

**Introduction:** To compare and analyse satisfaction and costs of telehealth services for patients receiving allied health services at a quaternary oncology hospital.

**Material and methods:** Cross-sectional design survey distributed to patients who had received outpatient allied health (psych-oncology, dietetics, speech pathology) telehealth services from March November 2020. Responses regarding satisfaction and barriers relating to telehealth were examined, and costs calculated.

**Results:** A total of 156 surveys were distributed, 124 were completed and included in the analysis. The majority of respondents (56%) were female patients, with a median age of 57 years. Survey results revealed that 89% of respondents would access allied health consultations using telehealth again, of whom 14.5% indicated that they preferred telehealth to a face-to-face appointment. Common barriers to service delivery were internet connection, inability to perform physical examination via telehealth, and patient unfamiliarity with technology. Levels of satisfaction were high, with 92.7% of respondents either satisfied or very satisfied with the allied health telehealth service offered. Only 1.5% of the participants were dissatisfied on account of unfamiliarity with the technology and preference for face-to-face contact with their clinician.

To attend a face-to-face allied health consultation 90% of respondents would have to drive to the hospital, with cost of petrol and parking per trip calculated to be an average of \$ 51.25.

**Conclusions:** Allied health service delivered via telehealth was met with high rates of satisfaction and resulted in lower patient costs.

**Key words:** quality of life, telemedicine, neoplasm, rural health.

Contemp Oncol (Pozn) 2022; 26 (1): 44–48  
DOI: <https://doi.org/10.5114/wo.2022.115047>

# Patient satisfaction and cost analysis of telehealth delivered by allied health oncology clinicians

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## Introduction

In response to the physical distancing restrictions introduced because of the COVID-19 pandemic and considering the significant burden of travel-related health care costs, telehealth practice was implemented for allied health services at a quaternary oncology hospital in Australia. Telehealth is designed to provide the best possible care within the patient's own home [1]. It is clear that patients who undergo oncology treatment experience varying degrees of financial burden [2], comprising of medical fees, treatment-related costs, medication, time taken off work, transport to and from their oncology facility, and accommodation for those in rural or remote areas. Provision of telehealth services has been shown to facilitate timely diagnosis and treatment [3] and convenience of remote monitoring [4], and to reduce travel-related costs [5]. A systematic review conducted by Rising *et al.* [6] found that few studies had focused on the financial impact and patient experience of telehealth, and those that did look at the financial impacts primarily focused on physician consultations [7].

This study sought to examine patient's satisfaction and conduct a cost analysis for outpatient allied health telehealth services offered as standard care during the COVID-19 pandemic. We hypothesised that there would be a financial advantage for patients utilising telehealth. We planned to assess the impact of telehealth on patient's satisfaction. We also examined patient's satisfaction with telehealth appointments. Based on published data [8], we expect patients with prior familiarity with technology, including those from remote and rural areas, to draw particular benefit from telehealth services as their preferred method of allied health service delivery.

## Material and methods

Ethical approval was obtained from Royal Prince Alfred Research and Ethics committee (X20-0403 & 2020/ETH02370), and all participants provided verbal or written informed consent to participate in this study. Participants who had accessed telehealth for outpatient appointments were recruited consecutively from an Australian quaternary oncology centre between March and November 2020.

## Participants

Participants were included if they met the following criteria: a) over 18 years of age, b) confirmed diagnosis of cancer, and c) received one or more allied health (Psych-oncology, Dietetics, Speech Pathology) outpatient telehealth service. The Strengthening the Reporting of Observational Studies in Epidemiology Guidelines [9] were used to ensure comprehensive reporting. The allied health consultation followed the hospital's telehealth standard care protocol implemented in response to the COVID-19 pandemic. The allied health clinician had, in most cases, engaged in a face-

to-face interaction with the patient prior to telehealth consultation; however, this was not exclusively the case. Participants predominantly used 'Zoom' (<http://zoom.us>) software – a free, cloud-based video-conferencing service. When this was not available (e.g. when participants did not have a web-camera), alternative options such as an audio-only phone call were explored that met their individual needs. Those whose clinical needs could not be met via telehealth were offered a face-to-face appointment (e.g. laryngectomy voice prosthesis changes). Consultations typically ranged between 20 and 60 minutes in length.

### Data collection

The survey questions were selected after reviewing existing literature and consulting the team leaders of the allied health oncology panel (Appendix 1). Demographic and clinical data including gender, age, and tumour stream were collected. Surveys were distributed online and via phone. Those who indicated an interest in participating but had either low literacy skills or were from a culturally or linguistically diverse background were given the option to complete the survey verbally or with an interpreter. Surveys were conducted by a speech pathologist, who was trained in communicating with participants who may experience problems with language, speech, or fluency.

### Multivariate analysis for satisfaction with telehealth

The results of the surveys were analysed using descriptive statistics. A subsequent analysis was conducted using "The R Project for Statistical Computing 3.6.0", and the lme4 package modelling binomial logistic regressions evaluated the impact of demographic variables and patient satisfaction with telehealth using the Kaplan-Meier curves. Binary logistic regression was used for the multivariate analysis.

### Results

The total number of surveys distributed was 156, with 124 respondents (79.4%). All participants had received one or more allied health service (Psych-oncology, Dietetics, Speech Pathology) via telehealth as a part of their cancer treatment. Three (2%) participants required an interpreter. The participants' demographics are summarised in Table 1. Most respondents were female ( $n = 70$ , 56%), with a mean age 56.6 years.

**Table 1.** Participant demographics

Total subjects	N = 124
Age mean (range)	56.6 (21–83)
Health discipline* (%)	
Psychoncology	21 (17)
Dietitian	82 (66)
Speech pathology	71 (57)
Sex (%)	
Male	54 (44)
Female	70 (56)
Tumour stream (%)	
Head and neck	72 (58)
Breast	17 (14)
Lung	20 (16)
Gynaecological	10 (8)
Other	5 (4)
Distance (km) from hospital	
Mean (range)	59.5 (1.6–5.67)
Prior knowledge with telehealth (%)	
Yes	78 (63)
No	46 (37)

\* Values add up to more than 100% on account of most participants receiving multidisciplinary care.

### Telehealth satisfaction and comparison

Most participants (93%,  $n = 115$ ) indicated that they were either satisfied or very satisfied with the telehealth service provided. A minority of 7 participants (6%) had a neutral opinion and 2 (1%) were unsatisfied or very unsatisfied. The majority (70%) felt that the quality of the service was equivalent to a face-to-face appointment, particularly for review appointments which did not require a physical examination. Telehealth was considered superior to face-to-face appointments in 14% of respondents, of whom 2 experienced agoraphobia. Common advantages in response to the allied health services provided via telehealth were access to specialist services for geographically remote participants, avoidance of travel related anxiety, reduction in infection risk during a pandemic in those who are immunocompromised, convenience, time, and cost effectiveness. Those who found telehealth to be inferior (15%) to face-to-face consultations noted the challenge of performing any sort of physical exercise or examination, such as oro-facial stretches or swallowing therapy, as a part of their therapy,

**Table 2.** Participant factors influencing satisfaction with telehealth

	Satisfaction with telehealth		Likelihood of choosing to use telehealth again	
	p-value	95% CI	p-value	95% CI
Age	0.1	0.43–1.51	0.1	0.34–3.82
Distance from the hospital	0.09	0.71–1.23	0.02	0.68–1.30
Allied health discipline	0.6	0.67–3.42	0.07	1.15–2.76
Tumour stream	0.8	0.48–2.23	0.09	0.51–1.53
Prior knowledge of telehealth	0.04	1.66–4.33	0.03	0.82–1.23

CI 95% – confidence interval

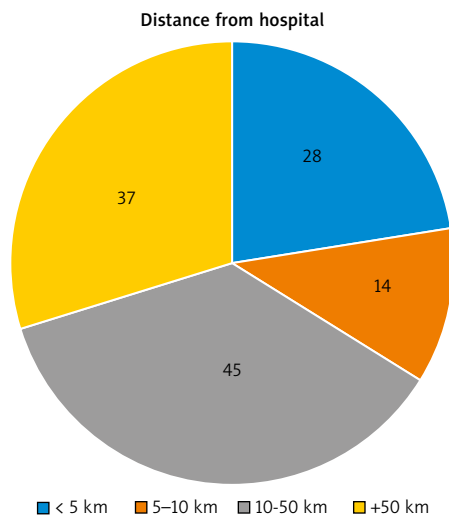


Fig. 1. Distance (km) from treating hospital

inability to complete a physical examination (limited to visual assessment only), and difficulty with technology.

Logistic regression analysis found a statistically significant correlation between those who had prior knowledge and experience using telehealth and their satisfaction and likelihood of electing to use telehealth again (Table 2). Those who lived farther away were also more likely to elect to use telehealth again. There was no correlation between participants' age, tumour stream, and the type of allied health discipline accessed and their satisfaction or likelihood of electing ongoing access to telehealth (Table 2).

### Cost analysis

Distance from the hospital to the participant's place of residence was calculated using their home address postal code, then calculating the distance in kilometres to the hospital. The results of this analysis are depicted in Figure 1. Most participants resided further than 10 km from the treating institution. A large number (37/124; 30%), however, would have travelled greater than 50 km to attend an appointment. The average distance from the hospital was 59.4 km (range 1.6–567 km) for a one-way trip. Most respondents (90%) would usually drive to their appointments. The price of petrol per kilometre was estimated to be 10 cents, making the average travel costs for a face-to-face clinic appointment \$ 11.80 (range of \$ 0.20–112) for a two-way trip. Parking was an additional \$ 10–20. Most participants required a series of consultations with their allied health team, thus multiplying the potential cost of attending face-to-face appointments. A minority of 17 respondents (14%) would require booking accommodation close to the hospital to attend their allied health appointment(s).

Many respondents were required to forego a part or whole day of work (41%). Costs involved in taking multiple sick days or booking accommodation also need to be considered. Furthermore, one should consider that a high proportion of participants would also need to bring a support person (56%), who may also need to take time off work or stay away from home, subsequently losing income.

Costs associated with the transition from face-to-face to telehealth for the allied health providers were low. The most frequently used telehealth service, 'Zoom', is a free service. Costs associated with telehealth implementation were primarily around replacement of computers without web-camera capability and time for staff training. Whilst the rate of failure to attend was not formally measured in this study, it was the experience of the clinicians that telehealth both reduced non-attendance rates and late attendance to scheduled appointments.

### Discussion

This study demonstrates a high level of satisfaction and cost-effectiveness associated with telehealth during the height of the COVID-19 pandemic. As infection rates in Australia continue to follow an encouraging trajectory due to nation-wide adoption of infection control practices, lock downs, and vaccinations, consideration of the applicability of telehealth to a post-pandemic world is required.

It appears that ongoing access to telehealth remains a valuable option for many participants. Those living further from the hospital and who had used telehealth previously were significantly more likely to elect to use telehealth again. Variables of age, tumour stream, and allied health service did not reach statistical significance. Like previous studies, these results suggest at least greater financial benefit for participants from rural or remote areas, where travel to a recurring hospital appointment is both time consuming and costly [10]. This is increasingly relevant given the evidence supporting centralised oncology care, bringing participants from greater distances to high volume, specialised centres for their treatment [11].

Participants who have returned to work or who experience anxiety related to hospital visits are likely also to benefit from ongoing access to allied health services via telehealth [12]. Previous work has identified that time taken attending health care appointments [13] and coordinating health care delivery [14] adds to the participant's treatment burden. It can be presumed that by reducing burdens and barriers associated with engaging with health care, patients may be enabled to engage in recommendations and treatment regimes [11].

The average cost for attending a face-to-face consultation (petrol and parking) in this study was \$ 16–26, depending on the length of the participant's consultation and subsequent parking fees. This does not take in account any costs associated with absence from work or booking accommodation near the hospital to attend one or more allied health appointment(s). More than a third of respondents (41%) had to take work leave. For someone employed at the minimum wage for Australia in 2021, this would generate a minimum loss of \$ 158.72 [15] in income per appointment. Due to the complex nature of cancer care, patients usually require multiple appointments with many health professionals [16], meaning this expense multiplies quickly.

A minority (14%) of the respondents also required accommodation in close proximity to the hospital, one night of budget accommodation, costing approximately \$ 250.

For those already at a socioeconomic disadvantage due to absence from work for cancer treatment, these additional costs could become prohibitive to access adequate allied health continuity of care. Patients requiring multiple visits or consults with several clinicians are likely to experience even greater cost saving over the course of treatment with the use of telehealth. Despite the stated benefits of telehealth, many respondents prefer the face-to-face service model. Receiving a physical examination, face-to-face rapport with allied health professionals, and reliability of technology were the main factors in favour to face-to-face.

Following the initial expense of establishing a telehealth service, ongoing costs of maintaining telehealth for healthcare providers is low.

### Limitations

This study has clear limitations including a relatively small sample size, diverse cancer stream recruitment, multiple clinical specialties, and absence of thorough economic analysis. The distribution for participants from a single institution limits how widely these results can be generalised to other populations. The cross-sectional survey was un-validated and limited in scope. It did capture a large percentage of patients (79.4%) who received telehealth during the specified period; however, as in any survey where participation is voluntary, risks of misrepresentation of the intended cohort due to non-response bias should be noted. Despite anonymity, respondents may have felt an inclination to compliment the service under examination, risking acquiescence bias, and an over-representation of service satisfaction.

### Future directions

The results presented here describe the experience and opinion primarily of the patient, and neglect to consider the perspective of the clinician. Allied health professionals who have undergone rapid up-skilling not only in the use of telehealth technology and translation of clinical skills from the face-to-face to telehealth platform should be consulted for a cost-benefit analysis of telehealth moving forward. Examination of attendance of face-to-face and telehealth service models may also be warranted to understand whether there are trends in attendance between the respective service delivery models of care.

### Conclusions

This is the first study that incorporates both satisfaction and costs of allied health telehealth care after treatment for an oncological diagnosis. As Australian healthcare settings slowly return to standard practice (i.e. face-to-face) after the height of the COVID-19 pandemic, ongoing access to telehealth appears to be a practice that has value for select patients.

### References

- Gardner MR, Jenkins SM, O'Neil DA, et al. Perceptions of video-based appointments from the patient's home: a patient survey. *Telemed J E Health* 2015; 21: 281-285.
- Smith GL, Lopez-Olivo MA, Advani PG, et al. Financial burdens of cancer treatment: a systematic review of risk factors and outcomes. *JNCCN* 2019; 17: 1184-1192.
- Binder B, Hofmann-Wellenhof R, Salmhofer W, Okcu A, Kerl H, Soyer HP. Teledermatological monitoring of leg ulcers in cooperation with home care nurses. *Arch Dermatol* 2007; 143: 1511-1514.
- Chumbler NR, Kobb R, Harris L, et al. Healthcare utilization among veterans undergoing chemotherapy: the impact of a cancer care coordination/home-telehealth program. *J Ambul Care Manage* 2007; 30: 308-317.
- Gordon J. Dermatologic assessment from a distance: the use of teledermatology in an outpatient chemotherapy infusion center. *Clin J Oncol Nurs* 2012; 16: 418-420.
- Rising KL, Ward MM, Goldwater JC, Bhagianadh D, Hollander JE. Framework to advance oncology-related telehealth. *JCO Clin Cancer Inform* 2018; 2: 1-11.
- Thaker DA, Monypenny R, Olver I, Sabesan S. Cost savings from a telemedicine model of care in Northern Queensland, Australia. *Med J Aust* 2013; 199: 414-417.
- Harkey LC, Jung SM, Newton ER. Patient satisfaction with telehealth in rural settings: a systematic review. *Int J Telerehabil* 2020; 12: 53-64.
- Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *J Clin Epidemiol* 2008; 61: 344-349.
- Moffatt JJ, Eley DS. The reported benefits of telehealth for rural Australians. *Australian Health Review* 2010; 34: 276-281.
- Kilsdonk MJ, Siesling S, van Dijk BAC, Wouters MW, van Harten WH. What drives centralisation in cancer care? *PLoS One* 2018; 13: e0195673.
- Liu N, Huang R, Baldacchino T, et al. Telehealth for noncritical patients with chronic diseases during the COVID-19 pandemic. *J Med Internet Res* 2020; 22: e19493.
- Cheng AC, Levy MA. Data driven approach to burden of treatment measurement: a study of patients with breast cancer. *AMIA Annu Symp Proc* 2017; 2016: 1756-1763.
- Eton DT, Ramalho de Oliveira D, Egginton JS, et al. Building a measurement framework of burden of treatment in complex patients with chronic conditions: a qualitative study. *Patient Relat Outcome Meas* 2012; 3: 39-49.
- Fair Work Australia. Minimum wages. <https://www.fairwork.gov.au/pay/minimum-wages> (lastly accessed 3 May 2021).
- Taberna M, Gil Moncayo F, Jané-Salas E, et al. The multidisciplinary team (MDT) approach and quality of care. *Front Oncol* 2020; 10: 85.

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**Submitted:** 04.12.2021

**Accepted:** 14.03.2022

*The authors declare no conflict of interest.*

# Appendix 1

## Telehealth questionnaire

### Demographic data

1. Gender	<ul style="list-style-type: none"> <li>• Male</li> <li>• Female</li> </ul>
2. Age	<ul style="list-style-type: none"> <li>• 18–24 years old</li> <li>• 25–34 years old</li> <li>• 35–44 years old</li> <li>• 45–54 years old</li> <li>• 55–64 years old</li> <li>• 65–74 years old</li> <li>• 74+ years old</li> </ul>
3. Post-code	
4. Please rate any barriers to using telehealth relevant to you	<ul style="list-style-type: none"> <li>• Familiarity with technology</li> <li>• Internet connection</li> <li>• Availability of technology or equipment</li> <li>• Preference for face-to-face</li> <li>• Other</li> </ul>
5. Please compare telehealth to a face-to-face appointment, is it:	<ul style="list-style-type: none"> <li>• Better</li> <li>• The same</li> <li>• Worse</li> </ul>
6. Would you choose telehealth again?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
7. Please describe any benefits that you experienced using telehealth	
8. If you had to attend Chris O'Brien Lifehouse in person, how would you have gotten here?	<ul style="list-style-type: none"> <li>• Car</li> <li>• Public transport</li> <li>• Other .....</li> </ul>
9. If you had to attend Chris O'Brien Lifehouse, would you have brought someone to your appointment?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
10. If you had to attend Chris O'Brien Lifehouse, would you have required to stay in accommodation near the hospital?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
11. If you had to attend Chris O'Brien Lifehouse, would you have had to miss a day of work?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>

Please answer the questions by circling the response that best matches how you feel about your most recent Telehealth consultation:

1. I was satisfied with my video/phone consultation	5 Strongly agree	4 Agree	3 Unsure	2 Disagree	1 Strongly disagree
2. I could talk to the specialist easily and openly	5 Strongly agree	4 Agree	3 Unsure	2 Disagree	1 Strongly disagree
3. I am more likely to attend an appointment over telehealth than face-to-face	5 Strongly agree	4 Agree	3 Unsure	2 Disagree	1 Strongly disagree
4. I had no difficulty seeing and hearing through the videoconferencing/phone	5 Strongly agree	4 Agree	3 Unsure	2 Disagree	1 Strongly disagree
5. I felt that being able to video/phone consult with my doctor was convenient and/or saved me time and money	5 Strongly agree	4 Agree	3 Unsure	2 Disagree	1 Strongly disagree
6. I was able to develop a good relationship with my clinician	5 Strongly agree	4 Agree	3 Unsure	2 Disagree	1 Strongly disagree
7. I felt my privacy and confidentiality were preserved during my visit with the doctor	5 Strongly agree	4 Agree	3 Unsure	2 Disagree	1 Strongly disagree

Please rate any barriers to using telehealth relevant to you.