English

Epidemiological aspects of patients treated with tele-electrocardiography at the UFPI telehealth center

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Abstract

Introduction: *Telemedicine has facilitated access to healthcare services, growing rapidly after the Covid-19 pandemic.* ***Objectives:*** *To evaluate the clinical-demographic profile, the remote coverage of the telehealth service, and the electrocardiographic changes found in the studied population.* ***Methods:*** *Between November 2020 and March 2022, data from patients who underwent electrocardiograms (ECG) in primary care in Teresina and cities in the interior of Piauí, which sent electrocardiographic tracings through the Gestor Saúde system to the telehealth service of the University Hospital of the Federal University of Piauí (HU-UFPI), were evaluated. The analyzed variables included age group, sex, distance from the UBS, coverage region, and diagnoses of electrocardiographic changes.* ***Results:*** *Electrocardiograms of 27,955 patients (63% women) from 61 UBS were evaluated, with 98.67% performed in Teresina and 1.33% in 8 municipalities up to 633 km from HU-UFPI. Of these, 78.3% of the ECGs were normal and 21.7% were altered. Ventricular repolarization abnormality was the most common alteration (7.96%), followed by intraventricular conduction disturbance (6.63%) and arrhythmias (4.77%).* ***Conclusion:*** *The tele-ECG service of HU-UFPI showed wide implementation and reach, even in regions with difficult access to healthcare.*

Keywords: *Telemedicine; Electrocardiography; Epidemiology*.

Resumen

Aspectos epidemiológicos de los pacientes tratados con teleelectrocardiografía en el centro de telesalud de la UFPI

Introducción: *La telemedicina ha facilitado el acceso a los servicios de salud, creciendo rápidamente después de la pandemia de Covid-19.* ***Objetivos:*** *Evaluar el perfil clínico-demográfico, la cobertura remota del servicio de telesalud y los cambios electrocardiográficos encontrados en la población estudiada.* ***Métodos:*** *Entre noviembre de 2020 y marzo de 2022, se evaluaron datos de pacientes que se sometieron a electrocardiogramas (ECG) en atención primaria en Teresina y ciudades del interior de Piauí, que enviaron los trazados electrocardiográficos a través del sistema Gestor Saúde al servicio de telesalud del Hospital Universitario de la Universidad Federal de Piauí (HU-UFPI). Las variables analizadas incluyeron grupo de edad, sexo, distancia de la UBS, región de cobertura y diagnósticos de los cambios electrocardiográficos.* ***Resultados:*** *Se evaluaron electrocardiogramas de 27,955 pacientes (63% mujeres) de 61 UBS, siendo 98,67% realizados en Teresina y 1,33% en 8 municipios hasta 633 km de distancia del HU-UFPI. De estos, el 78,3% de los ECG eran normales y el 21,7% estaban alterados. La alteración más común fue la anormalidad de la repolarización ventricular (7,96%), seguida de trastornos de conducción intraventricular (6,63%) y arritmias (4,77%).* ***Conclusión:*** *El servicio de tele-ECG del HU-UFPI mostró una amplia implementación y alcance, incluso en regiones con difícil acceso a la salud.*

Palabras-clave*: Telemedicina; Electrocardiografía; Epidemiología.*

Resumo

Aspectos epidemiológicos de pacientes atendidos em tele eletrocardiografia no núcleo de telessaúde da UFPI

Introdução: *A telemedicina tem facilitado o acesso aos serviços de saúde, que vem crescendo rapidamente após a pandemia da Covid-19.* ***Objetivos:*** *Avaliar o perfil clínico-demográfico, a abrangência remota do serviço de telessaúde e as alterações eletrocardiográficas encontradas na população estudada.* ***Métodos:*** *Entre novembro de 2020 e março de 2022, foram avaliados dados de pacientes que se submeteram a eletrocardiogramas (ECG) na atenção primária em Teresina e cidades do interior do Piauí que enviaram os traçados eletrocardiográficos através do sistema Gestor Saúde ao serviço de telessaúde do Hospital Universitário da Universidade Federal do Piauí (HU- UFPI). As variáveis analisadas incluíram faixa etária, sexo, distância da UBS, região de abrangência e diagnósticos das alterações eletrocardiográficas* ***Resultados:*** *Foram avaliados eletrocardiogramas de 27.955 pacientes (63% mulheres) de 61 UBS, sendo 98,67% realizados em Teresina e 1,33% em 8 municípios distantes até 633 km do HU-UFPI. Destes, 78,3% dos ECG eram normais e 21,7% alterados. Alteração de repolarização ventricular foi a alteração mais comum (7,96%), seguida por distúrbio de condução intraventricular (6,63%) e arritmias (4,77%).* ***Conclusão:*** *O tele-ECG do HU-UFPI mostrou ampla implementação e alcance, mesmo em regiões com difícil acesso à saúde.*

Palavras-chave: Telemedicina; Eletrocardiografia; Epidemiologia..

INTRODUCTION

The impact of cardiovascular diseases in Brazil goes beyond individual health consequences influencing the country's health system and economy[1,2]. Studies reveal significant variation in reducing mortality rates from cardiovascular diseases (CVD) among Brazilian states, with a more pronounced decrease observed in the Southeast, South, and the Federal District, compared to the North and Northeast[3]. This disparity highlights challenges in the effective management of CVD, particularly within the Unified Health System (SUS), where the implementation of low-cost strategies that balance prevention and treatment is complex[4].

In this context, telemedicine, especially telecardiology, is emerging as a promising tool to improve risk assessment in primary care[5]. Through screening technologies, such as electrocardiograms (ECG), telecardiology can facilitate early diagnosis and appropriate management of heart disease[6]. By providing remote ECG reports and support to physicians, this approach can streamline the treatment of acute and chronic cardiovascular diseases, reducing medical errors, increasing patient safety, reducing waiting times for specialized care in large centers and financial costs for the SUS, and avoiding people having to leave their homes and work.

The telecardiology system implementation in primary care, especially in regions lacking specialized cardiology care such as in the state of Piauí, appears to be a viable and economically advantageous measure[7,8].

The telemedicine project of the Telehealth Center of the University Hospital of the Federal University of Piauí (HU-UFPI) is a Brazilian initiative that integrates information technology in the health area, aiming to improve access and quality of medical care in remote areas lacking specialists. This project is part of a national effort and has been adopted in several Brazilian states, such as Minas Gerais, Bahia, Rio Grande do Sul, and São Paulo. Such initiatives seek to promote equity in health care, allowing patients in remote locations to receive specialized diagnoses and treatments without the need to travel, optimizing the

use of available health resources, and increasing the efficiency of the health system.[9] This study aims to evaluate the clinical-demographic profile and electrocardiographic alterations in patients treated in primary health care, enhancing the delivery of cardiovascular care at the local level

OBJECTIVE

This study aimed to evaluate the clinical-demographic profile and investigate electrocardiographic changes in the studied population.

METHOD

Study Design

A cross-sectional, observational, and analytical study was carried out, analyzing data from patients who underwent electrocardiograms (ECG) at UBS in Teresina and other municipalities in Piauí. The data were collected between November 2020 and March 2022 and sent to the HU-UFPI telehealth center.

Data Collection

Anonymized secondary data were collected from the Ministry of Health's SMART platform. Cardiologists evaluated the ECGs of patients treated in primary care via the HU-UFPI telehealth system. Questionnaires assessed the quality of electrocardiographic devices in the UBS, including type of equipment, electrode application, quality of printouts, and results. The number of ECG requests and the changes identified were recorded. The variables analyzed included age group, gender, distance from the UBS, coverage region, and electrocardiographic diagnoses, such as ventricular repolarization disorders (VRD), old infarction, bundle branch block, ischemia, intraventricular conduction disorders (IVCD), arrhythmias, and ventricular overload.

This study was approved by the Research Project Evaluation Committee (CAPP) of the University Hospital of UFPI with a letter of consent number 107/2024/SGPITS/GEP/HU-UFPI-EBSERH (protocol number CAAE 83548624.6.0000.8050). The researchers guaranteed data privacy, confidentiality, and anonymity.

Statistical Analysis

Data on gender, age, and ECG changes were analyzed using the statistical software R. Absolute and percentage frequencies described the sample characteristics and electrocardiographic changes. Anderson-Darling ($\alpha = 0.01$) and Mann-Whitney tests assessed the normality of age and differences between genders and ECG changes. The significance level adopted was 5% ($\alpha = 0.05$).

RESULTS

Among 36,593 electrocardiograms available on the SMART platform, 27,955 ECG tracings were evaluated, from 61 active executing units, 86% were located in Teresina. The mean age of the patients was 51.9 ± 17.3 years and 63% of the patients were female. Regarding the analysis of the electrocardiographic tracings, 78.3% were normal, while 21.7% presented some alteration (Table 1). Regarding the percentage distribution of the electrocardiographic alterations presented considering the total population studied, we found that among the 21.7% of altered ECGs, the most frequent abnormality found were repolarization alterations, followed by conduction disorders and arrhythmias (Table 2 and Figure 1).

Table 1: Distribution of electrocardiograms by Result

ECG result	**Number of screenings**	**Percentage (%)**
Normal	21,881	78.30%
Altered	6,074	21.70%
Total	27,955	100%

Legend: ECG = electrocardiogram.

Table 2: Percentage distribution of the main electrocardiographic alterations presented (n=5595) in the studied population (N=27,955).

Type of Alteration	**Number of screenings (n)**	**Percentage (%)**
Repolarization Alterations	2,397	8.57%
Driving Disorders	1,647	5.89%
Arrhythmias	1,551	5.54%
Total	5,595	20.01%

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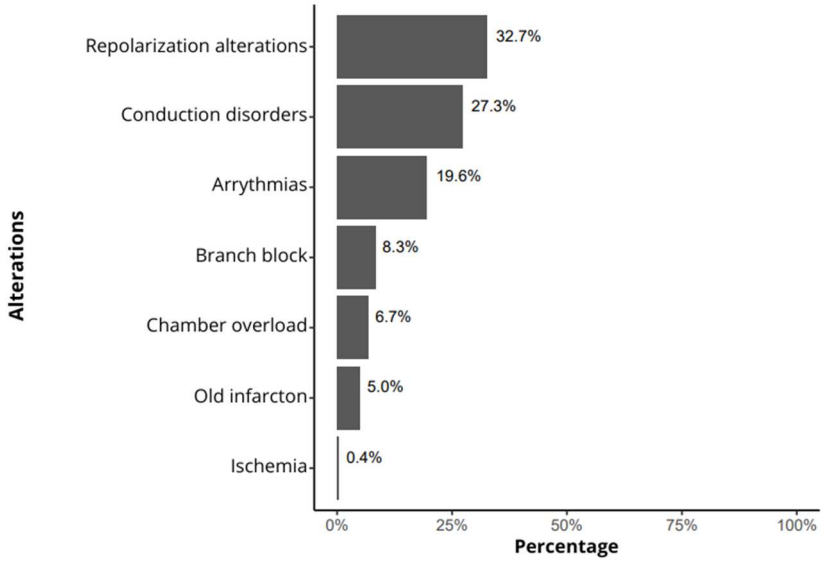
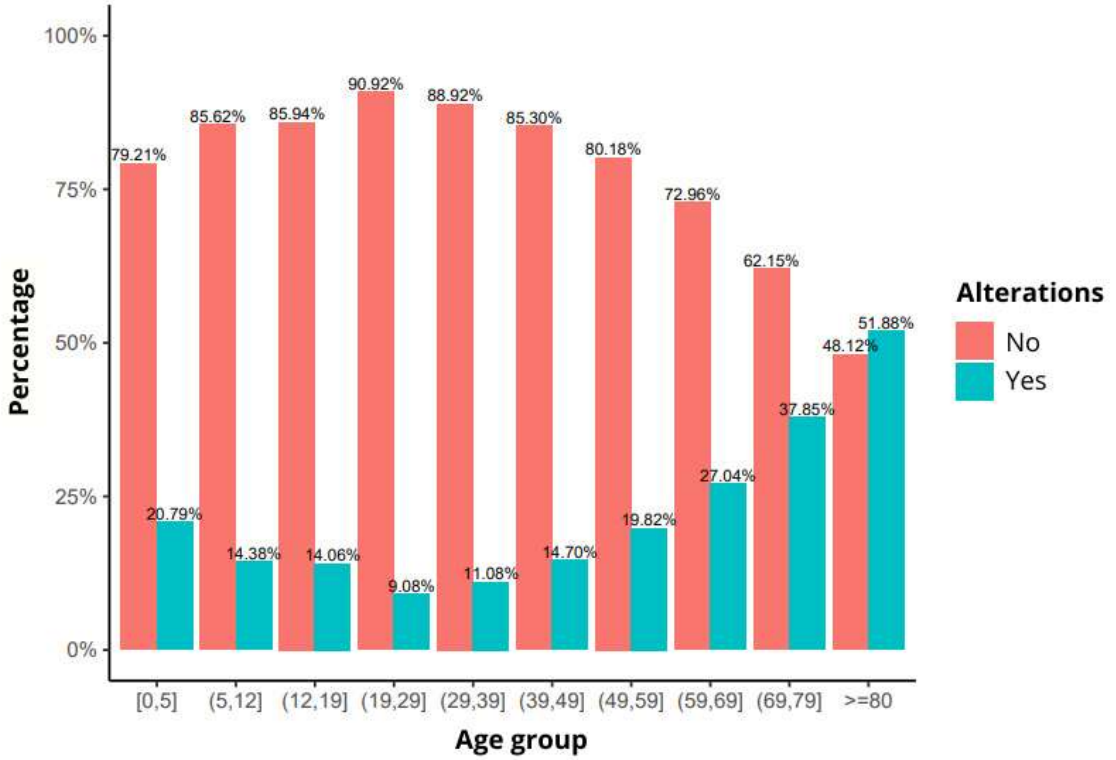
Figure 1 - Percentage distribution of the main electrocardiographic alterations found in the studied population. Total N = 27,955; N of altered ECGs = 5595.



Electrocardiographic Alterations by Age Group

Electrocardiographic alterations were more frequent in patients over 69 years old, with 37.55% in the 69-79 age group and 51.88% in patients over 79 years old. This highlights the importance of intensified cardiovascular monitoring in the elderly population (Figure 2). From 30 years old onwards, the presence of electrocardiographic alterations has a progressive increase.

Figure 2. Presence or absence of electrocardiographic alterations related to age group.



DISCUSSION

Telemedicine has been explored in the assessment and management of cardiovascular conditions in the primary care setting. This study focused on the retrospective analysis of ECG results of patients treated in the primary care network, emphasizing early identification and stratification of cardiovascular risk.

The distribution of ECG results showed that 78.3% of the screenings were normal, indicating a relatively stable cardiovascular profile in the study population. Detailed analysis of electrocardiographic changes and their

associations with epidemiological factors enables the development of risk stratification algorithms and protocols, enriching the ability to identify and manage patients with cardiac conditions in primary care units through telemedicine, especially in low-resource areas.

There are regional particularities and variability in the prevalence and patterns of cardiovascular diseases[10]. This highlights the need to monitor these conditions, especially in higher-risk populations such as the elderly and men. In addition, telemedicine allows patients in remote areas to access specialized evaluations without traveling to urban centers. This approach not only improves the efficiency of the health system but also reduces the costs associated with transportation and seeking medical care[11].

The implementation of the ECG telediagnosis system facilitated access to specialized diagnoses by enabling electrocardiograms to be performed locally and the reports to be interpreted remotely by cardiologists. This ensured rapid and accurate diagnosis, which is essential for timely interventions in cardiac emergencies. In addition, tele-ECG promoted the ongoing training of health professionals, ensuring the quality and accuracy of the tests performed[12].

The data from this study provide important epidemiological information on the electrocardiographic and epidemiological characteristics of patients treated at primary care units in the state of Piauí, especially in the capital. There was a significant predominance of units located in Teresina (86%). This concentration of data in a single metropolitan region may influence the generalization of the results to the state as a whole or to Brazil, given the socioeconomic and demographic diversity present in the country. Compared with national studies, the epidemiological characteristics in Teresina may not reflect the reality of less urbanized regions or other geographic regions of Brazil, where factors such as access to medical care, prevalence of comorbidities, and lifestyle habits may differ significantly[13,14]. Therefore, it is crucial to consider these regional variations when interpreting the results and when planning public health interventions, ensuring that strategies are adapted to the specificities of each location.

Recent studies on dynamic ECG devices to detect atrial fibrillation (AF) have shown that advanced technologies and artificial intelligence algorithms can identify a higher prevalence of cardiac anomalies, often missed by conventional ECGs. This suggests that a significant proportion of normal ECGs may hide undiagnosed abnormalities[15,16]. Another study, part of the MONICA/KORA project, found a high prevalence of early ventricular repolarization (VRP) pattern in middle-aged people, especially men, and associated VRP with an increased risk of cardiac death. The prevalence of VRP was higher than previously reported, indicating that some anomalies may go undetected in routine assessments[17]. These data indicate that although many ECGs are classified as normal, underlying anomalies may not be detected by traditional methods. More advanced technologies and continuous monitoring may improve the accuracy of detecting anomalies, suggesting that the prevalence of abnormal ECGs may be underestimated.

Therefore, it is crucial to consider technological advances in cardiac diagnostics and the possibility of subclinical anomalies not captured by traditional methods.

Among the alterations found in the ECG, ventricular repolarization alterations were the most prevalent but this does not increase the degree of need for attention for these patients, given that ventricular repolarization abnormalities are common in the general population and generally have no important clinical significance. Arrhythmias and conduction disorders are more prevalent in patients with structural heart disease, especially those with previous myocardial infarction, due to fibrotic scars that alter the electrical conduction of the heart[18]. In our study, ventricular repolarization alterations that characterized myocardial ischemia were rare (0.4%), being considered a low-risk profile for the population served by primary care in our region and reinforces the importance of actions directed at these patients who present clinically significant alterations, optimizing the use of public resources in the health care of the population.

One of the main limiting factors of the research is the lack of detailed information on patients' comorbidities. The absence of such data prevents a more in-depth analysis of health conditions that may influence the observed electrocardiographic characteristics. In addition, the research did not have access to the symptoms reported by the patients, which limits the ability to correlate electrocardiographic changes with specific clinical manifestations. These limiting factors may lead to a limited interpretation of the results since it is not possible to adequately assess the full clinical context of the patients, which is essential for a holistic understanding of the electrocardiographic and epidemiological findings.

CONCLUSION

In the initial experience of the HU-UFPI telehealth center, we observed that clinically relevant electrocardiographic alterations such as acute ischemia and atrial fibrillation were not very prevalent but they allowed for early diagnosis and treatment of these patients through specialized guidance. This study highlights the feasibility and usefulness of HU-UFPI telemedicine as an auxiliary tool for diagnosis and therapeutic guidance for users of the public health system. Telemedicine, especially tele-ECG, has proven to be an effective strategy for early identification of cardiac anomalies, even in areas with limited resources, facilitating access to specialized care for populations in remote regions. However, the research faced limitations such as the lack of detailed data on patients' comorbidities and symptoms, which restricted a more complete analysis of health conditions. These findings highlight the importance of including more comprehensive clinical information in future studies to improve the correlation between electrocardiographic findings and patients' health status. Therefore, the study highlights the value of telemedicine in the cardiovascular conditions diagnosis and management in primary care, reinforcing the need to expand these programs and to consider regional variations in the formulation of public health strategies.

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REFERENCES

1. Siqueira A de SE, Siqueira-Filho AG de, Land MGP. Analysis of the Economic Impact of Cardiovascular Diseases in the Last Five Years in Brazil. Arq Bras Cardiol [Internet]. 2017 Jul;109(1):39–46. Available from: https://doi.org/10.5935/abc.20170068

2. Siqueira A de SE, Siqueira-Filho AG de, Land MGP. Análise do Impacto Econômico das Doenças Cardiovasculares nos Últimos Cinco Anos no Brasil. Arq Bras Cardiol. 2017;109(1):39-46.

3. Brant LCC, Nascimento BR, Passos VMA, Duncan BB, Bensenõr IJM, Malta DC, et al. Variações e diferenciais da mortalidade por doença cardiovascular no Brasil e em seus estados, em 1990 e 2015: estimativas do Estudo Carga Global de Doença. Rev bras epidemiol [Internet]. 2017 May;20:116–28. Available from: https://doi.org/10.1590/1980-5497201700050010

4. Almeida PF de, Medina MG, Fausto MCR, Giovanella L, Bousquat A, Mendonça MHM de. Coordenação do cuidado e Atenção Primária à Saúde no Sistema Único de Saúde. Saúde debate [Internet]. 2018 Sep;42(spe1):244–60. Available from: https://doi.org/10.1590/0103-11042018S116

5. Fraga LL, Nascimento BR, Haiashi BC, Ferreira AM, Silva MHA, Ribeiro IK da S, et al. Combinação de Ferramentas de Telecardiologia para Estratificação de Risco Cardiovascular na Atenção Primária: Dados do Estudo PROVAR+. Arq Bras Cardiol [Internet]. 2024;121(2). Available from: https://doi.org/10.36660/abc.20230653

6. Oliveira MT de, Canesin MF, Marcolino MS, Ribeiro ALP, Carvalho AC de C, Reddy S, et al. Diretriz de Telecardiologia no Cuidado de Pacientes com Síndrome

Coronariana Aguda e Outras Doenças Cardíacas. Arq Bras Cardiol [Internet]. 2015 Jun;104(5):1–26. Available from: https://doi.org/10.5935/abc.20150057

7. Farah S. Telecardiologia e Seu Potencial em Áreas Remotas. Arq Bras Cardiol. 2023;120(5).

8. Accorsi TAD, Nemoto RP, Nunes JT, Azevedo Filho AFB, Moreira FT, Kohler KF, et al. Características Clínicas e Manejo de Pacientes Avaliados por Teleconsulta Cardiológica na Região Brasileira com Maior Número de Cidades Isoladas. Arq Bras Cardiol. 2023;120(5)

9. Silva AB, da Silva RM, Ribeiro GdR, Guedes ACCM, Santos DL, Nepomuceno CC, et al. Three decades of telemedicine in Brazil: Mapping the regulatory framework from 1990 to 2018. PLoS ONE. 2020;15(11). doi:10.1371/journal.pone.0242869.

10. Brant LCC, Nascimento BR, Passos VMA, Duncan BB, Bensenõr IJM, Malta DC, et al. Variations and Particularities in Cardiovascular Disease Mortality in Brazil and Brazilian States in 1990 and 2015: Estimates from the Global Burden of Disease. Rev Bras Epidemiol. 2017;20(Suppl 1):116-28. doi: 10.1590/1980-5497201700050010.

11. Alkmim MB, Figueira RM, Marcolino MS, Cardoso CS, Abreu MP, Cunha LR, et al. Improving Patient Access to Specialized Health Care: The Telehealth Network of Minas Gerais, Brazil. Bull World Health Organ. 2012;90:373-8. doi:10.2471/BLT.11.099408.

12. Ribeiro ALP, Alkmim MB, Cardoso CS, Carvalho GGR, Caiaffa WT, Andrade MV, Cunha DF, Antunes AP, Resende AGA, Resende ES. Implementation of a telecardiology system in the state of Minas Gerais: the Minas Telecardio Project. Arq Bras Cardiol. 2010;95(1):70-8. doi: 10.1590/S0066-782X2010005000060.

13. Silva JR, et al. Estudo comparativo de características epidemiológicas em diferentes regiões do Brasil. Rev Bras Epidemiol. 2020;23(2):345-56.

14. Oliveira MC, Santos AP. Análise das diferenças regionais em estudos epidemiológicos brasileiros. Rev Saude Publica. 2019;53:120-9.

15. Fu, W., Li, R. Diagnostic performance of a wearing dynamic ECG recorder for atrial fibrillation screening: the HUAMI heart study. *BMC Cardiovasc Disord* 21, 558 (2021). https://doi.org/10.1186/s12872-021-02363-1

16. Kaolawanich, Y., Thongsongsang, R., Songsangjinda, T. *et al.* Clinical values of resting electrocardiography in patients with known or suspected chronic coronary artery disease: a stress perfusion cardiac MRI study. *BMC Cardiovasc Disord* 21, 621 (2021). https://doi.org/10.1186/s12872-021-02440-5

17. Sinner MF, Reinhard W, Müller M, Beckmann BM, Martens E, Perz S, Pfeufer A, Winogradow J, Stark K, Meisinger C, Wichmann HE, Peters A, Riegger GAJ, Kääb S. Association of Early Repolarization Pattern on ECG with Risk of Cardiac and All-Cause Mortality: A Population-Based Prospective Cohort Study (MONICA/KORA). PLoS Med. 2010 Jul 27;7(7) doi: 10.1371/journal.pmed.1000314.

18. Kingma J, Simard C, Drolet B. Overview of Cardiac Arrhythmias and Treatment Strategies. Pharmaceuticals. 2023;16(6):844. doi: 10.3390/ph16060844.

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Carlos Eduardo Batista de Lima: Concept and design of the study, manuscript preparation, critical review of intellectual content, analysis, and interpretation of data.
Vitória Castro Ferreira de Oliveira: Manuscript preparation, literature review.
Victor Eulálio Campelo: Data collection, critical review of the manuscript.
Thiago Nunes Pereira Leite: Critical review of the manuscript.
Paulo Márcio Sousa Nunes: Critical review of the manuscript.
Maurício Giraldi: Technical and logistical support, manuscript review.
Jussara Valentim Cavalcante Nunes: Technical and logistical support, manuscript review.
Newton Nunes de Lima Filho: Data collection, interpretation of results, manuscript review.
Lucas Teixeira Dias: Data collection, interpretation of results, manuscript review.
Ginivaldo Victor Ribeiro do Nascimento: Critical review of intellectual content.

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