

Evidence-Based Pharmacological Treatment for Heart Failure in Brazil

Luísa Preiss Marques da Rocha,^{1,3} Kathleen Asturian,¹ Isabel Machado Canabarro,² Lidia Einsfeld,^{1,3} Diogo Pilger¹

Universidade Federal do Rio Grande do Sul (UFRGS),¹ Porto Alegre, RS – Brazil

Universidade Federal de Santa Catarina (UFSC),² Florianópolis, SC – Brazil

Hospital de Clínicas de Porto Alegre (HCPA),³ Porto Alegre – Brazil

Abstract

Background: Heart failure (HF) affects an estimated 64 million individuals globally. Current guideline-directed medical therapy (GDMT) comprises four cornerstone pharmacological medications proven to reduce hospitalization and/or mortality: renin-angiotensin system inhibitors, beta-blockers, mineralocorticoid receptor antagonists (MRA), and sodium-glucose cotransporter 2 inhibitors (SGLT2i).

Objective: This study aimed to describe, through an exploratory analysis, access to HF drug therapy in Primary Health Care in Brazil, via the Brazilian Unified Health System (SUS).

Methods: This was a descriptive, cross-sectional study based on data extracted from Municipal Lists of Essential Medicines (REMUMEs) published on official municipalities' websites from Brazilian metropolitan regions in June 2024.

Results: A total of 387 municipalities were included, of which only 50.9% had a REMUME publicly available. Among these, 61.4% had been published within the previous 2 years. The frequency of each drug class was as follows: angiotensin-converting enzyme inhibitors in 92.4% of municipalities, angiotensin II receptor blockers in 80.2%, cardioselective beta-blockers in 91.9%, and MRAs in 85.8%. No REMUME simultaneously included all four GDMT medications. In 22.3% of the metropolitan cities, only two or fewer drug classes were available to patients' access.

Conclusion: The remarkable variability in the composition of REMUMEs, along with the frequent omission of at least one of the four essential pharmacological pillars, indicates a potential suboptimal management of HF at the population level. Given the importance of comprehensive pharmacological treatment in HF, these findings highlight ongoing challenges in access to essential medicines within the SUS, even in metropolitan areas.

Keywords: Heart Failure; Drug Therapy; Access to Essential Medicines and Health Technologies; Health Services Accessibility.

Introduction

Heart failure (HF) affects over 64 million individuals globally, with an estimated prevalence ranging from 1% to 3% of the world population.^{1,2} In Brazil, HF is the leading cause of hospitalizations among people over 65 years of age, resulting in costs of over 1.4 billion reais in hospitalizations and 77,290 deaths between 2018 and 2021.^{3,4} Morbidity and mortality rates due to HF in Brazil surpass those observed in countries with higher per capita income, and pharmacological treatment is recognized as one of the most cost-effective interventions.^{5,6}

HF management encompasses non-pharmacological strategies such as lifestyle modification, physical activity, and regular follow-up with healthcare teams, in addition to pharmacotherapy. Pharmacological treatment plays a fundamental role in improving clinical outcomes. According to the Brazilian Heart Failure Guidelines (DBIC), pharmacotherapy for HF, especially heart failure with reduced ejection fraction (HFrEF), is based on four essential pillars.^{7,8} The first pillar includes inhibitors of the renin-angiotensin system, selecting among neprilysin inhibitors and angiotensin receptor blockers (ARNI), angiotensin-converting enzyme inhibitors (ACEI), or angiotensin II receptor blockers (ARBs). The second and third are cardioselective beta-blockers and mineralocorticoid receptor antagonists (MRA). Lastly, sodium-glucose cotransporter-2 inhibitors (SGLT2i), dapagliflozin or empagliflozin, represent the fourth pillar.^{7,8}

In accordance with the Basic Component of Pharmaceutical Services, each municipality is responsible for establishing its own Municipal List of Essential Medicines (in Portuguese, *Relação Municipal de Medicamentos Especiais*, or REMUME). The list is based on the epidemiology profile of municipal

Mailing Address: Lidia Einsfeld •

Universidade Federal do Rio Grande do Sul (UFRGS), Postgraduate Program in Pharmaceutical Services and Policies, Pharmacy Faculty, São Luís Street, 150, Annex I. Postal Code: 90620-170, Porto Alegre, RS – Brazil

E-mail: l.einsfeld@gmail.com

Manuscript received February 17, 2025; revised manuscript July 28, 2025; accepted August 25, 2025.

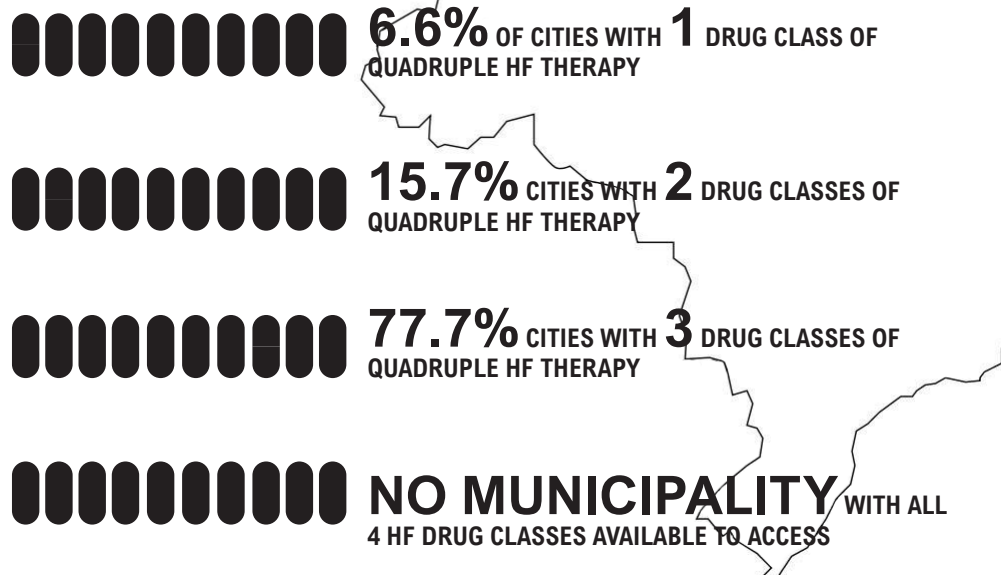
Editor responsible for the review: Ricardo Mourilhe-Rocha

DOI: <https://doi.org/10.36660/ijcs.20250058>

Central Illustration: Evidence-Based Pharmacological Treatment for Heart Failure in Brazil



HEART FAILURE 4 DRUG CLASSES AVAILABLE VIA SUS IN BRAZIL



Int J Cardiovasc Sci. 2026;39:e20250058

Graphical representation of the availability of essential medications for heart failure pharmacological therapy in the municipal lists from the federal capital, state capitals, and their respective metropolitan regions. HF: heart failure; SUS: Brazilian Unified Health System.

inhabitants, and it represents the main alternative for accessing medications in outpatient settings, according to the National Policy on Pharmaceutical Assistance of 2004.^{9,10} On the other hand, access is also possible through the Brazilian Popular Pharmacy Program (PPP), a nationwide federal program that offers access to basic medications without any individual costs, in the same manner as those provided by municipalities.¹¹ Clinical guidelines of the Brazilian Unified Health System (SUS), including the Ministry of Health's Clinical Protocols and Therapeutic Guidelines (PCDTs), define recommended treatments for various health conditions, including the most effective, safe, and cost-effective medications. REMUMEs should reflect these guidelines by listing the medications available in each municipality. The absence of essential medicines recommended by PCDTs in the REMUME for prevalent diseases suggests inadequate implementation of guidelines in practice, as the effectiveness of guidelines depends directly on access to recommended drugs.

Hence, this study aimed to describe the availability of medications for HF treatment in REMUMEs of Primary Care in Brazilian capitals and metropolitan municipalities.

Methods

This is a descriptive, cross-sectional, documental study conducted between May and June of 2024. The sample comprehended the 27 capitals of the federative units (26 states and the Federal District) and the municipalities of the 24 metropolitan regions of each capital, except for Rio Branco, Acre; Campo Grande, Mato Grosso do Sul; and Brasília, Federal District, which do not have a correspondent metropolitan region, according to the Brazilian Institute of Geography and Statistics (IBGE).^{12,13}

The following data were collected from the online REMUMEs available in the public domain: the website address, the year of list publication, and the identification of HF medications recommended by the DBIC.⁷ For data collection, a form was created using Microsoft Forms Office®.

To locate the online REMUMEs, three search strategies were used on the Google digital platform: 1) "REMUME and name of municipality"; 2) "List of medicines and name of municipality"; or 3) "Basic list and name of municipality". For municipalities where a REMUME was available, a double check was carried out by two independent researchers. A second search was performed for the REMUMEs not found

Original Article

primarily. Municipalities without accessible REMUMEs were excluded.

In addition, the availability of medications via SUS, from the PPP, and the national list of specialized drugs (in Portuguese, *Componente Especializado da Assistência Farmacêutica*, CEAF) were also assessed.

Descriptive statistics were applied using Microsoft Excel® software, and the municipalities were stratified into three groups according to the number of inhabitants: small (fewer than 25,000), medium (25,000 to 100,000), and large (more than 100,000).^{14,15}

Results

A total of 387 municipalities (27 capitals and 360 metropolitan municipalities) were analyzed, with 197 (50.9%) presenting electronically accessible REMUMEs (Table 1). Table 1 also details the availability proportion by region: lowest in the Northeast (34.2%) and highest in the South (78.8%). Most lists (61.4%; n = 121) were published within the past 2 years; 38 (19.3%) between 2020 and 2022, and 26 (13.2%) before 2020.

Table 2 describes the medications available in the REMUMEs. Lisinopril, perindopril, candesartan, and telmisartan were not found in any list (data not shown).

The overall analysis showed that no list included all four pharmacological pillars simultaneously recommended by the Brazilian guidelines. The first pillar was present in 93.4% of lists, limited to ACEI and/or ARB classes (although sacubitril-valsartan is the evidence class IA alternative in this pillar). The second and third pillars (cardioselective beta-blockers and MRAs) were present in 91.9% and 85.8% of lists, respectively. The fourth pillar, more recently included in HF pharmacological guidelines, comprising SGLT2i (dapagliflozin and empagliflozin), was absent from all analyzed lists. Coverage of the first three pillars was observed in all municipalities only when considering medication availability via CEAF and PPP; full four-pillar coverage was not achieved in any scenario.

Table 3 shows the distribution of HF drug access according to the region of the country and the size of the municipalities. The Central Illustration summarizes access to quadruple therapy for HF across the country.

Table 1 – Regional distribution of municipalities and population, and the availability of REMUMEs in the public domain.

	Municipalities included (n)	Population ¹⁵	REMUME available in the public domain n (%)	Population with electronically available REMUME / total population of the region (%)
Brazil	387	82,284,563	197 (50.9)	81.6
North	47	7,176,867	23 (48.9)	62.2
Northeast	117	19,005,260	40 (34.2)	72.6
Central-West	36	7,403,501	15 (41.7)	81.4
Southeast	102	39,762,901	52 (51.0)	86.0
South	85	8,936,034	67 (78.8)	97.4

REMUME: Municipal List of Essential Medicines.

Table 2 – Frequency of selected medications for pharmacological treatment of heart failure by region.

	Brazil (n=197)	North (n=23)	Northeast (n=40)	Central-West (n=15)	Southeast (n=52)	South (n=67)
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
ARNI*	0	0	0	0	0	0
ACEI	182 (92.4)	23 (100.0)	39 (97.5)	14 (93.3)	52 (100.0)	54 (80.6)
Enalapril**	176 (89.3)	23 (100.0)	37 (92.5)	14 (93.3)	51 (98.1)	51 (76.1)
≥ 2 different formulations	111 (56.3)	15 (65.2)	24 (60.0)	10 (66.7)	31 (59.6)	31 (46.3)
Captopril**	140 (71.1)	20 (87.0)	24 (60.0)	12 (80.0)	46 (88.5)	38 (56.4)
≥ 2 different formulations	21 (10.7)	7 (30.4)	1 (2.5)	5 (33.3)	5 (9.6)	3 (4.5)
Captopril and enalapril	134 (68.0)	20 (87.0)	22 (55.0)	12 (80.0)	45 (86.5)	35 (52.2)
Ramipril	1 (0.5)	0	0	0	0	1 (1.5)

ARB	158 (80.2)	22 (95.7)	38 (95.0)	11 (73.3)	46 (88.5)	41 (61.2)
Losartan**	157 (79.7)	22 (95.7)	38 (95.0)	10 (66.7)	46 (88.5)	41 (61.2)
≥ 2 different formulations	13 (6.6)	2 (8.7)	2 (5.0)	0	8 (15.4)	1 (1.5)
Valsartan	1 (0.5)	0	0	1 (6.7)	0	0
Cardioselective beta-blockers	181 (91.9)	21 (91.3)	35 (87.5)	11 (73.3)	50 (96.2)	64 (95.5)
Metoprolol succinate**	65 (33.0)	4 (17.4)	12 (30.0)	6 (40.0)	16 (30.8)	27 (40.3)
≥ 2 different formulations	29 (14.7)	2 (8.7)	9 (22.5)	5 (33.3)	5 (9.6)	8 (11.9)
Metoprolol tartrate	29 (14.7)	2 (8.7)	2 (5.0)	1 (6.7)	3 (5.8)	21 (31.3)
≥ 2 different formulations	1 (0.5)	0	0	0	1 (1.9)	0
Carvedilol	173 (87.8)	20 (87.0)	33 (82.5)	10 (66.7)	50 (96.2)	60 (89.6)
≥ 2 different formulations	147 (74.6)	15 (65.2)	27 (67.5)	10 (66.7)	48 (92.3)	47 (70.1)
Bisoprolol	2 (1.0)	0	1 (2.5)	1 (6.7)	0	0
Nebivolol	1 (0.5)	0	0	1 (6.7)	0	0
MRA						
Spironolactone**	169 (85.8)	19 (82.6)	33 (82.5)	10 (66.7)	51 (98.1)	56 (83.6)
≥ 2 different formulations	54 (27.4)	7 (30.4)	10 (25.0)	7 (46.7)	21 (40.4)	9 (13.4)
SGLT2i	0	0	0	0	0	0
Dapagliflozin***	0	0	0	0	0	0
Loop diuretics						
Furosemide**	178 (90.4)	21 (91.3)	39 (97.5)	14 (93.3)	51 (98.1)	53 (79.1)
Others	173 (87.8)	18 (78.3)	28 (70.0)	13 (86.7)	50 (96.2)	64 (95.5)
Hydralazine	56 (28.4)	8 (34.8)	8 (20.0)	2 (13.3)	28 (53.8)	10 (14.9)
≥ 2 different formulations	11 (5.6)	1 (4.3)	4 (10.0)	1 (6.7)	3 (5.8)	2 (3.0)
Isosorbide dinitrate	97 (49.2)	10 (43.5)	13 (32.5)	6 (40.0)	27 (51.9)	41 (61.2)
≥ 2 different formulations	14 (7.1)	1 (4.3)	3 (7.5)	0	5 (9.6)	5 (7.5)
Hydralazine + isosorbide dinitrate	38 (19.3)	6 (26.1)	5 (12.5)	2 (13.3)	17 (32.7)	8 (11.9)
Digoxin	171 (86.8)	17 (73.9)	28 (70.0)	13 (86.7)	49 (94.2)	64 (95.5)
Ivabradine	0	0	0	0	0	0

ACEI: angiotensin-converting enzyme inhibitors; ARB: angiotensin II receptor blockers; ARNI: neprilysin and angiotensin receptor inhibitors; MRA: mineralocorticoid receptor antagonists; SGLT2i: sodium-glucose cotransporter 2 inhibitors. *Sacubitril/valsartan, available through the Specialized Pharmaceutical Assistance Component (for patients with New York Heart Association class II and BNP > 150 (or NT-proBNP > 600), with a reduced ejection fraction of 35% or less, aged 75 or younger, and refractory to the best available treatment within the Unified Health System). **Medications available through the Popular Pharmacy Program. ***Medication available through the Popular Pharmacy Program (for patients over 65 years old, with a diagnosis of type 2 diabetes and cardiovascular disease) and through the Specialized Pharmaceutical Assistance Component (ICD-10: non-insulin-dependent diabetes mellitus [E11.2 to E11.9], aged 65 or older, with inadequate glycemic control despite optimized treatment, and established cardiovascular disease [previous acute myocardial infarction, previous coronary artery bypass graft surgery, prior coronary angioplasty, stable or unstable angina, previous ischemic stroke, previous transient ischemic attack, and heart failure with an ejection fraction below 40%]).

Discussion

This is the first nationwide study on the availability of pharmacological therapy for HF treatment in Primary Health Care Services through SUS in REMUMEs across the country.

The concept of an essential medicine is defined by the World Health Organization as one of the highest importance,

fundamental, and indispensable to the health needs of a population, and it should be permanently available. The decision to incorporate medications into a REMUME, when guided by the Pharmacy and Therapeutics Committee, ensures that the lists align with the population's needs, the national guidelines, and the resources available. This process follows

Original Article

Table 3 – Four pillars for heart failure treatment by municipality size.

Considering only REMUMEs n (%)				
	1 pillar	2 pillars	3 pillars	4 pillars
Brazil	13 (6.6)	31 (15.7)	153 (77.7)	0
Small size	7 (3.6)	11 (5.6)	33 (16.8)	-
Medium size	3 (1.5)	14 (7.1)	42 (21.3)	-
Large size	3 (1.5)	6 (3.0)	78 (39.6)	-
North	1 (4.3)	4 (17.4)	18 (78.3)	0
Small size	1 (4.3)	3 (13.0)	10 (43.5)	-
Medium size	0	1 (4.3)	1 (4.3)	-
Large size	0	0	7 (30.4)	-
Northeast	3 (7.5)	6 (15.0)	31 (77.5)	0
Small size	3 (7.5)	3 (7.5)	0	-
Medium size	0	1 (2.5)	13 (32.5)	-
Large size	0	2 (5.0)	18 (45.0)	-
Central-West	3 (20.0)	3 (20.0)	9 (60.0)	0
Small size	2 (13.3)	3 (20.0)	3 (20.0)	-
Medium size	1 (6.7)	0	2 (13.3)	-
Large size	0	0	4 (26.7)	-
Southeast	0	3 (5.8)	49 (94.2)	0
Small size	0	0	2 (3.8)	-
Medium size	0	2 (3.8)	13 (25.0)	-
Large size	0	1 (1.9)	34 (65.4)	-
South	6 (9.0)	15 (22.4)	46 (68.7)	0
Small size	1 (1.5)	2 (3.0)	19 (28.4)	-
Medium size	2 (3.0)	10 (14.9)	13 (19.4)	-
Large size	3 (4.5)	3 (4.5)	15 (22.4)	-

REMUME: Municipal List of Essential Medicines. Small size: up to 25,000 inhabitants; medium size: from 25,000 to 100,000 inhabitants; large size: more than 100,000 inhabitants.¹⁴

a rigorous methodology based on scientific evidence, safety, efficacy, and cost-effectiveness of the treatment.^{9,16-18}

Without drug therapy, the natural course of HF leads to a 35% mortality rate within 2 years in cases of HFrEF.² The benefit has been demonstrated in clinical trials; however, medication use remains suboptimal, with a low percentage of patients reaching target doses or using the recommended drugs contemporaneously.^{2,19} This gap may negatively impact patient outcomes, especially in regions with limited access to alternative supply modalities.

Many HFrEF treatment guidelines recommend concomitant use of a fundamental quadruple therapy: a combination of angiotensin receptor blocker/neprilysin inhibitor (or an ACEI, or an ARB), cardioselective beta-blocker, MRA, and SGLT2i.^{2,8} This combined therapy can extend life expectancy by up to

6 years compared to conventional therapy (beta-blocker plus ACEI or ARB).²⁰ Although the newest pharmacological agents (notably sacubitril-valsartan, dapagliflozin, and empagliflozin) have been tested individually in randomized controlled trials, Vaduganathan et al.²⁰ estimated their additive value when combined for HFrEF. Their study demonstrated that the use of outcome-modifying drugs (sacubitril-valsartan, beta-blockers, MRAs, and SGLT2i) has been shown to reduce the risk of cardiovascular death, HF-related mortality, and hospitalizations, thereby demonstrating their clinical efficacy. The results of this study further emphasize the importance of employing quadruple therapy, which incorporates neurohormonal modulation beyond conventional treatment and advances towards greater survival benefits when all four pillars are utilized.

Agarwal et al.⁶ demonstrated that less than half of the essential medicines lists of low- and middle-income countries included all four pharmacological classes for the treatment of HF.¹⁴ In this study, no REMUME simultaneously included all four recommended treatment pillars. In 22.3% of the lists, two or fewer therapeutic classes were identified. Most municipalities had only three of these pillars, mostly in large municipalities and mostly in the Southeast Region. In another 15.7% of municipalities, the municipal list included only two of the essential treatment pillars, mostly in medium-sized municipalities. In 13 cases (6.6%), the municipal list contained only one of these treatment pillars, mostly in small municipalities, indicating remarkable significant differences in medication availability and subsequent patient access nationwide.

The first of the four pillars refers to medications that act on the renin-angiotensin system. The proven superior therapeutic class in this first pillar is the co-crystal sacubitril-valsartan, which was not identified in any list in our study. Access to this medication through the SUS is exclusively through the CEAf and according to specific selection criteria.^{21,22} This context likely explains the result found.

If sacubitril-valsartan is not available (or if a patient is intolerant to the drug), the other therapeutic alternatives that comprise this first pillar of treatment (ACEI, ARB, and/or nitrate/hydralazine) were available in the basic health care network in 93.4% of municipalities. Vasodilation is essential for the management of patients with HF, as it reduces preload, improves organ and tissue perfusion, and alleviates symptoms. In cases where access was not available via primary care, its availability was restricted to PPP and CEAf.²² Restricted access implies delayed patient progression; only the insertion of ACEI in HF therapy can reduce mortality rates by 25% within 2 years and hospitalizations by 21%.¹⁷ Our results show the presence of ACEI in 92.4% (n = 182) of REMUMEs throughout the study, and in all municipalities in the North and Southeast Regions. Captopril and enalapril were even found in two or more presentations on the municipal list, especially in the Central-West Region, questioning the burden of purchasing logistics and distribution of medications in the preparation of REMUMEs.²¹

Losartan, an ARB used as an alternative to ACEI, was present in 79.7% of municipalities. Notably, in 13 municipalities (6.6%) of the study, no ACEI or ARBs were present. This condition limits patient access to therapy with proven benefit in HF.²¹

The combination of hydralazine and isosorbide dinitrate, an effective option for vasodilation in Black patients and/or those who cannot tolerate the use of ARNI, ACEI, or ARBs, was found in 38 municipalities (19.3%). In 27 of these (71.1%), the isosorbide dinitrate formulation is the 5 mg tablet for sublingual administration and is therefore incorporated into the REMUME for the treatment of angina, rather than HF.⁷

Beta-blockers were present in 99% of the lists. As a second pillar of HF treatment, they contribute up to 41% of the reduction in the relative risk of hospitalizations and a 16% reduction in the mortality rate, even as a monotherapy, by protecting myocardial remodeling and potentially recovering ejection fraction.¹ However, atenolol and propranolol were the

beta-blockers most frequently found in the study, and they do not represent a therapeutic choice for HF, despite their wide availability in the SUS.²³ The beta-blockers of choice are those with central myocardial activity, and the cardioselective beta-blockers with proven action in HF are carvedilol, metoprolol (succinate and tartrate), bisoprolol, and nebivolol.⁷ These were found in 91.9% of the REMUMEs surveyed. Published studies use metoprolol succinate for the treatment of HF, but the use of tartrate emerges as an alternative due to its widespread availability in the SUS, thus requiring adaptation when introducing it into therapy.²³ However, even with the adaptation of dosage and pharmaceutical formulation, approximately one tenth of municipalities still do not have beta-blockers for the treatment of HF on their lists. This finding highlights the limited accessibility of a cornerstone pharmacological agent. Cardioselective beta-blockers are crucial not only for HF management but also for other cardiovascular diseases, including post-myocardial infarction and ischemic events, with significant potential implications for clinical outcomes in the Brazilian population.

The use of MRAs (spironolactone, eplerenone) as a third pillar is essential. In clinical studies, patients with HFrEF using this drug class had their mortality reduced to 16% over 2 years. Spironolactone was found in only 85.8% (169) of lists and was the only MRA presented in REMUMEs. Eplerenone was not found, probably because of its recent registration at the National Health Surveillance Agency (2022), and it has not been incorporated into the SUS.²⁴

Finally, SGLT2i (dapagliflozin and empagliflozin) constitute the fourth pillar of treatment for patients with HF.¹⁷ They represent the most recent benefit for patients with HF, with a 31% reduction in the relative risk of hospitalizations and a 10% reduction in the mortality rate. Their benefits have already been proven in patients with HF, regardless of whether they have diabetes mellitus type 2 (DM2). In Brazil, this therapeutic option was only approved in the second half of 2024. Therefore, dapagliflozin and empagliflozin were not found in the lists analyzed. At the time of this writing, the PCDT for HF²² had not yet included SGLT2i as a therapeutic alternative. Access to dapagliflozin via the SUS is exclusively through the CEAf, according to the requirements established by the PCDT for DM2, and not for HF.²³

The HF protocol treatment by SUS²² has not yet included SGLT2i as a therapeutic alternative. Its use represents the most recent benefit for patients with HF, with a relative risk reduction of 31% in hospitalizations and a decrease of 10% in the mortality rate. Its benefits have already been proven in patients with HF, regardless of DM2 status. In Brazil, this therapeutic option was only approved in the second semester of 2024.

Although dapagliflozin is included in the PPP, even in this alternative to access, this does not extend to all patients with HF; it is available exclusively to patients with concomitant cardiovascular disease and DM2 aged over 65 years, and subject to copayment.^{25,26} According to the Chamber for Regulation of the Medicine Market, the maximum consumer price for dapagliflozin in Brazil ranges from 120 to 160 BRL (2024 values),²⁷ which imposes financial and social barriers to access.

In the present study, findings on furosemide are also crucial. Although the loop diuretic is not part of quadruple therapy in HFrEF, it is the cornerstone for congestion management, in both inpatient and outpatient settings. Furosemide remains essential to avoid admissions due to decompensation, the leading cause of HF hospitalizations. It is the only loop diuretic available within the Brazilian health system and was not found in almost a tenth of the sample (9.64% of the cities). The omission of furosemide from municipal lists restricts patient access to the PPP or payment purchases. Given Brazil's vast territory and the voluntary registration of commercial pharmacies in the program, the PPP is not always a feasible option, especially for many patients in remote areas, due to geographic and logistical constraints.

It is important to emphasize that while quadruple therapy has strong evidence supporting its use in HFrEF, other HF phenotypes—such as heart failure with preserved ejection fraction (HFpEF) or mildly reduced ejection fraction—have distinct therapeutic recommendations (for example, dapagliflozin for HFpEF). Nonetheless, pharmacological treatment across the HF spectrum frequently involves agents included in quadruple therapy, further underscoring the necessity of ensuring access to these medications through the SUS.

Study limitations

The unavailability of REMUMEs on the official websites of municipal governments or health departments constitutes a limitation of this study. However, it also represents a significant finding, reflecting the difficulty of accessing these lists even by prescribing physicians. Federal Law No. 14,654 of 2023 mandates the online publication not only of medication lists but also of the stock levels of medicines in pharmacies that are part of SUS.²⁸

Furthermore, analyses were performed solely on official medication lists, not on the actual physical stock available in each municipality. Therefore, this research aimed to analyze the selection of medications on these lists, rather than actual patient access.

Conclusion

The municipal lists analyzed showed significant variability among medications provided and revealed a complex and challenging landscape to the availability of essential HF drugs in Brazilian municipalities. The regional disparities highlight deficiencies in the implementation of guaranteed access to medications for the population, emphasizing that only three pillars of HF pharmacological treatment were available when considering the addition of CEAF and PPP.

References

1. Bueno H, Moura B, Lancellotti P, Bauersachs J. The Year in Cardiovascular Medicine 2020: Heart Failure and Cardiomyopathies. *Eur Heart J*. 2021;42(6):657-70. doi: 10.1093/eurheartj/ehaa1061.
2. Bozkurt B, Ahmad T, Alexander KM, Baker WL, Bosak K, Breathett K, et al. Heart Failure Epidemiology and Outcomes Statistics: A Report of the

In light of the challenges encountered, it is crucial to implement effective strategies to improve the availability of these essential medicines: ensuring patients' quality of life, reducing readmissions and healthcare costs, and finally reaching better HF outcomes in Brazil, ensure patients' quality of life, and reduce healthcare costs related to readmissions of those affected by cardiovascular diseases.

Author Contributions

Conception and design of the research: Einsfeld L, Pilger D. Acquisition of data: Rocha LPM, Asturian K, Canabarro I, Einsfeld L, Pilger D. Analysis and interpretation of the data: Rocha LPM, Einsfeld L, Pilger D. Statistical analysis: Rocha LPM, Einsfeld L, Pilger D. Writing of the manuscript: Rocha LPM. Critical revision of the manuscript for intellectual content: Einsfeld L, Pilger D.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Sources of Funding

There were no external funding sources for this study.

Study Association

This study is linked to the undergraduate thesis in Bachelor of Pharmacy degree at the Federal University of Rio Grande do Sul (UFRGS) and to the Drug Utilization Study Design course from the Postgraduate Program in Pharmaceutical Services and Policies at UFRGS.

Ethics Approval and Consent to Participate

This article does not contain any studies with human participants or animals performed by any of the authors.

Use of Artificial Intelligence

The authors did not use any artificial intelligence tools in the development of this work.

Availability of Research Data

All datasets supporting the results of this study are available upon request from the corresponding author: Lidia Einsfeld.

- Heart Failure Society of America. *J Card Fail*. 2023;29(10):1412-51. doi: 10.1016/j.cardfail.2023.07.006.
3. Albuquerque DC, Souza JD Neto, Bacal F, Rohde LE, Bernardes-Pereira S, Berwanger O, et al. I Brazilian Registry of Heart Failure - Clinical Aspects, Care Quality and Hospitalization Outcomes. *Arq Bras Cardiol*. 2015;104(6):433-42. doi: 10.5935/abc.20150031.

4. Souza M, Nascimento L, Kozlowsky I, Farjun B, França K, Kuriyama S, et al. Impacts of Heart Failure on the Brazilian Health and Pension System: What is the Cost of the Disease? *J Bras Econ Saúde*. 2022;14(2):149-61. doi: 10.21115/JBES.v14.n2.p149-61.
5. Cestari VRF, Garces TS, Sousa GJB, Maranhão TA, Souza JD Neto, Pereira MLD, et al. Spatial Distribution of Mortality for Heart Failure in Brazil, 1996-2017. *Arq Bras Cardiol*. 2022;118(1):41-51. doi: 10.36660/abc.20201325.
6. Agarwal A, Husain MJ, Datta B, Kishore SP, Huffman MD. Access to Heart Failure Medicines in Low- and Middle-Income Countries: An Analysis of Essential Medicines Lists, Availability, Price, and Affordability. *Circ Heart Fail*. 2022;15(4):e008971. doi: 10.1161/CIRCHEARTFAILURE.121.008971.
7. Rohde LEP, Montera MW, Bocchi EA, Clausell NO, Albuquerque DC, Rassi S, et al. Diretriz Brasileira de Insuficiência Cardíaca Crônica e Aguda. *Arq Bras Cardiol*. 2018;111(3):436-539. doi: 10.5935/abc.20180190.
8. Marcondes-Braga FG, Moura LAZ, Issa VS, Vieira JL, Rohde LE, Simões MV, et al. Emerging Topics Update of the Brazilian Heart Failure Guideline - 2021. *Arq Bras Cardiol*. 2021;116(6):1174-212. doi: 10.36660/abc.20210367.
9. Brasil. Ministério da Saúde. Secretaria de Ciência, Tecnologia, Inovação e Insumos Estratégicos em Saúde. Departamento de Assistência Farmacêutica e Insumos Estratégicos. Relação Nacional de Medicamentos Essenciais: Renome 2022 [Internet]. Brasília: Ministério da Saúde; 2022 [cited 2025 Nov 07]. Available from: <https://www.conass.org.br/wp-content/uploads/2022/01/RENAME-2022.pdf>.
10. Brasil. Ministério da Saúde. Conselho Nacional de Saúde. Resolução nº 338, de 6 de maio de 2004. Aprova a Política Nacional de Assistência Farmacêutica [Internet]. Brasília: Ministério da Saúde; 2004 [cited 2025 Nov 07]. Available from: https://bvsms.saude.gov.br/bvs/saudelegis/cns/2004/res0338_06_05_2004.html.
11. Brasil. Ministério da Saúde. Fundação Oswaldo Cruz. Programa Farmácia Popular do Brasil: Manual Básico. Brasília: Ministério da Saúde; 2005.
12. Instituto Brasileiro de Geografia e Estatística. Recortes Metropolitanos e Aglomerações Urbanas [Internet]. Rio de Janeiro: IBGE; 2023 [cited 2025 Nov 07]. Available from: <https://www.ibge.gov.br/geociencias/organizacao-do-territorio/estrutura-territorial/18354-regioes-metropolitanas-aglomeracoes-urbanas-e-regioes-integradas-de-desenvolvimento.html>.
13. Instituto Brasileiro de Geografia e Estatística. Regiões Metropolitanas, Regiões Integradas de Desenvolvimento e aglomerações Urbanas: Nota Técnica 01/2022 [Internet]. Rio de Janeiro: IBGE; 2022 [cited 2025 Nov 07]. Available from: <https://biblioteca.ibge.gov.br/visualizacao/livros/liv101958.pdf>.
14. Calvo MC, Lacerda JT, Colussi CF, Schneider IJ, Rocha TA. Municipalities Stratification for Health Performance Evaluation. *Epidemiol Serv Saude*. 2016;25(4):767-76. doi: 10.5123/S1679-49742016000400010.
15. Instituto Brasileiro de Geografia e Estatística. Censo Demográfico 2022 [Internet]. Rio de Janeiro: IBGE; 2024 [cited 2025 Nov 07]. Available from: <https://censo2022.ibge.gov.br/>.
16. World Health Organization. The Selection and Use of Essential Medicines: Report of the 12th WHO Expert Committee [Internet]. Geneva: World Health Organization; 2002 [cited 2025 Nov 07]. Available from: <https://apps.who.int/iris/handle/10665/42497>.
17. Organização Mundial da Saúde. Guia para a Elaboração de Listas de Medicamentos Essenciais [Internet]. Genebra: Organização Mundial da Saúde; 2002 [cited 2025 Nov 07]. Available from: <https://www.who.int/publications/i/item/9241546067>.
18. Jesus JMP, Santos EM, Barroso NP, Silva ML, Silva DR. The Importance of the Implementation of the Pharmacy and Therapeutic Commission in a Regional Hospital in the Alto-Sertão Paraibano. *Res Soc Dev*. 2022;11(4):e41811427494. doi: 10.33448/rsd-v11i4.27494.
19. Savarese G, Kishi T, Vardeny O, Eryd SA, Bodegård J, Lund LH, et al. Heart Failure Drug Treatment-Inertia, Titration, and Discontinuation: A Multinational Observational Study (EVOLUTION HF). *JACC Heart Fail*. 2023;11(1):1-14. doi: 10.1016/j.jchf.2022.08.009.
20. Vaduganathan M, Claggett BL, Jhund PS, Cunningham JW, Ferreira JP, Zannad F, et al. Estimating Lifetime Benefits of Comprehensive Disease-Modifying Pharmacological Therapies in Patients with Heart Failure with Reduced Ejection Fraction: A Comparative Analysis of Three Randomised Controlled Trials. *Lancet*. 2020;396(10244):121-8. doi: 10.1016/S0140-6736(20)30748-0.
21. Conselho Nacional de Secretarias Municipais de Saúde. Guia de Orientação Técnica aos Gestores Municipais de Saúde Quanto à Seleção e Aquisição de Medicamentos para a Atenção Básica: Análise da Relação Municipal de Medicamentos do Componente Básico da Assistência Farmacêutica e Processos de Aquisição Praticados pelos Municípios Brasileiros em 2018: Caderno 6 [Internet]. Brasília: Conselho Nacional de Secretarias Municipais de Saúde; 2022 [cited 2025 Nov 07]. Available from: <https://www.conasems.org.br/wp-content/uploads/2022/06/Caderno-6-Diagnostico-da-Assistencia-Farmacutica.pdf>.
22. Brasil. Ministério da Saúde. Diretrizes Brasileiras para Diagnóstico e Tratamento da Insuficiência Cardíaca com Fração de Ejeção Reduzida. Brasília: Ministério da Saúde; 2020.
23. Einsfeld L, Pilger D, Roman C. Evidence Based Treatment of Heart Failure: Challenges of Drug Access. *ABC Heart Fail Cardiomyop*. 2023;3(3):e20230049. doi: 10.36660/abchf.20230049.
24. Brasil. Agência Nacional de Vigilância Sanitária (ANVISA). Inspra® (Eplerenona): Novo Registro [Internet]. Brasília: ANVISA; 2024 [cited 2025 Nov 07]. Available from: <https://www.gov.br/anvisa/pt-br/assuntos/medicamentos/novos-medicamentos-e-indicacoes/inspra-r-eplerenona-novo-registro>.
25. Brasil. Ministério da Saúde. Secretaria de Ciência, Tecnologia, Inovação e Insumos Estratégicos. Portaria SCTIE/MS nº 54, de 11 de novembro de 2020. Aprova o Protocolo Clínico e Diretrizes Terapêuticas do Diabetes Mellitus tipo 2 [Internet]. Brasília: Ministério da Saúde; 2020 [cited 2025 Nov 07]. Available from: https://www.gov.br/conitec/pt-br/midias/protocolos/20201113_pcdt_diabete_melito_tipo_2_29_10_2020_final.pdf.
26. Brasil. Ministério da Saúde. Programa Farmácia Popular do Brasil. Lista de medicamentos do Programa Farmácia Popular do Brasil [Internet]. Brasília: Ministério da Saúde; 2023 [cited 2025 Nov 07]. Available from: <https://www.gov.br/saude/pt-br/composicao/sectis/da/farmacia-popular/codigos-de-barras/lista-de-medicamentos-pfppb>.
27. Brasil. Agência Nacional de Vigilância Sanitária. Câmara de Regulação do Mercado de Medicamentos (CMED): Listas de Preços [Internet]. Brasília: ANVISA; 2024 [cited 2025 Nov 07]. Available from: <https://www.gov.br/anvisa/pt-br/assuntos/medicamentos/cmed/precos/capa-listas-de-precos>.
28. Brasil. Lei nº 14.654, de 23 de agosto de 2023. Acrescenta Dispositivo à Lei nº 8.080, de 19 de setembro de 1990, para tornar Obrigatória a Divulgação dos Estoques dos Medicamentos das Farmácias que Compõem o Sistema Único de Saúde (SUS) [Internet]. Diário Oficial da União, 2023 Aug 24 [cited 2025 Nov 07]. Available from: <https://www.in.gov.br/en/web/dou/-/lei-n-14.654-de-23-de-agosto-de-2023-506413147>.

