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Review Article

The safety and acceptability of using telehealth for follow-up of patients following cancer surgery: A systematic review

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ABSTRACT

Introduction: Although virtual consultations have played an increasing role in delivery of healthcare, the COVID-19 pandemic has hastened their adoption. Furthermore, virtual consultations are now being adopted in areas that were previously considered unsuitable, including post-operative visits for patients undergoing major surgical procedures, and surveillance following cancer operations. This review aims to examine the feasibility, safety, and patient satisfaction with virtual follow-up appointments after cancer operations.

Methods: A systematic review was conducted along PRISMA guidelines. Studies where patients underwent surgical resection of a malignancy with at least one study arm describing virtual follow-ups were included. Studies were assessed for quality. Outcomes including adverse events, detection of recurrence and patient and provider satisfaction were assessed and compared for those undergoing virtual or in-person post-operative visits.

Results: Eleven studies, with 3369 patients were included. Cancer types included were gynecological, colorectal, esophageal, lung, thyroid, breast, prostate and major HPB resections. Detection of recurrence and readmission rates were similar when comparing virtual consultations with in-person visits. Most studies showed high patient and healthcare provider satisfaction with virtual consultations following cancer resection. Concerns were raised about the integration of virtual consultations into workflows in fee-for-service settings, where reimbursement for virtual care may be an issue.

Conclusion: Virtual follow-up care can provide timely and safe consultations in surgical oncology. Virtual consultations are as safe as in-person visits for assessing complications and recurrence. Where appropriate, virtual consultations can safely be integrated into the post-operative care pathway for those undergoing resection of malignancy.

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1. Introduction

The COVID-19 pandemic has resulted in a significant disruption to health care systems by creating pressure beyond the maximum capacity of many hospitals globally [1]. Oncologic care has consequently been disrupted during the pandemic, with modifications to treatment and reductions in screening, diagnostic procedures, diagnoses, and other care [2,3]. One strategy to mitigate these stresses has been to transition in-person appointments towards

telehealth services [4,5]. Telehealth involves the implementation of virtual platforms such as phone or video calls to deliver health care, consultation, or information [6]. The use of telemedicine has increased drastically during the COVID-19 pandemic [7], with positive patient-reported experiences overall [8]. Further, amongst oncology care centers specifically, virtual platforms have been met with high satisfaction by patients and providers [9,10]. Although telehealth is established as a mechanism for following patients undergoing surgical procedures for benign disease, its safety and role in surgical oncology, particularly for those undergoing major resections, is not well established.

The necessity for complete resection in cancer surgery often results in complex operative procedures with high risk of morbidity

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and post-operative challenges. While there have been major advances in audio/visual technology, telemedicine still challenges a surgeon's ability to physically view and examine a patient following surgery. [11,12]. It is important to establish the safety and effectiveness of telehealth in surgical cancer patients both short-term and long-term, given the frequent follow-ups and long-term surveillance protocols associated with many cancers [13]. The aim of this review is to examine the evidence regarding the feasibility, safety of, and patient satisfaction with virtual follow-up under surgical oncology services.

2. Methods

This systematic review was conducted based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [14].

2.1. Search strategy

A systematic database search was conducted in MEDLINE, Embase, and Cochrane, for studies evaluating the use of virtual postoperative follow-up appointments for surgical cancer patients. Studies from January 2012 to May 2022 were included. Additional articles were identified through the reference lists of relevant articles. The following search terms were used to yield relevant references: virtual, telephone, video, digital, remote, surgery, operation, cancer, carcinoma, metastasis, tumor, postoperative, follow-up, surveillance, appointment.

The selection criteria were as follows:

Inclusion criteria:

1. Participants were adults (18+) diagnosed with cancer
2. Participants underwent surgical operation as a means of cancer treatment
3. Participants were involved in virtual follow-up protocols, by phone call, video conference, or both
4. Full text available in English

The exclusion criteria:

1. Case studies, conference abstracts, reviews and meta-analyses of the literature
2. Studies assessing cancer providers in general without a focus on cancer surgeons

The titles and abstracts of all initial search results were screened. The full texts of select articles were then screened to identify the articles included in this review by two authors (KX, JB). Disagreements were resolved by the third author (JY). The results of all included articles underwent qualitative analysis and narrative synthesis. Due to the lack of consistent or comparable outcomes reported between different studies, as well as the wide variety of cancers assessed, no quantitative analyses were undertaken.

2.2. Data extraction

Data was collected from each study using a data extraction spreadsheet, which all authors reviewed. The following information was extracted: Author and publication year, Journal, Outcomes assessed, Study design, Sample size, Cancer type, and Method of telehealth follow-up. The data extracted relating to specific clinical outcomes or disease progression were as follows: Readmission rates, In-person review required, and Morbidity and mortality. Lastly, patient and surgeon satisfaction or perspectives was also collected.

2.3. Bias assessment

To assess methodological quality and risk of bias for all included full-text articles, all randomized control trials were assessed using the Jadad scale [15] and the methodological index for non-randomized studies (MINORS) [16]. The Jadad scale was used to assess the risk of bias for control trials, and the MINORS scale was used to assess non-randomized studies. The Jadad scale scores range from 0 to 5 and the possible MINORS scores range from 0 to 24 (Supplemental Tables 1 and 2).

3. Results

3.1. Search results

A total of 3358 articles were identified from the database searches. Duplicates were removed and all titles were screened. From the title screening, 190 articles were eligible for abstract screening, of which 60 articles were kept for full-text screening. The full-text screening yielded 11 relevant articles that were eligible for analysis, with 3369 patients. The PRISMA flow diagram is presented in Fig. 1.

3.2. Study characteristics

An overview of the studies' main characteristics is summarized and presented in Table 1. Scoring from the Jadad scale and MINORS tool are included, with a wide range in quality of included studies. The articles eligible for analysis reported on the following cancers: endometrial, colorectal, thoracic, thyroid, breast, and prostate. The designs of these studies included randomized control trials (RCT), prospective analyses, retrospective chart reviews, and questionnaires or surveys. The primary and secondary outcomes in these studies were largely focused on clinical or disease outcomes, as well as patient or provider satisfaction. The clinical and disease outcomes are presented in Table 2, and the patient or provider perspectives are outlined in Table 3. Other common themes included time and financial cost analyses, and the accessibility of telehealth for patients. The method of telehealth follow-up included phone calls, video calls, or a combination of both. The sole exception was the study by Malcolm et al., which stated the use of "remote" follow-up methods without description of the specific technology or platform(s) used [17].

3.3. Study results

3.3.1. Readmission rates and unscheduled visits

Two studies assessed readmission rates and unscheduled visits [10,18]. The study by Cerfolio et al. prospectively followed 56 patients who underwent major thoracic surgery with telemedicine postoperative appointments and found that there were no emergency readmission or in-person reviews required as a result of these virtual visits [18]. Uppal et al. conducted a retrospective study to compare surgical cancer patients who received telemedicine follow-up with those who received in-person follow-up, and found that 90-day remission and 30-day readmission rates were not statistically different between groups ($p = 0.77$ and $p = 0.29$, respectively) [18]. The mean time to readmission was also similar ($p = 0.585$) in this study.

3.3.2. Recurrence detection rates

Recurrence detection was assessed in three studies [19–21]. The 2017 randomized trial by Beaver et al. found similar rates of recurrence (5/129 TM vs. 5/130 non-TM) in stage-I endometrial cancer patients regardless of in-person or virtual follow-up

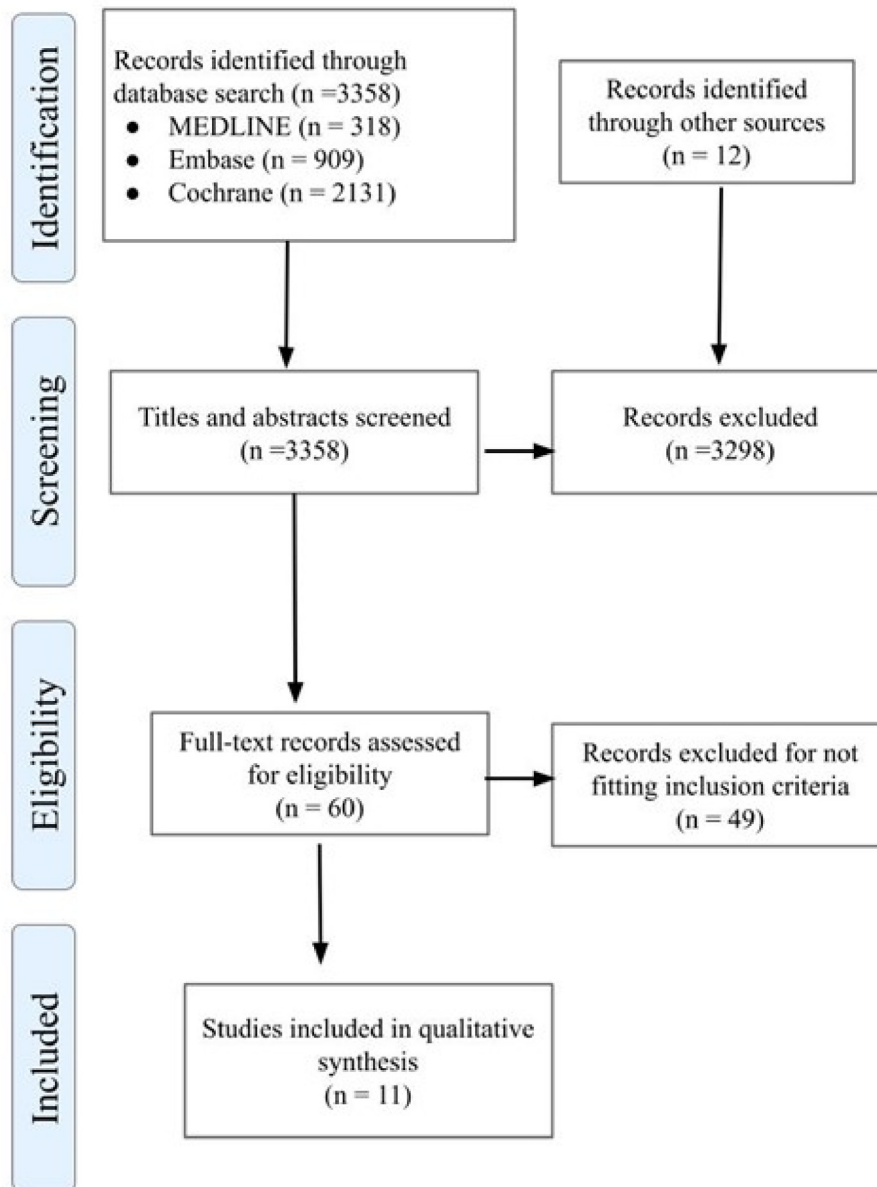


Fig. 1. PRISMA flow diagram of search results.

appointment methods [19]. All recurrences were detected based on symptoms as reported by the patients. Beaver et al. also conducted a similar study of 50 colorectal cancer patients and found the same recurrence rate in telemedicine (5/25 recurrence) and in-person patients (5/25 recurrence) as detected by CT scans [20]. The retrospective study by Mole et al. found recurrence in 14 of 142 patients, though there was no control group reviewed for comparison [21].

3.3.3. Morbidity and mortality

There were four studies that reported on patient morbidity or mortality [10,18,21,22]. Uppal et al. found no difference in the 90-day mortality between the 98 patients who received virtual follow-up and the 437 patients who received in-person care [10]. Cerfolio et al. assessed 56 patients who received pre-operative telehealth visits, of which 25 also received postoperative visits [18]. There was no major morbidity and no 30- or 90-day mortality for any of the 56 patients. However, there was minor morbidity in 10 of 56 patients although it is unclear which of these patients

received preoperative virtual visits alone, or also received postoperative visits. Mole et al. found a 5-year mortality rate of 2.8% for telehealth patients, though there was no comparative group who did not receive telehealth services [21]. Similarly, Siddika et al. found the 5-year mortality to range from 7.3% to 21.2% for colorectal cancer patients depending on the Dukes tumor stage [22].

3.3.4. Patient and provider perspectives

Nine studies reported on patient or provider satisfaction as displayed in Table 3. Of these, only the study by Viers et al. assessed both [23]. The eight studies reporting on patient perspectives indicated high overall satisfaction based on surveys or standardized questionnaire scores (i.e., STAI-S, GHQ-12, Likert scales, etc.). Nearly all studies reported high satisfaction with no statistically significant difference compared to non-telehealth groups, and the 2012 study by Beaver et al. even reported that the telehealth group had statistically higher satisfaction than non-telehealth [19]. Studies reported that patients in virtual follow-up care felt comfortable

Table 1
Overview of all studies including quality assessment.

Author	Year	Journal	Outcome	Study design	Patients (N) TM = tele	Cancer type	Method of follow- up	Bias assessment score
Beaver et al.	2017	BJOG: An International Journal of Obstetrics and Gynaecology	Patient anxiety and satisfaction, QOL	RCT	259 (129 TM)	Endometrial (stage-I)	Phone call	Jadad 3
Beaver et al.	2012	Colorectal Disease	Patient anxiety and satisfaction, clinical visits, recurrence detection, costs	RCT	50 (25 TM)	Colorectal	Phone call	Jadad 4
Cerfolio et al.	2019	Journal of Visualized Surgery	ER and in-person visits, # of patients who prefer in-person	Prospective	25 TM	Thoracic (lung, esophageal)	Video call	MINORS 12
Klain et al.	2020	European Journal of Nuclear Medicine and Molecular Imaging	Number of patients assessed in 2019 (non-TM) vs 2020 (TM)	Retrospective	445 TM 525 non-TM	Thyroid, differentiated	Phone call	MINORS 17
Malcolm et al.	2021	Colorectal Disease	Quality of life	Retrospective Survey	128 TM	Colorectal	"Remote"	MINORS 14
Mole et al.	2019	British Journal of Nursing	Outpatient visit frequency, patient satisfaction, costs	Retrospective Survey	142 TM	Colorectal	Phone call	MINORS 10
Neeman et al.	2021	JAMA Network Open	Clinician satisfaction	Survey	202 clinicians (16 surgeons)	Breast	Video or phone call	MINORS 8
Noble et al.	2019	Pilot and Feasibility Studies	Patient access and preferences	Survey	53 baseline, 50 1-month post-op	Breast	Video call	MINORS 16
Siddika et al.	2015	Colorectal Disease	Visit timeliness, recurrence, 5-year survival, costs, patient satisfaction	Retrospective Survey	900 TM	Colorectal	Phone call	MINORS 11
Uppal et al.	2022	JCO Oncology Practice	90-day readmission, 30-day readmission, readmission LOS, mortality	Retrospective	535 (98 TM)	Colorectal, pancreas, liver, gastric, peritoneal cytoreduction, sarcoma	Video or phone call	MINORS 18
Viers et al.	2015	European Urology	Visit efficiency, patient and provider satisfaction, costs	Prospective RCT	55 (28 TM)	Prostate	Video call	Jadad 2

Table 2
Clinical and safety outcomes for patients with virtual follow-up.

Author	Year	Re-admission	In person review required	Recurrence	Morbidity and mortality
Beaver et al.	2012			2/25 control and 1/25 in TM.	
Beaver et al.	2017			5/129 TM, 5/130 control	
Cerfolio et al.	2019	No emergency readmissions.	No in-person reviews required.		No major morbidity. Minor morbidity: 10/56. No 30- or 90-day mortality. 5-year mortality: 4/142 5-year mortality: 7.3%–21.2% based on tumor type.
Mole et al.	2019			13/142 patients.	
Siddika et al.	2015				
Uppal et al.	2022	90-day readmission: 16.3% TM, 16.5% control	14/98 (14.2%) TM		No difference in mortality.

expressing themselves or asking questions, and as though their provider paid attention and had strong communication skills [18,19]. However, the study by Noble et al. found low acceptance towards the prospect of virtual care, with only 15% of patients surveyed stating that they would have accepted video teleconsultation in place of in-person care [24]. Of note, this patient population were prospectively surveyed about the possibility of following up by telemedicine without actually experiencing post-operative telehealth follow-up. Further, although the study by Siddika et al. found high satisfaction with telehealth overall, a portion of patients still expressed a preference for follow-up with a doctor or nurse specialist (16% and 11% of patients, respectively) [22]. Regarding the perspectives of oncologic surgeons, telehealth was generally well-received, although Neeman et al. reported lower satisfaction for surgical oncologists compared to non-surgical oncologists [25]. Surgical oncologists in the study by Viers et al. expressed concerns that virtual visits would not fit into the existing clinical workflow, specifically concerning physician reimbursement [23].

4. Discussion

There has been a rapid shift towards virtual consultations in many healthcare systems due to the Covid-19 pandemic. By necessity, these pivots occurred quickly, often with limited consideration of safety and efficacy. Although telehealth and virtual consultations are well established in other areas of medicine, this is the first review to specifically examine the use of these technologies in a range of surgical oncology specialties.

Overall, telehealth as a means of follow-up for postoperative cancer patients yielded comparable clinical and disease outcomes to in-person care. Studies assessing readmission, recurrence, and morbidity or mortality concluded that virtual clinics for post-operative surveillance were adequate and not statistically different from in-person appointment outcomes. Patient and provider satisfaction with phone and video-based services was also generally well-received, although there were some concerns from oncologic surgeons with regards to the acceptance of telehealth into the clinical workflow.

Table 3
Patient and provider perspectives regarding satisfaction with virtual consultations.

Author	Year	Cohort assessed	Perspectives and QoL Scores
Beaver et al.	2012	Patients (TM and non-TM)	High satisfaction in both groups. GHQ-12 scores and STAI scores similar; after adjusting for baseline, TM had higher satisfaction ($P = 0.029$). TM group was more likely to raise concerns during consultation, but not statistically significant.
Beaver et al.	2017	Patients (TM and non-TM)	STAI-S (anxiety) scores similar: 33.0 TM, 35.5 control. No significant difference for satisfaction with information. TM group stated more that their provider paid attention, and they could express themselves and ask questions. Control group was more likely to be kept waiting for appointment and state that they did not need info. HFU significantly less likely to state that the nurse knew their particular case.
Cerfolio et al.	2019	Patients (TM)	High overall satisfaction for all TM patients; highest scores in provider communication areas. Note: There were 56 patients in this study, of which 25 were called post-op. The other 13 patients in this study preferred in-person post-op visits.
Malcolm et al.	2021	Patients (TM and non-TM)	26.6% of patients reported perfect health. High satisfaction with no difference between groups. EQ-5D index score: 0.785; QLQ-C30 median score: 75
Mole et al.	2019	Patients (TM)	High satisfaction with care, accessibility, and convenience. All answers between 4.70 and 5.00 (Likert scale 1–5)
Neeman et al.	2021	Surgeons	Well-received and often preferred overall (including cancer surgeons). However, surgeon satisfaction was lower than non-surgical oncologists (11/16 satisfied).
Noble et al.	2019	Patients (TM)	Satisfaction: only 15% said they would have accepted post-op video teleconsultation if this was offered. Accessibility: Over 70% had a suitable device and internet connection for telehealth.
Siddika et al.	2015	Patients (TM)	High satisfaction overall (97% satisfied). However, 16% of patients expressed preference for follow-up with doctor, and 11% with nurse specialist.
Viers et al.	2015	Patients (TM and non-TM) Surgeons	No significant difference in patient perception of visit confidentiality, efficiency, education quality, or overall satisfaction. All scores from both groups between 1.0 and 2.1. (7-point Likert scale; 1 = disagree, 7 = agree) High satisfaction from surgeons regarding virtual (88% strongly agree) and in-person (90%). However, concern that virtual visits may not fit into the clinical workflow ($p = 0.05$).

The results of the studies in this review were generally in agreement, indicating satisfactory telehealth experiences and comparable outcomes to in-person follow-up care. However, many of the included studies had small sample sizes, and those with larger sample sizes often had fewer than 100 cases of telemedicine use, and the findings of these studies must thus be interpreted with caution [10,18,20,23,24]. Of note, the prospective study by Cerfolio et al. stated that 13 patients during the recruitment stage preferred in-person rather than virtual visits for post-operative care, so the final sample of patients who received telehealth and were surveyed were likely already accepting towards virtual care [18]. An interesting finding in the study by Beaver et al. was the high number of patients in the telehealth group who raised concerns during their appointments [19]. The authors discuss the ambiguity of the reasons for this finding, stating that patients in virtual care may have posed more questions to their healthcare providers either due to a lack of sufficient information provided during these consultations or due to a higher level of comfort and openness achieved during these virtual visits. The former would suggest that telehealth post-operative visits are inferior to in-person care, whereas the latter suggests an advantage to providing appointments through virtual platforms that allow patients to receive care from the comfort of their own homes. Another notable aspect to this review was the wide variety of cancers included. Given the different surgery complexities and recovery processes associated with these different cancers, it is crucial to consider that this literature synthesis encompasses a broad range of cancer patients, and the conclusions from studies of one particular cancer (i.e., endometrial cancer) population may not necessarily be applicable to another cancer population (i.e., breast cancer). Nonetheless, the follow-up frequencies of various cancer types are often similar, with frequent physical examinations and administration of adjuvant therapies [26–28]. Therefore, the general results from this review likely apply to many cancer cases, and provide evidence that telehealth use to date in postoperative surgical oncology settings has been well-received by patients and providers alike.

The literature for non-cancer surgical patients indicates similar results, with patients and their families satisfied with telephone

follow-up protocols after surgery [29]. The complication rate and required clinic or emergency intervention is relatively low in this population, and reduces the number of in-person appointments required after treatment [29–31]. Further, a systematic review conducted in 2013 assessed telephone follow-up after surgery and found only five studies on this topic, which were of poor methodological quality and reported dissimilar findings [32]. The current abundance of evidence reflects that although there is still limited research for telehealth and surgery, evidence has increased nonetheless compared to a decade ago. Regarding oncology overall, patients and providers have expressed positive perceptions towards virtual care due to the reduced travel costs and ability for family members to join from different geographic regions [33,34]. Moreover, in a recent survey of gynecologic cancer patient attitudes towards telemedicine, one patient mentioned postoperative discomfort as a potential barrier to traveling long distances to attend in-person appointments [35]. Further, telehealth is becoming increasingly established in other domains of oncologic care, providing a means for access to supportive care (i.e., behavioral, rehabilitation, mental health, etc.), screening, counseling, and provision of prescriptions [33,36]. Despite the evident advantages of telehealth integration into oncology, the possibility of a reduced interpersonal connection between patient and provider remains a frequent concern associated with transitioning towards virtual appointments [34]. Barriers due to digital illiteracy and inequalities of access to technology are also concerns that cannot be ignored when considering the introduction of virtual care systems [5]. In addition, although a survey of patients attending cancer clinics yielded high satisfaction levels overall, the few respondents who were surgical cancer patients did specify a preference for full physical examination in place of a telehealth appointment [37].

The limitations of this study include the small number of studies included, and the high heterogeneity in terms of outcomes assessed and disease characteristics of the subjects. Furthermore, there is a lack of randomized data to assess the quality of care and follow-up. There is also a lack of studies with an appropriate control group for comparative purposes. Considering the low number of papers and the high heterogeneity in patient populations and outcomes

assessed, no quantitative analysis was conducted. In select studies, the providers delivering virtual care were nurses rather than surgical oncologists, as there was very limited evidence available specific to surgeon-conducted telehealth follow-up [19,21,22]. Lastly, telehealth is still a relatively novel and rapidly changing aspect of healthcare, with rapid and frequent advancements. Therefore, the sources included in this review will not necessarily encompass the changing perspectives of patients and providers regarding the current and most updated telehealth systems.

5. Conclusion

Telehealth is an effective and generally well-received method of follow-up care for cancer patients. This has significant implications for clinical practice, as it could provide an alternative to traditional in-person care that allows patients to avoid the burden of transportation time and costs and lengthy wait times without sacrificing the quality of care. However, there is a need to establish a stronger evidence base to gain a robust understanding of the clinical outcomes and patient or provider experiences following virtual clinics for postoperative care.

Declaration of competing interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ejso.2022.08.037>.

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