Review of Telehealth Solutions for Outpatient Heart Failure Care in a Veterans Health Affairs Hospital in the COVID-19 Era

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INTRODUCTION

Telemedicine encompasses methods to deliver care using medical devices to collect and transmit health information and has become a key medium to deliver healthcare in the COVID-19 pandemic. The Veterans Health Administration (VA) was an early adapter of telehealth services starting in 2003.[1] Prior to the pandemic, the VA had already established the nation's largest telehealth system. The VA reports over 900,000 veterans used VA telehealth services in 2019 encompassing 2.29 million episodes of telehealth care.[2]

The VA hospital employs a multidisciplinary chronic care model for Outpatient Heart Failure management. Important elements of this model include: 1.) Transition of Care consultation for transition between hospital and home, 2.) IV Diuretic Clinic to provide volume assessment and aggressive diuresis as indicated 3.) Shared Medical Visits to provide self-management education and pharmacologic treatment for heart failure by a multi-disciplinary team, 4.) Heart Failure Clinics to provide close follow-up to veterans at risk for re-hospitalization, 5.) Telemonitoring of weight and vital signs for patients at high risk of decompensation.

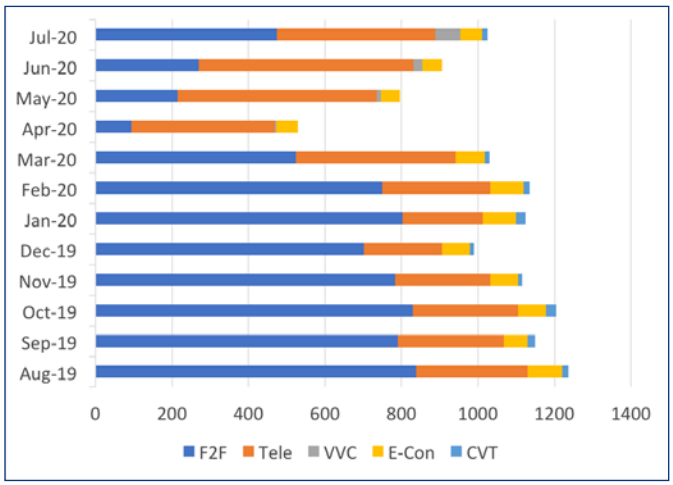
The VA has established several formats for administering care via telecardiology that are now being used increasingly under Centers for Disease Control (CDC) guidance to limit community exposure to SARS-CoV-2. We provide an example of telecardiology using heart failure management at a VA Hospital in New England.

E-CONSULT (ELECTRONIC CONSULT)

If the referral is for a clinical question not requiring face-to-face interaction, it is completed via an e-consult in an asynchronous fashion. A response is provided by the e-consult team within 72 hours. This is performed through a standard clinical workstation with a desktop computer.

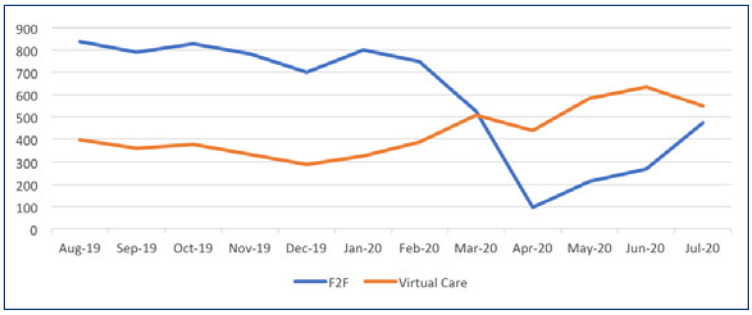
In contrast to other forms of telecardiology, e-consultations have seen a decline since the pandemic. The monthly average fell from 78 encounters to 58 encounters after March 2020. (**Figures 1 and 2**) We suspect that with all non-essential medical procedures and clinic visits on hold, there were fewer referrals from Primary Care and Surgical Services.

Figure 1. Total cardiology encounters by encounter type.



F2F = face to face visit, Tele = telemonitoring, VVC = VA Video Connect, E-Con = e-consult, CVT = clinic video telehealth

Figure 2. Trends for face-to-face (F2F) visits vs virtual care visits.



Sample e-consult:

Mr. C is a 67-year-old male who lives over 40 miles away from the VA with a past medical history of hypertension, hyperlipidemia, diabetes, coronary artery disease and heart failure with reduced ejection. He has gained 10 lbs. and has worsening shortness of breath for the last week, please provide recommendations.

Chart was reviewed and recommendations made for the patient to be worked up with echocardiogram and nuclear stress test. Will provide follow-up in satellite clinic through CVT.

CLINIC VIDEO TELEHEALTH (CVT)

If the patient requires evaluation but is unable to come in for a face-to-face visit, a CVT visit may be scheduled. This is a synchronous method of telecardiology that utilizes an audio-visual (AV) interface to communicate with a satellite VA clinical location.

Providers are equipped with Globalmed® telemedicine stations that run Cisco® software that allow for more streamlined communication with remote sites. (**Image 1**) At the off-site locations an electronic stethoscope is used with Care Tone® IP Management System software (product of AmericanTeleCare®) to transmit heart and lung sounds in real time. A high-definition camera "wand" allows attachments of lenses and to examine the integumentary system in greater detail. (**Images 2,3,** and **Audio file**). Some locations feature the Eko Duo® that allows transmission of heart sounds and a single lead EKG in real time. (**Image 4**).

Image 1. A work station equipped with a Globalmed® telemedicine station that runs Cisco® software, Cisco IP® telephone, a desktop computer, a mouse, keyboard, speakers, and a webcam with a microphone.

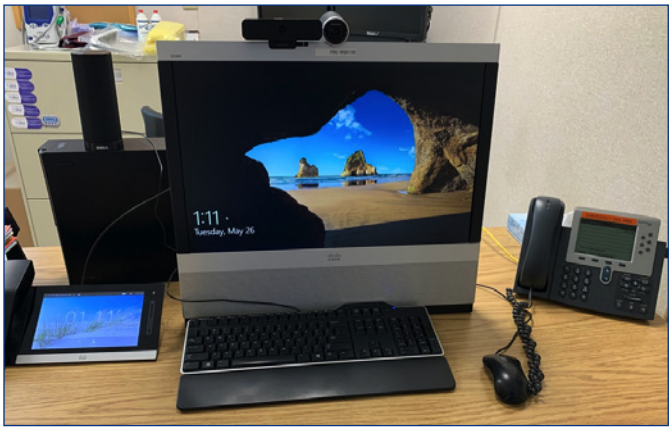


Image 2. A remote workstation equipped with two monitor screens, a desktop computer, a mouse, keyboard, speakers, and a webcam with a microphone. In addition, tools such as an electronic stethoscope and a wand with attachments to examine skin in detail and an otoscope are shown in more detail in Image 3.

Image 3. A closer view of the electronic stethoscope is used with Care Tone® IP Management System software and the high-definition camera "wand" allows attachment with lenses and otoscope.

Image 4. The Eko Duo® that allows transmission of heart sounds and a single lead EKG in real time.

After registering at the off-site location, the patient is accompanied to the exam room by a CVT technician who assists with the physical exam, and cardiac and pulmonary auscultation. The physician then discusses the assessment and plan with the patient and documents the visit.

This format of telecardiology has also seen a decline following implementation of community exposure precautions as it involves the patient visiting the satellite clinic in person. The monthly average has gone from 17 visits to 5 visits since March 2020 (**Figures 1 and 2**).

Sample CVT visit:

Mr. C chose to be seen in the satellite clinic via CVT as he lived greater than 40 miles away from the main VA hospital. The cardiology provider observed that Mr. C was dyspneic walking into the exam room. Testing results were reviewed with Mr. C, which showed a reduced left ventricular ejection fraction and myocardial scar with no ischemia. A physical exam was performed with the assistance of the CVT technician using the electronic stethoscope and camera wand. Bi-basilar crackles and 2+ pitting edema were noted. Guideline-directed medical therapy for heart failure with reduced ejection fraction was started, including oral diuretics. He was further scheduled for an outpatient appointment at the IV diuretic clinic the same week, where he received 1 dose of IV diuretic with 650 cc of urine output and 0.8lbs. of weight loss.

VA VIDEO CONNECT (VVC)

If the patient is unable to or advised not to come into the clinic or offsite location, VA Video Connect (VVC) is used. This is a synchronous format that utilizes AV to communicate with the patient at home. The patient is contacted via telephone by clinic staff to ensure they have a device capable of supporting the AV visit. If not, patients may be mailed an iPad® and in select cases, an Eko Duo® device to conduct the visit. The patient is sent an appointment email with a link that connects to the secure call via VA VVC platform (VA Video Connect). If the patient has a smart phone or computer access, non-VA platforms can also be used such as Cisco Webex™ or Doximity Inc.

There were no VVC visits prior to March 2020. Since then, the numbers have almost tripled every month with a total of 65 VVC visits in July 2020 (**Figures 1 and 2**).

Sample VVC visit:

Mr. C's CVT follow-up appointment with cardiology at the satellite VA site was changed to a VVC appointment due to SARS-CoV-2 restrictions. Given his lack of smart phone or computer access, an iPad® with built-in Internet access was mailed to him along with an eko® device to ensure an adequate cardiology auscultation and rhythm assessment. Training for the use of the iPad® and Eko® device was provided by VA staff at the patient's home.

REMOTE MONITORING

At the VA, patients who may need closer follow-up are referred to telehealth. This is an asynchronous telecardiology modality that is used to monitor heart rate, blood pressure, pulse oximetry, weight and pedometer steps. A large proportion of this population are patients with heart failure that have had a recent hospitalization for an exacerbation of the same. They are issued home monitoring technology called the In-Home Monitoring Device by Medtronic© with Internet-based transmission capability to record these measurements which are then transmitted to the VA. The device also administers a symptom-based survey of the respective disease process, in this case, symptoms of heart failure. An assigned telehealth case manager downloads the patient's clinical data on a periodical basis (daily, weekly, PRN) into the electronic medical records on demand. If critical values were noted, the relevant provider is alerted. This format has seen the most robust increase in numbers since March 2020. From a monthly average of 255 encounters a day from August 2019-February 2020, we are now conducting an average of 458 encounters a day since March 2020 (**Figures 1 and 2**).

Sample remote monitoring visit:

After the VVC visit, Mr. C was identified as being high risk of readmission for a heart failure exacerbation. He was issued a remote monitoring device and asked to monitor daily weights, blood pressures and heart rates. On 7/15/2020 it was noted that his blood pressures were trending lower than usual along a decreasing weight, without shortness of breath. His leg swelling was reported to be down as well. The cardiology provider was alerted of this change and dose reduction in the patient's diuretics was recommended and relayed to him by the telehealth RN. Mr. C has not visited an acute care facility during the COVID pandemic until present.

CONCLUSION

The VA hospital employs a multidisciplinary chronic care model for Outpatient Heart Failure management. The pandemic has made telecardiology an indispensable component of cardiology practice, outnumbering face-to-face visits. Some components of heart failure care such as IV Diuretic Outpatient Clinic are indispensable to provide volume assessment and aggressive diuresis to patients in need. Other aspects can be transitioned to a telecardiology format. Heart failure clinics are being conducted via VVC, patients requiring closer follow-up are being scheduled for remote monitoring in place of nursing visits. With the technology available it is straightforward to obtain a relevant history and physical exam.

With the current uncertain climate, we expect that telecardiology will continue to feature prominently in the delivery of cardiovascular care.

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Disclosures

Supportive foundations: None

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