



Review

Alternatives to Hospitalization: Adding the Patient Voice to Advanced Heart Failure Management

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ABSTRACT

Advanced heart failure (HF) is associated with the extensive use of acute care services, especially at the end of life, often in stark contrast to the wishes of most HF patients to remain at home for as long as possible. The current Canadian model of hospital-centric care is not only inconsistent with patient goals, but also unsustainable in the setting of the current hospital-bed availability crisis across the country. Given this context, we present a narrative to discuss factors necessary for the avoidance of hospitalization in advanced HF patients. First, patients eligible for alternatives to hospitalization should be identified through comprehensive, values-based, goals-of-care discussions, including involvement of both patients and caregivers, and assessment of caregiver burnout. Second, we present pharmaceutical interventions that have shown promise in reducing HF hospitalizations. Such interventions include strategies to combat diuretic resistance, as well as

RÉSUMÉ

L'insuffisance cardiaque avancée est associée à une utilisation considérable des services de soins de courte durée, surtout en fin de vie et souvent en contradiction totale avec les désirs de la plupart des patients, qui sont de rester à la maison le plus longtemps possible. Le modèle canadien actuel, centré sur les soins hospitaliers, n'est pas seulement incompatible avec les objectifs des patients, mais il est n'est pas viable vu le manque criant de lits constaté dans des hôpitaux de partout au pays. En tenant compte de ce contexte, nous présentons une perspective permettant de discuter des facteurs nécessaires pour éviter l'hospitalisation des patients atteints d'insuffisance cardiaque avancée. Il faut d'abord identifier les patients admissibles à des soins non hospitaliers en menant des discussions exhaustives sur les objectifs de soins qui se fondent sur les valeurs et qui portent notamment sur la participation du patient et de ses aidants et sur

A 79-year-old female breast cancer survivor, with chemotherapy-related dilated cardiomyopathy, presented to the cardiac clinic after recurrent hospital presentations.

Progressively, over the preceding 2 to 3 years, she had developed a loss of energy and a loss of interest in physical activities, accompanied by the progressive development of advanced shortness of breath and peripheral edema. The diagnosis of dilated cardiomyopathy, with severe biventricular systolic dysfunction, was made at the time of an earlier emergency room presentation, with a multigated acquisition (MUGA) scan, demonstrating a left ventricular ejection fraction of 16% and significant right ventricular dysfunction.

She continued to display signs of volume overload, including elevated jugular veins, mild hypoxia on room air, and profound pitting edema to the knees bilaterally. Her last dry weight of 52 kg had been measured several months earlier,

and her N-terminal pro-B-type natriuretic peptide (NT-proBNP) level was > 70,000 pg/mL. Her medications included apixaban 2.5 mg taken orally twice a day (po BID), furosemide 80 mg po BID (recently increased from 40 mg po BID), ramipril 1.25 mg po BID, and bisoprolol 1.25 mg taken orally daily. Hypotension and renal dysfunction precluded the further up-titration of guideline-directed medical therapy (GDMT). She had a palliative performance score¹ of 40% and was mainly bedbound, dependent on her spouse for the slightest of activities. Her Meta-analysis Global Group in Chronic Heart Failure (MAGGIC) score² was calculated at 40, predicting a 52.3% one-year mortality. She had very little appetite and was exhausted with the slightest of exertion. Despite these physical limitations, she described being at peace with her condition, and screening questionnaires did not identify depression or spiritual distress.

Ultimately, she was diagnosed with advanced heart failure (HF), based on repeated hospitalizations and refractory congestion despite attempted optimization of GDMT. During exploration of her person-centred goals, she clearly articulated her interest in remaining at home with family until the end of life, with a strong preference for a natural death at home. She valued the ability to visit with and continue to be an active participant in the lives of her children and

Received for publication January 17, 2023. Accepted March 31, 2023.

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See page 8 for disclosure information.

nondiuretic treatments of dyspnea, and the continuation of guideline-directed medical therapies. Finally, to successfully care for advanced HF patients at home, care models, such as transitional care, telehealth, collaborative home-based palliative care programs, and home hospitals, must be robust. Care must be individualized and coordinated through an integrated care model, such as the spoke-hub-and-node model. Although barriers exist to the implementation of these models and strategies, they should not prevent clinicians from striving to provide individualized person-centred care. Doing so will not only alleviate strain on the healthcare system, but also prioritize patient goals, which is of the utmost importance.

grandchildren. She was not interested in pursuing medical assistance in dying (MAID), as it was not in keeping with her religious and cultural values. Her goals of care (GOC) were fully supported by her spouse, who was present throughout the cardiology and palliative care assessments. Ultimately, using a collaborative approach involving cardiology, palliative care, and home care, and the use of intensified oral diuretics, oxygen, and low-dose opioids to control symptoms and improve volume status, she was able to achieve her goal of remaining at home until the end of life a few months later. This case illustrates the identification of a patient eligible for home-based care through the translation of a comprehensive GOC discussion, the use of a pharmaceutical approach that did not rely on inpatient intravenous (IV) diuretics, and a collaborative systematic approach to allow the patient to remain at home for end-of-life care.

Background

The Heart Failure Society of America defines advanced HF as persistent symptoms despite repeated optimization of therapies, along with frequent hospitalizations, a poor quality of life or difficulties conducting activities of daily living, and poor exercise tolerance.³ Patients experience signs of low output (confusion, fatigue, anorexia, renal dysfunction), and congestion (dyspnea, ascites, liver dysfunction, edema).⁴ Pain, depression, and anxiety are additional symptoms that may require management.⁴ HF is associated with high mortality; 50% of all HF patients and 80% of those with advanced HF will die within 5 years of diagnosis.^{4,5} Despite this incidence, the mortality associated with HF is often under-recognized and under-communicated, as studies have shown that both patients and physicians are poor at predicting survival.⁶

HF is associated with the extensive use of acute care services. Between 2021 and 2022, 67,972 Canadians were hospitalized with the primary diagnosis of HF, making this the third most common reason for hospitalization.⁷ Hospital admissions become increasingly frequent as the disease progresses. In a cohort of 5836 advanced HF patients, 64% visited the emergency department, 60% were hospitalized,

l'évaluation de l'épuisement des aidants. Nous présentons ici les interventions pharmaceutiques qui se sont révélées prometteuses dans la réduction des hospitalisations pour cause d'insuffisance cardiaque. Il s'agit de stratégies visant à lutter contre la résistance aux diurétiques et de traitements non diurétiques de la dyspnée, ainsi que de la poursuite des traitements médicaux indiqués par les lignes directrices. Enfin, pour bien soigner les patients atteints d'insuffisance cardiaque avancée à domicile, les modèles de soins, comme les soins de transition, la télémédecine, les programmes collaboratifs de soins palliatifs à domicile et les programmes d'hospitalisation à domicile, doivent être robustes. Les soins doivent être personnalisés et coordonnés par un modèle de soins intégré, comme le modèle en étoile (*spoke-hub-and-node*). Bien qu'il existe des obstacles à l'instauration de ces modèles et stratégies, ceux-ci ne devraient pas empêcher les médecins de s'employer à offrir des soins adaptés axés sur la personne. Cette pratique libérera le système de santé d'un poids et permettra de mettre de l'avant les objectifs des patients, qui sont de la plus grande importance.

and 19% were admitted to the intensive care unit in the 30 days prior to death.⁸ In Ontario, Canada, between 2010 and 2015, 75% of HF deaths occurred in-hospital, despite 70% wishing for an out-of-hospital death.⁹ The hospital-centric model of care applied to the advanced HF population is likely dependent on several factors, including poor understanding of patient preferences, underdeveloped outpatient alternatives, lack of comparable data to prove efficacy, and the high level of access to inpatient care driven by Canada's universal healthcare system. Ultimately, these factors translate to the reflexive behaviour, on the part of many care providers, of referring patients to the emergency department before fully considering and discussing potential home-based alternatives.

Unfortunately, the application of a hospital-centric approach to all advanced HF patients is associated with a number of inherent problems. First, universal hospitalization generally occurs against patients' wishes. Patients with HF often value quality of life over quantity, and they may wish to prolong their time at home, avoiding hospital admission and a hospital death.^{9,10} In addition to contravening patients' wishes, hospitalization can prove harmful to the vulnerable and frail HF population by causing iatrogenic infection, delirium, and functional decline.^{11,12} Hospitalization also can severely disrupt home supports, which can preclude discharge and promote longer stays, or can lead to the need for transfer to long-term care facilities.¹³ Finally, hospital-centric models burden the already strained Canadian healthcare system. In 2013, the costs of hospitalizations for HF as a primary diagnosis totaled CAD\$482 million, with costs expected to increase to CAD\$722 million by the year 2030.¹⁴ Not only are HF hospitalizations costly, they contribute to the growing hospital-bed availability crisis across the country. Patients who present to the emergency department not only face long wait times for assessment, but also, once admitted, often endure long waits in the emergency department before an inpatient bed becomes available (the 90th percentile for Canadian admitted patients was 40.7 hours in 2021-2022, which translates to 10% of admitted patients staying in the emergency department for almost 2 days).¹⁵ As an estimated up to 40% of readmissions

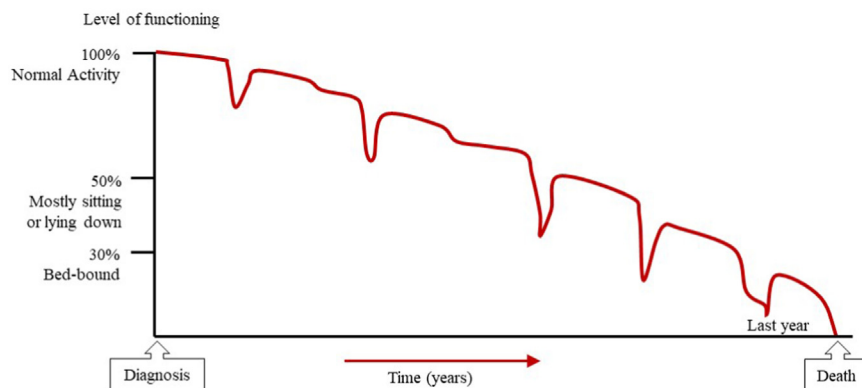


Figure 1. Advanced heart failure disease trajectory, characterized by the gradual decline over months to years, with intermittent exacerbations. Reproduced with permission from Steinberg et al.⁴ with permission from *Canadian Family Physician*. Adapted from Lunney et al.⁵²

for HF are preventable,¹⁶ the implementation of strategies to avoid inpatient care when possible is warranted.¹²

A reinvestment of resources is warranted to better align care with patients' wishes and address the rising pressures on the healthcare system in a cost-saving or neutral fashion. Given this context, we present a narrative to achieve the following: (i) help identify eligible advanced HF patients who could be managed at home via robust GOC discussions, consideration of caregiver burnout, and implementation of decision tools in the emergency room; (ii) discuss pharmaceutical interventions to keep eligible patients at home; and (iii) discuss system interventions to provide collaborative and integrated home-based care. We do not review these topics exhaustively, but rather have provided selected references to illustrate the concepts discussed. Finally, we do not intend to minimize the importance of inpatient HF care when it is appropriate, but we recognize the concept that each decision for each patient should be individualized and person-centred.

Identifying Patients Who Might Benefit from a Home-Based Approach to Care

The first step in considering alternatives to hospitalization for the advanced HF population is the identification of eligible patients. This includes comprehensive GOC discussions, to ensure that care aligns with patient preferences, and assessing for caregiver burnout, which can be a major barrier to outpatient management. Finally, as advanced HF patients frequently present to the emergency department, use of decision-making tools to help determine eligibility for home-based care would prove useful.

GOC

GOC discussions serve a pivotal role in determining whether hospital alternatives are appropriate for an individual advanced HF patient, by eliciting values and preferences for end-of-life care.⁵ Although difficult to study, GOC discussions have been associated with improved quality of life, greater patient satisfaction with end-of-life care, improved quality of communication, and increased compliance with patients' wishes.¹⁷⁻¹⁹ Available literature suggests that patients appreciate open and honest discussions, regardless of the difficult nature of such.²⁰ Furthermore, quality GOC

discussions are associated with fewer unwanted aggressive medical interventions, fewer hospitalizations, and increased use of hospice and palliative care services.¹⁸ Data from England have demonstrated that simply knowing a patient's wishes regarding their preferred location of death allowed 70% of patients to have those wishes realized.²¹ McCauley et al. demonstrated the success of eliciting patient preferences via an advanced practice nurse intervention for elderly patients with HF after hospital discharge.²² In this study, identified patient needs and wishes helped individualize patient care and also reduced the time spent in-hospital, in a cost-effective manner.²²

Unfortunately, prognostic uncertainty often leads to confusion and discord regarding GOC among patients, families, and the healthcare team.¹⁷ The disease trajectory of HF is not linear, and it is characterized frequently by an overall deterioration, punctuated with episodes of often unpredictable decompensations and transient recovery (Fig. 1).^{4,23} Comorbid health conditions further complicate the prediction of a clear pattern.²³ Other factors, including the lack of robust prognostic tools, and the efficacy of GDMT even in the advanced state, can make identification of the end of life challenging.⁴ As clinicians often face uncertainty in leading the discussions or assessing patient readiness for such conversations, GOC discussions often focus on a patient's view toward invasive procedures, rather than on their goals, values, and wishes, which produce more holistic and consistent informed decisions.^{18,19} These factors lead to missed opportunities for discussion and documentation of patients' wishes. For example, in a retrospective study including 24,291 patients admitted with HF, only 12.7% had a documented advanced directive.²⁴

Given the difficulties associated with GOC discussions, tools such as the Serious Illness Conversation Guide can help structure such interactions.¹⁹ Inclusion of certain components in the guide, such as illness understanding, information sharing, preferences, goals, fears, acceptable function, tradeoffs, and family involvement, has been shown to aid in creating effective conversations.^{19,25} Other decision tools and resources are available, such as best-case and worst-case scenarios and the Speak Up website (www.advancecareplanning.ca),²⁶ that can help elucidate healthcare goals in the context of an acceptable healthcare workload.²⁷ Regardless of the method

used, the discussion should be undertaken over an adequate period of time and should fully embrace person-centred care—that is, the concept that care is more than simply treating the disease itself.²⁸ Rather, person-centred care takes into account the disease experience and patient goals, and acknowledges that the best care stems from a collaboration among healthcare professionals, patients, and patients' families.²⁸

A common misconception is that GOC discussions are applicable to only those facing imminent death.²⁰ However, earlier conversations have the potential to allow for patient participation, a more person-centred approach to care, and more time to determine plans pertaining to end of life.^{20,29} A delay in having GOC conversations may require reliance on substitute decision makers, and is associated with increased use of life-sustaining treatments.¹⁸ A point to note is that GOC are not static, and patient preferences, acceptance of advanced therapies, and wishes regarding hospitalization can and will change over time; these should be revisited, especially at significant points in the disease trajectory.^{6,17,30} Additionally, inclusion of substitute decision makers in GOC discussions will not only allow for consideration of family perspectives and concerns,²⁷ but also promote informed decisions, should the substitute decision maker need to act on the patient's behalf. In order to ensure that GOC are addressed, they should be integrated into each HF clinic visit. Doorenbos et al. randomized 80 HF clinic patients to a GOC intervention vs usual care.³¹ The GOC intervention involved nurse-led previsit telephone coaching and education, from which patient mortality and individualized communication tips were provided to the HF clinician.³¹ GOC conversations were significantly increased in the intervention group (58% vs 2.6%), as was the quality of communication.³¹ Although this model is promising, it excludes those who are not followed by a HF clinic and so cannot be applied universally. In these cases, primary care providers, general cardiologists, or palliative care specialists may need to lead the discussion.

Advanced HF patients are complex medical patients. Those > 75 years of age have, on average, 5 additional chronic conditions, including a high prevalence of cognitive impairment.^{32,33} With the advancement of HF therapies, treatment is at risk of becoming too standardized.²³ Although they lead to systemic benefit in many patients, algorithms fail to acknowledge the medical complexity of advanced HF patients, and they may miss the mark on patient-focused outcomes (functionality, symptoms, or quality of life), which often are not studied in clinical trials.^{23,27} Furthermore, patients with multiple medical comorbidities almost always are excluded from clinical trials, making the translation of data to this population controversial.²⁷ Identifying which condition(s) contribute to which symptoms, and how the treatment of one symptom will affect another, are other challenges in this medically complex population.²⁷ This uncertainty should be communicated to the patient and family, to fully inform decision making and allow alternate priorities to guide discussions.²⁷

Ultimately, an understanding of patient priorities should be reached and understood by the healthcare team, the patient, and the family, taking into account life context, other medical comorbidities, and benefits and harms of each proposed intervention.²⁷ Such an approach not only will help

decrease conflicting care within the healthcare team,²⁷ but also will identify those advanced HF patients who may be eligible for alternatives to hospitalization.

Caregiver burden

The role played by caregivers in the HF narrative is often underappreciated. However, caregiver burden is an important consideration when determining patient eligibility for hospitalization alternatives. Caregivers are responsible for providing a wide spectrum of care, but they often have limited disease knowledge, especially as it relates to symptom management.³⁴ Caregivers can experience high levels of distress and burnout, which can lead to greater patient distress and lower treatment adherence.³⁵ These stressors are often amplified during periods of disease exacerbation and at times of transition in care, when caregivers often are not involved in discharge planning or provided with appropriate preparation.³⁶ Accordingly, caregiver depression, stress, and time providing care are associated with more-frequent hospitalization for the patient.³⁴ Conversely, one would hope that caregivers who feel better equipped to provide care would report lower levels of stress and would help patients remain at home. However, studies attempting to improve caregiver-reported outcomes, using a variety of methods, including nurse-led psycho-educational sessions, telemonitoring, and support groups, have produced mixed results.³⁴ Further research is necessary, including the effect of palliative care, and addressing the needs of caregivers during transitional periods in care, as this has the potential to help align treatment with patient goals and possibly reduce hospitalizations.^{34,36}

Rapid discharge models

Many advanced HF patients present to the hospital at times of symptom exacerbation, but not all require admission. Unfortunately, clinical equipoise alone does not predict outcomes adequately and can lead to unnecessary hospitalizations.³⁷ In fact, between 64% and 84% of HF patients presenting to the hospital are admitted.³⁸ Implementation of a decision-making tool to facilitate rapid discharge in appropriate patients would potentially help identify those advanced HF patients who are eligible for home-based care. Ten hospitals in Ontario participated in a cross-sectional cluster randomized trial, evaluating the use of a decision-making tool (the **Emergency Heart Failure Mortality Risk Grade for 30-day Mortality [EHMRG30-ST]**; n = 2480) vs usual care (n = 2972).³⁷ During the intervention phase, HF patients with an acute exacerbation were stratified based on the risk of death; low-risk patients were discharged early (≤ 3 days) to transitional care led by a nurse and supervised by a cardiologist, whereas high-risk patients were admitted.³⁷ The incidence of death from any cause, or hospitalization for cardiovascular causes, was 12.1% during the intervention phase and 14.5% during the control phase (adjusted hazard ratio 0.88; 95% confidence interval 0.78 to 0.99; $P = 0.04$) within 30 days.³⁷ The safety of early discharge for low- and intermediate-risk patients was further demonstrated by the fact that less than 6 deaths or hospitalizations occurred before the first outpatient follow-up appointment.³⁷ Although the study excluded patients with end-stage disease, as well as those enrolled in palliative care, the concept of calculating risks with risk scores

Table 1. Alternate care models to avoid hospitalization in patients with advanced heart failure

Model of care	Description
Transitional care	Services to provide safe and timely movement of patients across levels of healthcare and care settings (for example, from hospital to home) ³⁶
Telehealth	Use of technology to remotely communicate with or monitor patients ²³
Collaborative home-based palliative care	Provision of palliative care services in the home, through the integration of cardiology, palliative care, and primary care ⁹
Home hospital	A discreet, physician-led ward, located in the home of the patient ¹¹ Services include the provision of medications, collection of laboratory work, and ability to perform basic investigations. ¹¹ Patients can be admitted directly from the emergency room or transferred from a traditional inpatient ward. ¹¹
Integrated care	The management of health services, such that patients receive continual, coordinated care across care levels ⁴⁸ An example of integrated care applied to heart failure is the spoke-hub-and-node model. ⁴⁸

such as the EHMrg30-ST is an example of the need to individualize care.³⁷ Unfortunately, to our knowledge, no such algorithm exists for advanced HF.

Pharmaceutical Interventions

Multiple pharmaceutical strategies exist to help eligible advanced HF patients remain at home, including subcutaneous furosemide, synergistic use of diuretics, IV furosemide administered in an outpatient clinic, nondiuretic strategies, and continuation of GDMT.

Subcutaneous furosemide

Over time, advanced HF patients may experience diuretic resistance, despite escalating diuretic doses, due to gut edema, chronic kidney disease, low renal blood flow, and hypotension.³⁹⁻⁴¹ When this occurs, patients often present repeatedly to the hospital to receive IV treatment, despite their conflicting wishes to stay at home.¹³ Alternate preparations of furosemide exist and may be useful to combat diuretic resistance and allow for advanced HF patients to be treated in the home and avoid hospitalization. López-Vilella et al. demonstrated the safety and efficacy of oral solution and subcutaneous furosemide in 27 patients with advanced HF (New York Heart Association [NYHA] class III to IV).³⁹ Patients were included in the study if they experienced refractory congestion despite taking high-dose furosemide tablets (> 120 mg/d) and 2 additional diuretics.³⁹ The oral solution contained 250 mg furosemide given over 24 hours in 2 divided doses (n = 17).³⁹ Subcutaneous furosemide was administered via an elastomeric pump at a dose of 100 mg over 24 hours (n = 10).³⁹ After 5 days of therapy, functional status (NYHA class) improved from 3.7 ± 0.3 to 2.5 ± 0.7 (*P* = 0.0001) in the oral solution group, and from 3.8 ± 0.5 to 3.1 ± 0.7 (*P* = 0.02) in the elastomeric group.³⁹ A greater proportion of patients in the oral solution group (94.1%) experienced weight loss, compared to that in the elastomeric group (50%, *P* = 0.008).³⁹ Both groups experienced a nonsignificant increase in creatinine, and the number of hospital visits did not differ between treatment groups.³⁹ Problems with the elastomeric pump were minor; one patient developed a kink in the tubing, and a second developed local skin irritation.³⁹ Both cases were addressed by changing the equipment, thereby demonstrating the feasibility and

safety of using the pump in an outpatient setting.³⁹ Although the results of the oral solution arm appear promising, the findings should be interpreted with caution due to the very small sample size, the lack of comparison to tablets, and the inability to exclude the sizable effect from inclusion in the study itself. Further data are required to understand the efficacy of oral furosemide solution in the setting of diuretic resistance. A similar study by Zacharias et al. evaluated the use of subcutaneous furosemide (dose range from 40 to 250 mg daily) in 28 patients with advanced HF.¹³ Patients were managed by a multidisciplinary palliative-cardiology team and had access to 24-hour phone support.¹³ Treatment with subcutaneous furosemide resulted in weight loss in 70% of the population (median loss of 5.6 kg), with 93% avoiding hospitalization.¹³ Local site reactions occurred in 23% of patients and resolved spontaneously in all but 2 cases that required oral antibiotics.¹³

Synergistic use of diuretics

An additional strategy to combat diuretic resistance and need for hospitalization is the concomitant use of pharmacologic agents within different classes. Palazzuoli et al. evaluated the effectiveness of oral metolazone in addition to IV furosemide in a retrospective study of 132 patients with acute decompensated NYHA class III to IV HF requiring high doses (> 100 mg) of oral furosemide daily.⁴⁰ The addition of oral metolazone resulted in better diuretic response, and weight reduction, and it improved the congestion score at discharge.⁴⁰ No significant differences in renal function or electrolytes were present between the 2 groups.⁴⁰ Mullens et al. randomized 519 patients with acute decompensated HF, clinical signs of volume overload, and an NT-proBNP level > 1000 pg/mL or BNP level > 250 pg/mL, to IV acetazolamide (500 mg daily) or placebo, in addition to IV loop diuretics.⁴² Successful decongestion occurred in 42.2% of the acetazolamide group, compared to 30.5% of the placebo group at day 3.⁴² Although we are not aware of a similar study using oral acetazolamide, benefit from this agent is theoretically possible, owing to its high bioavailability.

Intravenous furosemide

Outpatient IV clinics can serve as a useful tool for advanced HF patients who require IV diuresis for worsening

symptoms, or are not sick enough to require hospitalization, or in order to shorten hospital stays. The **Outpatient Intravenous Lasix Trial (OUTLAST)** was a single-centre randomized controlled trial in which 100 HF patients (NYHA class III to IV) who were recently hospitalized for an acute exacerbation were randomized to one of the following groups: (i) standard of care; (ii) IV placebo; and (iii) IV furosemide.⁴³ Groups (ii) and (iii) attended biweekly clinics for IV therapy, medication reconciliation, and education for 1 month.⁴³ Hospitalizations were significantly reduced in the IV furosemide group; 17.1% were rehospitalized in the standard-of-care group, 22.6% in the IV placebo group, and 3.7% in the IV furosemide group at 30 days.⁴³ Arranging for IV diuresis in a day hospital setting would provide greater benefit, by facilitating access to multidisciplinary resources, such as a dietician and a pharmacist.¹²

Nondiuretic strategies

Around 90% of advanced HF patients will experience dyspnea, which has a major impact on quality of life and, when inadequately controlled, can lead to hospitalization.^{5,39} Other nondiuretic strategies exist to treat dyspnea and should be employed to ensure that patients remain at home. Non-pharmacologic strategies include exercise, breathing training, use of a fan, and walking aids.⁵ Home oxygen therapy is beneficial only if associated hypoxia is present.⁵ Opioids may be prescribed for persistent dyspnea and can be intensified when exacerbations occur, as a few small studies suggest that they have long-term benefit in the setting of advanced HF.⁵ Finally, in select cases, intermittent infusion of IV inotropes may be appropriate to relieve symptoms and improve quality of life, even in the palliative setting,⁵ but the accessibility of outpatient IV inotropes is presently quite limited and site-specific.

GDMT

Finally, GDMT should be continued in the advanced HF population, as tolerated by heart rate and blood pressure, to improve symptoms and reduce hospitalization.⁴⁴ A recent meta-analysis including 186 randomized controlled trials found the following guideline-recommended interventions to be beneficial in reducing hospitalization, with moderate to strong evidence: angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, mineralocorticoid receptor antagonists, cardiac rehabilitation, and cardiac resynchronization therapy devices.⁴⁴ Unfortunately, in advanced HF patients, de-escalation rather than up-titration of GDMT is often dictated by frailty, hypotension, and concomitant multiorgan involvement.^{3,4} Finally, in patients with intracardiac devices, consideration of defibrillator deactivation should be made, to avoid unwanted shocks.⁴

Systems Interventions and Integration of Care

Once an advanced HF patient is deemed eligible for hospital alternatives, an appropriate clinical model may be implemented. Possible models include transitional care, telehealth, home-based palliative care, home-hospital programs, and MAID, as summarized in [Table 1](#). To achieve success, these system interventions cannot exist in isolation but rather must exist as a component of integrated care.

Transitional care

Advanced HF patients are frequently hospitalized for a multitude of reasons, as stated above. Interrupting the cycle of recurrent hospital stays requires robust transitional care programs that can provide timely follow-up. Unfortunately, transitional care resources are often underdeveloped or nonexistent, precluding early discharge,³⁷ and the lack of services has been linked to high rehospitalization rates, especially in older adults with multiple comorbidities.⁴⁵ Additionally, transitional care programs are often heterogeneous, making systematic evaluation difficult.⁴⁶ For example, transitional care consisting of high-intensity home visits or a multidisciplinary HF clinic has been shown to reduce all-cause readmission rates in a systematic review and meta-analysis.⁴⁶ However, other models, such as patient education or telecommunication in isolation, do not appear to affect readmission rates.⁴⁶ The disparity in transitional care outcomes was demonstrated by the **Patient-Centered Care Transitions in HF (PACT-HF)** trial, which randomized 2494 discharged HF patients to a transitional care program vs usual care (follow-up at the discretion of the treating clinician).⁴⁷ This particular transitional care program consisted of patient education, a structured hospital discharge summary, a primary care provider visit within 1 week of discharge, and a referral for nurse home visits and heart function clinic assessment in high-risk patients (< 40% of the intervention group).⁴⁷ No between-group differences were observed in the time to all-cause readmission, emergency department visit, or death at 3 months.⁴⁷ The lack of favourable outcomes may be explained by the population studied, which was older, had more comorbidities, and included patients without fixed addresses, or those residing in nursing homes.⁴⁷ Many of these patients would have been excluded in other trials, and they may not represent ideal candidates for this model of care.⁴⁷ Although this approach should not necessarily discount the use of transitional care, it stresses the need to correctly identify appropriate follow-up methods for each individual patient.

Telehealth

Telehealth, which can range from virtual physician visits to the use of devices that transmit physiological data, has demonstrated conflicting results when applied to the HF population, again likely due to the variety in models.^{23,48} Although meta-analyses have shown positive outcomes,⁴⁴ these have been criticized for publication bias and the inclusion of poor-quality, heterogeneous studies.²³ A hermeneutic systemic review attempted to synthesize the available literature into several observations to overcome this issue.²³ The authors of the review concluded that telemonitoring is most successful in reducing hospitalizations when it is applied to high-risk patients after hospitalization, involves the monitoring of many variables (such as symptoms, pulse, and heart rhythm), is followed by rapid medication titration, and occurs in situations in which the control arm is receiving suboptimal care.²³ Shortcomings have been cited, and they include patient preference for in-person visits, and the need for clinical assessment, creating issues for trials with low recruitment.²³ Certainly, a role exists for telehealth in person-centred care; an example is individuals living outside urban centres who wish to reduce their travel. However, further research is

required to characterize those individuals who would benefit most, and determine how to integrate available technologies while ensuring that care addresses the person as a whole.

Collaborative home-based palliative care

Collaborative home-based palliative care (CHPC) programs have been associated with improved quality of life, reduced healthcare use, and an increased chance of realizing a patient's wish to die at home.⁹ Unfortunately, palliative care historically has been underutilized in the HF population, due to the difficulty in predicting end of life,⁴ and the lack of palliative care services to follow patients for a longer period of time, when death is not as imminent. The lack of recognition of end of life in the HF population is highlighted by European data, which show that the mean time from a palliative-care referral to death is less than 2 weeks.⁵ The benefits of a CHPC program were demonstrated in a matched cohort study conducted between 2013 and 2019 in Ontario.⁹ Outcomes of adults who died of chronic HF who were receiving CHPC (n = 245) were compared to outcomes of those receiving usual care (n = 1172).⁹ The CHPC program, utilized in patients aged 88.2 ± 7.9 years, promoted GOC discussions, and included collaboration among palliative care specialists, primary care providers, and cardiologists.⁹ CHPC was associated with a lower chance of death in the hospital, at 41.2%, as compared to 78.2% in the usual-care group.⁹ Additionally, patients in the CHPC group spent a longer time at home (a median of 29 days, compared to 20 days in the usual-care group) and experienced fewer hospital admissions (relative risk [RR], 64%), emergency room visits (RR, 67%), and intensive care unit admissions (RR, 57%).⁹ In addition to favourable patient outcomes, CHPC is cost effective, estimated to decrease costs by CAD\$4400 per patient in one analysis conducted in Ontario.⁴⁹ Despite these favourable statistics, only 32% of HF patients at the end of life received CHPC in the province.⁹ Referrals based on patient needs rather than estimates of survival time may help to overcome difficulties in predicting end of life.

Home hospital

A home hospital represents the highest level of care available to HF patients in the outpatient setting. Home hospitals provide hospital-level services in a patient's home, essentially functioning as a discreet ward with nurse and physician home visits.¹¹ Tibaldi et al. described a population of older (aged > 75 years) comorbid patients with acute decompensated HF (> one-third NYHA class IV) randomized to the general medical ward (n = 53) vs a physician-led geriatric home-hospitalization service (n = 48).¹¹ Patients admitted to the home-hospital service were transferred home within 24 hours of the emergency department visit.¹¹ Mortality was 15% at 6 months, with no significant between-group differences.¹¹ No differences occurred in the number of subsequent hospitalizations, but the time to first hospital admission was longer in the home-hospital group (84.3 days vs 69.8 days), and the mean total cost per patient was lower (USD\$2604.46 vs USD\$3027.78).¹¹ Home-hospital patients further benefited from more-favourable quality of life, nutrition, and depression

scores, and lower (although not statistically significantly lower) rates of infection and delirium.¹¹ Although the length of stay was longer for home-hospital patients (20.7 days vs 11.6 days), no home-hospital patients were transferred to long-term care facilities (as opposed to 16% of medical ward patients).¹¹ A home-hospital model is limited by the requirement of a robust program with intensive visits from healthcare workers and the ability to provide basic testing and bloodwork, if indicated, in the home.¹² Additionally, the generalizability of the home-hospital model is limited, and patients must be selected carefully. For example, in the Tibaldi et al. study, patients were excluded for any of the following reasons, which represented 65% of the eligible population: were newly diagnosed with HF; lived outside the hospital catchment area; lacked social supports; required invasive treatment; suffered from severe dementia, renal impairment, liver failure, terminal cancer, or anemia (hemoglobin < 90 g/L); or were awaiting cardiovascular surgery.¹¹

MAID

Finally, in discussion of person-centred care and alternatives to hospitalization in the advanced HF population, some patients may request MAID. The intricacies of this topic are beyond the scope of this narrative piece. Although MAID remains an individualized choice of some advanced HF patients, current Canadian statistics show that most HF patients do not opt for MAID.⁵⁰ Palliative care and ongoing cardiac care remain much more frequently utilized services.

Collaboration and integration of care

Integrated care is the provision of health services in a continual manner across levels of care to meet an individual's needs of health promotion, disease prevention, diagnosis, treatment, rehabilitation, and palliative care (Table 1).⁴⁸ Following a person-centred care approach, each individual advanced HF patient will require different system and pharmaceutical strategies to remain at home, based on their unique set of preferences, goals, and social situations, requiring collaboration among levels of care and care providers. A proposed model to realize integrated care for the HF population is the spoke-hub-and-node model.⁴⁸ Patients are organized into 3 levels, depending on complexity and risk.⁴⁸ Low-complexity and low-risk patients are cared for in the spoke, usually by primary care providers.⁴⁸ Moderate-complexity and moderate-risk patients are cared for in the hub by a multidisciplinary team, led by an internist, cardiologist, or primary care provider with HF training.⁴⁸ Finally, the highest-complexity and highest-risk patients are cared for in the node, by a multidisciplinary team led by a HF physician.⁴⁸ Patients managed in the spoke can receive consultation and diagnostic testing from the hub and node levels, which could also include palliative care and geriatric specialists.⁴⁸ The model stresses ongoing reassessment of patient risk and complexity, along with coordination within the framework, allowing for patient reallocation as indicated.⁴⁸ This model is favourable, as it stresses collaborative care and patient access, shifts the focus of care to the community, and acknowledges each patient as a unique individual with unique needs.⁴⁸

Limitations

The major limitation facing advanced HF patients who wish to avoid hospitalization is the implementation of alternate outpatient care models and integrated care, which require major health system change—a process requiring time, considerable effort in planning, and anticipated extensive resources. HF hospitalizations and end-of-life care contribute large costs to the healthcare system, and models to promote outpatient care possess the potential to reduce these costs.³⁹ Although home-based palliative care, home hospitals, and telehealth have demonstrated cost effectiveness,^{11,23,49} most studies evaluating the efficacy of alternate models are small and do not include a cost analysis, making generalization challenging.^{43,46} At the very least, these strategies should be considered as a reallocation of resources to offset pressures on the hospital system and better meet patient needs.⁵¹ Alternative funding models, including sharing of funding among hospitals and community partners, or bundled funding rather than fee for service to promote collaborative care, have also been proposed.^{48,51}

Additional limitations include the lack of randomized trial evidence and prospective data.¹² However, treating each patient as identical to those enrolled in randomized controlled trials fails to tailor care to the individual, which is central in meeting a patient's needs and helping them avoid hospitalization. In other words, randomized data should be strongly considered, but implementation requires careful consideration of their applicability to each patient. Furthermore, although diuresis protocols exist and are used in CHPC programs,⁹ they remain unvalidated.¹² Again, the lack of a protocol should not be viewed negatively when the goal is to provide individualized care. Additional limitations include unclear medical responsibility, the need for always available “rescue” care, as well as mechanisms for sharing of health data among care providers.¹² Hopefully, these perceived barriers will not impede the spread of alternate care models, as they possess the potential to significantly improve care for advanced HF patients.

Conclusion

Advanced HF patients experience high rates of hospital admission, despite the fact that many of them wish to remain at home as long as possible. This was certainly the case with our patient, who, after much conversation, education, and reflection, chose home-based care at end of life. Given this context, and the evolving hospital-bed availability crisis across the country, measures should be employed to ensure that more patients' wishes are met. Realization of the wish of these complex medical patients to remain at home requires the following: (i) determination of patient eligibility through ongoing comprehensive GOC discussions, assessment of caregiver burden, and use of decision tools upon emergency department presentation; (ii) pharmaceutical interventions to manage diuretic resistance; and (iii) system interventions and integrated care to provide home-based alternatives. As the comparative data are relatively sparse, further research is indicated to reduce hospitalization rates in the advanced HF population. We challenge healthcare professionals and government officials to “think outside the box” and strive to implement policies and systems that place our patients' needs at the forefront of their personalized care.

Ethics Statement

The patient case has been significantly edited and altered to highlight important concepts and to preserve patient anonymity.

Funding Sources

The authors have no funding sources to declare.

Disclosures

The authors have no conflicts of interest to disclose.

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