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# Telemedicine broadening access to care for complex cases

*Joshua S. Jue, BS,*[a] *Sydney A. Spector,*[b] *and Seth A. Spector, MD, FACS*[a,b,*]

[a] *Department of Surgery, University of Miami Miller School of Medicine, Miami, Florida*
[b] *Surgical Service, Bruce W. Carter Department of Veterans Affairs Medical Center, Miami, Florida*

ARTICLE INFO

*Article history:*
Received 11 March 2017
Received in revised form
19 June 2017
Accepted 29 June 2017
Available online xxx

*Keywords:*
Telemedicine
Access to care
Complex cancer
Specialist-directed telemedicine
SDTM

ABSTRACT

*Background:* Surgical and nonsurgical specialists are highly centralized, making access to high-quality care difficult for many Americans. We explored the feasibility, benefits, preliminary outcomes, and patient satisfaction with a new type of health visit, in which a surgical oncologist used video telecommunication to manage and treat complex cancer diseases, including patients with severe comorbidities.

*Materials and methods:* Patients visited local VA medical centers throughout Florida to engage in video telecommunication visits with a centralized surgical oncologist in Miami, who directed their oncology treatment. The average length of stay and rate of unplanned readmission were calculated within each organ. The total mileage saved was calculated by subtracting the distance between the patient's home address and the local VA from the distance between the patient's home address and the Miami VA. Travel costs were determined by the VA's reimbursement of $0.415/mile for health-related travel and reimbursement of $150.00 for an overnight hotel stay. A Likert scale with both positively and negatively keyed questions was used to assess patient satisfaction.

*Results:* In 24 mo, seven unplanned readmissions occurred among 195 operations. Patients experienced an 80.7% reduction in travel distance and saved a total of 213,007.58 miles by visiting their local VA instead of the Miami VA. Survey results indicate that 86% of patients believed that the telemedicine program made medical care more accessible.

*Conclusions:* The Specialist-Directed Telemedicine Model can save patients substantial time and money by not traveling to centralized areas, while delivering greater continuity of care and patient satisfaction.



## Introduction

Increases in life expectancy and the aging baby boomer generation are only expected to increase the number of oncologic operations in upcoming years.[1] By 2020, the number of procedures for breast, rectum, colon, stomach, pancreas, and esophageal neoplasms is projected to increase by 42.7% as compared with 2004[1]; thus, it is more crucial than ever to have effective oncology services available to treat and manage the increasingly wide range of cancer cases. Currently, only 12% of cancer cases are performed by surgical oncologists.[2] Out of 27 studies observing the effect of surgical training on patient outcomes, 25 studies found that surgeons with specialized training had better outcomes than nonspecialized surgeons.[3] In spite of this correlation between surgical training and outcomes, less than 8% of counties have a surgical oncologist as

* *Corresponding author*. 1201 NW 16th St, Surgery 112, Miami, FL 33125. Tel.: +1 305-575-3244; fax: +1 305-575-3255.
E-mail address: JSJ16@med.miami.edu (S.A. Spector).
0022-4804/$ – see front matter 
http://dx.doi.org/10.1016/j.jss.2017.06.085

defined by membership in the Society of Surgical Oncology.[4] The low numbers of practicing surgical oncologists present a challenge for patients seeking higher quality cancer care.

Surgical oncology became increasingly centralized once the relationship between high-volume hospitals and improved outcomes for complex cancer surgery was described.[5] Unfortunately, the centralization of specialized care in highly populated areas is a common trend seen within surgical and nonsurgical specialties, including gynecologic oncology[6] and intensive critical care.[7] This ultimately serves as a barrier to complex care for those living outside densely populated areas. With 30% of the American population living in areas of less than 50,000 people and 20% of the population living in areas of less than 2500 people,[8] the centralization of high-quality health services has the potential to affect a substantial portion of the nation. Demographic disparities among patient populations treated at high-volume hospitals have also arisen. Patients at low-volume hospitals are more likely to have Medicaid, Medicare, or no insurance; be African-American; be from nonmetropolitan areas; and be from areas with higher poverty than patients treated at higher volume hospitals.[5] Similarly, patients treated by general surgeons are more likely to be older, female, a minority, and from areas of higher poverty than patients treated by surgical oncologists.[2] In an attempt to improve complex treatments, centralization has made high-quality services less accessible to historically discriminated populations.

Telemedicine has been used within oncology to bring complex cancer care to rural and underserved populations. In this example, oncologists remotely consult with health care providers and interact with patients at local sites that lack these areas of expertise. Telemedicine has primarily been limited to videoconferencing among physicians to coordinate care, patient or physician consultations, and mentorship of local surgeons during complex operations.[9,10] In this observational study, we sought to investigate the viability of using video telecommunication to manage and treat complex cancer diseases, including patients with severe comorbidities. We explored this question by developing a new system that we called Specialist-Directed Telemedicine (SDTM), in which a specialist comprehensively manages the patient's complex disease and coordinates the patient's local treatment. In this study, a surgical oncologist served as the specialist. All consults, preoperative and postoperative patient interactions, and anesthesia evaluations were completed via SDTM at the patient's local medical center with local staff. Patients only traveled to the managing surgical oncologist's facility if an operation/procedure was needed. We hypothesized that the complete management of these complex cases through telecommunication would save patients' substantial time and money, while not compromising surgical outcomes or patient satisfaction.

## Methods

### *Patient selection*

All patients enrolled in this study were patients who receive their medical care from the VA Healthcare System. Local VA medical centers throughout South Florida and Central Florida served as the primary location for the patient's medical care. Participants in this study were referred and consented to this telehealth program between July 2012 and June 2014 if their local primary doctor or oncologist believed that a surgical oncologist should be involved in management of the case. Patients visited their local VA medical center, as the first patients, in the morning of the weekly clinic day. One exam room within each VA medical center was outfitted with a moveable high-definition webcam and microphone to engage in video telecommunication visits with a centralized surgical oncologist. A nurse practitioner was dedicated to each initiating facility. Physical examinations were performed by a nurse practitioner under the video supervision of the surgical oncologist. Patients continued to receive oncology treatment at their local VA medical center, as directed by the surgical oncologist. Participants only visited the surgical oncologist's facility in Miami, Florida, for a surgical procedure. All outpatient preoperative and postoperative care was managed at the local VA facility.

### *Nature of cases and care*

Patients were classified by the final ICD-9 diagnosis of their chief complaint. The primary organ of involvement was used to categorize cases within broader groups. Cancers that were primarily confined to their originating organ were indicated using their organ name, followed by "neoplasm." Metastatic diseases that spread to multiple organs were labeled as "multiple organ involvement." The surgical oncologist's care was divided into categories that included "consultation," "management of disease," or "operation." The nature of care was determined by the type and number of video telecommunication encounters. Patients who participated in less than three visits without a procedure were classified as undergoing a "consultation." Patients who participated in three or more visits and did not have a surgical procedure were deemed to have their disease managed by the surgical oncologist and placed in the group titled "management of disease." Finally, patients who underwent an operation by the surgical oncologist and were subsequently followed and managed were labeled under the heading "operation." Participants whose operations were scheduled but subsequently aborted due to death or futility were still classified as "operation."

### *Operation risks*

Risks to surgery were assessed by a standardized preoperative evaluation administered by the VA. The values for each risk were taken from the preoperative evaluation of the patient's major operation, or most recent procedure, if several procedures were performed. Risk data from each patient were only used once, even if multiple operations/procedures were performed. The preoperative assessment documented patient factors and comorbidities that may increase the risk to surgery. Chronic Obstructive Pulmonary Disease (COPD), dyspnea with exertion or at rest, alcohol consumption of two or more drinks a day within 2 wk of surgery, smoking within the past year, diabetes mellitus, and the requirement of hypertension medication were all categorical factors that were