

Chronic Care Model for the Management of Patients with Heart Failure in Primary Care

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ABSTRACT: We recently investigated the prognostic impact of a Chronic Care Model (CCM)-based healthcare program applied in primary care in Tuscany Region mainly run by multidisciplinary teams composed of general practitioners (GPs) and nurses. The project included proactively planned follow-up visits for each patient, individualized counselling to optimize lifestyle modifications and adherence to appropriate diagnostic and therapeutic pathways. 1761 patients with Chronic heart failure (CHF) directly enrolled by the GPs were matched with 3522 CHF controls not involved in the project. Over a 4-year follow-up in the CCM group a higher CHF hospitalization rate was found (12.1 vs 10.3 events/100 patient-years; incidence rate ratio [IRR] 1.15, $p=0.0030$), whereas mortality was lower (10.8 vs 12.6 events/100 patient-years; IRR 0.82, $p<0.0001$). The CCM status was independently associated with a 34% increase in the risk of CHF hospitalization and a 18% reduction in the risk of death ($p<0.0001$ for both). The CCM status was associated with a 50% increase in the rate of planned Heart failure (HF) hospitalizations whereas the rate of 1-month CHF readmissions showed no differences. Such a divergent trend could be explained by the direct involvement of GPs in the CCM program, leading them to a better awareness of patients' clinical status, and then to a more frequent use of clinical pathways and facilities, including hospitalization. It is reasonable to argue that not all hospitalizations must necessarily be considered as a poor outcome, as they often provide additional opportunities to improve therapies, optimize patient education, or define follow-up strategies. The evidence of a divergent trend between mortality and hospitalization in our population might support the clinical importance of a multidisciplinary approach for the management of patients with HF.

KEYWORDS: Heart failure, health services, mortality, hospitalization, chronic disease

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Chronic heart failure (CHF) is a well-known leading cause of mortality, morbidity, and disability worldwide and a major clinical, economical, and social challenge for health care systems. Heart failure (HF) hospitalizations are progressively increasing over years, as recent data suggest an overall 2%–3% prevalence and an incidence of 5–10 per 1000 persons per year in developed countries, with even larger values in the elderly.¹ Moreover, despite continuous improvements in the pharmacological and non-pharmacological treatment options during the last few decades, the clinical outcome of patients with HF still remains poor, with an estimated average 50% mortality at 5 years.² The importance of an adequate management is further enhanced by the common presence of a high multimorbidity burden in the population with HF—particularly in geriatric patients—which in turn translates to an even worse outcome and a further heavier socioeconomic impact for health care systems. Based on these considerations, the idea of testing the utility of specific programs aimed at optimizing the management of patients with HF is clinically interesting.

A number of studies on patients with chronic diseases previously reported clinical benefits after implementation of the chronic care model (CCM), an approach aimed at changing the health care system from reactive—that is to say, a system that acts and responds only as a consequence of sickness—to proactive, ie aimed at maintaining patients' health by predefined, systematic interventions at the patient, practice, organization, and

community levels.³ The CCM was first proposed in the 1990s as a framework to optimize primary care and proactively attend to patients with chronic disease, overwhelming the limitations of the classical acute-care model. Its landscape has then evolved over time, with a progressively deeper attention to the interaction between the clinical-biomedical sphere and the sociocultural context of each patient, and with validation studies that showed its applicability and clinical utility in different populations with various chronic conditions.⁴ The need of considering multiple chronic conditions and the complex interaction between different components of patients' health has therefore led to an evolution of the initial CCM principles, making the need of a whole-person care one of the cornerstones of the current CCM approach. With this in mind, the potential application of the CCM to patients with HF is worthy of exploration. Few studies previously investigated its effectiveness in improving outcomes in patients with HF, with inconsistent results across studies on the effects on the risk of hospitalization and quality of life. Such potential clinical utility with considerable heterogeneity in effectiveness was recently confirmed by a meta-regression analysis.⁵ Notably, most of these studies were performed within hospital settings in the United States or in northern European Countries.

We recently explored the effect of the CCM on the outcome of patients with HF within the Italian health care system, which is based on a public service administered on a regional basis and



where a central role is played by the general practitioner (GP).⁶ In particular, we investigated the prognostic impact of a regional, CCM-based health care program applied since 2010 in Tuscany, aimed at improving the management of CHF in primary care and involving 1761 patients with CHF directly enrolled by the GPs. The project hinged on dedicated working teams including GPs and nurses, proactively planned follow-up visits for each patient, accurate and individualized counseling to optimize lifestyle modifications and adherence to treatments, and appropriate diagnostic and therapeutic pathways recommended by international guidelines. Interestingly, a major role was played by the nurses, who were fully responsible for the practical coordination of the whole follow-up process. A group of 3522 HF controls, selected according to a 1:2 ratio among patients with HF assisted by GPs not involved in the project, was considered as the control group. Over a 4-year follow-up period, we found a higher HF hospitalization rate in the CCM group than the controls (12.1 vs 10.3 events/100 patient-years; incidence rate ratio [IRR]=1.15 [1.05-1.27], $P=0.0030$), whereas mortality was lower in the CCM group than the controls (10.8 vs 12.6 events/100 patient-years; IRR=0.82 [0.75-0.91], $P<0.0001$). After adjustment to confounders, the CCM status was independently associated with a 34% increase in the risk of HF hospitalization and an 18% reduction in the risk of death ($P<0.0001$ for both). Interestingly, the effect on HF hospitalization was driven by a 50% higher rate of planned HF hospitalization.

These findings not only suggest that the beneficial effects of CCM on survival might be extended to patients with CHF followed in primary care but also indicate the need for different strategies to improve the outcome in terms of hospitalizations. The finding of a divergent trend for mortality and hospitalization in this study is not so unexpected and surprising. In a study on the effects of the Veterans Affairs Health Care System, performed in the United States in the years 2002-2006, mortality and HF hospitalization rates also showed a clear trend toward opposite directions.⁷ It should be noted that as our CCM program involved primary care physicians, the involvement in the CCM program may lead them to a better awareness of patients' clinical status and then to a more frequent use of clinical pathways and facilities, including hospitalization. Accordingly, in this study the CCM status was associated with a significant increase in the rate of planned HF hospitalizations and a considerably smaller effect on the rate of urgent hospitalizations.

Such evidence raises the intriguing question of the meaning of hospitalization as a measure of clinical outcome. Is it reasonable to argue that not every hospitalization must necessarily be considered as a poor outcome? We believe that this is the case. This issue may be rather straightforward for some kind of planned hospitalizations. However, even for non-planned hospitalizations, the possibility that some of them could improve the probability of survival should be considered. In this regard, it is also interesting that the rate of 1-month HF readmissions showed no differences between the CCM group and the controls in this study. Furthermore, in a previous study on patients with HF followed in primary care after a hospitalization,

rehospitalizations increased although patients had a better perception of their health status.⁸ It seems therefore reasonable to conclude that not all hospitalizations must necessarily be deemed as "bad," as they often provide additional opportunities to improve therapies, optimize patient education, or define follow-up strategies. Probably, dedicated tools to assess the effectiveness of interventions at the community level might be useful to reduce the limitations of hospitalization as a measure of outcome. In addition, the complexity of the whole process underlying a hospitalization event should be considered.⁹ For HF, hospitalization rates are affected not only by biological mechanisms—eg inadequate therapies, comorbidities, disease progression, or periodic decompensations that are intrinsic to the natural history of HF—but also by several other actors, among which hospital and primary care physicians, caregivers, the patients themselves, and organizational characteristics of the health care system.

Finally, we believe that the evidence of a divergent trend between mortality and hospitalization in our population might support the clinical importance of a multidisciplinary approach for the management of patients with HF. Although this concept is to date a main principle of the CCM, programs hinging on the CCM in the real world still often do not give a sufficient attention to the key role of multimorbidity in affecting the clinical outcome.¹⁰ A multidisciplinary approach, integrated within a CCM plan for the management of patients with HF, might provide multiple and expanded diagnostic and therapeutic pathways to the GPs, thus reducing the need for hospitalization.

Author Contributions

PF and PB: writing; FP and LP: statistical analysis; LR and AZ: article review and improvement

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