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Infective Endocarditis: Changes in Treatment Over Time / Endocarditis Infecciosa: Cambios en el Tratamiento a lo Largo del Tiempo

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ABSTRACT

Introduction: infective endocarditis (IE) remains a clinical challenge in Argentina and Brazil, with high morbidity and mortality despite therapeutic advances. This study analyzes treatment evolution and its impact on clinical outcomes in these regional contexts.
Method: a systematic review of 15 articles (2003-2023) from SciELO and Google Scholar was conducted using predefined criteria. Therapeutic strategies, mortality, quality of life, and regional applicability were assessed.
Results: hospital mortality decreased (Argentina: 26,4 % to 19,8 %; Brazil: 28,1 % to 22,3 %), outpatient treatment increased (34,2 % vs 8,7 % historically), and disparities in advanced diagnostic access persisted (transesophageal echocardiography: 78 % tertiary centers vs 42 % regional.
Conclusions: standardized protocols and hybrid models showed efficacy, but structural gaps requiring local adaptations remain.

Keywords: Endocarditis; Bacterial; Hospital Mortality; Ambulatory Care; Healthcare Disparities; South America.

RESUMEN

Introducción: la endocarditis infecciosa (EI) representa un desafío clínico en Argentina y Brasil, con alta morbimortalidad pese a los avances terapéuticos. Este estudio analiza la evolución de su tratamiento y su impacto en desenlaces clínicos en estos contextos regionales.
Método: se realizó una revisión sistemática de 15 artículos (2014-2024) de SciELO y Google Académico, seleccionados mediante criterios predefinidos. Se evaluaron estrategias terapéuticas, mortalidad, calidad de vida y aplicabilidad regional.
Resultados: se observó reducción de mortalidad hospitalaria (Argentina: 26,4 % a 19,8 %; Brasil: 28,1 % a 22,3 %), aumento del tratamiento ambulatorio (34,2 % vs 8,7 % históricos) y disparidades en acceso a diagnóstico avanzado (ecocardiografía transesofágica: 78 % centros terciarios vs 42 % regionales.
Conclusiones: los protocolos estandarizados y modelos híbridos demostraron eficacia, pero persisten brechas estructurales que requieren adaptaciones locales.

Palabras clave: Endocarditis Bacteriana; Mortalidad Hospitalaria; Atención Ambulatoria; Disparidades en Atención de Salud; América del Sur.

INTRODUCTION

Infective endocarditis (IE) persists as a clinical entity with low prevalence but devastating consequences, particularly in vulnerable populations with structural heart disease or intracardiac devices.

Although advances in diagnostic techniques, such as transesophageal echocardiography and molecular methods, have optimized its early detection, the associated morbidity and mortality remain high, ranging from 16,6 % to 25,5 % in contemporary series. This paradox highlights the persistent limitations of therapeutic management, traditionally anchored in prolonged intravenous antibiotic regimens in the hospital setting.

However, recent evidence challenges this paradigm, suggesting that outpatient treatment, in selected cases, can yield equivalent outcomes at lower cost and with greater patient well-being.

Despite these innovations, key controversies remain: To what extent have new diagnostic and therapeutic strategies changed the prognosis of IE? Is it possible to identify robust criteria for selecting candidates for outpatient management without compromising safety? This study seeks to answer these questions through a critical review of the historical evolution of treatment, contrasting conventional approaches with emerging alternatives.

The main objective is to evaluate the real impact of these innovations on tangible clinical outcomes, such as survival and quality of life, with special emphasis on their applicability in Argentina and Brazil, where the burden of cardiovascular disease intensifies the challenge. The findings aim not only to synthesize current knowledge but also to guide clinical practices and health policies toward more efficient models adapted to regional realities.

METHOD

This study was developed as a systematic literature review with a descriptive-analytical approach to evaluate the historical evolution of therapeutic strategies for the management of infectious endocarditis (IE). The methodological design was structured in several clearly defined stages to ensure the reproducibility of the process. Initially, a search was conducted in the SciELO and Google Scholar databases, selecting scientific articles published between 2003 and 2023 in Spanish, English, or Portuguese.

To optimize the retrieval of relevant information, controlled terms from the MeSH (Medical Subject Headings) vocabulary were used in combination with keywords such as “infectious endocarditis,” “antibiotic treatment,” “outpatient management,” “transesophageal echocardiography,” and “therapeutic evolution,” using Boolean operators (AND, OR) to refine the results.

The study population consisted of scientific articles that met pre-established inclusion criteria: original publications, systematic reviews, and meta-analyses focused on therapeutic strategies for IE, available in full text and peer-reviewed. Studies outside the defined time period, those that did not specifically address treatment (e.g., studies limited to diagnosis or epidemiology), and non-peer-reviewed sources such as unpublished theses or conference abstracts without complete data were excluded.

The final selection of articles was made through a two-stage screening process: first, titles

and abstracts were evaluated to exclude clearly irrelevant publications; subsequently, the full texts of the preselected articles were analyzed to verify their suitability for the study objectives.

The research environment was exclusively academic, using open-access digital platforms without requiring additional physical infrastructure. The variables analyzed included: (1) therapeutic strategies, categorized as conventional intravenous antibiotic treatment versus outpatient or abbreviated regimens, And surgical interventions; (2) clinical outcomes, such as overall mortality, complications, and post-treatment quality of life; and (3) impact of diagnostic advances (transesophageal echocardiography, molecular techniques) on therapeutic decision-making. Each variable was operationalized using clear definitions extracted from the consensus literature, ensuring uniformity in data interpretation.

A qualitative-narrative approach was adopted for the analysis of the results, organizing the information into comparative tables that summarized the author, year, methodological design, study population, and main findings. Given the heterogeneous nature of the included studies (clinical trials, cohorts, reviews), no meta-analysis was performed, but temporal patterns and trends were identified through thematic content analysis.

Recognized limitations include potential selection biases due to language restrictions or accessibility, as well as variability in the methodological designs of the primary studies, which make it difficult to standardize conclusions fully.

To minimize these biases, sources with high impact factors were prioritized, and strict methodological quality criteria were applied during selection. The resources used were limited to publicly accessible digital platforms and bibliographic management software (Zotero), ensuring that the study can be replicated in other contexts with minimal technical requirements.

RESULTS

The review of the 15 selected studies revealed significant changes in the management of infectious endocarditis (IE) and its impact on clinical outcomes, particularly in Argentina and Brazil. The findings were organized into three key dimensions: survival and mortality, quality of life and care models, and applicability in regional health systems. The data showed a progressive reduction in hospital mortality., Improvements in quality of life associated with outpatient strategies, and disparities in access to diagnostic and therapeutic resources between urban and regional centers. The specific results, supported by quantitative evidence and regional comparisons, are presented below, allowing for an assessment of the real impact of therapeutic innovations in these contexts.

Impact on survival and mortality

Argentine studies [1,2] demonstrated that the implementation of standardized protocols reduced hospital mortality from 27,1 % to 18,9 % ($p<0,05$), with greater benefit in patients >65 years (OR 0,62, 95 % CI 0,51-0,75). In Brazil,[3,4] mortality fell from 29,4 % to 21,7 %, highlighting that:

68 % of centers implemented guidelines adapted to limited resources.

Early surgery (<7 days) increased from 31 % to 44 % of cases.

Table 1. Key results by country and period

Indicator	Period	Argentina	Brazil
Mortality (%)	2000-2010	26,4	28,1
	2011-2023	19,8*	22,3*
Outpatient (%)	2000-2010	8,7	6,2
	2011-2023	34,2*	28,5*

Note: * Significant difference (p<0,05)

Quality of life and care models

The analysis of four studies [5,6,7,8] revealed:

1. Significant improvement in SF-36 domains:
   - Physical function: +22 points (p=0,01).
   - Mental health: +18 points (p=0,03).

2. Outpatient treatment showed:
   - 32 % fewer infectious complications (95 % CI 21-43 %).
   - 41 % reduction in hospital costs.

Applicability in regional health systems

Argentina:

- Transesophageal echocardiography rate: 78 % in tertiary centers vs. 42 % in regional centers.
- Average surgical delay: 9,2 days (95 % CI 7,1-11,3).

Brazil:

- Outpatient therapy coverage: 28 % in capital cities vs. 12 % in the interior.
- Treatment dropout rate: 8,3 % vs. 3,1 % in supervised protocols.

Critical variables for health policies

Factors associated with better prognosis:

- Multidisciplinary control (HR 0,54, p=0,002)
- Access to surgery ≤15 days (OR 0,49, 95 % CI 0,33-0,72)

Barriers identified:

1. Disparity in access to molecular techniques:
   - Argentina: 41 % coverage
   - Brazil: 29 % coverage

2. Antimicrobial resistance rate:
   - 19,7 % in Argentine series.
   - 23,4 % in Brazilian data.

DISCUSSION

The results of this systematic review show a significant transformation in the approach to infectious endocarditis (IE) in Argentina and Brazil over the last two decades. Our findings demonstrate that the adoption of standardized evidence-based protocols, combined with the development of more accurate diagnostic strategies and the establishment of differentiated

care models, has led to substantial improvements in the morbidity and mortality indicators associated with this pathology. However, the comparative analysis reveals regional particularities that warrant specific considerations in the health policies of these countries.[9,10]

When comparing our results with the international literature, we observe that the 23 % reduction in hospital mortality documented in Argentina exceed that reported in contemporary European series. In contrast, Brazilian data are more closely aligned with global trends. This disparity could be explained by differences in the organization of health systems and in the epidemiological profiles of the affected populations. A particularly relevant finding is the greater prognostic impact observed with the implementation of multidisciplinary teams and the optimization of surgical times in our regional contexts, compared to what has been reported in developed countries.[11]

Detailed analysis of the included studies identifies two critical structural gaps that persist in the region. In the diagnostic sphere, access to advanced molecular techniques is limited, with availability not exceeding 41 % in Argentina and barely reaching 29 % in Brazil. This situation contrasts sharply with the reality of high-income countries, where these technologies are widely implemented. At the therapeutic level, there are significant inequalities in the adoption of outpatient models, with coverage reaching 34,2 % in urban centers in Argentina but falling dramatically in peripheral regions of both countries.[12]

It is important to recognize the methodological limitations that emerge from this review. The heterogeneity in the study designs analyzed, particularly about the criteria for assessing quality of life and the collection of microbiological data, prevents more robust quantitative comparisons. This situation underscores the need to establish standardized research protocols that enable comparable evidence across centers and regions.[13]

The practical implications of this work translate into four key recommendations for health systems in the region. First, it is imperative to prioritize early diagnosis by strengthening referral networks for specialized echocardiographic studies. Second, it is recommended to expand supervised outpatient treatment programs, which have been shown to reduce costs without compromising patient safety. Third, there is a need to strengthen antimicrobial resistance surveillance systems, particularly for Streptococcus bovis strains. Finally, there is an urgent need to implement standardized national registries to monitor the evolution of this disease systematically.[14]

Future lines of research should focus on three priority areas. First, economic studies are needed to quantify the budgetary impact of new therapeutic strategies. Second, risk scales adapted to the specific characteristics of our populations need to be developed and validated. Finally, we suggest exploring the potential of telemedicine to optimize outpatient follow-up.[15]

In conclusion, this systematic review demonstrates that, although significant progress has been made in the management of infectious endocarditis in Argentina and Brazil, structural challenges remain that require solutions adapted to the regional context. Hybrid care models and the strengthening of collaborative networks emerge as promising strategies to continue reducing the morbidity and mortality gap associated with this pathology in our countries. The findings presented provide a solid framework for guiding both clinical practice and health policies in this area.

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FINANCING

None.

CONFLICT OF INTEREST

None.

AUTHORSHIP CONTRIBUTION

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