Infective Endocarditis Due to S. Aureus in Adult Patients: Clinical Study in Neiva (2022-2024)

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KEYWORDS

Infective Endocarditis, Adult Patients, Clinical Care

ABSTRACT

A documentary review was conducted on the production and dissemination of research papers pertaining to the study of infective endocarditis in adult patients and clinical care. The objective of the bibliometric analysis presented in this document was to ascertain the principal characteristics of the corpus of publications registered in the Scopus database during the period 2022-2024, resulting in the identification of 95 publications. The data provided by this platform was organized into graphs and figures, which categorized the information by year of publication, country of origin, area of knowledge and type of publication. Subsequently, the position of different authors regarding the proposed theme is referenced through a qualitative analysis, once the aforementioned characteristics have been described. The research yielded several noteworthy findings. Notably, the United States led in scientific production, with 40 publications, among countries with authors affiliated with institutions in that nation. The area of knowledge that made the greatest contribution to the construction of bibliographic material related to the study of infective endocarditis in adult patients and clinical care was medicine, with 89 published documents. Furthermore, the most used type of publication during the period indicated above was the journal article, which constituted 88% of the total scientific production. Furthermore, a case study is proposed for the care of this type of patient in a clinic in Neiva, Huila, Colombia. Through the observation technique, it is expected that the cases presented in older adults and their evolution will be characterized.

1. Introduction

Infective endocarditis (IE) is an infection characterized by colonization and invasion of the endocardium, native valves or prosthetic surfaces by microorganisms, mainly bacteria. Among the most common bacterial genera are Staphylococcus and Streptococcus (Fernández-Hidalgo, 2012) The epidemiological transition that has occurred over the past decade has been evidenced, although it is stated that infective endocarditis is not a constant disease, unlike other pathologies. It is estimated that IE is evidenced between 3.1 and 3.7 episodes per 100,000 inhabitants. It is important to note that its high mortality is due to multiple complications, mainly in older patients. Patients with infective endocarditis contract the infection as a result of reduced contact with the health system. This fact, in conjunction with the immunosuppressed state that these patients present, also correlates with an increase in in-hospital mortality, which is reported to be between 15 and 20%. (Fernández-Hidalgo N. y., 2013; Murdoch DR, 2009)

It is important to note, however, that among the most significant epidemiologically changes is the modification of the etiological spectrum. Previous references have indicated that this agent is staphylococci, including both Staphylococcus aureus and coagulase-negative Staphylococcus. Accordingly, the International Endocarditis Collaboration has confirmed that 28% of Staphylococcus aureus strains are resistant to methicillin. This figure highlights the significant impact of the resistance of this group of bacterial genera to first-line antibiotics, which is a crucial consideration for the appropriate treatment of infections caused by these organisms.

In light of the aforementioned uncertainty, vancomycin represents the optimal reference antimicrobial for this pathology, whether administered as monotherapy or in conjunction with other antimicrobials. This is due to the fact that it is expected to be most effective for the treatment of Staphylococcus aureus infections when used in conjunction with other drugs. However, recent publications suggest that vancomycin may have a lower efficacy in therapy, thereby facilitating the development of resistance in infections caused by these microorganisms (Gudiol, 2009).

The objective of this article is to analyze the beneficial and harmful effects of the different antibiotic regimens and to analyze the effectiveness of these drugs to treat adult patients with infective endocarditis due to Staphylococcus aureus. The aim is to improve the patient's quality of life and reduce the mortality rate associated with this pathology. The objective is to provide guidance to decision-

makers in hospital systems on the most effective and safe antibiotic treatments to incorporate into future protocols for this infectious pathology. Accordingly, this article aims to delineate the principal attributes of the compendium of publications indexed in the Scopus database pertaining to the variables "infective endocarditis," "adult patients," and "clinical care." As illustrated in the descriptions of the positions of certain authors affiliated with institutions from 2022 to 2024.

General Objective

The objective of this study is to analyze the preparation and publication of research papers in high-impact journals indexed in the Scopus database on the variables of infective endocarditis, adult patients, and clinical care during the period 2022-2024 from a bibliometric and bibliographic perspective.

2. Methodology

This article is carried out through a mixed orientation research that combines the quantitative and qualitative method.

On the one hand, a quantitative analysis of the information selected in Scopus is carried out under a bibliometric approach of the scientific production corresponding to the study of Infective Endocarditis, Adult Patients and Clinical Care. On the other hand, examples of some research works published in the area of study indicated above are analyzed from a qualitative perspective, based on a bibliographic approach that allows describing the position of different authors regarding the proposed topic. It is important to note that the entire search was carried out through Scopus, managing to establish the parameters referenced in *Figure 1*.

3.1. Methodological design

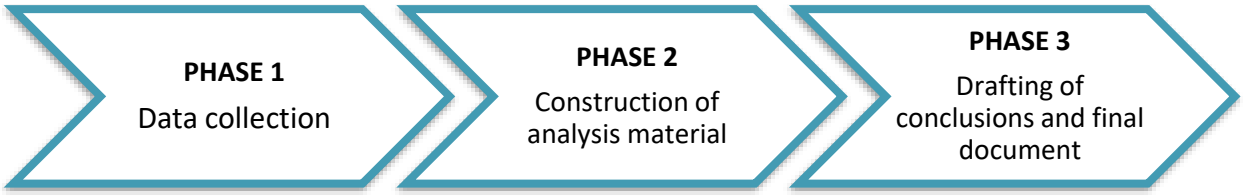

Figure 1. Methodological design

Source: Own elaboration

Phase 1: Data Collection

The data were collected from the search tool on the Scopus website, where 95 publications were obtained by applying the following filters:

TITLE-ABS-
KEY (infectious AND endocarditis, AND adult AND patients, AND clinical AND care) AND PUBYEAR > 2021 AND PUBYEAR < 2025

- Published documents whose study variables are related to the study of Infective Endocarditis, Adult Patients and Clinical Care.
- Limited to the period 2022-2024.
- Limited to Latin American countries.

- Without distinction of area of knowledge.
- Without distinction of type of publication.

Phase 2: Construction of analysis material

The information collected in Scopus during the previous phase is organized and then classified by graphs, figures and tables as follows:

- Co-occurrence of words.
- Country of origin of the publication.
- Area of knowledge.
- Type of publication.

Phase 3: Drafting of the conclusions and final document

In this phase, the analysis of the results previously yielded is carried out, resulting in the determination of conclusions and, consequently, the obtaining of the final document.:

3. Results and discussion

Word co-occurrence

Figure 2 shows the co-occurrence of keywords found in the publications identified in the Scopus database.

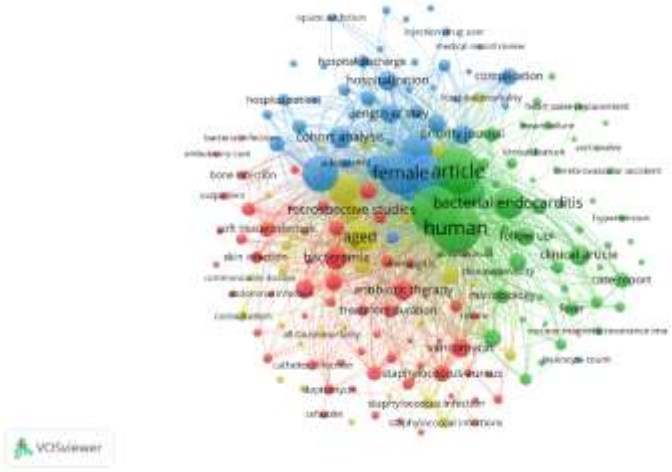

Figure 2. Word co-occurrence

Source: Own elaboration (2024); based on data exported from Scopus.

Infective endocarditis was the most frequently occurring keyword within the studies identified through the execution of Phase 1 of the methodological design proposed for the development of this article. Antibiotics are among the most frequently used variables, with associations extending to variables such as morbidity, mortality, Staphylococcus aureus, health systems, clinical treatments, and microbial agents. It is therefore noteworthy that infective endocarditis caused by Staphylococcus aureus is increasingly correlated with healthcare, which in turn conditions an increase in mortality. This presents a challenge to the correct choice of optimal antibiotic regimen for each patient, which in turn leads to a public health problem. However, it is evident that drugs such as vancomycin, which has been characterized as the antimicrobial with the greatest reference in recent years, in various scientific publications, it is stated that this drug presents a reduction in therapeutic efficiency, development of resistance, and increase in adverse reactions. In light of these considerations, novel antimicrobial regimens have emerged, incorporating unconventional agents such as daptomycin. These novel approaches have demonstrated efficacy when combined with other antibiotics, exhibiting bactericidal

activity against microbial agents, including staphylococcus and enterococci. Furthermore, daptomycin has an excellent safety profile and offers cost savings, rendering it an optimal and effective drug for diverse health systems.

Distribution of scientific production by year of publication

Figure 3 shows how scientific production is distributed according to the year in which each document was published.

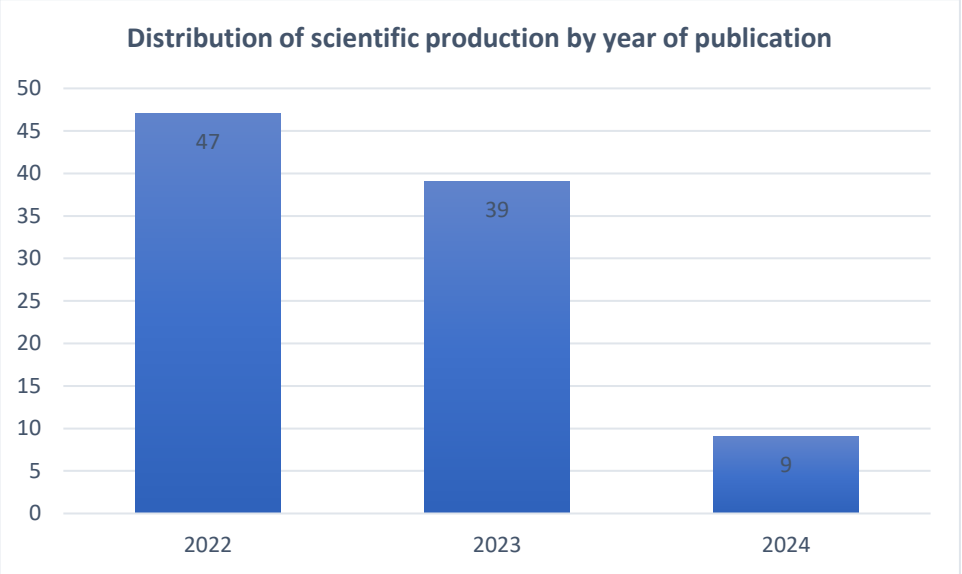

Figure 3. Distribution of scientific production by year of publication.

Source: Authors' elaboration (2024); based on data provided by Scopus.

The distribution of scientific production by year of publication reveals a notable increase in the number of publications registered in Scopus during the years 2022. This resulted in a total of 47 documents published in journals indexed on this platform. This phenomenon can be attributed to articles such as "Central Venous Catheter-Related Bloodstream Infections: Epidemiology and Risk Factors for Hematogenous Complications."

Central catheter-related bloodstream infections (CRBI) have the potential to result in significant complications, including suppurative thrombophlebitis, endocarditis, and metastatic infections. Although complications resulting from central venous catheter-related bloodstream infections (CRBIs) caused by Staphylococcus aureus (SA) are well documented, there is a paucity of data regarding CRBIs caused by other bacteria. The methodology employed in this study is as follows: This retrospective, two-year, single-center study of CRBI patients from a tertiary care hospital examined the hematogenous complications associated with CRBI based on patient characteristics, central venous catheter (CVC) types, and causative bacteria. The results are as follows: A total of 254 patients with confirmed CKD were included in the study. A total of 285 types of bacteria were isolated, with the majority belonging to the Enterobacteriaceae family (n = 94), followed by coagulase-negative Staphylococci (CNS, n = 82), SA (n = 45), and non-fermenting Gram-negative bacteria (NGB, n = 45). Among the patient cohort, 35 individuals developed at least one hematogenous complication, representing 14% of the total. These complications included suppurative thrombophlebitis (n = 15), endocarditis (n = 7), and metastatic infections (n = 16). In the multivariate analysis, the presence of hemodialysis, bacteremia that persists for a minimum of three days, and chronic kidney disease (CKD) resulting from Staphylococcus aureus (SA) infection were identified as factors that elevate the risk of hematogenous complications. Conversely, previous therapeutic anticoagulant therapy was associated with a reduced risk. The presence of diabetes, catheter maintenance, and hematogenous complications were identified as risk factors for mortality at three months. It can be concluded that a comprehensive

investigation of hematogenous complications in patients with persistent bacteremia, particularly those with SA infections and those on hemodialysis, is warranted (Ngo Bell, 2024).

Distribution of scientific production by country of origin

Figure 4 shows how scientific production is distributed according to the country of origin of the institutions to which the authors are affiliated.

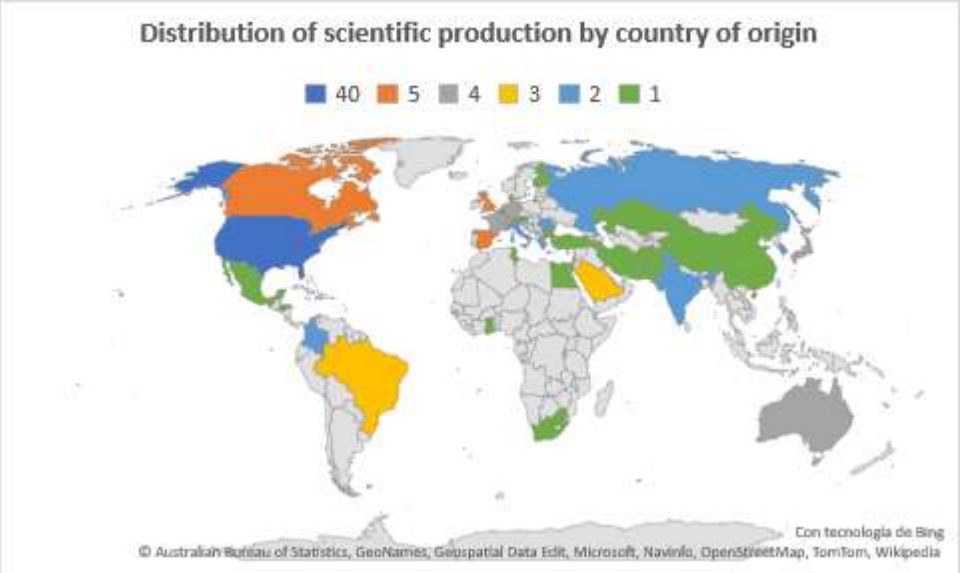

Figure 4. Distribution of scientific production by country of origin.

Source: Own elaboration (2024), based on data provided by Scopus

In examining the distribution of scientific production by country of origin, records from institutions were taken into account, thereby establishing the United States as the country with the highest number of publications indexed in Scopus during the period 2018-2023, with a total of 40 publications. Canada is in second place with five scientific documents, while Australia is in third place with four. The latter includes the article entitled "Comparison of dalbavancin with the standard treatment in the treatment of infective endocarditis: analysis of efficacy, safety and costs." The objective of this article is to analyze the behavior of dalbavancin for long-term treatments, particularly in the context of osteoarticular and infectious endocarditis (IE). The objective of this study was to evaluate the efficacy and costs associated with the treatment of infective endocarditis (IE). To this end, a comparison was made between dalbavancin and the standard of care (SOC). The methodology employed in this study is as follows: A retrospective multicenter cohort study was conducted on adult patients with definitive IE due to Gram-positive cocci. Dalbavancin was employed as a sequential therapeutic agent prior to the patient's discharge. The efficacy of the treatment was determined by a combined endpoint comprising clinical cure and the absence of recurrence at the 12-month follow-up. The duration of hospitalization and related expenses were examined in both treatment groups. The results of the study are presented below. Twenty-two patients received dalbavancin, while 47 received standard of care (SOC). The efficacy of the two treatments was comparable (dalbavancin 18 [72%] vs. SOC 44 [94%], P = .198). The hospital stay was shorter in the dalbavancin group (22 days [16-34] vs. 37 days [23-49], P = .001), particularly in those with E. faecalis IE (30 days [20-36] vs. 65 days [46-74], P <0.001). A reduction in cost was observed between the two groups (dalbavancin, €12,206 [8,998-17,283] vs. SOC, €16,249 [11,496-22,367], p = 0.032) (Suárez, 2024).

Distribution of scientific production by area of knowledge

Figure 5 shows the distribution of the preparation of scientific publications based on the area of knowledge through which the different research methodologies are implemented.

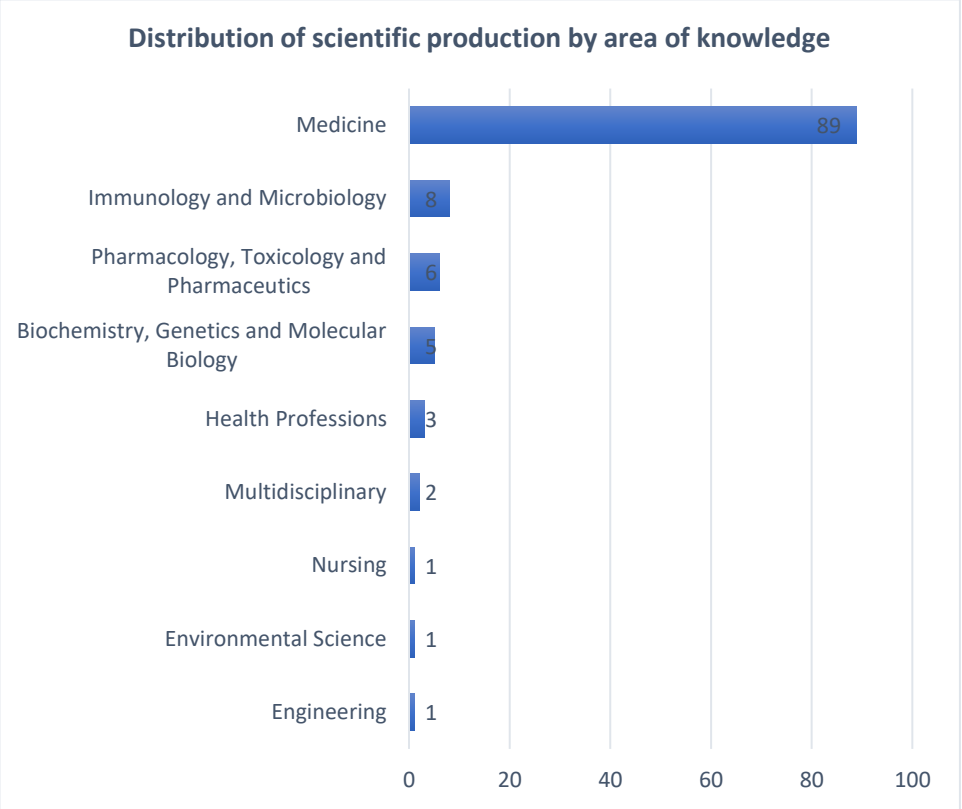

Figure 5. Distribution of scientific production by area of knowledge.

Source: Own elaboration (2024); based on data provided by Scopus

The field of medicine boasts the highest number of publications registered in Scopus, with a total of 89 documents. These publications have served as the foundation for methodologies related to infective endocarditis, adult patients, and clinical care. Second place is occupied by Microbiology and Immunology, with eight articles, and Pharmacology, Toxicology and Pharmaceuticals, with six. This can be attributed to the contribution and study of different branches of science. The article with the greatest impact was registered by the field of Medicine, entitled "Is preoperative intracranial hemorrhage a surgical contraindication in infectious endocarditis with stroke?" It is challenging to determine the optimal timing for surgical intervention in infective endocarditis (IE) with hemorrhagic stroke and neurological deficits, given the risk of exacerbating the stroke and leading to intracranial hemorrhagic conversion following surgery utilizing extracorporeal circulation (ECC). The objective of this retrospective study was to investigate the impact of the presence or absence of preoperative intracranial hemorrhage (ICH) on surgical outcomes in IE with recent stroke. Methodology: The medical records of all patients who underwent open-heart surgery for active infective endocarditis (IE) between February 2009 and December 2020 were retrospectively reviewed. Among the 164 patients who underwent surgery for left-sided IE, 71 cases in which the interval between stroke onset and surgery was less than four weeks were classified into two groups for analysis. The results of the study are presented below. Group A consisted of 49 patients who did not present with preoperative intracranial hemorrhage, while Group B consisted of 22 patients who did present with preoperative intracranial hemorrhage. No significant differences were observed in the underlying conditions between the two groups. The two groups exhibited comparable incidences of postoperative ICH (10.2% in group A vs. 13.6% in group B, P=0.696). The 30-day mortality rate was 8.2% in Group A and 4.5% in Group B (P = 1,000), and one-year survival was 86.8% in Group A and 95.5% in Group B (P = 0.320). A univariate analysis was conducted to ascertain potential risk factors for postoperative ICH exacerbation in all 71 patients. However, none of the assessed factors demonstrated a statistically significant association with ICH exacerbation (Lee, 2023).

Type of publication

Figure 5 illustrates the distribution of bibliographic findings according to the type of publication produced by each author identified in the Scopus database.

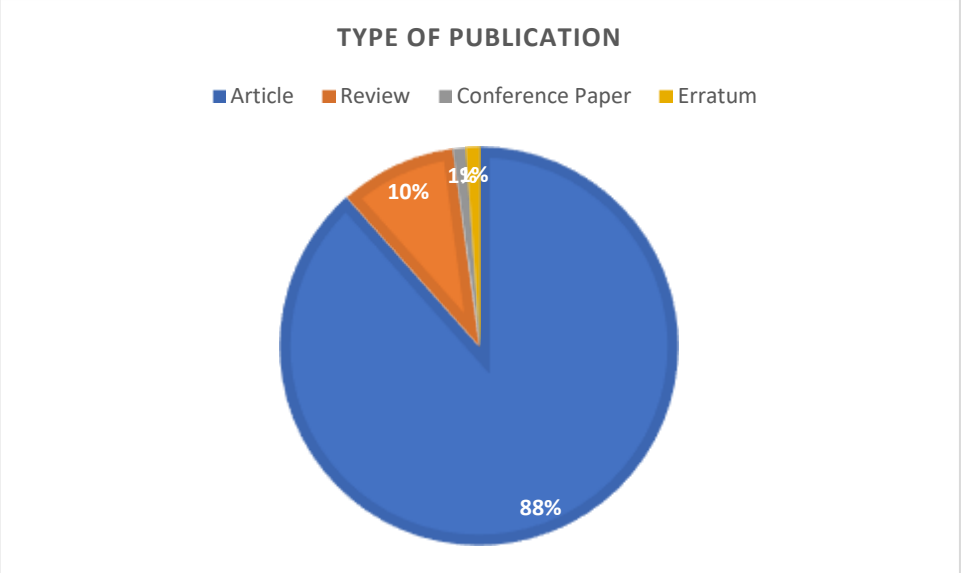

Figure 5. Type of publication.

Source**:** Authors' elaboration (2024); based on data provided by Scopus.

The most prevalent type of publication among the researchers referenced in this document was the journal article, representing 88% of the total production identified for analysis. This was followed by the journal, which constituted 10% of the total. Session papers are included in this classification, representing 1% of the research papers published during the period 2022-2024 in journals indexed in Scopus. In this final category, the article entitled "Microbiological diagnosis and spectrum of pathogens in infective endocarditis of surgically treated patients: a five-year retrospective monocentric study" merits particular attention. The objective of the study was to evaluate the diagnostic value of microbiological methods for detecting the microorganism responsible for infective endocarditis (IE) and to analyze the spectrum of pathogens involved. The methodology employed in this study is as follows: The study encompassed a total of 224 cases, comprising 211 individual patients, some of whom had undergone multiple surgical procedures. The patients were diagnosed with IE in accordance with Duke's modified criteria between January 2016 and July 2021 and subsequently underwent heart valve surgery at a tertiary hospital. The detection of pathogens was conducted through the use of blood culture, microbiological culture, and 16S rDNA PCR of explanted heart valve material. The results of the study are as follows: A pathogen responsible for IE was identified in 95.5% (n = 214) of the cases. The results demonstrated that 83.3% of the blood cultures were positive, whereas 32.6% of the heart valve samples exhibited evidence of a pathogen by culture and 88.2% by 16S rDNA PCR. A microorganism was identified by 16S rDNA PCR in 61.1% of cases with a negative blood culture result, but only in 19.4% by heart valve culture. The most prevalent pathogens were identified as Staphylococcus aureus (27%), viridans streptococci (20%), enterococci (19%), and coagulase-negative staphylococci (CoNS, 8%). The presence of Cutibacterium acnes (7%) was exclusively identified in cases of prosthetic valve-related IE (Ziegler, 2023).

Case Study Proposal

Type of study

A quantitative descriptive observational study will be conducted, as the researchers did not manipulate the information; instead, they will review the medical records of patients with the pathology under investigation. The data will be collected retrospectively.

Location

The study will be conducted in Colombia, specifically in the city of Neiva, Huila. Data will be gathered from patients admitted to a tertiary healthcare institution during a specified time frame between the first semester of 2022 and the first semester of 2024.

Population

The study will focus on a cohort of 100% adult patients with native valves who have been diagnosed with infective endocarditis and treated at a clinic in Neiva between the first half of 2022 and the first half of 2024.

Inclusion and exclusion criteria

Inclusion criteria:

- Patients over 18 years of age.
- Patients with ICD10 code diagnosis:
  - I33 Acute and subacute endocarditis
  - I330 Acute and subacute infective endocarditis
  - I339 Acute, unspecified endocarditis
- Patient with available report of blood culture with isolation of aerobic/anaerobic S. aureus by automatic method (CUPS 901221 – 901223)
- Patients residing in the municipalities of the department of Huila.

Exclusion criteria:

- Patients diagnosed with endocarditis due to candida, ICD code 10 B376
- Patients with acute rheumatic endocarditis, ICD code I011
- Noninfectious structural heart diseases.
- Endocarditis, valve not specified, in diseases classified elsewhere – ICD10 code I39.8
- Patients with mechanical valves
- Cardiac pathologies not related to native valves
- Patient who does not meet Duke's criteria

Sample

The sampling technique will not be applied since the researchers will review the medical records of 100% of the population under investigation, as long as they meet the inclusion and exclusion criteria.

Techniques and procedures for collection

Procedure:

A review of secondary sources will be conducted, as the researchers will consult the medical records of the patients subject to the research. Once the medical records have been selected in accordance with the inclusion criteria, the researchers will create an instrument in the Google Forms application. This will entail designing a form that includes the variables object of research, which will then be typed and subsequently analyzed and interpreted.

It should be noted that the present research is aimed at analyzing the medical history data provided by the Neiva clinic of patients with a confirmed diagnosis of infective endocarditis with involvement of the native valves whose infectious agent is *Staphylococcus aureus*. Therefore, any data that does not align with this parameter will not be taken into account during the research.

Technique

The methodology employed for data collection is based on a secondary source, namely medical records, which document the care provided to patients by health workers. This approach enables researchers to gain insights into healthcare practices by analysing data collected by third parties, thereby providing a unique perspective that is distinct from that of the researchers themselves.

Instrument

A Google Form will be utilized for the purpose of conducting a review of medical records, as it has been specifically designed to contain sections dedicated to the various variables of the study. These variables include, but are not limited to, the patient's sociodemographic and clinical information, diagnosis information, clinical findings, and other pertinent data. Subsequently, the data will be exported to an Excel spreadsheet, which will contain the following information.

# Patient	Sociodemographic characterization	Clinical features	Microbiological findings	Complications
1,2, 3,… n.	Age Sex Socioeconomic level Marital status Schooling Municipality of Residence	Risk factors Pathological history	Blood	Septic shock Valve regurgitation Required valve prosthesis or surgery

Finally, each data provided by the medical records will be coded to facilitate its processing in the Excel statistical sheet, with this, the absolute frequency and percentage values in the qualitative variables and measures of central tendency and dispersion for the quantitative variables will be calculated.

Results Processing and Analysis Plan

Once the data have been collected, a plan for processing and analyzing the results will be carried out for the quantitative variables in terms of measures of central tendency and measures of dispersion. For the qualitative variables, the plan will be carried out in terms of proportions. To calculate the incidence rate, the observed number of cases will be divided by the total time in which the population has been at risk. This is equivalent to the sum of the individual periods at risk.

Strategies for controlling confounding variables

Sample selection: The sample will be selected randomly since this technique allows any participant to be selected to the research group.

Ethical and bioethical aspects

In accordance with the principles established in the Declaration of Helsinki and in Resolution 008430 of October 4, 1993, and because the research was determined to be a risk-free investigation, the main method of investigation will be The use of medical records will be undertaken in accordance with Article 10 of the aforementioned Declaration of Helsinki and in compliance with the stipulations set forth in Article 6. In this study, the following criteria will be developed in alignment with the objectives of our research:

- Clearly express the risks and safety guarantees provided to participants.
- It will be in accordance with the scientific and ethical principles that justify it.
- The safety of the beneficiaries must prevail, and the risks must be clearly expressed, which must not, at any time, contradict Article 11 where we characterize risk-free research.
- Establish that the research will be carried out when authorization is obtained: from the legal

representative of the research institution and the institution where the research is carried out; and the approval of the project by the Research Ethics Committee of the institution.

4. Conclusion and future scope

The bibliometric analysis conducted in this study revealed that the United States had the highest number of published records for the variables "infective endocarditis," "adult patients," and "clinical care." A total of 66 publications are available in the Scopus database. Similarly, it was determined that the application of theories within the domain of social sciences, in conjunction with the findings of the preceding bibliometric analysis, indicates that infective endocarditis persists as a significant challenge for healthcare professionals engaged in the care of these patients. Nevertheless, advancements in pharmacology have been observed, largely due to the influence of technological advancements. This infection has been associated with significant mortality and morbidity rates. This is due to the non-specific clinical characteristics of the disease, the volatility of epidemiological changes, and the potential for future infection, which leaves the disease vulnerable to the actions of microbial agents. These challenges make the care of this pathology complex and require a greater commitment from responsible health professionals. A fundamental aspect of diagnosing and treating this infection is the ability to identify the causative microorganism. It is therefore crucial that healthcare professionals employ an appropriate technique for blood cultures and echocardiography. This process must be conducted prior to the initiation of antibiotic therapy and in conjunction with the avoidance of empirical antibiotic treatments. In turn, healthcare professionals are obliged to implement antibiotic prophylaxis in patients deemed to be at high risk. It can be concluded that advances in antimicrobial therapy and the development of superior diagnostic and surgical techniques have resulted in a notable reduction in the mortality and morbidity associated with infective endocarditis. However, this pathology continues to possess a considerable potential for fatal outcomes. Consequently, the integration of novel clinical criteria, with an emphasis on echocardiography, may represent a promising avenue for accurately diagnosing this disease. The timely recognition and optimal and comprehensive management of IE complications are of critical importance to the successful treatment of patients.

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