



Peer-Reviewed Review

Occupational therapy's role with ventricular assist devices and the promotion of travel protocols

Natasha Chandra^{1*} and Linda Suplicki²

Citation: Chandra N and Suplicki L. Occupational therapy's role with ventricular assist device and the promotion of travel protocols. *The VAD Journal*. 2020; 6(1):e2020617. <https://doi.org/10.11589/vad/e2020617>

¹ Boston University, Boston, MA

² The Heart Success & Mechanical Circulatory Support Program, Morristown Medical Center, Morristown, NJ

*Corresponding author: natashachandra029@gmail.com

Editor-in-Chief: Maya Guglin,
University of Indiana

Received: March 17, 2020

Accepted: April 20, 2020

Published: May 5, 2020

© 2020 The Author(s). This is an open access article published under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided that the original author(s) and the publication source are credited.

Funding: Not applicable

Competing interests: none

Abstract

An option for individuals diagnosed with end-stage heart failure is to receive a ventricular assist device (VAD). In 2006, Shepherd and Wilding produced an article regarding occupational therapy's role during the VAD process as they anticipated a growing need for this area of practice. Since that time, there continues to be a lack of supporting literature on occupational therapy's important role with this population. Therefore, the purpose of this article is to explain an occupational therapist's contribution on the VAD team, offer opportunities and interventions for enhancing quality of life for this unique population, and discuss an innovative travel protocol implemented at Morristown Medical Center.

Keywords: ventricular assist device, occupational therapy, travel



Background

In the United States, approximately 5.7 million adults are diagnosed annually with heart failure, and more than half are expected to die within five years (1). Once heart failure advances to end-stage, mortality soars to 80% in one year (2). An option for individuals diagnosed with end-stage heart failure is to receive a ventricular assist device (VAD), which can be implanted as a bridge-to-transplant therapy, bridge-to-recovery, or destination therapy. Bridge-to-transplant therapy is considered a short-term option until a donor heart becomes available for heart transplantation. In some cases, the VAD can restore the heart's function over time which eliminates the need for the donor heart transplant completely; this therapy is known as bridge-to-recovery. Destination therapy is a long-term treatment to improve quality and length of life when the patient is not a candidate for a heart transplant. The goal of destination therapy is for the patient to live the remainder of their life on a VAD.

In 2006, Shepherd and Wilding produced an article regarding occupational therapy's role during the VAD process as they anticipated a growing need for this area of practice (3). Since that time, there continues to be a lack of supporting literature on occupational therapy's role. Occupational therapists assist individuals in overcoming both physical and non-physical barriers in order to engage in meaningful tasks as safely and independently as possible. They are considered a vital part of the VAD team to address lifestyle changes during activities of daily living while managing the VAD along with improving fine motor manipulation skills to manage the device controllers or batteries. Occupational therapists can also provide assistance to overcome barriers in community mobility and travel. The purpose of this article is to explain the occupational therapist's role on the VAD team and offer opportunities for enhancing care of this unique population.

How the Device Works

There are various components to a VAD, including internal and external equipment. VADs help the function of the left, right, or both heart ventricles by pumping the blood out of the left and/or right ventricle and into the aorta, which then provides oxygenated blood to the body. The three parts of a VAD include the pump (internal), system controller, and a power source. Durable VAD pumps are placed in the apex of the left ventricle and weigh approximately 1 to 2 pounds. From the pump, an outflow graft and driveline are connected. The outflow graft transports the blood from the left ventricle into the aorta. The driveline exits the body from the chest or stomach; it is connected to the system controller that controls the pump settings and displays the VAD parameters. The driveline is important as it connects the internal equipment with the external equipment to provide power to the pump. A power source can be batteries or electricity via a power module that is connected to the system controller.

Grooming and Hygiene

After a VAD implant, the driveline exit site is extremely susceptible to infection as it is a tube that exits the body (4). Thus, hygiene is extremely important to reduce infections. In 2017, a research study concluded that eliminating conventional showers after a VAD implantation may reduce the



incidence of *Pseudomonas* exit site infections (4). Therefore, it is often recommended to use alternative means of hygiene until the skin around the driveline exit has healed for approximately 3 to 6 months. These alternatives can include sponge bathing, personal cleaning wipes, and waterless bodywashes such as DryBath®.

During bathing it is important to keep in mind that the external equipment cannot be submerged in water; medical device companies have created specialized shower bags to fit the patient's specific device and cover the exit site. Some individuals will hang the shower bag on a hook in order to utilize both hands and prevent accidentally dropping the device. Using a detachable showerhead or spray is also beneficial to aim the water stream away from the exit site; it can also help patients bathe until they are cleared to take a full shower. Occupational therapists can help educate on adaptive techniques and establish routines best for the patient's safety and comfort.

Dressing

Upper body dressing routines are altered after most heart-related surgeries for sternum healing. Occupational therapists can assist in creating a new routine while managing the device wires, controllers, and batteries in a safe manner that prevents stress on the sternum. Fine motor interventions are also beneficial post-operatively to promote independence in device management, bathing, and dressing. Specialized upper and lower body clothing are manufactured online for specific devices to provide options for equipment management. These clothing options may have pockets for batteries and controllers, a hole to feed wires through, or clips to keep the wires in place. Some individuals prefer using football girdles with pockets to maintain compression and keep the device materials hidden but safe. Many patients prefer clothing options that make the equipment less identifiable. A simple internet search will provide VAD patients with a multitude of companies and designs. As there are various types of shirts, jackets, girdles, and vests, patients can customize their look and increase their quality of life through expression. Some individuals are creative in their approach and make personalized products to manage their VAD equipment; these individuals often post instructions to make these products at home on various websites such as Pinterest© and MyLVAD© (5).

Nutrition and Exercise

Holdy et al. concluded that malnutrition causes metabolic imbalances that significantly contribute to infection complications and poor functional recovery after a VAD implantation (6). Thus, a team approach is imperative to provide education and individualized nutrition plans (7). Low-sodium diets should continue to be utilized after surgery to prevent fluid retention, and high protein diets are recommended to promote recovery and wound healing (7). Individuals with a VAD also need to take blood thinners after surgery. Vitamin K is found in most green and leafy vegetables, and its intake must be consistent to maintain stable anticoagulation. Simple diet changes can improve energy levels, help decrease symptoms and promote healing.

Prior to surgery, muscles in the body and endurance capabilities are diminished (8). Cardiac rehabilitation is often recommended post-discharge. This



medically supervised rehabilitation provides a progressive exercise regimen as well as education on healthy heart tips such as stress reduction and eating habits (8). Cardiac rehabilitation and occupational therapists can also assist in creating new healthy routines to improve endurance, such as daily walks or home exercises. After a VAD implantation, patients cannot submerge the device in water, which means swimming and water aerobics are exercise activities that are contraindicated. Fine motor exercises are recommended to help the patient perform device care efficiently and reduce associated swelling that is common after cardiac surgery.

Medication Management

Individuals are prescribed blood thinning medications after surgery to prevent clotting and promote device function. Traditional heart failure medications will be implemented based on a patient's needs, such as diuretics and/or additional medications to regulate heart rate and blood pressure. After returning home, the new medication regime can seem complicated; occupational therapists can assist in creating an individualized routine to manage one's medications. These modifications could include low- or high-technology such as medication dispensers, creating a color-coordinated calendar, setting phone timers, or utilizing a pill organizing company such as Pill Pack®.

Sleeping

Sleep is a vital activity that promotes revitalization and healing. Several VAD patients report sleeping more comfortably after implantation due to improvement in breathing; however, some changes might need to be implemented (5). For example, one cannot sleep on his or her stomach as it may compress or tug on the driveline throughout the night. Additionally, reducing frequent position changes and monitoring the driveline is vital to prevent damage to the healing driveline exit site. Occupational therapists can suggest pillow placements to increase comfort and decrease the need for position changes at night.

Prior to sleeping, patients must connect their device to an electrical power source as it is often difficult to hear a low battery alarm when in deep sleep, as well as to prevent unexpected battery depletion or power loss. Occupational therapists can help rearrange bedroom furniture, so the patient is close to a wall outlet and can place necessary equipment on a nightstand. Rearranging furniture can also be useful for individuals that often use the bathroom at night. Since the individual should be connected to an electrical power source, there is a limited range the person can walk. If the length of the power cable can reach the toilet, the individual can sleep nearest to the bathroom and must be cognizant of not tangling the cable; nightlights are also recommended for safety. If the length of the power cable is too short, the individual can utilize a bedside commode or urinal next to his or her bed. In case of an emergency or power outage, it is recommended to keep a flashlight, a backup controller, and charged batteries nearby. Basic fall prevention techniques, such as removing throw rugs and additional obstacles, should also be implemented to avoid tripping or tangling the cable.



Intimacy

Individuals with a VAD can engage in sexual activities. It is important, however, to reduce movement near the driveline exit and prevent excessive pressure on the equipment. An open discussion on various positions, modifications, and equipment management will help individuals engage in this meaningful aspect of quality of life. Birth control options are another necessary discussion. Pregnancy while on a VAD is contraindicated due to the potential for the pump to dislodge as the fetus grows in the womb. It is also contraindicated due to the mandatory blood thinner medication required for life.

Travel

Individuals with a VAD often experience negative feelings and anxiety about traveling away from their established VAD center. Due to these factors, individuals with a VAD are at risk of missing meaningful events such as business meetings, family celebrations, and vacations. Additional travel resources to reduce anxiety and facilitate independence are needed.

A lack of VAD knowledge in the community, coupled with a paucity of national or state guidelines on traveling with a VAD device, are major barriers to travel. This often results in airport security problems or delays in receiving emergency care. Device-specific QR codes from MyLVAD[®] were utilized to create individualized wallet cards, emergency ID cards for device controllers, and luggage tags. Each item contains valuable information such as name, date of birth, time-sensitive emergency procedures (no chest compressions, do not disconnect, call 24/7 VAD Help, etc.), life-sustaining medical equipment requirements, and instructions to access QR code information through a smartphone camera (Figures 1 & 2). Once the QR code is scanned, it directs the operator to detailed emergency protocols and device management for Heartmate II, Heartmate 3, and Heartware HVAD. These guidelines are standardized and designed to provide emergency personnel with key device management tips.

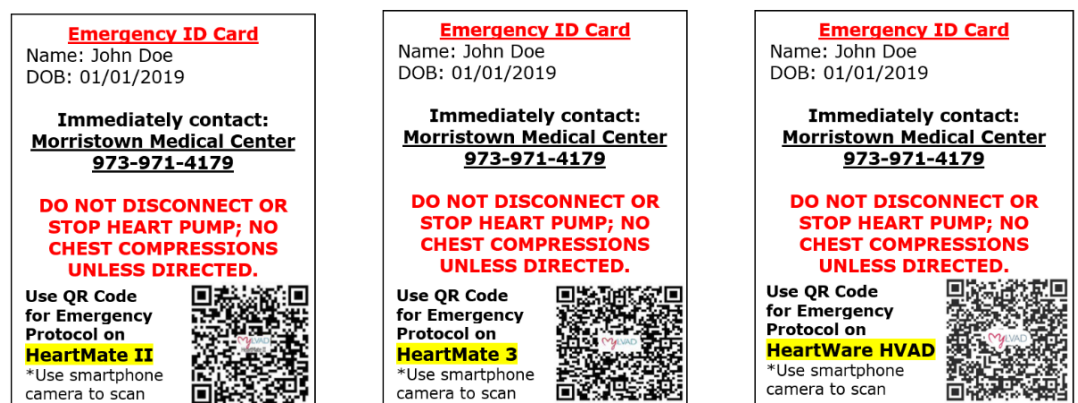


Figure 1. Ventricular assist device wallet cards



To help patients create a sense of control when traveling away from the established VAD center, a binder was created with VAD centers both nationally and internationally. On each map, a heart symbolizes where each VAD center is located, while the second page contains the pertinent information. This visual resource can help individuals prepare for an emergency by contacting that center prior to traveling, as well as allowing them access to care if the need arises. While VAD technology is rising, it is far from common among the medical community.

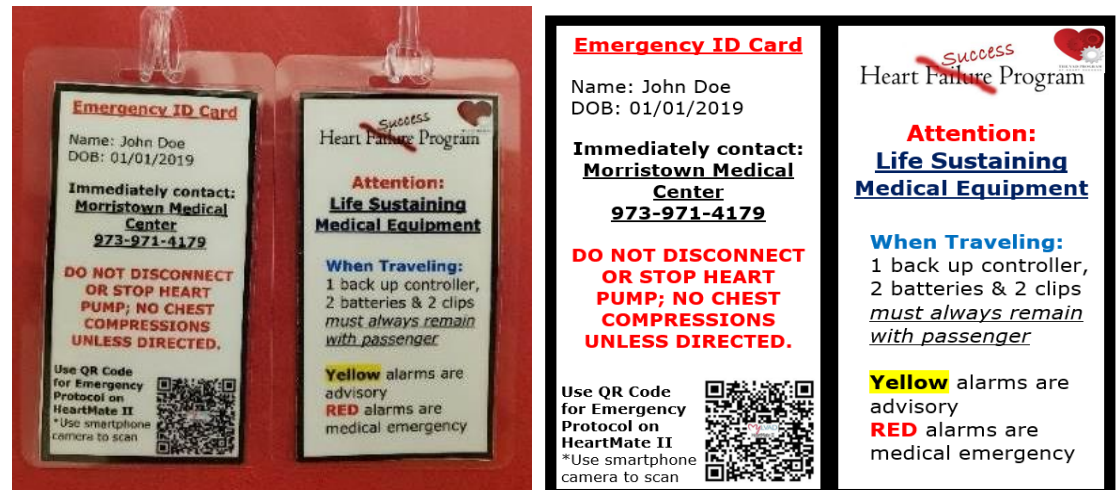


Figure 2. Ventricular assist device luggage tags

It is hoped that with the emergency ID cards, luggage tags, and map resources, individuals with a VAD will feel more confident to travel. The QR codes and vital information on the device controllers can help patients advocate for their needs and create awareness to the VAD community. Future recommendations include adding emergency personnel trainings in the patient's hometown, promoting VAD awareness and trainings for airline staff, meeting with medical device companies to print QR codes directly on the controller, and help the VAD community advocate for their rights. Traveling can be an important part of quality of life and needs to be addressed to ensure safety. Occupational therapists have a vital role in the VAD team to address all meaningful occupations. Although there is a lack of evidence, the VAD community can benefit from occupational therapy's unique ability to problem-solve daily challenges associated with their device.

References

1. U.S. Department of Health and Human Services. Heart failure fact sheet. 2019. Date of Access: 2019 October. Retrieved from https://www.cdc.gov/dhdsdp/data_statistics/fact_sheets/fs_heart_failure.htm.
2. Severino P, Mather PJ, Pucci M, D'Amato A, Mariani MV... Fedele F. Diagnostics. 2019;9(4):170.



3. Shepherd J, Wilding C. Occupational therapy for people with ventricular assist devices. *Aust Occup Ther J.* 2006;53:47-9. doi: 10.1111/j.1440-1630.2005.00506.x
4. Aburjania N, Sherazi S, Tchantchaleishvili V, Alexia JD, Hay CM. Stopping conventional showering decreases pseudomonas infections in left ventricular assist device patients. *Int J Art Org.* 2017;40(6):282-5.
5. MyLVAD. Retrieved from <https://www.mylvad.com>
6. Holdy K, Dembitsky W, Easton LL, Chillcott S, Stahovich M, Rasmusson B, Pagani F. Nutrition assessment and management of left ventricular assist device patients. *J Heart Lung Trans.* 2005;24(10):1690-6.
7. Hill A, Nesterova E, Lomivorotov V, Efremov S, Goetzenich A, ... Stoppe C. Current evidence about nutrition support in cardiac surgery patients- what do we know? *Nutrients*, 2018;(10)5: 597.
8. Regents of the University of California. Ventricular assist devices (VAD). 2018. Retrieved from [https://cardiacsurgery.ucsf.edu/conditions-procedures/ventricular-assist-devices-\(vad\).aspx](https://cardiacsurgery.ucsf.edu/conditions-procedures/ventricular-assist-devices-(vad).aspx)