

USE OF VENTRICULAR ASSISTANCE DEVICES IN PATIENTS WITH ADVANCED HEART FAILURE: SYSTEMATIC LITERATURE REVIEW

Grasiele Mattei Ise dos Santos

Centro Universitário Unifacig
Manhuaçu-MG

<https://orcid.org/0009-0003-7502-6387>

William Magnago de Mattos Panciere

Centro Universitário do Espírito Santo
(UNESC)

Colatina - ES

<https://orcid.org/0009-0003-4430-4970>

Vanessa Begio

Universidade Anhembi Morumbi (UAM)
São José dos Campos - SP

<https://orcid.org/0009-0007-3141-132X>

Marcelo Zibetti

Centro Universitário Redentor
(UniRedentor)

Itaperuna - RJ

<https://orcid.org/0009-0008-3505-3977>

Luyla dos Santos Resende

Centro Universitário de Valença (UNIFAA)
Valença - RJ

<http://lattes.cnpq.br/9874362320827171>

Marcos Horacio Miranda Junior

Faculdade de Medicina de Campos (FMC)
Campos Dos Goytacazes - RJ

<https://orcid.org/0009-0001-7780-3181>

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Breno Rafaele Gehlen Montecinos Gallo
Universidade do Sul de Santa Catarina
(UNISUL)
Tubarão - SC
<https://orcid.org/0009-0002-5159-9140>

Matheus Bastos Schwab
Centro Universitário do Espírito Santo
(UNESC)
Colatina - ES
<http://lattes.cnpq.br/9332895311594527>

Guilherme Pastro Creimer
Escola Superior de Ciências da Santa Casa de
Misericórdia de Vitória (EMESCAM)
Vitória- ES
<http://lattes.cnpq.br/0665288549785560>

Laura Rangel de Freitas Ribeiro Rocha
Faculdade de Medicina do Vale do Aço
(UNIVAÇO)
Ipatinga - MG
<https://lattes.cnpq.br/7042087398825953>

Jaqueline Miranda Pena da Silva
Centro Universitário Unifacig
Manhuaçu - MG
<https://orcid.org/0009-0007-3022-2244>

Gabriel Rodrigues Vitor
Faculdade de Medicina do Vale do Aço
(UNIVAÇO)
Ipatinga - MG
<https://orcid.org/0009-0006-9100-2651>

Abstract: Goal: To provide an up-to-date synthesis of available evidence on the use of VAD in patients with advanced HF. Methodology: The first step will be a systematic search for relevant articles in the MEDLINE, embase and cochrane Library databases, using the following search terms: “advanced heart failure” and “ventricular assist devices”. A total of 156 studies were found, and 6 studies were selected to compose the collection. Results: The analyzed studies indicate that ventricular assist devices can improve patients’ quality of life, increase survival and reduce morbidity in patients with advanced heart failure. The economic evaluation of ventricular assist devices has shown that the cost-effectiveness of these devices may vary depending on patient characteristics and the type of device used. Conclusion: the use of ventricular assist devices in patients with advanced heart failure has proven to be a viable therapeutic option.

Keywords: Advanced heart failure; Ventricular assist devices.

INTRODUCTION

Heart failure (HF) is a prevalent and common clinical condition, affecting approximately 64.3 million people worldwide (Lloyd-Jones et al., 2021). HF occurs when the heart is unable to pump enough blood to meet the body’s metabolic needs, resulting in symptoms such as dyspnea, fatigue, and peripheral edema. HF is one of the leading causes of hospitalization and mortality, with a mortality rate of 50% in the first five years after diagnosis (Bui et al., 2020).

In patients with advanced HF, drug therapy may not be enough to control symptoms and improve quality of life. In this scenario, ventricular assist devices (VAD) can be an effective therapeutic option to prolong survival and improve cardiac function. VADs are mechanical devices that are implanted in the heart or blood vessels adjacent to the heart

to help pump blood and reduce the symptoms of advanced disease. There are several types of VAD, including left ventricular assist devices (LVAD) and right ventricular assist devices (RVAD) (Baumwol et al., 2020).

The use of VAD in patients with advanced heart failure has become increasingly common. However, despite the increasing use of these devices, there is still uncertainty about their effectiveness, safety and cost-effectiveness. In this context, the present study aims to carry out an integrative literature review to provide important information about the use of VAD in patients with advanced HF. Data from the available evidence on the efficacy and safety of these devices will be identified, as well as their relationship with cost-effectiveness. The review aims to provide an up-to-date synthesis of available evidence on the use of VAD in patients with advanced HF, in order to guide clinical practice and provide important information for future research in the area.

METHODOLOGY

The integrative review will be conducted in stages. The first step will be the systematic search of relevant articles in the MEDLINE, Embase and Cochrane Library databases. The search will be performed using the following search terms: “advanced heart failure” and “ventricular assist devices”. The inclusion criteria for selecting articles will be: primary studies published in English, which have evaluated the efficacy, safety and cost-effectiveness of these devices. Studies that do not have patients with advanced heart failure as a target population will not be considered.

Selected articles will be evaluated independently by two reviewers. To assess the methodological quality of studies. The synthesis of the results will be carried out through a descriptive and narrative approach, including the description of the characteristics of the selected studies and the main evidence.

A total of 156 studies were found, and 6 studies were selected to compose the collection.

RESULTS

The search results in the databases are presented in Figure 1, indicating that a total of 156 studies were found. After the initial title screening, 124 studies were excluded, resulting in 32 studies for abstract evaluation. Then, the screening of titles and abstracts allowed selecting 11 studies for complete reading, of which 6 were included in the systematic review according to the established inclusion criteria.

Information about the studies referring to the authors/year, objective, type of study and main results was listed, as shown in Chart 1.

DISCUSSION

The Health Quality Ontario (2016) and Chew et al. (2022) agree that the use of ventricular assist devices is a promising option for patients with advanced heart failure who are not eligible for heart transplantation. Both studies report that the devices improve patients' quality of life and reduce the mortality rate. The Health Quality Ontario study (2016) also points out that the devices are effective in reducing hospitalizations, while Chew et al. (2022) report that the use of devices is cost-effective compared to other treatment options. These results highlight the importance of ventricular assist devices in the management of advanced heart failure in patients who are not candidates for heart transplantation.

The study “Left Ventricular Assist Devices: A Primer For the General Cardiologist” by Chaudhry et al. (2022) offers important information about LVADs and their application in clinical practice. According to the article, LVADs play a key role in the treatment of advanced heart failure, but it is essential that patients who are candidates for these

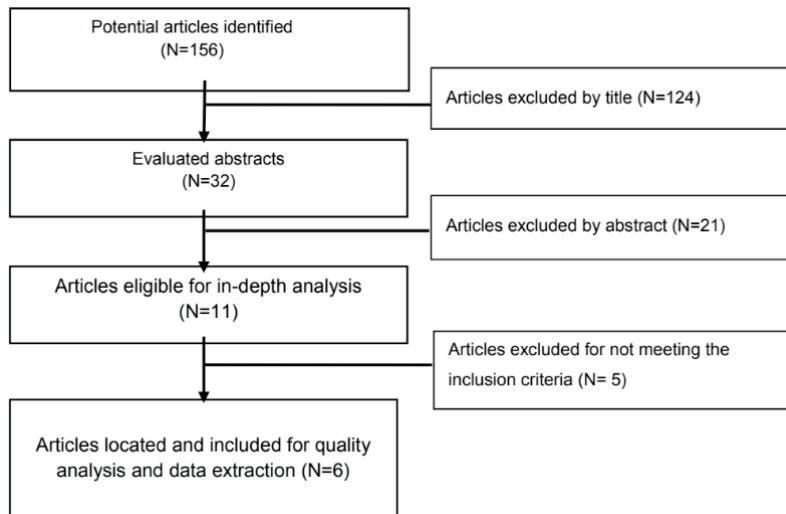


Figure 1.0 Flowchart of the distribution of articles found and selected.

Source: Santos et al., 2023.

Authors and Year	goal	Kind of study	Main results
Health Quality Ontario, 2016	To evaluate the efficacy and safety of using ventricular assist devices as a destination therapy in patients with advanced heart failure.	Systematic literature review	The review identified six studies, including two randomized clinical trials, that evaluated the use of ventricular assist devices in patients with advanced heart failure. The results indicated an improvement in the survival and quality of life of patients with the use of these devices.
Chew et al., 2022	To assess the cost-effectiveness of using ventricular assist devices in patients with advanced heart failure who are not eligible for heart transplantation.	Cost-effectiveness analysis	The use of ventricular assist devices has been found to be cost-effective compared to other treatment options for patients with advanced heart failure who are not eligible for heart transplantation.
Baras et al., 2017	To evaluate the cost-effectiveness of using ventricular assist devices in outpatients with advanced heart failure.	Cost-effectiveness analysis	The use of ventricular assist devices has been found to be cost-effective compared to other treatment options for outpatients with advanced heart failure.
Gopinathannair et al., 2019	To review the available evidence on the management of arrhythmias in patients receiving ventricular assist devices.	Systematic literature review	The review highlighted the importance of proper monitoring and treatment of arrhythmias in patients with ventricular assist devices, including pharmacological therapy and non-pharmacological interventions such as catheter ablation.
Chriqui et al., 2021	To evaluate the accuracy of echocardiographic parameters in predicting right ventricular failure after left ventricular assist device implantation in patients with heart failure.	Meta-analysis	The meta-analysis identified several echocardiographic parameters that may be useful in predicting right ventricular failure after left ventricular assist device implantation, including right ventricular diastolic diameter and systolic pulmonary pressure.
Chaudhry et al., 2022	To provide a guide for general cardiologists on the use of ventricular assist devices in patients with advanced heart failure.	Narrative review	The review highlighted the importance of proper patient selection for ventricular assist device implantation, as well as proper management of potential complications.

Framework 1.0–Distribution of scientific productions according to the following variables: authorship, year of publication, objective, type of study and results (n= 6).

Source: Santos et al., 2023.

devices are carefully selected and evaluated by a multidisciplinary team before and after implantation. The study also highlights the need for an in-depth understanding of the pathophysiology of advanced heart failure and the complications associated with the use of LVADs, as well as the importance of long-term follow-up of patients receiving these devices. In conclusion, it emphasizes the importance of LVADs as a therapeutic option for advanced heart failure,

The Health Quality Ontario study (2016) presents a technology assessment regarding the use of EVDs in patients with advanced heart failure. The review highlighted that the use of LVADs as a destination therapy has been associated with a significant improvement in the quality of life and survival of patients with advanced heart failure. However, it also emphasizes that the use of LVADs is associated with significant complications, including infections, bleeding and stroke. The use of LVADs as a destination therapy is a valuable option for patients with advanced heart failure, but that proper patient selection and careful assessment of risks and benefits are key to a successful approach.

The study by Chriqui et al. (2021) provides important information about the ability of echocardiographic parameters to predict right ventricular failure (RVF) after LVAD implantation in patients with heart failure. The results of the meta-analysis showed that right ventricular ejection fraction (RVEF) and pulmonary artery systolic velocity (PASV) were the most predictive parameters of RVF in patients receiving LVAD. Specifically, patients with EFVO < 30% and ESV > 2.2 m/s had a higher risk of post-LVAD PVD. These findings are important as they help to identify patients at higher risk of postoperative complications and can be used to guide the selection of candidates for AVED. Therefore, these results can help inform postoperative management

strategies and provide clinicians with more accurate information about patients who may need additional care. However, further studies are needed to validate these findings and determine their clinical applicability in different practice settings.

The management of arrhythmias is one of the main concerns in patients with LVADs. Gopinathannair et al. (2019) performed a systematic review of the literature on the management of arrhythmias in patients with AVEs and highlighted the importance of careful assessment of cardiac rhythm in patients with AVEs. It is evident that arrhythmia is a common complication in these patients, and the management of these arrhythmias can be challenging due to the complexity of the clinical status. There is a need for a multidisciplinary approach in the management of arrhythmias in patients with LVADs, involving cardiologists, electrophysiologists and specialists in mechanical devices. In addition, the importance of appropriate selection of pharmacological therapies and consideration of invasive procedures such as catheter ablation and cardiac resynchronization,

For Chew et al. (2022) there is a need to evaluate the use of EVDs in different subgroups of patients and in different health care settings to better assess the benefits and costs in each context. Furthermore, the study recognized that the use of ELVs is not appropriate for all patients with advanced heart failure and that adequate patient selection is essential for a successful approach. Overall, the study provides important evidence on the feasibility and cost-effectiveness of using LVADs in patients with advanced heart failure who are not eligible for heart transplantation, and highlights the need for a careful and individualized approach in the management of these patients.

Although the study Baras et al. (2017) agree

that ventricular assist devices can improve quality of life and reduce mortality in patients with advanced heart failure, they disagree on whether or not they are a cost-effective option. The study concluded that while the devices can be cost-effective in some cases, they are generally more expensive than other treatment options, such as standard medical care. Furthermore, the study also points out that the available evidence on the use of devices in outpatients is limited, and the effectiveness of using devices in patients with advanced heart failure who are still able to move freely needs to be further investigated.

FINAL CONSIDERATIONS

Based on the reviewed studies, it was possible to observe that the use of ventricular assist devices in patients with advanced heart failure has proven to be a viable therapeutic option. The analyzed studies indicate that ventricular assist devices can improve patients' quality of life, increase survival and reduce morbidity in patients with advanced heart failure. However, the studies also highlight the importance of careful selection of patients and multidisciplinary follow-up during treatment with these devices. The economic evaluation of ventricular assist devices has shown that the cost-effectiveness of these devices may vary depending on patient characteristics and the type of device used. Therefore, it is important to consider not only the effectiveness of ventricular assist devices, but also their costs and benefits relative to other therapeutic options available for the treatment of advanced heart failure.

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