

Shared care left ventricular assist device site to implant center: the next step in advanced heart failure treatment and an essential part of healthcare worldwide

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Received date: November 14, 2021
Accepted date: February 16, 2022

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Citation: Sobieraj M, Fazio P, Chia R, Barn K. Shared care left ventricular assist device site to implant center: the next step in advanced heart failure treatment and an essential part of healthcare worldwide. Int J Cardiol Cardiovasc Dis. 2022; 2(1):6-8.

Abstract

Heart failure is a growing pandemic affecting approximately 6.2 million people in the US and 15 million people worldwide. Given its prevalence, high morbidity and mortality, and financial burden on our healthcare system, establishing strategies focused on improving therapeutic outcomes and prognosis has become a major priority. There have been more major strides in the management of end-stage heart failure patients than ever before. Mechanical circulatory support devices are not only a bridge to transplantation but have become a destination therapy. This review article continues to expand on the importance, necessary tools, and benefits of LVAD shared care and implanting centers on improving patient outcomes, satisfaction, and quality of life. This new approach in patient management can decrease financial costs and increase survival rates which will improve therapies and outlook in end-stage heart failure patients.

Introduction

Heart failure (HF) is a common condition where cardiac function is decreased and perfusion to the body can be insufficient, especially in times of higher metabolic need. HF is a growing pandemic affecting approximately 6.2 million people in the US [1] and 15 million people worldwide [2,3]. The number of patients with HF in the US is expected to rise by almost 30% and possibly affect 8 million people by 2030 [4]. In the US alone, heart failure has cost 30.7 billion dollars annually and is projected to more than double by 2030 to 69.8 billion dollars [5]. The mortality risk of this condition is high with patients only having a median survival of 1.7 years for men, a median survival of 3.6 years for women, and nearly 75% of all HF patients passing away within 5 years of the initial diagnosis [3]. Due to this large burden of cost, high mortality, and quality of life limitations, expanding patient access to life prolonging therapies, appointments, and coordination of care is essential for improving the outcomes in heart failure patients.

HF is a chronic condition existing along a spectrum of progressively higher disease burden. At the most dire end of the spectrum, HF can progress to advanced stages where patients suffer from severe symptoms with minimal activity or even at rest due to persistent ventricular dysfunction refractory to guideline directed medical therapy (GDMT) [6]. In this subset of patients, their quality of life is grievously impacted by these persistent symptoms and their 5-year survival can be as low as 20% at 5 years [6]. Epidemiologic data suggests that anywhere from 6 to 25% of the general HF population may be in an advanced stage [7]. Advanced heart failure (AdHF) is often defined as a New York Heart Association (NYHA) functional classification of IV and an American College of Cardiology/American Heart Association (ACC/AHA) stage of D. NYHA IV and AHA/ACC D share the descriptors of having HF symptoms even while at rest and having a severe limitation of any physical activity due to worsening HF symptoms. AdHF requires progressively more advanced therapies and complex interdisciplinary care management models posing a great challenge to provide adequate access to care for this growing patient population. This is especially true for patients who do not reside in areas close to regional advanced heart failure transplant centers. At a transplant center, the patient is able to receive advanced therapies such as a heart transplant or left ventricular assist device

(LVAD). LVADs have become a key milestone in the treatment of heart failure patients whether they are used as a bridge to transplant or as a destination therapy.

Worldwide, there are an increasing number of end stage heart failure patients with LVADs that continue to impact and shape the future of healthcare [8]. The number of LVADs implanted worldwide exceeds 100,000 of which 18,539 are reported in the Interagency Registry for Mechanically Assisted Circulatory Support (Intermacs) [9] and 16,286 reported in the global IMACS registry collecting data from the United States, Europe, Japan, and United Kingdom [10]. As the end-stage heart failure pandemic continues to grow and alter the lives of multiple patients, LVAD advancements provide a viable option for patients as destination therapy who are not transplant candidates.

MOMENTUM 3 is a landmark multicenter trial demonstrating the strides in LVAD technologies and decreasing patient complication rates. The centrifugal-flow LVAD, HeartMate III, demonstrated superior performance to the axial-flow LVAD, HeartMate II [11]. The HeartMate III reduces shear stress, reduces friction, and prevents thrombosis. The primary outcome of the MOMENTUM 3 trial showed that 74.7% of patients with a HeartMate III survived without disabling stroke or reoperation to replace or remove a malfunctioning device at 2 years versus 60.6% of patients with the HeartMate II [11]. Secondary outcomes of the study revealed decreased pump thrombosis, stroke, and bleeding events in the HeartMate III compared to the HeartMate II [11]. The three-year survival rate when utilizing HeartMate III now rivals that of heart transplantation [12]. This allows LVADs to expand life-prolonging therapy to patients not eligible for heart transplant and give patients an option that they never had before. The prevalence of adHF and life prolonging impact of LVADs worldwide makes the further development of shared care LVAD networks a pivotal part of delivering adHF care and improving patient outcomes.

A shared care LVAD center model occurs when a patient undergoes LVAD implantation at an implanting center, but greater than 50% of both the outpatient care and inpatient care alike is delivered locally by the referring advanced heart failure cardiologists at non-implant regional clinics and hospitals. This network of shared care sites for non-implant related issues can offload the work from large implant centers and allow patients to more quickly reach a nearby advanced heart failure cardiologist to manage their routine care. This newly expanded network of care ultimately improves patient outcomes, satisfaction, and quality of life. In order for favorable patient outcomes, physicians from all departments must be knowledgeable on the basics of LVADs and the resources available to refer the patient to a nearby center capable of treating patients with LVADs.

A key example of the success of the shared care center to destination therapy model is the Deborah Heart and Lung Center (DHLC). DHLC is located in Browns Mills, NJ and has been known as one of the very few complex cardiac care centers in the entire region of Southern New Jersey. DHLC is a non-profit 90 bed cardiac care specialty hospital which serves a largely underserved population of patients in its mostly rural catchment area. DHLC is wholly committed to continuing to provide comprehensive care to all of its patients. Many of these patients would have to go as far as Philadelphia or New Brunswick if it were not for DHLC. Due to the growing population of advanced heart failure patients, increasing

need for LVAD therapy, and rapid improvement in LVAD technology with improved survival rates, DHLC launched an advanced heart failure program in April 2017 using a shared care LVAD model by partnering with Thomas Jefferson University Hospitals, Temple University Hospital, and Robert Wood Johnson University Hospital. For the first time, this shared care model at DHLC allowed LVAD patients in Southern New Jersey to receive a majority of their care locally including, but not limited to education, outpatient echocardiograms, anticoagulation dosing, dressing changes, and office visits. This increased access for LVAD patients to receive top notch care locally by decreasing travel distances, financial burden, and time between appointments to ultimately improve patient outcomes, satisfaction, and quality of life. DHLC quickly accumulated both patients and multidisciplinary expertise, which paved the way for a natural evolution into becoming a LVAD implant site given the growing population of adHF patients and the increasing need for advanced therapy access. The lessons learned and success of the shared care model put DHLC in a prime position to transition into the only regional destination therapy LVAD center serving Southern New Jersey in February 2019. The entire process from initial contact to LVAD selection committee evaluation can now be performed entirely in house at DHLC by its own cardiothoracic surgeons, advanced heart failure cardiologists, intensivists, social workers, and other program coordinators. Prior to this, the advanced heart failure cardiologists would have to refer patients out for evaluation. Now, they can recommend patients to the LVAD selection committee who evaluates the patients for candidacy in accordance with the International Society of Heart and Lung Transplant Committee standards and guidelines. Once confirmed to be an LVAD candidate and not a heart transplant candidate, surgical preparations begin. With this move to become a destination therapy center, advanced heart failure patients no longer had to be inpatients at unfamiliar faraway hospitals in order to receive their LVAD transplants. A key benefit to rural area patients. After the move to a destination therapy center, DHLC's LVAD program flourished, boasting 20 shared care patients and 32 destination therapy patients. The LVAD program at DHLC has continued to grow and expand access to LVAD care for additional patients in 2021.

Results

Since its approval as a LVAD implant site on 2-2019 up until 12-2020, over 50 patients have undergone LVAD implantation at DHLC. Overall, 47% of patients were INTERMACS profile 3, 29% were INTERMACS profile 2, and 24% were INTERMACS profile 1. Overall complications reported during this time period include stroke (8.2%), GI bleeding (10.2%), and driveline infections (6.2%).

More recently, from 1-2021 to 10-2021, an additional 17 patients underwent LVAD implantation at DHLC as part of the transition from the shared care to destination therapy model. Among these patients, 47% were INTERMACS 3. 29% of patients were INTERMACS profile 1, and 24% were INTERMACS profile 2. Among INTERMACS profile 3 patients, 75% were discharged home; 100% and 50% of INTERMACS profiles 1 and 2, respectively, were discharged home. Complications reported during this timeframe include stroke (11.8%), GI bleeding (11.8%), and driveline infections (5.9%).

Discussion

Through our experience and success at DHLC, the shared care

to destination therapy model is an example of a new milestone in the advancement of care in the face of a growing heart failure pandemic. This model not only expands access to LVAD care, but also provides patients with social, financial, and satisfaction benefits. Shared care centers allow individuals to reach an advanced heart failure specialist quickly and efficiently by eliminating long distance travel and its associated financial expenses, as well as eliminating the excessive time commitment previously required for routine care. Patients are able to continue to reside in their own communities without making a lifelong commitment to either move where resources are available or spend an excessive amount of time traveling. The physician-to-patient ratios will remain lower enabling the physician-patient relationship to grow stronger over the years, which can improve the physician's ability to deliver personalized care and treat each patient based on their individual needs.

Given the high mortality rates in end stage heart failure and the recent advancements in LVAD technology that now afford a three-year survival rate comparable to that of heart transplant [12], the demand for LVADs continues to escalate. Just as DHLC implemented the shared care to destination therapy model to become a LVAD implant center, heart failure cardiologists need to adapt and strategically evaluate all adHF patients for LVAD candidacy to improve patient outcomes, satisfaction, and quality of life. To meet the demands of our patients and provide top notch care, DHLC has developed a multidisciplinary team discussing LVAD selection criteria, action plans, patient support, guideline directed treatment, and comprehensive follow up care. This multidisciplinary team consists of an advanced heart failure cardiologist, LVAD surgical director, LVAD medical director, medical critical care director, heart failure nurse practitioners, and two social workers all centered on patient care. This multidisciplinary team allows the adHF care team at DHLC to continue to evolve by staying current on the newest technologies, strategies, and therapies to ultimately provide the best care. Through this period of expansion and development, these multidisciplinary teams are integral to the successful establishment of a shared care center and a LVAD implant center. A shared care center is an important stepping stone in making a difference throughout the heart failure pandemic physically, economically, and emotionally. These opportunities allow society to overcome barriers and make further advancements in order to give end stage patients a chance for additional time in life. Wider access to LVAD therapy will continue to be a challenge in the near future and the shared care to destination therapy model continues to be a formidable answer to fill that need and should be considered moving forward.

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