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Patterns of guideline directed medical therapy (GDMT) in congestive heart failure patients at RSUD. Raden Mattaher Jambi

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Abstract

Background: Congestive heart failure (CHF) is a condition with a high mortality rate and a significant economic burden, requiring comprehensive and systematic therapeutic management. Guideline-Directed Medical Therapy (GDMT) recommends four pillars of therapy for patients with heart failure with reduced left ventricular ejection fraction: renin-angiotensin-aldosterone system (RAAS) inhibitors, beta-blockers, mineralocorticoid receptor antagonists (MRAs), and SGLT2 inhibitors, with diuretics used in certain conditions. **Objective:** This study aims to obtain a pattern of Guideline-Directed Medical Therapy (GDMT) in congestive heart failure patients at RSUD.Raden Matther Jamb **Methods:** This retrospective observational study describes the pattern of GDMT use in congestive heart failure patients at RSUD.Raden Matther Jambi during January–July 2025. **Results:** The results show that from 99 congestive heart failure patients, 70% received bisoprolol (beta-blocker), 34% received RAAS inhibitors (ACEi/ARB), and 4% received ARNI. MRAs were used by 27% of patients, and SGLT2 inhibitor use was not found. **Conclusion:** These findings indicate barriers to GDMT implementation related to healthcare financing policies, limited access to generic and innovator drugs, and patient adherence to therapeutic regimens.

Keywords: Congestive Heart Failure (CHF); Guideline-Directed Medical Therapy (GDMT); Drug Utilization Pattern; Beta-Blocker; Renin-Angiotensin-Aldosteron System (RAAS) Inhibitor; Mineralocorticoid Receptor Antagonists (MRA); Sodium-Glucose Cotransporter-2 Inhibitors (SGLT2i)

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INTRODUCTION

Heart failure is a clinical syndrome characterized by a collection of signs and symptoms resulting from abnormalities in the structure and/or function of the heart, resulting in hemodynamic disturbances that are often accompanied by increased levels of natriuretic peptides and objective evidence of pulmonary or systemic congestion (1). The burden of this disease is increasing rapidly globally, with estimates indicating approximately 56.5 million cases in 2021, a jump from 25.4 million in 1990, reflecting an upward trend in incidence over the past three decades (2).

In Indonesia, the prevalence of heart disease in the population aged >15 years is reported to reach 9.2%, while hospital data shows a large proportion of heart failure patients are associated with ischemic heart disease and hypertension, for example, a report at Dr. Sardjito Hospital, which recorded 40.2% of cases related to these etiologies (3,4). At the regional level, the national health survey (Riskesdas, 2018) recorded a prevalence of heart disease in Jambi Province of around 0.9%, indicating a local burden. However, the absolute figure is smaller than the national exposure. Heart failure has broad clinical and social implications, with repeated hospitalizations associated with a decreased prognosis and a reduced quality of life for patients, ranging from physical function limitations to emotional and psychosocial disorders (5–7). In addition to the clinical impact, this condition also places a significant economic burden, particularly in low- and middle-income countries, facing increasing prevalence in the elderly population (8).

Guideline-Directed Medical Therapy (GDMT) is an evidence-based therapeutic framework essential for the management of congestive heart failure (CHF), aimed at improving clinical outcomes and reducing readmissions. GDMT incorporates standardized pharmacological interventions to ensure patients receive optimal regimens based on the latest evidence, encompassing four main classes of medications: renin-angiotensin-aldosterone system (RAAS) inhibitors, beta-blockers, mineralocorticoid receptor antagonists (MRAs), and SGLT2 inhibitors (9). Implementation of these guidelines is tailored to disease classification and severity so that therapy titration and combination can be individualized to maximize hemodynamic and prognostic benefits. Consistent implementation of GDMT contributes to reduced mortality and readmission risk (10,11). However, the effectiveness of GDMT in clinical practice is often limited by patient barriers, including healthcare financing policies, access to generic or innovator drugs, and the level of patient adherence to therapeutic regimens (12).

RSUD.Raden Matther Jambi is an advanced facility and regional referral hospital in Jambi Province that treats patients with high clinical complexity, including heart disease and heart failure requiring comprehensive cardiology evaluation, intensive intervention, and synergistic outpatient follow-up. As a referral center, clinical practice patterns and therapeutic decisions at this hospital reflect the challenges of implementing evidence-based guidelines in a diverse population. Based on this context, this study aims to obtain a pattern of Guideline-Directed Medical Therapy (GDMT) in congestive heart failure patients at RSUD.Raden Matther Jambi, focusing on the level of implementation of GDMT core components, namely renin-angiotensin-aldosterone system (RAAS) inhibitors, beta-blockers, mineralocorticoid receptor antagonists (MRAs), and SGLT2 inhibitors. Research on GDMT administration patterns at this institution is still limited and underexplored. This study is expected to provide baseline data that can form the basis for provincial health policy recommendations to optimize clinical management and reduce the clinical and economic burden caused by heart failure.

METHODS

Study design and setting

This study is a retrospective observational study with a descriptive approach conducted at RSUD.Raden Matther Jambi. The data source was the medical records of patients undergoing treatment at the hospital between January and July 2025, which were systematically analyzed according to the GDMT.

Population, samples and sampling

The population of this study consisted of all adult and geriatric patients (≥18 years) diagnosed with congestive heart failure (CHF) and treated at RSUD.Raden Matther Jambi during January–July 2025. The sample was taken using a consecutive sampling approach, including all patients who met the inclusion criteria, namely: (1) aged ≥18 years at the time of hospitalization, and (2) having a diagnosis of congestive heart failure as a primary or secondary diagnosis. Exclusion criteria included medical records that could not be traced and incomplete medical records, especially in the treatment notes section, so that the data were inadequate for analysis. Data that met the criteria were then analyzed descriptively.

Instruments and criteria

The research instrument consisted of a data collection form designed to record patient information, including characteristics patient (age, gender, and length of hospitalization), comorbidity history (hypertension, diabetes mellitus, kidney disease, ischemic heart disease, and other comorbid conditions), and patient therapy documentation, including medication name, dose, route of administration, frequency, and duration. This form was used to standardize the data collection process from medical records so that descriptive analysis could be performed.

Procedure and data collection

This study began with a preparatory stage, which involved applying for a research permit from RSUD.Raden Matther Jambi to obtain access to medical records. After obtaining the permit, data collection was carried out using a pre-designed data collection form. All data obtained were then compiled, selected according to inclusion criteria, and categorized based on medications included in the Guideline-Directed Medical Therapy (GDMT) scheme. Non-GDMT medications were further classified according to their pharmacological groups for descriptive analysis and therapy pattern mapping purposes.

Statistical analysis

The analysis of Guideline-Directed Medical Therapy (GDMT) implementation patterns in heart failure patients at RSUD.Raden Matther Jambi was conducted descriptively and presented in tabular form for ease of interpretation. The tabular presentation includes a summary of the frequency and distribution of use of each GDMT component as well as a classification by pharmacological group.

Ethical concideration

This research was conducted after obtaining approval from the research permit of the Faculty of Medicine and Health Sciences, Universitas Jambi and the ethics commission of RSUD. Raden Mather Jambi Hospital.

RESULTS

A total of 120 medical records of patients diagnosed with congestive heart failure, either as a primary or secondary diagnosis (ICD-10 code I50.9), were collected for the period January–July 2025. After applying the inclusion and exclusion criteria, 99 medical records (82.5%) met the inclusion criteria, while 21 medical records (17.5%) could not be traced or had incomplete treatment records. The characteristics of patients who met the criteria are presented in Table 1; the majority were aged 18–≤65 years (74%), while 26 patients (26%) were aged >65 years.

Table 1. Characteristic data of congestive heart failure patients

Patient characteristics	Total (N=99)
Age	
18 - ≤65 years	73 (74%)
> 65 years	26 (26%)
Gender	
Male	71 (72%)
Female	28 (28%)
Length of Hospitalization	
≤ 7 days	89 (90%)
> 7 days	10 (10%)
Comorbidities	
Coronary Artery Disease	58 (59%)
Type II Diabetes Mellitus	21 (21%)
Atrial Fibrillation	7 (7%)
Kidney Function	4 (4%)
Hyperthyroidism	3 (3%)
Chronic Obstructive Pulmonary Disease	2 (2%)

The majority of patients were male (72%), while 28 patients (28%) were female. This proportion may be due to the increasing risk of heart failure with age and the higher prevalence of multimorbidity in the male population compared to women (13). Most had short hospitalizations of ≤7 days (90%), while 10 patients (10%) were hospitalized for more than 7 days. The most frequently recorded comorbidity was coronary artery disease in 58 patients (59%), followed by type II diabetes mellitus in 21 patients (21%). Atrial fibrillation was recorded in 7 patients (7%), renal dysfunction in 4 patients (4%), hyperthyroidism in 3 patients (3%), and chronic obstructive pulmonary disease in 2 patients (2%). Some patients had more than one comorbidity. The combination of congestive heart failure and diabetes mellitus is known to increase the risk of mortality and the frequency of hospitalizations (14). The presence of various comorbidities in patients with congestive heart failure requires comprehensive therapeutic management to prevent complications resulting from polypharmacy and drug interactions (15)

A review of 99 medical records was conducted to assess the implementation of guideline-directed medical therapy (GDMT) in patients with congestive heart failure. The therapies analyzed included renin–angiotensin-aldosteron system (RAAS) inhibitors, β-blockers (BB), mineralocorticoid receptor antagonists (MRAs), sodium-glucose cotransporter-2 inhibitors (SGLT2i), and diuretics in patients where indicated. Details of the use of each drug class are presented in Table 2.

Table 2. Patterns of GDMT use in patients with congestive heart failure

Therapy	Total	Frequency (%)
Renin-Angiotensin-Aldosteron System Inhibitors		
Angiotensin-Converting Enzyme Inhibitor		
Ramipril	27	27%
Captopril	2	2%
Imidapril	1	1%
Ramipril		
Angiotensin II Receptor Blockers (ARBs)	20	20%
Candesartan		
Angiotensin Receptor/Neprilysin Inhibitor Sacubitril-valsartan	4	4%
Mineralocorticoid Receptor Antagonists		
Spironolactone	27	27%
ß-Blocker (BB)		
Bisoprolol	70	70%
Carvedilol	1	1%
Sodium-Glucose Cotransporter-2 Inhibitors	0	0%
Diuretik		
Loop-Diuretic		
Furosemid	86	87%
Diuretic-Thiazid		
Hidroklortiazid	6	6%

RAAs therapy was relatively limited, identified in 54 of 99 patients (54%), with ACE inhibitors (55.6%), ARBs (37.0%), and ARNIs (7.4%). Beta-blockers were the most frequently prescribed medication class, with bisoprolol recorded in 70 patients (70%) and carvedilol in 1 patient (1%), resulting in the majority of patients receiving at least one beta-blocking agent. Mineralocorticoid receptor antagonists (spironolactone) were administered in 27 patients (27%), while no SGLT2 inhibitors were administered during the study period (0%). Loop diuretics were predominant in clinical practice, particularly furosemide (87%), while thiazide diuretics were reported in 6 patients (6%), reflecting the management focus on congestion control and symptomatic treatment. Complex comorbidities in patients with congestive heart failure lead to complex medication requirements; as a result, many patients receive polypharmacy (>5 medications)(16). This reflects the fact that congestive heart failure is not a single disease, but rather the end-point manifestation of multiple, interconnected medical conditions, requiring a multimodal therapeutic approach (17). The pattern of other drug use in this patient has been classified according to drug class and is presented in Table 3.

Table 3. Other medication use patterns in congestive heart failure patients

Supportive therapy	Total	Frequency (%)
Antiplatelet		
Aspilet	77	78%
Clopidogrel	76	77%
Ticagrelor	4	4%
Antihyperlipidemia		
Atorvastatin	69	67%
Simvastatin	15	15%
Fenofibrate	5	5%

Anticoagulants		
Fondaparinux	40	40%
Enoxaparin	9	9%
Warfarin	7	7%
Other antihypertensives		
Amlodipine	9	9%
Cardiac Glycosides		
Digoxin	12	12%
Analgesics		
Diclofenac Sodium	4	4%
Pethidine	3	3%
Meloxicam	2	2%
Ketorolac	1	1%
Tramadol	1	1%
Antihyperglycemic		
Insulin Aspart	15	15%
Insulin Glargine	12	12%
Insulin Detemir	4	4%
Metformin	10	10%
Glimepiride	6	6%
Glyquidone	2	2%

Commonly used supportive medications in the 99 patients included antiplatelet agents; aspirin (aspilet) was recorded in 77 patients (78%), and clopidogrel in 4 patients (4%). Lipid-lowering therapy was predominantly atorvastatin (67%), while simvastatin and fenofibrate were recorded in 15 (15%) and 5 (5%) patients, respectively. For anticoagulation, fondaparinux was administered in 40 patients (40%), enoxaparin in 9 patients (9%), and warfarin in 7 patients (7%). Digoxin was recorded in 12 patients (12%).

Diabetes mellitus significantly contributes to the development of congestive heart failure, particularly in patients with poor glucose control. Insulin resistance and endothelial dysfunction in diabetes lead to impaired vasodilation and increased vascular stiffness, exacerbating the risk of heart failure (18). In patients with comorbid DM, therapies to control hyperglycemia included various insulin regimens, including insulin aspart (15%), insulin glargine (12%), and insulin detemir (4%), as well as oral hypoglycemic agents, namely metformin (10%), glimepiride (6%), and glycidone (2%). In general, many patients received a combination of several agents (multi-therapy) for glycemic control.

DISCUSSION

This study presents a descriptive overview of the implementation of Guideline-Directed Medical Therapy (GDMT) in patients with congestive heart failure at RSUD.Raden Matther Jambi. The main results show a predominance of β-blocker administration, while the use of renin–angiotensin-aldosteron system (RAAS) inhibitors and mineralocorticoid receptor antagonists (MRAs) was relatively low, and SGLT2 inhibitors were almost absent during the study period. These findings are consistent with data from the United States, which reported the proportion of β-blocker use at 89%, RAAs inhibitor at 65%, and MRA at 50%. In addition to the four pillars of GDMT, the majority of patients (87%) received diuretic therapy, primarily loop diuretics (furosemide) (19).

The high use of beta-blockers (70%) is consistent with treatment recommendations for HFrEF patients and HFmEF; these drugs should be prescribed to all patients unless contraindicated or intolerant. Agents such as bisoprolol, carvedilol, and metoprolol SR have been shown to increase left ventricular ejection fraction (LVEF), reduce heart failure symptoms, and improve clinical status (20). Beta-blockers are beneficial in patients with or without coronary artery disease (CAD), in those with diabetes, in the elderly, and in women; they should be started at a low dose and titrated to the optimal dose. However, beta-blocker use does not replace the need for other combination therapies that have been shown to reduce mortality, such as renin–angiotensin-aldosteron system (RAAS) inhibitors (9).

Renin–angiotensin-aldosteron system (RAAS) inhibitors are recommended as part of GDMT to reduce morbidity and mortality in HFrEF and HfmEF patients, with ACE inhibitors as the first-line option in patients intolerant to ACEi, and switching to ARNIs may be considered. ARNI administration has been reported to reduce levels of the prognostic biomarker NT-proBNP and improve left ventricular remodeling parameters (21). Angiotensin receptor blockers (ARBs) can be used as an alternative in patients who are intolerant to ACE inhibitors or if ARNIs are contraindicated, for example, in patients with a history of angioedema. Switching therapy between ACE inhibitors and ARNIs should not be done immediately; a gap of at least 36 hours is required to reduce the risk of angioedema (9).

Mineralocorticoid receptor antagonists (MRAs), or aldosterone antagonists, are an important component of GDMT therapy that has been shown to reduce mortality, reduce hospitalizations for heart failure, and suppress the incidence of sudden cardiac death (22). MRAs (e.g., spironolactone) should be administered with caution or avoided in patients with severe renal dysfunction (eGFR ≤ 30 mL/min/1.73 m^2) or hyperkalemia (serum potassium ≥ 5.0 mEq/L), as these conditions are contraindicated. In practice, therapy can be initiated at a low initial dose, typically 25 mg once daily, with dose review and titration after approximately one month, with regular monitoring of renal function and serum potassium levels (9)

SGLT2 inhibitors have been shown to reduce the risk of hospitalization for congestive heart failure through a cardioprotective mechanism, so the benefits are present in both patients with and without type 2 diabetes mellitus (9). The absence of these agents in some studies or clinical practice indicates significant implementation barriers, including limited availability in hospital formularies, cost and access constraints to high-priced medications, and concerns about side effects in patients with renal comorbidities, all of which may limit the adoption of these therapies in the heart failure population (23).

Polypharmacy in heart failure patients with comorbidities such as coronary artery disease, diabetes, and thromboembolism creates a heavy therapeutic burden. It is associated with a high incidence of adverse clinical outcomes (24). The prevalence of polypharmacy in this group is high. It often increases the risk of drug interactions, medication burden, and side effects, which can hinder titration and optimization of GDMT therapy. Therefore, HF management requires a coordinated multidisciplinary approach. The role of clinical pharmacists in selective deprescribing, regimen optimization, and patient education is crucial to reduce risk, increase adherence, and improve safety and clinical outcomes (25).

CONCLUSIONS

An analysis of treatment practices for congestive heart failure patients at RSUD.Raden Matther Jambi revealed a predominance of beta-blockers, followed by RAAS

inhibitors and mineralocorticoid antagonists (MRAs), with the majority of patients receiving diuretic therapy. In contrast, the use of SGLT2 inhibitors was not identified. This discrepancy between evidence-based guidelines and clinical practice is likely influenced by patient clinical factors (e.g., contraindications, comorbidities), documentation limitations, availability in formularies, and cost barriers associated with patient health insurance schemes. Given the clinical evidence supporting the benefits of GDMT therapy, integrated interventions, formulary optimization, and strengthening the role of multidisciplinary teams (including clinical pharmacists) are needed to improve the quality of care and patient clinical outcomes.

CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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DECLARATION OF ARTIFICIAL INTELLIGENCE USE

We hereby confirm that no artificial intelligence (AI) tools or methodologies were utilized at any stage of this study, including during data collection, analysis, visualization or manuscript preparation. All work presented in this study was conducted manually by the authors without the assistance of AI-based tools or systems.

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