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GENERAL REVIEW

The effect of care pathways for hip fractures: a systematic overview of secondary studies

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Abstract The aim of this paper was to perform a systematic overview of secondary literature studies on care pathways (CPs) for hip fracture (HF). The online databases MEDLINE–PubMed, Ovid–EMBASE, CINAHL–EBSCO–host, and The Cochrane Library were searched. A total of six papers, corresponding to six secondary studies, were included but only four secondary studies were HF-specific and thus assessed. Secondary studies were evaluated for patients' clinical outcomes. There were wide differences among the studies that assessed the effects of CPs on HF patients, with some contrasting clinical outcomes reported. Secondary studies that were non-specific for CPs and included other multidisciplinary care approaches as well showed, in some cases, a shorter hospital length of stay (LOS) compared to usual care; studies that focused on promoting early mobilization showed better outcomes of mortality, morbidity, function, or service utilization; CPs mainly based on intensive occupational therapy and/or physical therapy exercises improved functional recovery and reduced LOS, with patients also discharged to a more favorable discharge destination; CPs principally focused on early mobilization improved functional recovery. A secondary study specifically designed for CPs showed lower odds of experiencing common complications of hospitalization after HF. In conclusion, although our overview suggests that CPs can reduce significantly LOS and can have a positive impact on different outcomes, data are insufficient for formal recommendations. To properly understand the effects of CPs for HF, a systematic review is needed of primary studies that specifically examined CPs for HF.

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Introduction

The 1.26 million hip fractures (HFs) estimated in adults for the year 1990 are predicted to rise to 7.3–21.3 million by 2050 [1]. The one-year death rate after a HF is about 20–30 %; and one-third of this excess mortality can be directly attributed to the HF itself [2]. In addition to the short-term mortality associated with HF, significant excess annual mortality persists up to 10 years or more after HF [3]. Older individuals who suffer a HF can expect a 15–25 % decline in the ability to perform activities of daily living (ADL), and about 10–20 % of the fractured people will be unable to return to their previous residences and will need some type of assisted living care [4]. Even after a significant recovery during the first year, hip fracture patients continue to suffer from functional impairment and loss in quality of live at 1 year [5].

HFs correspond to the second most important cause of hospitalization in older patients [6], with elderly patients accounting for approximately 90 % of all hospital stays due to HFs [7]. Health service consumption increases significantly after hip fracture, with most of their healthcare costs owing to long-term care [8–10]. One of the key issues that frequently arise when care teams manage HF is that it is not easy to provide standard care that can reduce variations in processes of care and patient outcomes.

Care pathways (CPs) are complex interventions [11–13] and can be one of the approaches to foster better outcomes and optimal resource use [14–16]. CPs are currently used worldwide for different kinds of patient groups [17, 18].

CPs have been applied as a practice method and tool for the improvement of the care management of patients with a HF, globally one of the main causes of mortality and morbidity. Because of this reason, numerous primary and secondary literature studies about CPs for HF were published (and it is the unique case in the literature). Unfortunately, these studies seem to be not conclusive. Even though the use of CPs has been in general recommended by international guidelines in relation to the management of HF patients [19–24], no conclusive systematic overview of secondary studies is available that specifically examines the effects of CPs use on HF patients through the continuum of care.

Hence, the main objective of the present systematic overview of the literature was to identify and analyze published secondary studies of the effects of CPs on HF patients.

This overview of secondary literature studies represents an initial level of a wider literature review approach to overall investigate the available published studies assessing the effect of the use of CP for HF.

Besides the general objective of the overview, our specific research questions are the following: Are there in the literature secondary studies evaluating the effect of CPs for HF, through whose findings it is possible to achieve conclusive recommendations on the use of CP for HF? Are all the eventual secondary studies specific for CP or not, and/or are also specific for hip fracture or not? Are the primary studies included in the eventual secondary studies classifiable as CP through a unique definition of CP?

Materials and methods

Data sources

Two reviewers (FL and CL) independently searched major electronic biomedical databases for relevant articles on CPs and HF and hand searched and checked the bibliographies of identified publications. To identify secondary literature, we searched in The Cochrane Library: the Cochrane Database of Systematic Reviews (CDSR, up to 4th Quarter 2010), the Cochrane Database of Abstracts of Reviews of Effects (DARE, up to 4th Quarter 2010), Health Technology Assessment Database (HTA database, up to 2010 Issue 4), and NHS Economic Evaluation Database (NHSEED, up to 2010 Issue 4). We also searched MEDLINE–PubMed (1975–Jan 2011), Ovid EMBASE (1998–2010, Jan 2011), and CINAHL–EBSCO–host (1981–Dec 2010).

Search strategy

To obtain the best sensitivity for the searches, we did not limit the initial search by year of publication or language. However, we examined the full texts of only relevant English, German, French, Dutch, and Italian language articles. As a first strategy, the following medical subject headings (MeSH) related to CPs and HFs were used: Critical Pathways AND Hip Fractures (MEDLINE), Clinical Pathways AND Hip Fractures (EMBASE), and Critical Path AND Hip Fractures (CINAHL). Second, a combined non-MeSH and MeSH search was performed based on the following search string: (“care pathway” OR “clinical pathway” OR “critical pathway” OR “care map” OR “clinical path” OR “multidisciplinary approach”) AND (“Hip Fractures”[MeSH]). For the four searched databases included in the Cochrane Library (CDSR, DARE, HTA, NHSEED), the MeSH terms “Critical Pathways” AND “Hip Fractures” were used. When the full text of a relevant article was not found, the authors were contacted for further information. If the requested information was not available, the article was excluded.

Inclusion criteria

In order to obtain a sufficient level of evidence, we included, as secondary literature publications, other systematic overviews (SO), systematic reviews (SR), meta-analyses (MA), and health technology assessment (HTA) reports [25]. The secondary publications had to include experimental and quasi-experimental primary studies (original articles) addressing CP interventions for PFF. All studies concerning CPs were included if they had recruited patients of all ages who had been admitted to acute care hospitals, post-acute care/rehabilitation, and post-rehabilitation for HF. All studies concerning all potential outcome measures on clinical outcomes, process of care, and hospitalization costs were considered. The evidence level of the included primary studies was classified as follows: I = randomized controlled trials (RCTs); II = Cohort observational study (high evidence); IIa = Cohort observational study (moderate evidence); IIb = Cohort observational study (limited evidence); IIc = Cohort observational study (weak or unclear evidence).

To properly include secondary studies about CP in our systematic overview, the definition of care pathway according to the European Pathway Association (www.E-P-A.org) was adopted. A CP is defined as a complex intervention for the mutual decision making and organization of care processes for a well-defined group of patients during a well-defined period. Defining characteristics of CP include: (i) an explicit statement of the goals and key elements of care based on evidence, best practice, and patients' expectations and their characteristics; (ii) the facilitation of the communication among the team members and with patients and families; (iii) the coordination of the care process by coordinating the roles and sequencing the activities of the multidisciplinary care team, patients, and their relatives; (iv) the documentation, monitoring, and evaluation of variances and outcomes; and (v) the identification of the appropriate resources. The aim of a CP is to enhance the quality of care across the continuum by improving risk-adjusted patient outcomes, promoting patient safety, increasing patient satisfaction, and optimizing the use of resources [16, 26].

Subsequently, to our classification of care interventions, secondary studies were also included if they dealt with other multidisciplinary care approaches (MCAs) delivered by a team. In fact, MCAs were intended to be wider holistic approaches to bridge the gap between hospital admission and discharge home, but not based on a CP. Effectively, the E-P-A definition of CP allowed the classification of CP interventions versus other, non-CP, interventions of the primary studies included in the secondary studies (Table 1).

Table 1 Classification of CP interventions and other, non-CP, interventions related to the primary studies included in the secondary studies ($N = 4$)

Secondary study—author, year [Ref.]	CP intervention: primary study—author, year [Ref.]	Other intervention[a]: primary study—author, year [Ref.]
Cameron [29]	Ogilvie-Harris [33]	Pachter [34]
	Tallis [35]	
Beaupre [30]	Choong [45]	Cameron [36]
	March [39]	Galvard [37]
	Roberts [44]	Swanson [38]
		Cameron [40]
		Huusko [41]
		Naglie [42]
		Hagsten [43]
		Huusko [46]
Chudyk [31]	Choong [45]	Jette [47]
	March [39]	Cameron [36]
	Koval [49]	Swanson [38]
	Beaupre [50]	
	Beaupre [51]	
Neuman [32]	Choong [45]	Rasmussen [52]
	March [39]	Khasraghi [53]
	Roberts [44]	Moran [56]
	Beaupre [51]	
	Olsson [54]	
	Hommel [55]	

CP intervention classification based on E-P-A definition of CP

[a] Other intervention, based on multidisciplinary care approaches, that authors of the secondary studies classified as CP. [Ref.] = references number. Other two secondary studies were not includible in our systematic overview [27, 28]

Exclusion criteria

The explicit reasons for article exclusion were the following: (1) the article did not contain the results of any study; (2) the study was not pertinent to the research question(s); (3) the study was part of duplicate publications reporting the same main outcome measures and/or it was a study performed as a individual component of the same study not including additional results; (4) the study lacked detailed and appropriate risk-adjusted analyses; and (5) the study met the inclusion criteria but the full text was not available and the authors could not be retrieved (corresponding author/information not available).

Selection of studies

Two reviewers (FL and CL) screened all the titles, abstracts, and keywords of publications identified by the

searches to assess their eligibility, according to the above-mentioned inclusion and exclusion criteria. Publications that clearly did not meet the inclusion criteria were excluded during this phase. We then obtained a complete paper copy of all potentially relevant studies and had both reviewers assess all publications according to the pre-specified selection criteria. Disagreements were resolved by discussion with two additional researchers (MP and KV).

Methodological quality assessment of studies

Two reviewers (FL and CL) independently assessed the specificity of the pathway intervention according to the defined characteristics by E-P-A. The results are shown in Table 1. Disagreements were resolved by discussion with the two additional researchers (MP and KV).

Results

The explicit search strategy led to the initial selection of 108 records. After removing duplicate articles, 85 were considered as potentially relevant (Fig. 1). For the first stage of the study assessment, we scanned all 85 titles and abstracts for inclusion, excluding 79 non-pertinent publications. The remaining 6 potentially relevant articles were assessed as full texts.

The non-CP interventions were considered as other interventions evaluated in the secondary studies (Table 1). The SO initially included 6 pertinent publications corresponding to 6 secondary studies. Even though 6 secondary studies were identified and considered, it was not possible to include the SR and MA of Rotter et al. (2008) and the SR and MA of Rotter et al. (2010) because both studies were not HF-specific [27, 28]. In fact, these two reviews considered other conditions in addition to HF, hardly including primary HF studies in their reviews (2 and 1, respectively) (Fig. 1).

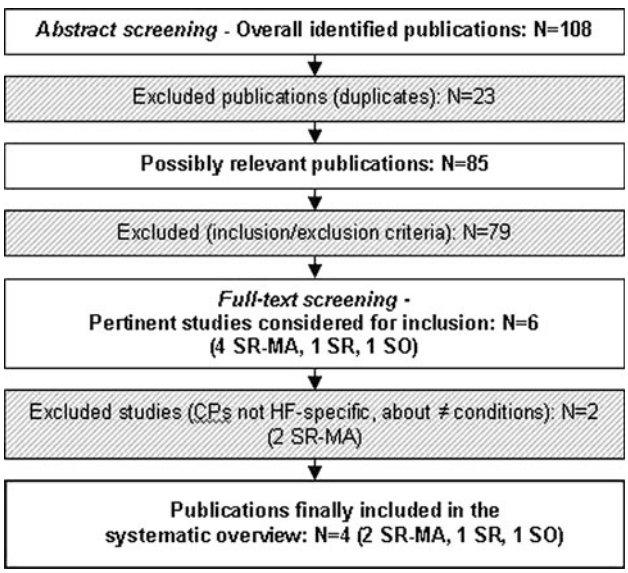

Fig. 1 Flowchart showing the results of the search strategy. *SO* Systematic overview, *SR* systematic review, *MA* meta-analysis

Of the four studies finally included in the SO, three evaluated CPs together with MCA interventions for HF and only one specifically addressed how CPs affect the quality of care provided to patients with HFs [29–32]. It was possible to describe the results of secondary studies only for outcome indicators, such as function, morbidity, mortality, discharge location, hospital readmission, and hospital length of stay (LOS). Such results were measured either during the entire care period (i.e., starting from the time of hospital admission through to the final rehabilitation process) or during particular phases and settings of patient care. The characteristics and results of the included studies are described in Table 2.

In an HTA report consisting of a SR and MA, Cameron et al. [29] found that, in the three primary studies included, the use of CPs (or MCAs) was associated with a shorter hospital LOS (mean reduction of 5.3 days) [33–35]. However, there was no evidence that CPs affected readmission to hospital, residential status, mortality, or morbidity. CPs did result in a non-significant increase in patients achieving independent mobility at discharge.

In the results of their SO of both primary studies and systematic reviews, Beaupre et al. [30] concluded that no clear level 1 evidence (consisting of at least one good quality RCT) existed to support the premise that CPs and MCAs with a focus on promoting early mobilization afford better outcomes in terms of mortality, morbidity, function, or service utilization than usual care [36–44]. They found that some studies suggested that CP- and MCA-standardized multidisciplinary care reduced in-hospital LOS, with an increase in LOS in other studies [36–39, 41–46].

A SR of Chyudik et al. [31] focused on CPs and MCAs in the HF rehabilitation continuum. When implemented in an acute care setting, CPs mainly based on intensive occupational therapy and/or physical therapy exercises improved functional recovery [36, 47, 48], and reduced LOS [36, 47, 49]. Patients subjected to CPs were also discharged to a more favorable discharge destination [36]. CPs principally focused on early mobilization improved functional recovery [50]. The effects of CPs on discharge location [39, 50, 51], and LOS [45, 50, 51], were conflicting. No differences were found before and after the implementation of CPs in terms of hospital readmission [45, 51] or mortality [39, 51]. Moreover, only one study found differences in functional recovery between CP patients and non-CP patients, but only after accounting for levels of social support across both groups of patients [51].

Table 2 Included secondary articles specific for HF studies examining CPs alone, or CPs together with other interventions ($N = 4$)

Author, year (type of article)	Intervention and setting/phase(s) of HF care	Type of care approach: CP or MCA (study design)	Outcome measures assessed for CP/CP + MCA	Synthesis of the results for CP/CP + MCA	Evidence level	Main conclusion and recommendations for CP/CP + MCA (other interventions)
Cameron [29] (SR-MA HTA)	Geriatric rehabilitative care for HFs MCA programs, included CPs, following the acute management of the elderly	2 CPs according to authors' classification (by our criteria: 2 CPs[a] [CBAs] and 1 MCA [CBA]) and 38 MCAs	LOS, return to previous residential status, mortality, residential status, functional outcome	Shorter in-hospital LOS (mean reduction of 5.3 days) [33–35] No evidence of difference in readmission to hospital (OR 0.77, 95 % CI 0.20–2.98); residential status (OR 1.55, 95 % CI 0.25–9.53); mortality (OR 0.78, 95 % CI 0.35–1.76) or morbidity/complications (OR 0.79, 95 % CI 0.28–2.26). NS increase in numbers achieving independent mobility at discharge (OR 2.25, 95 % CI 0.95–5.31)	I–II	CP (and also MCA) reduces total in-hospital LOS. There are insufficient data to recommend the introduction of formal CP in association with these practices, although there is weak evidence that they may be advantageous
Beaupre [30] (SO)	MCA for HFs, included CPs Early postoperative phase (up to 7–10 days)	1 SR of 9 MCAs (RCTs) and 11 MCAs according to authors' classification (by our criteria: 3 CPs[a] [CBAs] and 8 MCAs [RCTs])	Level of function, morbidity, LOS, mortality	No clear level 1 evidence that MCA with early mobilization affords better outcomes in terms of mortality, morbidity, function, or service utilization than usual care [36–44] Some studies suggest standardized MCA reduced in-hospital LOS, while others suggested it increased LOS [36–39, 41–46]	I–II	Effectiveness of MCA (CP included), compared with usual care is unclear. Despite numerous studies, no clear Level I evidence exists to show that MCA with early mobilization affords better outcomes in terms of mortality, morbidity, function, or service utilization than usual care
Chudyk [31] (SR)	Different approaches of rehabilitation practices in the elderly with HFs (included CPs) *Settings: acute care hospital, post-acute care/rehabilitation, post-rehabilitation*	8 CPs by author's classification (by our criteria: 5 CPs[a] [1 QRT and 4 CBAs] and 3 MCAs (RCTs)	*Within an acute care setting—intensive occupational therapy and/or physical therapy exercises:* functional recovery, LOS, discharge destination *Within an acute care setting—early mobilization:* functional recovery, discharge location, LOS, readmission, mortality	*Intensive occupational therapy and/or physical therapy exercises (1 RCT, 4 CBA):* Functional recovery improved [36, 38, 47] and LOS decreased [36, 38, 49]. More favorable discharge destination [36] *Early mobilization (4 CBA):* Improved functional recovery [50] Conflicting evidence for: discharge location [39, 50, 51], and LOS [45, 50, 51]. No difference in: readmission [45, 51], and mortality [39, 51]	IIa (Moderate) IIb (limited) IIc (weak) (unclear)	MCA (CP included) involving intensive OT and/or PT exercises and early mobilization were associated with improved functional recovery during acute care

Table 2 continued

Author, year (type of article)	Intervention and setting/phase(s) of HF care	Type of care approach: CP or MCA (study design)	Outcome measures assessed for CP/CP + MCA	Synthesis of the results for CP/CP + MCA	Evidence level	Main conclusion and recommendations for CP/CP + MCA (other interventions)
Neuman [32] (SR-MA)	CPs specific for HFs	9 CPs study investigations by author's classification (by our criteria: 6 CPs[a] [1 qRCT and 8 CBA]) ($N = 4{,}637$)	Rates of deep vein thrombosis, pressure ulcers, surgical site infection, urinary tract infection, pneumonia, short-term mortality (death during or within 30 days of hospitalization)	Lower OR, in favor of CP, of: deep venous thrombosis (OR 0.33, 95 % CI 0.14–0.75) [44, 45, 52, 53]; pressure ulcers (OR 0.48, 95 % CI 0.30–0.75) [44, 45, 53–55]; surgical site infection (OR 0.48, 95 % CI 0.25–0.89) [19, 21, 26]; urinary tract infection (OR 0.71, 95 % CI 0.52–0.98) [19–22, 26] NS differences in the odds for: contracting pneumonia (OR 1.01, 95 % CI 0.67–1.53) [44, 45, 51–53, 56]; and in combined outcome of in-hospital [51–54] or 28/30-day mortality [44, 45] (OR 0.86, 95 % CI 0.66–1.13)	I–II	An significant association was observed between CP use and lower odds of 4 common complications of hospitalization after HF NS association was observed between CP use and changes in short-term mortality, suggesting that assessments of hospital quality based on short-term mortality may not reflect important improvements in patient outcomes that hospitals may achieve using CP

CBA Controlled before-and-after study, *CP* care pathway, *HTA* health technology assessment report, *HFs* hip fractures, *LOS* in-hospital length of stay, *MA* meta-analysis, *MCA* multidisciplinary care approach, *NS* non-significant, *OR* odd ratios, *qRCT* quasi-randomized controlled trial, *RCT* randomized controlled trial, *SO* systematic overview, *SR* systematic review

[a] CPs studies according to E-P-A definition criteria; evidence level: I = RCT; II = Cohort study (high); IIa = Cohort study (moderate); IIb = Cohort study (limited); IIc = Cohort study (weak or unclear)

In a SR and MA of Neuman et al. [32], an association was observed between CP use and lower odd ratios (OS) of experiencing four common complications of hospitalization after HF: deep venous thrombosis [44, 45, 52, 53], pressure ulcers [44, 45, 51, 53–55], surgical site infection [44, 45, 52], and urinary tract infection [44, 45, 51–53], respectively. An association between CP use and changes in combined short-term mortality outcome (i.e., in-hospital mortality plus 30-day mortality) did not reach statistical significance [44, 45, 52–54]. Similarly, no significant differences were observed for the OS of contracting pneumonia [44, 45, 51–53, 56].

Discussion

Some different specific and not specific for CP and HF secondary literature studies are published on the topic related to CP for HF (6 were included at a first phase in the overview, and 4 were finally assessed); and this is the first known case in the literature about CP. Both a recently published Cochrane review of CP studies (2010) and a paper by Rotter et al. (2008) concluded that CPs reduce the risk of complications without having a negative impact on the organization of care [27, 28]. Although both reviews were well conducted and based on sound analyses, we were concerned about the appropriateness of the primary studies included. CPs are complex interventions. It is difficult to compare findings if study publications do not describe the intervention or context in sufficient detail [16]. In any case, one cannot use these results for a systematic review of the effects of CPs on a specific condition and/or procedure because of their lack of specificity [28, 57]. Therefore, even if we had considered both studies for our systematic overview, we would not have been able to address any specifics about the effects of CPs for HF.

As a possible limitation to our findings, it could be argued that the originality of a review of secondary literature could be limited, not being based on numeric quantities. We think that this could be generally true when analyzing highly specified interventions (a new drug, a new device, etc.). In such cases, it is possible that a review of secondary literature would not add any value to existing papers. On the contrary, in health services research are evaluated complex interventions that are a mix of different active components and that are difficult to specifically define [11–13]. Because of the lack of specific definitions, there is a risk that secondary literature on complex interventions could be seriously biased by the misclassification of the intervention because the included papers are not enough specific. This is the case of care pathways that are often confused with other similar interventions, such as the

implementation of clinical guidelines, of protocols, as it has been shown in a recent literature debate [16].

Our analysis of results obtained through a specific secondary literature search revealed the issues discussed above. In fact, it was difficult to compare different studies because they lacked a common definition for CP. In addition, it was not always clear whether the results were attributable to the CPs or to some specific intervention included in the CPs. The latter probably led to the fragmentation of the CPs as complex interventions. Therefore, studies that could not attribute their results specifically to a CP itself probably did not address our main overview objective. The most specific and recent meta-analysis by Neuman et al. (2009) showed a similar problem. Neuman et al. developed their own instrument "to assess elements common to clinical pathways" that were based merely on two previous reviews [19, 50], not on actual definitions. In fact, much confusion remains about what a clinical pathway and/or a CP is and there is an urgent need to adopt a clear and strict definition for CP [16]. Indeed, because of this methodological issue, some of the individual studies included in the secondary studies may not have assessed CPs after all. Moreover, in many of the primary papers included in the secondary research that we analyzed, CPs were part of wider programs or organizational interventions, such as geriatric orthopedic rehabilitation units and multidisciplinary early-supported discharge programs [58]. In fact, in addition to CP, different other interventions (not clearly classified as CP, by E-P-A definition) are often included in the secondary studies. Mostly, the secondary studies did not clearly and completely describe the specific content of the development and implementation process of the CP intervention related to the included primary studies. Therefore, even when a CP was developed, many of the observed results could not be directly attributable to the use of the CP. Also, the study designs were substantially different in many characteristics, including typology of patients, typology of controls groups, and selected outcomes. Finally, the studies did not consider other possibly relevant measures of organization of care, health service consumption, and cost-related outcomes.

Considering all these possible limitations, the major conclusion that emerged from the secondary literature is that CPs can reduce significantly LOS and can have a positive impact on different outcomes. The results also suggest that assessments of hospital quality for HF, when primarily based on mortality, may not reveal important improvements in patient outcomes that may be achieved by using CPs.

We conclude that, although positive results emerged from the present systematic overview of secondary literature studies, the available evidence does not allow formal recommendations. Limitations included the characteristics of dissimilar populations, with differences in inclusion criteria and methods to develop and implement specific interventions, and with patient outcome measures used to assess the effect of CPs as complex interventions.

Therefore, we think that a review of secondary literature on the effect of care pathways for hip fractures is something more than a comprehensive summary of the published papers but is a useful guide to researchers and clinicians in understanding better both the definition of care pathways and their effects on patients with hip fractures. In fact, has it has been shown in Fig. 1, only four studies met inclusion criteria and have been assessed. To our knowledge, this study is the first reviews of secondary literature on the effect of care pathways for hip fractures and we think that our findings will be also of help to strengthen study design of further original reviews on the same and similar topics.

Future research should include adequately powered, multicenter studies with high-quality methodological designs. Future studies should also investigate the effects of CP interventions on patients' and caregivers' quality of life, their satisfaction with the interventions, teamwork, and, possibly, include cost-effectiveness outcomes. More long-term data are needed as well. Health service consumption increases dramatically after HF, with most of the excess healthcare costs related to long-term care, begging for follow-up data on the long-term journey and care of older patients.

Despite the weak findings of this overview of secondary studies, only basing on these findings, it is possible to understand some main critical methodological issues related to the secondary literature studies. In the light of these issues, there is a need for a further level of literature review approach to overall investigate the available published studies specifically addressing the effectiveness of CPs for HF. Consequently, the findings of the overview will allow to adopt a more rigorous and explicit methodology in a systematic inclusion and review of primary literature studies (original articles).

One of the research priorities is a definitive multicenter cluster randomized control trial of the impact of CPs in the in-hospital management and follow-up of HF patients.

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Conflict of interest The authors of the present manuscript, Fabrizio Leigheb, Kris Vanhaecht, Walter Sermeus, Cathy Lodewijckx, Svin Deneckere, Steven Boonen, Paulo A Boto, Rita Veloso Mendes, and Massimiliano Panella, declare that they have not proprietary interest or conflict of interest.

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