

Review

Complexity in caring for an ageing heart failure population: concomitant chronic conditions and age related impairments[☆]

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Abstract

The complexity of caring for the ageing heart failure (HF) population is further complicated by concomitant chronic conditions (i.e., polypharmacy, depression), age related impairments (i.e., hearing, visual and cognitive impairments, impairments in activities of daily living (ADL/IADL), and other issues (e.g., health illiteracy, lack of social support). This paper provides an overview of these risk factors, outlines how they individually and in interplay endanger favourable outcome by putting patients at risk for poor self-management. Moreover, suggestions are made on how these issues could be addressed and integrated in heart failure management by applying gerontological care principles in caring for the ageing heart failure population.

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1. Heart failure and the older persons

Heart failure (HF), a chronic disease primarily affecting the older persons (mean age 70), has been described as reaching epidemic proportions. Improved treatment of acute coronary events resulting in prolonged survival, an increased awareness of and ability to diagnose HF, and the ageing of our population account for the continuous increase in the incidence and prevalence of HF [1–6]. Epidemiology studies have identified an annual incidence of HF of 5.4/1000 and a point prevalence for women and men of all ages of 10.5/1000 and 10.9/1000, respectively. The rising number of individuals being treated for HF is explained by a documented annual increase of 1/1000 and 0.9/1000 in the prevalence of HF for women and men, respectively [6].

Heart failure is characterised by high mortality and morbidity rates. This was described in a Scottish study by Khand et al. (2001) [7], which showed that, of a cohort of 12,640 patients newly diagnosed with HF (mean age of 74), 23% died during their initial hospital admission and a further 50% died within 3 years. For the 9718 patients who survived their initial hospitalisation, there were 22,747 readmissions over the 3-year study period [7]. This high rate of rehospitalisation is further reflected in the statistics from the USA, showing that 20% of all hospitalisations for persons 65 years and older are HF-related [8]. The high mortality associated with HF is documented in a Swiss study where patients with HF (mean age 75 years) had a 12.6% annual mortality as compared to 4.3% in the general population [9].

Projected population estimates for Europe indicate that by 2050, 27.6% of the population (173 million people) will be 65 years of age or older. This number will have doubled since 1995 and is almost 4 times more than in 1950 [10]. Given these numbers, we can anticipate an ever-increasing prevalence of patients with HF, presenting a tremendous challenge for health care systems as well as clinicians to provide state of the art services to this growing population.

Understanding the issues involved in caring for the ageing HF population requires a careful exploration of factors contributing to the complexity of the care for this patient group. The management of multiple concomitant chronic conditions often requires managing polypharmacy. Age-related impairments such as auditory, visual and cognitive functioning, limitations in activities of daily living (ADL) in addition to health illiteracy, and social isolation, individually or in interplay, may contribute to poor clinical outcomes. They may also jeopardize a patient's successful self-management and lead to nonadherence with the treatment regimen. In this article, the older person living with HF is therefore not only addressed from a geriatric

perspective which focuses on medical problems and care for older people with diseases, but more specifically from a gerontological perspective, with a focus on the process of ageing and includes the problems of older people in general [11]. Care from this perspective includes aspects of disease prevention and health promotion and regards the older person as a wilful and active partner rather than as a passive patient.

2. Heart failure and concomitant chronic conditions

Concomitant chronic conditions are common in the older patient with HF. A recent population study of 122,630 patients with HF, age 65 and older, found that 14% have 0–1 comorbidity, whereas 58% have 2–5, 19% have 6–8, and 7% have more than 9 concomitant illnesses. Patients with more than 5 comorbidities account for more than 80% of the total hospital days for HF. The most common comorbidities were essential hypertension (55%), diabetes mellitus (31%), chronic obstructive pulmonary disease (COPD; 26%), ocular disorders (24%), and hypercholesterolemia (21%) [12]. In addition, 11% of community-dwelling older adults with HF was found to be depressed [13]. Studying an older (mean age 86) population of hospitalised HF patients, Lien et al. (2002) [14] found that approximately one third of the older ($N=116$, mean age 86) patients hospitalised with HF also have hypertension, mental impairment, musculoskeletal problems requiring analgesia, incontinence, and/or psychological conditions requiring psychotropic medications. Hypothyroidism, cerebral vascular accidents, ischemic heart disease, diabetes, and chronic anaemia were diagnosed in 10–26% of these patients. Renal failure and arthritis have also been found to be significant morbidities for patients with HF [14,15].

Comorbidities contribute both to the development of chronic HF as well as influencing its progression and response to therapy. On the one hand, HF can be the result of the presence of poorly managed cardiovascular risk factors over a patient's lifetime (e.g., smoking and hyperlipidemia) and/or the existence of poorly managed comorbidities (e.g., hypertension, coronary heart disease, or diabetes). On the other hand, once HF is diagnosed, comorbidities in combination with other existing or emerging age-related impairments may further complicate the course of the disease. For instance, diabetes can result in renal failure and visual impairments, and rheumatoid arthritis can limit physical functioning, thus hindering HF patients' adequate self-management, which is known to negatively impact clinical outcomes [16]. Because HF is a complex chronic illness, which is highly influenced by

comorbid disorders, it is important to consider these factors in therapeutic decision making [15].

2.1. Polypharmacy and adverse events

Multiple chronic conditions necessitate life-long drug therapy. The number of medications taken increases with the number of concomitant illnesses [17,18]. The older adults are the largest per capita consumers of medications. International data indicate that patients older than 65 years account for 15–18% of the population but consume 40–50% of prescribed medicines [19–21].

Prevalence of polypharmacy increases with higher age and has been increasing over the past years. In two recent large-scale studies, it was noted that 11–25% of older persons use 5 or more medications simultaneously [21,22], and this has been found to be associated with poor outcomes in view of poor physical and psychological health [20]. Congestive HF, along with COPD and diabetes mellitus, are major factors associated with extensive use of multiple medications [23].

Polypharmacy is worrisome in view of the increased risk for adverse events and nonadherence. With regard to the increased risk of adverse events, it has to be noted that elders are most vulnerable to pharmacokinetics, pharmacodynamics, and homeostatic changes secondary to higher age or illnesses. These changes make them particularly sensitive to adverse events, interactions, and toxicity of medications. The average clinician often lacks sufficient knowledge regarding possible drug–drug interactions. In addition, a lack of information regarding medication prescriptions ordered by other providers serves as significant factors in increasing the complexity of the therapeutic regimen [24]. Furthermore, the risk of medication mishaps is higher in the older population due to errors in self-administration caused in part by visual and cognitive impairment, illiteracy, high medication costs, the complexity of the medication regimen, duration of treatment, and/or side effects of the medications [24]. Polypharmacy-related issues are important in the assessment of HF patients as well as in interventions aimed at improving their self-management.

2.2. Depression

Persons living with HF are prone to depression, as are all patients living with chronic conditions [25]. De Geest et al. (2003) [26] profiled HF patients admitted to geriatric (mean age 86) and cardiology (mean age 68.5) wards and found that the prevalence of depressive symptomatology in HF patients admitted to geriatric wards was 56.5% compared to 29.5% in patients admitted to cardiology wards. The prevalence in patients hospitalised with severe HF who meet the criteria for major depression ranges between 15% [27] and 36% [28]. In a large sample of community-dwelling elders with HF, this percentage was found to be 11%, significantly higher than the 3.2% among persons with

no heart condition. Multiple logistic regression, controlling for confounding variables, showed an almost twofold risk for depression in the presence of HF (OR=1.96, 95% CI=1.2–3.3) [13].

Depression may go along with a sense of inadequacy in performing activities of daily living (ADL) [29]. This sense of inadequacy may interfere with the requirements of adequate self-management. A recent meta-analysis showed that the odds of being nonadherent with the therapeutic regimen are about three times higher in depressed patients [30]. In addition to increasing the risk of nonadherence, depression is also found to be an independent risk factor for poor medical outcomes in HF patients [31–33]. This indicates the importance of screening for depression and the initiation of adequate treatment in the HF population.

3. Heart failure and age related impairments

Age related issues and impairments such as hearing, visual and cognitive impairments, and impairments in activities of daily living (ADL/IADL) are partly linked to comorbid conditions and are also factors that should be taken into consideration when evaluating the older HF patients' capabilities to be active partners in their treatment regimens. The relevance of these issues will be discussed in more detail in the following sections, using non-HF-specific data sources as well as empirical evidence from the HF population.

3.1. Visual and hearing impairment

Visual impairment increases with age. Nineteen percent of persons aged 70 years and older have visual impairments including blindness [34]. This is a major impediment in self-management of the HF patient's treatment regimen that requires, among other abilities, reading labels and distinguishing tablets according to their colour.

Hearing impairment also increases with age. Of all persons 70 years of age and older, one third have hearing impairments [34] possibly jeopardizing the information exchange between HF patients and health care providers concerning the therapeutic regimen. Data reported by De Geest et al. [26] substantiate these previous numbers regarding visual and hearing impairments [26]. Fifty-four percent and 34.9% of HF patients on geriatric wards had problems with poor hearing and vision compared to 24% and 26% of patients admitted to cardiology wards, respectively. Poor vision was a correlate of nonadherence with medication regimen in both groups, although poor hearing was not found to be a correlate [26].

3.2. Cognitive impairment

Although cognitive decline is associated with ageing and severe cognitive impairment due to dementia increases with

age [35], cognitive functioning of the older adults is normally sufficient to independently manage their own medication regimen. Forgetfulness is a common reason for nonadherence in older patients; however, severe cognitive impairment most compromises patients' abilities to independently manage their treatment regimen [36]. Cognitively impaired patients are more likely to receive assistance with medication management compared to cognitively intact subjects [37].

Neuropsychiatric conditions such as Alzheimer's disease, vascular dementia (the second most common cause of dementia), and complications such as delirium or depression are common in older patients with HF [38]. It has been recorded that vascular cognitive impairment was present in 26% of patients discharged from hospital after treatment for congestive HF [39]. It has been found that one in two older persons with chronic HF has a Mini Mental State Score <24, indicating cognitive impairment [40,41]. De Geest et al. [26] found that 78% of HF patients admitted to the geriatric ward showed cognitive impairment as compared with 11% of patients admitted to cardiology wards [26]. Chronic HF increases the odds for cognitive impairment twofold after controlling for other known risk factors [41]. Several potential mechanisms for this finding exist, most of them directly related to HF such as hypotension, fluid shifts, depressed cardiac output, decreased cerebral perfusion, white matter lesions from silent cerebral infarction, and increases in hemodynamic pressure. Although further studies are needed to explore the potential mechanisms, factors indirectly linked to HF, such as depression, multiple medications, and nutritional deficiencies could be related to cognitive impairment in HF patients [42]. In a recent multicentre survey, it has been found that cognitive impairment is independently associated with functional disability in older persons with HF (adjusted OR=6.49, 95% CI=4.39–9.59) [43].

3.3. Activities of daily living

Older age, which is often combined with chronic conditions such as rheumatoid arthritis, is associated with decreased functional capabilities that may negatively impact adherence abilities with the medication regimen. For instance, childproof caps, blister packages, or nebulizers may be difficult to handle, and large pills may be troublesome to swallow for geriatric patients [44].

A substantial proportion of the HF patients admitted to geriatric wards showed problems with activities of daily living/instrumental activities of daily living (ADL/IADL), possibly limiting their capabilities for adequate self-management of their HF condition. Seventy-two percent of the patients admitted to geriatric wards needed assistance with medication management, 43% with use of telephone, and 90% with transportation [26]. Reduced capabilities in ADL/IADL have been found to be a risk factor leading to rehospitalisation in the older population [45–47].

4. Other Issues

Taking a gerontological perspective in describing challenges of caring for an older HF population, two other issues merit attention, i.e., health illiteracy and lack of social support or social isolation.

4.1. Health illiteracy

Successful self-management for a patient with a chronic disease such as HF requires patients to read prescriptions on medication bottles; understand the dosage, time and guidelines for taking medications; know when and where to appear for the next follow-up appointment; read information pamphlets and understand doctor's directions; evaluate themselves for signs and symptoms of a worsening condition; accurately explain their health problems to healthcare professionals; and be able to negotiate complex health care systems. These skills belong to the definition of functional health literacy [48] and take literacy, which has been defined as the "ability to use printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential," [49] to a more complex level.

Low literacy or illiteracy is a considerable problem as demonstrated by the US National Adult Literacy Survey (NALS) of 26,000 randomly selected adults in the USA, which found that one quarter of the population are functionally illiterate, and of those, one third are age 65 and older [50]. This problematic condition of the older adults was again confirmed in a study of 2659 patients that showed that more than 80% of the subjects older than 60 years of age were classified as functionally illiterate or marginally illiterate [51]. Because of the high percentage of older patients with chronic illnesses including HF, it is quite possible that many of these patients have difficulties to understand written and oral information concerning their illnesses and treatment. Functional illiteracy may partly explain findings of De Geest et al. [26] who found an overall knowledge deficit among all HF patients, with particularly higher deficits in the older HF patients [26]. Low health literacy has been shown to be associated with worsening health status, as reflected in increased frequency of hospitalisation, greater hospital length of stay, and subsequent increased healthcare costs [52].

A challenge to the healthcare worker is to assess the abilities of the patient to understand healthcare recommendations, as illustrated by the NALS survey, which found that 66–75% of the adults in the lowest literacy level and 93–97% of the adults in the marginally literate level described themselves as being able to read and/or write English well or very well [50]. A simple question of "do you understand what I have told you" will not necessarily reveal the true situation. Healthcare workers need to ask patients to "explain" or "demonstrate" self-care behaviours in order to judge if the patients' understanding is sufficient.

4.2. Lack of social support

Many older persons live alone and are prone to lack of social support. Social integration, a factor investigated since the 1970s, influences health behaviour, psychological, and physiological well-being through different pathways [53], one of which is social support provided by the intimate or extended social network [54]. A recent study was undertaken to evaluate the possible effects of social relationships (perceived social support and perceived social isolation) upon mortality risk among patients with HF ($N=119$, mean age 65.7. years). Results indicated that social isolation was a significant predictor of mortality (relative risk, 1.50, CI: 1.00–2.19; $P<0.038$) when controlling for depressive symptoms, HF severity, and functional status and age [55]. The quality of the received social support in intimate relationships has been shown to influence mortality in patients with HF. Although in Murberg and Bru's study (2001) [55] the perceived intimate network support was only marginally associated with increased risk of mortality (relative risk, 0.60, CI: 0.35–1.02; $P<0.06$), Coyne et al. [56] have shown mortality in patients with HF to be highly influenced by marital functioning and satisfaction [56].

In addition to increased mortality, the risk of social isolation and lack of social support lead to a higher prevalence of depressive symptomatology and subsequent poor psychosocial outcomes [57,58]. It has been shown that even in assisted living and home health care settings, patients with HF can be at risk for lack of social support and poor health outcomes [59]. Lack of social support has also been identified as a factor influencing nonadherence, which is a risk factor for rehospitalisation of older patients with HF [60,61]. Living alone has been shown to be a major predictor of rehospitalisation in a recent French study ($N=358$) [62]. Inasmuch as the chance to live alone increases with age due to deaths of partners, the social network and the social support may decrease over the course of an HF patient's life; especially the changes in social support impact health outcomes. For example, in Bennett et al.'s [63] study ($N=147$), the baseline support did not predict 12-month health-related quality of life, but changes in social support significantly predicted changes in health-related quality of life ($R^2=0.14$) [63]. Therefore, with the well-known connection between social networks and health, it is vital that health care professionals working with this population of HF patients are aware of the potential for isolation and screen for it. Availability of social support can be assessed through asking patients on their marital status and living conditions, with patient being single, widowed or divorced, or living alone being at higher risk for social isolation. Clinicians can also ask patients whether or not they can count on someone to talk over problems or count on someone for help with the daily tasks if needed. Again, absence of this support has to be regarded as a risk factor [45].

5. Chronic illness management in older patients with HF: a call for integrating the geriatric and gerontological care paradigm

A chronic illness management model for older HF patients, integrating the geriatric and gerontological care paradigm, should be introduced as a future-oriented approach to planning effective care for patients with HF. It is therefore relevant to explore how the broader elements described above can be integrated in a program using a multifaceted approach addressing HF issues as well as issues related to other comorbidities and age related impairments.

Published guidelines for the prevention, diagnosis, and treatment of HF stipulate that state of the art care of this patient group necessitates the use of a chronic illness management approach in order to optimize outcomes [64,65]. This approach contrasts with an acute management care model in that it guarantees continuity of care from the home setting across institutional boundaries, is focused on enhancing patients' self-management, and thus regards behavioural and psychosocial aspects of the treatment process as equally important as the typical medical aspects model (e.g., diagnoses, drug treatment) [66]. Health care delivery models successfully integrating all of these different components in the disease management within the HF patient's illness trajectory show positive effects on rehospitalisation, length of stay, quality of life (QOL), costs, and mortality in HF patient treatment management [67–69].

Despite the fact that the ageing HF population is increasing in prevalence, the old and very old patients with HF have been underrepresented and understudied in trials assessing the effectiveness of chronic illness management models aimed at improving outcomes in HF [70]. Moreover, the tested models do not integrate the challenges related to multiple comorbidities and/or age-related impairments outlined previously. Only one study has specifically addressed the care of older HF patients with multiple comorbidities so far [71].

It would be worthwhile to integrate the principals of geriatric and gerontological team management in the HF programs through an assessment of other comorbidities and age-related impairments and adapt or use interventions accordingly. The goals of comprehensive geriatric and gerontological assessment and management are to (1) maximize functional independence and autonomy, (2) prevent further decline, (3) stabilize or improve quality of life, and (4) prolong survival [72,73]. These goals are attained by taking the cumulative burden of multiple conditions into account in assessing and caring for the older person. Moreover, this approach encompasses aspects of prevention, management, and rehabilitation and not merely the treatment of HF in the acute care setting. Care for the older person with HF should include a comprehensive assessment of cognitive and functional capacities, including visual and hearing impairment and health illiteracy; use and

knowledge of medications, with special attention to drug interactions, adverse effects, and use of over the counter drugs; and motivational issues, taking into account the influence of a possible depression and of a lack of social support. Care planning will focus on patient and caregiver education, self-management training, follow-up plans, preventive home visits, and coordination of care [73,74]. Crucial is an interdisciplinary team approach of professional caregivers (physicians, nurses, social workers, dieticians, occupational therapists, physiotherapists, speech therapists, psychologists, and pharmacists) trained in care for the older people, who work in close collaboration with the patient and the family. For example, when confronted with an older person with an acute exacerbation of HF, instead of merely stabilizing or improving the physical condition, the interdisciplinary team initiates a comprehensive assessment and tries to determine what influenced the patient's deterioration. The assessment may, for example, reveal noncompliance with the therapeutic regime due to motivational and practical difficulties to combine a diabetes diet and a low fat and low salt diet, irregular use of diuretics to avoid incontinence in an older person with stress incontinence and an unstable gait, difficulties the family may have to understand and manage in the medication regimen, etc. Together with the patient and the family, the team members may then work out a care plan to prevent future difficulties. Examples of the team helping to problem-solve with patients and families are as follows: an occupational therapist may train the patient or his family to use the medication containers such as childproof caps or weekly medication dispensers; a psychologist may work with the patient to learn to deal with those issues which may affect his motivation to follow the therapeutic regimen; the dietician may work out a diet that takes into account the practical difficulties to obtain special food, etc. Creating such care plans will always entail searching for a delicate balance between optimal conditions for the disease and the best conditions for the person's life. Comprehensive geriatric assessment and management have proven its added value in improved mental and functional status, morale, and patient satisfaction in addition to reduced hospitalisation, institutionalisation, and mortality [73]. Programs for HF patients providing certain flexibility are valuable, for example, providing home care services for those patients whose physical or psychosocial condition prevents them from attending the outpatient clinics for their follow-up care [75].

6. Conclusion

As HF becomes increasingly a disease of the older people, some of its underappreciated complexity in relation to concomitant chronic conditions and age-related impairments must be addressed in an effort to enhance outcomes. Limitations in activities of daily living as well as in auditory, visual, and cognitive functioning combined with multiple comorbidities present a tremendously complex challenge in

light of successful chronic illness management. The effectiveness of HF programs specifically tuned towards the old and very old HF patients, which integrate the principals of geriatric and gerontological team management, needs to be further tested.

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