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Hospice in heart failure: why, when, and what then?

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Abstract Hospice is a model of care for patients nearing the end of their lives that emphasizes symptom management, quality of life (QOL), and support of the patient and caregiving family through the death of the patient and the family's bereavement. It is associated with high patient and caregiver satisfaction and appears to not shorten lifespan for appropriately referred patients. Patients with advanced heart failure are being referred to hospice care more often than in the past, but the majority of deaths occur without this benefit. Hospice care in the USA is defined by the Medicare Hospice Benefit and associated regulations. Hospice is appropriate for patients with an expected survival prognosis of 6 months or less, and multiple predictive factors and tools are available to assist in prognostication. Management of symptoms and specific drug therapy options are discussed. For many patients, deactivation of electronic cardiac devices is appropriate when the goals of care are comfort and QOL. Ongoing collaboration of the referring physician with the hospice agency and staff offers opportunities for seamless and quality care.

Keywords Hospice · Heart failure · Palliative care · Symptom management · Prognostication

Case presentation

G.A. is an 84-year-old man who presented to the local emergency department for worsening cough and dyspnea. He has had recurrent lower respiratory infections and has known heart failure (HF) from ischemic cardiomyopathy; left ventricular ejection fraction (LVEF) 4 months previously was 25%. Evaluation demonstrates a respiratory rate of 32/min, blood pressure (BP) of 116/72, a regular cardiac rhythm with a rate of 92/min with a blowing holosystolic murmur and audible S3. Chest X-ray shows worsening bibasilar infiltrates, and serum B-type natriuretic peptide level is elevated at 3450 pg/ml; he was transferred to a tertiary care center for exacerbation of HF.

Ten years earlier, G.A. suffered an acute myocardial infarction with cardiac arrest and received extended roadside bystander cardiopulmonary resuscitation. Coronary artery bypass grafting and implantable cardioverter defibrillator (ICD) placement were performed, and in time, he regained baseline physical and cognitive function. He carries a diagnosis of chronic obstructive pulmonary disease (COPD) as well as an intermediate-grade lymphoma in sustained partial remission on no current therapy.

He is found to have an organizing bibasilar pneumonia, but bronchoscopic specimens show no pathogen. Repeat echocardiogram reveals an estimated LVEF of 10%, and right heart catheterization shows pulmonary capillary wedge pressure of 25 mmHg. Relevant laboratory studies include serum sodium of 131 mEq/l, potassium of 4.1 mEq/l, urea nitrogen (BUN) of 34 mg/dl, creatinine of 2.8 mg/dl, and hemoglobin of 11.3 g/dl. He is treated with antibiotics and a doubled dose of furosemide and is continued on his remaining prehospitalization medication regimen of losartan, carvedilol, and spironolactone.

Ten days after discharge, he is readmitted to his local hospital with marked worsening of cough, dyspnea, orthopnea, and development of new bilateral lower extremity edema. Despite corticosteroids, antibiotics, and increased diuretic dosing, his cough, orthopnea, and dyspnea persisted, with nocturnal symptoms severe enough for him to say, "If this

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goes on, I may not be here by morning." The patient's goals of care were reassessed in discussions with his physicians and family.

Introduction

Hospice is a model and system of care for individuals nearing the end of their lives, with a primary focus on quality of life (QOL). This is accomplished by expert symptom assessment and palliative management, support of the patient and family through the end of life, and bereavement services after the patient's death. In 2013, 58,309 Americans died of HF, and in a further 226,079, it was a contributing factor to their demise [1]. Hospice care has been underutilized patients with heart failure [2] though recently that trend is changing. Year 2014 data show that heart disease was responsible for 23.4% of American deaths, and that same year, patients with heart disease made up 14.7% of those served by hospices [3, 4].

HOSPICE 101

In order for a referring physician to efficiently collaborate with a hospice agency in the management of a patient, it can be helpful to have a basic understanding of the mandates and system of hospice care delivery in the USA.

The Medicare Hospice Benefit and Conditions of Participation

The delivery of hospice care in the USA is nearly always based on the Medicare Hospice Benefit (MHB) established by congress in 1982. Medicaid programs and most, though not all other, third-party payers structure their benefits similarly. Patients are eligible for the MHB if they are covered under Medicare Part A, are certified by two physicians to be terminally ill, defined as having an expected survival prognosis of 6 months or less, and if they choose this benefit [5]. Patients who elect the hospice benefit relinquish their Part A coverage for conditions contributing to the terminal prognosis. The chosen hospice agency is charged with managing these conditions, the symptoms associated with the disease(s) and treatments, and the terminal status itself [5].

The responsibilities of the hospice agency are defined by the Conditions of Participation (COP) that outline requirements for care, processes, documentation, and reimbursement [5]. A major onus for the agency (specifically for the Medical Director) is certification of terminal prognosis. The initial certification, including a narrative statement supporting that certification remains in effect for 90 days, at which time this process is repeated, again with 90-day validity. At 180 days of continuous service, and each subsequent 60 days (or after any patient-initiated revocation with subsequent re-election of the MHB), a personal face-to-face visit by a physician or nurse practitioner employed by the agency must be performed, the findings of which must be used to support the recertification of terminal prognosis. In hospice parlance, each of these intervals of recertification is termed a "benefit period," and there is no limit to the number of such periods providing the patient's anticipated survival remains 6 months or less from that point and that the patient chooses to remain covered by the hospice program.

The basic reimbursement structure of the MHB is a per diem payment to the agency for each patient-day of hospice care. This capitation gives the agency fiduciary responsibility and authority in policies and decisions regarding the care of the patient. While this system provides a reliable reimbursement stream, it can produce difficult choices for the hospice agency.

Hospice care like all good palliative care is team-based. Hospice agencies are required to provide patients with medical, nursing, social work, spiritual care, home health aide, trained volunteer, and bereavement services. Many hospice programs also provide expressive therapy (art and/or music), massage therapy, or other benefits, though there is no payment provided for these through the MHB.

Hospice agencies are required to provide all durable medical equipment for management of the patient's terminal conditions and symptoms. For the physician, this means that there are no medical necessity forms for such items as hospital beds, assistive devices, and oxygen, although agency policies do vary.

With regard to drug therapy, the hospice provider must provide and manage all medications for "palliation and management of the terminal illness and related conditions as identified in the hospice plan of care (POC) [5]." Hospices are allowed to bill a co-pay of 5% with a maximum charge of $5 per prescription for covered medications, but most agencies do not collect this fee. This drug benefit can be a tremendous benefit to the patient, especially for those with complicated or expensive medication regimens, particularly as it eliminates conventional pharmacy co-payments, deductibles, and gaps in pharmacy coverage (known as "doughnut holes"). However, this does not mean that a hospice must cover every prescribed medication. Hospices are encouraged to have formularies or preferred drug lists, to offer therapeutic substitutions for medications for which an acceptable alternative drug or other treatment modality exists or even to deny coverage if a proposed medication (or imaging, procedure, or other intervention) is not consistent with the patient's goals and the hospice POC. Descriptions of how this process can affect specific drugs or interventions appear later in this article. One important but infrequent caveat is that patients are free to continue to take any medication prescribed for the conditions for which they are receiving hospice care, but if this is not covered by the hospice POC, it will likewise not be covered by any Medicare

Part D plan. In this case, the financial burden falls to the patient. Open and ongoing communication between the hospice agency, prescriber, patient, and pharmacy is essential in order to assure seamless and efficient care.

Issues raised by MHB and COP

An inevitable result of the tension between the intense regulatory environment for hospices and the relative freedom providers have in implementing these regulations is that there can be considerable variability between and among hospice agencies. This has been summarized as, "If you've seen one hospice program, you've seen one hospice program." A small community faith-based organization will undoubtedly differ in culture and policies from a large regional agency that is a subsidiary of a national for-profit corporation, yet both can deliver effective hospice care for the majority of patients and families.

One major issue to consider, especially for the patient with terminal heart failure, is the fact that heart failure hospice care often involves a layer of clinical complexity that is less often seen in patients with malignancy or dementia [2], such as management of multiple medications and advanced technologies. The ability of hospice clinicians to accurately assess and care for these patients is variable as is the agency's financial ability to absorb the costs of this care. For example, the drug and equipment costs for a continuous milrinone infusion will likely consume the bulk of an agency's per diem reimbursement for a patient. Hospices are prohibited from approving or denying a specific drug or treatment primarily on the basis of cost, provided that it is within the patient's goals and hospice POC. An agency can and should opt to not admit a patient if it has insufficient clinical or financial resources to provide appropriate care. It is advantageous therefore for a physician considering a hospice referral for a patient to understand these inter-agency differences and be familiar with hospice agency options available to patients in their service area.

Why to refer

Patients with advanced HF can find themselves in a situation in which they are required to expend increasing energy in the work of managing their disease and its treatment [6]. Balancing dietary restrictions, monitoring weight, adhering to complex medication regimens, and dealing with an often fragmented and frustrating health-care system requires significant patient and caregiver effort. As the disease and the comorbidities that frequently coexist worsen, this work requirement increases, while the capacity of the patient to expend the effort diminishes [6]. While individual choices and decisions change over time and do not necessarily directly relate to the status of disease or extent of symptoms [7], eventually many reach a point at which the effort to continue a disease-directed approach becomes excessively burdensome or futile. This can evolve gradually, but often, the realization that such a point has been reached occurs with an acute deterioration or hospitalization. Hospice care, with its primary goals of QOL rather than treatment of disease, presents a viable option for these patients.

The focus of the hospice POC on the patient and family, with expert symptom assessment and palliative management, psychological, spiritual, and bereavement support, clearly improves QOL at the end of life and excels in empowering patient and family autonomy and choices during the final phase of life [8]. Surviving caregivers of HF patients who were enrolled in hospice express high levels of satisfaction with the care the patient received, with some 93% satisfied with the symptom management [9]. While perhaps counterintuitive, this change of focus from disease modification to symptom management and QOL does not decrease lifespan and may actually be associated with a lengthened life [10].

Costs and health-care utilization

Patients with HF who are enrolled in hospice experience significantly fewer episodes of hospitalization and intensive care unit admissions than those not enrolled [11]. In a study of Medicare beneficiaries hospitalized for HF in Alabama, those who were referred to hospice at discharge were readmitted within 30 days at a rate of only 5% compared with a 41% rate for a matched cohort not referred to hospice but who died within 6 months. This dramatic difference persisted 90 days and 6 months post-discharge [12]. Despite lower inpatient and intensive care utilization, overall Medicare expenditures are similar during the final 6 months of life for those receiving hospice care and those without it [11].

When to refer

Survival prognostication

In the USA, hospice care is considered to be appropriate when the survival prognosis of the patient reaches 6 months or less. Language in the Medicare regulations suggests that a "more likely than not" standard is most appropriate. Survival prognostication in patients with HF has been examined repeatedly over the past decades but remains an inexact science [13]. Patients and families significantly overestimate likelihood of survival [14], though this may be in large part due to lack of information and understanding. Estimates by clinicians are more accurate, with one study suggesting nurses' estimates more on target than those of physicians [15].

Patients with HF may succumb via sudden cardiac death or pump failure with metabolic derangement and coma [7].

Similar to those with cancer and other terminal illnesses, death is often preceded by a period of declining functional capacity and increasing need for assistance with activities of daily living [8], and these functional declines occur with a more rapid rate of change than previously. For a patient with a consistent relationship with a single or small group of observant clinicians, such functional deterioration can lead to a recognition that the trajectory of disease is changing and as such is likely entering a terminal phase.

With the current common fragmentation of care and the "ballot box" functionality of many electronic medical record systems (simple to put items in, difficult to get desired meaningful information out), this type of longitudinal image of a patient's course may be less obvious. Multiple studies have attempted to develop "snapshot" prognostication tools utilizing available clinical information to produce quantitative estimates of survival. As discussed elsewhere in this issue, frequently identified predictors of high risk of mortality include age, New York Heart Association functional class IV, elevated heart rate, hypotension, hyponatremia, elevated BUN, and the presence of comorbidities such as COPD, malignancy, renal insufficiency, anemia, cerebrovascular or peripheral vascular disease, and dementia [13]. LVEF and the cause of the HF (ischemic vs. other) are much less predictive than might be intuited [13].

While there is no universally applicable prognostic model, two tools with particular utility in predicting survival for potential hospice referral using routinely available clinical data are illustrated in the tables along with scoring examples from the case presentation from the start of this article. The Heart Failure Risk Scoring System (HFRSS) [16], summarized in Table 1, was derived from the Canadian Enhanced Feedback for Effective Cardiac Treatment (EFFECT) study of newly hospitalized patients with a primary diagnosis of heart failure. It uses a point scoring system from admission clinical findings and comorbidities to produce 30-day and 1-year mortality estimate quintiles from "very low" (1-year mortality of ~2.7%) to "very high" (~74.7%) [16]. An even simpler predictive tool is a four-item risk score derived from patients aged ≥70 admitted with a diagnosis of HF [17] and is illustrated in Table 2. BUN >30 mg/dl, systolic BP <120 mmHg, presence of peripheral arterial disease, and serum sodium <135 mEq/l each were identified as independent clinical correlates of 6-month survival prognosis; with none present, the mortality risk is 3.7% and with ≥3 present 66.7% [17].

Despite the availability of these tools, hospice care remains underutilized for patients with HF [2]. A simple screening tool is the "surprise" question: "Would you be surprised if this patient died in the next 12 months?" A "no" response by the physician strongly correlates with high mortality risk [18] and should stimulate a more careful evaluation of prognosis and discussion with the patient regarding goals of care.

Communication and goals of care

One issue that has been raised in several studies is that patients with advanced HF may not understand that their disease is likely to cause their death [7, 13]. This can be particularly true for those whose illness has extended over a longer period of time and has been characterized by stepwise episodes of exacerbation or decline each followed by recovery of much but not all functional capacity, often at a cost of adjusted or increasingly complex medication regimens. These repeated "bounce-backs" can then produce a sense of "fixability" as regards the patient's understanding of the condition and expectations for the future. These can be supported in the patient's mind when their encounters with their heart failure clinicians and team focus predominantly on test results and medications. Because patients with HF can die before entering a recognizable "terminal" phase, it is recommended that the issue of dying be first addressed early in the course of the disease [13]. Issues and techniques of physician-patient communication are dealt with in detail elsewhere in this issue. HF exacerbation or the need for a new medication present ideal opportunities to reassess the patient's understanding of the disease and current and future goals of care.

Managing the hospice patient with heart failure

Referral and collaboration

One concern of patients with HF who are referred to hospice is that they will lose their relationship with physicians and other members of the HF team that they have come to depend on [19]. This is commonly expressed as a fear that their new support team will not have the same level of understanding and skill in managing their care, especially if their treatment includes complex drug regimens or devices. A patient may desire their cardiologist to remain as attending physician after hospice admission, but often specialists elect for the primary physician or hospice medical director to assume this duty. Difficulties in care transition are accentuated if the hospice team does not have the patient's clinical records available early on. In a study of hospice agencies caring for HF patients, medical information the hospice team considered important for prognostication or ongoing care was provided or readily available to them only about half the time [20]. As with all medical referrals, outcomes are much more likely to be optimal if the transition is seamless.

Symptom management

Details of pharmacologic management of various symptoms in HF are discussed elsewhere in this issue, but the following

Table 1 Heart Failure Risk Scoring System (HFRSS), adapted from Lee et al. [16], used by permission

Variable	Points	Score for patient G.A.
Age (years)	+ Age (years)	84
Respiratory rate (min = 20, max = 45)[a]	+ RR (breaths/min)	32
Systolic blood pressure (mmHg)		
≥180	−50	
160–179	−45	
140–159	−40	
120–139	−35	
100–119	−30	-30
90–99	−25	
≤90	−20	
BUN (max. = 60 mg/dl)[a]	+ Level (in mg/dl)	34
Serum sodium concentration <136 mEq/l	+ 10	10
Cerebrovascular disease	+ 10	
Dementia	+ 15	
Chronic obstructive pulmonary disease	+ 10	10
Hepatic cirrhosis	+ 35	
Cancer	+ 15	15
Hemoglobin <10.0 g/dl	+ 10	
Point total[b]	1-year mortality rate	
≤60 (Very low)	2.7–7.8%	
61–90 (Low)	12.9–14.4%	
91–120 (Intermediate)	30.2–32.5%	
121–150 (High)	55.5–59.3%	121[b]
≥150 (Very high)	74.7–78.8%	

[a] Values higher than maximum or lower than minimum are assigned the listed max. or min. value

[b] Point total = numerical sum of all items in Points column

summary emphasizes aspects of control of these symptoms specifically in the hospice context.

Dyspnea

Dyspnea is defined as "a subjective experience of breathing discomfort that consists of qualitatively distinct symptoms that vary in intensity" [21]. Shortness of breath is considered a hallmark symptom of HF, occurring in 50–88% of patients with advanced HF patients [22, 23], and is more common than the particular "classic" symptoms of orthopnea or paroxysmal nocturnal dyspnea [22]. Caregivers of deceased HF hospice patients see successful management of the patient's dyspnea of high importance in their satisfaction with hospice care [9]. Clinicians and researchers have traditionally evaluated dyspnea based on observational or physiologic data such as tachypnea or hypoxemia, but it has become clear that the sensation of breathlessness is inherently a patient-experienced and therefore patient-reported quantity, and correlation between symptom burden and physiological measurement is poor [24]. While physical mechanisms (hypoxemia, muscle fatigue, airway obstruction, etc.) contribute greatly to shortness of breath, the breathlessness experience can also be greatly impacted by psychological, social, and spiritual factors, leading to a concept of "total dyspnea" [24]. The bedrock of dyspnea management in heart failure is the optimization of the medication regimen including diuretics [13], and this is the primary reason that most hospice agencies consider these agents as having palliative intent and include them as part of the hospice POC.

Table 2 Four-item prognostic scale[a]

One point each for:	Point total	Predicted 6-month mortality
BUN >30 mg/dl	0	3.7%
Systolic BP <120 mmHg	1	16.3%
Peripheral arterial disease	2	41.0%
Serum Na^+ <135 mEq/l	>3	66.7%
Score for patient G.A.	3[b]	

[a] Validated for hospitalized patients aged ≥70

[b] One point each for BUN of 34, SBP of 116, and serum Na^+ of 131

The most effective and therefore first-line pharmacologic agents for treatment of dyspnea as a symptom are opioids [13, 25]. Though relief of dyspnea is likely an effect of most if not all members of the opioid class, by far the most experience has been with morphine which, in opioid-naïve patients, can be used in low oral doses such as 10 to 20 mg daily in divided doses [25]. There is experience and evidence for both scheduled long-acting and taken as needed short-acting regimens though many experts recommend scheduled dosing titrated to the desired effect [25]. Significant dose escalation for dyspnea management is not often necessary, and the salutary effect appears to persist for extended periods, at least to 3 months, with continued therapy [25, 26]. Benzodiazepines have minimal activity against dyspnea per se [27], but breathlessness is often accompanied by symptoms of anxiety or panic that may be alleviated effectively with careful use of these agents.

Supplemental oxygen is clearly beneficial for patients with hypoxemia, but for those with normal oxygen saturation, the picture is less clear [28]. In non-hypoxemic patients with dyspnea, only a small minority of whom had heart failure, nasal oxygen improved breathlessness no better than ambient air delivered using the same nasal cannula system and rate, but both produced improvement over baseline [29]. This adds weight to the idea that the mechanisms by which supplemental oxygen might relieve breathlessness are complex and largely unknown [28]. These and similar studies have led many hospice clinicians to recommend battery-powered handheld fans as a simple and inexpensive intervention that can improve dyspnea [30]. From a practical standpoint, a trial of supplemental oxygen can be used, and if the patient reports benefit, it can be continued, withdrawn if not. For patients in the very last hours to days of life, adding oxygen is unlikely to provide relief of apparent air hunger [31]. Measurement of oxygen saturation is neither a requirement for nor an appropriate measure of effectiveness of oxygen therapy for the hospice patient.

Pain

Multiple studies have documented that pain is a common symptom for patients with HF [22, 23, 32–34] occurring in 52–85% of patients and increasing in prevalence with advancing severity of disease [32]. In one study, patients with reported pain had shorter survival than those without [32], but this has not been consistent in all trials [33]. Patients frequently report that their pain is severe enough to cause significant distress [22] and interfere with normal functioning [33, 34]. Patients frequently experience pain in more than one site, with legs below the knees the most common and chest pain also being prevalent [33]. The etiology of some of the pain experienced by patients often is related to comorbidities, but its frequency, severity, and character suggest pathophysiologic mechanisms likely related to HF itself that remain enigmatic [32, 33]. In addition, patients nearing the end of life also suffer pain in the psychological, social, and spiritual or existential realms producing a total pain greater than that engendered by physical mechanisms alone [35].

Management of pain in the hospice patient with HF should be based, as in any other terminal illness, on meticulous history-taking and physical examination as well as discussion of goals of care and the patient's willingness to accept or even desire side effects of treatment such as sedation [35]. Non-drug therapies such as massage, expressive therapies, energy therapies, and mindfulness meditation are frequently utilized by patients and may be provided by practitioners associated with the hospice agency. Non-steroidal anti-inflammatory drugs carry significant gastrointestinal risk and should not be used in patients with HF because prostaglandin inhibition can lead to sodium and water retention, increased systemic vascular resistance, and blunted response to diuretics as well as gastrointestinal complications [36]. Adjuvant analgesics such as tricyclic antidepressants, serotonin-norepinephrine reuptake inhibitors, and anticonvulsants may have benefits in some patients, especially those with a neuropathic component to the pain, such as those with painful diabetic neuropathy. Acetaminophen may be reasonable to try in appropriate doses in select patients, but it should be noted that in the PAIN-HF study, the only pharmacologic agents demonstrating analgesic activity were opioids [33]. Details of opioid management are beyond the scope of this review, but the basics of starting with short-acting oral agents on regular intervals with adjustment to the level of pain along with a scheduled stimulant laxative serves well as an initial plan [35]. Regulations and guidelines for appropriate opioid prescription have exemptions or less stringent standards for hospice patients in some states; however, appropriate care and compliance are necessary to ensure adequate pain control while minimizing risk of opioid abuse or diversion. Hospice professionals usually have expertise in these issues, and collaboration with the hospice team is invaluable in pain management.

Fatigue

Studies of symptom prevalence in hospice patients with HF identify fatigue or lack of energy in 69–82%, second only to dry mouth in pervasiveness [22, 23]. Causes of fatigue are legion including impaired cardiac output, deconditioning, comorbidities, impaired sleep, and poor appetite [13, 22]. Energy conservation techniques and education and normalization for the patient and family can be helpful. Psychostimulants such as methylphenidate are occasionally recommended for treating fatigue in the hospice population [7, 13], but most of the research has been in the cancer

population, and their utility in the heart failure patient is uncertain [37].

Delirium

Delirium, defined as "an acute change in mental status that may fluctuate and has underlying physiological causes," is very common in patients with serious or advanced medical illnesses, including HF, and should be considered when confusion arises in any high-risk patient [38, 39]. Even in patients nearing the end of life, a specific cause such as constipation, urinary retention, or an effect of many commonly used medications can sometimes be identified and reversed [38, 39]. However, in the hospice population, irreversible delirium is common—identified when either an appropriate diagnostic and therapeutic trial to reverse the delirium is ineffective or when the underlying physiological processes are irreversible, as in the patient very near death [38].

Treatment of delirium should first be directed at the underlying cause if such can be identified and reversed. There are no FDA-approved agents for the management of delirium. The most commonly used agents are antipsychotics such as haloperidol, chlorpromazine, or quetiapine which can be titrated to effective dose [38, 39]. Most of the concerning adverse effects of these agents are seen with prolonged and high dose use, but QT prolongation does need to be kept in mind. Benzodiazepines are not recommended in potentially reversible delirium; however, when the process is likely irreversible and associated with agitated behavior, benzodiazepines or phenobarbital titrated for relief of the distressing symptom of agitation can be helpful for the distress of the patient as well as caregivers and family. In addition to their sedating effect, these agents also provide muscle relaxation and anticonvulsant effects [38].

Gastrointestinal symptoms

Nausea is experienced in at least 20% of hospice patients with heart failure [22] and is usually multifactorial in origin. Hepatic congestion or the presence of ascites can contribute to nausea, but delayed gastric emptying, slowed intestinal motility and constipation from disease, immobility, or medications often are involved. Vigilant management of bowel function, especially for patients on opioids or medications with anticholinergic effects, is vital. The use of stimulant laxatives (e.g., senna, bisacodyl) and/or osmotic agents (e.g., polyethylene glycol, milk of magnesia) on a scheduled basis with additional as needed dosing will prevent severe constipation in most patients. Fiber supplements (e.g., psyllium) are not recommended for most patients at the end of life because of the risk of worsening constipation if taken without adequate water [40]. Docusate provides little if any benefit to patients receiving stimulant laxatives [41].

Pharmacologic agents aimed at the receptors responsible for nausea and vomiting, primarily dopamine and serotonin (5HT3) in these patients, will improve symptoms in the large majority of patients [42]. Because of the mechanisms of nausea in the terminally ill population, metoclopramide is the first pharmacologic choice recommended by most experts [42]. Concern about development of movement disorders with its use can be mitigated by using the lowest effective dose and the fact that in the hospice patient, extended courses of therapy are less frequent. Butyrophenones (e.g., haloperidol) and phenothiazines (e.g., chlorpromazine) have an extensive track record of efficacy in management of nausea, both when given acutely and on an ongoing basis. The risk of extrapyramidal effects can be mitigated by using the lowest effective dose continued only as long as required. In addition, these agents can prolong QT interval and must be used judiciously in patients with heart disease and those on other medications that produce QT prolongation. 5HT3 receptor antagonists (e.g., ondansetron) have a well-established role in the management of chemotherapy-induced and postoperative nausea and vomiting, but their role in the terminal HF population is less clear [42]. Cannabinoids such as dronabinol or, in jurisdictions in which it is legal, marijuana have been used in the management of chemotherapy-induced nausea and vomiting [43]; efficacy and dosing strategies in the heart failure hospice population are unclear.

Medication management

Usual guideline-based medication management of HF includes agents and regimens designed to extend survival, prevent complications, decrease morbidity, improve or maintain organ function, and preserve functional status. In the hospice setting, the prioritization of these possible aims of therapy get reordered such that the primary goals become abatement of distressing symptoms and enhancement of patient-perceived QOL including functional capacity [7, 13]. Avoidance of preventable complications remains important, but survival prolongation is often not a primary patient goal and in some cases is not desired at all. In addition, these patients may experience a burden of polypharmacy, with one study showing that in those with expected prognosis less than 1 year, the average patient was receiving 12.5 different medications [44]. For the patient entering hospice care, then "deprescribing" should be seriously considered. As HF patients usually have a trusted long-standing relationship with their heart failure team who have emphasized lifetime adherence to these medications, the discontinuation of agents no longer needed will be more likely accepted by the patient if it is recommended by that team, particularly by the cardiologist. Negotiation and establishment of goals of medication management with a patient and family

can be challenging, but it presents an opportunity for the physician to significantly influence the course of the final segment of a patient's life [45]. As there are few data regarding symptoms and QOL as impacted by HF medications in the hospice setting, individualization of therapy in collaboration with the patient, family, and hospice agency is the basis for ongoing prescription [7]. Figure 1 illustrates a process of approaching drug management in these complicated patients. As patient conditions can change frequently and rapidly, this evaluation process needs to be repeated at each change. Three groups of medications deserve particular mention.

"*HF medications*"

Angiotensin-converting enzyme inhibitors (ACEIs) improve dyspnea, fatigue, and other HF symptoms in a majority of patients [7]; angiotensin receptor blockers have a less robust evidence base, but valsartan was shown to improve composite fatigue and dyspnea scores versus placebo [7]. Efficacy of beta blockers on symptom management is less clear [7], but they are often continued for rate control, hypertension, and angina. For patients with heart failure with preserved ejection fraction, nitrates can diminish functional capacity and should not be used in the hospice setting [46]. Maintenance of euvolemia is important in symptom management, with loop diuretics, sometimes augmented by aldosterone blockers, the mainstay of treatment. It is important for the hospice nursing staff to be skilled in volume assessment, and very helpful if the patient is able to be weighed daily, with adjustment in diuretic doses aiming for a target weight [7]. As routine laboratory monitoring is not a typical part of a hospice POC, it is important for the physician to pay particular attention to risks of perturbations in potassium balance with changes in diuretic dose or regimen as well as other medication changes (especially ACEIs) or suspected changes in renal function.

As has been discussed elsewhere in this issue, long-term continuous infusion of positive inotropic agents in these patients can be indicated for palliative symptom control but carries significant risks of harm [47]. The value of its ongoing use is determined by patient-reported symptoms, function, QOL, and personal choices. As the financial cost of this therapy is substantial, likely consuming a large fraction of the Medicare reimbursement for the patient, hospice agencies vary in their willingness to provide this therapy as part of the patient's POC [48]. To ensure effective ongoing care, referring cardiologists should understand the policies of area hospices in this regard.

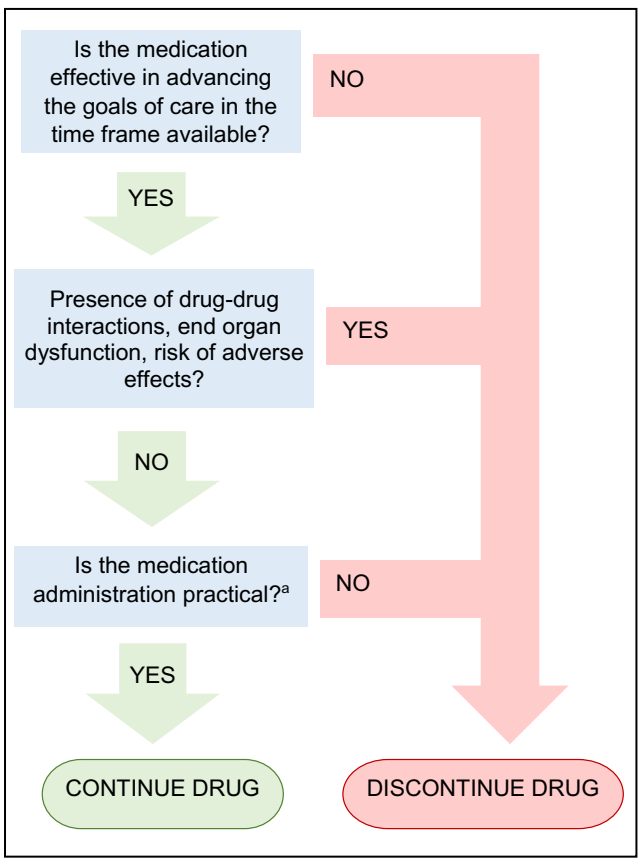

Fig. 1 A simple algorithm for determining medication appropriateness. [a] i.e. Can the patient swallow the pill? Does the drug create a financial hardship? Does the patient want to continue taking it?

Statins

In a randomized clinical trial in patients with expected life expectancy less than 1 year, 58% of whom had cardiovascular disease, discontinuing statins resulted in no apparent change in survival or symptom burden but an improved QOL and significant financial cost savings [49]. Patients and families can be reassured that it is not only safe but also probably advantageous to discontinue statins when entering hospice care.

Anticoagulants

Patients with HF are commonly and appropriately prescribed anticoagulants for the prevention of stroke and other thromboembolic events, though it should be noted that patients with advanced HF were excluded from the pivotal trials that led to these recommendations [50]. The risk of these events is predictable, in both patients with and without non-valvular atrial fibrillation utilizing the CHA_2DS_2-VASc score [51]. For patients with the highest risk identified by this score, the annual risk of total thromboembolic events is 6.9–7.5% [51], so for the patient with a survival prognosis of weeks to months, prophylaxis offers little benefit. Warfarin in particular, given the poor nutritional intake and multiple medication changes common in the hospice population, is more likely to be detrimental than beneficial [50]. Novel oral anticoagulants have

seen increased use based on perceived safety and absence of need for blood monitoring. However, the relatively low absolute risk of embolism or stroke balanced against the cost and pill burden patients may experience argues against their continuation in many cases. A similar thought process would be appropriate in evaluating the utility of antiplatelet agents for those with coronary artery stents. The risks and benefits of anticoagulants for patients with mechanical prosthetic valves must be individualized. The inclusion of anticoagulants in the hospice POC is an area of inter-agency variability.

Routes of drug administration

As patients approach the end of life, their ability to swallow medications effectively becomes compromised. The first approach should be to re-evaluate the utility of each medication and only continue those with ongoing benefit for management of symptoms, QOL, and the dying process. Most necessary medications can be administered sublingually or in the gingivobuccal recess, either utilizing concentrated preparations (e.g., morphine 20 mg/ml solution) or crushing tablets in a very small amount of water to create a slurry. Most medications given this way are actually absorbed enterally. Rectal administration is also possible with pharmacologic data and extensive clinical experience suggesting that it can be effective for most essential drugs in this population [52]. This can be done with compounded suppositories, but uncoated tablets administered into a non-stool-containing rectal vault and the use of micro-enemas are both options, and with appropriate education and support, most patients and caregivers can be coached into accepting and utilizing these methods. The advent of a proprietary device for drug micro-enema administration has resulted in studies comparing this method with other rectal administration techniques [53].

Some hospices continue to recommend and use compounded transdermal preparations, particularly for management of nausea or anxiety. Common drugs included are lorazepam, diphenhydramine, haloperidol, dexamethasone, and metoclopramide. Studies have failed to demonstrate significant drug absorption by this method; therefore, except for medications with clear efficacy with transdermal application (e.g., fentanyl, nitroglycerin, clonidine, scopolamine), the use of the skin for drug delivery is discouraged [54].

Device deactivation

Individuals with advanced HF frequently have implanted electronic devices with potential palliative, life-prolonging and rescue benefits [55]. In the end of life phase, the potential benefits of these devices may no longer be seen as desirable by patients refocusing their goals of care [55–57]. Deactivation of these devices is legal, ethical, and part of appropriate patient care.

Implantable cardioverter defibrillator

The purpose of an ICD is defibrillation or electrical resuscitation in the event of a fatal ventricular arrhythmia. Well-conducted trials have led to indications for implantation with the result that a large fraction of patients with advanced HF have had an ICD placed [55]. Currently, about a third of patients who die with an ICD in place do so while receiving hospice care [58]. As the aim of an ICD is life rescue with no symptom management or other palliative benefit, it is common for patients to opt for deactivation of the defibrillator function of the device as they also elect to forego other aggressive interventions. Clinical practice guidelines and learning competencies for cardiology fellows both recommend discussion of potential deactivation of an ICD at the time of implantation [55, 59], but evidence indicates that this rarely occurs [56, 60]. In a single institution study, patients with ICDs thought that articulating their wishes about the device in their advance directive (AD) was a good idea, yet only 3 of 140 of those with an AD had included a plan for management of the ICD in their document [61]. Most often, the triggering event for a discussion regarding ICD deactivation is hospitalization for an acute exacerbation leading to a change in goals of care [57].

A recent study of patients who died of various causes with an ICD in place showed that in just over half of these patients, end-of-life discussion regarding goals of care had been documented and that in a quarter of those discussions, the issue of the ICD was not addressed [56]. As expected, devices were deactivated only in the group of patients in which these discussions occurred; the median time between the discussion and the death of the patient was 7 days. Of interest, the fraction of patients who suffered a sudden cardiac death was not different between the group who had ICD deactivation and those in whom the device remained active. While inappropriate ICD shocks occur in up to 20% of patients in the last 30 days of life [57], in this and other studies, patients who had experienced ICD shocks in the past were not more likely to request deactivation [56, 60].

Pacemaker

Pacemaker deactivation, while considered ethically appropriate based on patient autonomy [55, 62], is much less frequently performed than deactivation of ICDs. Patients often do not know why the pacemaker is present, and it is difficult, without device query, to anticipate the consequences of deactivation. Hospice physicians frequently advise against discontinuing pacemaker function because these devices often provide benefits in symptom management, particularly fatigue, dyspnea, lightheadedness, and syncope.

Left ventricular assist device

Issues surrounding palliative care in patients with left ventricular assist device (LVAD) are discussed in detail elsewhere in this issue. It is useful to remember that for all patients receiving an LVAD as destination therapy and for all with one as a bridge device but for whom transplant becomes impossible, death with the device is the expected outcome [63]. But in a study of bereaved caregivers of patients with LVADs, a predominant theme was that of surprise that the patient was approaching the end of life, leading to a sense of being overwhelmed and confused with regard to what to do and what to expect [63]. Frustration and confusion were increased when hospice or emergency personnel arrives without adequate understanding of the device and the caregivers found themselves in the dual roles of device expert and instructor and grieving family member.

Fortunately, several investigators are identifying the specific educational and support needs of these patients and their caregivers and pilot programs partnering LVAD programs with local hospice and palliative care organizations for more seamless and effective care of these patients including device discontinuation in the home setting [63–65].

Collaboration with and education of the hospice team

Hospice physicians, nurses, and other staff are experts in symptom assessment and control, emotional and spiritual support, and the negotiation of the unfamiliar and frightening landscape of social and legal issues that characterize the dying and bereavement processes. But these clinicians may experience challenges in caring for particularly complex patients, especially those with complex medication regimens or advanced HF therapies [2]. A survey of hospice clinicians caring for HF patients shows that they desire ongoing collaboration with the referring primary care physician and/or cardiologist and would particularly relish receiving HF-specific education [2]. This offers an opportunity for the cardiologist to positively impact the care not only of the current patient but future ones as well.

Return to case

Mr. A. was discharged to home under the care of a local hospice agency with his primary care physician as attending. His dyspnea dramatically improved with as needed low doses of morphine and the use of supplemental oxygen. Because of his improvement in symptoms, he initially refused the use of a hospital bed and other equipment. However, about 10 days later, he experienced a sudden decline in physical and cognitive function. His family was able to share together in providing his hands-on care over the next few days as he lost consciousness and then died with his family surrounding him and his beloved dog on his lap.

Summary and conclusions

For patients with advanced HF for whom, because of age, comorbidities, futility, or personal choice, ongoing pursuit of increasingly aggressive and burdensome treatment is undesirable, the goals of care often switch to QOL, symptom management, and completion of life tasks. For these individuals and their families, hospice, optimally in collaboration with the primary physician, cardiologist, and/or HF team, provides effective and supportive care for the end of life and the family's bereavement. Hospice care, which in the USA is defined and regulated based on the Medicare Hospice Benefit, produces high degrees of satisfaction by patients and their families and does not decrease lifespan. Prognostication models and recommendations for palliative symptom management and drug therapy as discussed herein will assist the cardiologist or primary physician to appropriately select patients for referral and to effectively collaborate with the hospice team in the care of these patients approaching the end of their lives.

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Compliance with ethical standards

Conflict of interest The author declares that he has no conflict of interest.

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

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