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ORIGINAL ARTICLE

Practical management of frailty in older patients with heart failure

Statement from a panel of multidisciplinary experts on behalf the Heart Failure Working Group of the French Society of Cardiology and on behalf French Society of Geriatrics and Gerontology

Anne-Sophie Boureau[1]*, Cédric Annweiler[2], Joël Belmin[3], Claire Bouleti[4], Mathieu Chacornac[5], Michel Chuzeville[6], Jean-Philippe David[7], Patrick Jourdain[8], Pierre Krolak-Salmon[9], Nicolas Lamblin[10], Marc Paccalin[11], Laurent Sebbag[12] and Olivier Hanon[13]

[1]*Department of Geriatrics, University Hospital, Nantes, France; Institut du Thorax, University Hospital, Nantes, France;* [2]*Department of Geriatric Medicine and Memory Clinic, Research Center on Autonomy and Longevity, University Hospital, Angers; UPRES EA 4638, University of Angers; Gérontopôle Autonomie Longévité des Pays de la Loire; Robarts Research Institute, Department of Medical Biophysics, Schulich School of Medicine and Dentistry, University of Western Ontario, London, ON, Canada;* [3]*Hôpital Charles Foix et Sorbonne Université, Ivry-sur-Seine, France;* [4]*Cardiology, University of Poitiers, Clinical Investigation Center (CIC) INSERM 1402, Poitiers University Hospital, Poitiers, France;* [5]*Department of Cardiology, Annecy Genevois Hospital, Annecy, France;* [6]*Geriatric Cardiology Department, Edouard Herriot Hospital, Hospices Civils de Lyon, Lyon, France;* [7]*INSERM- U955, IMRB, CEpiA team, Department of Geriatric Medicine, AP-HP, Hôpitaux Henri-Mondor, Univ Paris Est Creteil, Creteil, France;* [8]*DMU COREVE, GHU Paris Saclay, APHP, Paris, France; INSERM UMR S 999, IHU TORINO (thorax Innovation), Turin, Italy;* [9]*Clinical and Research Memory Center of Lyon, Lyon Institute For Elderly, Hospices Civils de Lyon, Villeurbanne, France; University of Lyon, Lyon, France; Neuroscience Research Centre of Lyon, INSERM 1048, CNRS, Lyon, France;* [10]*Institut Cœur Poumon, CHU de Lille, Inserm U1167, Institut Pasteur de Lille, Université de Lille, Lille, France;* [11]*Department of Geriatrics, CHU La Milétrie, CIC-1402, Poitiers, France;* [12]*Service Insuffisance Cardiaque et Transplantation Hospices Civils de Lyon Hôpital Louis Pradel, Bron, France; and* [13]*Department of Geriatrics, Université de Paris, EA 4468, APHP, Hôpital Broca, Paris, France*

Abstract

Aims The heart failure (HF) prognosis in older patients remains poor with a high 5-years mortality rate more frequently attributed to noncardiovascular causes. The complex interplay between frailty and heart failure contribute to poor health outcomes of older adults with HF independently of ejection fraction. The aim of this position paper is to propose a practical management of frailty in older patients with heart failure.

Methods A panel of multidisciplinary experts on behalf the Heart Failure Working Group of the French Society of Cardiology and on behalf French Society of Geriatrics and Gerontology conducted a systematic literature search on the interlink between frailty and HF, met to propose an early frailty screening by non-geriatricians and to propose ways to implement management plan of frailty. Statements were agreed by expert consensus.

Results Clinically relevant aspects of interlink between frailty and HF have been reported to identify the population eligible for screening and the most suitable screening test(s). The frailty screening program proposed focuses on frailty model defined by an accumulation of deficits including geriatric syndromes, comorbidities, for older patients with HF in different settings of care. The management plan of frailty includes optimization of HF pharmacological treatments and non-surgical device treatment as well as optimization of a global patient-centred biopsychosocial blended collaborative care pathway.

Conclusion The current manuscript provides practical recommendations on how to screen and optimize frailty management in older patients with heart failure.

Keywords Heart failure; Frailty; Older patients; Practical management

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**Correspondence to: Anne-Sophie Boureau, Department of Geriatrics, University Hospital, 44093 Nantes, France. Tel: +33 2-40-16-50-46.*
Email: annesophie.boureau@chu-nantes.fr

Introduction

Heart Failure (HF) prevalence increases with age, doubling from 6% of general population aged 60 to 79 years to approximately 12% above >80 years.[1] The high prevalence of HF likely relates to numerous of HF risk factors, such as coronary artery disease and hypertension, increasing with age. The HF prognosis in older patients remains poor with a high 5 years mortality rate (54.4%), more frequently attributed to non-cardiovascular causes (54.3%).[1] The complex interplay of frailty, co-morbidities, cognitive and physical function, and social context contribute to poor health outcomes of older adults with HF independently of ejection fraction. The role and goals of care of each of these factors are uniquely relevant to the implementation and success of HF management.

The concept of frailty and its different approaches describe a dynamic and intermediate state prior to disability, characterized by diminished capacity to respond to stressors due to a reduced functional reserve. Even though there is no single standard definition, this key concept of frailty and its different approaches are associated with poor outcomes such as: falls, morbidity, disability, polypharmacy, hospitalization, institutionalization and mortality.[2] The two main approaches of frailty are (i) a physical phenotype approach proposed by Fried and colleagues in 2001, based on five directly or self-reported measures of weight loss, exhaustion, slow gait speed, weak handgrip strength, and low physical activity[3]; (ii) alternatively, a frailty approach proposed by Rockwood and colleagues based on an accumulation of deficits including geriatric syndromes, co-morbidities as cognitive status or cardiovascular diseases reducing functional reserve.[4] The two models of frailty recognize subjects at different time of reduced functional reserve which generate different clinical and prognosis implications. Indeed, Fried frailty phenotype identifies subjects at the initiation of reduced function reserve, with an increased risk of potential negative outcomes in presence of stressors, and mortality at 2 years around 10%.[3,5] Rockwood model as a deficit accumulation model, identifies patients with already diagnosed diseases including falls and cognitive impairment. Patients with high Rockwood frailty score have a high 2 years mortality rate, more similar to the one observed in patients with severe disability.[2,6]

Because of the complex and multifaceted nature of frailty, understanding its relationship with HF and its management is important for optimal global care and treatment. The aim of this position paper proposed by an expert panel composed of HF specialist/cardiologist and geriatrician, is to explore the interlink between frailty and HF, to propose an early frailty screening by non-geriatricians and a management plan of frailty in HF patients.

Frailty in heart failure patients

Prevalence and prognostic impact of frailty in heart failure patients

In community-dwelling adults aged 65 and older, the frailty prevalence is between 3% and 23%.[3,7] Even though there is a considerable frailty prevalence heterogeneity between studies due to different frailty measures (different tools, validated or adapted) and study settings, the frailty prevalence in HF patients is still high.[8] For instance, a survey of 1727 community-dwelling HF older patients found a prevalence of frailty as in Rockwood approach, up to 94% of subjects.[9] In another study using multiple frailty screening tools in 487 community-dwelling older patients, the prevalence of frailty was between 30% and 52% for chronic HF patients.[10] For hospitalized HF patients, the frailty prevalence varies between 56 and 76%, independently of left ventricular ejection function.[11,12] In the specific setting of heart failure patient candidate for left ventricular assist device, the frailty incidence as reported in the meta-analysis of Tse et al was as high as 21% of the population despite the relative young age (57.7 ± 15.3 years old).[13]

Despite the lack of standardization of frailty definition and measures (Fried criteria, Rockwood criteria, etc.), previous studies report strong association between frailty and a higher risk of death, hospitalizations, and functional decline for HF patients[9,14–23] (*Table 1*).

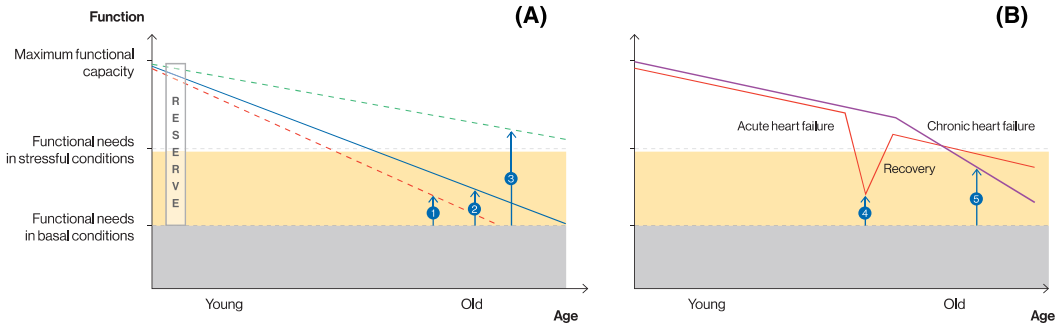
Interlink between frailty and heart failure

Interlink between HF and frailty are tenuous. On one hand, chronic HF undeniably induces frailty. HF is one of the major co-morbidities taken into account in frailty models as in Rockwood's.[4] This disease also induces fatigue, decrease in muscle strength, and sometimes decrease in physical activities. All these factors are included in Fried's frailty model.[3] In addition, chronic HF (CHF) can increase or even initiate a cognitive disorder by inducing major executive impairments.[24] This interaction explains the impact of CHF on frailty, regardless the frailty definition. On the other hand, frail patients have a diminished capacity to respond to stressors as acute HF. Indeed, their maximum functional capacity decreases below the level required under stressful

Table 1 Published studies on frailty impact on prognosis in heart failure (HF) patients, from latest meta-analysis (2018) until May 2021

Authors	Study	Study population	*N*	Characteristics of the study population	Outcomes	Time to follow up	HR or OR (95% CI) *P*-value
Zheng *et al.*[16] 2021	Prospective cohort study	Inpatients with acute HF	443	Mean age: 76.1 50.8% male	Composite: Mortality and readmission	6 months follow up	HR = 1.78 (1.02–3.10) $P = 0.041$
Weng *et al.*[17] 2021	Retrospective cohort study	Older inpatients in Geriatric department	811	Mean age of HF patients = 82.7 73.5% male	Mortality	Median follow up 3.2 years	HR = 1.05 (1.0004–1.10) $P < 0.05$
Kohsaka *et al.*[19] 2020	Retrospective cohort study	Veterans with HF	163 085	Mean age of frail patients = 77 97.2% male	Composite: Mortality and readmission	2 years	OR = 1.71, (1.65–1.77)
Matsue *et al.*[18] 2020	Prospective cohort study	Inpatients with acute HF	1180	Mean age = 81 57.4% male	Composite: Mortality and readmission	1 year	HR = 2.04 (1.28–3.24) $P = 0.003$
Dewan *et al.*[20] 2020	Prospective study	HF-rEF (PARADIGM)	13 265	Mean age = 65 22.2% female	Composite: Mortality and readmission	26.6 months	HR = 1.71 (1.56–1.88) $P < 0.001$
Kwok *et al.*[15] 2020	Retrospective cohort study	Inpatients with acute HF	11 626 400		In-hospital mortality		OR = 3,05 (2,57-3,62) $P < 0,001$
Newton *et al.*[21] 2019	Prospective cohort study	Inpatients with acute HF	811	Mean age = 77	Mortality	1 year	HR = 1.98 (1.18–3.30) $P < 0.01$
McAlister *et al.*[22] 2019	Retrospective cohort study	Inpatients with acute HF	26 626	Mean age = 77.4	Mortality	30 day and 90 days	$P < 0.01$
Bottle *et al.*[23] 2019	Retrospective cohort study	Primary care	6360	82% > 65 years 44.5% female	First admission	1 year	HR = 2.57 (1.69–3.90) $P < 0.001$
Yang *et al.*[14] 2018	Meta-analysis	Inpatients with acute HF	2645		Mortality	Median follow-up: 1.8 years	HR = 1.54 (1.34–1.75) $P < 0.001$

Figure 1 (A) Schematic mechanisms of frailty in aging. Maximum functional capacity (blue line) decreases with age, as well as functional reserve. Frailty occurs when maximum functional capacity decreases below the level required under stressful conditions (arrow 2). In young individuals, functional capacity is sufficient to overcome stressful conditions. The slope of functional decline varies among individuals. Persons with slower decline experience successful aging and are not frail (green line, arrow 3) and those with steeper decline experience accelerated aging and greater frailty (red line and arrow 1). (B) Heart failure (HF) may alter functional capacity through a decrease functional reserve and an increase frailty (arrows 4 and 5). The effects of acute HF on frailty might be reversible after recovery.



conditions. However, the effects of acute disease might be reversible after recovery (*Figure 1*).

Given the close interlink between HF and frailty, it seems essential to screen for frailty in older HF patients and vice versa to optimize HF treatment in older patients to avoid an acute decompensation, a major stressor which can accelerate functional impairment toward major disability. Furthermore, beneficial treatment interventions can be implemented to reduce impact of frailty.[25]

Benefits of frailty management

Patients with both frailty and CHF require an individualized management approach. Whatever the frailty definition used (Fried or Rockwood model), the implementation of treatment should include a multidisciplinary approach with pharmacological and non-pharmaceutical treatment as psychological and social care.

In 1995, MW Rich et al., reported in a randomized prospective study the value of coordinated multidisciplinary intervention to increase quality of life, and to reduce 90 days-readmission, total medical cost and mortality of HF older patients.[26] Although this study did not include frailty tools, the multidisciplinary care plan corresponded to what can be proposed for this disease. Since then, other interventional studies with implementation of specific frailty management have been published. The value of physical activity alone remains debated. Thus Chen's meta-analysis (which included 7 randomized trials) showed a positive effect of physical activity on the 6-minute walking test and quality of life but no impact on hospitalization or mortality.[27] However, a randomized study confirmed the benefit of a combined intervention (dietary advice, psychological support, locomotor rehabilitation) with specialized follow-up to optimize management of frail HF patients compared with standard management.[28]

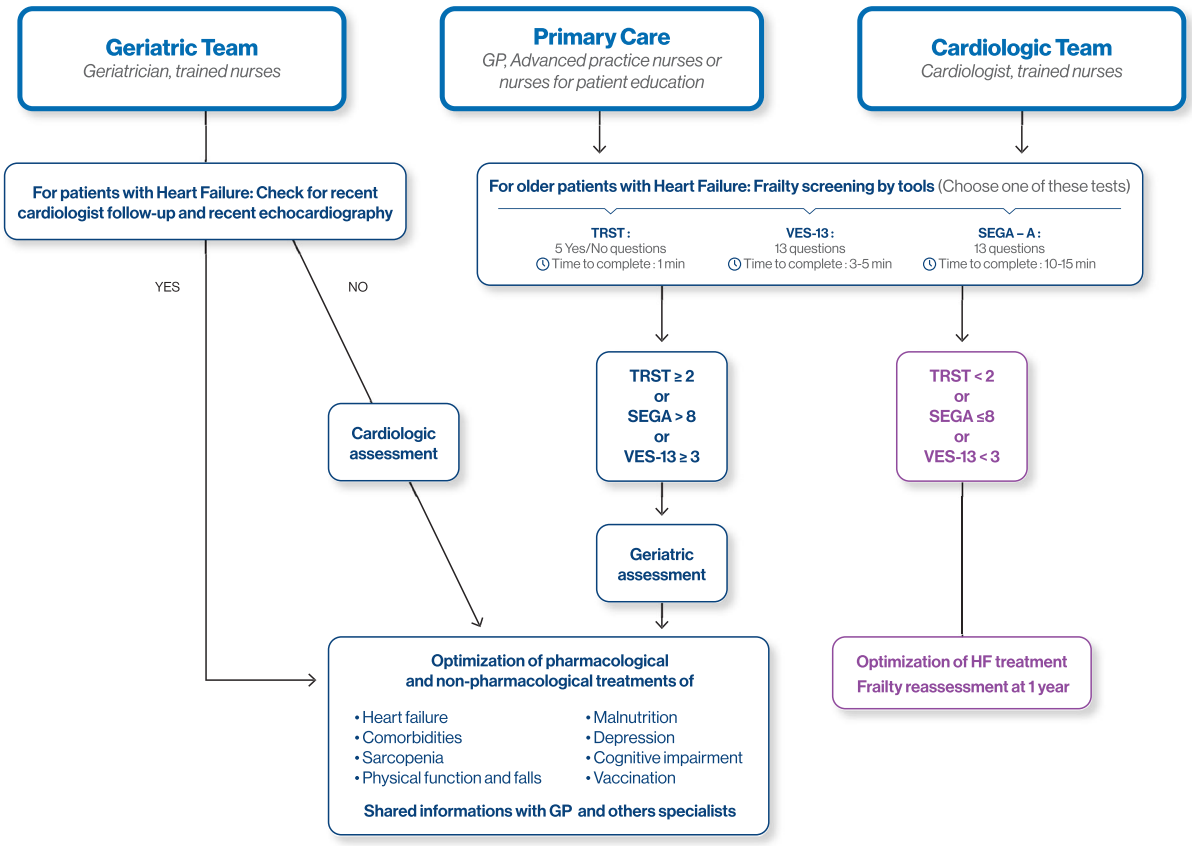
Practical guide to screen for frailty in heart failure patients

A screening programme is not just a single test but rather a pathway that starts by identifying the population eligible for screening and stops when interventions, treatment and outcomes are reported[1] (*Figure 2*, and *Table 2* and *3*). The expert panel, on behalf the Heart Failure Working Group of the French Society of Cardiology and on behalf French Society of Geriatrics and Gerontology, focused on the frailty model based on an accumulation of deficits including geriatric syndromes, co-morbidities as cognitive status or cardiovascular diseases reducing functional reserve.

Who?

Regarding the high prevalence of frailty in older patients with HF, regardless of left ventricular ejection fraction, acute or chronic HF, its screening and management should therefore be a priority for the HF teams. Because frailty prevalence increases with age, with or without co-morbidities, the patient we would select as a particular target for frailty screening would be a patient with HF aged 75 and older.[32,33] It does not seem appropriate to restrict the target population according to co-morbidities because frailty may be secondary to heart failure itself. Indeed, frailty if cardiac surgery, surgical, and non-surgical device treatment is considered, the frailty screening should be proposed for patients aged >65 years or sometimes even youngers.[13] It is nevertheless proposed to avoid screening for frailty in patients with palliative care whether for a terminal HF or for other reasons as completely dependent patients, approaching the end of life, who could not recover even from a minor illness.

Figure 2 Collaborative care for older patients with HF.



When?

HF has two very distinct clinical presentations: outpatients with chronic HF and inpatients with acute HF. In each situation, screening for frailty is necessary as it is associated with poor outcomes for both inpatients and outpatients.[14,19,23] Unstable HF leads to frequent readmission each time associated with an increase of frailty.[34] The tool used for frailty screening in inpatients or outpatients might vary due to the healthcare settings and inpatients capacities. In order to have one simple message, the expert panel wanted to select one simple screening tool that could be used in different settings. Therefore, beside acceptable test performance in different settings of care, the screening tool should be feasible and with a good patient's acceptability in these different settings. Frailty screening tools must not take more than few minutes to complete.[10] For inpatients, the screening test will therefore preferably be carried out in the cardiology department or in cardiac intensive care unit once the diagnosis of HF has been confirmed and the prognosis evaluated. Moreover, screening must be carried out early, ideally within the first 48 hours, in order to propose an individualized care plan during and after the hospital stay, depending on the local and logistical resources. The screening tools can be carried out by the hospital cardiology team ideally specialized in HF, the resident or medical student, or a nurse.[35] Outpatient frailty screening test can be carried out by general practitioners, referred cardiologists, advanced practice nurses or nurses for patient education, at any time during the usual follow-up for HF.[36,37]

How?

The frailty defined by an accumulation of deficits including geriatric syndromes and co-morbidities, can be assessed by a multidimensional comprehensive geriatric assessment. This is neither feasible nor likely to be relevant for frailty assessment in all older HF patients. Among the instruments available and validated for frailty assessment in older subjects, the most commonly used are the one used for the different approaches: Fried criteria[3] and the Rockwood Clinical Frailty Scale.[4] However, these tools are time-consuming to perform or requires specific equipment (dynamometer for Fried Criteria). In order to facilitate implementation in daily practice, it is necessary to

Table 2 Details and predictive values of frailty screening tools: TRST, SEGA-A, and VES-13

	SEGA A	VES-13	TRST
Type of instrument	Patient assessment	Questionnaire for patients or caregivers (face-to-face or telephone interview)	Patient assessment
Duration (min)	10	3–5	1–5
Number of items	13	13	5
Type of items	Age Drugs Mood Self-perception of health Falls Nutritional status Co-morbidities Incontinence Need of help for daily living activities Cognitive function	Age Self-perception of health Difficulties for 6 physical activities Limitation for 5 activities of daily living due to health problems	History or evidence of cognitive impairment Recent hospitalization or emergency visit Gait disturbances or falls Use of 5 drugs or more Independence for activities of daily living performed by a nurse, elder abuse, substance abuse, medication non-compliance
Items Scoring and Scale Threshold	Three-level Threshold > 8	Two to three-level Threshold ≥ 3	Two-level Threshold ≥ 2
Context of care of validation	Emergency, hospitalization	Community dwelling elders in primary care, hospitalization, surgery and cancer patients, emergency, inpatients of cardiology ward*	Emergency, hospitalization
Predictive values (Se, Spe) for			
Mortality	Yes[45]	Yes (Se: 87%, Sp: 47%)[42]	Yes
Institutionalization	Yes	Yes (Se: 92%, Sp: 50%)[42]	No
Hospitalization	Yes	No	Yes (Se: 83%, Sp: 32%)[48]
Functional decline	Yes	Yes (Se: 91%, Sp: 59%)[42]	Yes (Se: 66%, Sp: 47%)[48]
Strengths	Multiple predictive outcomes	Validated in numerous different settings Rapid screening tool	Simple 5 questions Short screening tool
Limitations	Require a longer time to complete	Sensitivity and specificity are unknown to predict risk of hospitalization	Sensitivity and specificity are unknown to predict risk of institutionalization

TRST, Triage Risk Screening Tool; SEGA, Short Emergency Geriatric Assessment); VES13, Vulnerable Elders Survey-13; Se, Sensitivity; Spe, Specificity.

use simplest screening tools instead of assessment tools, integrated in a pre-established care pathway. Numerous frailty screening tools have been developed in general population as Clinical Frailty Scale, Frailty Phenotype, SHARE-FI, FRAIL, … as well as tools in order to identify older adults who may benefit from a geriatric assessment as Short Emergency Geriatric Assessment (SEGA), Vulnerable Elders Survey-13 (VES-13) or Triage Risk Screening Tool (TRST)[1] (tools are in the supporting information).[10,35,38]

In a systematic review published in 2018 with 20 studies, Mc Donagh J. et al analysed 8 frailty screening tools and frailty assessment tools in HF patients. Even though frailty is an important prognostic indicator in HF patients and needs a holistic therapeutic approach, screening tools are not fully validated in these patients.[35] In another study with ambulatory HF patients, Clinical Frailty Scale (CSF) has a high correlation with assessment tools and the lowest misclassification rate in identifying frailty according to the standard combined frailty index.[10] Further studies are needed to clarify if these simple frailty screening tools have comparable prognostic value to more comprehensive frailty assessments for HF patients. In order to identify the main factors of frailty from the outset, tools incorporating elements of the geriatric assessment can be used. The HFA of ESC has proposed a HF-specific tool based on four major domains (clinical, psycho-cognitive, functional, and social).[39] For the moment, domains have been defined but agreement on the specific items to include in these four domains is needed, as well as the validation (specific and sensitive) of this new score in identifying patients with frailty in HF cohort studies.[39] Others tools including domains of the geriatric assessment already exist.

The Vulnerable Elders Survey-13 (VES-13) is a 13-item questionnaire developed through analysis of nationally representative sample survey data of older patients in the United States in 2001.[40] This scale can be easily administered during a face-to-face or telephone interview in a few minutes by clinicians or non-clinicians. It has been assessed in outpatient and inpatient care and is applicable in primary care.[41,42]

The Short Emergency Geriatric Assessment (SEGA-A) was proposed in 2004 for an early geriatric syndrome identification in emergency ward.[43,44] The SEGA tool has been validated with general practitioners.[45] This screening has the advantage of being largely validated (in emergency wards, in hospital and outpatient departments) because it has very

Table 3 Primary prevention of frailty and optimization care of geriatric syndromes in elderly HF subjects angiotensin-converting enzyme inhibitors (ACE-I), angiotensin receptor blockers (ARBs) and angiotensin receptor neprilysin inhibitors (ARNIs) together with mineralocorticoid receptor antagonists (MRAs), sodium-glucose co-transporter 2 inhibitors (SGLT2i), beta-blockers (BB)

	Prevention	Treatment
HFrEF HFpEF	• Treatment of risk factors as cardiovascular chronic diseases: hypertension, diabetes, atrial fibrillation	• Optimal therapy (ACEi or ARNI, BB, MRA, SGLT2i)[29] • Refer to resynchronization if indicated • Optimal diuretic management adapted to co-morbidities therapeutics • Exercise training programme, 2–3 times/week
Co-morbidities and polypharmacy	• Treatment doses management according to renal clearance • Try to use a single drug to treat two or more diseases[30] • Patient and caregiver information about each medication	• Check co-morbidities management including iron deficiency • Priority setting for patients with multiple co-morbidities • Medication review
Sarcopenia	• Regular physical exercise adapted to patient capacity	• Exercise training programme, which includes aerobic, strength, and balance exercises, 2–3 times/week • Combination of nutrition and exercise programmes
Malnutrition	• Weight monitoring • Protein intake: 1 to 1.2 g/kg/day • Regular physical exercise adapted to patient capacity	• Energy input of 30 to 40 kcal/kg/day • Protein intake: 1.2 to 1.5 g/kg/day • +/− oral nutritional supplements • Regular physical exercise adapted to patient capacity
Physical function and falls	• Screen for orthostatic hypotension • Sufficient water supply • Regular physical exercise adapted to patient capacity	• Identify and treat risk factors including psychotropic drugs reduction • Search for potential precipitating risk factors • Vitamin D supplementation[31] • Environmental assessment • Exercise training programme, which includes aerobic, strength, balance and flexibility exercises, 2–3 times/week
Depression	• Combatting Social Isolation	• Medication if needed: selective serotonin reuptake inhibitors • Psychotherapy
Cognitive impairment	• Treatment of chronic diseases such as hypertension or atrial fibrillation to prevent cognitive decline. • Social participation	• Specific attention to drug adherence (home help to deliver treatments) • Specific treatments and social support • Cognitive stimulation
Vaccination	• Influenza, pneumococcal, SARS-CoV2	
Social	• Therapeutic compliance screening	• Social support • Nurses for treatment

good feasibility and acceptability, reproducibility and very good test performances. It takes 5 min to complete by professionals who are not necessarily doctors and who may be from the medico-social field.[45]

The Triage Risk Screening Tool (TRST) is a screening tool validated in 2003 in two emergency departments in Cleveland.[46] It predicts a high risk of readmission and adverse events. It can be performed in a few minutes by a non-physician. As SEGA-A and VES-13 tools, TRST tool has the advantage of exploring all the elements of the geriatric assessment and thereby identifying the main factors of frailty from the outset. In 2013 in France, the French Health Authority (Haute Autorité de Santé, HAS) published recommendation on 'How to reduce avoidable readmission of older patients?' in which this tool was proposed in order to implement a geriatric follow up after hospitalization.[47]

The predictive value of these scales in determining older patients at increased risk of functional decline, institutionalization, or death are summarize in *Table 2*.

After screening?

After positive screening, integrated care pathways between cardiologists and geriatricians should be clear for HF patients and all practitioners involved. Indeed, the final aim of this screening is to propose a multidimensional global cardiogeriatric assessment and to initiate the multidimensional care plan for patients with positive screening tools. For patients with normal screening tools, the interval for re-evaluation can be of 1 year.

Practical guide for frailty management in older patients with heart failure

The aim of geriatric and cardiologic collaboration in integrated care pathways is to reduce mortality, hospitalizations and readmission for HF, to improve the quality of life and

functional status of frail HF patients. The goal of the team is also to achieve patient preferences in the patient's treatment plan including pharmacological treatment optimization and global care plan optimization.[49,50]

Optimizing pharmacological treatments and non-surgical device treatment

HF treatment is based on the European Society of Cardiology Guidelines for the diagnosis and treatment of acute and chronic HF.[29] First, it is essential that older patients have at least one cardiologic evaluation with an echocardiography if practitioner suspects HF diagnosis. Transthoracic echocardiography is the method of choice for assessment of myocardial systolic and diastolic function and to search for a differential diagnosis with its own management (valvular disease and cardiac amyloidosis). In geriatric wards, nearly 50% of older HF patients do not have at least one echocardiography or a known left ejection ventricular function (LVEF).[51] Differentiation of patients with HF based on LVEF is important due to different underlying aetiologies, co-morbidities and response to treatment (ESC Guidelines). Secondly, recommended therapies for HFrEF improve functional capacity, reduce mortality and acute hospital admission. Initiating treatment and/or drugs doses titration [ACE inhibitors, beta-blockers, angiotensin receptor blockers (ARBs), mineralocorticoid receptor antagonists (MRAs) and angiotensin receptor neprilysin inhibitor (ARNI), sodium-glucose co-transporter-2 inhibitors (SGLT2is)] can be challenging in frail older patients due to several reasons: the risk of side effects is increased by co-morbidities (e.g. renal insufficiency), polypharmac,y and drug interactions, the expected benefit of these therapies and their time to action is more complex to evaluate because frail older patients are often excluded from original studies.[52] Thus, the benefit–risk balance is sometimes difficult to assess. Tools exist to help clinician to review appropriate or potentially inappropriate medication in older adults, such as the STOPP and START tool.[30] However, randomized trials conducted in patients with reduced ejection fraction HF and large observational studies have shown a beneficial effect of these drugs, regardless of age.[53–58] Recently, an expert consensus from French Society of Geriatrics and Gerontology emphasizes that the management of HF in the very old patient can still be improved by optimizing HF drugs especially in HF with reduced ejection fraction (HFrEF).[59] Given that undertreatment and medication deprescribing of recommended treatments can lead to a worsening of HF, therapeutic optimization between general practitioner (GP), cardiologists, and geriatricians is therefore essential. Similarly, non-surgical device treatment as cardiac resynchronization therapy can improve the prognosis and quality of life of older patients with HFrEF but their benefit may be lessened in frail patients.[60] Finally, diuretic management, especially for HFpEF patients, is also challenging particularly to prevent complications such as cardio-renal syndrome.

In all cases, co-morbidities treatment should be also optimized as these co-morbidities can lead to HF decompensation and increase frailty. Iron deficiency and Vitamin D deficiency should be investigated as it is recommended to correct deficiencies by injectable iron in HFrEF patients, and oral D Vitamin deficiency in older patients.[29,31] Finally, influenza, pneumococcal, and SARS-CoV-2 vaccinations are also essential in this targeted population.

Optimizing global patient-centred biopsychosocial blended collaborative care pathway

Non-pharmacological treatment is essential for older patients with HF. The limited evidence supporting the effectiveness of exercise tailored to older and frail HF patients highlights the current gaps in their management. In HF patients including patients with preserved ejection fraction, endurance exercise, such as cycling or walking, can improve exercise capacity.[61] Indeed, 2021 ESC guidelines recommends a supervised, exercise-based, cardiac rehabilitation programme for frail patients with HF.[29] Aerobic exercise combined with resistance training appears to be effective in preventing muscle loss associated with HF. For older patients, a multicomponent exercise training programme, which includes aerobic, strength, and balance exercises, is considered to be the most effective for improving mobility and gait, increasing muscle mass and strength, decreasing falls, enhancing functional performance of activities of daily living, and improving quality of life.[62] The use of exercise games might be a way to encourage patients with HF to exercise especially those who may be reluctant to more traditional forms of exercise.[63] In this context, these types of exercises could be proposed to older HF patients. Furthermore, it is widely acknowledged that a combination of nutrition and exercise programmes is one valuable approach to the management of the physical components of frailty. And insufficient calorie intake is associated with poorer post-discharge quality of life and increased burden of readmission in patients with HF.[64] The shift of dietary strategy to frailty prevention with advancing aging in combination with exercise, could improve quality of life in older adults with HF.[65] This include dietary advice, fortified diet and oral protein-energy supplementation if needed.

In the same time, identification of geriatric syndromes is needed in order to optimize geriatric care plan.[66] The multimodal geriatric care plan is based on the treatment of sarcopenia, malnutrition, impaired physical performance, depression, cognitive impairment and finally social care if necessary. For each component, a first step treatment is detailed in *Table 2*. These approach are complementary and

often interlinked, and therefore require an integrated and patient-centred care plan.

Furthermore, even if HF patients are not frail, its prevention is necessary regarding the interlink between the two diseases. The proposed prevention interventions in order to preserve functional status are detailed in *Table 3*.

The integrated care pathway will depend of the initial screening circumstances. First of all, the implementation of screening for frailty will be more efficient if practitioners are aware of these diseases' impact and their interlink with HF. After the screening step, several actions will be proposed in order to optimize geriatric and cardiologic care as shown in *Figure 2*. For complex cases, a complete geriatric assessment and a multidisciplinary discussion involving cardiologist and geriatrician will be needed to define care plan priorities.[50,67] New cardiogeriatric integrated care models are needed. Given the prevalence of co-morbidities and geriatric syndromes, one can imagine follow-up in a cardiogeriatric day hospital in order to reduce number of patient's visits and to give specialized HF and frailty care plan. Another care plan could be developed for outpatients with advanced practice nurses, nurses for patient education or nurse-led programmes, telemedicine, telerehabiliation platform.[68,69]

Conclusions

Given the strong association between frailty, heart failure and morbi-mortality, it seems essential to screen for frailty in patients with HF. Among the numerous frailty screening tools, the ones exploring all the elements of the geriatric assessment and thereby identifying the main factors of frailty from the outset seems to be more suitable for a first step of global care management. Beneficial treatment interventions can be implemented to reduce impact of frailty and improve heart failure outcomes. Optimizing the care of older adults with HF is challenging and needs new specific pathways. Frail older patients with HF would benefit from common cardio-geriatric recommendations.

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Conflict of interest

O.H. received personal fees from Novartis, Bayer, Servier, Pfizer, BMS, Boehringer Ingelheim, Astra Zeneca, Vifor, Leo pharma, Sanofi, Medtronic. The rest of the authors have nothing to disclose.

Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Data S1 Supporting Information.

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