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REVIEW ARTICLE

Predischarge and Postdischarge Heart Failure Management: Treatment Optimisation, Adherence, and Multidisciplinary Care

Marija Polovina [1,2], Ovidiu Chioncel [3], Gianluigi Savarese [4], Magdy Abdelhamid [5], Gordana Krljanac [1,2], Carsten Tschöpe [6,7], Petar M. Seferović [2,8]

[1] Department of Cardiology, University Clinical Centre of Serbia, Belgrade, Serbia.
[2] Faculty of Medicine, University of Belgrade, Belgrade, Serbia.
[3] Emergency Institute for Cardiovascular Diseases "Prof. Dr. C.C. Iliescu" Bucharest; University for Medicine and Pharmacy "Carol Davila" Bucharest, Bucharest, Romania.
[4] Division of Cardiology, Department of Medicine, and Karolinska Institute, Stockholm, Sweden.
[5] Faculty of Medicine, Kasr Al Ainy, Cardiology Department, Cairo University, Cairo, Egypt.
[6] Department of Cardiology, Angiology and Intensive Care, Campus Virchow German Heart Center at Charité, Berlin, Germany.
[7] Berlin Institute of Health at Charite Center for Regenerative Therapies, Berlin, Germany.
[8] Serbian Academy of Sciences and Arts, Belgrade, Serbia.

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ABSTRACT

Hospitalisation for heart failure presents a critical event associated with significant risk of readmission and mortality. It also offers a window of opportunity to optimise patient management with a goal to improve clinical outcomes, functional status, and quality of life. This narrative review summarises contemporary, evidence-based strategies for optimising heart failure management before and after hospital discharge. Firstly, comprehensive assessment of congestion status is necessary before discharge because residual congestion is a major contributor to poor outcomes. In addition, robust evidence supports the early initiation and rapid up-titration of core guideline-directed medical therapies in all patients without known contraindications, irrespective of left ventricular ejection fraction. The core guideline-directed medical therapies classes include renin-angiotensin system inhibitors, sacubitril/valsartan, beta-blockers, mineralocorticoid receptor antagonists, and sodium-glucose cotransporter-2 inhibitors. Intensive strategy to optimisation of renin-angiotensin system inhibitors, beta-blockers, and mineralocorticoid receptor antagonists has been shown to reduce the risk of death or readmission by 34% at six months compared to standard care. Likewise, initiating sodium-glucose cotransporter-2 inhibitors during hospitalisation has demonstrated favourable effects on clinical outcomes, including lower risk of all-cause mortality and readmission. Furthermore, multidisciplinary care and early and sustained postdischarge follow-up are essential to address comorbidities, ensure continuity of care and allow further optimisation of medical therapy. They also enable timely management of potential issues concerning drug intolerance, side effects, nonadherence, or changes in clinical status. Successful long-term management and adherence to treatment recommendations also requires structured patient education and empowerment for self-care.

keywords: heart failure, management, guideline-directed medical therapy, congestion, adherence, multidisciplinary care, education

Introduction

Heart failure (HF) is a global health challenge, affecting an estimated 64 million people worldwide, and associated with significantly impaired survival and frequent hospitalisations [1]. An estimated 2.1 million hospitalisations for HF take place in Europe annually [2]. Hospitalisation for HF is a critical event, since it is linked to a higher mortality, greater risk of complications, and a vulnerable postdischarge period marked by a significant risk of readmission[3]. Hospitalisation for HF also offers a valuable opportunity to optimise patient management and improve clinical outcomes. Current European Society of Cardiology (ESC) Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure highlighted several key strategies in pre- and postdischarge management of patients with HF [4,5]. These include complete decongestion, or minimal residual congestion, rapid initiation and up-titration of guideline directed medical therapies (GDMT) following patient stabilisation, structured postdischarge follow-up, and engaging patients in multidisciplinary care that addresses care transition, comorbidities, and patient education. These recommendations are based on recent clinical trial evidence demonstrating that such strategies can improve clinical outcomes, functional capacity, and quality of life following hospitalisation for HF [6-8]. However, real-world data reveal that a significant proportion of patients are discharged with residual congestion, whilst multiple challenges and gaps persist in implementing Guideline-recommended management strategies for HF, significantly affecting patient outcomes and prognosis [9-11].

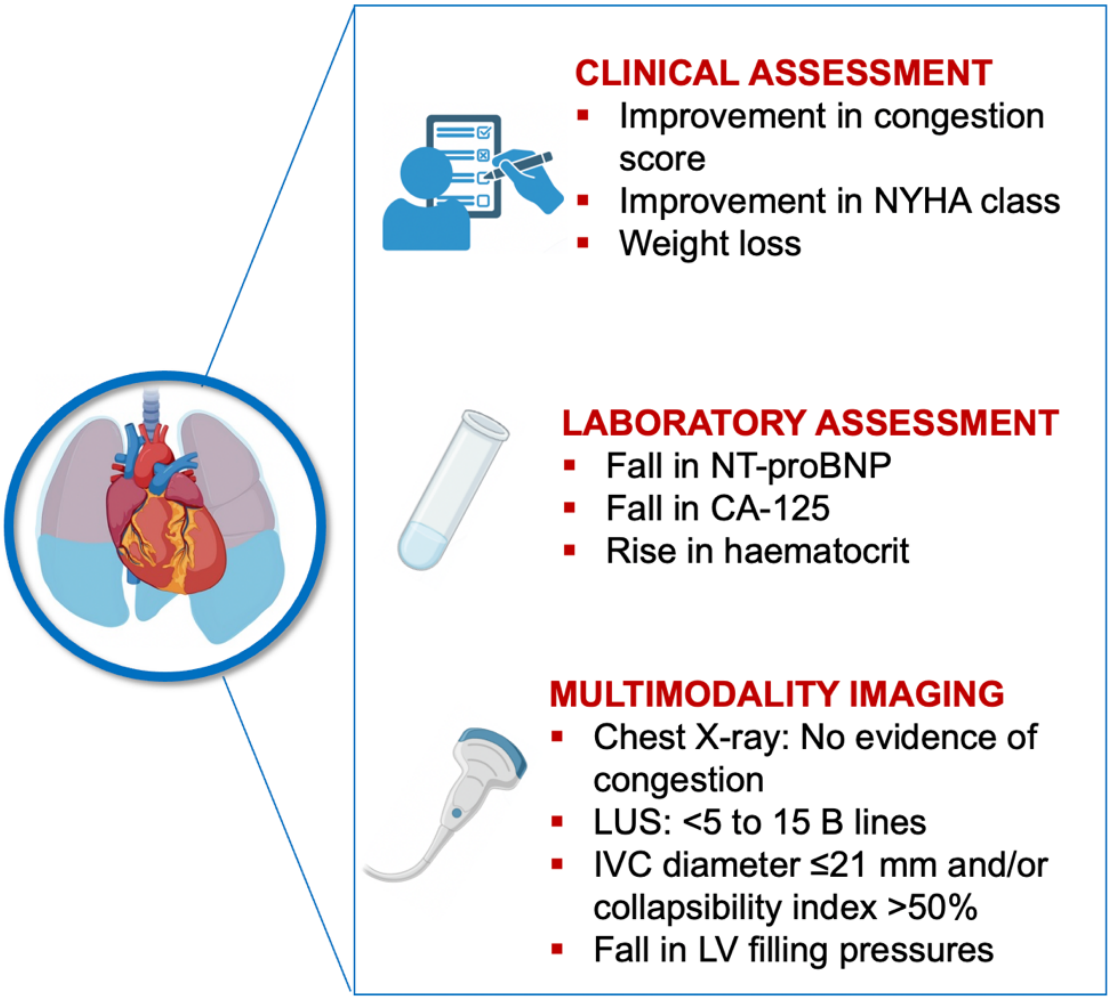
This narrative review is intended for physicians across all levels of care, aiming to highlight key elements in the pre- and postdischarge management of patients with HF. It addresses effective management of congestion, timely GDMT initiation and up-titration, and the importance of structured follow-up. Emphasis is placed on adopting a multidisciplinary approach, ensuring a successful transition of care, and promoting patient education – all essential for improving GDMT implementation and adherence, and enhancing quality of care and patient outcomes.

Predischarge management of congestion: implications for the implementation of medical therapies for heart failure

Congestion is defined as fluid accumulation in the intravascular compartment and the interstitial space, resulting from increased cardiac filling pressures and/or increased vascular permeability because of inflammation[12]. Congestion in HF may progress chronically due to maladaptive renal sodium and water retention, or acutely from fluid mobilization from the splanchnic reservoir [13]. It is the most frequent cause of hospitalisation for HF, present in ~90% of admitted patients according to the ESC and Heart Failure Association (HFA) HF long-term registry [9]. Residual congestion persists in 30.9% of patients at discharge and is associated with worse prognosis in terms of mortality and readmission rates [9,14]. Residual congestion often indicates a more advanced disease state in HF, as it is more frequently seen in older patients, those with worse symptoms and multiple comorbidities, and may be associated with diuretic resistance and/or worsening renal function or acute kidney injury [15-17].

Given its detrimental effects, predischarge assessment of congestion by multiple targets has important clinical implications [4]. Current evidence supports an integrative approach that combines clinical evaluation, laboratory markers and multimodality imaging to assess changes in congestion from baseline to discharge (**Figure 1**) [18]. This is important because clinical improvement may occur whilst tissue congestion persists and using multiple tools can increase the sensitivity of detecting residual congestion. A reduction of >30% in N-terminal pro-B-type natriuretic peptide (NT-proBNP) from baseline before discharge, or a predischarge NT-proBNP level <1500 pg/mL, is associated with a significantly lower risk of postdischarge adverse events [19]. Additional biomarkers, such as carbohydrate antigen 125, ghrelin and galectin 3, can complement natriuretic peptides in evaluating congestion [20-22]. Several imaging tools can be used, including chest X-ray, echocardiographic evaluation of left ventricular (LV) filling pressures, imaging of inferior vena cava (IVC) size and collapsibility, and detection of B-lines with lung ultrasound (LUS) (**Figure 1**). Chest X-ray has the benefit of being affordable and accessible but suffers from low sensitivity (i.e. one in five patients with congestion may have normal radiogram) [23], and the requirement for repeat radiation exposure. Despite these limitations, high radiographic congestion scores at discharge predict greater risk of rehospitalisation [24]. Non-invasive assessment of predischarge LV filling pressures with echocardiography was shown to be superior to clinical evaluation alone in the prediction of readmission [25,26]. It is considered appropriate to obtain a fall in E/e' ratio <10-15 [18]. IVC imaging and LUS provide a reliable estimation of right atrial pressure and lung congestion, respectively, and rapidly reflect changes in volume status in response to treatment. Persistently dilated IVC with low collapsibility index before discharge predicts greater risk of readmission [27]. Likewise, the number of B-lines indicates the severity of pulmonary congestion, with <5 B-lines indicating no congestion and >30 B-lines indicating severe congestion[28]. Furthermore, residual pulmonary congestion as assessed with LUS at discharge is strongly associated with adverse outcomes [29,30].

Figure 1. Decongestion targets



CA-125 – carbohydrate antigen 125; IVC: inferior vena cava; LUS – lung ultrasound; NT-proBNP – N-terminal pro-B type natriuretic peptide; NYHA – New Yorks Heart Association; LV – left ventricular

Intravenous loop diuretics remain the cornerstone therapy for relieving fluid overload. To enhance diuretic response and achieve more complete decongestion, multiple strategies have been investigated. Among them, combining loop diuretics with "non-loop" agents that act at different sites along the nephron to induce sequential nephron blockade which leads to increased sodium and water excretion has been evaluated in several clinical trials. Addition of intravenous acetazolamide (i.e. inhibits proximal tubule sodium reabsorption) to furosemide, compared to furosemide alone, in the ADVOR trial, has provided more successful decongestion and shorter hospital stay, without significantly increasing the rate of adverse events (i.e. worsening kidney function, hypokalaemia, hypotension) [31]. Similarly, a combination of intravenous furosemide with an oral thiazide-like diuretic, compared to furosemide alone in the CLOROTIC trial, enhanced diuretic response, but did not lead to improved symptom relief and was associated with a higher risk of worsening renal function [32]. Furthermore, a decongestive strategy guided by urinary sodium excretion has demonstrated improved natriuresis and diuresis; however, it did not impact 180-day HF rehospitalisation or all-cause mortality, which was the co-primary endpoint of this trial [33]. Of note, these and other strategies aimed to improve diuretic response failed to show improvements in clinical outcomes, including mortality and HF readmission rates (**Table 1**).

Table 1. Strategies to improve diuretic response

Shorter door-to-diuretic time (i.v. furosemide <60 min from admission)
Furosemide intravenous bolus every 12 h vs continuous furosemide infusion
Furosemide combined with "non-loop" diuretics: ▪ Acetazolamide ▪ Hydrochlorothiazide ▪ Metolazone ▪ Spironolactone
Natriuresis-guided diuretic therapy
Vasopresin-2 receptor agonists (tolvaptan)
Rollofyline
Ultrafiltration/renal replacement therapy

According to references [31-33,44,82-86]

Although successful decongestion (i.e. attaining euvolemia) is a desirable therapeutic goal in patients hospitalised for HF, it is noteworthy to consider that overzealous diuretic use can have adverse effects, including worsening renal function/acute kidney injury, dehydration, hypotension and electrolyte disturbances that may delay or preclude institution of GDMT [34]. Current evidence suggests that euvolemia is not a prerequisite for predischarge initiation and optimisation of GDMT. Patients involved in the recent STRONG-HF trial, that assessed efficacy and safety of rapid GDMT implementation in hospitalised HF patients, regardless of left ventricular ejection fraction (LVEF), were required to be haemodynamically stable (i.e. systolic blood pressure ≥100 mmHg and heart rate >60 bpm within prior 24 h) and without significant renal dysfunction or electrolyte abnormalities (i.e. estimated glomerular filtration rate, eGFR ≥30 mL/min/1.73 m^2 and K+ ≤5.0 mmol/L) before randomisation [35]. Persistent congestion, evidenced by a screening NT-proBNP >2500 pg/mL and >10% decrease between screening and before randomization (but still >1500 pg/mL), was required for inclusion [35]. The patients were randomized to either an intensive strategy involving initiation of the three classes of neurohormonal inhibitors – angiotensin-converting enzyme inhibitor (ACEI), angiotensin receptor blocker (ARB) or angiotensin receptor–neprilysin inhibitor (ARNI); beta-blocker (BB); and mineralocorticoid receptor antagonist (MRA) – two days before discharge, followed by rapid up-titration to target doses within two weeks postdischarge, or to standard of care [35 6]. Compared to standard care, the intensive treatment strategy resulted in a 34% risk reduction in HF rehospitalisation or all-cause mortality at 6 months (hazard ratio, HR 0.66; 95% confidence interval, 0.50–0.86) [6]. Further analysis demonstrated that timely initiation and rapid up-titration of HF medications (ACEI/ARB/ARNI, BB and MRA) in haemodynamically stable, but still modestly congested patients, is associated with attaining more complete and sustained decongestion over time, ultimately translating into improved clinical outcomes and quality of life [6,36,37]. Re-assessment of natriuretic peptide levels after discharge can help guide clinical decisions, such as increasing the diuretic dose or slowing GDMT up-titration if a rise in NT-proBNP is observed [38]. These observations are further supported by the EMPULSE trial, which-assessed the efficacy and safety of a sodium-glucose-contransporter-2 (SGLT2) inhibitor, empagliflozin (on top of usual care) vs placebo in patients hospitalised for HF, regardless of LVEF [7]. In addition to showing a significant improvement in clinical outcomes with empagliflozin vs. placebo, this trial also demonstrated more effective and sustained decongestion with early empagliflozin initiation (median three days after admission) [39]. Moreover, contemporary GDMT can help reduce loop diuretic doses needed to prevent subsequent development of fluid overload in the long run [40].

Initiation and optimisation of medical therapies in patients hospitalised for heart failure

The current evidence-based approach to reducing the risk of rehospitalisation and mortality in patients admitted for HF involves provision and optimisation of the four fundamental classes of GDMT upon clinical stabilisation and before discharge (**Figure 2**) [5]. This includes the use of neurohormonal inhibitors (i.e. ACEI/ARB/ARNI, BB, and MRA) along with an SGLT2 inhibitor (i.e. dapagliflozin or empagliflozin) in all patients without contraindications, regardless of LVEF, based on the STRONG-HF results [5,6]. Neurohormonal inhibitors should be up-titrated to 50% target doses before discharge and then up-titrated to the effective target (100%) doses (or at least maximum tolerated doses) during the careful follow-up visits within 2 – 6 weeks postdischarge [6]. Since SGLT2 inhibitors come in a single dose and have a negligible or no effect on blood pressure, heart rate or electrolyte levels, they can be easily implemented along other HF medications. For each patient, an optimal timing should be identified before discharge to provide all four GDMT classes, due to their synergistic and rapid beneficial effects. This is emphasised by the recent FINEARTS-HF trial assessing the efficacy of a nonsteroidal MRA, finerenone vs. placebo in patients with HF and mildly reduced (HFmrEF) or preserved ejection fraction (HFpEF) for the risk reduction in total HF events and CV death [41]. The trial included more than 50% of patients with a recent HF event (i.e. hospitalisation) before randomisation (~20%, <7 days before randomisation) and demonstrated a 26% lower rate of the composite primary outcome (rate ratio, 0.84; 95% CI, 0.74 - 0.95) with finerenone vs. placebo [41]. Of note, a prespecified analysis of this trial demonstrated a statistically significant improvement in outcomes with finerenone after only 28 days from the treatment institution, and sustained thereafter [42], supporting similar earlier observations of rapid treatment benefits with contemporary medications [43,44].

However, decisions on how and when to provide GDMT in individual patients may be influenced by haemodynamic factors (i.e. blood pressure, heart rate), renal function, electrolyte levels (i.e. hyperkalaemia), comorbidities, frailty and concerns about intolerance and adverse effects. These concerns may be even more challenging in therapy-naïve patients. Whereas the STRONG-HF trial demonstrated feasibility, safety, and beneficial effects of continuing and rapidly up-titrating GDMT in patients who were already on at least some (but not yet optimized) HF drugs prior to randomisation, evidence supporting GDMT initiation in treatment-naïve patients is less robust. Available data, derived mostly from smaller-scale clinical trials and observational studies, support benefits of GDMT initiation in therapy naïve haemodynamically stable individuals, mostly with HF and reduced ejection fraction (HFrEF). For example, the IMPACT-HF trial demonstrated that predischarge initiation of carvedilol in stabilised BB naïve patients with LVEF <40% was feasible, and not associated with more adverse effects or prolonged hospital stay [45]. Improved outcomes with ACEI/ARB initiation have been reported in HFrEF patients without a history of prior ACEI/ARB use [46]. Furthermore, PIONEER-HF and TRANSITION trials demonstrated that ARNI initiation during hospitalisation is safe and well tolerated, even in patients without prior exposure to ACEI/ARB [47,48]. In the PIONEER-HF trial, the benefits of ARNI over enalapril were consistent among HFrEF patients who were ACEI/ARB-naïve [49]. Finally, the EMPULSE trial confirms that initiating empagliflozin in stabilised HF patients is both effective and safe when

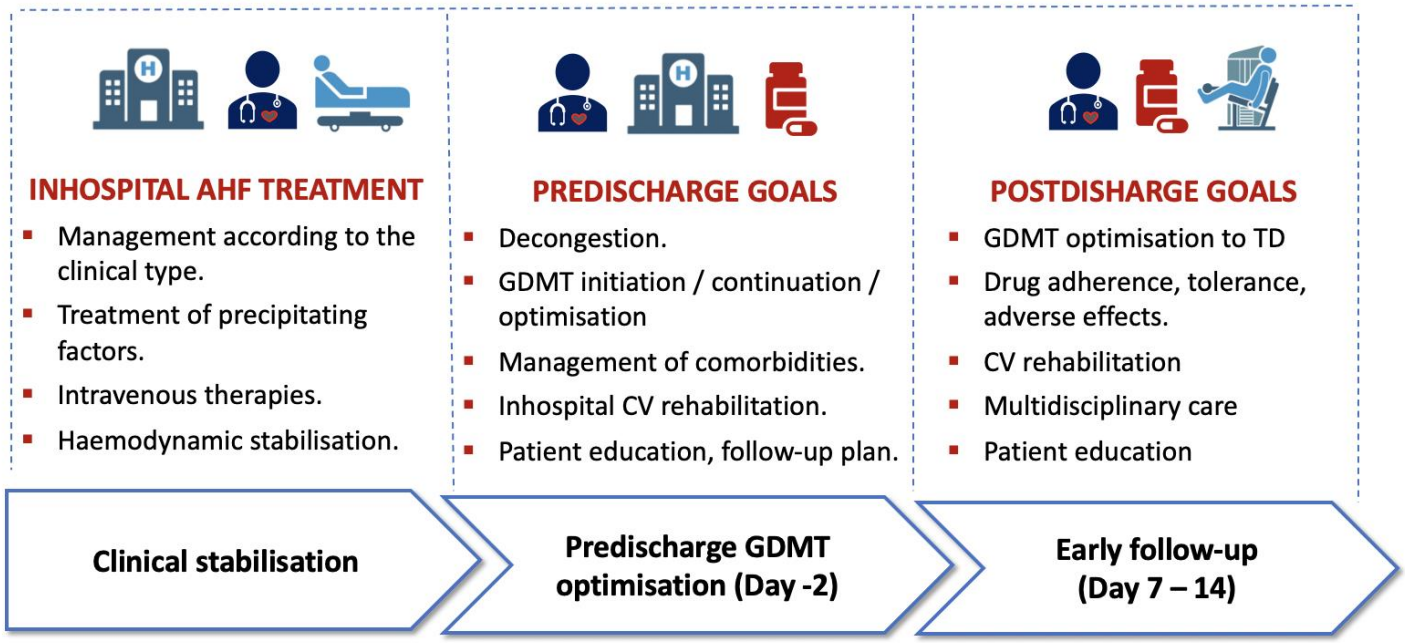
started after a median of three days following hospital admission [7]. Of note, in clinical practice most patients admitted for newly diagnosed acute HF have often been prescribed one or more GDMT drug classes for the treatment of comorbidities and are therefore not truly therapy naïve.

Another challenge in optimising GDMT during hospitalisation arises when it is necessary to reduce the dose or temporary discontinue drug therapy, most frequently due to hypotension, bradycardia, worsening renal function/acute kidney injury, and/or significant electrolyte imbalances [46]. Whilst multiple studies have suggested improved outcomes with in-hospital continuation of medical therapies, medication withdrawal or even dose reduction has been associated with higher rates of mortality and readmission and lower likelihood of subsequent drug re-initiation at follow-up [46,50,51]. Despite challenges, therefore, GDMT optimisation should be prioritised in high-risk patients.

Follow-up strategies to improve implementation of medical therapies for heart failure

Postdischarge continuity of care is crucial for HF patients since it facilitates multiple goals and ultimately improves quality of life and reduces the risk of readmission or mortality (**Figure 2**). The ESC Guidelines for HF management recommend first follow-up visit at 1 – 2 weeks after discharge [4]. This is supported by extensive data suggesting that an early follow-up visit, within 7 – 14 days after discharge is associated with lower risk of death or rehospitalisation within 30 days [52,53]. Even a telephone call within this period has been linked to better outcomes [52], whereas delays or inability to secure follow-up visits have been associated with poorer outcomes [53]. Follow-up visits can be performed by HF specialists, cardiologists, or even general practitioners and trained nurses, and follow-up with a familiar physician yields better outcomes than with an unfamiliar one, highlighting the importance of continuity of care [53,54]. Early optimisation of GDMT to target doses should be prioritised, as supported by the STRONG-HF results. This trial has shown that an intensive treatment strategy with an initial follow-up visit within 7 days after discharge, followed by subsequent visits up to 6 weeks can provide more successful GDMT optimisation (i.e. greater proportion of patients achieving target doses of ACEI/ARB/ARNI, BB, and MRA) compared to usual care, eventually translating into improved outcomes [6].

Figure 2. Predischarge and postdischarge heart failure treatment goals



CV- cardiovascular, GDMT – guideline-directed medical therapies, TD target dose

Rapid treatment optimisation, rather than follow-up frequency or settings, seems to be crucial for clinical outcomes after discharge. A randomised trial (ECAD-HF) assessed a strategy of optimized care and patient education by a HF specialist over the 2 – 3 weeks, compared to standard care in high-risk HFrEF patients characterised by recent HF hospitalisation, low blood pressure, renal dysfunction and/or increased levels of natriuretic peptides [55]. The trial failed to show a reduction in all-cause mortality or HF hospitalisation at 6 months with intensified management compared to usual care (HR 0.97; 95% CI 0.74 - 1.26) [55]. Importantly, there was no significant difference in treatment optimisation between the intensive and usual care groups in this trial, which might have influenced clinical outcomes. However, reasons for the sub-optimal treatment optimisation remain unclear and may reflect greater intolerance/side effects, characteristic of the high-risk patients involved in the ECAD-HF trial [55].

Despite its significance, real-world data continue to reveal delayed and/or suboptimal GDMT implementation and up-titration. A multinational cohort study using routine-care data demonstrated a delay in the postdischarge initiation of "novel" GDMT (i.e. an SGLT2 inhibitor and ARNI) compared with "older" HF medications (i.e. ACEI/ARB, BB, MRA) [56]. Up-titration to target doses remained low, while drug discontinuation rates were high [56]. A registry-based data from the Netherlands, suggested that, among chronic and

worsening HF patients, 44% of those with HFrEF and 35% of those with HFmrEF were prescribed the quadruple GDMT, but only 1% achieved target doses for all drug classes [10]. Similar results were reported earlier in HFrEF outpatients in the United States [11]. An Italian registry involving individuals with severe HFrEF demonstrated that BB, ACEI/ARB/ARNI and MRA were provided in 82%, 55% and 60% of patients, respectively, whilst ≥50% of target doses were reached in 41%, 22%, and 56% of those taking BB, ACEI/ARB/ARNI and MRA, respectively [57].

The reasons for suboptimal GDMT implementation are complex and multifactorial [58]. Patient-related factors involve concerns about intolerance or side effects due to chronic kidney disease, hypotension, bradycardia and/or hyperkalaemia [57]. Furthermore, older age, female sex and frailty are often associated with under-prescription [59], despite proven GDMT benefits among vulnerable patient categories [60]. Physicians' lack of confidence and clinical inertia, polypharmacy, and factors related to drug availability, affordability and access to care also have a significant impact on GDMT implementation [58,61]. However, reasons for drug non-prescription remain unknown in up to 50% of patients [57]. Another major limitation in providing rapid treatment optimisation through multiple patient visits is the lack of sufficient workforce to support seamless integration between inpatient and outpatient care [62]. Various digital health solutions (teleconsultations, non-invasive and invasive telemonitoring, electronic clinical decision support systems etc.) have been explored to support care transition and GDMT uptake (**Table 2**), and their applicability across different healthcare systems deserves further assessment.

Table 2. Selected digital health intervention studies to improve uptake and optimisation of medical therapies for heart failure

Study	Intervention	Outcome
IMPLEMENT-HF [87]	Pharmacist-physician GDMT Team provided suggestions to treating teams based on an evidence-based algorithm for GDMT optimisation in patients with HFrEF.	Improved HF GDMT uptake and optimisation
Rao et al. [88]	Randomised clinical trial of multidisciplinary virtual HF consultation vs usual care for GDMT optimisation in patients with HFrEF.	Improved HF GDMT implementation and dose titration
TIM-HF[89]	Randomised trial of a secure web-based system of remote patient management plus usual care vs usual care alone.	Reduction in the percentage of days lost due to unplanned CV hospitalisation and all-cause mortality (RR, 0.80, 95% CI 0.65-1.00; p=0.0460) Reduction in all-cause mortality HR 0,70, 95% CI 0.50-0.96).
DAVID-HF [90]	Home monitoring system consisting of wearable armband monitors paired with the smartphone application in HFrEF patients	Improved HF GDMT up-titration
MONITOR-HF [91]	Randomised clinical trial of invasive monitoring of pulmonary artery pressure (CardioMEMS-HF system, Abbott Laboratories, Abbott Park, IL, USA) vs standard care in patients with HF, regardless of LVEF	Improvement in quality of life and reduction in HF hospitalisations
PROMPT-HF [92]	Randomised trial of tailored electronic health record alerts vs usual care for GDMT optimisation in HFrEF patients	Significantly higher rates of the four classes of GDMT provision at 30 days.
EPIC-HF[93]	Randomised trial of patient activation tools designed to encouraged patients to work collaboratively with their clinicians to "make one positive change" vs. standard care	Improved GDMT initiation and dose intensification

Addressing patient adherence and persistence to medical therapies for heart failure

In addition to suboptimal GDMT implementation by physicians, non-adherence (i.e. not taking medications as prescribed) or lack of persistence (i.e. drug discontinuation) among HF patients impose a significant impediment to successful treatment outcomes. Accordingly, medication non-adherence was identified in 21% - 64% of patients preceding an episode of worsening HF in different studies [63]. Multiple factors can impact medication adherence and persistence, as summarised in **Table 3**.

Table 3. Factors associated with medication nonadherence

Patient-related factors
Socioeconomic deprivation
Low health literacy
Patients' perception of drug ineffectiveness
Living alone
Frailty
Cognitive impairment
Depression
Multimorbidity
Treatment-related
Polypharmacy
Multiple healthcare providers
Healthcare system-related
Availability
Affordability/Reimbursement
Access to care

According to references [94-97].

Given the complexity of factors influencing adherence and persistence, interventions aimed to improve these aspects of care likely need to be multifactorial, patient-centred and tailored to specific healthcare circumstances. Appropriate transition and coordination of postdischarge care involving scheduled follow-up visits, long-term follow-up commitment, patient education and empowerment for self-management, as well as the amount of time spent with patients by healthcare professionals have shown to provide some improvements in adherence [64,65]. Persistence in patient education and motivation to accept medical treatment as a necessary part of living with HF, and empowerment to understand the benefits of treatment and how to deal with potential mild and transient symptoms of intolerance/side effects can favourably impact patients' perceptions and adherence. A multidisciplinary approach including pharmacist-led education and follow-up, assisted with modern technologies, compared to standard care has also shown modest improvement in adherence [66]. Medication reminders utilising electronic pillboxes or health-apps have been well-accepted by the patients and associated with improved adherence [67].

Management of patients with HF is almost inevitably linked to polypharmacy (i.e. use of ≥5 medications), due to the GDMT complexity and frequent need to treat concomitant comorbidities. Treatment simplification by carefully deprescribing unnecessary medications (taking into consideration patient preferences and risk of post-withdrawal symptom exacerbations), treating comorbidities with appropriate HF drugs (e.g. arterial hypertension, angina, diabetes, chronic kidney disease etc.), and even development of a polypill containing several of the disease-modifying HF medications have been proposed to improve adherence/persistence [68,69]. Currently, a polypill-based strategy containing low fixed doses of spironolactone, empagliflozin, and a titratable dose of metoprolol-succinate, added to a titratable dose of renin-angiotensin system blocker (not included in the polypill) vs standard care is being assessed to evaluate the impact on left ventricular function in HFrEF patients (NCT04633005) [69]. Changes in health policies aimed to improve access to care and drug reimbursement may also foster treatment adherence. Notably, successful interventions that enhance patient adherence in HF have been shown to reduce the risk of death by 11% (HR, 0.89; 95% CI, 0.81 - 0.99), and decrease the odds for hospital readmission by 21% (odds ratio, 0.79; 95% CI, 0.71 - 0.89) [70].

Multidisciplinary care, cardiovascular rehabilitation, and patient education

Multimorbidity and frailty are prevalent in patients with HF and are associated with adverse outcomes, greater utilisation of healthcare resources and more complex management that can impede GDMT implementation and adherence [71,72]. To address the need for the multifaceted and coordinated care by multiple specialists, the Heart Failure Association (HFA) of the ESC proposed a concept of the Quality-of-Care Centres for HF management [73]. These centres are intended to provide an integrated multidisciplinary approach and smooth transition of care between different specialists and across different levels of care [73]. This approach is essential to manage both CV (e.g. atrial fibrillation, valvular heart disease, ischaemic heart disease etc.) and non-CV comorbidities (e.g. diabetes, chronic lung disease, chronic kidney disease, anaemia, electrolyte disturbances) ensuring compliance with different guideline recommendations and avoidance of therapeutic competition. It offers an opportunity to initiate cardiovascular rehabilitation and promote interventions such as smoking cessation, nutritional improvements, and other lifestyle modifications that can impact patient outcomes [74]. It is also essential for ensuring optimal care of patients with advanced HF. A meta-analysis of 74 trials has shown that multidisciplinary HF management can reduce HF admissions (relative risk, RR 0.87, 95% CI 0.79 - 0.95) and all-cause mortality (RR 0.70, 95% CI 0.61 to 0.81), supporting the integration of multidisciplinary care into existing healthcare systems [73,75]. However, many European countries either lack dedicated HF centres or have less than one such centre per million inhabitants, indicating the need for further reorganisation and development of healthcare infrastructure that can deal with a growing burden of HF [2].

Pre- and postdischarge cardiovascular rehabilitation, including structured exercise training and risk factor modification can help improve health status and quality

of life and reduce the risk of hospitalisation and mortality in a broad spectrum of HF patients, including the elderly and frail individuals [76-78]. Despite proven benefits, cardiac rehabilitation remains underutilised, and is further challenged by poor adherence, with dropout rates reaching 63%[79]. Improving implementation requires raising awareness among physicians and patients, alongside health policies that ensure affordable or reimbursed multidisciplinary rehabilitation programmes.

Patient education about HF symptoms, treatment significance, and necessary lifestyle modifications is another vital component of HF management. Education should be extended to family members and caregivers with an emphasis on disease management and psychological and social support. Effective self-care among HF patients in the community, including adherence to medications and life-style recommendations, appropriate symptom response, and consulting behaviours (i.e. contacting a healthcare provider when appropriate), has been demonstrated to significantly reduce the risk of clinical outcomes (HR, 0.66, 95%CI 0.46 - 0.96) compared to poorer self-care [80]. According to the HFA/ESC recommendations, patient education for effective self-care should encompass several domains as presented in **Table 4** [81]. Multidisciplinary care offers the most effective environment for engaging patients in education and promoting self-empowerment [73,81]. The multidisciplinary team should incorporate various specialists and trained nurses to provide educational sessions, informative materials, telemonitoring, and e-health support, tailored to individual patient characteristics, disease severity, health literacy, values, and preferences [81]. However, a unified approach to patient education and self-care has not yet been adopted across the heterogenous healthcare systems in Europe [2]. Therefore, healthcare professionals engaged in the management of HF patients should dedicate time and effort in patient education adapted to individual clinical needs and health literacy levels.

Table 4. Key elements of patient self-care

Self-care maintenance
Adherence to medications
Healthy diet and nutritional supplementation
Physical activity
Smoking cessation
Moderate alcohol consumption
Immunisation
Self-care monitoring
Early recognition of worsening HF signs and symptoms
Self-care management
Adjustments in diuretic doses in response to signs of fluid overload
Adjustments in other medication doses in response to symptoms
Adjustment in physical activity
Seeking medical assistance when necessary

According to reference [81]

Conclusions

Over the recent years pre- and postdischarge management of patients admitted for HF has received considerable scientific interest and advanced significantly. It now offers evidence-based options to improve patients' well-being and reduce the risk of hospitalisation and mortality. These options entail appropriate management of congestion, continuation or initiation and optimisation of GDMT before discharge, and postdischarge efforts to secure early and sustained follow-up, rapid GDMT up-titration to target doses, and access to multidisciplinary care addressing comorbidities, cardiac rehabilitation, and patient education. Persisting efforts to strengthen self-care capacities in both patients and their family members and broader utilisation of novel digital health technologies can also lead to improved uptake and adherence to medical treatment. Yet, gaps remain between guideline recommendations and their application in clinical practice. Despite numerous challenges, it is incumbent upon healthcare providers to close these gaps and enhance the quality of HF care.

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