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A patient-centred, comprehensive model for the care for heart failure: the 360° heart failure centre

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Heart failure (HF) is a chronic heterogeneous clinical syndrome that is unified by the presence of clinical signs and symptoms of congestion and by the difficulty of its diagnosis and management. Its prevalence, of 6.5 million people in the USA,¹ is rising due to an increasing incidence and to advances in medical, interventional and device therapies which extend the longevity of the affected patients. Despite these advances, HF is characterised by intermittent and recurrent exacerbations, which are associated with high morbidity, mortality and costs. The estimated costs of HF care are 40 billion dollars annually in the USA, from which >10 billion are due to hospital admissions after presentation to an emergency department (ED).² Currently, the care paradigm for patients with HF is dichotomous, divided between the care of patients with chronic compensated HF in the outpatient setting and acute decompensated heart failure (ADHF) in an inpatient setting. Patients with compensated HF are managed longitudinally in outpatient clinics, including HF cardiology clinic, general cardiology clinic and primary care clinics. Traditionally, each of these clinics exist as independent ‘silos’ with limited direct communication between them. Furthermore, they are designed, staffed and supplied to provide traditional outpatient care, with limited ability to intervene in a rapid or invasive way. This is clearly focused on the evaluation and management of compensated patients.

Perhaps it is not surprising that ADHF accounts for over 1 million annual ED presentations in the USA.² When a patient with ADHF presents to any of the above-mentioned clinical offices, there is a limited infrastructure and capabilities to address their acute needs. For a mild decompensation, oral diuretics may be adjusted with a plan for follow-up laboratories and phone calls. For a more severe decompensation, a patient may be directly admitted to the hospital or

referred to the nearest ED. More than 90% of all patients with ADHF presenting to an ED are admitted to the hospital, for an average length of stay of 5 days.² Even though inpatient admission for decongestion is the major throughput for ADHF care, there have not been significant changes in the ED or inpatient care of these patients for the past several decades. This is reflected in the most current American College of Cardiology/American Heart Association (AHA) guidelines from 2013 and subsequent update in 2017,^{3,4} which do not give guidance for risk stratification of ADHF, nor the appropriate care setting of therapy. What recommendations are available primarily focus on in-hospital management with decongestion with an intravenous diuretic, home HF medical therapy should be continued, and for discharge planning. Indeed, the high readmission and complications rates, including death, may be due to the lack of clinical trials data and standardised practices of ADHF management in the ED and as inpatients.

We propose that an alternative paradigm for the long-term management of patients with compensated HF and ones with ADHF is needed to improve outcomes of patients with HF at lower costs—the 360° HF centre. This should be a patient-centred comprehensive, inpatient and outpatient, care model that uses a care coordinator to manage patients with HF (figure 1). Chronic care models using multidisciplinary healthcare professionals, such as care coordinators, self-care/wellness educators, group therapy/education, dietitians, clinical pharmacists and social workers, have been effective in other chronic disease models.^{5,6} On the outpatient side, where the patients with HF spend the majority of their time, the model must be centred around the patient who will be coupled with a care coordinator. A meta-analysis of 47 randomised studies of care coordination after hospital discharge across

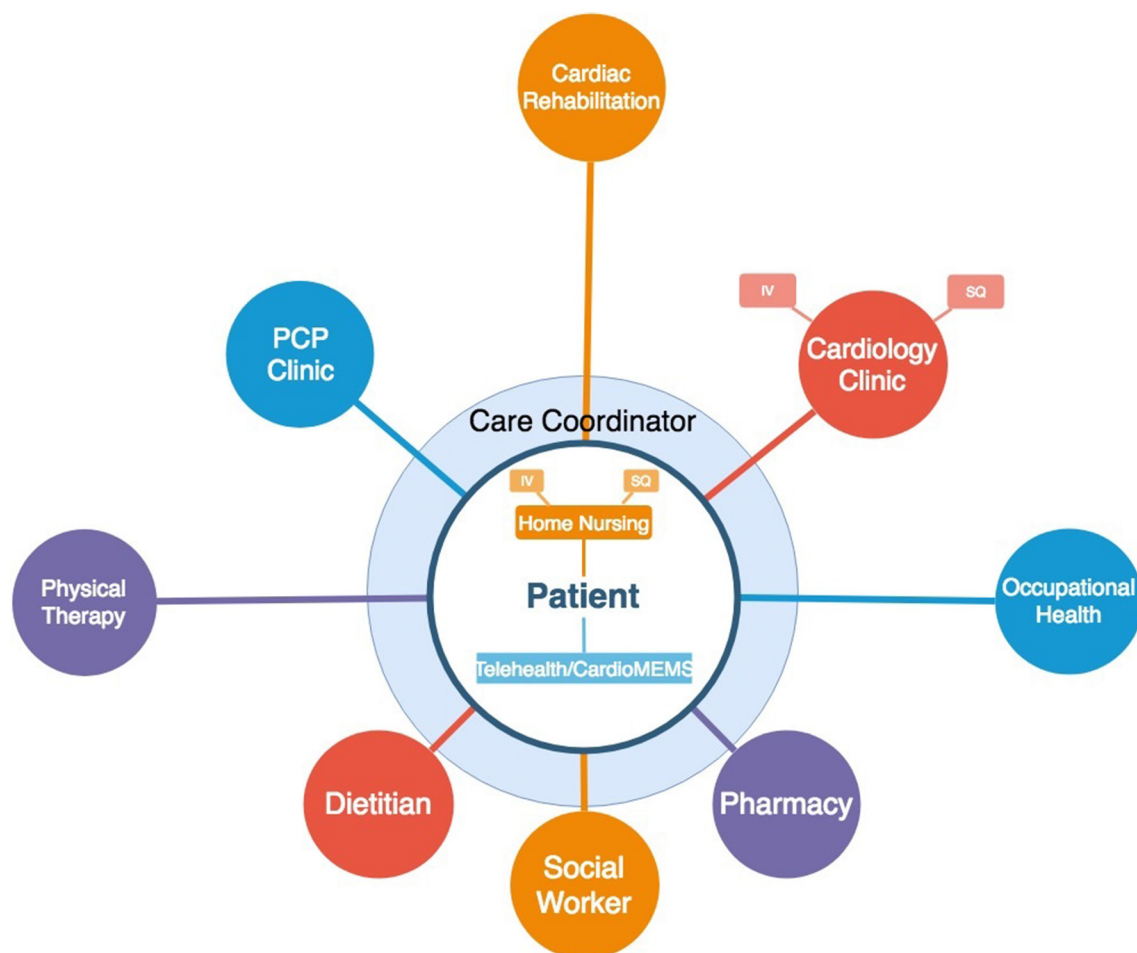


Figure 1 360° heart failure centre: a patient-centred comprehensive model for the care for congestive heart failure (HF). The care is centred around the patient with distance of different services representing the frequency and level of support. The patient is in the centre of the inner circle and can receive home services, including monitoring and home nursing (capable of intravenous (IV) or subcutaneous diuresis (SQ)). The care coordinator, through whom all supportive services provide coordinated care, manages all aspect related to the HF management of the patient. Additional services, including dietary, social work and pharmacy, have close regular follow-up and interventions with the patient. Other services, including occupational health, physical therapy and cardiac rehabilitation, can be used on as-needed basis. Patient continues to follow closely with primary care practitioner (PCP) and cardiology clinics (capable of IV or SQ diuresis).

a variety of diagnoses, including HF, showed reduction in readmissions, a trend toward reduction in mortality and improvement in patient satisfaction.⁷ Indeed, the AHA recommends that care coordination, among other, is essential for patients with HF being discharged from the hospital after ADHF admission.⁸ The care coordinator, who may be a mid-level practitioner, like a HF nurse practitioner or physician assistant, will be deeply familiar with the medical, mental, social and financial condition of the patient with HF and be the direct point of contact for the patient and other providers for any chronic or acute medical status changes. The care coordinator must have multidisciplinary support staff previously shown to improve clinical outcomes for patients with HF including a dietitian,^{9 10} a clinical pharmacist^{11 12} and a social worker,¹³ who can be shared with the patient's primary care physician. Diets, like Dietary Approaches to Stop Hypertension and the Mediterranean diet, have shown benefits in the

secondary HF prevention and in reducing the mortality in women with HF.^{9 10} Several randomised controlled studies performed in multiple continents found that integrating clinical pharmacists in the care of patients with HF results in reduction in hospitalisations, either from HF or other, which has led to the recommendation that clinical pharmacists be part of the team caring for patients with HF by the Heart Failure Society of America and American College of Clinical Pharmacy Cardiology Practice and Research Network.^{11 12} A major predictor for poor outcomes and hospital readmissions for HF are inadequate social resources and support,¹⁴ which can be addressed by a social worker. A randomised trial by O'Donnell *et al*,¹³ found that a social worker-lead palliative care intervention can facilitate end-of-life and goals of care discussions in patients with advanced HF. Therefore, we propose that these multidisciplinary care providers can be strategically used for:

- ▶ Dietary education which must take place in the patient's home and while grocery shopping to truly be effective in promoting durable lifestyle change.
- ▶ A clinical pharmacist is instrumental in reviewing patients' medication lists to help evaluate for possible deleterious interactions between different medications not usually prescribed by HF practitioners, and suggest alternatives to existing medications, like sodium–glucose cotransporter-2 inhibitors in patients with diabetes.
- ▶ A social worker is essential to help the patient and provider navigate through the multitude of financial and logistical barriers to providing better options for medical, mental and financial health.

Additional services such as telehealth and/or CardioMEMS should be available to monitor patients with HF at home. All patients with HF can benefit from daily monitoring for early detection of deviations in established haemodynamic parameters. CardioMEMS was indicated for high-risk patients, defined as having advanced heart failure with New York Heart Association III symptoms and a HF hospitalisation in the past year by the USA Food and Drug Administration.¹⁵ More recently, 'real-world' studies showed more significant reduction in pulmonary artery pressures than the initial study and significant reduction in HF hospitalisations.^{16 17} Home telehealth monitoring of weight, blood pressure and heart rate, which also has been shown to reduce mortality in patients with HF,^{18 19} is appropriate for all remaining patients. When a patient with HF is identified as having a persistent unfavourable change in their monitoring parameters by telehealth and/or CardioMEMS, such as an increase in weight or pulmonary capillary wedge pressures, they should be contacted to evaluate for correlation with worsening in symptoms.

A 360° HF centre should provide more extensive and interventional outpatient services for patients with HF than a traditional cardiology clinic. When adjustment of oral diuretics is ineffective, elected patients with HF should be treated with intravenous or subcutaneous infusions of diuretics at home (through home services) or in clinic. This, however, requires home and/or clinic services that are enabled to administer and monitor the effects of^{20 21} intravenous and/or subcutaneous (for review, see Afari *et al.*²²) diuretics. In the case of subcutaneous administration, patients would need to have their blood drawn (potentially before and 1–2 days after administration) to evaluate for changes in renal function and electrolytes. With intravenous administration, patients would also need to be monitored for vital sign changes for 3 hours after administration and repeated blood draws. The combination of close monitoring via telehealth and/or CardioMEMS with the appropriate intervention of a care coordinator in HF clinic and at home will help with the early management of HF decompensation, thus averting ED presentation and hospital admissions usually associated with this patient population.

Patients with ADHF who present to the ED should be evaluated by the 'six-axis model'²³ and if determined to

be low risk could be discharged through close collaboration between the ED and a 360° HF centre. Patients with ADHF and high-risk features should be admitted to either a medical service with HF specialist consultation or to a primary HF service for further management. The inpatient ADHF care should focus on symptomatic improvement of congestion, diuresis to reach euvolaemia and evaluation for potential causative factors of the ADHF presentation, including cardiac or non-cardiac comorbidities, disease progression or dietary/medication non-adherence. The 360° HF centre care coordinator and multidisciplinary team would be well equipped to create an action plan to address such specific HF patient's causative factors and to initiate palliative care consultation when appropriate. Continuity of care with the care coordinator and pharmacist in the 360° HF centre keeps consistent messaging regarding dry weight monitoring, as well as medication education, key elements in the care of patients with HF. Regularly held comprehensive discharge planning meetings, incorporating the 360° HF centre care team with the inpatient teams, should be held to evaluate for need of additional services (such as physical therapy, occupational therapy, home health, chore worker, telehealth, CardioMEMS or hospice) and to facilitate the execution of these multidisciplinary discharge plans. At the time of hospital discharge, every patient with ADHF must have baseline monitoring parameters (including estimated 'dry weight'), instructions for the patient to call the care coordinator for changes in symptoms, pharmacy education on medication administration and side effects, a 30-day supply of all discharge medications with prescriptions for refills and a 7-day follow-up appointment in the HF clinic. Ultimately, randomised clinical trials are needed to assess feasibility, safety and effectiveness of inpatient versus outpatient management of patients with ADHF presenting to the ED.

There are many barriers to creating an effective 360° HF centre. First and most obvious is the belief that the costs and reimbursements in the current fee for service model will not adequately compensate for the aforementioned services. Diuretic administration through subcutaneous or intravenous route have designated billable Current Procedural Terminology codes (96365, 96366, 96374 and 96372) for either push or infusion, with similar reimbursement for both the technical and the provider fees to many common cardiac procedures, like echocardiograms or moderate sedation. As of 2019 telemedicine now also has billable codes (99201 and 99215 as well as 99452, 99451, 99446, 99447, 99448 and 99449)²⁴ to account for the services provided to monitor and manage patients with HF via home telehealth and/or CardioMEMS. Second, there are concerns that this programme will increase utilisation of medical resources and costs. However, it is more likely that by preventing costly inpatient admissions, reducing adverse outcomes and lost productivity due to ADHF, the costs of a 360° HF centre will be more than offset. This must be validated through clinical studies comparing the costs and

outcomes of the current standard of care with the 360° HF centre, which is in line with the ongoing changes to restructure reimbursements based on performance metrics rather than the current fee for service model: paying for health, not for healthcare.

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