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Original Research Article

Access to telehealth services for colorectal cancer patients in the United States during the COVID-19 pandemic

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ABSTRACT

Background: The COVID-19 pandemic yielded rapid telehealth deployment to improve healthcare access, including for surgical patients.
Methods: We conducted a secret shopper study to assess telehealth availability for new patient and follow-up colorectal cancer care visits in a random national sample of Commission on Cancer accredited hospitals and investigated predictive facility-level factors.
Results: Of 397 hospitals, 302 (76%) offered telehealth for colorectal cancer patients (75% for follow-up, 42% for new patients). For new patients, NCI-designated Cancer Programs offered telehealth more frequently than Integrated Network (OR: 0.20, $p = 0.01$), Academic Comprehensive (OR: 0.18, $p = 0.001$), Comprehensive Community (OR: 0.10, $p < 0.001$), and Community (OR: 0.11, $p < 0.001$) Cancer Programs. For follow-up, above average timeliness of care hospitals offered telehealth more frequently than average hospitals (OR: 2.87, $p = 0.04$).
Conclusions: We identified access disparities and predictive factors for telehealth availability for colorectal cancer care during the COVID-19 pandemic. These factors should be considered when constructing telehealth policies.

1. Introduction

The Coronavirus-19 (COVID-19) pandemic had broad impact on the delivery of healthcare services. Due to concerns about capacity and resource utilization, many facilities reduced the number of non-COVID-19 related services offered, and cancer care was no exception to this widespread disruption of healthcare delivery.[1] Patients with cancer experienced significant delays and interruptions in both diagnosis and delivery of treatment, a potentially catastrophic interference given the importance of continuous care in cancer treatment.[1,2] Such disruptions have been particularly observed for colorectal cancer (CRC), the second leading cause of cancer deaths in the United States.[3] One multicenter study conducted in the early months of the pandemic found that the number of CRC patients seen decreased by 40% and the number of CRC screenings decreased by 85%.[4] This disruption in cancer care is estimated to have serious downstream effects, with some models estimating a 15–16% increase in CRC deaths.[5]

To combat this upheaval of standard healthcare services during the COVID-19 pandemic, the healthcare sector embraced telehealth as a means of improving access to healthcare services. Despite longstanding availability of telehealth technology, large-scale incorporation of telehealth services in daily standard practice pre-pandemic was not pervasive, with tele-oncology being particularly underutilized.[6–10] Barriers to widespread implementation included lack of infrastructure, training, access to adequate technologies for both the patient and provider, and impetus for implementation. During the first few months of the COVID-19 pandemic, federal and state governments, insurers, and healthcare facilities alike rapidly implemented significant, yet

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temporary, steps to remove access barriers to telehealth services, including flexibility of technology platforms, increased reimbursement for telehealth visits, and implementation of facility infrastructure to increase telehealth capacities.[10–12] For example, as early as March 2020, the Centers for Medicare & Medicaid Services (CMS) increased access to Medicaid telehealth services by broadening eligibility of telehealth encounters for reimbursement with its 1135 waiver.[12,13] Consequently, telehealth utilization increased dramatically, with a greater than four-fold increase in consumer utilization of telehealth technologies for cancelled healthcare visits compared to 2019 and providers seeing 50 to 175 times the number of patients via telehealth compared to pre-pandemic practice.[14] In a study conducted at a statewide practice, telehealth grew to serve 15–20% of new patients and 20–25% of established patients from March to September of 2020, demonstrating a significant increase in overall telehealth service utilization, particularly for established patients.[15]

While the COVID-19 pandemic has accelerated the widespread utilization of telehealth services, many patients lack access due to gaps at the level of their provider or their own technology.[16] Even during the pandemic, telehealth implementation has faced significant regulatory and administrative barriers.[12] At present, it is impossible to fully comprehend the extent of access barriers faced by cancer patients across the United States during the pandemic, as there is no known literature on the nationwide availability of telehealth services for cancer care. Further, no study has investigated facility-level characteristics associated with telehealth availability for cancer care, neither during nor prior to the pandemic. These access barriers are particularly important to understand for a disease such as colorectal cancer, which necessitates urgency of care due to the proven survival benefit of screening, high mortality rates for late-stage disease, and multidisciplinary care involving handoff from other specialties.[17,18] Therefore, we sought to investigate the accessibility of telehealth services for colorectal cancer care at Commission on Cancer (CoC) hospitals across the United States during the COVID-19 pandemic. We also sought to establish facility-level characteristics associated with telehealth service offerings to further understand factors that may influence telehealth availability and inform future policy. We chose to investigate CRC due to its high frequency, impact on all patients regardless of gender or heritage, and perceived likelihood of it being treated by most cancer centers and representative of cancer care in general.

2. Materials and methods

2.1. Facility identification and characterization

We identified all CoC-accredited facilities using the American College of Surgeon's Commission on Cancer Hospital Locator.[19] Of the more than 1200 hospitals identified, we excluded facilities with unique membership policies such as Veterans Affairs Hospitals and Kaiser Foundation Hospitals. We also excluded specialty programs such as pediatric cancer, hospital associated cancer, freestanding cancer, oncology medical home, and rectal cancer only programs. Finally, hospitals located in Puerto Rico were excluded. We then used a random number generator to create a sample comprised of approximately one-third of CoC-accredited hospitals that met inclusion criteria. These hospitals included National Cancer Institute (NCI)-designated Cancer Programs (has NCI peer-reviewed Cancer Center Support Grant), Integrated Network Cancer Programs (controls multiple facilities that provide integrated and comprehensive cancer care and services), Academic Comprehensive Cancer Programs (offers postgraduate medical education in at least four program areas with a case load of more than 500 annual newly diagnosed cancers), Comprehensive Community Cancer Programs (caseload of 500 or more annual newly diagnosed cancers), and Community Cancer Programs (caseload of 100–500 annual newly diagnosed cancers).

We then collected explanatory hospital characteristics that we hypothesized may influence or serve as predictors of telehealth access using the 2016 American Hospital Association (AHA) Annual Survey database and the publicly available CMS General Information database.[20,21] We utilized the AHA database to describe facility affiliations, memberships, and classifications such as type of cancer program, urbanicity, accreditation by the Joint Commission, cancer program approved by the American College of Surgeons (ACS), major teaching hospital status, and medical school affiliation. We also used the AHA database to describe facility capabilities and capacities, such as presence of free-standing emergency department or outpatient center, presence of surgery department, bed size, and total facility admissions. Finally, using the AHA database we obtained financial information including ownership, health maintenance organization (HMO) facilities, preferred provider organization (PPO) facilities, fee-for-service models, integrated salary models, and accountable care organization (ACO) status. ACO status refers to whether the facility has established an ACO contract, which entails both primary care physician accountability for the total costs of patient care and financial incentives that link magnitude of bonus payments to performance quality.[20] We queried the CMS database for performance metrics such as hospital overall rating, readmission rates, effectiveness of care, and timeliness of care. Effectiveness and timeliness of care are determined by how often or quickly hospitals provide care that has been shown to generate the best results for certain conditions.[22] We excluded all facilities that were not characterized in both the AHA and CMS databases.

2.1.1. Secret shopper design

Trained investigators contacted the randomly selected facilities between June and August 2020 using an appointment availability audit study model, or secret shopper study. This cross-sectional, prospective study protocol has previously been shown to successfully evaluate healthcare service access and availability from a patient perspective.[23–28] In this study design, investigators contacted the phone number of each member institution reported on the CoC website posing as an individual seeking colorectal cancer care for a family member with a new diagnosis of colorectal cancer (Fig. 1). Investigators then recorded the colorectal department referral location, telehealth availability for new patients, and telehealth availability for follow-up visits (Fig. 1).

2.2. Data analysis

The primary outcome variables of this study were telehealth appointment availability for initial CRC patient consults and for follow-up visits for established CRC patients. We utilized univariable and multivariable logistic regression to evaluate associations between facility characteristics and telehealth availability for both initial consults and follow-up visits. Variables that approached significance on univariable analysis ($p < 0.1$) were included in the multivariable model. Continuous variables were divided into quintiles and the lowest four quintiles were compared against the highest quintile. JMP 15 (SAS Institute, Cary, NC) was used for statistical analysis and p-values less than 0.05 were considered significant. We mapped the facility locations and corresponding telehealth availability using ArcGIS® software by Esri (Fig. 2). State boundaries were mapped using USA States (Generalized) data layer. This study was deemed exempt from review by the Yale School of Medicine Institutional Review Board.

3. Results

The CMS and AHA databases characterize over 5000 and 6000 hospitals in the United States, respectively. Of the 411 CoC-accredited facilities that were selected via a random number generator, 14 facilities could not be contacted or were not fully characterized in both the AHA and CMS databases. Table 1 summarizes hospital characteristics of the 397 successfully contacted and characterized CoC-accredited facilities. Most hospitals in the sample are cancer programs recognized by

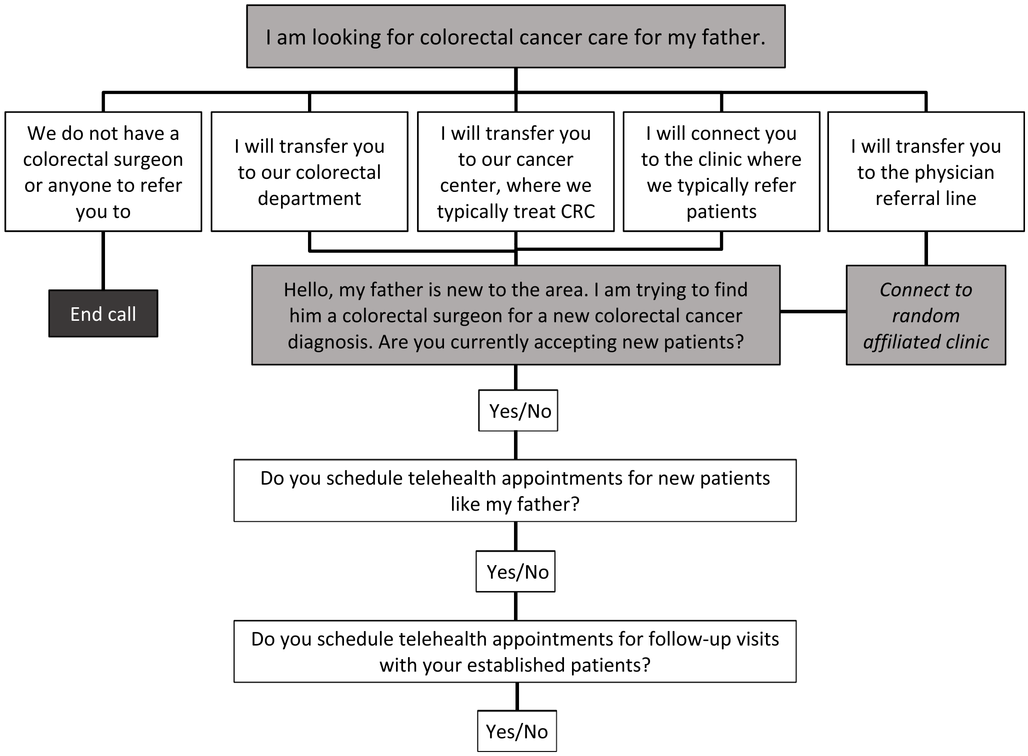

Fig. 1. Secret shopper study investigator script.

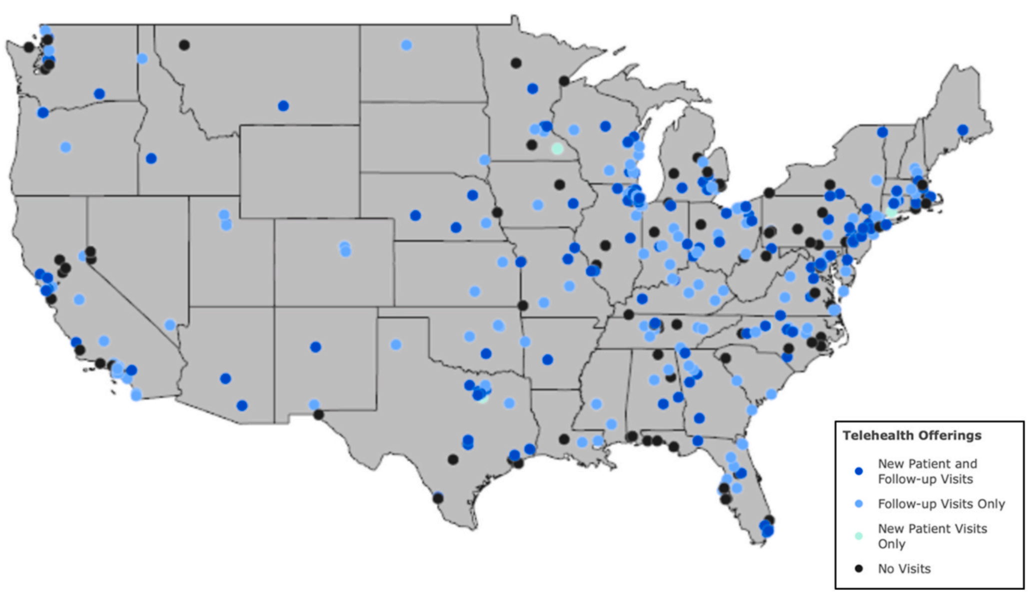

Fig. 2. Telehealth availabilities at investigated Commission on Cancer accredited facilities across the United States. Note that three centers in Alaska and Hawaii are not shown. This map was generated using ArcGIS® software by Esri. State boundary data was extracted from States (Generalized) publicly available dataset.

the American College of Surgeons (90%), non-government non-profit facilities (75%), and affiliated with a medical school (64%). Table 2 describes telehealth appointment availability for new patient visits and follow-up visits for the sample. Overall, 76% of hospitals offered telehealth appointments while 24% offered no telehealth services for CRC patients. Hospitals more frequently provided telehealth appointments for follow-up visits (75% of hospitals) than for new patient visits (42% of hospitals). While 35% of hospitals had telehealth availability for follow-up visits but not new patient visits, only 1% of hospitals offered telehealth for new patient visits and not follow-up visits. Finally, 41% of hospitals had telehealth appointment availability for both follow-up and new patient visits. Fig. 2 shows the geographic distribution of the sample and corresponding facility telehealth availability.

We found several facility-level characteristics to be associated with telehealth appointment availability for new patients on univariable analysis, described in Table 3. NCI-designated Cancer Programs were significantly more likely than all other types of cancer programs to offer telehealth appointments for new patients. Non-government, nonprofit facilities were significantly more likely to offer telehealth appointments for new patients than for-profit hospitals. Major teaching hospitals,

Table 1
Sample facility characteristics. ACS: American College of Surgeons; CoC: Commission on Cancer; HMO: Health Maintenance Organization; NCI: National Cancer Institute; PPO: Preferred Provider Organization.

Hospital Characteristic	CoC Facilities (n = 397)
Medicaid Expansion State	
Yes	270 (68%)
Type of Cancer Program	
NCI Designated	30 (8%)
Integrated Network	43 (11%)
Academic Comprehensive	57 (14%)
Comprehensive Community	173 (44%)
Community	94 (23%)
Ownership	
For-profit	48 (12%)
Government	50 (13%)
Non-government Nonprofit	299 (75%)
Urbanicity	
Metropolitan	361 (91%)
Rural	36 (9%)
Free-standing Emergency Department or Outpatient Center	
Yes	300 (76%)
Surgery Department	
Yes	359 (90%)
Accreditation by Joint Commission	
Yes	346 (87%)
Cancer Program Approved by ACS	
Yes	359 (90%)
Major Teaching Hospital	
Yes	84 (21%)
Medical School Affiliation	
Yes	254 (64%)
HMO Facility	
Yes	94 (24%)
PPO Facility	
Yes	96 (24%)
Fee-for-service Model	
Yes	30 (8%)
Integrated Salary Model	
Yes	224 (56%)
Accountable Care Organization	
Yes	196 (49%)
Bed Size	
<300 beds	196 (49%)
Total Facility Admissions	
Highest Quintile	79 (20%)
Hospital Overall Rating	
1 star (lowest)	33 (8%)
2 stars	94 (24%)
3 stars	97 (24%)
4 stars	117 (29%)
5 stars (highest)	54 (14%)
Readmission	
Same as National Average	36 (9%)
Above National Average	168 (42%)
Below National Average	188 (47%)
Effectiveness of Care	
Same as National Average	331 (83%)
Above National Average	17 (4%)
Below National Average	46 (12%)
Timeliness of Care	
Same as National Average	133 (34%)
Above National Average	51 (13%)
Below National Average	209 (53%)

hospitals with a medical school affiliation, and ACOs were associated with greater telehealth access. Facilities with the greatest number of total admissions were also significantly more likely to offer telehealth services.

Univariable analysis of facility-level characteristics associated with telehealth appointment availability for follow-up visits revealed only ACO status and timeliness of care to be significantly associated with telehealth access (Table 3), where ACOs and facilities with above average timeliness of care were significantly more likely to provide telehealth appointments for follow-up visits (Table 3).

Table 2
Telehealth appointment availability for new colorectal cancer patient visits and follow-up colorectal cancer visits. CoC: Commission on Cancer.

Telehealth Appointment Availability		CoC Facilities (n = 397)
New Patient Visits (Y/N)	Follow-up Visits (Y/N)	
Y	Y	161 (41%)
N	N	95 (24%)
Y	N	4 (1%)
N	Y	137 (35%)
Any form of telehealth appointment offered		**302 (76%)**

When controlling for all other factors, type of cancer program remained significant on multivariable analysis of telehealth availability for new patient visits (Table 4). Comprehensive Community Cancer Programs were least likely to offer telehealth appointments, with 90% decrease in odds of telehealth appointment availability compared to NCI-designated programs, followed by Community (80% less likely than NCI-designated programs), Academic Comprehensive (82% less likely), and Integrated Network (80% less likely) Cancer Programs (Table 4).

On multivariable analysis of telehealth availability for follow-up visits, facilities with above average timeliness of care exhibited 2.87 times higher odds of offering telehealth availability than facilities with average-ranked timeliness of care (Table 4).

4. Discussion

Using a cross-sectional study design during the COVID-19 pandemic, we found that, despite rising trends in telehealth utilization, 24% of Commission on Cancer accredited hospitals offered no telehealth services for colorectal cancer surgical patients. While 75% of facilities offered telehealth appointments for follow-up visits with established patients, only 42% offered telehealth appointments for new patient visits. In aggregating our novel database with national AHA and CMS databases, we found that select facility-level characteristics, including type of cancer program and timeliness of care, were significantly associated with telehealth availability.

The lack of telehealth service capabilities for CRC patients at 24% of CoC-accredited hospitals suggests meaningful access barriers to tele-oncology services. Additionally, the lack of telehealth services for 58% of new CRC patients may be particularly impactful with respect to delays in cancer care. The presence of this access barrier during the early waves of the COVID-19 pandemic is significant as it represents a potential hurdle to receiving necessary early and continuous cancer care.[29] Access barriers to tele-oncology during the COVID-19 pandemic, as demonstrated by reduced likelihood of telehealth visit, disproportionally affected racial and ethnic minorities, rural residents, and Medicaid-insured patients, indicating that access barriers to telehealth services may further previously existing disparities in the healthcare access landscape.[30] Such access barriers may lead to inefficiencies in healthcare delivery and delayed care. Notably, lack of telehealth availability is likely even more widespread at non-CoC-accredited hospitals, as CoC-accredited facilities must meet minimum quality standards to maintain their accreditation and are typically better resourced.[19] Of note, urbanicity was not significantly associated with telehealth availability in our dataset. This suggests that rural patients, who may struggle the most with geographic challenges to access, are not more at risk than urban patients.

The relatively high proportion of centers (76%) offering some form of telehealth service suggests meaningful overall improvements in telehealth access during the first few months of the pandemic. Prior to the pandemic, a study conducted by the American Medical Association reported that just 15% of physicians worked in practices that used telemedicine for patient interactions.[31] While literature on rates of telehealth availability during the COVID-19 pandemic is scarce, one global study from April 2020 indicated that 52% of surgeons used

Table 3
Univariable analysis of key hospital characteristics associated with telehealth appointment availability for colorectal cancer care. ACS: American College of Surgeons; CRC: Colorectal Cancer; HMO: Health Maintenance Organization; NCI: National Cancer Institute; PPO: Preferred Provider Organization.

Hospital Characteristic	Telehealth Availability for New CRC Patients		Telehealth Availability for Follow-Up CRC Visits	
	Count (%)	Odds Ratio (95% CI)	Count (%)	Odds Ratio (95% CI)
Medicaid Expansion State				
No (n = 127)	48 (38%)	Ref	90 (71%)	Ref
Yes (n = 270)	117 (43%)	1.26 (0.82, 1.94)	208 (77%)	1.38 (0.86, 2.22)
Type of Cancer Program				
NCI Designated (n = 30)	24 (80%)	Ref	25 (83%)	Ref
Integrated Network (n = 43)	23 (53%)	**0.29 (0.10, 0.84)***	36 (84%)	1.03 (0.29, 3.61)
Academic Comprehensive (n = 57)	25 (44%)	**0.20 (0.07, 0.55)***	47 (82%)	0.94 (0.29, 3.05)
Comprehensive Community (n = 173)	64 (37%)	**0.15 (0.06, 0.38)****	122 (71%)	0.48 (0.17, 1.32)
Community (n = 94)	29 (31%)	**0.11 (0.04, 0.30)****	68 (72%)	0.52 (0.18, 1.51)
Ownership				
For-profit (n = 48)	11 (23%)	Ref	34 (71%)	Ref
Government (n = 50)	17 (34%)	1.73 (0.71, 4.23)	34 (68%)	0.88 (0.37, 2.07)
Non-government Nonprofit (n = 299)	137 (46%)	**2.84 (1.40, 5.79)***	230 (77%)	1.37 (0.70, 2.70)
Urbanicity				
Metropolitan (n = 361)	151 (42%)	Ref	271 (75%)	Ref
Rural (n = 36)	14 (39%)	0.89 (0.44, 1.79)	27 (75%)	1.00 (0.45, 2.20)
Free-standing Emergency Department or Outpatient Center				
No (n = 97)	38 (39%)	Ref	77 (79%)	Ref
Yes (n = 300)	127 (42%)	1.14 (0.71, 1.82)	221 (74%)	0.73 (0.42, 1.27)
Surgery Department				
No (n = 38)	14 (37%)	Ref	29 (76%)	Ref
Yes (n = 359)	151 (42%)	1.24 (0.62, 2.49)	269 (75%)	0.93 (0.42, 2.03)
Accreditation by Joint Commission				
No (n = 51)	22 (43%)	Ref	39 (76%)	Ref
Yes (n = 346)	143 (41%)	0.93 (0.51, 1.68)	259 (75%)	0.91 (0.46, 1.83)
Cancer Program Approved by ACS				
No (n = 38)	14 (37%)	Ref	24 (63%)	Ref
Yes (n = 359)	151 (42%)	1.24 (0.62, 2.49)	274 (76%)	1.88 (0.93, 3.80)†
Major Teaching Hospital				
No (n = 313)	119 (38%)	Ref	228 (73%)	Ref
Yes (n = 84)	46 (55%)	**1.97 (1.21, 3.21)***	70 (83%)	1.86 (1.00, 3.48)†
Medical School Affiliation				
No (n = 143)	49 (34%)	Ref	100 (70%)	Ref
Yes (n = 254)	116 (46%)	**1.61 (1.05, 2.47)***	198 (78%)	1.52 (0.96, 2.42)†
HMO Facility				
No (n = 303)	125 (41%)	Ref	229 (76%)	Ref
Yes (n = 94)	40 (43%)	1.05 (0.66, 1.69)	69 (73%)	0.89 (0.53, 1.51)
PPO Facility				
No (n = 301)	127 (42%)	Ref	230 (76%)	Ref
Yes (n = 96)	38 (40%)	0.89 (0.56, 1.43)	68 (71%)	0.75 (0.45, 1.25)
Fee-for-service Model				
No (n = 367)	154 (42%)	Ref	279 (76%)	Ref
Yes (n = 30)	11 (37%)	0.80 (0.37, 1.73)	19 (63%)	0.54 (0.25, 1.19)
Integrated Salary Model				
No (n = 173)	69 (40%)	Ref	132 (76%)	Ref
Yes (n = 224)	96 (43%)	1.13 (0.76, 1.69)	166 (74%)	0.89 (0.56, 1.41)
ACO				
No (n = 149)	55 (37%)	Ref	103 (69%)	Ref
Yes (n = 196)	94 (48%)	**1.58 (1.02, 2.43)***	157 (80%)	**1.80 (1.10, 2.95)***
Bed Size				
<300 beds (n = 196)	77 (40%)	Ref	144 (73%)	Ref
>300 beds (n = 201)	88 (44%)	1.20 (0.81, 1.80)	154 (77%)	1.18 (0.75, 1.87)
Total Facility Admissions				
Lowest Four Quintiles (n = 318)	123 (39%)	Ref	232 (73%)	Ref
Highest Quintile (n = 79)	42 (53%)	**1.80 (1.10, 2.96)***	66 (84%)	1.88 (0.99, 3.58)
Hospital Overall Rating				
1 star (lowest) (n = 33)	10 (30%)	Ref	25 (76%)	Ref
2 stars (n = 94)	38 (40%)	1.56 (0.67, 3.65)	66 (70%)	0.75 (0.30, 1.88)
3 stars (n = 97)	45 (46%)	1.99 (0.86, 4.62)	70 (72%)	0.83 (0.33, 2.06)
4 stars (n = 117)	47 (40%)	1.54 (0.67, 3.54)	97 (83%)	1.55 (0.61, 3.93)
5 stars (highest) (n = 54)	25 (46%)	1.98 (0.79, 4.95)	38 (70%)	0.76 (0.28, 2.04)
Readmission				
Same as National Average (n = 36)	13 (36%)	Ref	31 (86%)	Ref
Above National Average (n = 168)	68 (40%)	1.20 (0.57, 2.54)	124 (74%)	0.45 (0.17, 1.24)
Below National Average (n = 188)	83 (44%)	1.40 (0.67, 2.93)	138 (73%)	0.45 (0.16, 1.21)
Effectiveness of Care				
Same as National Average (n = 331)	138 (42%)	Ref	244 (74%)	Ref
Above National Average (n = 17)	6 (35%)	0.76 (0.28, 2.11)	13 (76%)	1.16 (0.37, 3.65)
Below National Average (n = 46)	20 (43%)	1.08 (0.58, 2.00)	38 (83%)	1.69 (0.76, 3.77)
Timeliness of Care				
Same as National Average (n = 133)	53 (40%)	Ref	92 (69%)	Ref
Above National Average (n = 51)	17 (33%)	0.75 (0.38, 1.49)	44 (86%)	**2.80 (1.16, 6.74)***
Below National Average (n = 209)	94 (45%)	1.23 (0.79, 1.92)	158 (76%)	1.38 (0.85, 2.24)

*p < 0.05, **p < 0.001.

telemedicine in their practice for CRC care, while mental health treatment and substance use facilities as of April 2020 were found to have 43% and 27% availability of telehealth services, respectively.[32–34] Our study suggests an increase in telehealth service availability compared to both pre-pandemic and early-pandemic figures, suggesting that the temporary policies put in place to expand telehealth accessibility at the start of the pandemic may have been successful. However, given the temporal nature of these policies, there is potential for access barriers and related disparities to be reintroduced or further exacerbated.[12] Additional investigation is warranted regarding the causal relationship between telehealth policy shifts during the pandemic and telehealth

Table 4
Multivariable analysis of key hospital characteristics associated with telehealth appointment availability for colorectal cancer care. ACS: American College of Surgeons; CRC: Colorectal Cancer; NCI: National Cancer Institute.

Hospital Characteristic	Telehealth Availability for New CRC Patients	Telehealth Availability for Follow-up CRC Visits
	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Type of Cancer Program		
NCI Designated (n = 30)	Ref	Ref
Integrated Network (n = 43)	**0.20 (0.06, 0.69)***	-[a]
Academic Comprehensive (n = 57)	**0.18 (0.06, 0.52)***	-[a]
Comprehensive Community (n = 173)	**0.10 (0.03, 0.33)****	-[a]
Community (n = 94)	**0.11 (0.03, 0.39)****	-[a]
Ownership		
For-profit (n = 48)	Ref	Ref
Government (n = 50)	1.04 (0.32, 3.40)	-[a]
Non-government Nonprofit (n = 299)	1.90 (0.71, 5.09)	-[a]
Cancer Program Approved by ACS		
No (n = 38)	Ref	Ref
Yes (n = 359)	-[a]	1.74 (0.77, 3.93)
Major Teaching Hospital		
No (n = 313)	Ref	Ref
Yes (n = 84)	0.66 (0.30, 1.44)	1.55 (0.75, 3.21)
Medical School Affiliation		
No (n = 143)	Ref	Ref
Yes (n = 254)	1.20 (0.71, 2.04)	1.09 (0.62, 1.91)
ACO		
No (n = 149)	Ref	Ref
Yes (n = 196)	1.10 (0.68, 1.78)	1.68 (1.00, 2.82)
Total Facility Admissions		
Lowest Four Quintiles (n = 318)	Ref	Ref
Highest Quintile (n = 79)		-[a]
Timeliness of Care		
Same as National Average (n = 133)	Ref	Ref
Above National Average (n = 51)	-[a]	**2.87 (1.03, 8.04)***
Below National Average (n = 209)	-[a]	1.17 (0.68, 2.04)

*p < 0.05, **p < 0.001.
[a] Association did not approach significance (p < 0.1) on univariable analysis and was not included in the multivariable model.

availability at United States cancer centers.

The lower rate of telehealth appointment availability for new CRC patients as compared to established patients is also meaningful, as it may delay formulation of treatment plans, allow for disease progression, and create case backlogs. Though no national literature on telehealth availability for new patients exists, this finding is corroborated by one statewide study in Michigan that reported 58.8% of surgeons offering telehealth services overall but only 26.8% offering telehealth for new patients.[35] While physician preference may be a key driver of this phenomenon, this disparity may also be driven in part by the fact that select telehealth expansion policies differentiate between new and established patients.[35] For example, qualifying telehealth services for Medicare reimbursement (waiver 1135) require the patient to have a prior established relationship with the practitioner.[12,13] Disparities in accessibility for new patients may additionally be driven by added administrative burden to onboard new patients and physician reluctance to initiate treatment plans, particularly surgery, after an initial remote visit, given the importance of physical examination to the surgeon workforce (e.g., rectal exam to determine candidacy for sphincter preservation). Future work should investigate reasons for the discrepancy between new and established patient visits. Outcome differences will also need to be assessed to reassure clinicians of their equivalence.

When investigating predictors of telehealth availability, we found type of cancer program to be a significant predictor for new patients visits when controlling for other facility-level factors. Specifically, telehealth availability was greater at NCI-designated Cancer Programs compared to all other types of cancer programs. Comprehensive Community Cancer Programs were found to have the lowest relative telehealth availability. While relationships between facility type and tele-oncology availability, both during and prior to the COVID-19 pandemic, are not well documented in the literature, this dynamic may be explained by the differential in financial and administrative resources available to implement the necessary infrastructure to scale up or introduce telehealth services. It is meaningful that Comprehensive Community and Community Cancer Programs are both the most prevalent types of cancer programs in the United States and the least likely to offer telehealth appointments for new patients.[19] This finding suggests that fewer new cancer patients have access to hospitals with telehealth services. While COVID-19 telehealth policies that expanded the geographic reach of a practicing physician may have helped reduce this inequality, the temporary nature of these policies leaves room for the reintroduction of inequitable access.[12]

When investigating predictors of telehealth access for follow-up visits, we found that facilities with above national average timeliness of care were significantly more likely to offer telehealth appointments than those with average ranking. Given that telehealth appointments are typically more rapid and efficient than in-person visits, facilities that prioritize timeliness of care may be more likely to embrace telehealth practices.[36,37]

There are several limitations to our study. We did not conduct a baseline study prior to the COVID-19 pandemic, limiting our ability to draw any conclusions with respect to the magnitude of changes from the pre-pandemic period into the pandemic. However, given pre-pandemic figures on telehealth utilization, we can reasonably conclude that telehealth utilization increased following the pandemic.[14] Additionally, the telehealth landscape changed rapidly during the pandemic, allowing for potential changes in facility telehealth offerings during the three months of data collection that may not have been captured. We also contacted colorectal surgery departments only, so these findings reflect surgical CRC care and may not be generalizable to multidisciplinary CRC care. Finally, we did not contact all CoC-accredited facilities; however, our sample was randomly selected and encompasses approximately one-third of CoC-accredited facilities, which likely provided a reasonably representative sample for analysis.

5. Conclusions

To our knowledge, this is the first nationwide, cross-sectional study to investigate access to telehealth services and facility-level predictors of telehealth availability for colorectal cancer care at CoC hospitals during the first wave of the COVID-19 pandemic. We found that access barriers to telehealth services for colorectal cancer care exist, particularly for new patients. We also established that telehealth access may be influenced by specific facility-level factors including facility type for new patient visits and timeliness of care for follow-up visits. Policy makers should consider facility-level factors that may make telehealth implementation more logistically challenging or less likely to be adopted to reduce these differences. Tele-oncology may provide an efficient and cost-effective opportunity to increase access to care for all cancer patients. Therefore, repeat analysis in the late pandemic and post-pandemic era is warranted to gain insight into the permanence of the paradigm-shift in the provision of telehealth for cancer patients driven by the COVID-19 pandemic.

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