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Interactive home telehealth and burns: A pilot study

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ABSTRACT

Objective: The objective of this study is to review our experience incorporating Interactive Home Telehealth (IHT) visits into follow-up burn care.
Methods: A retrospective review of all burn patients participating in IHT encounters over the course of 15 months was performed. Connections were established through secure video conferencing and call-routing software. Patients connected with a personal computer or tablet and providers connected with a desktop computer with a high-definition web camera. In some cases, high-definition digital images were emailed to the provider prior to the virtual consultation. For each patient, the following was collected: (1) patient and injury demographics (diagnosis, prognosis, and clinical management), (2) total number of encounters, (3) service for each encounter (burn, psychiatry, and rehabilitation), (4) length of visit, including travel distance and time saved and, (5) complications, including re-admissions and connectivity issues.
Results: 52 virtual encounters were performed with 31 patients during the first year of the pilot project from March 2015 to June 2016. Mean age of the participant was 44 years (range 18–83 years). Mean total burn surface area of the participant was 12% (range 1–80%). Average round trip travel distance saved was 188 miles (range 4–822 miles). Average round trip travel time saved was 201 min (range 20–564 min). There were no unplanned re-admissions and no complications. Five connectivity issues were reported, none of which prevented completion of the visit.
Conclusions: Interactive Home Telehealth is a safe and feasible modality for delivering follow-up care to burn patients. Burn care providers benefit from the potential to improve outpatient clinic utilization. Patients benefit from improved access to multiple members of their specialized burn care team, as well as cost-reductions for patient travel expenses. Future studies are needed to ensure patient and provider satisfaction and to further validate the significance, cost-effectiveness and safety.

1. Introduction

Telemedicine is an alternative means of health care that delivers services and provides medical information to patients via communication technologies [1]. For patients living in underserved or rural communities, telemedicine has the potential to enhance patient access to specialist services. Specialized burn care has become less accessible,

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with a decrease in the number of burn centers and a corresponding increase in referral areas [2–4]. As it relates to burn care, telemedicine has been used extensively in the triage of burn patients, to provide information regarding referrals, in the diagnosis and management of acute burns, as well as to provide follow-up care to burn patients in inpatient rehabilitation facilities [2,5]. Although telemedicine lends itself well to burn care, its utilization varies by clinic. The electronic exchange of high-resolution, still images, is widespread among burn centers; however, in the United States, only one-third of burn centers utilize interactive video to evaluate wounds, and no burn center has documented use of Interactive Home Telehealth (IHT) for burn patient care [2].

IHT is a form of telemedicine where a patient and provider utilize video conference technology to engage in a virtual encounter [1]. Potential benefits of IHT include the following: (1) improved access to specialized care for patients living in remote or rural communities, (2) cost-reductions for patients in travel and time, (3) cost-reductions for providers in patient transport, referrals, and inpatient volume, (4) virtual follow-up on healing burns and scars, (5) consultations to confirm patient compliance with care plan, remote management, adjustment of medications, and improved efficiency of clinic time [2–6].

Numerous studies have shown telemedicine to be feasible and effective in managing various disease states, reducing inpatient volume, and permitting early patient discharge after-surgery [7,8]. IHT encounters have a high degree of patient and provider satisfaction with a majority of clinicians judging the virtual encounters to be as-good or better than their face-to-face alternatives [2,6,9]. Patient satisfaction with telemedicine is reported to be high primarily due to time saved [5]. In addition, specifically for burns in the acute rehabilitation phase, telemedicine has been found to be an effective modality with substantial cost-reductions in patient transport, and significant gains for patients and providers [5].

The aim of this study was to review our initial experience incorporating IHT consultations into follow-up care for burn patients at an American Burn Association (ABA) accredited burn center. Over the course of 15 months, 31 burn patients participated in 52 virtual encounters with various members of the burn team, including surgeon, physiatrist, and psychiatrist.

2. Methods

This IRB approved retrospective study reviewed burn patients from a single ABA accredited burn center enrolled in IHT between March 2015 and June 2016. Burn patients were selected for subsequent IHT encounters based on willingness to participate, as well as their access to electronic video devices. Patients discharged from an inpatient admission or the emergency department with barriers to follow-up such as distance from hospital on discharge, inability to drive or obtain a driver, or significant comorbidities that made traveling difficult, were offered an IHT encounter. Age was not a restriction to telehealth consideration. Verbal informed consent was obtained and further implied as the patient was required to complete an enrollment form containing detailed program information.

Patients were informed that IHT encounters involved a "bring your own device" (BYOD) model. The availability of a PC, Mac, or iOS based computer or tablet with internet access and video capability was required to participate. The patient was responsible to securely protect their medical information on personal devices and maintain a secure email address if forwarding still images. Attending physicians utilized HIPAA compliant computer systems with secure email addresses. The level of education associated with IHT encounters were attending level burn surgeons, physiatrists and psychiatrists. Attending burn surgeons utilized consumer grade 1080p Logitec™ cameras which were connected to PC computers with noise canceling microphones. Although the physicians' cameras were 1080p resolution, the images were scaled down according to available internet speed and buffering capabilities of linked devices. Video resolution was at best 720p with scaled resolution. Attending burn surgeons, physiatrists, and psychiatrists conducted telehealth encounters from their office.

Encounters between patients and providers were carried out using video conferencing software from Vidyo™ which provided a secure, HIPAA compliant, 128-bit AES encryption platform. Call routing was accomplished using software from SBR Health, Inc. A telehealth coordinator created SBR Health accounts for patients and completed a test call to troubleshoot device, software, and/or internet connection issues prior to the physician-patient interaction. Patients discharged to home-care were informed to secure a private and well-lit room for their telehealth encounter. The physician reserved the right to disconnect from the encounter if the atmosphere was not appropriate. High-resolution, still images of the injury could be emailed from patient to provider prior to the virtual encounter. The videoconferencing software permitted the provider to share their screen with the patient, allowing the provider to show and point to images with the computer mouse for review.

Typical encounters included a brief follow-up discussion, with a review of any changes in clinical status, as well as a problem focused video-directed virtual physical exam. Changes to the outpatient burn plan of care were communicated directly to the patient. IHT encounters were not preceded by a patient survey; however, clinicians described connection quality immediately following each encounter using the electronic survey tool REDCap [10]. The following data was collected for each patient: demographics, injury (diagnosis, prognosis, and clinical management), total number of encounters, service for each encounter (burn, psychiatry, and rehabilitation), length of visit, travel distance and time saved, complications, re-admissions, and online connectivity issues.

3. Results

During a study period of 15 months, 52 IHT encounters were performed on 31 burn patients (27 male, 4 female) with a mean age of 44 years (range 18-83 years) and a mean total burn surface area of 12% (range 1– 80%). Twenty-nine of the 31 participating patients had been admitted to the burn unit with a mean length of stay of 13.6 days (range 1–77 days). Two

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