Telemedicine Reports
Volume 7, 2026
DOI: 10.1177/26924366261470583
Accepted July 6, 2026

Telemedicine Reports
Mary Ann Liebert
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ORIGINAL RESEARCH ARTICLE Open Access

Telehealth and Time-to-Treatment Initiation Among Breast Cancer Patients During COVID-19: A Retrospective Cohort Study

Nancy Heffernan,[1,*] MaryPat Porinchak,[1,†] Shiela M. Strauss,[1,2] Margaret Barton-Burke,[1] and AnnMarie Mazzella-Ebstein[1]

Abstract

Background: COVID-19 caused disruptions in access to oncology health care for patients with breast cancer. This study explored the time differences in days from the initial patient call to time-to-treatment initiation (TTI) and evaluated the relationship between initial in-person consult (IPC) and telehealth consult (THC).

Methods: Retrospective data were collected for the years 2019, 2020, and 2021. Demographic characteristics were summarized for each year. Chi-square and nonparametric tests were used to examine demographic data, differences in the number of THCs versus IPCs each year, differences in TTI for patients who had THC versus IPC for each study year, and overall differences across each of the study years in TTI.

Results: Records from 960 patients included 447 IPCs in 2019; 81 THCs and 47 IPCs in 2020; and 26 THCs and 359 IPCs in 2021. Significant differences were found for age ($p = 0.013$) between 2019, 2020, and 2021 (medians of 55, 51, and 55, respectively). Differences between the number of IPCs versus THCs from 2019 to 2021 combined were statistically significant ($p < 0.001$): 2019 (no THCs), 2020 (63% THCs vs. 37% IPCs), and 2021 (93% IPCs vs. 7% THCs). In 2019–2021, TTI was greater for patients who had an IPC versus those who had a THC; the median TTI was 28 days for THC versus 33 days for IPC, $p = 0.045$.

Conclusions: Findings suggest that THCs did not delay and may accelerate TTI. Further studies examining the relationship of initial consult type to TTI are needed.

Keywords: telemedicine; telehealth; breast cancer; time-to-treatment; COVID-19; oncology nursing

Introduction

Patients seeking cancer treatment require efficient scheduling with appropriate providers to ensure the best possible clinical outcomes. The COVID-19 pandemic resulted in health care delivery disruptions and influenced an estimated 41–42% of U.S. adults who reported delaying or avoiding seeking medical care due to pandemic-related constraints.[1] Health care systems demonstrated considerable variation in preparedness and capacity to address these constraints, as well as organizational structure and agility in responding to disruptions in cancer treatment.[2] The pandemic necessitated a change in the delivery of health care services to reduce the risk of exposure to the virus while maintaining access to cancer care.[3,4] Telehealth (TH) was the alternative strategy. In June 2020, TH usage surged

[1]Memorial Sloan Kettering Cancer Center, New York, New York, USA.
[2]NYU Rory Meyers College of Nursing, New York, New York, USA.
[†]*Current affiliation:* AstraZeneca, Wilmington, Delaware, USA.

*Address correspondence to: Nancy Heffernan, BSN, RN, OCN, Memorial Sloan Kettering Cancer Center, 1275 York Avenue, New York, NY 10065, USA, E-mail: heffernn@mskcc.org

from 0.3% to 23.6% of all ambulatory care encounters.[5] The literature supports that the COVID-19 pandemic impacted breast cancer screening, diagnosis, and treatment and accelerated the delivery of virtual care.[6] In the general cancer patient population, utilization of TH has been shown to reduce wait times and expedite cancer diagnosis and treatment compared to in-person visits.[7] However, studies during the pandemic linking initial TH consults (THCs) to time-to-treatment initiation (TTI) are limited and inconsistent. For patients with breast cancer, there is a research gap. This study aimed to examine the relationship between initial consult type and TTI. This article presents findings on how one cancer center in the Northeast United States modified care models to include TH initiatives in a group of patients with breast cancer.

Primary entry point for new patients

The primary entry point for new patients seeking care at this center is the Patient Access Service (PAS). Patients with breast cancer comprise one of the largest groups seeking consultations. The PAS operational process relies on the Criteria Matching Tool (CMT), which is an organizationally developed clinical guideline. The CMT integrates a decision-support algorithm based on patients' clinical information and provides diagnosis and stage-specific criteria to guide appropriate and expeditious scheduling of initial consultations. A patient contacts PAS, and when they meet clinical criteria, a new visit consult is scheduled. Complex cases undergo clinical review by a PAS Registered Nurse (RN). The RN's role includes educating, guiding, and advocating for patients about clinical appropriateness and the timing of a consultation. The RNs triage complex cases to the center's physician partners when additional guidance is required.

The pandemic interrupted the efficiency of the center's centralized scheduling process and necessitated the development of new workflows. In response to the pandemic, the PAS team and physician leadership developed breast cancer stage and subtype-specific algorithms. Each consult request was assessed and triaged on an individual case basis.[8] Patients who were under the care of an outside oncologist and were requesting a second opinion or transfer of care underwent a triage process. Most were recommended to stay under the care of their local oncologist and to call back at their next treatment decision point. Exceptions were considered for certain scenarios: (1) patients who were deemed to be on a suboptimal treatment regimen, (2) patients with a rare cancer diagnosis that would best be treated at this center, and (3) patients who may be candidates for a clinical trial. The RN was responsible for communicating the recommendation to the patient.

The purpose of this study was to explore the time differences in days from the initial PAS call to TTI in a population of patients with breast cancer. The study's objectives aimed to identify whether the initial visit was an in-person consult (IPC) or a THC. After we determined whether there were significant differences in the number of THCs versus IPCs each year, differences in TTI based on initial consult type were examined for each study year, and overall. We also examined whether differences existed across each of the study years in TTI.

Methods

Study design

A retrospective, single-center design and analysis of data was conducted for patients with breast cancer who called PAS requesting a consultation before (2019), during (2020), and after (2021) the pandemic. The greatest volume of calls requesting new visit consults occurred in April of each study year (Fig. 1).

The aims focused on examining the potential influence of time differences in days from the initial PAS call to the first cancer treatment, defined as the TTI. TTI is defined as the number of days from the first call to PAS to the first definitive treatment. Adjustments for confounders (e.g., comorbidities, distance) were not possible due to data limitations. Treatments include surgery, systemic therapy (chemotherapy or hormonal therapy), and radiation therapy. We acknowledge that delays in TTI due to outside pathology or imaging review are inherent in oncology clinical practice. This variable was not included in the measured TTI interval and could be provided at the organization if expressly required for the consult.

Other factors and breast cancer variables collected during the initial PAS phone call from prospective patients included prior adjuvant therapies, tumor stage, biologic subtype, metastatic status, and treatment intent. These factors could influence treatment urgency. During the pandemic, the CMT for breast surgery and breast medicine services were updated frequently according to defined scheduling guidelines. High-priority patients were identified and scheduled for an in-person consultation. For instance, patients diagnosed with inflammatory breast cancer and living within the center's catchment areas were offered an

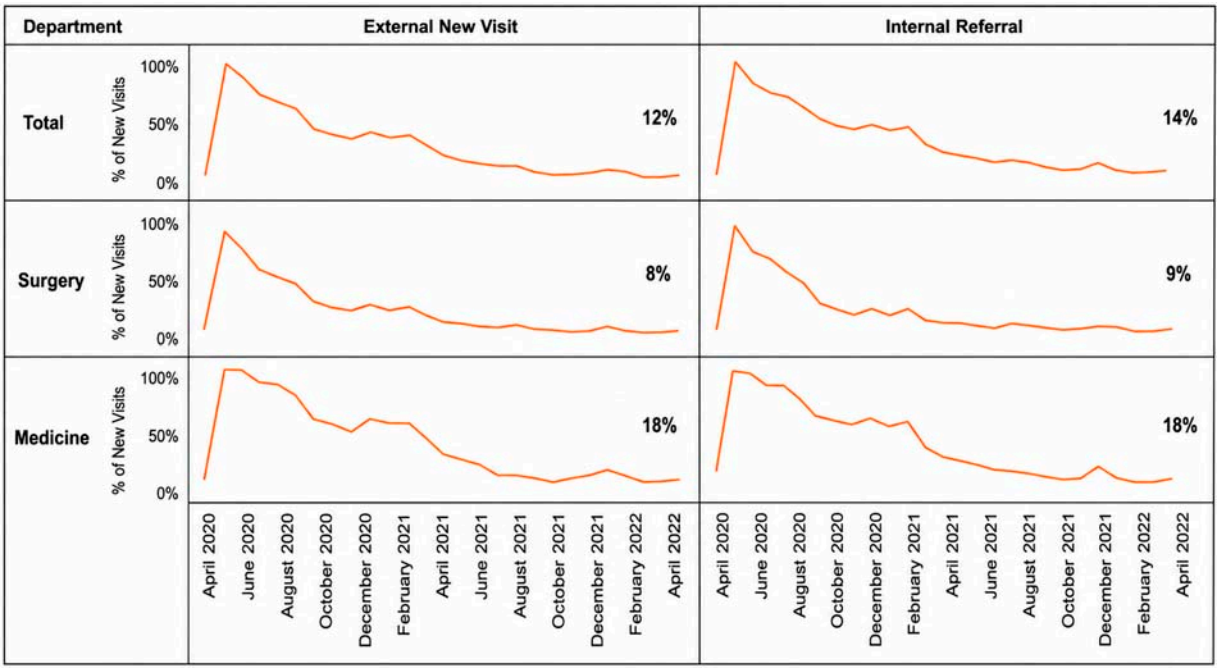

FIG. 1. Percentage of telemedicine new visits by month.

initial in-person consultation. Defined in this study, a consult is the initial assessment by an oncologist. The setting was a tertiary care comprehensive cancer center in the northeastern United States.

This study was guided by Donabedian's theoretical framework that proposes a relationship between structure, process, and outcomes.[9] PAS is the structure that operationalizes a set of criteria for scheduling new patients. The PAS process determines how and when an initial consult is scheduled. Timely and appropriate scheduling is the outcome.

Sample

Records were extracted from the PAS database and the electronic medical record and included all adult patients with a suspected or confirmed diagnosis of breast cancer. Eligibility criteria included the following: (1) self-callers, (2) male or female, and (3) referrals from external providers. Patients calling for a second opinion who did not stay for treatment, or those with a concurrent secondary malignancy, were excluded from the study data.

Study procedures

This study was approved by the cancer center's review board (IRB# 23-141). Records for the study time frames were obtained through the organization's Analytics Team in the Department of Strategy and Innovation and DATALINE. The medical record numbers (MRNs) were de-identified, and a unique identification number/code (ID) was assigned before the data were used in the analysis. The extracted data were curated into an Excel spreadsheet and were reviewed for duplicates, completeness, and integrity. Complete records that met the study inclusion criteria were summarized into a de-identified dataset for the center's biostatistician. Four data collection time points (DP) included the following: (1) first PAS call, (2) reports reviewed, (3) new visit consult scheduled, and (4) first treatment. Figure 2 illustrates the PAS workflow.

Statistical methods

Demographic information on sex, race, ethnicity, and age was summarized descriptively and examined for differences between the data collection points, as was the number of IPCs versus THCs. The time differences in days were examined for the time points between the initial PAS call to TTI for patients who received an IPC versus a THC. Differences across years in categorical demographic variables (sex, race, ethnicity) and the number of IPCs versus THCs were examined using

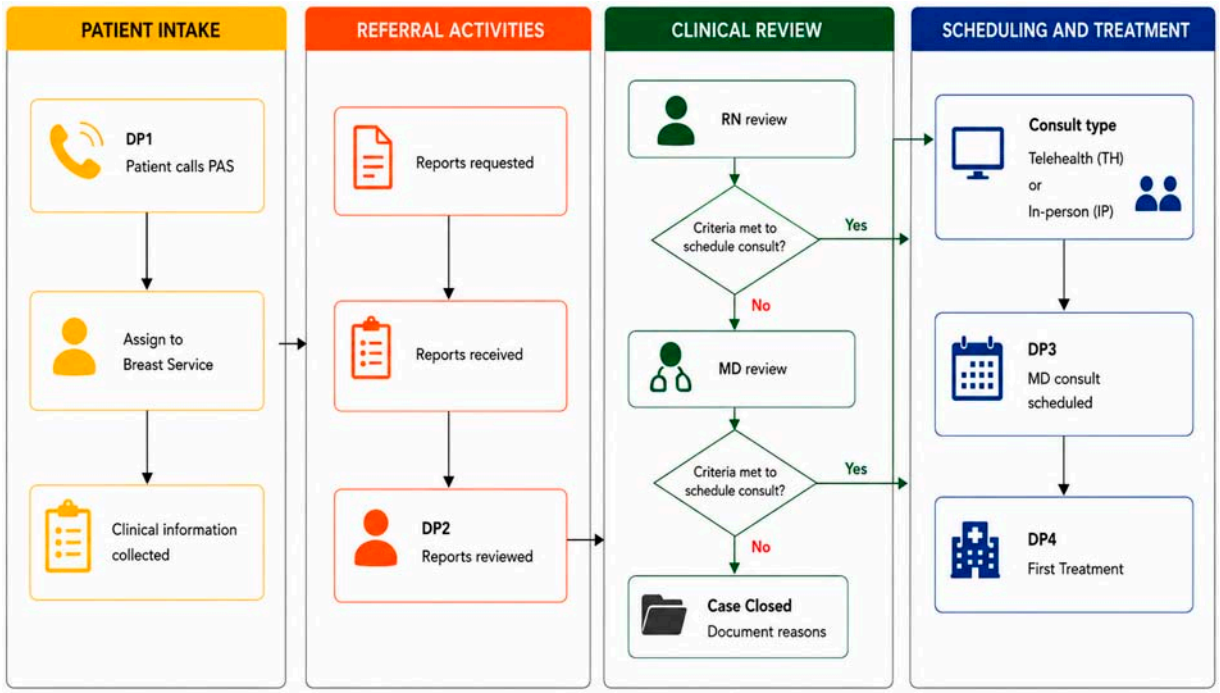

FIG. 2. Patient access breast service workflow for new breast cancer referrals.

chi-square analyses. Patients' age and time differences from initial PAS call to TTI were examined using parametric (i.e., analysis of variance or *t*-test) or nonparametric tests (i.e., Mann–Whitney and Kruskal–Wallis tests), as appropriate based on the extent to which the data were normally distributed. Differences were examined in TTI for patients who had a THC versus an IPC for each study year and overall. In addition, differences across each of the study years in TTI were assessed for patients who had IPC, THC, or either modality.

Table 1. Demographics Statistics

Demographics *N* = 960	2019 (*N* = 447) *N* (%)	2020 (*N* = 128) *N* (%)	2021 (*N* = 385) *N* (%)	Sig.
Sex				
Male	2 (0.4)	3 (2.3)	4 (1.0	0.141
Female	445 (99.6)	125 (97.7)	381 (99.0)	
Race				
Asian	56 (12.5)	18 (14.1)	47 (12.2)	0.945
Black	52 (11.6)	14 (10.9)	36 (9.4	
White	309 (69.1)	88 (68.8)	278 (72.2)	
Unspecified	30 (6.7)	8 (6.3)	24 (6.2)	
Ethnicity				
Non-Hispanic	389 (87.0)	109 (85.2)	338 (87.1)	0.820
Hispanic	40 (8.9)	11 (8.6)	32 (8.3)	
Unspecified	18 (4.0)	8 (6.3)	15 (3.9)	
Age				
Mean (SD)	55.7 (13.6)	51.7 (11.8)	55.4 (13.4)	**0.013***
Median (25th,75th %)	55.0 (46.0, 66.0)	51.0 (45.0, 59.0)	55.0 (45.5, 64.0)	

*$p = 0.05$.
N, number; %, percent of population; Sig., significance.

Results

The dataset included 960 patient records for the years 2019–2021. In 2019, only IPCs were performed (n = 447). In 2020, there were 81 THCs and 47 IPCs (n = 128), and in 2021, there were 26 THCs and 359 IPCs (n = 385).

Demographic data

The sample characteristics are highlighted in Table 1. No statistically significant differences were found across the years in sex, race, or ethnicity. Age, as a continuous variable, was not normally distributed according to the

Table 2. Number of In-Person Versus Telehealth Consults

N = 960	2019	2020	2021	
N (%)	(*N* = 447) *N* (%)	(*N* = 128) *N* (%)	(*N* = 385) *N* (%)	Sig.
Type of visit				**<0.001**
Telehealth (THC)	0 (0.0)	81 (63.3)	26 (6.8)	
In-person (IPC)	447 (100.0)	47 (36.7)	359 (93.2)	

N, number; %, percent of population; Sig., significance (statistical significance was defined as $p = 0.05$).

Kolmogorov–Smirnov test, so differences across years were examined using the Kruskal–Wallis nonparametric test. Statistically significant differences were found for age ($p = 0.013$) between 2019 (median = 55), 2020 (median = 51), and 2021 (median = 55).

Comparisons across 2019, 2020, and 2021 of the number of IPCs versus THCs. Chi-square analysis showed that the differences between the number of IPCs versus THCs were significant ($p < 0.001$) across the years 2019, 2020, and 2021 (Table 2).

Comparisons across 2019, 2020, and 2021 of the number of days from the initial PAS call to TTI for IPCs only, THCs only, and combined IPCs and THCs. The number of days from the initial PAS call to TTI, whether IPC, or IPC and THC combined, was not normally distributed for each of the years 2019, 2020, and 2021. Thus, nonparametric tests were needed to examine differences across these years in the number of days from initial PAS call to TTI for IPCs only, THCs only, and combined IPCs and THCs. The Kruskal–Wallis test was used to examine differences across the 3 years in IPCs only and combined THCs and IPCs. As there were no THCs in 2019, the Mann–Whitney *U* test was used to examine differences in 2020 and 2021 in THCs. Table 3 shows that no statistically significant differences were found across these years in the number of days from initial PAS call to TTI for IPC only, THC only, and combined IPCs and THCs, $p = 0.43$, $p = 0.56$, and $p = 0.26$, respectively.

Comparisons of the number of days from the initial PAS call to TTI for IPCs only, THCs only, and combined IPCs and THCs for each of the years 2019, 2020, and 2021. Analyses were conducted comparing time differences in the number of days from the initial PAS call to TTI for patients who received an IPC versus a THC for each of the years 2020 and 2021, and the years 2020 and 2021 combined. Table 4 presents the results of Mann–Whitney *U* tests comparing days from the initial PAS call to TTI for patients who received IPC versus THC from 2019 to 2021, and separately for 2020 and 2021. It provides medians and 25th and 75th percentiles. The Hodges–Lehman estimator was used to calculate the median of all pairwise differences between data points in the IPC and THC groups for 2020 and 2021, and for 2019–2021. Confidence intervals are included for the estimator during each of these time periods. However, annual comparisons were nonsignificant, but the pooled 2019–2021 analysis showed significantly shorter TTI with TH.

Discussion

This retrospective analysis aimed to explore time differences in days between the initial PAS call to TTI in patients with breast cancer who had an initial THC versus an IPC. This study primarily evaluated the operational and access outcomes of integrating THCs to facilitate new visits during the COVID-19 pandemic. The PAS team, in partnership with physician leadership, dynamically modified scheduling guidelines to address the imposed pandemic restrictions to accommodate the needs of patients seeking oncology care at this center. The PAS RNs were instrumental in ensuring that new patients were correctly triaged. The primary findings highlight that THCs, compared to IPCs, did not negatively impact TTI in this sample. TH was associated with shorter TTI in this cohort, although confounding by pandemic workflows and triage bias cannot be excluded.

Pre-pandemic, TH was underused, understudied, and represented <1% of all physician–patient encounters at this organization. However, the pandemic imposed a reduction in face-to-face physician–patient encounters and influenced the center-wide use of THCs.[8] The pandemic initiated a necessary culture shift and workflow change, which provided an important opportunity to explore the extent to which visit type, IPC or THC, influenced the number of days to TTI.

Table 3. Comparing Days from the Initial Patient Access Service Call to Time-to-Treatment Initiation for Patients Who Received In-Person, Telehealth, or Either In-Person or Telehealth Consults

	2019	2020	2021	
Visit type	Median (25th, 75th percentile)	Median (25th, 75th percentile)	Median (25th, 75th percentile)	Sig.
In-person	32.0 (21.0, 51.0)	34.0 (26.0, 52.0)	33.0 (23.0, 51.0)	0.431
Telehealth		27.0 (20.0, 41.0)	28.0 (24.0, 38.0)	0.563
In-person or Telehealth	32.0 (21.0, 51.0)	30.5 (21.0, 42.8)	33.0 (23.0, 51.0)	0.263

Sig., significance (statistical significance was defined as $p = 0.05$).

Table 4. Comparing Days from the Initial Patient Access Service Call to Time-to-Treatment Initiation for Patients Who Received In-Person Versus Telehealth Consults in 2020 and 2021

Year	Telehealth median (25th, 75th percentile)	In-person median (25th, 75th percentile)	Independent samples Hodges–Lehman median difference estimate	95% confidence interval of the Hodges-Lehman median difference estimate	Sig.
2020	27.0 (20.0, 41.0)	34.0 (26.0, 52.0)	−6.0	(−12.0, 1.0)	0.088
2021	28.0 (24.0, 38.0)	33.0 (23.0, 51.0)	−3.0	(−10.0, 3.0)	0.363
2019–2021	28.0 (21.0, 41.0)	33.0 (22.0, 51.0)	−3.0	(−7.0, 0.0)	**0.045**

Statistical significance was assessed using the Mann–Whitney *U* test, with significance defined as $p = 0.05$.
N, number; %, percent of population.

The sample characteristics found statistically significant differences for age between 2019, 2020, and 2021, suggesting that IPCs were preferable in this sample as they increased proportionately in 2021. This finding needs further investigation since in-person visits were limited by pandemic restrictions.

In the analysis, differences were not found for the number of days across the study's time frames (2019–2021) from the initial PAS call to TTI for IPCs only, THCs only, and combined THCs. This finding may be attributed to the immediate availability of THCs starting in 2020 and forward. Before 2020, the THC option was nonexistent at this center. Furthermore, organizational mechanisms to offer TH as an option were not available at this time and were implemented later as pandemic restrictions necessitated.

Findings from the analyses comparing time differences from the initial PAS call to TTI for patients who received IPCs versus THCs for each of the years 2020 and 2021, and the years 2020 and 2021 combined, revealed statistically significant time differences in days when the years were combined. The markedly smaller number of patients in 2020 compared with 2019 and 2021 likely reflects major pandemic-related referral disruptions. We acknowledge that these findings may decrease the ability to directly compare TTI across years. However, study results from our limited sample may be more clinically meaningful and suggest that the number of days from the initial PAS call to TTI in 2019–2021 was greater for those who had an IPC than for those who had a THC. There may be multiple reasons contributing to this finding, including potentially earlier availability of THCs in addition to constraints in clinic spaces due to ongoing pandemic restrictions. Another factor may have been provider preference, but it was not a variable that we studied. These factors may have contributed to a longer wait time for an IPC. Since the mean age of patient records in this sample was between 50 and 55 years of age, it is plausible that patients may have had technology challenges to facilitate a THC. Since the pandemic, there has been an increase in the use of digital devices for medical encounters across all patient populations, and evidence has shown that telemedicine is highly effective for patients of all ages, including older adults.[10,11]

Findings from this study's sample suggests that IPCs may be preferred by this sample of patients. However, THC was introduced as an alternative access modality during the pandemic, and therefore, patient preferences for requesting an IPC or THC were not examined in this study. To date, the use of THCs is more prevalent and could be included in future research initiatives. IPCs increased proportionately in 2021 when pandemic restrictions were eased, and patients may have been offered a choice of visit type. These findings differ from a more recent large study conducted at this center, which demonstrated patient preference for THCs over IPCs, and that patient satisfaction with telemedicine in cancer care delivery remained high after the COVID-19 pandemic.[12] In fact, ASCO's standards provide a framework for TH in oncology to address many areas, including patient selection and access, multidisciplinary care coordination, and implementation of TH into cancer care.[13] Further inquiry to identify oncology patient perspectives for choosing a consult modality would inform future patient communication and engagement strategies.

In terms of associations comparing TTI based on the initial consult type (IPC or THC), a paucity of literature exists. Studies conducted during the pandemic lack data describing the impact of telemedicine on the patient–physician relationship, time to treatment, cost of care, patient and clinician satisfaction, and outcomes.[4] Post-pandemic, TH interventions were found to reduce the time burdens of cancer treatment and enhance cancer prevention and control, surveillance, supportive care, and treatment decision making.[7]

In oncology care, THCs have been shown to reduce wait times and expedite cancer diagnosis and treatment compared to in-person visits.[13] Lengthened TTI is associated with an absolute increased risk of mortality ranging from 1.2% to 3.2% per week in curative settings such as early-stage breast, lung, renal, and pancreas cancers.[14,15] An analysis of two of the largest cancer databases in the United States concluded that survival outcomes in early-stage breast cancer are affected by the length of the interval between diagnosis and surgery. However, differences in overall survival and disease-specific survival remain small.[16,17] More recent studies in the breast cancer patient population suggest that adaptation of TH modalities plays an expanding role in oncology care delivery post-pandemic.[18–20]

The reported literature supports the efficacy of THCs and the statistical significance for cancer care. However, findings from this study should be viewed with caution. Results of this study identified a modest decrease in days to TTI (28 vs. 33 days), suggesting the clinical significance of the findings for patients seeking care at our cancer center. A future replication study at the center could provide evidence that supports findings from recent studies for adopting TH modalities for patients with breast cancer and options for accessing oncology care delivery. Ongoing and future research on the impact of telemedicine is warranted to evaluate effects on patient empowerment, quality of life, and clinical outcomes.

This article reports on one aspect of how integration of THCs during the initial visit may potentially minimize system-level delays to treatment initiation in cancer patients. Further research may determine whether TH utilization as the initial consult will improve a patient's access to treatment initiation more quickly.

Ongoing research, separate from this retrospective study, involves an organizational and research initiative at this center called MATCHES (Making Telehealth Delivery of Cancer Care at Home Effective and Safe), a Telehealth Research Center. Patients involved in the MATCHES initiative expressed satisfaction with telemedicine visits in proportions that remained consistent since the pandemic.[12,21,22] A scoping review of TH interventions in cancer care concluded that there are gaps in the literature in areas across the care continuum, with most studies examining TH usage in the active treatment phase.[23] Future studies examining the relationship between initial visit types and TTI could inform ongoing TH implementation strategies.

Strengths

The pandemic was the catalyst that introduced telemedicine as a viable option for care delivery for patients with complex conditions such as cancer. This small-scale study found that THCs were an effective way to establish care and initiate cancer treatment during the pandemic. The Patient Access Nurses' expertise played a vital role in facilitating new visit scheduling to avoid delays in cancer care.

Limitations

This was a study with a narrow objective to examine initial consult type and its relationship to TTI in a sample of patients with breast cancer. It was a single-center, retrospective study with potential selection bias and nonrandom triage. Cancer stage and comorbidity data were not collected, and long-term survival outcomes were not assessed. Patient records were obtained from a single cancer center in a limited group of patients with breast cancer, and thus, the results may not be generalizable. The data support that TH was not associated with delayed treatment, but causality cannot be inferred. Data were retrospectively obtained from a stand-alone database, which is a subsystem of the organization's medical records and may have limited or missing information. While the data from 2019 to 2021 may be viewed as older, it was collected during an unprecedented time in health care. However, study results may have implications for current care delivery options in other populations of cancer patients.

Conclusion

Initial THCs were successfully operationalized at this center during the pandemic. This consult type did not negatively impact TTI in patients with breast cancer who sought care here. Further studies examining initial consult type and its relationship to TTI are needed to better understand its impact on access to specialized care.

Acknowledgments

The authors wish to acknowledge Sean Osier for his assistance with data collection and the colleagues in PAS for their tireless advocacy for our patients.

Authors' Contributions

N.H.: Data collection, analysis, and article development. M.P.P., S.M.S., M.B.-B., and A.M.M.-E.: Protocol development, study design, data collection, analysis, and article development.

Author Disclosure Statement

The authors do not declare any conflicts of interest.

Funding Information

This study was partially funded by the MSK Geri & Me Nursing Fund.

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Cite this article as: Heffernan N, Porinchak MP, Strauss SM, Barton-Burke M, Mazzella-Ebstein AM (2026) Telehealth and time-to-treatment initiation among breast cancer patients during COVID-19: A retrospective cohort study, *Telemedicine Reports*, 2026, 7, 26924366261470583, DOI: 10.1177/26924366261470583.

Abbreviations Used

CMT = Criteria Matching Tool
IPC = in-person consult
PAS = Patient Access Service
THC = telehealth consult
TTI = time-to-treatment initiation, in days