Review article

Transitions of Care Between Acute and Chronic Heart Failure: Critical Steps in the Design of a Multidisciplinary Care Model for the Prevention of Repeat Hospital Admissions

Josep Comín-Colet, Cristina Enjuanes, Josep Lupón, Miguel Cainzos-Achirica, Neus Badosa and José Maria Verdu

6 Unidad de Insuficiencia Cardiaca, Servicio de Cardiología, Hospital del Mar, Barcelona, Spain
7 Programa Integrado de Atención a la Insuficiencia Cardiaca, Área Integral de Salud Barcelona Litoral Mar, Servicio Catalán de la Salud, Barcelona, Spain
8 Grupo de Investigación Biomédica en Enfermedades del Corazón, Programa de Investigación en Procesos Inflamatorios y Cardiovasculares, Instituto Hospital del Mar de Investigaciones Médicas (IMIM), Barcelona, Spain
9 Departamento de Medicina, Universidad Autónoma de Barcelona, Barcelona, Spain
10 Unidad de Insuficiencia Cardiaca, Servicio de Cardiología, Hospital Germans Trias i Pujol, Badalona, Barcelona, Spain
11 Welch Center for Prevention, Epidemiology and Clinical Research, Johns Hopkins University, Baltimore, Maryland, United States
12 Ciccarone Center for the Prevention of Heart Disease, Department of Cardiology, Johns Hopkins Medical Institutions, Baltimore, Maryland, United States
13 Centro de Atención Primaria Sant Martí de Provençals, Instituto Catalán de la Salud, Barcelona, Spain
14 Instituto de investigación de Atención Primaria Jordi Gol, Instituto Catalán de la Salud, Barcelona, Spain

ABSTRACT

Despite advances in the treatment of heart failure, mortality, the number of readmissions, and their associated health care costs are very high. Heart failure care models inspired by the chronic care model, also known as heart failure programs or heart failure units, have shown clinical benefits in high-risk patients. However, while traditional heart failure units have focused on patients detected in the outpatient phase, the increasing pressure from hospital admissions is shifting the focus of interest toward multidisciplinary programs that concentrate on transitions of care, particularly between the acute phase and the postdischarge phase. These new integrated care models for heart failure revolve around interventions at the time of transitions of care. They are multidisciplinary and patient-centered, designed to ensure continuity of care, and have been demonstrated to reduce potentially avoidable hospital admissions. Key components of these models are early intervention during the inpatient phase, discharge planning, early postdischarge review and structured follow-up, advanced transition planning, and the involvement of physicians and nurses specialized in heart failure. It is hoped that such models will be progressively implemented across the country.

© 2016 Sociedad Española de Cardiología. Published by Elsevier España, S.L.U. All rights reserved.

Transiciones de cuidados entre insuficiencia cardiaca aguda y crónica: pasos críticos en el diseño de un modelo de atención multidisciplinar para la prevención de la hospitalización recurrente

RESUMEN

Pese a los avances en el tratamiento de la insuficiencia cardiaca, la mortalidad, el volumen de reingresos y sus costes sanitarios son muy elevados. Los modelos de atención a la insuficiencia cardiaca inspirados en el modelo de atención crónica, también denominados programas o unidades de insuficiencia cardiaca, han demostrado beneficios clínicos en pacientes de alto riesgo. Sin embargo, mientras que las unidades de insuficiencia cardiaca tradicionales se han centrado en los pacientes detectados en su fase ambulatoria, la presión creciente de la hospitalización está desplazando el foco de interés hacia programas multidisciplinares alrededor de las transiciones, especialmente entre las fases aguda y tras el alta. Estos nuevos modelos de atención sanitaria integrada para la insuficiencia cardiaca pivotan sus intervenciones en los momentos de transiciones, son de carácter multidisciplinar, centrados en el paciente, están diseñados para asegurar la continuidad asistencial y han demostrado una reducción de las hospitalizaciones potencialmente evitables. Componentes clave de estos modelos son la intervención precoz durante la hospitalización, planificación del alta, visita precoz y seguimiento estructurado tras el alta, planificación de transiciones avanzadas y la participación de médicos y...
enfermeras especializados en insuficiencia cardiaca. Es de esperar la progresiva implantación de estos modelos en nuestro entorno.
© 2016 Sociedad Española de Cardiología. Publicado por Elsevier España, S.L.U. Todos los derechos reservados.

### Abbreviations

HF: heart failure  
HFU: heart failure unit  
PC: primary care

### INTRODUCTION

Because of the epidemiological scale of heart failure (HF), its clinical complexity, its impact on patients’ quality of life, and the workload that it represents for a health care system with finite resources, this syndrome is one of the greatest health care, organizational, and economic challenges to be faced in the coming years.\(^3\) Despite undeniable advances in recent years in HF treatment and the organization of HF management,\(^4\) mortality, number of readmissions, and associated health care costs remain very high.\(^1,3\) These data demonstrate the need for further advances in optimizing HF management in the different phases of the continuum of care. Specifically, it has been demonstrated that the transition between hospital discharge and starting or restarting outpatient follow-up is a key stage.\(^8\) Although theoretically short, this transition has strong prognostic potential and can affect future episodes of decompensation and early readmissions.\(^3,9\) The appropriate management of these transitions is a need not covered by most current chronic HF management programs. In this review, we analyze the key aspects of transitions of care in HF and the features of the programs aimed at improving its management.\(^6,8,10–12\)

### HEART FAILURE UNITS: COMPONENTS AND SCIENTIFIC EVIDENCE FROM THE TRADITIONAL CARE MODEL

Heart failure care models inspired by the chronic care model are called disease management programs for HF, also known as heart failure programs or heart failure units (HFU).\(^5–7,12\) These models aim to reduce mortality and hospital admissions in patients with HF and improve their health-related quality of life (Figure 1). Theoretically, these models help ensure that the scientific evidence is applied homogeneously without variation, thereby helping to raise the bar for quality of care and increase the equity of our health care system.\(^\)\(^4–7,13–15\)

Within the general framework of HFUs, multiple models of care have been described, ranging from a single educational session before discharge or a single educational home visit by a specialist nurse and regular telephone follow-up to a multidisciplinary intervention centralized in a physical unit, with or without interaction with primary care (PC). Most HFUs combine several of these interventions.\(^4–7,13–16\) The increasing use of these care systems has been perceived favorably due to the initial results from many studies and meta-analyses,\(^5,6\) leading to their level IA recommendation in clinical practice guidelines.\(^7,16\) In this type of unit or program, a variety of interventions may be carried out (education, follow-up, treatment, social support) from those that have been demonstrated to improve quality of life, reduce the number of hospital admissions for HF and for all causes, and even reduce mortality.\(^5,6\) This reduction in hospital admissions\(^4,14,15,19–21\) and improved survival have also been demonstrated in Spain. Such findings have encouraged the implementation of various HFUs in Spain.\(^22\)

![Figure 1. Key elements of heart failure programs inspired by the chronic care model.](image-url)
In some more recent studies, the failure to demonstrate a clear benefit from these HFUs has brought into question the most desirable format of these types of program and even their usefulness. Regarding specific aspects of care, the location of the target population, among other factors, are very different in the literature than in clinical practice. A Cochrane review that analyzed 25 studies with nearly 6000 patients in total concluded that it was not possible to identify the ideal components of the different interventions (HFUs or other formats of care) due to the wide heterogeneity of the different models. Despite these limitations, we believe that there are some basic key components that should form the basis of all HF programs or HFUs (Table 1).

Widespread implementation of these integrated care models for patients with HF has been difficult for several reasons. Such reasons include the heterogeneity of the models evaluated in clinical trials, the questionable applicability of study results in “real world” clinical practice, and their organizational complexity. In addition, there is wide variability in the organization and performance of the care of chronic patients in each healthcare area or area covered by a particular hospital, which is determined by the resources available and the organizational dynamics. Therefore, we cannot talk about a “class effect” in these organizational models. Thus, the quality programs launched by the Spanish Society of Cardiology (SEC-Excelente) and the Spanish Society of Internal Medicine (UMIPIC) aim to establish quality standards in the organization of HF in Spain.

HEART FAILURE CARE MODELS CONCENTRATING ON TRANSITIONS OF CARE: WHY?

In Spain, between 2003 and 2011, the number of admissions for HF in patients older than 65 years increased by 26%, in a period when the population of persons old than 65 years grew by 13% Hospital admissions for HF have a bimodal distribution and are more frequent at the onset and end of the disease. Approximately one third of all HF patients present with a hospital admission. Admitting a patient can be an opportunity to adequately document the diagnosis, make an individualized adjustment to chronic HF treatment, provide better health education to the patient, and develop a follow-up plan. A recent population-based study observed that having a recent hospital admission was associated with higher mortality and more readmissions and was an independent predictor of increased health care costs in the following year.

Rates of hospital readmission after discharge for HF are fairly high and tend to be concentrated in the first few months following discharge (Figure 2). In Catalonia in 2005-2014, readmission rates for such patients at 30 days postdischarge were between 14% and 15%, while readmissions at 90 days and 180 days were 25% and 30%, respectively. In this context, readmissions for clinically-related HF postdischarge are mostly due to exacerbation of the underlying disease, and could be prevented in up to 75% of cases. Early readmissions after discharge are strongly linked to the quality of inpatient care, and although they may be due to incomplete stabilization of the patient, they are often due to poor discharge coordination and the inability to ensure good-quality care early after discharge. This, along with the readmission patterns shown in Figure 2, mean that the traditional care processes for HF should be redesigned toward a care model that revolves around transitions of care, creating more opportunities for the prevention of repeat hospital admissions.

MULTIDISCIPLINARY, INTEGRATED ORGANIZATION IN TRANSITIONS BETWEEN ACUTE AND CHRONIC HEART FAILURE: KEY ELEMENTS, RECOMMENDATIONS, AND EXPERIENCE

The paradigm shift in the management of chronic diseases that has taken place in recent years is based on the development of a multidisciplinary model that provides integrated care of the patient with HF throughout the life of the disease, which spans the diagnosis and inpatient phase until discharge to home, with special emphasis on the subsequent follow-up and transition of care to different health care settings depending on the progress of the condition. The change in strategy in this area is based on directing these clinical management structures at the times when there is a transition of care between professionals. The aim is to achieve a change from traditional HFUs to multilevel programs of transitional care for HF. Data from most studies indicate that a smooth transition in patients with HF reduces the rate of potentially avoidable readmissions and reduces the risk of adverse clinical events.

Table 1
Chronic Care Model and Heart Failure Care Programs: Recommended Components

| 1. Patient empowerment encouraged by promoting self-care and self-sufficiency |
| 2. Integrated patient assessment and intervention |
| 3. Change from a conventional method of attention to a more proactive method with interventions based on multidisciplinary teams, by: |
| a. Systematic intervention in patients (planned contact) |
| b. Systematic management based on clinical practice guidelines |
| 4. New nursing roles encouraged (specialized in HF: case managers in primary care) to: |
| a. Carry out interventions with the support of physicians in a structured and planned way |
| b. Provide intensive patient education in self-care |
| c. Address barriers to adherence and self-care early |
| 5. Involvement of cardiologists and other hospital specialists (internists, geriatricians) subspecialized in HF |
| 6. Input from other professionals, such as rehabilitation physicians, physiotherapists, pharmacists, and psychologists |
| 7. Good connection between primary care and specialized care that promotes continuity between the different levels of care |
| 8. Early detection and treatment of exacerbations: facilitate the existence of flexible care facilities with open access for patients in case of decompensation |
| 9. Use of technology for communication between patients and health care providers and between health professionals |
| a. Incorporation of telemedicine in the follow-up process (telemonitoring and teleintervention) |
| b. Encourage the use of electronic clinical information systems for better communication between health professionals (integration of electronic clinical records between providers) to help decision-making by primary care professionals and for evaluation of results |

HF, heart failure.
For the integrated assessment and intervention process to be a success, it is necessary to develop HF programs with a functional structure (Table 1) that includes team members involved in the process in each area where patients with HF could be admitted, so that patients can be detected and included in the HF management care route in each area. Clinical information systems can be useful for this detection. The units involve cardiology, emergency medicine, internal medicine, acute geriatric units, emergency department short-stay units, and subacute units, amongst others. In all these areas, it is crucial to have: a) confirmation of the HF diagnosis with clinical elements and use of biomarkers, and b) active involvement in the care pathway and the discharge planning process, aspects that still have a wide margin for improvement here in Europe.

A comprehensive psychosocial assessment of the patient by a nurse is considered one of the key strategies in HF programs and should be started in the first 24 hours of the inpatient stay. The nurse coordinator for the HF inpatient process acts as the liaison between the different services involved (neuropsychology, rehabilitation, geriatrics, etc) and the core components of cardiology and internal medicine that form HFUs. The nurse coordinates the key actions described in Figure 3 and, above all, the discharge. Early intervention in these aspects aims to lay the foundations for an early functional recovery, improve self-care from the time of admission, identify the main carer, correctly plan the discharge, and minimize the risk of readmission. Coordination with social work will be necessary in certain cases to overcome social barriers that impede the clinical aims and the aims of the patient. In patients admitted with HF, physicians specialized in this disease must make the diagnosis and plan the medical management. Cardiologists specialized in HF must take a significant role in these processes, be it directly on the cardiology ward or by providing support to other medical specialties on wards for frail patients, where the cardiologist should be available for consultation. In addition, a holistic view of the patient is fundamental in any type of multidisciplinary structure, whether it is led by cardiologists or internists. This is a defining aspect in the organizational model proposed in the UMIPIC program by the Spanish Society of Internal Medicine, through the creation of integrated management units for patients with HF and multiple comorbidities. The initial implementation of these units has shown a highly significant reduction in hospital readmissions for this type of patient.

Discharge Planning and Transition of Care

Continuity of care in HF requires different professionals, in different types of establishment (multilevel), and at different times, to establish a shared view of the care required with a common focus: the patient. The effectiveness of integrated HF care programs focusing on transitions of care with a multidisciplinary and patient-oriented approach largely depends on: a) adequate discharge planning; b) the patient meeting stability criteria before discharge; c) quality of care objectives being met by using checklists in the periods before and after discharge (Table 3); and d) adequate communication of information to the professional who will take the lead at follow-up (Tables 3 and 4).

The defining elements of the transition of care in the Barcelona Litoral Mar model (Figure 3) are: a) nurse-led coordination of the in-hospital intervention; b) systematic in-hospital intervention by members of the multidisciplinary HF program (acute beds assigned to the HF program), and c) planning of discharge and transfer to home, based on in-person meetings between the in-hospital and community health care professionals in a discharge plan.
EARLY FOLLOW-UP AFTER DISCHARGE AND TRANSITION OF CARE

Early follow-up after discharge is an essential step in the success of the transition from the acute phase to long-term outpatient management. Most HF programs include a follow-up visit after discharge, which ideally should be done in the first 7 to 10 days. The contents of the first postdischarge visit should be well defined and are summarized in Table 3. It is also important to define in which cases an even earlier contact (24-48 hours) could be helpful, be it in-person (in the clinic or at home) or by telephone. Some models include these earlier contacts.

This intervention can be conducted in the outpatient or inpatient setting (HFU), either in-person (at home, primary care center, HFU clinic, day hospital) or remotely (telemedicine). A systematic assessment using checklists allows the nurse to check that the patient is euolemic, reinforce the
Table 2
Roles of the Cardiologist and Nurse in a Heart Failure Program During the Inpatient Period

<table>
<thead>
<tr>
<th>Roles of the cardiologist in the HFU</th>
<th>Roles of the HF specialist nurse and interventions in the inpatient phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaustive investigation of the cause of HF</td>
<td>Holistic assessment of the patient and his or her environment</td>
</tr>
<tr>
<td>Prognostic and functional stratification</td>
<td>Cognitive, social, functional, and dependency and frailty assessment using specific tests</td>
</tr>
<tr>
<td>Implementation of neurohormonal treatment</td>
<td>Multidisciplinary coordination, putting into place the different services involved</td>
</tr>
<tr>
<td>Evaluation of advanced therapeutic interventions: coronary intervention, cardiac surgery, devices, cardiac transplant, or ventricular assistance</td>
<td>Follow-up during inpatient stay and assessment of self-care at discharge</td>
</tr>
<tr>
<td></td>
<td>Interventions based on motivational interview and other educational resources (teach-back, gamification)</td>
</tr>
</tbody>
</table>

HF, heart failure; HFU, heart failure unit.

Table 3
Checklist of the Actions That Should Be Carried out Before Discharge, at the First Early Review After Discharge and in Subsequent Visits for Patients With Heart Failure

1. Diagnostic assessment (confirmation of HF), etiological (correctable or noncorrectable cause of HF), functional, and prognostic assessments should be done before discharge
2. Assessment of volometric status by clinical means (dry weight, examination), use of biomarkers (natriuretic peptides) or new technologies (eg, bioimpedence vector analysis, pulmonary and cardiac assessment with portable ultrasound)
3. Recording of changes in functional class, other symptoms or episodes of decompensation that have occurred since the last review
4. Checking that optimal decongestion status and hemodynamic status have been achieved
5. Start/titration (or planning) of evidence-based therapy
6. Adverse events minimized, including monitoring renal function, electrolytes, and drug intolerance
7. Detection and assessment of medication-related problems
8. Diagnostic plan and care plan are well defined and well communicated to the next professional (medical and nursing discharge report)
9. Plan for screening and coordinated care of the patient’s comorbidities
10. Psychosocial assessment performed by the nurse ensuring the following aspects:
   a. Patient and carer are clear who is the key contact in case of problems and how to get in touch with him/her
   b. Detection and modification of barriers to adherence
   c. Assessment of the possible limitations in terms of social support that could limit the success of the intervention and planning to minimize these
   d. Education on HF
   e. Promotion of self-care in the patient, knowledge of warning signs and emergency plans in case of exacerbation (flexible diuretic regimen, HF unit day hospital, care in primary care emergency centers), understanding the postdischarge plan
   f. Joint care (professionals, family, carers) in line with patient preferences, establishing plans for palliative care and advanced plans in the end-of-life stage
11. Individualized discharge planning with a care plan created by and coordinated with the receiving teams and primary care (patient care route sheet) and shared with the patient (individual action plan)
12. Resolve questions from the patient and the carer

HF, heart failure.

Table 4
Contents of Heart Failure Nurse Discharge Report

| Interventions performed (educational, social, and functional) and goals achieved |
| Interventions pending for the next level of care (blood test, titration of medications) |
| Presence of complexity criteria |
| Status at discharge (functional class, weight) |
| Method of follow-up at discharge and methods of contact with the hospital HF unit |

HF, heart failure.

In respect to this point, many transition of care programs incorporate a postdischarge follow-up call. This can be done at different points and with different aims: an early postdischarge call as a bridging intervention to maintain a safe transition and/or follow-up calls to ensure continuity of care after hospitalization, improve treatment adherence, and reduce hospital readmissions.

Continuing the education process is another basic element in the transition of care. The aim of the intensive educational intervention is to improve the 3 aspects of self-care: maintenance (diet, exercise, and medications), monitoring (daily evaluation to detect deterioration), and self-management (appropriate responses to problems such as warning signs and use of a flexible diuretics regimen). Educational materials (paper or electronic support), as well as group or motivational interventions, can be of help on this matter.

Review of medication and medicines reconciliation at the first postdischarge follow-up allow assessment of treatment adherence and the detection of medication-related problems, be it by nurses.
or pharmacists involved in the program. In some regions, shared electronic prescription is available: this is undoubtedly a very useful tool for medicines reconciliation.6,8,12

Lastly, access to health care for these patients is highly important to ensure the equity that is implicit in universal access and a rapid response in case of emergency. Thus, in cases of early decompensation, patients must have immediate access to health care professionals. The creation of a day hospital dedicated to HF with open access or follow-up using telemonitoring are useful for this.4,8,15

A recent meta-analysis29 that analyzed the impact of discharge planning for patients with HF showed a relative risk reduction for readmission for HF and for all causes of 32% and 15%, respectively, compared with conventional care. Models of early postdischarge home follow-up and those that combine different follow-up methods (hospital clinic, home visit, or telephone) are the most efficient in reducing readmissions.

In Spain, the HFU of the Hospital Universitario Germans Trias i Pujol in Badalona demonstrated that a specific multidisciplinary support program after discharge with early follow-up for complex patients with HF allowed a relative reduction of > 40% in readmissions for clinically-related causes.34

In addition, the Barcelona Litoral Mar HF care model includes early postdischarge follow-up (< 7 days) for all patients.4 In this care model, a home-based postdischarge transitional intervention was designed for chronic complex HF patients, whose frailty is a dominant factor.30 In this intervention, PC nurse case managers physically go to the hospital to: a) plan the discharge of these patients during their hospital stay by meeting in person with the HFU team; b) coordinate the discharge with the PC team; c) carry out (or advocate) an early postdischarge home visit in the first 48 hours; and d) provide support to the PC team during follow-up over the first 3 months postdischarge using a clinical pathway.4 A pragmatic assessment of this intervention showed, in comparison with usual care, a significant reduction in readmissions for HF (risk ratio [RR] = 0.4; 95% confidence interval [95%CI], 0.2-0.8; P = .02), all-cause readmissions (RR = 0.4; 95%CI, 0.2-0.8; P = .009), and all-cause mortality (RR = 0.3; 95%CI, 0.1-0.9; P = .03). It also showed a relative reduction of 24.1% of the direct costs assessed using analytical accounting (P = .07) in favor of the patient group that received this transitional intervention; this was not statistically significant.30

POSTDISCHARGE MANAGEMENT: STRUCTURED FOLLOW-UP

After the early postdischarge contact, patients should be included in management programs that ensure a structured and planned follow-up based on specific detailed clinical pathways that ensure evidence-based intervention.6,11,12 This follow-up should be based on nursing professionals with specialized training in HF, whether in the inpatient (HF nurses) or outpatient (case managers) setting, with the support of the HF specialist and in coordination with their PC team members.8

The concept of care during transitions includes a wide range of interventions in terms of intensity (Table 5)12 and content.8,10–12 A recent meta-analysis that included 41 studies12 analyzed the impact of different transitional care interventions on readmissions and emergency department visits. These interventions included patient education prior to discharge (in the management of HF, nonpharmacological strategies and medication management, normally done by a HF specialist nurse using written educational materials or videos), a discharge plan (that included a review of medications, the development of a personalized care plan, and a discharge report sent to the family physician or cardiologist), and a scheduled, structured, proactive follow-up. This meta-analysis demonstrated that transitional interventions after discharge significantly reduce the risk of readmission and emergency department visits by 8% and 29%, respectively (RR = 0.92; 95%CI, 0.87-0.98; P = .006, and RR = 0.71; 95%CI, 0.5-11.0; P = .04). High-intensity interventions reduced the risk of readmission independently of the duration of the intervention in all patients, but especially in those older than 75 years. Moderate-intensity transitional interventions were effective only if they were implemented for at least 6 months. In contrast, low-intensity interventions were not effective.12 Similar results have been observed in other studies8,10,11 that also reported an improvement in survival with these interventions.

**Philosophy of Structured Follow-up**

Patients with chronic diseases such as HF require an integrated approach to their care using robust clinical pathways with well-defined objectives, ranging from the diagnostic approach to end-of-life care. Structured follow-up after a hospital admission is a key point in the patient process.4,13 with the objective of promoting patient empowerment and changing the professionals’ actions from a conventional approach to a proactive approach with nursing-based interventions.8,12 Structured follow-up after discharge allows systematic application of interventions to reduce variability in clinical practice (Table 3), but must be planned according to the patient’s characteristics. According to the Barcelona Litoral Mar model,4 in the hospital discharge planning process, 2 different clinical pathways are defined for structured postdischarge follow-up: a) structured home-based follow-up (in person, telephone, and PC clinic) led by PC case manager nurses,3,30 and b) combined structured follow-up (at home, HFU clinic-day hospital, telemedicine) led by HF specialist nurses assigned to the HFU (hospital-based).4,15 The level of detail and the complexity of the cardiological interventions is greater for patients selected for the clinical pathway led by hospital-based nurses and therefore it includes patients at greater risk of readmission for exacerbation of this condition. For patients with significant frailty and dependence, inclusion in the PC-based clinical pathway is encouraged: the holistic approach plays a large role in this setting. Details have been published of these clinical pathways and their favorable results in terms of reducing mortality, repeat admissions, and health care costs.4,15,30

<table>
<thead>
<tr>
<th>Table 5</th>
<th>Classification of Intensity of Transitional Interventions12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intensity</strong></td>
<td><strong>Components</strong></td>
</tr>
<tr>
<td>Low</td>
<td>Structured telephone follow-up without home visits, or regular follow-up in clinic without home visits</td>
</tr>
<tr>
<td>Moderate</td>
<td>Home visits alone, or a combination of telephone follow-up and regular follow-up in outpatients without home visits, or telemonitoring (telemedicine) without planned patient visits</td>
</tr>
<tr>
<td>High</td>
<td>A combination of home visits with other types of follow-up (telephone and/or clinic) or telemonitoring (telemedicine) combined with planned patient visits (eg, home visits, telephone follow-up, videoconferences)</td>
</tr>
</tbody>
</table>

Structured Follow-up in Specialized Heart Failure Units: The Role of Telemedicine

In the HF care process focused on transitions of care, there are potential advantages of using telemedicine. Firstly, it allows remote monitoring of biological markers and/or symptoms to enable the early detection and monitoring of decompensation and other clinical events that would otherwise lead to readmission; secondly, it establishes a channel of communication with patients from their home to conduct structured follow-up after discharge, be it by telephone calls or videoconference.15,16

The results of studies that assessed structured follow-up (telephone) or telemonitoring using telemedicine have been widely different. Overall, they have shown positive results in improving survival, reducing hospital admissions, and improving quality of life.15,16,35; however, 2 large randomized controlled trials have shown neutral results.15,37 Possibly because of this, to date, this method of follow-up has not received clear backing in the clinical practice guidelines.15,17

In Spain, there have been several experiences with the use of telemedicine in the field of HF. A clinical study assessed a platform for telemonitoring and the promotion of self-care in the HFU of Hospital Universitario Germans Trias i Pujol. Favorable results were observed, with a reduction of hospital admissions, particularly with telemonitoring of these patients.38 In this area, in the Hospital del Mar HF program (Barcelona), a telemedicine platform was developed (telemonitoring and teleintervention with videoconference) for the follow-up of patients with HF deemed high-risk at the time of discharge. The efficacy of this platform was subsequently assessed in a randomized clinical trial.15 The trial showed a significant relative reduction of 61% for admissions due to HF and 45% for health care costs in favor of the group followed-up with telemedicine.15 There are multiple key factors for facilitating the successful implementation of telemedicine in the care process for patients with HF, which are summarized in Figure 4.4,15,35–37 Given these findings, the Barcelona Litoral Mar HF program has incorporated telemedicine as part of its standard protocol in the transition of care at discharge for patients at high risk of readmission.4

Key Aspects in Structured Community-based Follow-up After Discharge: Integration With Primary Care

Integrated health care is based on a holistic view of the health system with a population-based focus, based on the coordination of services and patient-centered care.13 Due to its accessibility and all-round knowledge of the patient, the PC setting is an ideal place for the treatment and follow-up of patients with HF as part of the continuum of care of HF in a way that is coordinated with centralized HF units in hospitals. The data from clinical trials and pragmatic studies show that this component of integration clearly improves outcomes.30,39,40 Table 6 summarizes the most important aspects to take into account for the integration between levels of care in both HFUs and PC.

The process of structured PC follow-up must enable the early detection of decompensation and therapeutic optimization of patients and should be based on a specific clinical pathway, early follow-up after discharge,9 and care that is predominantly (but not only) home-based and led by case manager nurses working together with the patient’s PC team (general cardiology, nursing and family medicine).4,30,39,40 This approach in Spain is that which most resembles the British model of HF care in PC, based on the Community Heart Failure Services.40 This type of intervention led by PC can reduce readmissions for HF and for all causes after a recent hospital admission.4,14,30,39,40 It is recommended that the approach be structured around clinical pathways that include the actions proposed in Tables 3 and 6.4,8 This care process can also include high-risk patients with no previous admission who are detected in PC, which constitutes per se a transition of care that should be encouraged.4,15,30

Figure 4. Key factors for a cost-effective integration of telemedicine to the care process of patients with heart failure. The circles contain the elements that can act as barriers, and beside them, the factors that can help to overcome them.
Table 6
Integration of Care for Patients With Heart Failure Between Levels of Care

<table>
<thead>
<tr>
<th>Key actions for the integration of levels of care between the hospital HFU and primary care</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provide support for the diagnostic process and the initial management of the patient with suspected HF in the primary care setting</td>
</tr>
<tr>
<td>• Maintain open, 2-way communication between the 2 levels of care</td>
</tr>
<tr>
<td>• Support from the HFU in the management of low-risk or moderate-risk patients in the primary care setting</td>
</tr>
<tr>
<td>• Provide quality care to high-risk patients who would not benefit from specialized follow-up in the HFU hospital setting</td>
</tr>
<tr>
<td>• Maintain an open channel of communication with high-risk patients followed-up in the hospital unit</td>
</tr>
</tbody>
</table>

Points for assessment in the monitoring of patients with HF followed-up in primary care

| • Functional class |
| • Knowledge of warning signs |
| • Patient knowledge about what to do if warning signs occur |
| • Compliance in daily weight monitoring |
| • Treatment adherence |
| • Fluid restriction |
| • Adherence to recommended diet |
| • Adherence to recommended exercise |
| • Understanding of the flexible diuretic regimen |

HF, heart failure; HFU, heart failure unit.

POSTDISCHARGE MANAGEMENT: ADVANCED TRANSITIONS

Structured post-discharge follow-up should consider the points at which new transitions of care could or should occur that, unless coordinated properly, could mean another readmission. The incorporation of checklists in the clinical pathways helps to facilitate their effective execution.4,6 These transitions, called advanced transitions, are summarized below.

Transfer to Primary Care-based Management

After structured outpatient follow-up based on the hospital HFU team, care management can be transferred to the PC team (family physician, family nurse, case manager, and general cardiologist) after meeting some pre-established treatment goals and reducing the risk of readmission.4 It is important that this step is based on active communication that reports the actions performed and the interventions pending regarding educational aspects and self-case aspects (including barriers to adherence), factors related to HF, factors associated with comorbidities, social aspects, and a plan for the professional in case of further deterioration.6

Transitions of Care in Patients with Acute Exacerbation ( Decompensation): Alternatives to Conventional Emergency Admission

A defining element of the transitional care models is the priority given to preventing readmissions.5 Table 7 and Figure 3 show the key elements and the health care resources proposed in the Barcelona Litoral Mar HF care model as alternatives to conventional admission in cases of exacerbation.4 During exacerbations, treatment of congestion can be given quickly in an outpatient setting by escalating oral diuretic doses or by using intravenous diuretics in intravenous diuretic therapy units in PC or in the HFU day hospital. In refractory cases, elective hospital admission in (subacute) combined social and health care units or in acute beds can allow long-lasting stabilization that is difficult to achieve by other methods. We must highlight the importance of telemedicine in several of the steps in this care model.

Finally, it is important to recognize that some admissions to acute beds may be unavoidable. In some cases, elective admission enables stabilization of the patient by intensifying treatment in a way that can only be done in hospital, thus ensuring longer periods of stability.27

Transition Toward Advanced Heart Failure Units

Advanced HF is defined as HF that is refractory to conventional treatment such as neurohormonal drugs and devices.17,18 Some patients with advanced HF require additional complex therapies, such as device implantation, or other advanced solutions, such as cardiac transplant or mechanical circulatory support. To identify such patients, prognostic and functional assessment during a structured follow-up is essential. The clinical pathways must specify the criteria and mechanisms to facilitate early transfer of care of such patients to the advanced HF teams or units, to receive these therapies.5,18

Transition Toward End-of-life Care

In patients with advanced HF, there is an increase in hospital readmissions between 1 and 2 months before death. The strategies that reduce the risk of readmission in the early stages of the disease may not be effective for patients who have progressed to this more advanced stage, something that can occur despite optimal therapy and good self-care.27 A significant number of these patients will not be candidates for solutions such as cardiac transplant or mechanical circulatory support. Table 8 summarizes the most prominent aims and elements for a good approach to this critical phase, in which end-of-life care is prioritized. For this stage of the disease, some integrated care models propose concentrating care in the home, led by the PC team with support from the palliative care team if there is adequate family support.4,61 For patients with poor symptom control and/or little family support, admission to a social-health care setting should be considered (end-of-life units, long-stay units).31,42 Such units are well prepared to provide mid-term support at this stage, with admissions contained to general inpatient wards. If the clinical situation is in the last days and the patient requires admission, direct admission to a palliative care unit is advisable. This whole process requires a redesign of end-of-life care in each health care area, based on an agreement between health care providers that is reflected in the care pathway for that specific area.4,27

Table 7

Key Elements and Care Resources for Transitions in Cases of Acute Exacerbation of Heart Failure According to the Barcelona Litoral Mar Model of Care⁴

**Key actions**

- Include in the care pathway a clear description of the action to be taken in case of decompensation both in hospital and in primary care
- Agree the criteria and the care routes for the decompensated patient within the integrated program
- Define a specific clinical pathway for patients who, after structured follow-up, continue to be at high risk of repeat admission, which allows identification of patients for end-of-life care or candidates for advanced cardiac solutions

**Services portfolio for the health area within the integrated program: alternatives to hospital admission**

- Assessment and treatment open access to patients and by referral from the managing team in the HF process in case of exacerbation
- Outpatient treatment of decompensation with adjustment of oral therapy or intravenous furosemide without admission
- Elective admission in social-health care admission units (subacute units) with discharge planning for re-inclusion in the care pathway
- Elective admission of refractory patients who are not candidates for advanced cardiac solutions in end-of-life units (social-health care centers with the possibility of a parental management regimen in a long-stay unit)
- Support from HF specialists in decision-making regarding hospitalized patients in alternative units to conventional hospital admission
- Prevention of acute exacerbations in patients with refractory or recurrent congestion including renal replacement therapy (peritoneal dialysis) and intermittent inotropic support program with inodulators and/or use of telemonitoring

**Care resources**

- Hospital resource: HFU day hospital
- Primary care resource: primary care emergency centers
- Social and health care resource: subacute units, end-of-life units

HF, heart failure; HFU, heart failure unit.

Table 8

Transition of Care in End-of-life Phases⁴,¹⁷,¹⁸,⁴¹

**Aims of HFUs in the end-of-life process**

- Provide integrated care between cardiology, internal medicine, geriatrics, social work, and primary care
- Avoid unnecessary hospital admissions and investigations
- Improve patient transfers between the different levels of care according to their progress
- Ensure the patient and family face the end-of-life process free from suffering, respecting the patient’s wishes

**Key steps in the optimal transition towards end-of-life care in patients with HF**

- Availability of a protocol and clinical pathway specific for end-of-life and palliative care for patients with HF on a regional basis (by area), agreed on by all professionals from all the care services involved
- Managing team adequately identifies the end-of-life stage based on:
  - The severity of HF (classic criteria of poor prognosis associated with general markers of severity, such as frailty and functional or cognitive decline)
  - Progression of HF (readmissions, acute episodes, visits to the emergency department)
  - Patient’s wishes
- Decision to start end-of-life care shared in a joint multidisciplinary session (hospital HFU team and primary care, represented by the case managers) or after direct contact with the primary care physician
- Joint agreement on the treatment plan including emergency plans

HF, heart failure; HFU, heart failure unit.

**REFERENCES**


**CONCLUSIONS**

Care management programs for HF have traditionally focused on patients with chronic HF at high risk of readmission detected during their outpatient phase. The growing pressure from repeat hospital admissions of patients with HF is shifting the focus of interest from the traditional outpatient care of HF in conventional HFUs toward multidisciplinary management programs focused on transitions of care, especially between the acute phase and the postdischarge phase. This has led to the application of integrated transition of care programs, of a multidisciplinary, patient-centered nature. These HF care models that concentrate on transitions of care are based on a holistic assessment of patients during their inpatient stay, identification of specific needs, the discharge planning process, and an early, structured follow-up after discharge that includes transitions of advanced care.

**CONFLICTS OF INTEREST**

None declared.

Please cite this article in press as: Comín-Colet J, et al. Transiciones de cuidados entre insuficiencia cardíaca aguda y crónica: pasos críticos en el diseño de un modelo de atención multidisciplinaria para la prevención de la hospitalización recurrente. Rev Esp Cardiol. 2016.


