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Shared Decision-Making in General Surgery: A Prospective Comparison of Telemedicine vs In-Person Visits

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Brief Title: Telemedicine Shared Decision-Making

Background: The Covid-19 pandemic has accelerated a shift towards virtual telemedicine appointments with surgeons. While this form of healthcare delivery has potential benefits for both patients and surgeons, the quality of these interactions remains largely unstudied. We hypothesized that telemedicine visits will be associated with lower quality of shared decision-making.

Study Design: We performed a mixed-methods, prospective observational cohort trial. All patients presenting for a first-time visit at general surgery clinics between May 2021 and June 2022 were included. Patients were categorized by type of visit: in-person vs telemedicine. The primary outcome was level of shared decision-making as captured by Top Box score of the collaboRATE measure. Secondary outcomes included quality of shared decision-making as captured by the 9-item Shared Decision-Making Questionnaire (SDM-Q-9) and satisfaction with consultation. An adjusted analysis was performed accounting for potential confounders. A qualitative analysis of open-ended questions for both patients and practitioners was performed.

Results: Over a 13-month study period, 387 patients were enrolled. 301 (77.8%) underwent an in-person visit and 86 (22.2%) underwent a telemedicine visit. The groups were similar in age, gender, employment, education, and generic quality of life scores. In an adjusted analysis, a visit type of telemedicine was not associated with either the collaboRATE TopBox score (OR 1.27; 95% CI 0.74-2.20) or SDM-Q-9 (β -0.60; p =0.76). Similarly, there was no difference in other outcomes. Themes from qualitative patient and surgeon responses included physical presence, time investment, appropriateness for visit purpose, technical difficulties, and communication quality

Conclusion: In this large, prospective study, there does not appear to be a difference in quality of shared decision making in patients undergoing in-person vs telemedicine appointments.

Keywords

Telemedicine; telehealth; general surgery; shared decision-making; SDM; collaboRATE; patient satisfaction; communication quality

Introduction

Telemedicine is the use of communication and information technologies to remotely provide healthcare to patients who are physically separated from providers. In a surgical setting, audio- and video-based virtual visits have been utilized for preoperative evaluation in addition to postoperative monitoring and long-term follow-up,[1] though at infrequent rates prior to 2019.[2] With face-to-face limitations imposed by the COVID-19 pandemic and expansion of coverage for telemedicine,[3] usage has substantially increased across surgical specialties.[4,5] Among both providers and patients, there is interest in continued use of telemedicine beyond the COVID-19 pandemic.[6,7]

Increased popularity has brought about surging interest in telemedicine compared to traditional in-person visits. Among proposed advantages are improving access to geographically distant providers, improving cost-efficiency of visits, and reducing time burden. Existing observational[8–14] and randomized[15–17] studies suggest similar rates of patient satisfaction and subsequent care use in telemedicine appointments relative to in-person. While the setting of patient follow-up has been a popular target of investigation, little is known about initial consultations between surgeons and patients. Telemedicine may negatively influence the quality of physician-patient interactions, including the absence of a physical exam and communication limitations with virtual modalities.[18–20] A fundamental component of interaction quality in a surgical visit is shared decision-making, or the "process by which clinicians and patients make decisions together using the best available evidence about the likely benefits and harms of each option, and where patients are supported to arrive at informed preferences." [21] There is a knowledge gap about the influence of a visit type of telemedicine on shared decision-making, especially in a surgical population.[22]

Goals of this mixed-methods study were 1) to compare levels of shared decision-making and patient satisfaction between telemedicine and in-person visits with initial patient-surgeon encounters, 2) to identify whether a visit type of telemedicine is a significant predictor of shared decision-making when controlling for baseline provider- and patient-level variation, and 3) to qualitatively assess patient and provider preferences and barriers regarding telemedicine and in-person visits. We hypothesized that telemedicine would be associated with inferior levels of patient-perceived shared decision-making relative to in-person visits.

Methods

Study Design

This single site prospective mixed-methods study was approved by the Vanderbilt University Medical Center IRB (IRB #210507). We obtained informed consent from participants. All English-speaking adult patients completing a new patient visit at a Vanderbilt clinic in the Division of General Surgery between May 2021 and June 2022 with a documented email address were eligible. Both telemedicine and in-person visits were included; all telemedicine visits were conducted by attending physicians via video using the Zoom platform (Zoom Video Communications, Inc, San Jose, USA), while in-person visits included interactions with attending and resident physicians. Patients meeting inclusion criteria were invited by email no later than 24 hours after their appointment to complete a screening questionnaire confirming eligibility. Enrolled participants completed two measures of shared decision-making with CollaboRATE and the 9-item Shared Decision Making Questionnaire (SDM-Q-9), one measure of generic quality of life with the EuroQol 5 Dimension 5 Level (EQ-5D-5L), a satisfaction rating, a computer comfort rating, and questionnaires about socioeconomics (employment, highest level of education, annual household income) and appointment-specific features

(telemedicine versus in-person visit type, whether an operation was scheduled during the appointment). CollaboRATE is a measure of the shared decision-making process that has been previously validated[23] and implemented across multiple practice settings. It captures three aspects of shared decision-making: explanation of the health issue, elicitation of patient preferences, integration of patient preferences. The SDM-Q-9 quantifies patient involvement in shared decision-making through nine questions answered on a 6-point Likert scale.[24] The EQ-5D-5L index contains five domains of self-reported quality of life: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. EQ-5D-5L index scores were calculated using the standardized United States EQ-5D-5L value set.[25] Study participants were administered a qualitative questionnaire with open-ended responses about positive and negative aspects of their appointment visit type (SDC 1, http://links.lww.com/JACS/A190). Remaining variables of age, gender, self-reported race, and encounter department were obtained through retrospective chart review. Patient addresses were geocoded and converted to distance from provider clinic site using the DeGAUSS[26] R package.

Quantitative Design

The primary outcome was level of shared decision-making as captured by collaboRATE. Secondary outcomes were an additional measure of shared decision-making in the SDM-Q-9 and level of patient satisfaction. Top Box score conversions were applied to collaboRATE to capture responses scoring in the highest possible category (answering "Every Effort was Made" to all questions) and Satisfaction (answering "Most confident" to "Rate how confident you are with the care you received during this appointment"). Top Box scoring was adopted given prior ceiling effects of surveys assessing physician communication,[27] a decision consistent with existing investigations of surgeon communication quality.[28] To assess the potential for nonresponse bias,

responders were compared to non-responders in terms of age, gender, visit type, and visit department.

Power Calculation

An *a priori* power analysis was performed guided by prior psychometric investigation of CollaboRATE top score frequency when comparing a low level of shared decision-making (17.2%) to a high level of shared decision-making (42.3%).[29] At $\alpha = 0.05$, a sample size of 102 (51 in each arm) was needed in order to achieve 0.80 power.

Statistical Analysis

Descriptive statistics are reported in Table 1, with mean and median for continuous variables and counts and percentages for categorical variables. Cluster analysis and redundancy analysis were performed to examine the correlation structure among the study variables and missing data pattern. Multiple imputation was performed to impute missing covariate data before fitting multivariable models. Logistic regression models were fitted for binary outcome measures (collaboRATE Top Box, Satisfaction Top Box) and linear regression for numeric outcome measures (SDM-Q-9). Adjusted odds ratios and confidence intervals are summarized with forest plots. All statistical analyses were performed in R 4.2.1.

Qualitative Analysis

In order to gain further insight into patient and provider perceptions of telemedicine, responses to open-ended questions (SDC 1, http://links.lww.com/JACS/A190) were interpreted according to constant comparative methodologies[30] and thematic analysis[31] as previously described. Thematic coding was performed independently by two investigators (TU and AH) with discrepancies resolved through discussion to consensus. Commonalities in coded responses were extracted into higher order themes.

Results

Quantitative

Of 819 patients eligible after screening, 387 (47.3%) patients completed the collaboRATE questionnaire and were included in the primary analysis. Non-responders were more likely to be older in age and have an in-person visit (SDC 2, http://links.lww.com/JACS/A190). The majority of included patients were female (57.1%), employed (57.9%), "most comfortable" with using a computer (57.4%), and attended in-person visits (77.7%) (Table 1). Median distance between patient home address and clinic location was greater in telemedicine (50.3 miles) relative to in-person (27.3 miles) visits. Patients indicated that they did not prefer their respective appointment style in 4.4% of in-person and 4.0% of telemedicine visits. Patients indicated that they would not choose their respective appointment style again in 4.8% of in-person and 2.6% of telemedicine visits. Top Box score was achieved in the majority of visits for collaboRATE (in-person 65.3%, telemedicine 69.8%) and Satisfaction (in-person 72.8%, telemedicine 77.8%) (Figure 1). Mean (SD) of SDM-Q-9 was 90.6 (16.1) for telemedicine and 90.8 (15.8) for in-person visits. (Table 2)

In adjusted analyses of shared decision-making measures, the only significant factor associated with achieving a collaboRATE Top Box score was EQ-5D-5L (OR [95% CI], 1.46 [1.13, 1.90]) (Table 2, Figure 2). A visit type of telemedicine was not associated with collaboRATE Top Box (OR [95% CI], 1.44 [0.93-2.24]). In linear regression, variables associated with a higher SDM-Q-9 score were having any appointment with Surgical Weight Loss (β estimate +- SE) (15.08 +- 3.69, $p = 0.02$) and EQ-5D-5L (β estimate +- SE) (5.88 +- 2.56, $p < 0.01$). A visit type of telemedicine was not associated with SDM-Q-9 score in linear regression (β estimate +- SE) (-0.60 +- 1.96, $p = 0.76$) No included covariates were associated

with achieving Satisfaction Top Box including visit type of telemedicine (OR [95% CI], 1.33 [0.73, 2.42]).

Qualitative

Patient Perspective

For qualitative questions, 327 patient responses were received. Open-ended responses were collated into 5 themes (Table 4): physical presence, time investment, appropriateness for visit purpose, technical difficulties, and communication quality. Except for technical difficulties, each theme had applicable responses from both in-person and telemedicine visits.

Regarding physical presence, in-person visit responses highlighted the importance of the physical exam and ability to obtain labs/imaging.

"I like the interaction and chemistry of the in-person meeting. There were items discovered by the doctor being able to touch and feel the area of concern."

Telemedicine patients favorably viewed decreased infectious risk during the COVID-19 pandemic.

"*If you're uncomfortable about going in person; especially with COVID still around."*

Regarding time investment, greater commitment for both physician and patient to be physically present for a visit was discussed among in-person responses.

"*Having to take time to get to facility, park and wait in waiting room. Much easier and quicker to join telehealth from home."*

Many commented on the convenience of telemedicine visits including absence of driving distance as well as less time away from work or family.

"I do prefer this [telemedicine] treatment style, it is convenient and I don't have to miss work or drive"

For the theme of appropriateness for visit purpose, patients completing in-person appointments viewed this visit type as preferable for surgical consultation.

"Nothing beats in person for a serious medical discussion. Surgery is a serious matter, even if the actual procedure is fairly routine in nature."

Telemedicine responses focused on suitability of virtual visits for follow-up appointments.

"I prefer in person initially because I like contact with the doctor and staff. However, the convenience of future appts via telehealth is an option I would consider for subsequent visits."

Technical difficulties arose associated with operating the telemedicine visit software.

"I could hear but the doctor couldn't. He called me on the phone and it worked great."

Regarding communication quality, exclusively favorable aspects of communication quality were mentioned for in-person visits and included the ability to incorporate physical models in explanations, interpretation of non-verbal communication cues, ease of engaging in informal conversation, and greater interaction with all members of clinical staff.

"I feel that the conversations flow more easily with in person meetings."

Both positive and negative perceptions of telemedicine communication quality were reported. Favorable aspects included lack of clinical environment distractions and equivalent connection relative to in-person visits.

"I feel more connected with the provider, I am looking at them face-to-face on a screen in my home without any distraction of a clinic environment feel very comfortable using e-visits. I feel seeing the care-taker on screen is as good as seeing them in person."

Negative aspects of inferior relational quality were also reported.

"*I'm concerned that virtual a doctor can be even less interested in my situation, pain, and needs."*

Provider Perspective

Twelve surgeons completed the qualitative questionnaire (SDC 3, http://links.lww.com/JACS/A190). Themes from patient surveys were echoed in provider open-ended responses, with additional themes of documentation efficiency and licensing restrictions surfacing with telemedicine visits (Table 4). Providers were specifically queried about perspectives on surgery after completing only telemedicine visit. Some always preferred at least one in-person visit before surgery, whereas others felt comfortable in select situations taking into account disease-specific variation and level of patient health literacy.

"Can work in some situations / diseases but does not work for all of them, particularly when a physical exam is necessary".

Discussion

In this mixed methods, prospective observational cohort of first-time consultations at general surgery clinics, our primary finding was that a visit type of telemedicine was not a significant predictor of shared decision-making or satisfaction when controlling for baseline sociodemographics and generic quality of life. Qualitative questionnaires revealed largely congruent perceptions between providers and patients; visit strengths included the convenience of telemedicine and the physical examination of in-person visits. Telemedicine communication quality was frequently viewed favorably, though many preferred for surgical discussions to take place in-person.

In our study, the type of visit (telemedicine versus in-person) was not a predictor of two shared decision-making outcomes in adjusted analyses. In a prior systematic review of 12 studies comparing shared decision-making in a remote setting relative to in-person, Hartasanchez et al[22] concluded an inability to make judgements about shared decision-making levels in real-time

virtual visits citing vast heterogeneity and low quality of available evidence. The only included surgical population was Barsom et al[14], who assessed satisfaction among 50 patients with colorectal cancer using a questionnaire that contained the item "The healthcare provider involves me enough in decisions about the treatment". Fewer patients in the telemedicine group reported "Agree" to this question relative to the in-person group. Although the telemedicine variable was not associated with lower quantitative shared decision-making scores in our study, qualitative responses uncovered potential barriers to virtual interaction quality. Patients specifically highlighted difficulty in interpreting non-verbal communication cues, inability to interact with other clinical staff members as part of developing trust in the care team, inferior rapport-building or small talk, and difficulty in understanding explanations without use of physical models or drawings. Providers echoed concerns of difficulties in interaction quality in telemedicine visits, similar to prior analogous surveys of surgeons.[19] Thus, while our included surgeons were able to achieve quantitatively equivalent shared decision-making scores in both in-person and telemedicine appointments, there were elements of virtual visits that detracted from communication quality. Further research into patient perceptions is needed to guide educational efforts[32,33] and consensus guidelines[18,34] aiming to maximize surgeon communication during telemedicine visits.

Our finding that telemedicine was not associated with a decrease in patient satisfaction agrees with prior investigations. Cremades et al[15] conducted a randomized controlled trial (RCT) of telemedicine versus in-person follow up in 200 general surgical patients. They found no difference in clinical outcomes or patient satisfaction between groups but worse feasibility of follow-up. In a RCT of postoperative follow-up in 41 patients undergoing minimally invasive gynecologic surgery, Radtke et al[17] concluded higher patient satisfaction in the telemedicine

group. Additional metrics of visit quality have been studied with similar positive conclusions, including minimal impact on additional in-person care,[35] reductions in no-show rates,[36] and patient- or surgeon-perceived effectiveness.[37] Our data support low rates of dissatisfaction with telemedicine; only 4.0% reported they did not prefer this appointment type and 2.6% would not choose it again. Although some payers have withdrawn support for telemedicine after expiring COVID-19 emergency declaration orders, our findings suggest high interaction quality in these visits and lend support for continuation of coverage. Rather than eliminating this visit type, we advocate for future work to refine the suitable disease processes, practice settings, and consultation purposes appropriate for telemedicine.

A tendency for patients with higher generic or disease-specific quality of life to report higher levels of satisfaction with care has been documented in multiple practice environments previously.[38,39] Consistent with this, generic quality of life measured through EQ-5D-5L in our study was a predictor of both primary and secondary outcomes in our adjusted analyses. As studies investigating telemedicine frequently include patients with vast heterogeneity of diseases and severities, we recommend controlling for health-related quality of life with future attempts to study the effect of telemedicine visits.

The process of identifying appropriate candidates for telemedicine visits continues to evolve, with disagreement around use in new patient evaluations or surgical consultations. A consensus from the Telemedicine in Colorectal Surgery Italian Working Group recommended against use in initial consultation or the surgical decision-making process.[18] Similarly, Choi et al[40] reported inferior satisfaction among surgeons when comparing telemedicine new patient to follow-up visits, but no difference when comparing in-person new patient to follow-up visits. However, others studying telemedicine in a new patient setting have shown superb provider

communication,[41] favorable patient satisfaction,[12,42–44] and no change in likelihood of new patients subsequently undergoing surgery.[45] In our study, quantitative data indicated high levels of shared decision-making and satisfaction among initial virtual consultations; however, providers and patients suggested that some surgical discussions may be best suited for in-person visits. Further, our included surgeons were hesitant when prompted about offering surgery after only telemedicine appointments. Thus, substantial value was placed on in-person visits in the surgical consultation process even when telemedicine scored highly on patient markers of shared decision-making and satisfaction. Because these perspectives would be absent if telemedicine interaction quality was judged solely from quantitative metrics, our study reinforces the value of a qualitative component when investigating visit quality outcomes. Future qualitative assessments of shared decision-making in a surgical setting are needed, especially regarding telemedicine.

Strengths of this study include the prospective evaluation of multiple validated measures of shared decision-making with a comparator of in-person visits completed throughout the same study period. We also controlled for patient- and provider-level covariates in adjusted analyses and performed an *a priori* power analysis to inform sample size with guidance from prior validation studies of the primary outcome.

This study needs to be interpreted with acknowledgements to its limitations. Our nonresponse rate was 52.7%, with non-responders more likely to be older in age and have an in-person visit. Our inclusion criteria specified an email address, access to the Internet, and access to a RedCap compatible device to complete screening forms and study questionnaires. This may have resulted in a study population with higher electronic device proficiency and socioeconomic status relative to the general population. Most of our population achieved at least a collegiate

degree and was currently employed. Thus, although we did not find a significant association between sociodemographics and primary or secondary outcomes, we do not believe our study design was appropriate to contribute to the growing evidence about differential telemedicine access and satisfaction along these lines.[46–50] Our single-center collection of data may not be representative of other geographic settings or other surgical specialties. Further, our attempts to control for baseline variability in adjusted analyses did not account for health literacy, and the nonrandomized nature of the study that allowed patients to choose between a visit type of in-person or telemedicine may have inflated visit quality scores. We did not study if technical issues could have contributed to lower overall telemedicine scores. Finally, the decision to adopt Top Box scoring likely sacrificed precision of results with the possible consequence of losing ability to detect more subtle differences in shared decision-making.

Conclusions

In initial visits between general surgeons and patients, telemedicine was not associated with changes in shared decision-making or satisfaction questionnaire scores when compared to in-person consultation. Analysis of open-ended patient responses revealed suggestions for many surgical discussions to take place in-person, with follow-up as a suitable application for telemedicine.

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Figure legend

Figure 1: Patient ratings of shared decision-making and satisfaction stratified by visit type. (A) Proportion of visits achieving collaboRATE Top Box; (B) proportion of visits achieving Satisfaction Top Box; (C) box and whiskers plot of Shared Decision-Making 9-item Questionnaire.

Figure 2: Logistic regression forest plot for primary and secondary outcomes. Odds ratio for included covariates with outcome of (A) collaboRATE and (B) Satisfaction with consultation.

Precis

In first-time general surgery visits, telemedicine was not associated with different shared decision-making or satisfaction scores relative to in-person. Qualitative responses highlighted the convenience of telemedicine, the physical examination of in-person visits, and suggestions for many surgical discussions to take place in-person.

Table 1: Demographics Stratified by Visit Type

Variable	**In-person (N=301)**	**Telemedicine (N=86)**	**Overall (N=387)**
Age, y, mean (SD)	54.3 (13.6)	53.3 (12.4)	54.1 (13.3)
Sex, n (%)			
Female	169 (56.3)	52 (60.5)	221 (57.1)
Male	131 (43.7)	34 (39.5)	165 (42.6)
Missing	0 (0)	0 (0)	1 (0.3)
Self-reported race, n (%)			
Black or African American	29 (9.7)	14 (16.3)	43 (11.1)
Other	7 (2.3)	2 (2.3)	9 (2.3)
White	249 (83.0)	66 (76.7)	315 (81.4)
Missing	15 (5.0)	4 (4.7)	20 (5.2)
Encounter department, n (%)			

Variable	In-person (N=301)	Telemedicine (N=86)	Overall (N=387)
Colorectal surgery	56 (18.7)	15 (17.4)	71 (18.3)
General surgery	150 (50.0)	41 (47.7)	191 (49.4)
Bariatric surgery	94 (31.3)	30 (34.9)	124 (32.0)
Missing	0 (0)	0 (0)	1 (0.3)
Current employment, n (%)			
No	99 (33.0)	28 (32.6)	128 (33.1)
Yes	175 (58.3)	49 (57.0)	224 (57.9)
Missing	26 (8.7)	9 (10.5)	35 (9.0)
Education, n (%)			
High school or less / some college	90 (30.0)	26 (30.2)	116 (30.0)
College degree	104 (34.7)	32 (37.2)	137 (35.4)

Variable	In-person (N=301)	Telemedicine (N=86)	Overall (N=387)
Graduate degree	82 (27.3)	21 (24.4)	103 (26.6)
Missing	24 (8.0)	7 (8.1)	31 (8.0)
Income, n (%)			
<$60k	75 (25.0)	25 (29.1)	101 (26.1)
$60k-$120k	101 (33.7)	29 (33.7)	130 (33.6)
>$120k	93 (31.0)	21 (24.4)	114 (29.5)
Missing	31 (10.3)	11 (12.8)	42 (10.9)
Distance from clinic location, miles			
Mean (SD)	51.4 (68.1)	76.9 (72.9)	57.1 (70.0)
Median [min, max]	27.3 [0.320, 432]	50.3 [1.66, 351]	29.8 [0.320, 432]
Missing	0 (0)	0 (0)	1 (0.3)

Variable	In-person (N=301)	Telemedicine (N=86)	Overall (N=387)
Comfort with computer, n (%)			
1 (least comfortable) / 2 / 3	35 (11.7)	16 (18.6)	51 (13.2)
4	69 (23.0)	15 (17.4)	85 (22.0)
5 (most comfortable)	174 (58.0)	48 (55.8)	222 (57.4)
Missing	22 (7.3)	7 (8.1)	29 (7.5)
EQ-5D-5L			
Mean (SD)	0.780 (0.248)	0.784 (0.260)	0.781 (0.250)
Missing	14 (4.7)	5 (5.8)	19 (4.9)
Surgery scheduled during visit, n (%)			
No	215 (71.7)	59 (68.6)	275 (71.1)
Yes	53 (17.7)	18 (20.9)	71 (18.3)

Variable	In-person (N=301)	Telemedicine (N=86)	Overall (N=387)
Missing	32 (10.7)	9 (10.5)	41 (10.6)

EQ-5D-5L, EuroQol 5 Dimension 5 Level

Table 2: Outcome Regression Models

	CollaboRATE top box		Satisfaction top box		SDM-Q-9	
Variable	**Unadjusted frequency, %**	**Adjusted model* odds ratio (95% CI)**	**Unadjusted frequency, %**	**Adjusted model* odds ratio (95% CI)**	**Unadjusted score (SD)**	**Adjusted model† effect size (p value)**
Visit type of telemedicine	69.8%	1.44 (0.93-2.24)	77.8%	1.33 (0.73-2.42)	90.6 (16.1)	-0.60 (0.76)

*Logistic regression model incorporating age, sex, encounter department, employment, education, income, computer comfort, EQ-5D-5L Index Score

†Linear regression model incorporating age, sex, encounter department, employment, education, income, computer comfort, EQ-5D-5L Index Score

SDM-Q-9, Shared Decision-Making 9-item Questionnaire

Table 3: Qualitative Patient Perspectives

Theme	**Representative response**	
	In person	**Telehealth**
Physical presence	I like the interaction and chemistry of the in person meeting. There were items discovered by the doctor being able to touch and feel the area of concern	If you're uncomfortable about going in person; especially with COVID still around
Time investment	Having to take time to get to facility, park and wait in waiting room. Much easier and quicker to join telehealth from home.	I do prefer this [telemedicine] treatment style, it is convenient and I don't have to miss work or drive
Appropriateness for surgical consultation vs follow-up	Appropriateness for Surgical Consultation: Nothing beats in person for a serious medical discussion. Surgery is a serious matter, even if the actual procedure is fairly routine in nature.	Appropriateness for follow-up: I prefer in person initially because I like contact with the doctor and staff. However, the convenience of future appts via telehealth is an option I would consider for subsequent visits.
Technical difficulty	N/A	I could hear but the doctor couldn't. He called me on the phone and it worked great.

Communication quality	I feel that the conversations flow more easily with in person meetings.	I feel more connected with the provider, I am looking at them face-to-face on a screen in my home without any distraction of a clinic environment I'm concerned that virtual a doctor can be even less interested in my situation, pain, and needs.

Table 4: Qualitative Provider Perspectives

Theme	**Representative response**	
	In-person	**Telemedicine**
Physical presence	There is important information from the physical exam that cannot be achieved through telemedicine. I get a better overall assessment and connection with a patient when meeting in-person.	I need to examine patients and this is not an option virtually
Time Investment	Patient has to travel, [and] sometimes it takes more time to spend with patient.	Ease for my work location and ease for patient from a long distance.
Appropriateness for surgical consultation vs follow-up	N/A	Appropriateness for follow up: Not for initial evaluation. I believe that there is a lot to be gained by physically being able to evaluate a patient in person/clinic. Follow up appointments can work well.

Technical difficulty	N/A	Technical errors in setting up audio or video occur frequently.
Communication quality	Having in person meetings with patients has a more intimate feel and it seems to me that a rapport with the patient is better establish [ed].	It is harder to share diagrams and drawings over telehealth… Sometimes less "personal", following the same challenges seen in the business meeting space.
Documentation efficiency	N/A	Provider can more easily document during the visit.
Legal restriction	N/A	Limitation due to state lines and licensure

Figure 1

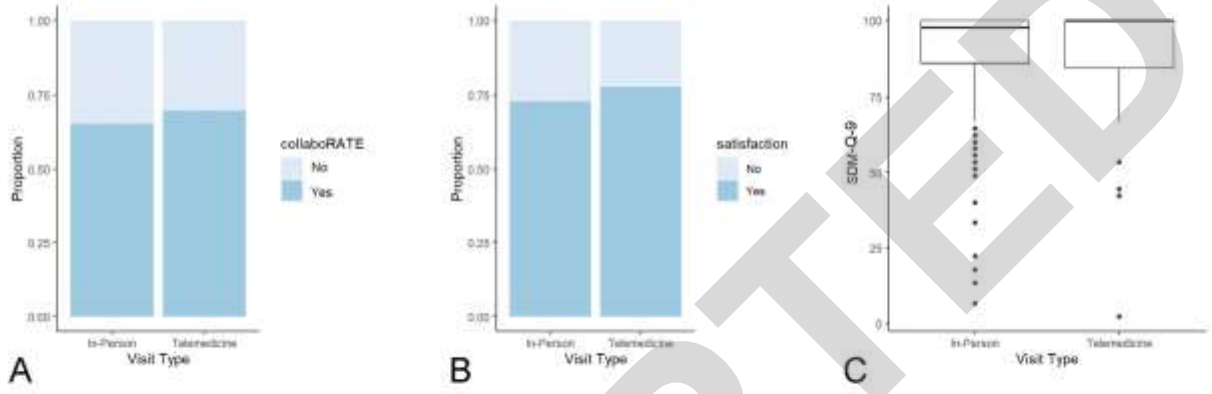

Figure 2