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Research paper

Clinical and epidemiological profile of infective endocarditis in Chile - A systematic review of descriptive analysis[☆]

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ARTICLE INFO

Keywords:

Infective endocarditis
 Chile
 Heart failure
 Embolism

ABSTRACT

Background: Infective endocarditis (IE) is still a complex disease despite advances in modern medicine, with diverse epidemiology and clinical manifestation, and poor prognosis. Several recommendations have recently been published but it is uncertain if they can be extrapolated to every country.

Objectives: To describe our national clinical and epidemiological profile on IE.

Methodology: A systematic search through PubMed, Scielo, and abstracts book of Chilean Congress since 2012. Studies assessing adult patients with IE from Chile reporting information related to epidemiology, clinical manifestation, treatment, and complications have also been consulted.

Results: Ten registries were included. The mean age was 53.9-year-old, and most cases were male (64 %) with arterial hypertension (42 %). Most cases were from the central and southern zones of Chile. The most frequent clinical symptoms were fever and heart failure, with acute presentation (63.5 %), aortic valve (72.2 %), and native valve involvement (83.7 %). Predominantly, it was medical treatment over surgical treatment (57.7 versus 42.3 %), with main surgical indications due to local cardiac complications (66 %) and heart failure related (65.9 %). Complications included mechanical valve damage in 24.7 %, and embolism in 27.7 %. *Staphylococcus* sp. (28 %) was the predominant microorganism, particularly *Staphylococcus aureus*, and negative microbiological studies were seen in 34 %. In-hospital mortality was 24.8 %, whereas global mortality was 33.3 %.

Conclusion: This systematic review highlights epidemiological and clinical aspects of IE across Chile, such as acute presentation, predominance of aortic valve involvement, and *S. aureus* infection. However, there is a lack of prospective registries, therefore reflecting the need to collect richer information.

1. Introduction

Infective endocarditis (IE) is an infection that affects either the endocardium or the heart valves. It remains a clinical challenge in modern medicine both in developed and developing countries. It is characterized by its complexity, diverse microbiology, potential clinical consequences and high mortality in spite of medical technology, antimicrobial therapy and surgical therapy [1,2]. This is particularly challenging for healthcare systems with limited resources, as the diagnosis

and treatment of IE requires an increased need of medical technology and trained personnel.

Epidemiological data and important guidelines are based on information from developed countries. The IE incidence has increased over time, even in developed countries [1,2]. In addition, IE has begun to have a more acute presentation profile and a predominance for *Staphylococcus* disease [3,4]. In addition, the microbiological resistance related to community-acquired streptococci and staphylococci is rising in US and Europe [5]. Without sufficient local data, the extrapolation of

Abbreviations: IE, infective endocarditis; NVE, native valve endocarditis; PVE, prosthetic valve endocarditis; HF, heart failure; NM, No mention; ECNEI 2, Estudio cooperativo nacional en endocarditis infecciosa.

[☆] Short Tweet: The profile of infective endocarditis in Chile highlights men over 50-year-old, fever and heart failure, and acute presentation involving aortic valve compromise due to *Staphylococcus* sp. Mortality remains high and similar to other large international registries. @C.delcastillog. @ AliciaTapiaGuz1. @Sochicaroficial.

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<https://doi.org/10.1016/j.ahjo.2025.100511>

Received 30 June 2024; Received in revised form 25 October 2024; Accepted 10 February 2025

Available online 21 February 2025

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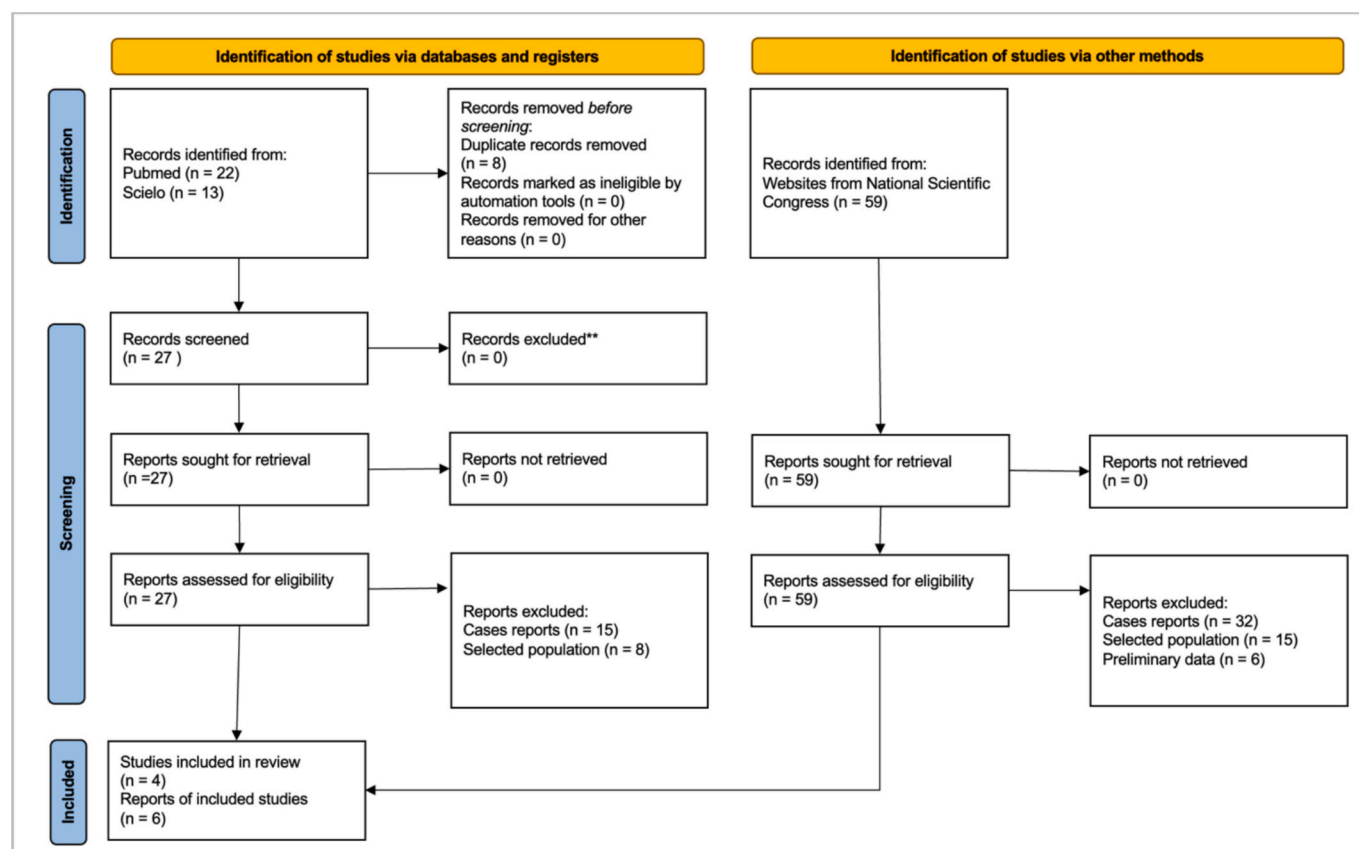


Fig. 1. PRISMA 2021 flow diagram for study.

the guideline's recommended treatment is affected by local antibiotic resistance.

However, we do not know if their recommendations are applicable to Latin American countries. The global burden of disease studies reported the highest incidence rate affects tropical and southern Latin American [6] countries. A recent Latin American systematic review published in 2022 highlighted that the overall mortality rate was 26.6 % whereas in-hospital mortality rate was 25.1 %, with a mild decrease since the 1970s (29.3 % in the 1970s to 26.5 % in the 2010s) [7]. Microbiological data showed similar rate between *Staphylococcus aureus* (18.6 %) and *Streptococcus viridians* (17.8 %) [7]. Although prospective multicenter studies were recommended, this has proved to be difficult to implement across Latin American countries in the light of inequalities in socio-demographic variables and healthcare systems [7–10].

Regarding Chilean levels, the ECNEI-2 multicenter study was published in 2012 which reported IE in 506 patients from 1998 to 2008 [4]. The incidence was 2 cases per 100,000 patients per year and in-hospital mortality was 26.1 %, with similar microbiological (*S. aureus* predominance) and clinical profile (acute presentation and aortic valve compromise), as previously mentioned. After ECNEI-2, there are no further multicenter registries in Chile.

This study seeks to contribute to the ongoing efforts to optimize patient outcomes, review current Chilean data, and hopefully mitigate the burden of IE in our country. For this reason, we have carried out a systematic review of descriptive analysis on IE among adult patients in Chile aiming to achieve a present description of the clinical characteristics, management options and their impact on mortality.

2. Methodology

A systematic review of the Chilean scientific literature in relation to descriptive analysis of IE published after the ECNEI-2 registry in 2012.

The guidelines of the PRISMA declaration were followed and the process is detailed below [11].

2.1. Data sources and searches

Two researchers conducted the search by combining keywords “Endocarditis” and “Chile” in the PubMed and Scielo databases, and a parallel search was also carried out in the abstract books of the Chilean Societies of Internal Medicine (SMS; Sociedad Médica de Santiago), Infectious Diseases (SOCHINF; Sociedad Chilena de Infectología) and Cardiology (SOCHICAR; Sociedad Chilena de Cardiología).

2.2. Study selection

The systematic search was carried out in February 2024, using Pubmed and Scielo. It was restricted to dates from January 2012 to January 2024 and included only adult patients. The combination of terms used was “Endocarditis” AND “Chile”. Consequently, 22 results were obtained in Pubmed and 13 in Scielo.

The review of abstract books was based on titles that include the word “endocarditis”. It included abstract books available on the internet from 2012 published in the Chilean Congresses of Internal Medicine (SMS), Infectious Disease (SOCHINF) and Cardiology (SOCHICAR). 4 abstracts were obtained from the SOCHINF congress, 35 from the SMS congress, and 21 from the SOCHICAR congress. However, the review of abstract books of 2012 in SOCHINF, 2012 in SOCHICAR, and 2012–2013 in SMS congresses was not performed as they were not available on Internet.

Table 1

Characteristics of studies. IE: infective endocarditis. NM: no mention. CKD: chronic kidney disease. HF: heart failure. NVE: native valve endocarditis. PVE: prosthetic valve endocarditis. Two authors carried out the revision.

Author (ref) / Year /Place	Uni or multicentric	Inclusion criteria	Total	♂ % (n)	Age* (year)	Comorbidities						Clinic manifestation	Presentation profile
						Hypertension % (n)	Diabetes % (n)	CKD % (n)	Dialysis % (n)	Immunosuppression % (n)	Previous IE % (n)		
Oyonarte et al. [ECNEI-2]. 2012. Multicentric.	Multicentric	Adults with IE between 1998-2008	n = 506	♂ = 66% (332)	50.2 ± 17	NM	12% (61)	NM	12.6% (64)	1.97% (10)	2.1% (11)	HF 51.7% (262)	Subacute 63% (319)
Stockins et al. 2012. Temuco.	Unicentric	Adults with IE between 2003-2010	n = 107	♂ = 75% (80)	49.9 ± 16.4	41.1% (15)	16.8% (8)	NM	NM	NM	NM	Fever + Murmur 66.2% (67) HF 42.9% (46)	NM
Bourke et al*. 2016. Osorno	Unicentric	Adults with IE between 2010-2015	n = 23	♂ = 69% (16)	60	NM	NM	NM	NM	NM	21.4% (11)	Fever 86.9% (20) Murmur 73.9% (17)	NM
Flores et al. 2017. Valparaiso.	Unicentric	Adults with IE between 2012-2016	n = 35	♂ = 54% (19)	57 ± 15.7	42.9% (15)	22.9% (8)	17% (6)	NM	NM	8.6% (3)	General discomfort 79.1% (27) Fever 71.4% (25)	Acute 68.6% (24)
Caro et al*. 2017. Rancagua.	Unicentric	Adults with IE between 2015-2017	n = 34	♂ = 64% (22)	NM	NM	NM	NM	NM	NM	NM	NM	NM
Cruz et al. 2018. Talca.	Unicentric	Adults with IE between 1998-2015	n = 62	♂ = 61% (38)	49.7 ± 15.7	27% (17)	24% (15)	11% (7)	1.6% (1)	3.2% (2)	NM	Fever 72.5% (45)	NM
Oyonarte et al*. 2018. Santiago.	Unicentric	Adults with IE between 2013-2018	n = 51	♂ = 76% (39)	58.6 ± 13.3	51% (26)	37.3% (19)	31.6% (16)	NM	NM	NM	Fever and HF	Acute 64.7% (33)
Eitler et al*. 2019. Santiago.	Unicentric	Adults with IE between 2017-2019	n = 40	♂ = 62% (25)	55 ± 15	NM	NM	NM	NM	NM	NM	NM	NM
Rojas et al*. 2021. Puerto Montt.	Unicentric	Adults with IE between 2017-2020	n = 101	♂ = 68% (69)	61	68% (69)	49% (49)	NM	38% (38)	NM	NM	NM	NM
Ayala et al*. 2023. Santiago	Unicentric	Adults with IE between 2007-2022	n = 281	♂ = 66% (157)	58.4 ± 16.9	52.1% (126)	25.6% (62)	NM	NM	12.8% (31)	NM	NM	NM

Author (ref) / Year / Place	Native or Prosthesis IE	Valve Involvement	Multi-valve compromise	Echo finding	Medical treatment	Surgical Indication			Mortality
						Heart Failure	No control infection	Embolism prevention	
Oyonarte et al. [ECNEI-2]. 2012. Multicentric.	Native 85.5% (433)	Aortic 90.3% (457)	NVE: 90.3%. PVE: Biological 1.4% and mechanic 8.3%	NM	53.9% (273)	HF 63.6% (322). Prosthetic dysfunction 10% (51)	Intracardiac complications 73.1% (367). Persistent infection 30.7% (155)	Embolism 9.4% (48). Valve vegetation >10 mm 29.6% (150)	26.1% (132) In-hospital
Stockins et al. 2012. Temuco.	Native 90% (96)	Aortic 61.6% (66)	NM	Valve vegetation 74.7% (80)	62.7% (67)	Acute HF NM	NM	NM	27.1% (29) In-hospital
Bourke et al*. 2016. Osorno	Native	Aortic 56.2% (13)	NM	Valve vegetation 95.6% (22)	61% (14)	NM	NM	NM	34.7% (8) Global
Flores et al. 2017. Valparaíso.	Native	Aortic 65.7% (23)	Multivalvular 22.9%	NM	71.4% (25)	HF 20% (7)	NM	Embolism 8.6% (3)	40% (14) In-hospital
Caro et al*. 2017. Rancagua.	Native	Aortic 46% (16)	Mitral-aortic 17.9%	NM	62% (21)	NM	NM	NM	44% (15) Global
Cruz et al. 2018. Talca.	Native 79% (49)	Aortic 50% (31)	Mitral-aortic 9.7%	Valve vegetation 87.1% (54)	75.8% (47)	HF 73.3% (45). Prosthetic dysfunction 26.7% (16)	Intracardiac complications 13.3% (8). Persistent infection 26.7% (16)	Valve vegetation >10 mm 20% (12). Embolism 6.7% (4)	19.4% (12) In-hospital
Oyonarte et al*. 2018. Santiago.	Native	Aortic 31.4% (16)	NM	NM	72.5% (37)	55% (28)	20% (10)	32% (16)	29% (15) Global
Eitler et al*. 2019. Santiago.	Native 80% (32)	Mitral 38% (15).	Mitral-aortic 23%	NM	25% (10)	NM	NM	NM	27.5% (11) Global
Rojas et al*. 2021. Puerto Montt.	Native	Aortic 56% (57)	NM	NM	55% (56)	NM	NM	NM	34% (34) Global
Ayala et al*. 2023. Santiago	Native 79.7% (224)	NM	NM	NM	58.7% (165)	NM	NM	NM	21% (59) In-hospital

^a Information from the abstract.

2.3. Inclusion criteria

- Descriptive analysis that included cases of IE in its most completed spectrum, considering surgical and non-surgical cases.
- Descriptive information regarding general demographic variables, comorbidities, microorganisms, valvular involvement, and mortality had to be included in the abstract.
- Only data from national health centers (Chilean hospitals).
- Data published between 2012 and 2023.

2.4. Exclusion criteria

- Insufficient descriptive information showed in abstracts.
- Research including preliminary data.
- Not included results of medical AND surgical IE patients.
- Report of selected IE patients, such as: endocarditis in dialysis patients, right-sided endocarditis, device-related endocarditis, etc.
- Clinical case and clinical series.

2.5. Data synthesis and analysis

A data form was prepared including geographical information, clinical characteristics, echocardiography, microbiology, management and mortality.

3. Results

Based on the inclusion and exclusion criteria, 10 articles were considered suitable and were taken to perform the systematic review (Fig. 1). 1184 cases were obtained from these 10 articles which are summarized in Tables 1, 2, and 3. Table 4 reports the combination results from the registries.

3.1. Demographic data

The majority are single-center registries, except for the ECNEI-2 registry that brought together 37 centers across the whole country,

Table 2
Local heart complications. NM: no mention. Revision carried out by authors.

Author (ref)	n	Mechanical valve damage (including rupture, perforation, and abscess) % (n)	Other
Oyonarte et al. [4] [ECNEI-2]	506	33.7 % (131)	
Stockins et al. [12]	107	20.6 % (22)	
Bourke et al. [13]	23	NM	Cardiac fistula 2.9 % (1)
Flores et al. [14]	35	8.6 % (3)	
Caro et al. [15]	34	26.4 % (9)	
Cruz et al. [16]	62	6.5 % (4)	
Oyonarte et al. [17]	51	NM	
Eitler et al. [18]	40	NM	
Rojas et al. [19]	101	40 % (40)	
Ayala et al. [20]	281	NM	

Table 3
Embolism-related to IE. NM: no mention. Revision carried out by authors.

Author (ref)	Presence % (n)	Embolism – Organ involvement			
		Neurologic % (n)	Abdominal % (n)	Limb % (n)	Other % (n)
Oyonarte et al. [4] [ECNEI-2]	30.6 % (155/506)	NM	NM	NM	NM
Stockins et al. [12]	19.6 % (21/107)	66.6 % (14)	Kidney 9.5 % (2)	19 % (4)	Other 4 % (1)
Flores et al. [14]	NM	40 % (14)	Kidney 22.9 % (8), splenic 22.9 % (8)	NM	Lung 2.9 % (1)
Cruz et al. [16]	17.7 % (11/62)	91 % (10)	Splenic 9 % (1)	NM	NM

Table 4
Clinical profile of IE in Chile. Summarize of registries.

	Cases	Total	%
Comorbidities			
Hypertension	268	637	42,1
Diabetes	222	1143	19,4
Chronic kidney disease	29	148	19,6
Dialysis	103	669	15,4
Immunosuppression	43	849	5,1
Previous IE	25	564	4,4
Clinical manifestations			
Acute profile	376	592	63,5
Native valve	834	996	83,7
Aortic valve	692	959	72,2
Mechanical valve damage	209	845	24,7
Embolism	187	675	27,7
Echocardiogram			
Vegetation	156	192	81,3
Medial management	715	1240	57,7
Surgical indication	525	1240	42,3
Heart failure	412	625	65,9
Prosthesis dysfunction	67	626	10,7
No controlled infection	171	568	30,1
Local cardiac complications	375	568	66,0
Multiple embolism	55	603	9,1
Vegetation > 10 mm	162	568	28,5
In-hospital mortality	246	991	24,8
Global mortality	83	249	33,3

but mostly from the central zone of Chile (40 % from Santiago). All the other registries were mainly from the central zone (Metropolitan Region, Valparaíso, Maule) and the southern zone (Araucanía and Los Lagos Region), with no records found from the northern zone. Among

Table 5
Microbiological profile of IE in Chile. Inclusion criteria: Complete Infectious analysis published (including negative results), corrected percentages, and reliable data.

Author (ref)	n	Microorganism analysis	Susceptibility published	Meet inclusion criteria
Oyonarte et al. [4] [ECNEI-2]	506	<i>Staphylococcus</i> sp. 25.9 % (131) <i>Staphylococcus aureus</i> 18.7 % (95) Coagulase-negative <i>Staphylococcus</i> 7.1 % (36) <i>Streptococcus</i> group 14.8 % (75) Other <i>Streptococcus</i> 13.6 % (69) <i>Enterococcus</i> sp. 4.7 % (24) Gram-negative bacilli 3.4 % (17) Fungi 1.2 % (6) HACEK 0.98 % (5) Negative blood culture 33.2 % (168) No information 2.7 % (11)	Not inform.	Yes
Stockins et al. [12]	107	<i>Streptococcus viridians</i> 30.8 % (33) <i>Staphylococcus aureus</i> 18.6 % (20) Other 13.3 % (14) Coagulase-negative <i>Staphylococcus</i> 5.6 % (6) Negative blood culture 31.7 % (34)	Not inform.	Not meet criteria
Bourke et al. [13]	23	Positive 86.9 % Gram-negative bacilli 26 % <i>Staphylococcus aureus</i> 17.3 % Negative blood culture 13.1 %	Not inform.	Not meet criteria
Flores et al. [14]	35	<i>Staphylococcus</i> sp. 31.4 % (11) <i>Staphylococcus aureus</i> 25.7 % (9) Coagulase-negative <i>Staphylococcus</i> 5.7 % (2) <i>Streptococcus viridians</i> 8.6 % (3) <i>Enterococcus faecalis</i> 5.7 % (2) <i>Enterococcus faecium</i> 5.7 % (2) <i>Candida parapsilosis</i> 5.7 % (2) <i>Streptococcus</i> <i>pneumoniae</i> 2.9 % (1) <i>Escherichia coli</i> 2.9 % (1) Negative blood culture 37.1 % (13)	Information-related in <i>Staphylococcus</i> <i>aureus</i> with 100 % methicillin sensitivity.	Yes
Caro et al. [15]	34	<i>Staphylococcus</i> 58.8 % (20) <i>Streptococcus</i> 8.8 % (3) <i>Enterococcus</i> 8.8 % (3) Fungi 8.8 % (3) Coagulase-negative <i>Staphylococcus</i> 8.8 % (3) Negative blood culture 8.8 % (3)	Not inform.	Not meet criteria

(continued on next page)

Table 5 (continued)

Author (ref)	n	Microorganism analysis	Susceptibility published	Meet inclusion criteria
Cruz et al. [16]	62	<i>Staphylococcus</i> sp. 37.1 % (23) <i>Staphylococcus aureus</i> 22.6 % (14) Coagulase-negative <i>Staphylococcus</i> 14.5 % (9) <i>Streptococcus</i> sp. 9.7 % (6) <i>Streptococcus viridians</i> 3.2 % (2) <i>Streptococcus agalactiae</i> 3.2 % (2) <i>Enterococcus faecalis</i> 3.2 % (2) <i>Corynebacterium</i> sp. 1.6 % (1) <i>Acinetobacter baumannii</i> 1.6 % (1) Gram-positive bacilli ¿diphtheromorph? 1.6 % (1) Gram-negative bacilli 1.6 % (1) <i>Streptococcus pneumoniae</i> 1.6 % (1) <i>Pseudomonas aeruginosa</i> 1.6 % (1) <i>Enterococcus</i> sp. 1.6 % (1) No microorganism information 32.3 % (20)	Not inform.	Yes
Oyonarte et al. [17]	51	<i>Staphylococcus</i> sp. 41.2 % (21) <i>S. aureus</i> 29 % (15) Methicillin-sensible <i>S. aureus</i> 13 % (7) Methicillin-resistance <i>S. aureus</i> 15 % (8) Coagulase-negative <i>Staphylococcus</i> 11 % (6) <i>Streptococcus</i> 27.5 % (14) <i>Enterococcus</i> 7.8 % (4) Fungi 3.9 % (2) Gram-negative bacilli 2 % (1) Negative blood culture 17.6 % (9)	Not inform.	Yes
Eitler et al. [18]	40	<i>Staphylococcus aureus</i> 41 % (11) <i>Streptococcus</i> sp. 32 % (9) <i>Enterococcus</i> sp. 11 % (3) Coagulase-negative <i>Staphylococcus</i> 7 % (2) <i>Candida</i> spp. 7 % (2)	50 % of <i>S. aureus</i> was methicillin-resistant.	Not meet criteria
Rojas et al. [19]	101	<i>Staphylococcus aureus</i> 40 % (40)	Not inform.	Not meet criteria
Ayala et al. [20]	281	<i>Staphylococcus aureus</i> 24.4 % (59) <i>Streptococcus viridians</i> 17.4 % (42) Coagulase-negative <i>Staphylococcus</i> 13.6 % (33) <i>Enterococcus</i> ^a was not reported	Not inform.	Not meet criteria

^a Quantification was based on positive blood culture - the authors carried out revision.

these registries, the city of Santiago predominates in the sample corresponding to 3 articles out of the 10 analyzed.

3.2. Epidemiological and clinical data

As seen in Tables 1 and 2, in all of the registries there is a predominance of males with 64 % and a mean age of 53.86-year-old. There is no complete and homogeneous record of comorbidities, although high blood pressure stands out as the main one with 42.1 %. The history of previous endocarditis highly varies between registries with average of 4.4 %. Drug addiction was poorly described and averaging up to 0.81 % (5 out of 613 subjects).

Additionally, it is noted that heart failure and fever are frequently described, but results cannot be compared due to the heterogeneity of the reported data. Acute presentation predominates in the most current records in up to 64.5 % of cases, although this was under reported. Valvular involvement commonly included native valve endocarditis (83.7 %) and aortic valve involvement (72.2 %). The most common echocardiogram finding was valve vegetation in 81.3 %.

3.3. Treatment and complications

IE was mostly medically managed (57.7 %) and the most frequent indications for surgical management reported are related to local cardiac complications in 66 % of cases and heart failure in 65.9 %. Mortality reports vary with mean in-hospital mortality of 24.8 % and mean global mortality of 33.3 % among registries.

In regard to local complications, mechanical valve damage accounts for 24.7 %, including valve rupture, abscesses and perforation. One study reported cardiac fistula in 2.9 %. Emboli occurs in 27.7 % of cases, with embolism to the nervous system predominating in all records (Table 3).

3.4. Microbiology

The microbiological analysis is depicted in Table 5 and Fig. 2, with predominance of *Staphylococcus aureus* in up to 41 % [18], followed by *Streptococcus viridians*. No publication reported any microbiological results by molecular or serology techniques. There is no detailed report about antimicrobial resistance, only 100 % of *Staphylococcus aureus* sensitive to methicillin is mentioned in Flores et al. [14], while Eitler et al. [18] report up to 50 % methicillin-resistance.

A sub-analysis is performed between registries with complete microorganism data, aimed to evaluate the distribution of microbiological. 654 subjects were included, and it was found that 28 % of patients suffered from *Staphylococcus* sp., 27 % from *Streptococcus* sp., and 3 % from *Enterococcus* sp. A total of 34 % of studies reported a negative microbiological result.

4. Discussion

Our study revealed that IE predominates in males, hypertensive and over 50-year-old. The information collected came mostly from the central and southern zones of Chile. The clinical scenario is acute presentation with heart failure and fever, most commonly involving the aortic valve with few reports of multi-valvular disease. The most common microorganism is *Staphylococcus aureus*, especially in more contemporary records. The number of negative blood cultures remains high (34 %) which could be explained in the light of antibiotic treatment before admission, and low quality in the blood cultures technique in recent years. Surgical treatment is less common than medical treatment with the most common surgical indications being related to local valve complication and heart failure. Mortality records vary but remain high with over 20 % in-hospital mortality and 30 % global mortality.

The recent global, regional, and national burden and quality of care index of endocarditis shows that IE mortality rates has remained stable

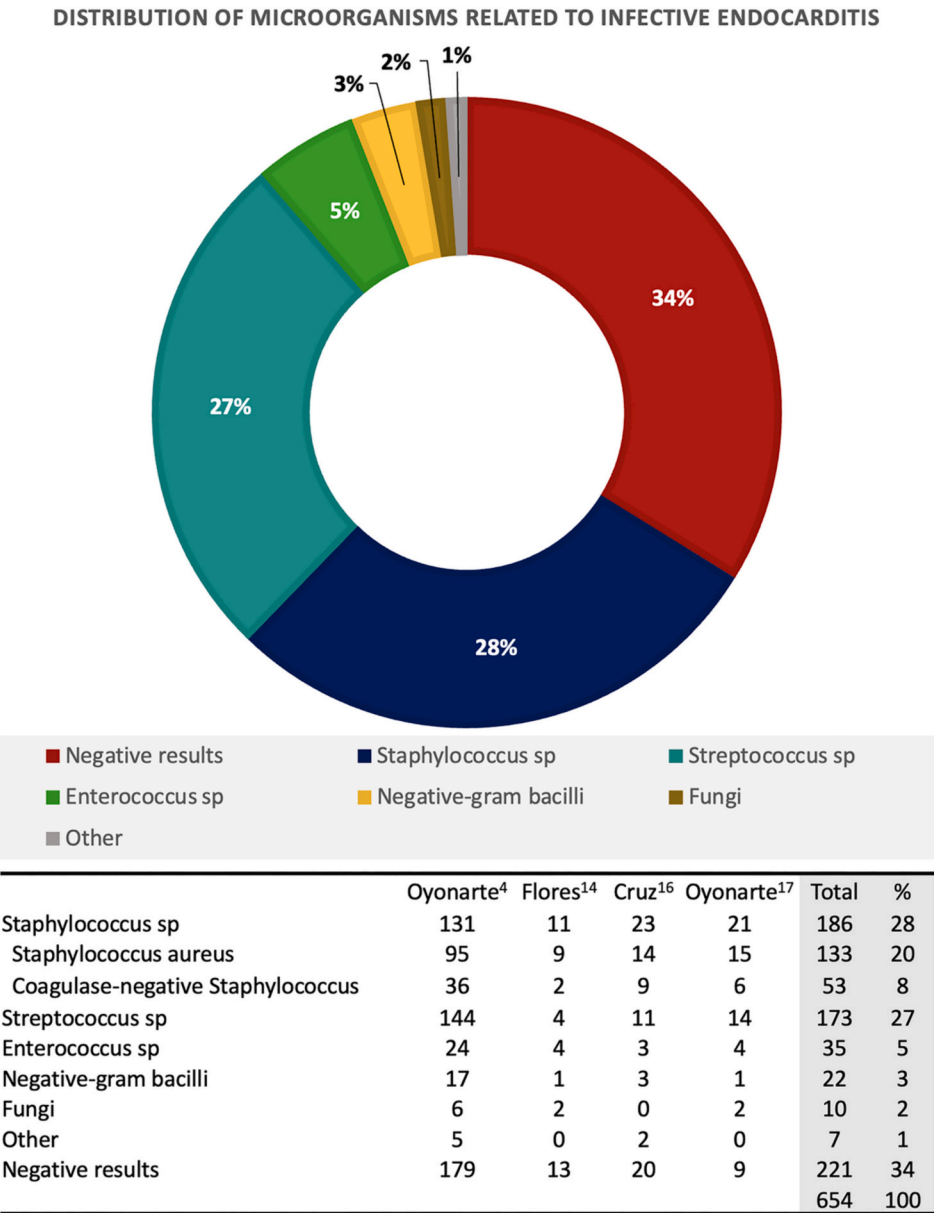


Fig. 2. Microbiological profile of IE in Chile. Combination results regarding microorganism involvement.

over the last 30 years, featuring Chile in the top 30 countries with the highest age standardized quality of care index [1,2]. The incidence has slightly increased worldwide, and in Andean Latin America it has risen from 2.51 per 10,000 in 1990 to 8.01 per 10,000 in 2019. The age-standardized incidence rate showed a fast growth in Chile with estimated annual percentage changes of 3.25 %. Unfortunately, there was no more data available about IE in Chile, but our systematic review has depicted a stable global mortality and in-hospital mortality across the registries, except in Flores et al. with up to 40 % of global mortality [1,2,5].

The international collaboration on endocarditis prospective cohort study [21], which included 4195 subjects only from European countries, showed that median age was 63.7-year-old and 69.4 % were male. IE native valve-related disease was more frequent with 68.3 %, but with progressive increases of prosthetic valve-related and device-related IE. *Staphylococcus aureus* predominated with 26.8 %. Vegetation was evident in 83.2 % of the total. In addition, 52 % underwent surgery and 19.3 % died during hospitalization. Additionally, a Latin American systematic review was published in 2022 describing most of the cases

were found in males (68.5 %) with predisposing heart condition (24.3 %) [7]. Principal clinical manifestation was fever in 83.9 %, and 36.4 % developed heart failure, with valve vegetations in echocardiogram in up to 84.3 %. IE native valve-related was more frequent (67.3 %), with principal involvement of the aortic valve. There were minimal differences between *Staphylococcus aureus* (18.6 %) and *Streptococcus viridians* (17.8 %) infection with 23.9 % negative microbiological blood results. In-hospital mortality was 25.1 %. These results are similar to ours, possibly because IE does not depend on epidemiological burden between countries.

The implication of our research provides current data of IE in Chile, allows comparisons with other international series and to extrapolate guideline recommendations. The principal advantage is displaying IE clinical data across the country over time.

Regarding our limitations, it is worth mentioning the high number of registries published only in congresses and their retrospective nature. Likewise, the sample size of every registry is not large enough and most of the subjects come from ECNEI-2. Granular data were insufficient to study and compare risk factors, valve compromise, differences between

biological and mechanical replacement, microorganisms, and more accurate analysis regarding mortality rate. Additionally, the northern zone is not represented in this review due to unreported data from this region. Comorbidities are poorly analyzed due to poor reported information in the published research. It is necessary to establish a registry collecting prospective data in order to obtain more detailed information.

5. Conclusion

This systematic review presents epidemiological and clinical aspects of infective endocarditis across Chile over time with its key characteristics being acute clinical presentation, predominance of aortic valve involvement, and *S. aureus* infection. Notably, there remains a high number of negative blood cultures and in-hospital mortality across the country. However, there is a lack of prospective registries thus reflecting the need to gather more accurate clinical data.

CRediT authorship contribution statement

César del Castillo: Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Conceptualization. **Alicia Tapia:** Validation. **Arnulfo Begazo:** Visualization. **Miguel Oyonarte:** Resources.

Funding disclosures

Nothing to declare.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

None.

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