion of asymptomatic tumors. The natural consequence of disruption in cancer screenings and delays in diagnosis and treatment is that cancer will present at a later stage and often require more complex care, lowering the likelihood that patients will respond to therapy and be cured of the disease. In the years after the pandemic, we anticipate that the effects of COVID-19 on access to cancer care will result in a stage migration to higher stages of disease and an overall increase in cancer mortality.

Notably, the considerable drops in screenings in April have subsequent implications for the number of new patient E&M visits, biopsies, and treatment dynamics in later months, as these patients could now have delayed diagnoses until their next scheduled cancer screening or until their disease becomes symptomatic. Because of the extended timeline of a patient’s cancer treatment journey, there is an expected lag of up to 3 months between when a patient is screened for cancer and when a patient is subsequently scheduled for a biopsy and then eventually receives treatment. Coupled with delays in surgeries in April and May, a second wave of the decreased

utilization of cancer services in the following months should be anticipated, as observed in the July figures reported in this study and likely to be continued in subsequent months. This second wave is characterized in the trends in delivery of chemotherapy administration, which first dropped in April and May in response to stay-at-home orders, patient hesitancy to seek care, and providers struggling to adapt to CDC guidelines for remaining open, followed by a secondary drop in July, possibly attributable to the after-effect of delayed or postponed screenings and biopsies, resulting in delayed therapy initiation or failure to identify cancer patients with asymptomatic disease. Fewer patients are also undergoing surgeries, receiving physician-administered treatment, and seeking chronic follow-up for existing cancers.

While cancer screening has improved in much of the United States, routine testing was disrupted for at least 6 months of 2020, and most rates remain diminished today. To effectively diagnose and manage cancer, stakeholders should consider how to heighten the awareness of the dangers of medical distancing and recover seniors’ confidence in their ability to seek safe and appropriate care. This care includes routine cancer screenings and appropriate treatment required to avoid significant negative impacts on cancer mortality in the United States. Decline in cancer screening rates, physician E&M visits, and administration of cancer therapies will likely translate into both a stage migration to more advanced cancer at diagnosis and higher cancer mortality among senior citizens in the United States. Policies to promote access to cancer care and support the cancer ecosystem have the potential to reduce the expected morbidity and mortality in this patient population. Further studies should be conducted to understand the impact on specific patient populations.

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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The following represents disclosure information provided by authors of this manuscript. All relationships are considered compensated unless otherwise noted. Relationships are self-held unless noted. I = Immediate

Family Member, Inst = My Institution. Relationships may not relate to the subject matter of this manuscript. For more information about ASCO's conflict of interest policy, please refer to www.asco.org/rwc or ascopubs.org/cci/author-center.

Open Payments is a public database containing information reported by companies about payments made to US-licensed physicians ([Open Payments](http://OpenPayments)).

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No other potential conflicts of interest were reported.

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APPENDIX

TABLE A1. Number of Physician-Administered Oncology Products Billed by Each Rendering Provider and Mean Change in Volume (2019 v 2020)

Oncology Products	2019							2020							P
	N = 721							N = 721							
	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	
By month															
Jan 2019 v Jan 2020	20.41	66.53	2	0	10	0	1,010	21.16	69.01	2	1	12	0	996	.0321
Feb 2019 v Feb 2020	17.93	59.80	1	0	10	0	949	18.22	60.10	2	0	10	0	870	.1085
Mar 2019 v Mar 2020	18.65	62.31	2	0	9	0	985	18.95	62.73	2	0	9	0	881	.9995
Apr 2019 v Apr 2020	19.57	61.08	2	0	11	0	852	17.23	52.66	1	0	9	0	530	.0472
May 2019 v May 2020	19.45	56.06	2	0	11	0	564	17.63	56.78	1	0	9	0	735	.0233
Jun 2019 v Jun 2020	18.62	57.48	2	0	12	0	766	18.26	59.93	2	0	10	0	813	.2771
July 2019 v July 2020	21.34	67.62	2	0	12	0	1,034	17.25	58.62	1	0	8	0	837	.0002
By year															
Jan-Jul 2019 v Jan-Jul 2020	135.98	425.63	12	3	78	1	5,950	128.69	412.53	12	3	68	1	5,412	.8021
By quarter															
Jan-Mar 2019 v Jan-Mar 2020	56.99	188.28	4	1	31	0	2,944	58.33	191.20	5	1	33	0	2,747	.0388
Apr-Jun 2019 v Apr-Jun 2020	57.64	172.28	5	1	34	0	1,972	53.12	166.82	4	1	29	0	1,828	.0696
Jun-Jul 2019 v Jun-Jul 2020	39.96	124.82	4	1	23	0	1,800	35.50	118.27	3	0	17	0	1,650	.0067

TABLE A2. Number of Evaluation and Management (E&M) Visits Billed by Each Rendering Provider and Mean Change in Volume (2019 v 2020)

2019											2020										
N = 15,323											N = 15,323										
Total Patient E&M Visits											Total Patient E&M Visits										
By month	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	P						
Jan 2019 v Jan 2020	29.69	199.07	3	0	14	0	9,142	29.50	195.17	4	1	15	0	9,982	< .0001						
Feb 2019 v Feb 2020	25.96	171.58	3	0	12	0	7,349	24.52	166.76	3	1	12	0	8,514	< .0001						
Mar 2019 v Mar 2020	27.54	182.51	3	0	13	0	8,670	19.18	123.93	3	0	10	0	6,298	< .0001						
Apr 2019 v Apr 2020	30.21	203.05	3	0	14	0	10,737	12.06	72.58	1	0	7	0	3,443	< .0001						
May 2019 v May 2020	29.67	200.24	3	0	13	0	11,356	17.67	134.53	2	0	9	0	8,131	< .0001						
Jun 2019 v Jun 2020	27.21	182.40	3	0	12	0	10,167	23.16	180.86	2	0	11	0	11,513	< .0001						
July 2019 v July 2020	29.37	196.63	4	1	14	0	10,816	20.95	170.48	2	0	9	0	11,415	< .0001						
By year	199.66	1,329.60	24	5	90	0	68,237	147.05	1,029.49	20	5	73	0	58,801	< .0001						
By quarter																					
Jan-Mar 2019 v Jan-Mar 2020	83.20	552.62	9	1	38	0	25,161	73.20	483.33	10	2	37	0	24,794	< .0001						
Apr-Jun 2019 v Apr-Jun 2020	87.09	584.29	10	2	39	0	32,260	52.89	383.79	6	1	26	0	22,592	< .0001						
Jun-Jul 2019 v Jun-Jul 2020	56.58	378.75	7	2	26	0	20,983	44.11	350.84	5	1	20	0	22,928	< .0001						
By year																					
2019											2020										
N = 7,141											N = 7,141										
New Patient E&M Visits											New Patient E&M Visits										
By month	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	P						
Jan 2019 v Jan 2020	5.40	42.63	1	0	3	0	2,193	4.99	38.56	1	0	3	0	2,052	< .0001						
Feb 2019 v Feb 2020	4.70	35.85	1	0	3	0	1,728	4.27	36.12	1	0	3	0	1,914	.0246						
Mar 2019 v Mar 2020	4.77	36.99	1	0	3	0	1,998	3.14	26.18	1	0	2	0	1,386	< .0001						
Apr 2019 v Apr 2020	5.06	41.25	1	0	3	0	2,340	1.64	13.35	0	0	1	0	569	< .0001						
May 2019 v May 2020	4.98	41.09	1	0	3	0	2,416	2.51	24.87	0	0	1	0	1,337	< .0001						
Jun 2019 v Jun 2020	4.58	38.76	1	0	2	0	2,383	3.50	34.52	1	0	2	0	2,066	< .0001						
July 2019 v July 2020	5.08	43.32	1	0	3	0	2,623	3.38	34.41	0	0	2	0	2,121	< .0001						
By year	34.59	278.37	6	2	17	1	15,681	23.43	205.73	4	2	13	1	11,408	< .0001						

(Continued on following page)

TABLE A2. Number of Evaluation and Management (E&M) Visits Billed by Each Rendering Provider and Mean Change in Volume (2019 v 2020) (Continued)

2019													2020												
N = 7,141													N = 7,141												
New Patient E&M Visits													New Patient E&M Visits												
	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	P	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	P		
By quarter																									
Jan-Mar 2019 v Jan-Mar 2020	14.87	115.20	2	1	8	0	5,919	12.40	100.46	2	1	7	0	5,352	.1573										
Apr-Jun 2019 v Apr-Jun 2020	14.63	120.86	3	1	7	0	7,139	7.65	71.89	1	0	4	0	3,935	<.0001										
Jun-Jul 2019 v Jun-Jul 2020	9.67	82.01	2	1	5	0	5,006	6.89	68.80	1	0	4	0	4,187	<.0001										
2019																									
N = 12,873																									
Existing Patient E&M Visits																									
	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	P	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	P		
By month																									
Jan 2019 v Jan 2020	25.74	161.63	4	1	15	0	6,949	25.80	159.73	5	1	16	0	7,930	<.0001										
Feb 2019 v Feb 2020	22.57	139.89	4	1	13	0	5,621	21.39	134.89	4	1	13	0	6,600	<.0001										
Mar 2019 v Mar 2020	23.93	148.94	4	1	14	0	6,672	16.90	100.34	3	1	11	0	4,912	<.0001										
Apr 2019 v Apr 2020	26.49	169.00	4	1	15	0	8,397	11.47	65.02	2	0	7	0	3,073	<.0001										
May 2019 v May 2020	25.88	166.93	4	1	15	0	8,940	16.14	117.92	2	0	10	0	6,794	<.0001										
Jun 2019 v Jun 2020	23.53	148.16	4	1	13	0	7,784	20.63	155.84	3	0	12	0	9,447	<.0001										
July 2019 v July 2020	25.31	157.61	5	1	15	0	8,193	18.41	145.40	3	0	10	0	9,294	<.0001										
By year																									
Jan-Jul 2019 v Jan-Jul 2020	173.45	1,088.74	29	8	98	1	52,556	130.72	867.85	25	7	80	1	47,393	<.0001										
By quarter																									
Jan-Mar 2019 v Jan-Mar 2020	72.23	449.99	12	3	41	0	19,242	64.08	392.83	13	4	40	0	19,442	<.0001										
Apr-Jun 2019 v Apr-Jun 2020	75.90	483.58	12	3	43	0	25,121	48.23	335.16	8	2	29	0	18,657	<.0001										
Jun-Jul 2019 v Jun-Jul 2020	48.85	305.58	9	2	28	0	15,977	39.04	300.90	6	1	22	0	18,741	<.0001										
2019																									
N = 387																									
Outpatient E&M Visits																									
	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	P	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	P		
By month																									
Jan 2019 v Jan 2020	207.04	540.25	25	2	149	0	5,791	211.22	540.91	32	3	151	0	6,195	.0852										
Feb 2019 v Feb 2020	179.24	465.28	21	2	126	0	5,055	175.16	464.04	27	3	121	0	5,336	.2419										
Mar 2019 v Mar 2020	194.49	501.16	23	2	139	0	5,096	134.64	348.94	18	2	88	0	3,776	.4126										
Apr 2019 v Apr 2020	208.36	517.71	23	3	140	0	4,301	62.26	144.29	10	1	50	0	1,055	<.0001										

(Continued on following page)

TABLE A2. Number of Evaluation and Management (E&M) Visits Billed by Each Rendering Provider and Mean Change in Volume (2019 v 2020) (Continued)

Outpatient E&M Visits	2019							2020							
	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	P
May 2019 v May 2020	209.38	498.18	28	3	145	0	3,270	112.04	304.37	14	1	74	0	3,517	.0012
Jun 2019 v Jun 2020	198.74	493.17	26	2	140	0	4,503	160.29	430.26	17	1	105	0	4,656	.0931
July 2019 v July 2020	215.16	543.36	30	3	154	0	5,719	149.05	407.69	15	1	95	0	4,725	.0009
By year															
Jan-Jul 2019 v Jan-Jul 2020	1,412.41	3,524.21	203	19	987	1	32,427	1,004.66	2,589.37	163	22	722	1	29,260	.3536
By quarter															
Jan-Mar 2019 v Jan-Mar 2020	580.76	1,505.08	70	6	430	0	15,942	521.02	1,347.54	80	9	375	0	15,307	.2658
Apr-Jun 2019 v Apr-Jun 2020	616.49	1,495.85	83	9	433	0	10,766	334.59	865.93	45	5	228	0	9,228	.0035
Jun-Jul 2019 v Jun-Jul 2020	413.90	1,034.95	60	7	291	0	10,222	309.34	835.13	35	3	206	0	9,381	.0115

TABLE A3. Number of Hospitalizations Billed by Each Rendering Provider and Mean Change in Volume (2019 v 2020)

Any Hospitalizations	2019							2020							
	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	P
By month															
Jan 2019 v Jan 2020	17.68	47.94	3	1	10	0	757	19.87	51.75	3	1	11	0	818	.0138
Feb 2019 v Feb 2020	16.37	43.02	2	1	10	0	677	17.03	46.30	2	1	10	0	741	.8388
Mar 2019 v Mar 2020	17.74	46.88	2	1	10	0	695	14.87	39.84	2	0	8	0	593	.1504
Apr 2019 v Apr 2020	17.13	48.43	2	1	10	0	822	11.97	31.99	2	0	7	0	460	.0020
May 2019 v May 2020	18.09	49.81	3	1	11	0	833	13.79	37.37	2	0	8	0	583	.0028
Jun 2019 v Jun 2020	17.65	47.24	2	1	10	0	732	14.70	41.91	2	0	8	0	703	.0088
July 2019 v July 2020	18.70	50.99	3	1	11	0	872	13.63	39.99	2	0	8	0	689	< .0001
By year															
Jan-Jul 2019 v Jan-Jul 2020	123.36	331.85	16	6	68	1	5,388	105.86	285.91	15	5	63	1	4,587	.1252
By quarter															
Jan-Mar 2019 v Jan-Mar 2020	51.79	137.42	7	2	30	0	2,129	51.78	137.07	8	3	29	0	2,152	.3563
Apr-Jun 2019 v Apr-Jun 2020	52.87	144.67	7	2	30	0	2,387	40.46	110.68	5	2	25	0	1,746	.0010
Jun-Jul 2019 v Jun-Jul 2020	36.35	97.92	5	2	21	0	1,604	28.33	81.55	3	1	16	0	1,392	< .0001

TABLE A4. Number of Telehealth Services Billed by Each Rendering Provider and Mean Change in Volume (2019 v 2020)

Telehealth	2019							2020							P
	N = 6,970							N = 6,970							
	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	
By month															
Jan 2019 v Jan 2020	0.02	1.20	0	0	0	0	98	0.04	1.49	0	0	0	0	117	< .0001
Feb 2019 v Feb 2020	0.02	0.78	0	0	0	0	62	0.04	1.57	0	0	0	0	127	< .0001
Mar 2019 v Mar 2020	0.02	1.05	0	0	0	0	84	2.28	16.26	0	0	1	0	622	< .0001
Apr 2019 v Apr 2020	0.03	1.47	0	0	0	0	120	12.73	79.63	2	1	7	0	2,636	< .0001
May 2019 v May 2020	0.03	1.50	0	0	0	0	118	9.95	59.82	2	0	6	0	2,171	< .0001
Jun 2019 v Jun 2020	0.03	1.35	0	0	0	0	109	7.30	47.85	1	0	4	0	2,032	< .0001
July 2019 v July 2020	0.03	1.37	0	0	0	0	111	6.09	38.71	1	0	3	0	1,227	< .0001
By year															
Jan-Jul 2019 v Jan-Jul 2020	0.18	8.63	0	0	0	0	702	38.44	236.05	7	2	22	0	7,770	< .0001
By quarter															
Jan-Mar 2019 v Jan-Mar 2020	0.06	3.01	0	0	0	0	244	2.37	17.99	0	0	1	0	866	< .0001
Apr-Jun 2019 v Apr-Jun 2020	0.09	4.29	0	0	0	0	347	29.98	183.01	5	2	18	0	6,192	< .0001
Jun-Jul 2019 v Jun-Jul 2020	0.06	2.71	0	0	0	0	220	13.39	85.70	2	0	7	0	3,259	< .0001

TABLE A5. Number of Physician-Administered Oncology Products Billed by Each Rendering Provider and Mean Change in Volume (2019 v2020)

Oncology Products	2019							2020							
	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	Mean	SD	Median	25th Percentile	75th Percentile	Min	Max	P
By month															
Jan 2019 v Jan 2020	20.41	66.53	2	0	10	0	1,010	21.16	69.01	2	1	12	0	996	.0321
Feb 2019 v Feb 2020	17.93	59.80	1	0	10	0	949	18.22	60.10	2	0	10	0	870	.1085
Mar 2019 v Mar 2020	18.65	62.31	2	0	9	0	985	18.95	62.73	2	0	9	0	881	.9995
Apr 2019 v Apr 2020	19.57	61.08	2	0	11	0	852	17.23	52.66	1	0	9	0	530	.0472
May 2019 v May 2020	19.45	56.06	2	0	11	0	564	17.63	56.78	1	0	9	0	735	.0233
Jun 2019 v Jun 2020	18.62	57.48	2	0	12	0	766	18.26	59.93	2	0	10	0	813	.2771
July 2019 v July 2020	21.34	67.62	2	0	12	0	1,034	17.25	58.62	1	0	8	0	837	.0002
By year															
Jan-Jul 2019 v Jan-Jul 2020	135.98	425.63	12	3	78	1	5,950	128.69	412.53	12	3	68	1	5,412	.8021
By quarter															
Jan-Mar 2019 v Jan-Mar 2020	56.99	188.28	4	1	31	0	2,944	58.33	191.20	5	1	33	0	2,747	.0388
Apr-Jun 2019 v Apr-Jun 2020	57.64	172.28	5	1	34	0	1,972	53.12	166.82	4	1	29	0	1,828	.0696
Jun-Jul 2019 v Jun-Jul 2020	39.96	124.82	4	1	23	0	1,800	35.50	118.27	3	0	17	0	1,650	.0067