

Telemedicine vs. In-person Preoperative Appointments in Elective Orthopaedic Surgery

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Abstract

Introduction: In orthopaedics, telemedicine has been successfully integrated into postoperative evaluations and rehabilitation. Due to the COVID-19 pandemic, there has been a shift towards increased utilization of telemedicine. However, telemedicine has not been studied as a substitute for in-person preoperative consultations. The purpose of this study was to compare patient satisfaction for patients who experienced in-person versus telemedical preoperative orthopaedic visits.

Methods: A retrospective review was performed for patients ≥ 18 years who underwent joint or spine surgery between March 2020 and December 2020 at a single institution. Due to the pandemic, patients had the option of in-person or strictly telemedical preoperative consultation. Online satisfaction questionnaires were distributed through REDCap subsequent to their surgery. Patients were grouped as in-person or telemedicine, and groups were compared via independent t-tests for continuous variables and chi-square tests for categorical variables. Alpha was set at 0.05.

Results: Of the 174 responses, 104 were in-person (29.1% response rate) and 70 were telemedicine (44.0% response rate). Patients with in-person appointments more frequently took time off of work for their appointment (33.7% vs. 4.48%, $p < 0.001$) but experienced less barriers to communication (3.85% vs. 27.5%, $p < 0.001$). The in-person group had higher preoperative appointment satisfaction rates but also higher rates of dissatisfaction (81.7% vs. 70.0% and 15.4% vs. 12.9%, $p = 0.005$). Patient satisfaction with their surgery (78.8% vs. 84.3%, $p = 0.715$) and patient satisfaction with their surgeon (80.6% vs. 85.7%, $p = 0.248$) were not significantly different between groups. Patients who conducted their appointment in-person were more likely to prefer to keep their appointment format the same (91.3% vs. 68.6%, $p < 0.001$).

Discussion: The pandemic has resulted in significant changes to surgical workflow. The results of this study demonstrate no differences in patient satisfaction rates between telemedicine and in-person preoperative consultations. Future investigation is required to determine whether telemedical consultation is a viable workflow extending beyond the pandemic.

Level of Evidence: III (retrospective cohort study)

Keywords: telemedicine, preoperative care, patient satisfaction, patient preferences, digital health, telehealth

1.1 Introduction

Preoperative patient appointments prior to elective procedures are vital to establishing the patient-physician relationship, determining eligibility for surgery, assessing and explaining disease severity, and setting postoperative expectations. However, access to healthcare may be hindered by multiple factors, such as geographic location and socioeconomic status.¹ As a means to extend healthcare coverage, telemedicine was developed in the late 1990s. Telemedicine has since advanced to include audiovisual conferencing, remote patient monitoring, and smartphone application integration to more closely model the in-person experience.

Within orthopaedic care, telemedicine has been used as a supplement for remote consultations, outpatient care, postoperative evaluations, and rehabilitation.^{2,3} Quality of care provided at these encounters has been shown to be similar when compared with face-to-face visits.⁴ Utilization of telemedicine has the added benefits of reduced appointment delays, traveling times, travel cost, and time off of work in addition to convenience. Prior literature supports high rates of patient satisfaction with telemedical care.² Despite the documented benefits, the use of telemedicine in orthopaedics has been scarce relative to other specialties.⁵ However, telemedicine has recently expanded at a national scale due to the COVID-19 pandemic, requiring providers to care for patients virtually to limit the risk of in-person transmission.⁶

To our knowledge, there are no existing studies which compare patient satisfaction for patients receiving preoperative orthopaedic telemedicine consultation to those conducted in-person. As telemedicine becomes more widespread, it is important to determine whether or not patients who choose to have telemedical preoperative visits are satisfied with their care. Furthermore, the widespread use of telemedicine will likely persist beyond the pandemic, and it is especially critical to evaluate its performance prior to its use in the absence of extenuating circumstances. Accordingly, our study compared patient satisfaction with their surgery and patient satisfaction with their surgeon rates between patients undergoing in-person versus telemedical preoperative consultation.

1.2 Material and Methods

1.2.1 Data Collection

Approval from the Institutional Review Board (IRB) was obtained prior to the initiation of this study. A retrospective review was performed between March 13, 2020 and December 2, 2020 for any arthroplasty procedure or spine procedure performed by either a fellowship trained joint orthopaedic surgeon or a fellowship trained spine orthopaedic surgeon at a single health care institution. March 13, 2020 marked our institution's transition to telemedicine as a result of the COVID-19 pandemic and subsequent lockdown, and was therefore chosen as the start date of the study. All patients 18 years of age or older were included in the study. Exclusion criteria included any patients undergoing revision surgery of the hip, knee, or spine or patients with multiple preoperative consultations.

An online questionnaire (REDCap, Nashville, TN) regarding preoperative appointments was distributed amongst the cohort of patients via e-mail and telephone within a year postoperatively. The results were also collected by REDCap electronic data capture tools hosted at our institution. The questionnaire addressed: (1) if patients took time off of work for their appointment, (2) duration of their appointment and their commute (potential travel time for those with telemedicine appointments), (3) if they felt they had barriers to communication including participation and comprehension, (4) whether they had the opportunity to discuss all of their concerns with the surgeon before surgery, (5) overall patient satisfaction (rated as either satisfied, unsatisfied, or neither for the preoperative appointment, surgery, and surgeon), and (6) if patients would have preferred to keep the format of their preoperative appointment the same.

1.2.2 Statistical Analysis

Patients were grouped based on in-person or telemedical preoperative consultation. Independent t-tests were used to compare continuous variables, and Pearson's chi-square tests were used for categorical data. Groups were then subclassified based on procedure type (arthroplasty or spine surgery) to see if differences existed within a particular subspecialty. RStudio (version 3.5.1; Boston, MA) was used to perform all analyses. Statistical significance was a p-value less than 0.05.

1.3 Results

1.3.1 Overall

Of the 516 total preoperative appointments meeting criteria, 357 (69.2%) were in-person and 159 (30.8%) were telemedicine. Of the in-person appointments, 104 patients responded (29.1%) consisting of 59 (56.7%) spine patients and 45 (43.3%) arthroplasty patients. Of the telemedicine appointments, 70 patients responded (44.0%) consisting of 30 (42.9%) spine patients and 40 (57.1%) arthroplasty patients ($p=0.101$). There were no significant differences in age (telemedicine: 62.8 years vs. in-person: 63.2 years, $p=0.979$) and commute time (potential commute time for telemedicine patients) to clinic (telemedicine: 37.0 minutes vs. in-person: 43.6 minutes, $p=0.207$) between groups. Patients whose consultations were in-person more frequently took time off work for their appointment (33.7% vs. 4.48%, $p<0.001$) but experienced less barriers to communication during the appointment (3.85% vs. 27.5%, $p<0.001$). However, there was no significant difference in the proportion of patients between groups who felt they had the opportunity to discuss their concerns with the surgeon during the appointment (88.5% vs. 85.7%, $p=0.763$). Patients who conducted their appointment in-person more often preferred to keep the format of their appointment the same were they to do it again (91.3% vs. 68.6%, $p<0.001$) (Table 1).

Table 1. Overall patient perspectives between in-person and telemedicine.

	In-Person (N=104)	Telemedicine (N=70)	P-value
Age (years)	63.2 (13.0)	62.8 (10.9)	0.979
Specialty: Arthroplasty	45 (43.3%)	40 (57.1%)	0.101
Specialty: Spine	59 (56.7%)	30 (42.9%)	
Took Time off from work	34 (33.7%)	3 (4.48%)	<0.001*
Duration of appointment ¹ (minutes)	41.9 (19.0)	35.8 (23.7)	0.018*
Duration of commute to clinic (minutes)	43.6 (31.9)	37.0 (31.1)	0.207
Barriers to communication during appointment	4 (3.85%)	19 (27.5%)	<0.001*
Opportunity to discuss all concerns with the surgeon	92 (88.5%)	60 (85.7%)	0.763
Preferred to keep format of appointment the same	94 (91.3%)	48 (68.6%)	<0.001*
Preoperative Ap- pointment	Satisfied	85 (81.7%)	0.005*
	Neither satisfied nor unsatisfied	3 (2.88%)	
	Unsatisfied	16 (15.4%)	
Surgery	Satisfied	82 (78.8%)	0.715
	Neither satisfied nor unsatisfied	4 (3.85%)	
	Unsatisfied	18 (17.3%)	
Surgeon	Satisfied	83 (80.6%)	0.248
	Neither satisfied nor unsatisfied	3 (2.91%)	
	Unsatisfied	17 (16.5%)	

*Indicated statistical significance (p<0.05)

¹Duration includes the time waiting to be seen by the provider(s)

Regarding their overall satisfaction with their preoperative appointment, patients in the in-person group had higher satisfaction rates but were also more frequently unsatisfied (satisfied: 81.7% vs. 70.0%, and unsatisfied: 15.4% vs. 12.9%), with a greater proportion of patients in the telemedicine group being neither satisfied nor unsatisfied (17.1% vs. 2.88%, p=0.005). In-person surgery satisfaction rates (78.8% vs. 84.3%, p=0.715) and surgeon satisfaction rates (80.6% vs. 85.7%, p=0.248) were not significantly different from the telemedicine group.

1.3.2 Arthroplasty

In the arthroplasty subgroup, 45 patients (52.9%) were in-person and 40 (47.1%) were telemedicine. The telemedicine group was significantly younger (63.6 years vs. 67.0 years, p=0.045). The in-person group had significantly higher rate of patients who preferred to keep the format of their preoperative appointment the same (90.9% vs. 70.0%, p=0.031). There was no difference in preoperative appointment satisfaction, satisfaction with the surgery, or satisfaction with the surgeon between groups (Table 2).

Table 2. Overall patient perspectives between in-person and telemedicine for the arthroplasty service.

	In-Person (N=45)	Telemedicine (N=40)	P-value
Age (years)	67.0 (9.83)	63.6 (10.5)	0.045*
Took Time off from work	9 (20.9%)	2 (5.26%)	0.084
Duration of appointment ¹ (minutes)	42.8 (18.4)	39.5 (26.4)	0.289
Duration of commute to clinic (minutes)	42.2 (32.7)	34.8 (25.3)	0.473
Barriers to communication during appointment	3 (6.67%)	8 (20.5%)	0.121
Opportunity to discuss all concerns with the surgeon	39 (86.7%)	36 (90.0%)	0.743
Preferred to keep format of appointment the same	40 (90.9%)	28 (70.0%)	0.031*
Preoperative Ap- pointment	Satisfied	40 (88.9%)	0.097
	Neither satisfied nor unsatisfied	2 (4.44%)	
	Unsatisfied	3 (6.67%)	
Surgery	Satisfied	40 (88.9%)	0.834
	Neither satisfied nor unsatisfied	0 (0%)	
	Unsatisfied	5 (11.1%)	
Surgeon	Satisfied	41 (91.1%)	0.667
	Neither satisfied nor unsatisfied	1 (2.22%)	
	Unsatisfied	3 (6.67%)	

*Indicated statistical significance (p<0.05)

¹Duration includes the time waiting to be seen by the provider(s)

1.3.3 Spine

In the spine subgroup, 59 patients (66.3%) were in-person and 30 (33.7%) were telemedicine. The in-person group more commonly took time off of work (43.1% vs. 3.45%, p<0.001) but less frequently had barriers to communication (1.69% vs. 36.7%, p<0.001). The in-person group also had longer appointments compared to the telemedicine group (41.3 minutes vs. 31.2 minutes, p=0.015). The in-person group had a significantly higher rate of patients who preferred to keep the format of their preoperative appointment the same (91.5% vs. 66.7%, p=0.008). Patients in the in-person group had higher preoperative appointment satisfaction but were also more frequently unsatisfied (satisfied: 76.3% vs. 70.0%, and unsatisfied: 22.0% vs. 10.0%), with a greater proportion of patients in the telemedicine group being neither satisfied nor unsatisfied (20.0% vs 1.69%, p=0.007). There was no difference in satisfaction with the surgery or satisfaction with the surgeon between groups (Table 3).

Table 3. Overall patient perspectives between in-person and telemedicine for the spine service.

		In-Person (N=59)	Telemedicine (N=30)	P-value
Age (years)		60.2 (14.4)	61.9 (11.5)	0.257
Took Time off from work		25 (43.1%)	1 (3.45%)	<0.001*
Duration of appointment ¹ (minutes)		41.3 (19.6)	31.2 (19.4)	0.015*
Duration of commute to clinic (minutes)		44.7 (31.6)	40.0 (37.7)	0.394
Barriers to communication during appointment		1 (1.69%)	11 (36.7%)	<0.001*
Opportunity to discuss all concerns with the surgeon		53 (89.8%)	24 (80.0%)	0.209
Preferred to keep appointment the same		54 (91.5%)	20 (66.7%)	0.008*
Preoperative Appointment	Satisfied	45 (76.3%)	21 (70.0%)	0.007*
	Neither satisfied nor unsatisfied	1 (1.69%)	6 (20.0%)	
	Unsatisfied	13 (22.0%)	3 (10.0%)	
Surgery	Satisfied	42 (71.2%)	25 (83.3%)	0.403
	Neither satisfied nor unsatisfied	4 (6.78%)	2 (6.67%)	
	Unsatisfied	13 (22.0%)	3 (10.0%)	
Surgeon	Satisfied	42 (72.4%)	26 (86.7%)	0.070
	Neither satisfied nor unsatisfied	2 (3.45%)	2 (6.67%)	
	Unsatisfied	14 (24.1%)	2 (6.67%)	

*Indicated statistical significance (p<0.05)

¹Duration includes the time waiting to be seen by the provider(s)

1.4 Discussions

This study represents the first evaluation of the differences in patient satisfaction rates for telemedical and in-person orthopaedic preoperative consultation visits. Preoperative consultation in this study represented the patients’ first point of contact with their surgeon. Accordingly, patients included in the telemedicine group were indicated for surgery without having physically met their surgeon prior to the day of surgery. Despite the lack of traditional in-person communication and inherent difficulties establishing rapport, the results demonstrate high patient satisfaction rates with telemedical consultation. Interestingly, telemedicine patients appeared to be more frequently neither satisfied nor unsatisfied with their preoperative appointment, which may be a reflection of patient expectations for the preoperative consultation. Compared to in-person consultation, patients who had telemedicine appointments took fewer days off from work. Although there were significantly more barriers to communication with telemedicine, there was no difference in the rate at which patients felt that they had the opportunity to discuss all concerns with their surgeon before surgery. These findings were consistent between arthroplasty and spine patients, suggesting that preoperative telemedicine consultations may be worth investigating in other subspecialties.

Telemedicine has been more recently integrated into the care of orthopaedic surgery patients due to the COVID-19 pandemic, with proposed advantages including increased safety, cost effectiveness, access to care, patient satisfaction, and efficiency.⁷ A retrospective review of spine patients with new, postoperative, and follow-up telemedicine appointments during the pandemic found a high rate of satisfaction (87.7%), which was similar to the satisfaction rates for the surgeon and surgery in our spine subgroup.⁸ A total of 45% of patients preferred telemedicine for appointments in the future, while in our study 70% of patients who had a preoperative telemedicine appointment preferred to keep the same format.⁸ Similarly, a retrospective questionnaire of 346 neurosurgical spine patients during the COVID-19 pandemic assessing patient satisfaction and willingness to proceed with surgery demonstrated high rates of satisfaction with telemedical preoperative consultation.⁹

A total of 95% of patients were either “satisfied” or “very satisfied”, and 37% of patients were willing to proceed with major surgery and 73% of patients were willing to proceed with minor surgery following their telemedicine visit alone. However, this study did not have a control group, and there was no assessment of the proportion of patients that ultimately decided to undergo surgery and whether they were satisfied with their surgery.

Additional studies have been performed comparing telemedical to in-person consultation in a variety of orthopaedic patient populations and appointment types. In a randomized control trial from Norway comparing orthopaedic telemedical and in-person consultations at a regional medical center, no differences in patient reported satisfaction and health outcomes were detected with 99% of remote consultation patients reporting satisfaction or very high satisfaction and 86% of patients preferring remote consultation as their next follow up appointment.² However, remote consultation was performed through real-time videoconferencing with a trained nurse and patient at the remote location. These measures may have mitigated any technological difficulties or barriers to communication. In a randomized controlled trial of joint arthroplasty patients undergoing web-based versus in-person follow-up appointments greater than 1 year following surgery, in-person appointments were associated with higher rates of satisfaction with the care they received by their surgeon, as well as the follow-up process. Interestingly, web-based follow-up appointments were preferred in this cohort, despite lower satisfaction rates compared to the in-person group.¹⁰ Similarly, a randomized controlled trial of post-operative follow-up in 58 patients receiving rotator cuff repair found no difference in overall satisfaction rates and a preference for telemedicine.¹¹

Telemedicine may have an impact on healthcare beyond patient satisfaction, as the COVID-19 pandemic has helped surgeons understand the utility in telecommunication technology while simultaneously requiring them to adapt in order to overcome its limitations.⁷ It is important to stress that patients included in this study had never before met with their consulting surgeon. Their telemedical visit served as a true consultation for both diagnosis and indication for surgery. An essential part of the diagnostic work-up of patients, particularly in the preoperative setting, is effective orthopaedic physical examination which has previously served as a significant limitation in adopting telemedicine into practice. However, with the coming of the pandemic, many orthopaedic examination maneuvers have been adapted, standardized, and validated in prior studies.¹² Additional confirmation of virtual exam findings takes place in-person on the day of surgery. Moreover, in a retrospective review on spine patient triage, it was noted that telemedicine saved \$325 per patient and cut wait times for consultation from 8 months to 0.5 weeks.¹³ In our study, we found that patients with telemedicine appointments did not take off work as much as patients with in-person appointments. However, this may not account for extra time spent by the patient obtaining imaging (e.g. radiographs) at outside facilities. Furthermore, telemedicine appointments were shorter in duration for the spine subgroup, while patients still felt they were able to discuss all of their concerns with the surgeon. Barriers to communication were increased in the telemedicine group, and this is likely due to technological complications. A previous study noted that both audio and video difficulties prevalent in telemedical communication led to difficulties in communication, participation, and comprehension and were associated with decreased satisfaction rates.⁸ As telemedicine becomes more common, a more seamless and standardized form of healthcare would be expected, and that may lead to improvements in patient satisfaction due to less frequent technological complications.

This study is not without limitations. Retrospective investigation of patient satisfaction is subject to recall biases. Additionally, patients were able to choose their preferred method of consultation rather than being randomized. The self-selection between groups can result in inflated satisfaction and/or preference scores for both telemedicine and in-person appointments. Moreover, the survey response rate was higher for the telemedicine group, which may have been from the questionnaire being accessed and distributed online. Patients who choose telemedicine may be more technologically savvy which may lead to higher online response rates.¹⁴ Calls were placed in addition to e-mails, but these may have been less convenient compared to patients who responded via the e-mail invitation. Our overall response rate was 33.7%; however, this is comparable to similar studies published in the literature.¹⁵ Lastly, only patients who had surgery were included in this cohort, and patients who may have decided against surgery based on their dissatisfaction with the preoperative appointment were not included.

1.5 Conclusion

Telemedicine and its integration into our healthcare systems can provide more flexibility for patients and providers. Our retrospective study of 174 orthopaedic preoperative appointments found no difference in satisfaction rates with the surgeon and surgery. However, patients with in-person appointments were more likely to be either satisfied or unsatisfied with their appointment, while patients in the telemedicine group were more likely to be neither satisfied nor dissatisfied. Based on these findings, preoperative telemedicine for routine spine and arthroplasty consultation may be a viable alternative option for a select category of patients and a worthwhile topic of further investigation outside the setting of a global pandemic.

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