



## Research Report

## Gynecologic oncology patients are ready for telemedicine in routine care: Results from a pre-COVID survey

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## ABSTRACT

**Objectives:** To assess telemedicine readiness of gynecologic oncology patients, particularly those at risk for care access disparities (increased distance to care, rural populations.)

**Methods:** Patients at all disease/treatment stages completed an anonymous survey during in-person outpatient appointments at an academic comprehensive cancer center from 1/6/2020 to 2/28/2020, conducted prior to the COVID-19 pandemic, before the introduction of telemedicine in this practice.

**Results:** Of 180 patients approached, 170 completed the survey (94.4%). Mean age was 59.6 years; 73.4% identified as White, 23.7% Black, and 2.9% other race. Ovarian cancer was most common (41.2%), followed by endometrial (27.1%), cervical (20.6%), and vaginal/vulvar (7.1%). Most patients traveled > 50 miles for appointments (63.8%); they were more likely from rural counties with significantly higher travel costs/visit (\$60.77 vs \$37.98,  $p = 0.026$ .) The majority expressed interest in using telemedicine (75.7%) or a smartphone app (87.5%) in their care. The majority of patients with difficulty attending appointments (88.9 vs 70.2%,  $p = 0.02$ ) or from rural counties (88.7% vs 69.6%,  $p = 0.03$ ) were interested in telemedicine; those with both characteristics reported 100% interest. The majority in both urban and rural counties had home internet access, and reported similarly high rates of daily use (79% vs 75%). Race and age were not associated with differences in internet access or use or telemedicine interest.

**Conclusions:** Telemedicine is attractive to the majority of patients and may offer financial/logistical advantages. Patients have high internet use rates and comfort with using technology for healthcare. Telemedicine should be incorporated into standard practice beyond the COVID-19 pandemic to reduce healthcare access disparities.

### 1. Introduction

There is increasing interest in patient care delivery strategies aimed at dismantling barriers to healthcare access for patients with gynecologic malignancies. A comprehensive review of patients with cancer demonstrated that patients with difficulty accessing care, especially those who travel long distances for care, experience higher rates of advanced stage diagnoses with lower guideline-concordant treatment and have worse survival and quality of life (Ambroggi et al., 2015). Factors contributing to disparities in healthcare access can include difficulty with transportation to appointments, increased transportation costs, and increased distance to comprehensive cancer centers. These disparities have been associated with decreased adherence to consensus surveillance recommendations and prevent enrollment and

participation in clinical trials (Unger et al., 2018; Virani et al., 2011). Almost 10% of American women live over 50 miles from the nearest gynecologic oncologist (Shalowitz et al., 2015); in Alabama, over two-thirds of women with gynecologic malignancy must travel over 100 miles to access the closest (Gynecologic Cancers, 2019).

Electronic medical record systems which integrate direct patient access to medical documentation have been increasingly adopted, mandated by the 21st Century Cures Act Final Rule (Rodriguez et al., 2020). These developments intend to improve transparency in healthcare and facilitate patient empowerment regarding their medical information and care; however, meaningful implementation of this technology is poorly understood in gynecologic oncology. The proportion of patients who are interested in using app-based or electronic medical record interfaces to communicate with their oncology team has

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not been well-established. Furthermore, programs educating patients on the use of these technologies have not been developed for the gynecologic oncology patient population, who may have different interests and priorities based on their health conditions and care plans. This lack of knowledge may limit the real-world applicability of ‘patient access’ technology for this patient population. Moreover, in-person appointments with a physical examination have been the standard practice for gynecologic oncologists during the surveillance period, with minimal use of telemedicine, and thus the impact of remote monitoring is unknown.

During the COVID-19 pandemic, many gynecologic oncologists began to incorporate some degree of telemedicine into clinical practice in order to maintain social distancing (Nakayama et al., 2020). However, there is limited literature assessing patient attitudes and readiness for telemedicine as a routine component of oncologic care during non-pandemic settings. In this study, conducted prior to the COVID-19 pandemic, we aimed to identify patient readiness for telemedicine as a component of routine gynecologic oncology care, with specific attention to patients at risk for disparities in healthcare access.

## 2. Methods

An anonymous survey was conducted of gynecologic oncology patients at a single-institution, academic, comprehensive cancer center (Supplemental Document 1.) Institutional Review Board approval was determined to be exempt due to the anonymous nature of the survey, which did not collect any patient identifying information and did not link to the patient medical record. Participants with all gynecologic malignancies, stages of disease, and stages of treatment and surveillance were included. The survey instrument was developed based on prior studies exploring readiness for telemedicine (Gurupur et al., 2017; Marhefka et al., 2020). Surveys were conducted during in-person outpatient appointments in English from January 6, 2020 through February 28, 2020, and all data were entered into REDCap. The planned primary outcome was to determine the readiness of patients for telemedicine: that is, the percentage of gynecologic oncology patients who were willing and/or able to use telemedicine or a web-based application as a component of their cancer care. Secondary outcomes included assessing differences in readiness with respect to racial/ethnic groups, urban vs. rural patients, and patient age. As this was an exploratory analysis using a sample of convenience, a power analysis was not performed. Patients self-identified their county of residence, which was identified as urban or rural using the United States Office of Management and Budget classification system which identifies all counties not within a metropolitan service area (MSA) as ‘rural.’ (Rural Population, 2020) This classification system is used by the Federal Office of Rural Health Policy. Patients also self-reported the distance from their residence to oncology clinic. Likert scale responses were bimodally coded: definitely/maybe vs probably not/definitely not. Student’s independent *t*-test and one-way ANOVA were used for univariate analysis; multinomial logistic regression was used for multivariate analysis. SPSS statistical software (IBM SPSS Statistics for Windows, version 26, IBM Corp., Armonk, N.Y., USA) was used for all analysis.

## 3. Results

Of 180 patients approached, 170 (94.4%) completed the survey. Mean age was 59.6 years (±St. Dev 115. years) (Table 1). 73.4% identified as White, 23.7% as Black, and 2.9% as other race. The majority of patients had ovarian cancer (41.2%), followed by endometrial (27.1%), cervical (20.6%), vaginal/vulvar (7.1%), and other (1.2%). Patients lived in four states and 47 counties. Based on 2010 federal census categorizations, 47.1% lived in urban counties and 36.5% lived in rural counties. County of residence was self-reported by patients and was not reported by 16.4% of patients. Mean income for patients in rural vs urban areas was \$44,132.74 vs \$52,325.64 ( $p = 0.010$ ), using 2010

**Table 1**  
Patient Demographics.

	Overall, n = 170 (%)
<b>Age, mean (years)</b>	59.6 ± 11.5
≤40 years	12 (7.1%)
41–64 years	96 (56.5%)
65 or older	58 (34.1%)
<b>Primary Cancer Site</b>	
Ovarian	70 (41.2%)
Endometrial	46 (27.1%)
Cervical	35 (20.1%)
Vaginal/Vulvar	12 (7.1%)
Other	2 (1.2%)
<b>Race/Ethnicity</b>	
White	124 (72.9%)
Black	40 (23.5%)
Asian	3 (1.8%)
Hispanic	1 (0.6%)
Native American	1 (0.6%)
<b>County of Residence</b>	
Urban	80 (47.1%)
Rural	62 (36.5%)
Not reported	28 (16.4%)
<b>Live &gt; 50 miles from cancer center</b>	
Yes	113 (63.8%)
No	52 (29.4%)
Not reported	12 (6.8%)

federal census data based on zip code. The majority of patients (n = 113, 63.8%) lived > 50 miles from their cancer center based on county mapping and self-reported distance. This was highly correlated with rural county of residence. Distance > 50 miles from cancer center was associated with a significantly higher cost for travel per visit (\$60.77 vs \$37.98,  $p = 0.026$ ), as was rural county of residence (\$61.43 vs \$37.98,  $p = 0.026$ .)

The majority of patients expressed interest in using telemedicine appointments (75.7%) or a smartphone app (87.5%) as a component of their cancer care. The majority of patients with difficulty attending appointments (88.9 vs 70.2%,  $p = 0.02$ ), or those from rural counties (88.7% vs 69.6%,  $p = 0.007$ ), were interested in telemedicine (Table 2); those with both characteristics reported 100% interest. The majority of patients in both urban and rural counties had the ability to access the internet and telemedicine services from home via smart phone or computer. Patients from rural and urban counties used the internet at similarly high rates (at least daily use, 86% vs 87%,  $p = 0.87$ .) There was no difference in pre-existing use of the patient portal (a Web-based interface with the electronic medical record for patients to send messages and receive updates from providers) between rural and urban patients (56.3% vs 66.2%,  $p = 0.43$ .)

On univariate analysis, patient age was not associated with differences in internet use (at least daily use,  $p = 0.248$ ; ever use,  $p = 0.561$ ), interest in telemedicine ( $p = 0.8$ ), or interest in using a computer or smartphone app to learn about cancer treatments ( $p = 0.243$ .) Age was not associated with difficulty in presenting to in-person appointments ( $p = 0.569$ ), urban/rural county of residence ( $p = 0.49$ ), or greater distance (residence > 50 miles, as reported by patients) between patient’s home and their cancer center ( $p = 0.07$ .)

With respect to race-specific analysis (Table 3), Black-White disparities were assessed due to the low number of respondents in other categories precluding statistical analysis (5/170 patients.) When compared to White patients, Black patients did not differ significantly with respect to age ( $p = 0.579$ ), distance > 50 miles from their cancer center ( $p = 0.360$ ), urban vs. rural county of residence ( $p = 0.140$ ), trouble attending in-person appointments ( $p = 0.109$ ) or money spent traveling to in-person appointments ( $p = 0.706$ .) Compared to White patients, Black patients had similar rates of internet use (at least daily use,  $p = 0.332$ ; ever use,  $p = 0.197$ .) White patients reported an increased rate of having used the electronic medical record patient portal to access their health information ( $p = 0.016$ ); however, there

**Table 2**  
Patient characteristics and attitudes regarding telemedicine and internet use according to urban/rural county of residency.

	Overall (n = 170)	Urban (n = 80)	Rural (n = 62)	P
<b>Age, mean (years)</b>	59.6 ± 11.5	60.3 ± 12.3	58.3 ± 11.3	0.34
<b>Live &gt; 50 miles from cancer center</b>				<b>0.000</b>
Yes	113 (66.5%)	39 (48.8%)	53 (85.5%)	
No	52 (30.6%)	39 (48.8%)	9 (14.5%)	
Not reported	5 (2.9%)	2 (2.5%)	0	
<b>Cost for travel per appointment, mean (\$)</b>	\$48.67 ± 57.43	\$37.98 ± 52.55	\$61.43 ± 61.42	<b>0.026</b>
<b>County Median Income, mean (\$)</b>	\$48,748.46	\$52,325.64	\$44,132.74	<b>0.010</b>
<b>Trouble attending appointments, (n = 139)</b>				0.34
Yes	36 (25.9%)	18 (22.8%)	18 (30%)	
No	103 (74.1%)	61 (77.2%)	42 (70%)	
<b>At least daily internet use (n = 126)</b>				0.87
Yes	109 (86.5%)	60 (87.0%)	49 (86.0%)	
No	17 (13.5%)	9 (13.0%)	8 (14.0%)	
<b>Would you use telemedicine?</b>				<b>0.007</b>
Definitely or probably not	31	24 (30.4%)	7 (11.3%)	
Maybe or definitely yes	110	55 (69.6%)	55 (88.7%)	
<b>Have you used the patient portal to get information about your health?</b>				0.43
Yes	87	51 (66.2%)	36 (56.3%)	
No	54	26 (33.8%)	28 (43.7%)	

**Table 3**  
Patient characteristics and attitudes regarding telemedicine and internet use according to self-identified race (White/Black).

	Overall (%)	White	Black	p-value
<b>Age, mean (years)</b>	59.6 ± 11.5	59.6 ± 11.8	60.8 ± 9.9	0.579
<b>Residence</b>				0.14
Urban	80 (56.3%)	55 (53.4%)	23 (70.6%)	
Rural	62 (43.7%)	48 (46.6%)	11 (32.4%)	
<b>Cost for travel per appointment, mean (\$)</b>	\$48.67 ± 57.43	\$46.06 ± 57.78	\$50.11 ± 53.67	0.706
<b>Trouble attending appointments, n = 139</b>				0.109
Yes	42	28	14	
No	119	94	25	
<b>At least daily internet use, n = 126</b>				0.282
Yes	119	94	25	
No	26	18	8	
<b>Would you use telemedicine?</b>				0.694
Definitely or probably not	40	30	11	
Maybe or definitely yes	123	93	29	
<b>Have you used the patient portal to get information about your health?</b>				0.016
Yes	92	76	16	
No	71	47	24	

was no difference in interest in telemedicine (p = 0.696.)

Multivariate analysis for interest in telemedicine was performed via multinomial logistic regression (Table 4.) Interest in telemedicine was not impacted by age (p = 0.12), race (p = 0.61), or self-reported travel >50 miles for appointments (p = 0.14), but the influences of urban/rural county of residence (p = 0.046) and difficulty attending appointments (p = 0.024) were persistent. Multinomial regression was utilized for interest in using a computer or smartphone application to learn about cancer treatments, and found no statistically significant relationships with respect to age, urban/rural county of residence, self-reported

travel >50 miles for appointments, race, or difficulty attending appointments.

#### 4. Discussion

Improving patient access to gynecologic oncology care is evolving as the field gains an enhanced understanding of patient and healthcare system factors that influence healthcare disparities. Technologic advancements hold the potential to increase healthcare access and patient involvement. Our study demonstrated that overall, gynecologic oncology patients are receptive to new forms of communication and care provision such as telemedicine and electronic patient portals using modern technologic avenues.

These findings are particularly salient when considering populations with poor access to care. Almost 10% of women live >50 miles from the nearest gynecologic oncologist: these patients are more likely to be in rural areas (Shalowitz et al., 2015). Both in Alabama and nation-wide, rural patients experience difficulty attending in-person appointments, and oncologic outcomes have been inversely related to farther distances from patient's treatment centers (Ambroggi et al., 2015; , 2019). Exacerbating this concern, rural hospitals are closing at an accelerating pace, particularly in the Southeast and lower Great Plains regions (Topchik et al., 2020). This limits accessible options for patients and further underscores the need to utilize direct-to-patient technology. Pilot interventions in virtual urgent care demonstrated promising uptake of internet-based healthcare technology into rural and low-access areas (Khairat et al., 2019). Our study affirms that gynecologic oncology patients are interested in these options: in fact, our results indicated that participants from rural areas with difficulty attending appointments were universally interested in using telemedicine or electronic health systems to communicate with their care teams. These patients tend to live in areas of lower median income and bear an increased cost of transportation. Using telemedicine may therefore provide an opportunity to address access-related disparities at a time of increasing need while addressing potential financial toxicities associated with oncologic care.

Although telemedicine offers a promising opportunity to bridge the gap between rural and urban patients with cancer, there are concerns regarding technological literacy and poor internet access. Historically, broadband internet infrastructure in rural America has been considered inadequate, representing a 'Digital Divide' compared to urban populations (DeGuzman et al., 2020; Broadband progress report, 2016). Some rural practices will therefore offer private spaces for patients to access telehealth services; however, even those distances may be too far for cancer patients to travel. Although our survey respondents reported good internet access overall, institutions implementing telemedicine must be cognizant of areas with potentially poorer infrastructure and identify avenues to prevent leaving these groups behind.

Racial disparities in healthcare access are also pertinent to gynecologic oncology patients. When compared to White patients, Black patients are less likely to receive guideline-concordant therapy and experience increased cancer-related mortality. Although these disparities are multifactorial, access to care differences are contributory (Rauh-Hain et al., 2018). A focus group analysis suggested that some minority and particularly Black patients may have mistrust in utilizing new technologies, with concerns about privacy and confidentiality arising from the legacy of racism in medicine in the United States (George et al., 2012). In contrast, our survey found that despite Black patients being less likely to have utilized patient medical record portals compared to White patients, both groups expressed similar interest in using telehealth services. This suggests that such technology is acceptable to our patient population. Furthermore, internet use among Black Americans was thought to be less common than for White Americans (Perrin, 2018). However, we found comparable rates of internet use between groups.

Age disparities in access and comfort with new technologies are also

**Table 4**

Multinomial logistic regression of interest in telemedicine as assessed by the question “Would you be interested having some of your appointments with us by telemedicine?”

Variable		β	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Age: Younger than 40 years, 41–60 years, 60 + years Race: White or Black County: Rural or Urban >50 miles? Do you ever have trouble getting to your appointments in our clinic?		-0.035	0.022	2.456	1	0.117	0.965	0.924	1.009
		-0.269	0.529	0.258	1	0.612	0.765	0.271	2.156
		-1.066	0.534	3.985	1	0.046	0.344	0.121	0.981
		0.719	0.481	2.236	1	0.135	2.053	0.800	5.272
		2.387	1.061	5.059	1	0.024	10.881	1.359	87.092

Definitely/maybe = 1, probably not/definitely not = 0.

Included in analysis: n = 130 (76.5%).

Nagelkerke R-squared: 0.265.

important for gynecologic oncology populations. One study in 2018 found that over 1 in 4 Medicare beneficiaries did not have home internet access (Roberts and Mehrotra, 2020). However, a comprehensive review concluded that telemedicine is feasible and acceptable to older adults, and called for increased research into older, rural patients at high risk for multifactorial access disparities (Batsis et al., 2019). Our survey agrees with these results: age was not associated with differences in healthcare access or interest in telemedicine or electronic health portal services. This may reflect increasing internet use and comfort among older adults (Anderson and Perrin, 2017). Given the average age of gynecologic oncology patients and aging US population, ensuring their comfort with utilizing these technologies must be a central component of program adoption.

Limitations of this study may represent the challenges in expanding telemedicine access to all patients and assessing the changes in attitudes that occurred during the COVID-19 pandemic. This was a convenience sample of patients presenting for in-person care at a tertiary cancer center; as a result, patients who received components of care at regional centers or via a co-management model with local providers were likely under-represented. These patients should be incorporated into future research regarding telemedicine. Approximately 16% of respondents did not provide county of residence information, which may bias conclusions related to urban/rural trends. Non-English speaking patients were not enrolled in this survey: language barriers may limit access to telehealth. Similarly, patients with special communication needs, such as hearing or vision impairments, may require additional services and training to make telemedicine accessible (Annaswamy et al., 2020). Inclusive design must also consider health and technologic literacy when designing telemedicine platforms (Rodriguez et al., 2020). Conscious attention to these patient populations is necessary to prevent the widening of healthcare access disparities. In addition, ensuring that support services such as Social Work and Financial Counseling are accessible via telemedicine is imperative to comprehensively address patient needs. Much of this infrastructure is still in its infancy and represents a significant opportunity for leadership.

The COVID-19 pandemic caused a rapid transformation of the U.S. healthcare system, forcing widespread adoption of telehealth and virtual platforms (Nakayama et al., 2020). This shift in practice patterns demonstrated the feasibility for telemedicine, suggesting that its use should continue long-term (Mann et al., 2020). The permanent codification of regulatory changes facilitating telemedicine expansion and reimbursement during the pandemic is currently unresolved (Physicians and other clinicians, 2020) and may require physician advocacy. This study was performed prior to the COVID-19 pandemic; it is likely that our patients are even more interested in telemedicine as a result of increased recent exposure. Future research should incorporate patient experiences with telehealth during the pandemic and their impact on attitudes towards technology in oncologic care. As a field, gynecologic oncology has an opportunity to lead the development and advocacy of patient-centered telehealth.

Future areas of research regarding telemedicine in gynecologic

oncology should include analyses of both patterns of uptake and influence on patient outcomes. Telemedicine interventions are a rapidly growing space; assessing the factors involved in participation and their impact represent an important area of developing research. Specifically, assessment of patient attitudes regarding quality of care, adherence to care recommendations, and patient/care team communication after program initiation may provide opportunities to address healthcare disparities. This data has not yet been comprehensively assessed in gynecologic oncology and is an area of much-needed investigation.

In conclusion, gynecologic oncology patients held positive attitudes, interest, and readiness in telemedicine and electronic health portals, even prior to the COVID-19 pandemic. This technology holds the potential to address healthcare disparities among high-risk patients with access to care barriers. However, attention must be paid to populations at risk of being ‘left behind’ by poor implementation. Gynecologic oncology patients are ready for telemedicine as a component of routine care. The field, and providers, should embrace the opportunity to incorporate new technology, advocate for permanent codification and reimbursement of telemedicine services, and remake the healthcare landscape to improve patient access with the goal to improve oncologic outcomes.

**Author contributions**

HJ Smith: Project development, data collection, implementation, analysis, manuscript supervision. MI Liang, CA Leath III, JM Straughn Jr, KS Bevis, RC Arend: Project implementation, data collection, final manuscript review. J Kim: data collection and analysis, manuscript preparation. J Dholakia: data collection, analysis and interpretation, manuscript preparation.

**Declaration of Competing Interest**

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: All authors have disclosed any potential conflicts of interest. Dr. Arend is on the Advisory Boards/Data Safety Monitoring Boards for Clovis, Leap Therapeutics, Astra Zeneca, Merck, VBL Therapeutics, Caris Life Sciences, KIYATEC, Glaxo SmithKline, Sutro, and Seagen. Dr. Huh reports consulting fees from LICOR, Astra Zeneca, and DYSIS. He also serves on the Advisory Boards/Data Safety Monitoring Boards for INOVIO and SYNIOS/AGENUS. None of the other authors report a significant conflict of interest related to this study.

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## Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.gore.2021.100871>.

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