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ADVANCES IN THERAPEUTIC INTERVENTIONS AND PREVENTIVE STRATEGIES FOR CARDIOVASCULAR DISEASES

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ABSTRACT:

Introduction: Cardiovascular diseases (CVD) represent the leading cause of global mortality and require effective approaches for prevention and treatment. The advancement of therapeutic interventions and preventive strategies is essential to reduce the morbidity and mortality associated with CVD. **Methodology**: This is a literature review, with a search carried out in the Virtual Health Library (VHL), using the Health Sciences Descriptors (DeCS): Cardiovascular Diseases, Therapeutic Measure and Disease Prevention. Six primary studies were selected according to previously established inclusion and exclusion criteria. **Results**: The findings indicate that technological advances, such as Transcatheter Aortic Valve Implantation (TAVR), offer lower surgical risk and faster recovery compared to traditional methods. In addition, the use of artificial intelligence in predictive algorithms has shown promise in personalizing cardiovascular prevention. However, poor adherence to drug therapies remains a challenge in the control of CVD. Preventive strategies, such as the HIPERDIA Program and nutritional interventions, have shown a positive impact on reducing risk factors. **Conclusion**: It is concluded that the combination of technological

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innovation, multiprofessional support and effective public policies can contribute significantly to the improvement of cardiovascular outcomes.

Keywords: Cardiovascular diseases. Cardiovascular Risk Factors. Therapeutic Measure. Disease Prevention.

INTRODUCTION

Cardiovascular diseases (CVD) continue to be the leading cause of mortality and disability in Brazil, affecting both men and women. According to estimates from the Global Burden of Disease (GBD) 2019, ischemic heart diseases (IHD) are the most responsible for deaths in the country, followed by cerebrovascular accident (CVA). IHD was associated with 12.03% (95%CI 10.66%-12.88%) and 12.2% (95%CI 11.5%-12.77%) of deaths and 4.78% (95%CI 4.08%-5.47%) and 6.48% (95%CI 5.92%-7.05%) of disability-adjusted life years (DALYs) in women and men, respectively. Stroke accounted for 10.39% (95%CI 9.25-11.11%) and 8.41% (95%CI 7.84%-8.83%) of deaths, with a more significant impact on women (Oliveira; Wenger, 2022).

Although there was a reduction in CVD mortality rates between 2000 and 2017, this improvement was not homogeneous among the regions of Brazil. Data from the GBD 2017 indicate that mortality from cardiovascular diseases fell from 248.8 to 178.0 deaths per 100 thousand inhabitants in the period. However, when analyzing the disaggregated data, a worrying increase in mortality was identified in the North and Northeast regions, while the other regions of the country showed a downward trend (Malta *et al*., 2020).

The growth of CVD is intrinsically linked to population aging and the high prevalence of modifiable risk factors, such as hypertension, diabetes mellitus, dyslipidemias, obesity, smoking, sedentary lifestyle, and inadequate diet. In addition to these classic factors, sociodemographic, ethnic, cultural, and behavioral issues play a determining role in the incidence and progression of cardiovascular diseases, contributing to differences in disease burden between different populations and their trends over time (Gomes *et al*., 2021).

Given this scenario, the implementation of effective preventive and therapeutic strategies becomes essential. The adoption of healthy lifestyle habits, combined with access to primary and secondary prevention, is essential to reduce cardiovascular morbidity and mortality. In addition, continuous monitoring of risk factors and inequalities in access to treatment should be a priority to enable evidence-based interventions, ensuring greater cost-effectiveness and sustainability of public health policies (Gomes *et al*., 2021).

In recent years, cardiology has benefited from significant technological advances, expanding the therapeutic options for patients with CVD. The development of Transcatheter Aortic Valve Implantation (TAVI) has revolutionized the treatment of aortic stenosis, becoming a less invasive alternative compared to conventional surgery. At the same time, self-management strategies, such as the use of artificial intelligence to monitor risk factors, have been shown to be effective in reducing the incidence of cardiovascular events. In addition, adherence to drug treatment, including the use of antiplatelets, statins, and

angiotensin-converting enzyme (ACEI) inhibitors, remains a challenge, requiring new approaches to ensure better clinical outcomes (Coccia, 2019; Afanasieva; Platov; Medvedeva, 2024; Silva *et al.* 2020).

In view of the complexity of the approach to CVD, it is essential to develop continuous research to improve therapeutic and preventive strategies, aiming at optimizing the management of these diseases. Thus, this integrative review aims to analyze the most effective therapeutic interventions and preventive strategies in the context of cardiovascular diseases, providing a critical view of recent advances and challenges that still exist in the area.

METHODOLOGY

The present research is configured as a literature review, a methodology that allows gathering and critically analyzing existing scientific studies, providing a comprehensive view on a specific topic. This approach is widely used in the health area, as it enables the inclusion of different methodological designs, contributing to the foundation of clinical practices and the development of evidence-based guidelines (Mendes; Scott; Galvão, 2008). In the context of cardiovascular diseases (CVD), the review allows us to synthesize the therapeutic advances and preventive strategies adopted, enabling an in-depth analysis of their efficacy and applicability.

The search for scientific articles was carried out in the Virtual Health Library (VHL), using the Health Sciences Descriptors (DeCS): Cardiovascular Diseases, Therapeutic Measure and Disease Prevention. The combination of these terms was made with Boolean operators to refine the results and ensure the inclusion of studies directly related to the objective of this research. The VHL was chosen as a database due to its scope and integration with sources such as SciELO, LILACS and MEDLINE, which bring together relevant publications in the health area.

The inclusion criteria established sought to ensure the relevance and timeliness of the publications analyzed. Primary articles published in the last ten years (2014-2024) that presented research on therapeutic interventions or preventive strategies for cardiovascular diseases were selected, in addition to being available in full in Portuguese, English, or Spanish. Studies that had a clear and well-described methodological design were also prioritized.

Studies that were not characterized as primary research, including systematic reviews, meta-analyses, opinion articles, and theoretical essays, were excluded. Studies that addressed cardiovascular diseases without emphasis on therapeutic or preventive

measures were also discarded. In addition, articles without access to the full text or that presented methodological inconsistencies were eliminated, as well as duplicate studies found in different databases.

Initially, the search returned 44 articles that met the descriptors used. After reading the titles and abstracts, 12 studies were selected that were most aligned with the research question. In the next phase, the complete reading of the texts resulted in the final inclusion of six studies, which were critically analyzed and incorporated into the discussion of this review.

The analysis of the selected articles was conducted systematically, extracting relevant information, such as authorship, year of publication, methodological design, main therapeutic interventions or preventive strategies addressed, and their respective clinical outcomes (Table 1). The synthesis of the data allowed comparisons to be made between the different studies, identifying advances, challenges and gaps in the literature on the management of cardiovascular diseases.

As this is a study based on previously published scientific publications, this study did not involve human beings and, therefore, does not require approval by the Research Ethics Committee (REC). However, all ethical guidelines related to the proper use of scientific sources were followed, ensuring the academic integrity of the research and the correct attribution of the references used.

DISCUSSION AND RESULTS

From the search carried out in the Virtual Health Library (VHL) using the Health Sciences Descriptors (DeCS), six primary studies were identified that answer the proposed research question. The selected articles address both therapeutic interventions and preventive strategies for cardiovascular diseases, providing a comprehensive overview of advances in the field.

Table 1. Main data from the studies selected in the database.

Author and year	Country	Methodology	Main results
Afanasieva; Salaries; Medvedeva, 2024	Russia	Development and evaluation of a recommendation algorithm	The study proposes an algorithm for the management of cardiovascular risk factors at home, using personalized recommendations. Expected clinical outcomes include improved control of risk factors, prevention of cardiovascular events, and increased adherence to healthy habits.

Silva *et al*. 2020	Brazil	Prospective, multicenter observational study	The prescription of antiplatelets, statins, and angiotensin-converting enzyme (ACE) inhibitors showed a significant decrease over 12 months (from 28.3% to 24.2%; $p < 0.001$), reflecting challenges in treatment adherence. In addition, the rate of cardiovascular events was 5.46%, with predictors such as advanced age, secondary prevention, and diabetic nephropathy, highlighting the need for better strategies for adherence to recommended therapies.
Coccia, 2019	Italy	Cross-sectional study with technological analysis	The study highlights TAVI as a less invasive technological innovation in relation to SAVR for the treatment of aortic stenosis, presenting a lower rate of postoperative complications and reduced mortality compared to conventional surgery. Advances in TAVR technology indicate a trend toward replacing the traditional surgical approach, especially in high-risk patients.
Gadenz; Benvegnú, 2013	Brazil	Cross-sectional epidemiological study	The study highlighted the influence of eating habits on the prevention of CVD, reinforcing the need for greater consumption of fruits, vegetables and fiber, in addition to reducing sodium intake. The outcomes indicated that socioeconomic factors and access to health professionals, especially nutritionists, directly impact the adoption of healthier diets.
Mendonça *et al.* 2021	Brazil	Cross-sectional and observational study	Lifestyle changes, including reducing body weight, glycemic control, and adopting healthy eating habits, as the main strategy to prevent the progression of NAFLD and reduce cardiovascular risks. The clinical outcomes indicated that patients who managed to improve these factors had less progression of hepatic steatosis, in addition to a positive impact on the reduction of blood pressure, triglycerides, and blood glucose, reinforcing the importance of the preventive approach.

Silva *et al.* 2015	Brazil	This is an exploratory-descriptive study with a qualitative approach	The nurses followed the recommendations of the HIPERDIA Program, promoting educational activities in the community, expanding access to health services and multidisciplinary support. The clinical outcomes indicated that these actions favored the population's awareness of cardiovascular risks, stimulating changes in lifestyle and treatment adherence, which may contribute to reducing morbidity and mortality due to cardiovascular diseases.

Source: authorship, 2025

Transcatheter aortic valve implantation (TAVI) has been consolidated as an innovative and less invasive alternative compared to surgical aortic valve replacement (SAVR) in the treatment of aortic stenosis. The study conducted by Coccia (2019) analyzed the evolution of this technology and its impact on global cardiology practice. The results demonstrated an exponential growth of research and innovations related to TAVI, with a growth coefficient of 0.40 ($p<0.001$), significantly outpacing the development of new approaches to SAVR (coefficient of 0.10, $p<0.001$). Statistical analysis suggests that TAVI is consolidating itself as the main technology for the management of aortic stenosis, with benefits such as shorter hospital stays and reduced postoperative complications. However, challenges such as the durability of prosthetic valves and the need for anticoagulation still require additional studies to ensure greater safety and long-term efficacy (Coccia, 2019).

In the context of obesity-associated Nonalcoholic Fatty Liver Disease (NAFLD), therapeutic strategies have been developed aimed at weight reduction and metabolic control. Interventions include lifestyle modification, use of specific medications, and, in more severe cases, bariatric surgery. The study analyzed highlights that the use of clinical indicators such as BMI, blood pressure, triglycerides, and blood glucose can be decisive in the early screening of patients at risk, allowing the implementation of immediate interventions that prevent disease progression and reduce the associated cardiovascular and metabolic impact (Mendonça *et al*., 2021).

Adherence to drug treatment for cardiovascular disease remains a significant challenge in clinical practice. A Brazilian study followed 4,975 patients at high cardiovascular risk for a period of 12 months, evaluating the use of antiplatelets, statins, and angiotensin-converting enzyme (ACE) inhibitors. The results showed a reduction in treatment adherence from 28.3% to 24.2% ($p<0.001$), reflecting a worrying scenario in the continuity of therapy. In addition, the rate of major cardiovascular events was 5.46%, with advanced age, secondary prevention, and diabetic nephropathy being the main risk factors.

These findings highlight the importance of implementing strategies to increase treatment adherence, as discontinuation of therapy can compromise clinical outcomes and increase the incidence of serious complications (Silva *et al*., 2020).

Cardiovascular prevention should be approached globally, considering the sum of individual risk factors and the impact of early interventions. Nurses play an essential role in this process, especially in the context of the Family Health Strategy (FHS). Studies indicate that the most effective preventive actions include following the guidelines of the HIPERDIA Program, community health education activities, improving accessibility to health services, and multiprofessional support. These strategies promote population awareness of risk factors, facilitate adherence to treatment, and reduce barriers to access to appropriate care (Silva *et al*., 2015).

The HIPERDIA Program is an essential tool for the identification and follow-up of patients with hypertension and diabetes mellitus, allowing the mapping of risks and the implementation of targeted preventive measures. In addition to providing relevant epidemiological data, the program enables the adoption of strategies to minimize cardiovascular complications in the long term. Some nursing professionals complement these guidelines through educational lectures, structured clinical consultations, and requests for complementary exams, which enables a more efficient preventive approach. The Family Health Support Center (NASF) also stands out as a fundamental component for interdisciplinary support in primary care (Silva *et al*., 2015).

Healthy eating is one of the fundamental pillars in the prevention of cardiovascular diseases. Guidelines from the World Health Organization (WHO) and the American Heart Association (AHA) recommend increasing the consumption of fruits, vegetables, whole grains, and lean proteins, while advising the reduction of the consumption of sugar, salt, and saturated fats. Studies show that high intake of sodium, saturated fats, and ultra-processed foods is directly associated with increased blood pressure and dyslipidemia, factors that increase the risk of heart attack and stroke. The implementation of public policies to reduce sodium in food and expand access to nutrition guided by health professionals are considered effective and economically viable strategies to reduce cardiovascular mortality (Gadenz; Benvegnú, 2013).

The development of technological tools for the monitoring and prevention of cardiovascular risk factors has been a promising advance in health promotion. The study on CVD-Risk-Prevent, a knowledge-based algorithm for self-management of cardiovascular risks, demonstrated that this personalized recommendation model is able to outperform traditional systems when considering multiple risk factors, including behavioral, biological,

and non-modifiable aspects. The validation of this system showed that its implementation can increase patient adherence to medical recommendations and reduce the incidence of cardiovascular events. In addition, the incorporation of artificial intelligence into the model allowed for greater precision in recommendations, promoting more individualized and effective interventions in the primary prevention of cardiovascular diseases (Afanasieva; Platov; Medvedeva, 2024).

CONCLUSION

The analysis of the selected studies highlights the importance of therapeutic interventions and preventive strategies in the fight against cardiovascular diseases. Technological advancement, exemplified by Transcatheter Aortic Valve Implantation (TAVI), demonstrates the positive impact of innovation in the treatment of aortic stenosis, offering lower surgical risk and faster recovery. In addition, the application of artificial intelligence in self-management algorithms, such as CVD-Risk-Prevent, reinforces the role of technology in personalizing clinical recommendations and increasing adherence to preventive practices. However, poor adherence to drug therapies, such as statins and antiplatelets, still represents a challenge, requiring strategies to improve continuity of treatment in high-risk patients.

Preventive strategies are essential for reducing morbidity and mortality due to cardiovascular diseases. The HIPERDIA Program and the work of nurses in the Family Health Strategy (FHS) play an essential role in raising awareness of the population about risk factors, promoting changes in lifestyle and ensuring greater access to health guidance. A balanced diet, associated with nutritional interventions and public policies aimed at reducing sodium and ultra-processed foods, also stands out as an effective tool in the prevention of CVD, especially in vulnerable groups, such as the elderly and hypertensive.

In view of the therapeutic advances and preventive strategies analyzed, the need for continuous research to optimize the management of cardiovascular diseases is evident. The strengthening of primary health care, combined with the use of new technologies and the adoption of effective public policies, can contribute significantly to the improvement of clinical outcomes and the reduction of inequalities in access to treatment. Thus, the integration of innovative approaches, multiprofessional support, and greater investment in prevention are essential to confront CVD and to promote a better quality of life for the population.

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