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VENTRICULAR ASSIST DEVICES AND NURSING CARE

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ABSTRACT

Objective: describing the functioning, benefits and complications associated with the use of ventricular assist devices and identifying the interventions performed by nurses in the care of patients using this device, according to presented evidence.

Method: an integrative review of articles collected in health databases conducted in February 2015. The descriptors used were *heart diseases*, *heart-assist devices* and *nursing*. We identified 34 articles, which were then submitted to thematic analysis.

Results: ventricular assist devices function as mechanical pumps promoting adequate cardiac output. Their main benefit is hemodynamic stabilization. The most common complication is infection. Health education, emotional support, outpatient care and curative care are the main care actions performed by nurses.

Conclusion: evidence confirms improvement in survival rates of patients with severe heart failure with the use of ventricular assist devices, reiterating the importance of expanding this technology in Brazil as a possibility for treatment.

DESCRIPTORS: Cardiac disorders. Cardiac insufficiency. Artificial heart. Nursing. Cardiovascular nursing. Nursing care.

DISPOSITIVOS DE ASSISTÊNCIA VENTRICULAR E CUIDADOS DE ENFERMAGEM

RESUMO

Objetivo: descrever o funcionamento, os benefícios e as complicações associadas ao uso de dispositivos de assistência ventricular e identificar as intervenções realizadas por enfermeiros no cuidado ao paciente com este dispositivo, de acordo com as evidências.

Método: revisão integrativa, com artigos coletados em bases de dados da saúde, em fevereiro de 2015. Os descritores utilizados foram *heart diseases*, *heart-assist devices* e *nursing*. Identificaram-se 34 artigos, os quais foram submetidos à análise temática.

Resultados: os dispositivos de assistência ventricular funcionam como bombas mecânicas promotoras de débito cardíaco adequado. Seu principal benefício é a estabilização hemodinâmica. A complicação mais comum é a infecção. Educação em saúde, suporte emocional, cuidados com sítio de saída e realização de curativo são os principais cuidados realizados por enfermeiros.

Conclusão: as evidências comprovam a melhoria da sobrevida de pacientes com insuficiência cardíaca grave com o uso dos dispositivos de assistência ventricular, reiterando a importância da ampliação dessa tecnologia no Brasil como possibilidade de tratamento.

DESCRIPTORIOS: Cardiopatias. Insuficiência cardíaca. Coração artificial. Enfermagem. Enfermagem cardiovascular. Cuidados de enfermagem.

DISPOSITIVOS DE ASISTENCIA VENTRICULAR Y CUIDADOS DE ENFERMERIA

RESUMO

Objetivo: describir el funcionamiento, los beneficios y las complicaciones asociadas con el uso de dispositivos de asistencia ventricular e identificar las intervenciones de enfermería en la atención al paciente con este dispositivo, de acuerdo con la evidencia.

Método: revisión integrativa, con los artículos recolectados en las bases de datos de salud en febrero de 2015. Los descriptores utilizados fueron *heart diseases*, *heart-assist devices* e *nursing*. Se identificaron 34 artículos, que fueron sometido al análisis temático.

Resultados: los dispositivos de asistencia ventricular actúan como bombas mecánicas que promueven gasto cardíaco adecuado. Su ventaja principal es la estabilización hemodinámica. La complicación más común es la infección. educación para la salud, el apoyo emocional, la atención y la realización de vendajes del orificio de salida son la atención primaria por parte de enfermería.

Conclusión: la evidencia apoya la mejora de la supervivencia de los pacientes con insuficiencia cardíaca grave con el uso de dispositivos de asistencia ventricular, reiterando la importancia de la expansión de esta tecnología en Brasil como un posible tratamiento.

DESCRIPTORES: Trastornos cardíacos. Insuficiencia cardíaca. Corazón artificial. Enfermería. Enfermería cardiovascular. Cuidados de enfermería.

INTRODUCTION

Chronic heart failure is a syndrome characterized by reduced cardiac output resulting from hemodynamic and neurohormonal responses.¹⁻³ It is a public health problem with high global morbidity and mortality. It affects about one million people in Europe, and it is estimated that 5.8 million adults live with the disease in the United States.⁴ Data are even more alarming in Brazil, as chronic heart disease accounts for 15.9 million deaths, and projections indicate that the country will have the sixth largest elderly population by 2025, which should result in multiplying the number of cases of this disease.⁵

In view of the above, the use of technologies becomes an important strategy for effectively managing this pathological condition. Cardiac transplantation is indicated for patients with a terminal diagnosis.³ However, given the lack of knowledge about donations,⁶ the mismatch between potential donors and effective donations, as well as the need for immediate correction of hemodynamic instability, transplantation becomes unviable. In turn, this determines the use of mechanical circulatory support, which in many cases is the only chance of survival.

Ventricular Assist Devices (VAD) are mechanical heart pumps that promote circulatory support for malfunctioning ventricles. Since cardiac failure results in reduced performance and (impaired) ventricular function as a pump, VAD assumes this function, providing adequate cardiac output. Therefore, it reduces the preload, cardiac workload and neurohormonal response, and in

turn, increases systemic circulation and tissue perfusion.⁷⁻⁸

Considering the complexity of this procedure, assistance based on completeness and interdisciplinarity becomes essential for health promotion, preventing diseases and improving the quality of life of these patients. In this context, the importance of nurses having solid knowledge of the techniques and handling of these devices is relevant, since this technology is already available in Brazil and is mostly used as a bridge for either paracorporeal or fully implantable heart transplantations. However, as this is a differentiated technology used in many specific groups, we point out that little has been discussed about nursing care directed at patients using these devices, and Brazilian publications on the subject are scarce.^{7,9-10}

The proposed article aims to develop criteria relevant to an extended discussion around this theme. We believe that this body of theoretical knowledge on the paths covered by national and international scientific production on VAD implantation through summarizing published research will support diagnostic and therapeutic decision processes related to the roles of health professionals, and especially nurses, thus constituting a relevant source of research to assist in care, and thereby guaranteeing a higher quality of care.

Therefore, the objective of this study was to describe the functioning, benefits and complications associated with using ventricular assist devices, and to identify the interventions performed by nurses in caring for patients with this device according to presented evidence.

METHOD

This is an integrative literature review, which is a method that aims to synthesize results obtained in research on a topic or issue in a systematic, orderly and comprehensive manner through careful fulfillment of six stages: identification of the research question; definition of the characteristics of the primary studies of the sample; selection in pairs of the studies that composed the sample; analysis of the findings of the articles; and results interpretation and publication of the review, providing a critical examination of the findings.¹¹

Considering these steps, the analysis of the selected studies was guided by the research questions: how does a VAD work? What are the benefits and complications associated with implanting this device? What care (actions) do nurses provide to patients with VAD implants?

The following databases were chosen for developing this study: Latin American and Caribbean Literature in Health Sciences (LILACS), Spanish Bibliographical Index of Health Sciences (IBECS), *Scientific Electronic Library Online* (SciELO), *Medical Literature Analysis and Retrieval System on-line* (MEDLINE) and the *National Library of Medicine* (PubMed), using the descriptors *heart diseases*, *heart-assist devices* and *nursing*, according to the MeSH terminology. The search equation was “heart diseases” (MeSH Terms) AND “heart-assist devices” (MeSH Terms) OR “heart-assist devices” (MeSH Terms) AND “nursing” (MeSH Terms).

The defined inclusion criteria for pre-selection of the studies were: articles produced by health professionals; published in periodicals, establishing the period of publication year in the last six years (2010-2015); that contemplated the proposed objectives; in English, Portuguese or Spanish; and electronically available in full. Editorials, letters to the editor and articles of reflection were excluded.

The *Preferred Reporting Items for Systematic Review and Meta-Analyses* (PRISMA) was used for describing the searches and selection of studies, according to the following flowchart (Figure 1).

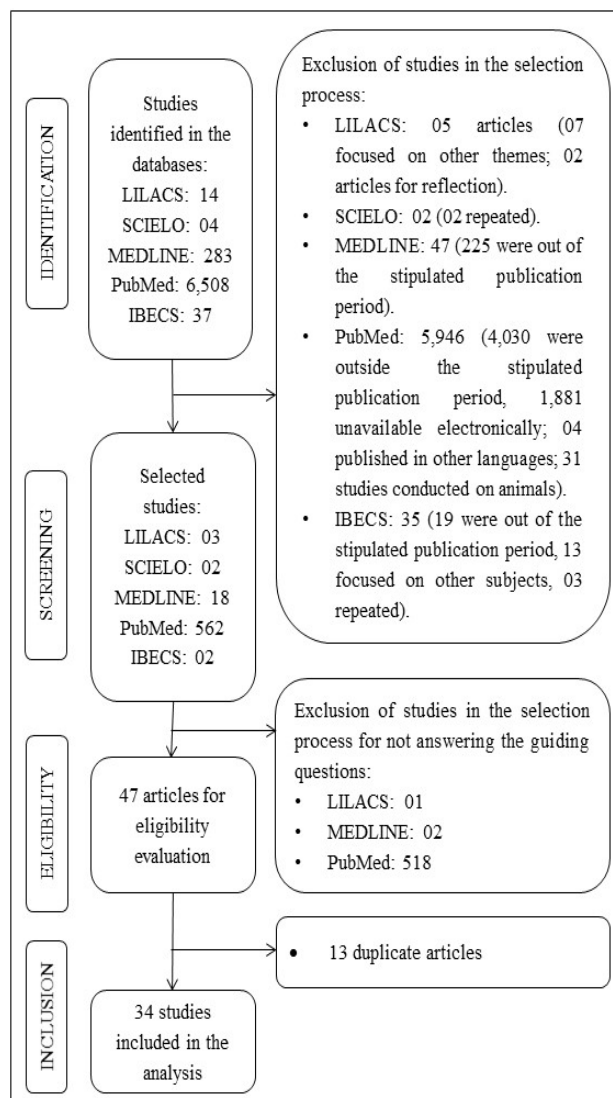


Figure 1 - Process of study selection in the LILACS, SciELO, IBECS, MEDLINE and PubMed databases. Fortaleza, CE, Brazil, 2015

The study selection process was performed through careful reading of titles and abstracts, so that studies that met the aforementioned inclusion criteria were maintained for final selection. A critical and detailed analysis was then carried out for the final selection of articles, comparing it with theoretical knowledge.¹¹

The *corpus* of the integrative review was composed of 34 articles, tabulated according to the following categories: title, periodical and year of publication, type/approach of the study and level of evidence (LE).

Classification from the experimental design¹² in five levels was used for the level of evidence, namely: Level I - the evidence comes from a systematic review of randomized controlled studies or comes from systematic reviews of randomized controlled trials; Level II - evidence derived from individual or observational randomized systematic reviews; Level III - evidence obtained from studies without randomized controlled, cohort or follow-up studies; Level IV - well-delineated case-control evidence, case studies and longitudinal studies; and Level V - evidence originating from descriptive studies.

The information was consolidated by categorizing the data, divided into: functioning, benefits and complications of the VAD, and interventions performed by nurses in caring for patients using VAD.

RESULTS

The final sample consisted of 34 publications (Table 1) from international (91.2%) and national journals (8.8%), with emphasis on the *Progress in Transplantation* journal, with a quantity of 13 (38.2%) studies. The countries of publication origin of the studies that composed the sample were: United States - 24 (70.6%); Canada and Brazil - 3 publications each (8.8%); Australia - 2 (5.9%); and Korea and China - 1 (2.9%). We observed that the year with the highest number of publications in the last five years was 2013 with 12 (35.3%) articles.

Chart 1 - Characteristics of reviewed studies, Nurse's actions and justification for their actions towards patients with ventricular assist devices. Fortaleza, CE, Brazil, 2015.

Study	Journal/ year	Methodological design	LE	Topic approached	Nursing actions	Justification for Nursing actions
A1 ¹³	Prog Transpl/ 2010	Experience Report	V	Preparing nurses for the <i>Total Artificial Heart</i> Program (TAH-t)	Creation/implementation of protocols and standard care; knowledge regarding the ethical aspects that involve the theme	Development and maintenance of professional competence
A2 ¹⁴	J Card Surg/ 2010	Review	V	Expansion of scientific knowledge about the use of VAD: components, associated benefits and complications	-	-
A3 ¹⁵	Prog Transpl/ 2010	Hermeneutic phenomenology	V	Emotional experiences of caregivers of patients with VAD	Evaluation of the perception of patients, family members, caregivers and nurses	Possibility of interventions based on the actual situation
A4 ⁸	Prog Transpl/ 2010	Case study	IV	Expansion of scientific knowledge about the use of VAD: components, associated benefits and complications	-	-
A5 ¹⁶	Medical-Surgical Nurs/ 2011	Descriptive	V	The use of VADs and ethical aspects	Creation/implementation of protocols and standard care; knowledge of the ethical aspects involving the theme	Development and maintenance of professional competence
A6 ¹⁷	J Card Surg/ 2011	Case-control study	IV	Re-evaluation of VAD patients eligible for transplant	-	-
A7 ¹⁸	Mayo Clin Proc/ 2011	Retrospective	V	Implementation of palliative medicine consultations	-	-
A8 ¹⁹	Pediatr Cardiol/ 2011	Descriptive	V	Children's experience awaiting transplant with VAD and family members	Evaluation of the perception of patients, family members, caregivers and nurses	Possibility of interventions based on the actual situation
A9 ²⁰	Prog Transpl/ 2011	Longitudinal	IV	Sleep pattern and quality	Analysis of sleep quality and pattern	Reduction of complications and health promotion
A10 ²¹	Prog Transpl/ 2011	Hermeneutic phenomenology	V	Lifestyle adjustments of caregivers of adults with VAD	Evaluating the perception of patients, family members, caregivers and nurses	Possibility of interventions based on the actual situation

Study	Journal/ year	Methodological design	LE	Topic approached	Nursing actions	Justification for Nursing actions
A11 ²²	Prog Transpl/ 2012	Experience Report	V	Alteration of body self-perception imposed by VAD	Evaluating the perception of patients, family members, caregivers and nurses	Possibility of interventions based on the actual situation
A12 ²³	Prog Transpl/ 2012	Descriptive	V	Nurses health care practice in caring for the patient with VAD	Assessment and management of health problems: interpretation/request for laboratory tests and other diagnostic procedures; realization of physical examination; monitoring vital signs; patients admissions and discharges; home visits	Patient monitoring to prevent or diagnose early complications associated with the use of VAD
A13 ²⁴	Circulation/ 2012	Case-control study	IV	Benefits: reduction of myocardial lipotoxicity, reversing insulin resistance and cardiac metabolism normalization in patients with advanced heart failure	-	-
A14 ²⁵	Prog Transpl/ 2012	Exploratory and descriptive	V	Definition of existing practices (standardization or protocol based on experts' opinions) to prevent infections	-	-
A15 ²⁶	Int J Artif Organs/ 2012	Exploratory and descriptive	V	Sleep pattern and quality	Analysis of sleep quality and pattern	Reduction of complications and health promotion
A16 ⁸	Arqu Bras Cardiol/ 2012	Review	V	Expansion of scientific knowledge about the use of VAD: components, associated benefits and complications	-	-
A17 ²⁷	Rev Bras Cirur Car- diovasc/ 2013	Case study	IV	Use of ventricular assistance after refractory cardiogenic shock	-	-
A18 ²⁸	J Clin Nurs/ 2013	Hermeneutic phenomenology	V	Alteration of body self-perception imposed by VAD	Evaluating the perception of patients, family members, caregivers and nurses	Possibility of interventions based on the actual situation
A19 ²⁹	Heart Ves- sels/ 2013	Case-control study	IV	Effects of VAD in carotid artery compliance	-	-
A20 ⁹	Prog Transpl/ 2013	Systematic review	II	Expansion of scientific knowledge about the use of VAD: its components, associated benefits and complications	-	-
A21 ³⁰	Int J Med Sci/ 2013	Case-control study	IV	Complications: oxidative stress, DNA damage and repair	-	-
A22 ³¹	Prog Transpl/ 2013	Descriptive	V	Nurses health care practice in caring for the patient with VAD	Evaluating the perception of patients, family members, caregivers and nurses	Possibility of interventions based on the actual situation
A23 ³²	Clin Infect Dis/ 2013	Retrospective	V	Manifestations and actions associated with the occurrence of infections	-	-
A24 ³³	Circulation/ 2013	Prospective	V	Risk factors for infection in the pre-, intra-and post-operative periods of VAD implantation	-	-
A25 ³⁴	J Emerg Nurs/ 2013	Case study	IV	Management of patients with VAD in the emergency department	Intervention in emergency situations and complications related to VAD	Control of complications and improved survival
A26 ³⁵	Mayo Clinic Proc/ 2013	Retrospective	V	Management of patients with VAD in the perioperative period	-	-

Study	Journal/year	Methodological design	LE	Topic approached	Nursing actions	Justification for Nursing actions
A27 ³⁶	Prog Transpl/2013	Review	V	Expansion of scientific knowledge about the use of VAD: components, associated benefits and complications	Assessment and management of health problems: interpretation/request for laboratory tests and other diagnostic procedures; realization of physical examination; monitoring vital signs; patient admissions and discharges; home visits	Patient monitoring to prevent or diagnose early complications associated with the use of the VAD
A28 ³⁷	Prog Transpl/2013	Review	V	Complications: intestinal bleeding	-	-
A29 ³⁸	Med Sci Monit/2014	Case-control study	IV	Benefits: hemodynamic effects	-	-
A30 ³⁹	Am J Nephrol/2014	Retrospective	V	Complications: kidney damage	-	-
A31 ⁴⁰	Int J Artif Organs/2014	Exploratory and descriptive	V	Nurses health care practice in caring for the patient with VAD	Assessment and management of health problems: interpretation/request for laboratory tests and other diagnostic procedures; realization of physical examination; monitoring vital signs; patient admissions and discharges; home visit	Patient monitoring to prevent or diagnose early complications associated with the use of VAD
A32 ⁴¹	J Korean Med Sci/2014	Case study	IV	Benefits: cardiac rehabilitation	-	-
A33 ⁴²	Prog Transpl/2014	Hermeneutic phenomenology	V	Perception of caregivers of adults with VAD	Evaluating the perception of patients, family members, caregivers and nurses	Possibility of interventions based on the actual situation
A34 ⁴³	Arqu Bras Cardiol/2015	Case study	IV	VAD implant for heart transplantation	-	-

Regarding the methodological design of the selected studies, there was a predominance of bibliographic reviews, case-control studies and case studies, with five (14.7%) publications of each; followed by four (11.8%) descriptive, phenomenological and retrospective studies; three (8.8%) exploratory-descriptive studies; two (5.9%) experience reports; and one (2.9%) systematic review, longitudinal and prospective study. Regarding the implemented approach, the qualitative approach was predominant with 19 (55.9%). Only one (2.9%) study with a mixed approach was found. In analysis of the professional category, we verified a predominance of studies carried out by physicians - 19 (55.9%), followed by nurses - 15 (44.1%). In addition, we also observed that most publications (64.8%) presented an evidence Level V; followed by IV (32.3%) and II (2.9%).

The care provided to patients was summarized in studies published by nurses, whose most evidenced behaviors were: evaluating the perception of patients, relatives, caregivers and nurses who deal with individuals with VAD implants, and evaluation and management of health problems.

DISCUSSION

Functioning, benefits and complications of ventricular assist devices

Technological progress has contributed to the development of pulsatile and continuous blood flow pumps, making them attractive and safe when used in patients of functional class III and IV of the New York Heart Association (NYHA). Early implantation in these patients and management to prevent complications has improved survival after VADs, which may be similar to transplantation.^{8,43} Costs related to the implantation of these devices have been little explored in the literature. Length of hospital stay after VAD implantation is higher than that of transplants, which significantly increases costs.⁷

VADs have become more popular in Europe and the United States, especially implantable ones. In Brazil, its use is more restricted to being a bridge to transplantation, and implantable ones are most commonly used in the Southeast region. In countries where organ supply falls short of need, such devices become unique alternatives for preserving

cardiac function.⁴ In Brazil, the availability of fully implantable devices partially subsidized by private health plans is evident.⁴³ However, there is a need to better organize outpatient services, taking into account implementation of nursing care systematization to make management more effective in the care provided to patients using VAD. In the United States, there is the position of the Ventricular Assist Device (VAD) coordinator/management, whose primary function is to take care of these patients.

In mechanical ventricular assist, types of devices are applied with the purpose of partially or totally replacing the heart's pumping function, and they are classified according to the pumping mechanism, location and action/drive types. These devices reduce left ventricular effort through the actual pumping of blood, removing venous blood from the circulation and returning it under pressure to the arterial circuit.

VAD therapy has three indications: a bridge for recovery, another for heart transplantation and as a definitive therapy. It consists of three parts: inlet and outlet cannulae, the blood pump and external power supply. The heart is attached to the inlet cannula which in turn is attached to the blood pump. The pump is then attached to the outlet cannula, which is anastomosed to the ascending aorta or pulmonary artery, depending on the side receiving the support.^{7,17}

Artificial ventricles may be paracorporeal or implantable. Implantable ones are used in the assistance of the left heart care and have high costs. They are indicated as definitive therapy in case of clinical contraindication for heart transplantation, allowing the maintenance of patients in care for periods longer than one year. Moreover, they have the advantage of providing less chances of infection or contamination. Paracorporeal devices can be used to assist systemic circulation. Despite having a lower cost, they are associated with higher rates of infection, since paracorporeal implants have the device externalized through cannulas, resulting in places where contamination can infiltrate. Another disadvantage is that their use requires that patients remain in the hospital environment.¹⁷

Patients considered for VAD therapy undergo an extensive and thorough evaluation to verify pre-existing conditions that could increase the risk of complications. The evaluation includes diagnostic tests, laboratory tests and general clinical evaluation (nephrology, pneumology, infectious and oncotic diseases) for the treatment of significant conditions of comorbidities.⁹

After VAD implantation, the patient receives specialized care in the Intensive Care Centers where they are strictly monitored in order to prevent atrial and ventricular arrhythmias, bleeding, hyperglycemia, renal, hepatic and neurological infections and dysfunctions. Nutrition should be started as soon as possible to avoid postoperative morbidity and mortality.³⁵

VAD therapy improves the quality of life of patients with chronic heart failure, which is assessed by different aspects such as physical, psychological, social and general well-being.^{7-8,27} A recent case-control study analyzed the benefits achieved by VAD in 61 patients with heart failure compared with nine patients without VAD. The results showed that the device promoted improved insulin resistance throughout the body and decreased levels of diacylglycerol and ceramide in the heart muscle. The content of fatty acid and triglycerides remained unchanged.²⁴

Another benefit reported in the literature involves hemodynamic stabilization. The choice of an appropriate blood flow support collaborates for positive hemodynamic effects, as evidenced in a study carried out in China which found that continuous VAD flow control is a strategy that allows constant pressure, allowing optimal pulsation, optimizing the vascular function.³⁸

A study carried out in Korea showed that the benefits of VAD implantation as the final therapy in a 75 year old patient, classified according to NYHA with functional class III-IV due to severe left ventricular systolic dysfunction, and provided improvement in this patient up to NYHA-II. This demonstrates the importance of appropriate cardiac rehabilitation, along with patient training for proper device management and potential emergency situations.⁴¹

Thus, it is important to prepare the patient and caregivers for this new reality, either with implantable or paracorporeal devices. Health education focusing on the functioning of these devices is essential to guarantee the benefits offered by technology.

Despite the proven benefits, many complications have been reported after surgery for VAD implantation. Severe infections and sepsis are among the most common. The occurrence of infections is present in 14% to 59% of the cases, and sepsis in 42% of the patients in the period of one year. A cohort study conducted in an American hospital showed that 101 infection episodes in 78 VAD patients were related to the transmission line (47%), followed by bloodstream infections (24%).³²

Regarding the microorganisms present in the infections associated with the device in the same study, Gram-positive cocci (45%) were predominant, followed by Gram-negative Staphylococci and nosocomial bacilli (27%). The findings corroborate a multicentric, prospective type study, in which the occurrence of infection was observed in 57% of the patients.³³

The clinical manifestations of infections may vary depending on the type of infection and pathogen; however, it is known that they are directly related to a high mortality rate, evidencing the importance of elaborating an algorithm for managing these infections, which may aid in the decision making of professionals involved in patient care.

Another study conducted at 38 centers in the United States through a series of conference calls, discussed variability in patient care with VAD for infection prevention/control. A total of 16 questions were developed, including questions about preoperative antibiotic recommendations, transmission line placement, and exit site. From this study, it was possible to define a standard practice protocol based on the opinion of VAD specialists for general care of the equipment and patients.²⁵

Another complication associated with the use of this device is the occurrence of bleeding, which is caused by several factors such as coagulation disorders and hepatic dysfunction.³⁷ In addition, we can highlight complications including DNA damage and oxidative stress;³⁰ lower carotid artery complacency and distensibility, which can lead to pressure on the left ventricle;²⁹ multiple organ failure; neurological events⁹ (long-term embolic or hemorrhagic events can occur); renal failure;³⁹ mechanical dysfunction; and psychological changes.²²

Due to the technological complexity, adverse events caused by the use of VAD, as well as the required care and need for constant monitoring, some patients may request the removal of the device and/or may become psychologically shaken, at risk of developing Burnout Syndrome and isolation.^{12,22}

Thus, medical palliative consultations are emphasized to address end-of-life preferences, facilitate care planning, symptom control, and maximize quality of life. A retrospective survey conducted by American physicians and nurses to evaluate the benefit of medical palliative care in 19 VAD patients found improvement in overall patient care, meeting the goals of care and management of symptoms.¹⁸

Nursing conduct in care of patients using ventricular assist devices

With increasing numbers of VAD patients, nurses and other health professionals are challenged to develop interventions that can provide patients and their families with quality care. For the success of this device in the long term, the multidisciplinary team must be in a constant training process, preparing to perform comprehensive care that is compatible with the demands of the patient.

Based on this premise, intensive care nurses from an American hospital created a program to develop clinical knowledge and promote continuous competence for those involved in VAD and total artificial heart care. The program is based on real-life training, and covers device-related care including emergency management, specificities for obtaining blood samples, catheter care, documentation of key parameters and ECG interpretation.¹³

Regarding nursing care, the literature shows the importance of nursing care as a whole, in the face of all its complexity. Evaluating the patient for the management of health problems is useful to prevent or to early diagnose the complications associated with the use of VAD.^{20,34-36}

Essential care involves the orientation of the patient and caregiver regarding the anatomy and functioning of the device; reviewing external components; instructing them to use VAD accessories; care with the exit site; performing dressing changes; daily follow-up documentation (vital signs and device parameters); identifying and responding to emergency situations and emergency contacts; following a healthy diet with sodium restriction and an exercise regiment; regarding physical activities, not practicing those that involve immersion in water (swimming pools) and avoiding contact sports or touching static electricity (computer screen and television).^{23,36,40} We can also add the preparation of the patient in the preoperative period, performing admissions and discharge of patients, listing patients for transplantation, performing psychosocial and sexual counseling of these patients.³⁴

As part of the nursing care directed to this clientele, an evaluation of sleep pattern and quality was also found. Studies on this subject have shown that VAD patients experience longer sleep latency and poor sleep efficiency.^{20,26} One week after implantation, patients had a high rate of sleep fragmentation and somnolence. These disturbances in the sleep pattern occurred up to six months after VAD implantation. These data are important since

the connection to sleep pattern and quality of life in this population deserve attention in the clinical practice.

From the above, we identified the importance of nurses understanding the existing technologies and care strategies to carry out a comprehensive care practice. However, it is urgent to carry out educational strategies, considering that these are valuable as they allow the union between theoretical knowledge and practice, promoting more efficient care among team members. For this, understanding the ethical issues involved with this therapeutic modality is also important.

Qualitative studies on patients with VAD point to the ethical obligation of nurses to provide emotional support to patients and their families, as well as specialized care.^{15,19,21-22,28,31,42} Feelings and perceptions of family members and caregivers of VAD patients, such as: anxiety and initial shock, loss of a loved one, of their own life, of their freedom and independence; (physical) burden and responsibility, accepting faith, empathy and social support, and lifestyle changes have been described in three studies, evidencing the need for a closer look at them and elaborating strategies that aim at emotional support.^{15,21,42}

From the patient's perception, research reveals the complexity of implanting this device, seen under two meanings: a new chance to live and the desire to be normal in public. Noting, therefore, the importance of trying to change the self-concept and showing them how changes in their bodies and their daily lives will be, as self-concept awareness is a vital component in maintaining health and well-being.^{19,22,28}

In order to achieve this, nurses must be psychologically prepared to deal with these emotional reactions of patients and family members. A study conducted in Canada with six nurses specialized in patient care with VAD revealed the need for the nurse-patient relationship and the ethical issue as essential elements in care practice. Thus, the institution should consider implementing programs that aim at providing emotional support to these professionals.³¹

Despite the above, it is important to highlight that the main limitation of the study is the difficulty of accessing publications in their entirety. This fact lowers the levels of scientific evidence, since studies that have high evidence are usually in high impact factor journals, which are mostly not freely available in the databases.

CONCLUSION

This study has presented a characterization of national and international studies on the implementation of VADs. We found a predominance of international articles carried out by medical professionals/physicians and low national production, with no studies carried out by Brazilian nurses.

Despite the majority of the studies presenting low levels of evidence, the results provided important information for management of patients with VAD implants in order to improve survival. Most of the analyzed articles emphasize a concern to diffuse the knowledge regarding the functioning of these devices, highlighting the benefits and stressing the complications. Regarding the articles produced by nurses, the perception of patients, family members, caregivers and nurses regarding the care and lifestyle changes incurred by the implant was the most evaluated.

Among international studies carried out by nurses, we observed that none of them involved the Nursing Process, which is an essential practice that elevates this professional category and allows for implementing comprehensive, holistic, and systematic care directed towards the real needs of patients. Thus, there is a great gap presented in the scientific production on this subject. The use of ventricular devices has been focused on a little in the Brazilian nursing reality, however, we have noticed that it is still lacking in regards to disseminating this knowledge in published works in national journals.

In the articles analyzed, we noticed a lack of discussion about the economic impact that the use of VADs would generate on the Brazilian health system. Despite an advantage in the quality of life and the prolonged survival of patients with chronic heart failure, we recommend further discussions regarding the cost-effectiveness of the treatment in patients using VAD as a bridge for transplantation or as a definitive therapy.

Based on evidence of improved survival with VADs, the scientific community should expand the use of these devices in patients with severe heart failure. Integrating the results evidenced in daily practice is essential, since this technology is effective and safe, in addition to providing functional capacity and hemodynamic recovery.

There are sufficient reasons for an increasingly accentuated incorporation of this technique in Brazil in order to offer patients the possibility of treatment, even if just as a bridge for transplantation, as verified in several studies in scientific literature.

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