Clinical Audit

A prospective observational study on the prescription of Guideline directed medical treatment (GDMT) at heart failure at Kauvery heart city

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Citation: Suryaprabha D , Shirlin M.S , R Vignesh , Madhumitha B . A prospective observational study on the prescription of guideline directed medical treatment (GDMT) at heart failure at Kauvery heart city. Kauverian Med J. 2026;3(8):6—15.

Academic Editor: Dr. Venkita S. Suresh

ISSN: 2584-1572 (Online)

Abstract

Background: Heart failure (HF) is a debilitating clinical syndrome characterized by significant morbidity, high mortality rates, and a substantial burden on healthcare resources worldwide. Despite major advancements in therapeutic strategies, HF remains a leading cause of cardiovascular-related related morbidity and mortality, largely due to what The Lancet calls ' Global apathy to heart failure'. If we are to succeed in lowering that morbidity and mortality and improve the quality of life of patients, we need to recognize Heart Failure at the earliest and respond. We also need to recognize the circumstances where heart failure is predictable and take steps to prevent it. Therefore, we have revisited the definition and classification of Heart Failure which consider both the symptoms and signs of heart failure.

Objective: This is an ongoing audit and studies severe heart failure (HFrEF, EF $\leqslant$ 35%) and moderate heart failure (HFmrEF, EF 45 to 35%). A subsequent study shall look separately at HFpEF as the patient population, etiology, the morbidity and mortality are very different.

Results: A prospective observational study on 295 patients for the period of Seven months from Aug 2025 to Apr 2026 was conducted in Kauvery Hospital, Heart City. All the data were interpreted and compared with Apr 2025 to July 2025 previously.

Conclusion: While our pilot study clearly demonstrates a higher mortality rate among patients who do not receive the benefits of GDMT during and after hospitalization, a larger sample size and longer study duration are essential to fully quantify these outcome measures. Sustained efforts to evaluate GDMT utilization through these audits remain a cornerstone for advancing evidence-based practice and achieving superior clinical outcomes in heart failure care.

Key words: Heart failure (HF); Guideline directed medical treatment (GDMT); Angiotensin Receptor-Neprilysin Inhibitors

1. Introduction

Heart failure (HF) is a debilitating clinical syndrome characterized by significant morbidity, high mortality rates, and a substantial burden on healthcare resources worldwide. Despite major advancements in therapeutic strategies, HF remains a leading cause of cardiovascular-related death globally. Furthermore, many patients experience a perceived quality of life that is lower than that associated with several advanced malignancies.

Patients with heart failure (HF) face a significantly compromised quality of life, frequently exacerbated by mental health comorbidities. Research indicates that over a third of HF patients (prevalence ranging from 21% to 45%) suffer from clinically significant depression. [1]

The aim of this quality improvement study was to assess the prescription rates of Guideline Directed Medical Treatment (GDMT) in patients with heart failure. It is hoped that the findings will lead to improvement in offering the four pillars of GDMT as early as possible during the evolution of heart failure.

Four Pillars of Heart failure Treatment

- ACEs/ARBs/ Angiotensin Receptor-Neprilysin Inhibitors (ARNIs)
- Cardio selective Beta Blockers
- Mineralocorticoid Receptor Antagonists (MRA)
- Sodium-Glucose Co-Transporter 2 (SGLT-2) inhibitors [2]

Heart failure remains a significant global health challenge, affecting millions of individuals worldwide and imposing substantial burdens on healthcare systems. Despite advances in therapeutic strategies, HF continues to be associated with high rates of morbidity, mortality, and hospitalizations, making it a leading cause of cardiovascular-related deaths globally [3]

Principles of HF management

- All four classes of drugs (1, SGLT2i)
- ACE/ ARB/ ARNI.
- MRA (includes the diuretic Spironolactone) and
- Cardio selective Beta blocker) should be started as early as possible at hospitalization

They are started at low, safe, tolerable doses and are to be titrated at two weekly intervals. Each drug would have some side effects that need to be carefully identified and handled. The GDMT complements other treatments for HF like revascularization (PCI/ CABG) resynchronization (CRT), control of ongoing risk factors like DM, HT,

dyslipidemias, Hypothyroidism and cardiac rehabilitation. Among the drugs for HF, the "Four pillars of GDMT" take priority. Among other drug options come the loop diuretics, Ivabradine, coronary vasodilators, Digoxin etc.[4]

Parameter	Explanation
NYHA functional class3	I, II, III, IV based on symptoms severity
EF4	HFrEF, HFmrEF, or HFpEF based on LVEF

Heart failure (HF) is classified into three primary categories based on the Left Ventricular Ejection Fraction (LVEF)a measure of how much blood the left ventricle pumps out with each contraction. The current universal definitions are:

The 4 NYHA heart failure classes are as follows:

Class I	Asymptomatic
Class II	Symptomatic with moderate activity
Class III	Symptomatic with mild activity
Class IV	Symptomatic at rest.

Heart failure is further classified by left ventricular ejection fraction (LVEF). The prognosis and response to treatment of patients with heart failure differs significantly when patients are stratified based on LVEF. In 2022, the ACC, AHA, and Heart Failure Society of America (HFSA) released guidelines for the management of heart failure that incorporate the following classification of heart failure by LVEF:

- Heart Failure with Reduced Ejection Fraction (HFrEF): patients with an LVEF ≤40%
- Heart Failure with Improved Ejection Fraction (HFimpEF): patients with a previous LVEF ≤40% and a subsequent measurement of LVEF >40%
- Heart Failure with Mildly Reduced Ejection Fraction (HFmrEF): patients with an LVEF 41% to 49% with evidence of spontaneous or provokable increased left ventricular filling pressures (LVFPs), characterized by elevated natriuretic peptides or hemodynamic measurements. HFmrEF is sometimes referred to as heart failure with midrange ejection fraction in the literature.
- Heart Failure with Preserved Ejection Fraction (HFpEF): patients with an LVEF ≥50% with evidence of spontaneous or provokable increased left ventricular filling pressures (LVFPs), characterized by elevated natriuretic peptides or hemodynamic measurements.

The diagnosis of HFpEF can be challenging, particularly in patients with overt signs or symptoms of congestion. However, approximately 50% of patients with heart failure are classified as HFpEF; not all patients with HFpEF will progress to HFrEF. HFpEF is a heterogeneous clinical syndrome with many phenotypes, and the underlying pathophysiological processes of HFpEF differ from those of HFrEF. While all patients with heart failure have ventricular diastolic dysfunction, diastolic dysfunction is considered part of the normal again process and is not synonymous with HFpEF. [7]

On admission with ADHF patients would need immediate attention to the volume overload with parenteral loop diuretics and vasodilators. GDMT is indicated on stabilization.

Initiating GDMT during hospitalization enables titration and seamless progression to discharge medication

By elucidating the real-world utilization patterns and outcomes of GDMT in hospitalized HF patients, this study aims to inform strategies for optimizing therapeutic approaches and improving outcomes for individuals with HF.

2. Objective

- In the current study, we did not differentiate between HFrEF (Reduced EF ≤40%) and HFpEF (Preserved EF ≥50%). However, we intend to include this classification in future research to provide a more granular analysis. Differentiating them allows for targeted treatment, as therapies that save lives in HFrEF often have limited impact on HFpEF. [5]

- Finerenone offers superior safety and efficacy in HFpEF, showing lower mortality, hospitalization, and hyperkalemia risks than spironolactone. Finerenone, a non-steroidal MRA, is often preferred for EF 40%, while spironolactone is a cost-effective, established, steroidal MRA. Finerenone may be less cost-effective. In the future we will include this also.

- Dedicated HF Clinic with designated cardiologist/ post graduate residents/ duty doctors,/nurses/Physician Assistants or Clinical Pharmacists can conduct the Heart Failure Clinic and its periodical audit , as per the institutional GDMT for HF protocol, successfully.

3. Materials and Methods

Study Design

This prospective observational study aimed to investigate the clinical characteristics, management strategies, and outcomes of heart failure (HF) patients admitted to Kauvery Heart City, over a period of 1 year 1 month (The collection was divided into three distinct phases to track progress: a baseline audit (Apr–Jul '25), a peak implementation phase (Aug–Dec '25), and a recent follow-up (Jan–Apr '26)}.

Data Collection

Data was systematically collected for a clinical audit of heart failure management between April 2025 and April 2026. The primary focus was to monitor the implementation of Guideline-Directed Medical Therapy (GDMT) and correlate treatment intensity with echocardiographic findings and extracted from electronic health records. The collection was divided into three distinct phases to track progress: a baseline audit (Apr–Jul '25), a peak implementation phase (Aug–Dec '25), and a recent follow-up (Jan–Apr '26). This chronological structure allowed for the identification of trends in medication up-titration and diagnostic frequency. Clinical data were collected prospectively. Data collection encompassed demographic information, medical history, cardiovascular risk factors, presenting symptoms, echocardiographic parameters, Prescription Patterns (GDMT) and clinical outcomes during hospitalization and discharge.

Study Population

The study population consists of all adult patients diagnosed with Heart Failure with reduced Ejection Fraction (HFrEF) admitted to or visiting Kauvery Heart City. It specifically includes individuals with a documented LVEF of ≤40% who are eligible for the "four pillars" of medical therapy. Patients with end-stage renal disease or those hemodynamically unstable are typically excluded to ensure accurate assessment of prescription patterns.

Outcome Measures

The primary outcome measure was the proportion of patients who received GDMT during admission and discharge, and proportion of patients on other drugs used in heart failure. Secondary outcome measures included post-discharge mortality, readmission rates, and change in symptom severity, functional status, and medication adherence.

Statistical Analysis

Descriptive statistics were used to summarize baseline characteristics of the study population. Percentage analysis was used to represent the outcome data.

4. Results

A prospective observational study on 295 patients for the period of Nine months from Aug 2025 to Apr 2026 was conducted in Kauvery Hospital, Heart City. All the data were interpreted and compared with Apr 2025 to July 2025 previously. The study reveals the importance of Guideline Directed Medical Management for Heart Failure patients.

No of Patients who Receives GDMT during Admission and Discharge from the month of Aug 2025 to Apr 2026							
Month	5 GDMT	4 GDMT	3 GDMT	2 GDMT	1 GDMT	No GDMT	Total
Aug-25	1	4	3	5	7		20
Sep-25		5	3	7	9		24
Oct-25		7	8	14	7	2	38
Nov-25		5	9	22	15	2	53
Dec-25	3	12	13	11	5	2	46
Jan-26		3	1	2	10	4	20
Feb-26		4	8	8	16	4	40
Mar-26		4	10	7	6	2	29
Apr-26		4	10	3	4	4	25
Total	4	48	65	79	79	20	295

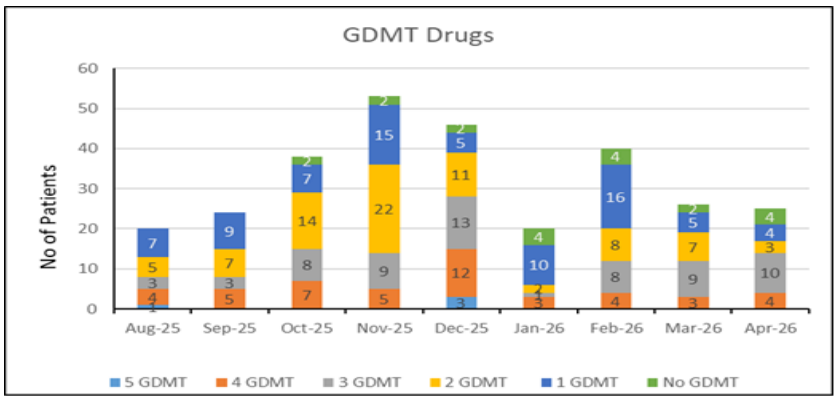


Fig (1): No of Patients who Receives GDMT during Admission and Discharge from the Month of Aug 2025 to Feb 2026

From August 2025 to April 2026, 295 patients were tracked, with the highest volume of cases occurring in November (53). While only 4 patients received the full 5-drug GDMT regimen, the majority utilized 2 or 3 GDMT combinations, totaling 114 cases. Usage peaked for 2-drug regimens in November, whereas December saw the most comprehensive care with the highest number of patients on 4 or 5 drugs.

No of Patients who Receives GDMT during Admission and Discharge from the Month of Aug 2025 to Feb 2026 in %						
Month	5 GDMT	4 GDMT	3 GDMT	2 GDMT	1 GDMT	No GDMT
Aug-25	5	2	15	25	35	
Sep-25		3	13	29	38	
Oct-25		18	22	37	18	5
Nov-25		9	17	42	28	4
Dec-25	7	27	28	24	2	4
Jan-26		15	5	1	5	2
Feb-26		1	2	2	4	1
Mar-26		14	34	24	21	7
Apr-26		16	40	12	16	16

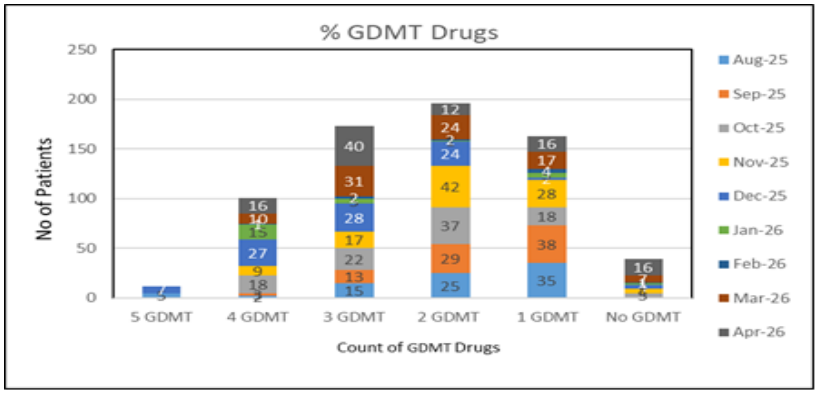


Fig (2): Number of patients (%) who received GDMT during admission and discharge from the Month of Aug 2025 to Apr 2026

Among the 295 patients monitored, the highest adherence was seen in the 2 GDMT category, which accounted for approximately 40% of all cases. Combined high-intensity treatment (4 or 5 GDMT) was administered to 17% of the patient population, peaking significantly during December 2025. The majority of patients (77%) received mid-to-low range therapy consisting of 1, 2, or 3 GDMT medications throughout the period. Only a small fraction, approximately 6%, received no GDMT at all, with the remaining patients being distributed across varying levels of therapeutic support. Fig 2. Number of patients who received GDMT during admission and discharge from the Month of Aug 2025 to Apr 2026 in % is shown in Fig 2.

Demographic analysis

Age	Female	Male	Total
20-29	2	1	3
30-39	1	8	9
40-49	3	27	30
50-59	23	73	96
60-69	20	62	82
70-79	20	36	56
80-89	9	10	19

Total	78	217	295

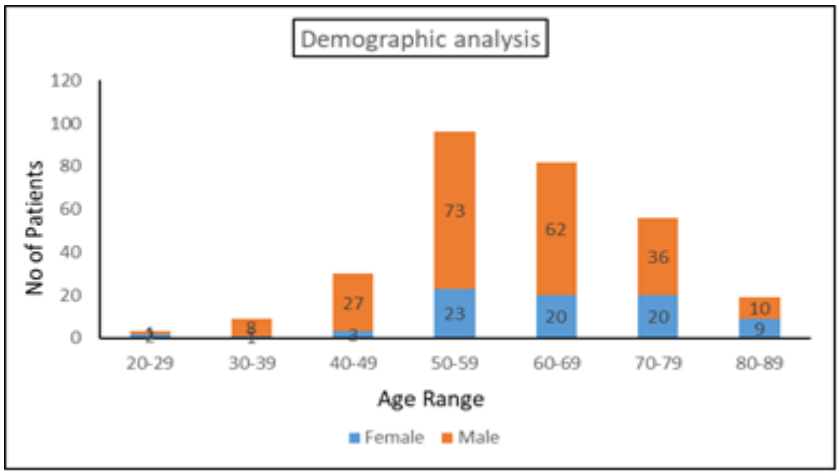


Fig (3): Demographic analysis of age and gender who received GDMT during admission and discharge from the month of Aug 2025 to Apr 2026

The demographic analysis of 295 individuals shows a significant male majority, accounting for 73 % of the total population. Female participation peaks in the 60–69 age group, while the male population is most concentrated in the 50–59 bracket. The data highlights a clear trend, with most of both genders falling between the ages of 50 and 79 in the Fig 3.

GDMT	Previous audit	Current audit	
	April to July 2025	Aug- Dec 2025	Jan-Apr 26
5 GDMT	7	4	0
4 GDMT	12	33	15
3 GDMT	33	36	29
2 GDMT	33	59	20
1 GDMT	37	43	36
No GDMT	13	6	14
Grand Total	135	181	114
	135	295	

Fig (4): Comparison of 4 GDMT Pillars during admission and discharge from the month of April 2025 to July 2025 vs Aug 2025 to Dec 2026 vs Jan 2026 to Apr 2026

The audit data reveals a significant shift in Goal-Directed Medical Therapy (GDMT) adherence across the three time periods for the 295 patients. Adherence Peaks: The "current audit" (Aug–Dec 2025) showed the best results, with a significant increase in patients receiving 4 GDMT (from 12 up to 33) and a drop in those receiving No GDMT (from 13 down to 6).

Recent Decline: In the latest "Jan–Apr 26" window, there is a concerning downward trend, with zero patients achieving 5 GDMT and a sharp rise in those receiving only 1 or no GDMT relative to the total. Volume vs. Quality: While the total number of patients audited increased in late 2025, the most recent data suggests a need to re-evaluate why high-level adherence (4-5 GDMT) has suddenly dipped in Fig 4.

The shift toward lower GDMT levels in early 2026 suggests a need for aggressive up-titration. Clinical teams should review the 36 patients currently on only 1 GDMT to determine if they can safely transition to 2 or 3 medications to meet current gold-standard guidelines.

Medication Pillar	Previous Audit (Apr-Jul '25)	Current Audit (Aug-Dec '25)	% Change (Peak Growth)	Recent Audit (Jan-Feb '26)
SGLT2 inhibitors	48	61	27%	53
Beta-blockers	56	61	9%	70
ACE/ARB/ARNI	29	50	72%	32
MRA	61	87	43%	67
Diuretics	29	114	293%	0

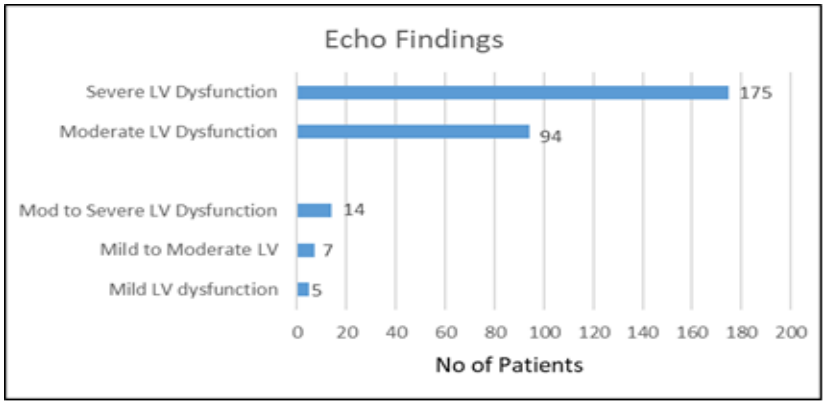
Fig (5): Comparison of 4 GDMT Pillars at admission and discharge from the month of April 2025 to July 2025 vs Aug 2025 to Dec 2026 vs Jan 2026 to Apr 2026

Significant Peak Growth: The Aug–Dec '25 period saw a substantial increase across all categories, most notably in ACE/ARB/ARNI (72% growth) and Diuretics (293% growth). This indicates a period of aggressive treatment initiation and fluid management.

Core Pillar Stability: Beta-blockers and MRAs remained the most consistently prescribed treatments, reaching their highest volumes (61 and 87, respectively) during the late 2025 peak.

Recent Decline (Jan–Apr '26): There is a sharp drop in prescription numbers in the most recent audit, with Diuretics falling to 0. This could reflect a transition to stable maintenance therapy for a smaller patient cohort or a potential gap in the most recent data collection in Fig 5.

Echo Finding Severity	Total Count	Percentage of Total
Mild LV dysfunction	5	2%
Mild to Moderate LV	7	3%
Mod to Severe LV Dysfunction	14	6%
Moderate LV Dysfunction	94	39%
Severe LV Dysfunction	175	59%
Grand Total	295	100%



Metric Category	Echo Severity Findings (Aug 2025 to Apr 2026)	GDMT Medication Audit (Aug 2025 to Apr 2026)
High Intensity	59% of patients have Severe LV Dysfunction.	Only 18.3% of patients are on 4–5 GDMT pillars.
Moderate Intensity	39.0% of patients have Moderate LV Dysfunction.	47.7% of patients are on 2–3 GDMT medications.
Low Intensity	3% have Mild to Moderate or Mild dysfunction.	34.0% of patients are on 0–1 GDMT medication.

Fig (6): ECHO findings and their Metric Category of Admission and Discharge from the Month of Aug 2025 to Apr 2026

Based on the comparison between echo severity and medication data for the 295 audited patients, here is a four-line discussion of the findings. While 59% of patients have Severe LV Dysfunction, only 18.3% have reached the gold-standard 4–5 pillar GDMT, indicating a significant need for aggressive up-titration.

Nearly 90% of the audited population falls into the moderate or severe categories, yet nearly half (47.7%) remain on only partial (2–3 drug) therapy. In the Jan–Apr 2026 period, 56.6% of patients were on 0–1 medication despite high volumes of moderate and severe cases, suggesting a delay in initiating new pillars.

The data highlights a clear opportunity to close the gap by transitioning patients from 1–2 medications to the full "four-pillar" regimen to match their high-risk echo profiles in Fig 6.

From our study, we observe that management protocols of HF do not benefit without prescription of GDMT drugs.

5. Importance of GDMT

- GDMT represents the most up-to-date and evidence-based approach to managing heart failure. Ensuring that patients receive therapies proven to be effective in improving outcomes reduces morbidity and mortality.

- By addressing various aspects of disease progression, such as neurohormonal activation, endothelial dysfunction, inflammation, and ventricular remodeling, GDMT helps optimize disease management and improve patient outcomes in heart failure.

- GDMT has shown to reduce the risk of cardiovascular events, including heart failure exacerbations, myocardial infarction, stroke, and cardiovascular death.

- GDMT aims not only to manage symptoms but also to slow or halt the progression of heart failure. By targeting key pathophysiological processes involved in disease progression, such as myocardial remodeling, fibrosis, and atherosclerosis, GDMT helps prevent further deterioration of cardiac function and structural abnormalities.

- GDMT provides long-term benefits beyond immediate symptom relief, including improved survival, reduced hospitalizations, and preservation of cardiac function.

6. Limitations

The Limitations in this study included its single-center design, relatively small sample size, and the potential for selection bias inherent in observational studies.

7. Conclusion

While our pilot study clearly demonstrates a higher mortality rate among patients who do not receive the benefits of GDMT during and after hospitalization, a larger sample size and longer study duration are essential to fully quantify these outcome measures. These findings underscore the critical value of GDMT in heart failure management. Consequently, implementing systematic audits is vital to monitor adherence to evidence-based guidelines and optimize patient care. Sustained efforts to evaluate GDMT utilization through these audits remain a cornerstone for advancing evidence-based practice and achieving superior clinical outcomes in heart failure care.

References

[1] Rutledge, T., Reis, V. A., Linke, S. E., Greenberg, B. H., & Mills, P. J. (2006). Depression in Heart Failure: A Meta-Analytic Review of Prevalence, Intervention Effects, and Associations with Clinical Outcomes. Journal of the American College of Cardiology, 48(8), 1542–1555.

[2] Reference: Heidenreich PA, et al. (2022). 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure. Journal of the American College of Cardiology, 79(17), e263–e421.

[3] Heidenreich, P. A., et al. (2022). 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure. Journal of the American College of Cardiology.

[4] D. Suryaprabha1*, M. Vinitha2, B. Chandru3., .Guideline-Directed Medical Treatment (GDMT) of Heart Failure at Kauvery Hospitals: A Clinical Audit. kauverian-scientific-journal

[5] Heidenreich PA, et al. (2022). Journal of the American College of Cardiology, 79(17), e263–e421.

[6] Mohammad Darvish et al., Heart failure: assessment of the global economic burden, European Heart Journal, Volume 46, Issue 31, 14 August 2025, Pages 3069–3078.

[7] Golla MSG, Shams P. Heart Failure with Preserved Ejection Fraction (HFpEF) [Updated 2024 Mar 19]. In: Stat Pearls [Internet]. Treasure Island (FL): Stat Pearls Publishing; 2026 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK599960/