The American Journal of Surgery 218 (2019) 476–479

Contents lists available at ScienceDirect

The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

Telehealth provides a comprehensive approach to the surgical patient☆

Kulvir Nandra*, George Koenig, Andrea DelMastro, Elizabeth A. Mishler, Judd E. Hollander, Charles J. Yeo

Thomas Jefferson University, Department of Surgery, 1015 Walnut Street, Curtis Building, Suite 620, Philadelphia, PA, 19107, USA

ARTICLE INFO

Article history:
Received 2 July 2018
Received in revised form
22 August 2018
Accepted 6 September 2018

Presented at:1.) Society for Education and the Advancement of Research in Connected Health (SEARCH) Telehealth Symposium. October 2017, Philadelphia, PA.2.) Academic Surgical Congress 13th Annual Meeting. January 2018, Jacksonville, Fl.

Keywords:
Telehealth
Video conferencing
National Quality Forum
Patient experience
Access to care

ABSTRACT

Background: This study describes telehealth use within the Department of Surgery in a large urban academic medical center and its role in diverse surgical patients.
Methods: We performed a retrospective descriptive study of video telehealth visits conducted by an academic urban surgery department from February 2017 to November 2017. We report our experience in accordance with the National Quality Forum recommended domains of access, experience and effectiveness.
Results: Six hundred and fifty-five (655) video telehealth encounters were performed during the study period: 152 were immediate postoperative visits, 424 were established patient visits, and 79 were group sessions. Our 30-day readmission rate of the post-operative visits was very low (4 of 152). One hundred and forty-one (141) patient survey responses show very high satisfaction and time savings.
Conclusions: Our results demonstrate a single institution's successful experience in offering telehealth to surgical patients in an urban setting.

Introduction

Translation of medical innovation and technology into practical clinical settings can pose many challenges. Telehealth, defined by the Health Resources and Services Administration as "the use of electronic information and telecommunications technologies to support and promote clinical healthcare, patient and professional health-related education, public health and health administration"[1] has had a significant impact on healthcare delivery. Despite clear advantages to patient care, the overall adoption of telehealth has progressed slowly in the past decades. Barriers to adoption include: unfamiliarity with technology, costs of implementation, lack of reimbursement, patient trepidation, concerns of inferior care delivery, and deterioration of the doctor-patient relationship.[2] For surgical patients, these barriers may be more pronounced. Traditional surgical training stresses the importance of physical examination in a post-operative patient. Nevertheless, a growing body of evidence now demonstrates the efficacy of telehealth in a variety of clinical scenarios. The National Quality Forum (NQF) recently published a framework to measure telehealth effectiveness and implementation.[3] Here, we present our Surgery Department's use of telehealth in various clinical settings for the surgical patient and evaluate it according to the domains of the NQF framework.

Methods

We conducted a retrospective descriptive review of all synchronous audio-video telehealth visits performed in our Department of Surgery from February 2017 through November 2017. We describe access, patient experience and effectiveness of the program.

Jefferson Health initiated JeffConnect in 2015, an enterprise-wide telehealth program that offers video visits with a Jefferson

☆ This manuscript has not been previously published or currently submitted elsewhere for publication and will not be sent to another journal until a decision is made concerning publication by American Journal of Surgery.

* Corresponding author.
E-mail address: Kulvir.Nandra@jefferson.edu (K. Nandra).

https://doi.org/10.1016/j.amjsurg.2018.09.020
0002-9610/

surgeon via Web or mobile app. This allows patients to follow up with providers virtually, as an alternative to an in-person visit. The JeffConnect team comprises a program and project manager and five telehealth coordinators. The Department of Surgery had a dedicated telehealth coordinator during this time period. The telehealth coordinators undergo training to organize clinical services and enhance patient engagement via telehealth. Telehealth coordinators are college educated non-medical providers who have completed an American Telehealth Association accredited telehealth facilitator certificate program.[4] Coordinators use videoconferencing technologies and scheduling software to coordinate and connect staff, patients, and providers. During its early implementation phase, the JeffConnect team conducted more than 50 two-hour in-person group education sessions training providers, schedulers, and staff. The training sessions covered topics including program description, legal and regulatory information relevant to providing care via telehealth, how to use the telehealth platform for conducting video visits, and value to patients.

To initiate the program, each attending surgeon within the department was approached to identify uses for a synchronous audio-video telehealth visit based on their own preference, patient preference and comfort level with the technology. Patients, meeting these criteria, schedule telehealth visits using the same processes that are used for scheduling in-person visits: either by calling a centralized health system scheduler, calling the office, or by requesting a telehealth visit online. Patients receive an automated reminder phone call two days prior to the visit. Additionally, for telehealth visits, the patient receives a phone call the day before from a telehealth coordinator to review processes for log-on, check that any necessary steps such as app download and registration are completed, and test the connection. On the day and time of the scheduled video visit, patients log on to their password-protected JeffConnect account using a mobile phone or tablet app or via a laptop or desktop browser equipped with a webcam and microphone. Providers log on from their health system location using a tablet app or web browser, also with a webcam and microphone. Providers have access to the electronic medical record to review the patient's prior records and document the visit. Group sessions were held on a separate web-based conferencing application called BlueJeans™ which allows for combined video and phone-in meetings. The department chair now requires that all attending surgeons participate in the telehealth program in some capacity every year – either for immediate postop visits or long term follow up as appropriate.

Access was assessed by volume of visits across surgical subspecialty and visit type. Experience and perceived effectiveness was assessed through a structured closed question survey emailed to patients by JeffConnect staff after each visit. We collected this visit and survey data; visits are categorized into immediate post-operative visit, established patient, or group sessions. Post-operative patients were not scheduled for further follow-up after a completed telehealth visit unless needed. Providers were blinded to survey results from the patients they treated. For objective measure of effectiveness, we used a Vizient database report to obtain 30 day readmission rate for immediate post-operative visits.

Results

Between February 2017 and November 2017, our department performed 655 telehealth visits. Visit type is classified in Table 1. Of these visits, 152 were post-operative visits with no planned 'face to face' follow-up. Four hundred and twenty-four (424) visits were for established patients for either preoperative care, or long-term follow-up. Lastly, 79 group sessions were held via BlueJeans™ for smoking cessation and bariatric patient support groups. Multiple surgical specialties conducted telehealth visits providing excellent access to all fields of surgery in our department (Table 2), including hepatobiliary procedures, thoracic surgery, vascular medicine and surgery, and many others. Effectiveness and safety of our post-operative visits were assessed using the Vizient database. Out of the 152 patients who had a telehealth only post-operative follow up, four (3%) had a readmission within 30 days of discharge.

Table 1
Total visits by category.

Visit Type	Number of Visits
Post-Operative Visit	152
Established Patient	424
Group Session	79
Total	**655**

Patient experience was analyzed with emailed surveys. We received 141 surveys (18% response rate), of which 134 (95%) patients were satisfied with their visit. In response to the survey prompt "I received the same level of care and an in-person visit", 52% of patients strongly agreed, 36% of patients agreed, 7% were neutral, and only 5% disagreed (n = 133, Fig. 1). When asked "I had enough time with the Jefferson provider", 57% strongly agreed, 39% agreed, 2% were neutral, and only 2% disagreed (n = 134, Fig. 2). Lastly, in response to "How much time do you think JeffConnect saved you?", 57% said more than three hours, 40% said one to three hours, and only 2% said less than one hour (n = 134, Fig. 3).

Discussion

Routine postoperative visits

We have previously reported high acceptance and patient satisfaction with scheduled visits in non-surgical specialties and urology.[5–8] Recent studies have demonstrated the efficacy and safety of telehealth follow-up after routine ambulatory surgery.[9,10] Examples include laparoscopic appendectomy, laparoscopic cholecystectomy, soft tissue mass excision, and hernia surgery. The literature demonstrates that for these uncomplicated patients, telehealth follow up as a replacement to an in-office visit provides a high level of patient satisfaction with no differences in health outcomes.[9,10] In offering telehealth follow up, patients who develop postoperative complications, have sensitive operating sites (such as the anus or breasts), or those with extended hospital stays are typically excluded (determined by provider clinical judgement in our department). We extend this prior knowledge by expanding the

Table 2
Individual visits by specialty (group sessions omitted) in descending order.

Specialty	Number of Visits
Vascular Medicine	136
General Surgery	114
Hepato-pancreatico-biliary Surgery	60
Thoracic Surgery	59
Bariatric Surgery	44
Vascular Surgery	38
Cardiac Surgery	28
Transplant Surgery	25
Surgical Oncology	21
Colorectal Surgery	19
Trauma Surgery	15
Endocrine Surgery	10
Breast Surgery	7
Total	**576**

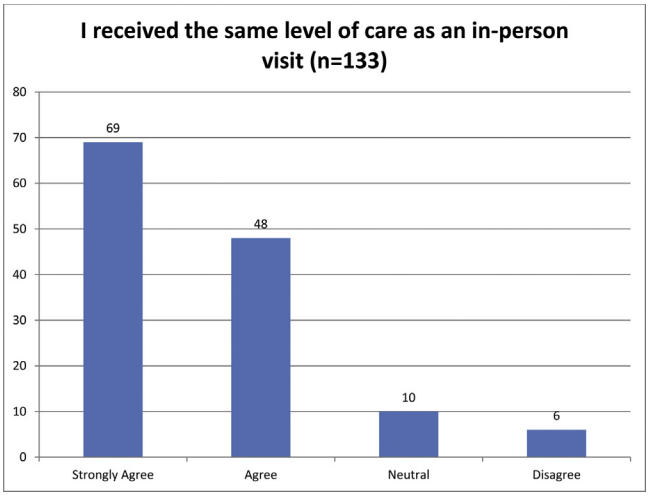

Fig. 1.

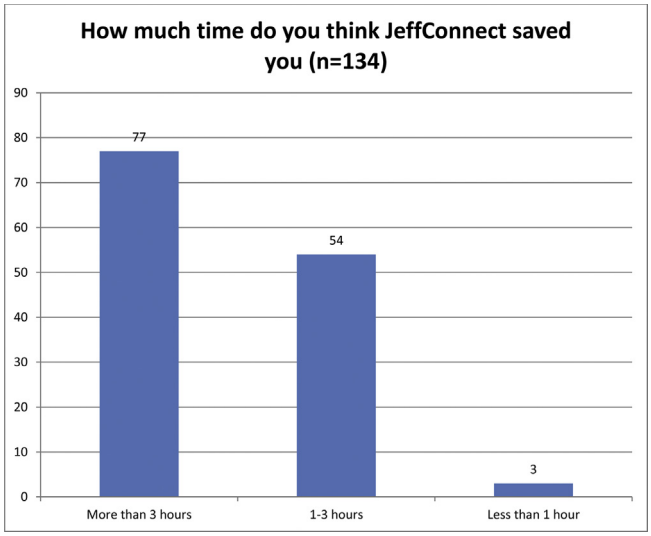

Fig. 3.

patient population beyond what has been previously reported, and by documenting an excellent patient experience as well as a very low readmission rate (3%). This reinforces the utility of telemedicine across surgical specialty areas. We have achieved these results by building telehealth work flows into routine clinical operations such as including it on patient discharge paperwork, in conversations with the inpatient care team and with the nursing staff ensuring patient education prior to discharge. We have now recently begun scheduling routine post operative telehealth visits at the time of scheduling for procedures.

Established patient visits

Established patients underwent two major categories of telehealth visits: preoperative and long-term follow up care. Patients, after an initial face to face office visit, can be seen in pre-surgical follow up via video teleconferencing. These visits allow patients to discuss results of preoperative imaging or neoadjuvant therapies. Patients can also ask questions about their upcoming surgery and expected post-operative course. Telehealth usage in this manner promotes preoperative compliance and reduces the incidence of no-shows to surgery, especially for remote distance patients or major/complex cases.[11]

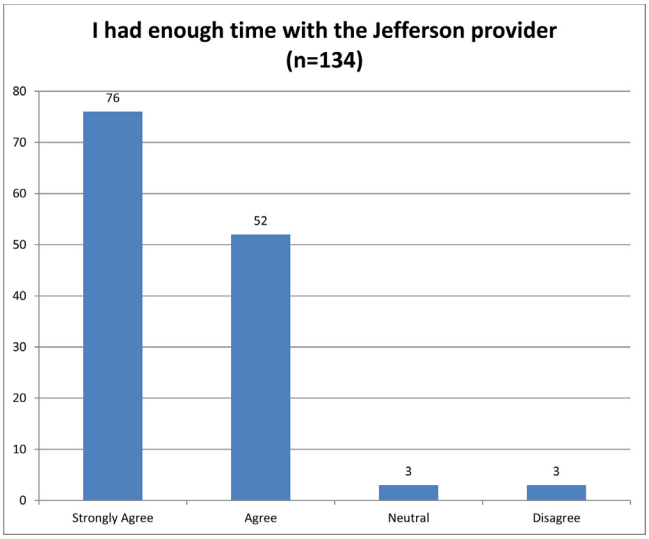

Fig. 2.

While more typical for medical patients, a significant proportion of surgical patients require long term follow up with their surgeon. The specialties in our department with the highest utilization for long term care are surgical oncology, thoracic surgery, bariatrics, and vascular medicine. Surgical oncology and thoracic surgery patients benefit from post-surgical follow up during ongoing chemotherapy or radiation therapy along with routine post-resection imaging. Here, patients can access test and imaging results directly through their mobile device while joining in a video visit with their provider. This allows patients to see multiple providers in follow up regularly without the burden of travel. Bariatric patients, similarly, can discuss ongoing symptoms and diet compliance after surgery. Lastly, vascular medicine effectively uses telehealth for anticoagulation management following new diagnoses of thrombotic events.

It is important to note that the benefits of telemedicine are not limited to rural areas. While rural areas often have provider shortages, urban areas often have appointment shortages, preventing adequate access to care.[12] Additionally, when assessed in a urological surgery population, satisfaction was unrelated to distance travelled. Thus, whether near or far from the hospital, patients have a positive experience and would agree to repeat telemedicine visits.[7]

Group sessions

Nurse practitioner led group sessions are primarily used for the bariatric patient population and for smoking cessation. The bariatric patients benefit from sharing experiences with one another and teleconference weekly with the office nurse practitioner. Patients interested in undergoing bariatric surgery can also join to gain more information about the process. Finally, smoking cessation is a critical part of our Division of Thoracic Surgery. The office nurse practitioner will schedule sessions for interested patients to improve compliance with smoking cessation. Anecdotally we believe engagement in these groups sessions to be enhanced by telehealth.

Applying the NQF framework

The NQF defined four domains to measure the success of telehealth: access to care, financial impact, experience, and effectiveness.[3] First, access to care must improve the patient-provider communication and health utility opportunities. For our population in a large referral network, patients see the benefits of saving traveling time and money. Some very remote patients would be physically unable to attend office follow up. Additionally, the integration into our outpatient EMR system and smartphone app makes it as user friendly as possible. As described earlier, several studies demonstrate the efficacy of telehealth delivered care in comparison to in-person visits. Our survey results underscore these findings for ambulatory surgery. The implications of this technology allow closer follow-up between provider and patient. Especially for highly specialized surgeries at a large referral center, telehealth can improve compliance with post-op care and prevent complications.[13]

Second, financial impact describes the cost associated with telehealth implementation and savings observed. With three hours or more of saved traveling time, patients also save money on parking costs, public transport or gasoline costs, tolls, and potential loss of wages. Our offices, in turn, save staff time from checking in a patient and rooming them. The global period for surgery helps justify these visits in that no loss of revenue is incurred between a telehealth visit versus an in-office visit. Initial health system costs arise from software purchasing, staff training, and acquiring troubleshooting personnel which hopefully are offset by improved patient access and office efficiency. Future studies can help quantify the amount of office and patient related savings compared to the investment costs into telehealth.

Third, the patient and provider experience domain includes the satisfaction and convenience of the technology. Using survey results, we show high levels of patient satisfaction with the telehealth program. These translate to care team satisfaction. Especially for chronic patients, providers have the chance for more frequent and flexible follow up. The program allows for several different treatment modalities to occur over a telehealth visit, from group sessions to preoperative care. Group tele-health sessions allow for a new form of surgical care with patients supporting each other under guidance from a provider.

Lastly, we can demonstrate with readmission data that postoperative telehealth based care is effective for patient outcomes. With minimal technical difficulties reported via surveys, the technology is also effective as a medium for care delivery.

Our descriptive retrospective review has a few limitations. Although we can demonstrate patient satisfaction, providers and office staff were not surveyed for their satisfaction with the service. Additionally, our low survey response rate of 18% can misrepresent patient satisfaction. Regarding study design, patients who underwent immediate telehealth follow-up were selected for uncomplicated outpatient surgeries. We have no matched cohort to directly compare outcomes in this group, or any other category of patients. We also did not track readmissions to other hospitals outside of our main campus nor did we track “no show” rates or “missed” telehealth appointments. Our study was also not designed to address whether synchronous audio-video telehealth is equivalent to or better than an in-person visit, but rather to describe our initial experience launching a broad program within multiple surgical specialties. From our experience, patients and providers benefit from the ability to examine incisions over video telehealth.

Conclusions

As an adjunct to surgical care, video telehealth confers benefits to patient access and experience. The domains supplied by the National Quality Forum support the successes of our program in giving comprehensive care for the surgical patient. The rapidly growing technology may have challenges during initial adoption. Yet, troubleshooting and training will improve accessibility of telehealth and pave the way for further innovation and implementation. Future directions will analyze the cost impact to patients and the department, examine the use of telehealth for remote surgical consults, and employ EMR integrated home medical devices[14,15]

Conflicts of interest

The authors have no conflicts of interest to disclose.

Funding

No outside funding or financial support was received for this study.

References

1. Telehealth Programs. *Health Resources & Services Administration*; 1 Nov. 2015. www.hrsa.gov/rural-health/telehealth/index.html. Accessed January 3, 2018.
2. Hollander JE, Davis TM, Doarn C, et al. Recommendations from the first national academic consortium of telehealth. *Popul Health Manag*. 2018 Aug 1;21(4):271–277.
3. National Quality Forum. *Creating a Framework to Support Measure Development for Telehealth*; 2017. http://www.qualityforum.org/Publications/2017/08/Creating_a_Framework_to_Support_Measure_Development_for_Telehealth.aspx. Accessed January 3, 2018.
4. ATA Accredited Telemedicine Training Programs. ATA Accredited Telemedicine Training Programs - ATA Main, www.americantelemed.org/main/ata-accreditation/training-programs.
5. Mullen-Fortino M, Rising KL, Duckworth J, Gwynn V, Sites FD, Hollander JE. Presurgical assessment using telemedicine technology: impact on efficiency, effectiveness and patient experience of care. *Telemed E-health*. 2018 Jul 26.
6. Powell RE, Stone D, Hollander JE. Patient and health system experience with implementation of an enterprise-wide telehealth scheduled video visit program: mixed-methods study. *JMIR Med Inf*. 2018 Jan;6(1).
7. Glassman DT, Puri AK, Weingarten S, et al. A single institution's initial experience with telemedicine. *Urol Pract*. 2017 Sep 5;5(5):371.
8. Powell RE, Henstenburg JM, Cooper G, Hollander JE, Rising KL. Patient perceptions of telehealth primary care video visits. *Ann Fam Med*. 2017 May 1;15(3):225–229.
9. Hwa K, Wren SM. Telehealth follow-up in lieu of postoperative clinic visit for ambulatory surgery: results of a pilot program. *JAMA Surg*. 2013 Sep 1;148(9):823–827.
10. Broman KK, Vella MA, Tarpley JL, Dittus RS, Roumie CL. Identification of postoperative care amenable to telehealth. *Surgery*. 2016 Aug 1;160(2):264–271.
11. Tam A, Leung A, O'callaghan C, Fagermo N. The role of telehealth in perioperative medicine for regional and rural patients in Queensland. *Intern Med J*. 2017 Aug 1;47(8):933–937.
12. Huigol, YS, Joshi AU, Carr BG, Hollander JE. Giving Urban Health Care Access Issues The Attention They Deserve In Telemedicine Reimbursement Policies. Health Affairs Blog. https://www.healthaffairs.org/do/10.1377/hblog20171022.713615/full/.
13. Miller GG, Levesque K. Telehealth provides effective pediatric surgery care to remote locations. *J Pediatr Surg*. 2002 May 1;37(5):752–754.
14. Cain SM, Moore R, Sturm L, et al. Clinical assessment and management of general surgery patients via synchronous telehealth. *J Telemed Telecare*. 2017 Feb;23(2):371–375.
15. Baillot A, Boissy P, Tousignant M, Langlois MF. Feasibility and effect of in-home physical exercise training delivered via telehealth before bariatric surgery. *J Telemed Telecare*. 2017 Jun;23(5):529–535.