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Adherence to guidelines in patients with chronic heart failure in primary health care

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ABSTRACT

Objective: To describe adherence to international guidelines for chronic heart failure (CHF) management concerning diagnostics, pharmacological treatment and self-care behaviour in primary health care.

Design: A cross-sectional descriptive study of patients with CHF, using data obtained from medical records and a postal questionnaire.

Setting: Three primary health care centres in Sweden.

Subjects: Patients with a CHF diagnosis registered in their medical record.

Main outcome measures: Adherence to recommended diagnostic tests and pharmacological treatment by the European Society of Cardiology guidelines and self-care behaviour, using the European Heart Failure Self-care Behaviour Scale (EHFScBS-9). *Results.* The 155 participating patients had a mean age of 79 (SD9) years and 89 (57%) were male. An ECG was performed in all participants, 135 (87%) had their NT-proBNP measured, and 127 (82%) had transthoracic echocardiography performed. An inhibitor of the renin angiotensin system (RAS) was prescribed in 120 (78%) patients, however only 45 (29%) in target dose. More men than women were prescribed RAS-inhibition. Beta blockers (BBs) were prescribed in 117 (76%) patients, with 28 (18%) at target dose. Mineralocorticoidreceptor antagonists were prescribed in 54 (35%) patients and daily diuretics in 96 (62%). The recommended combination of RAS-inhibitors and BBs was prescribed to 92 (59%), but only 14 (9%) at target dose. The mean score on the EHFScBS-9 was 29 (SD 6) with the lowest adherence to daily weighing and consulting behaviour.

Conclusion: Adherence to guidelines has improved since prior studies but is still suboptimal particularly with regards to medication dosage. There is also room for improvement in patient education and self-care behaviour.

Introduction

Chronic heart failure (CHF) is a common disease that is associated with high rates of morbidity and mortality and high costs to society, mainly because of frequent hospitalizations [1,2]. The prevalence of CHF is estimated to be 1–2% in the general population, increasing to 10% in those aged 70 years and older [3]. The prevalence of CHF continues to rise worldwide, mainly due to ageing populations [4–6].

Practice guidelines have been issued to support health care professionals in delivering the best possible, evidence-based care to patients [3,4]. The guidelines issued by the European Society of Cardiology (ESC) contain consensus for the diagnostic criteria and give recommendations for pharmacological and non-pharmacological treatment. They also stress the role of

patient education and self-care behaviour. Adherence to these guidelines reduces morbidity and mortality and increases the quality of life of the patients [7,8].

Structured care and a multidisciplinary approach are considered important to optimize the clinical management of patients with chronic diseases [5,9]. Most hospitals in Sweden have started heart failure clinics for optimizing pharmacological treatment and patient education [10]; however, primary health care centres usually lack a specific heart failure management programme [11]. In Sweden and many other countries, primary health care plays an important role in the diagnostics, treatment and follow-up of patients with CHF. Studies repeatedly show an improved but still suboptimal adherence to guidelines in the management of CHF, especially in primary health care [12–16]. It is important to examine

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whether the updated ESC guidelines of 2012 have had an impact on the management of CHF in primary care.

The aim of this paper is to describe current adherence to the international guidelines for CHF management concerning diagnostics, pharmacological treatment and self-care behaviour, and to study the differences in health care contacts and patient characteristics in patients in primary health care.

Material and methods

Design

A cross-sectional descriptive study of patients with CHF, using data from medical records, combined with a postal questionnaire.

Participants

All patients from three primary health care centres (PHCC) in the western part of Sweden, with an ICD-10 diagnosis code I50 for heart failure registered in their medical records between May 2010 and November 2013, were selected. The selection included both newly diagnosed patients and those who had been diagnosed prior to this period. Of the 18,852 registered patients, 316 (1.7%) were diagnosed with CHF (48.1% women). Patients were excluded from the study if they lived in nursing homes ($n = 56$), died before they could give their consent to participation ($n = 13$) or moved out of the area ($n = 1$). Questionnaires were sent to 246 patients. Out of these, six patients refused to participate, four of them because they did not consider themselves as suffering from heart failure. The questionnaire was answered by 155 (63%) patients who consented to participation in the study.

Medical records

Participants' medical records were reviewed using a template containing items recommended by ESC guidelines for the areas of diagnostics and medication [3]. Diagnostic tests, comorbidities and contact with a heart failure clinic were registered using data from 2007 to 2015. Contacts with general practitioners and hospital care for CHF were registered for a 19-month period from May 2012 to November 2013. Hospital care was defined as contact with a specialist in cardiology or internal medicine in a hospital outpatient clinic and/or hospitalization. When transthoracic echocardiography (TTE) was repeated, the value of the most recent left ventricular ejection fraction (EF) was registered. For 33 (18%) participants, data on EF was

missing. The pharmacological treatment registered was the prescribed medication at the time of the review, between February and April 2015.

Questionnaire

Self-care behaviour was measured using the European Heart Failure Self-care Behaviour Scale (EHFScBS) [17]. The scale is originally a 12-item questionnaire developed in a Swedish, Dutch and British population and later reduced to a nine-item version and tested for good validity and reliability [18]. The items are scored on a five-point scale ranging between 1: 'I completely agree' and 5: 'I completely disagree'. The possible range of scores for the total EHFScBS-9 is between 9 and 45. A lower score indicates better self-care behaviour. The scale contains questions about the adherence with the regimen ($n = 5$) and consulting behaviour when symptoms increase ($n = 4$). The specific questions are given in Table 4. Out of the 155 incoming scales, there was missing data in 12 of them. One item was missing in seven of these scales. Two items were missing in four, and six items were missing in one scale. When calculating the total score, this last one was excluded and in the 11 other scales, the missing item was replaced by the median ($=3$) [17]. An additional questionnaire. designed for the study, contained questions about the patient's social situation, knowledge about their heart failure diagnosis, and contact with health care.

Statistical analysis

Categorical data are expressed using frequencies and percentages, while continuous data are expressed using means and standard deviations (SD). A chi-square test was used to compare data when it was categorical. A Student's t-test was used for independent groups. Binary logistic regression analyses were used to investigate the effect of EF, age, sex and health care contacts on the prescription of medication and the effect of EF, age and sex on health care contacts. A p value of <0.05 was considered significant. The Statistical Package for the Social Sciences software version 21 (SPSS; IBM Corporation, Armonk, NY) was used.

Ethics

The study was approved by the regional ethical review board in Uppsala, Sweden (EPN 2014/279).

Results

There was no statistically significant difference in age between participating patients, who answered the

questionnaire and consented to a record review (155 patients) and those who did not (91 patients). Men had an overall higher tendency to participate than women, with 89 (57%) men among the participants, while 43 (47%) of the non-participating patients were men. However, this was only statistically significant in the group aged over 85 years where 25 (45%) were men among the participants compared to eight (24%) in the non-participating group ($p = .044$).

Background characteristics

The mean age of the participants was 79 (SD 9) years and 60 (40%) participants were over 85 years old. Men were diagnosed with ischaemic heart disease and atrial fibrillation significantly more often than women. There was no statistically significant difference in other comorbidities for sex and age group. Men and younger patients had an overall lower EF than women and elderly patients. Of the CHF patients, 51 (33%) answered that they were unaware of having a CHF diagnosis. This number was significantly higher in the age group over 85 years old (Table 1).

Health care contacts

Between May 2012 and November 2013, 121 (78%) patients consulted their general practitioner and 62 (40%) patients received hospital care for their CHF. Those latter patients had a mean EF of 41% (SD 15), which was significantly lower than the mean EF of 51% (SD 13) found in patients without hospital care during this period ($p < .001$). More men than women received hospital care (42 (47%) vs. 20 (30%); $p = .034$) but after logistic regression with correction for EF, sex was no longer a significant factor. Out of the 25 (16%) patients that were referred to the hospital heart failure clinic after the clinic started in 2011 until the time of the study in 2015, 20 (80%) were men, 21 (84%) were under 85 years old, and 20 (80%) had an EF $\leq 40\%$. After logistic regression analysis, an EF of $\leq 40\%$ was the only significant factor for referral to a hospital heart failure clinic.

Diagnosis

All patients had undergone an electrocardiogram (ECG) and the laboratory values of NT-proBNP were known in 135 (87%) patients. A TTE was performed in 127 (82%) patients, with no significant differences found for age and sex (Table 2). A total of 60 (97%) patients who received hospital care were examined by TTE compared to 67 (72%) patients in the group

without hospital contacts ($p < .005$). Of those who were examined with a TTE, 50 (41%) patients had an EF of $<40\%$.

Pharmacological treatment

An inhibitor of the renin-angiotensin system (RAS) was included in the treatment of 120 (78%) patients and was prescribed at the target dose in 45 (29%) patients. Men were more often treated with a RAS-inhibitor than women and were more often given the target dose (Table 4). Age, EF, estimated glomerular filtration rate and type of health care contact had no significant influence on treatment with RAS inhibitors.

Beta blockers (BBs) were prescribed to 117 (76%) patients, 28 (18%) in target dose. An EF of $\leq 40\%$ increased the prescribing of BBs significantly (Table 3). BBs were also prescribed more frequently to those who had received hospital care (56 (90%) vs. 61 (66%); $p < .001$), independently of EF. The only statistically significant factor for the prescription of BBs at target dose was contact with a heart failure clinic (10 (40%) vs. 18 (14%); $p = .002$).

Treatment combining RAS inhibitors and BBs, as recommended for CHF, was given to 92 (58%) patients and significantly more often to patients with a lower EF. However, of these patients, only 14 (9%) received the combination at target dose.

A mineralocorticoid receptor antagonist (MRA) was prescribed to 54 (35%) patients. There was no difference in EF, age-group or sex in the prescription rate. Hospital care and contact with a heart failure clinic increased the prescription rate of an MRA significantly (29 (47%) vs. 25 (27%); $p = .011$ resp. 14 (56%) vs. 40 (31%); $p = .015$).

Loop-diuretics administered daily were prescribed to 96 (62%) patients, with no difference in health care contacts, sex, age or EF.

Self-care behaviour

The mean score on the EHFScBS-9 questionnaire was 29 (SD 6). Nearly, all patients reported that they always take the prescribed medication. More than half of the patients disagreed completely with the item about daily weighing. The four items on consulting behaviour when different symptoms increase, all had a median score of 4 (I disagree) (Table 4). There was no statistically significant difference in self-care behaviour between age-groups, sex, EF, contact with a general practitioner, hospital care or whether patients knew they had a CHF diagnosis or not (partly shown in Table 1). Patients that had attended a heart-failure

Table 1. Baseline patient characteristics of patients with chronic heart failure in primary health care ($N = 155$).

Variables	Patients $N = 155$	Men $N = 89$	Women $N = 66$	< 85 yrs. $N = 95$	≥85 yrs. $N = 60$
Age (years), mean (SD)	79 (9)	78 (8)	82 (10)*	74 (7)	88 (4)
Sex: male/female[a] (%)		89 (57)	66 (43)	62 (65)/33 (35)	27 (45)/33 (55)*
Place of residence: rural/urban (%)	103 (66)/52 (34)	62 (70)/27 (30)	41 (62)/25 (38)	66 (70)/29 (30)	37 (62)/23 (39)
Aware of their chronic heart failure diagnosis (%)	104 (67)	61 (70)	43 (66)	75 (80)	29 (50)*
Living alone (%)	81 (52)	36 (40)	45 (69)*	41 (43)	40 (68)*
In need of home care service (%)	33 (21)	15 (17)	18 (27)	14 (15)	19 (32)*
In need of help with transportation to the PHCC (%)	42 (28)	18 (21)	25 (39)*	19 (20)	24 (41)*
Has a physician in PHCC who knows the patient and CHF diagnosis (%)	113 (73)	61 (69)	52 (81)	71 (76)	42 (76)
BMI, mean (SD)[b]	29 (6)	29 (5)	28 (6)	30 (6)	27 (5)*
EF %, mean (SD)[c]	46 (15)	42 (15)	52 (12)*	43 (15)	52 (13)*
Systolic blood pressure, mean (SD)	128 (17)	127 (17)	129 (16)	125 (17)	132 (16)*
Diastolic blood pressure, mean (SD)	72 (10)	73 (10)	72 (9)	72 (10)	73 (10)
eGFR, ml/min (SD)	61 (23)	64 (22)	58 (24)	65 (24)	55 (18)*
EHFScBS-9 (SD)	29 (6)	29 (7)	29 (6)	29 (7)	30 (6)
Comorbidity					
Hypertension (%)	118 (76)	65 (73)	53 (80)	69 (72)	49 (82)
Moderate to severe kidney failure (%) (eGFR< 59 ml/min)	69 (45)	35 (39)	34 (52)	37 (39)	58 (61)
Atrial fibrillation (%)	65 (42)	44 (49)	21 (32)*	44 (46)	21 (35)
Ischaemic heart disease (%)	62 (40)	44 (49)	18 (27)*	41 (43)	21 (35)
Diabetes mellitus (%)	45 (29)	31 (35)	14 (21)	37 (39)	8 (13)*
Cerebrovascular disease (%)	35 (23)	17 (19)	18 (27)	19 (20)	16 (27)
Obesity[b] (%)	47 (33)	30 (36)	47 (33)	34 (39)	13 (24)
Valvular disorder (%)	33 (21)	17 (19)	16 (24)	17 (18)	16 (27)
Cancer (%)	25 (16)	17 (19)	8 (12)	17 (18)	8 (13)
Periferal arterial disease (%)	23 (15)	17 (19)	6 (9)	13 (14)	10 (17)
COPD (%)	19 (12)	11 (11)	8 (12)	18 (19)	1 (2)*
Psychiatric disease (%)	12 (8)	6 (7)	6 (9)	9 (10)	3 (5)
Reumatic disease (%)	11 (7)	5 (6)	6 (9)	9 (10)	2 (3)
Mild dementia (%)	7 (5)	4 (5)	3 (5)	4 (4)	3 (5)

*$p < .05$.
BMI: body mass index; COPD: chronic obstructive pulmonary disease; EF: ejection fraction; eGFR: estimated glomerular filtration Rate; EHFScBS-9: European Heart Failure Self-care Behaviour Score. A lower score indicates better self-care behaviour; PHCC: Primary Health Care Centre; SD: standard deviation.
[a]In age-group columns.
[b]Data available in 143 patients.
[c]Data available in 122 patients.

Table 2. Performed diagnostic tests in patients with chronic heart failure ($N = 155$).

Diagnostic test	Patients n (%) $N = 155$	Men n (%) $N = 89$	Women n (%) $N = 66$	<85 yrs. n (%) $N = 95$	≥85 yrs. n (%) $N = 60$
ECG	155 (100)	89 (100)	66 (100)	95 (100)	60 (100)
NT-proBNP	135 (87)	78 (88)	57 (86)	80 (84)	55 (92)
TTE	127 (82)	76 (85)	51 (77)	82 (86)	45 (75)
Chest X-ray	128 (83)	72 (81)	56 (85)	80 (84)	48 (80)
Blood pressure	155 (100)	89 (100)	66 (100)	95 (100)	60 (100)
Sodium and potassium	155 (100)	89 (100)	66 (100)	95 (100)	60 (100)
Creatinin/eGFR	155 (100)	89 (100)	66 (100)	95 (100)	60 (100)
Complete blood count	153 (99)	88 (99)	65 (99)	93 (98)	60 (100)
Urea	29 (19)	20 (23)	9 (14)	17 (18)	12 (20)
Calcium	88 (57)	44 (49)	44 (67)*	49 (52)	39 (65)
Ferritin/TIBC	82 (53)	48 (54)	34 (52)	48 (51)	34 (57)
Liver enzymes	140 (90)	81 (91)	59 (89)	87 (92)	53 (88)
Thyroid function	138 (89)	77 (87)	61 (92)	84 (88)	54 (90)

*$p < .05$.
ECG: electrocardiogram; eGFR: estimated glomerular filtration rate; TTE: transthoracic echocardiography.

clinic had a mean score of 24 (SD 7) compared to a mean score of 30 (SD 6) in those who had not ($p < .001$).

Discussion

The results of the present study suggest that patient self-care behaviour and current diagnostic and pharmacological treatment practice in primary health care is suboptimal.

Diagnosis

In this study, 82% of the patients were investigated with a TTE, which is an improvement compared to the

Table 3. Prescribed pharmacological treatment in patients with chronic heart failure ($N = 155$).

	Patients, n (%) N = 155	Men, n (%) N = 89	Women, n (%) N = 66	EF ≤40, n (%) N = 50[a]	EF >40, n (%) N = 72[a]	<85 yrs, n (%) N = 95	≥85 yrs, n (%) N = 60
ACE-inhibitor	72 (47)	50 (56)	22 (33)*	27 (54)	34 (47)	45 (47)	27 (45)
ARB	52 (34)	27 (30)	25 (38)	18 (36)	21 (29)	31 (33)	21 (35)
RAS-inhibition	120 (78)	74 (83)	46 (70)*	43 (86)	53 (74)	73 (77)	47 (78)
RAS-inhibition target dose	45 (29)	35 (39)	10 (15)*	19 (38)	20 (29)	32 (34)	13 (22)
BB	117 (76)	70 (79)	47 (71)	47 (94)	49 (68)*	71 (75)	46 (77)
BB target dose	28 (18)	19 (21)	9 (14)	13 (26)	9 (13)	21 (22)	7 (12)
Combination of RAS-inhibition and BB	92 (59)	58 (65)	34 (52)	40 (80)	36 (50)*	56 (59)	36 (60)
Combination of RAS- inhibition and BB target dose	14 (9)	11 (12)	3 (5)	7 (14)	6 (8)	11(12)	3 (5)
MRA	54 (35)	31 (35)	23 (35)	22 (44)	22 (31)	32 (34)	22 (37)
Loop - diuretics on daily basis	96 (62)	52 (58)	44 (67)	34 (68)	41 (57)	54 (57)	42 (70)
Thiazides	23 (15)	15 (17)	8 (12)	6 (12)	13 (18)	17 (18)	6 (10)
Cardiac glycosides	26 (17)	11 (12)	15 (23)	8 (16)	15 (21)	18 (19)	8 (13)
Long-acting nitrates	17 (11)	9 (10)	8 (12)	6 (12)	8 (11)	9 (10)	8 (13)

*$p < .05$, within gender.
ACE: angiotensin converting enzyme; BB: beta blocker; ARB: angiotensin receptor blocker; EF: and age-groups. EF: ejection fraction. MRA: mineralocorticoid receptor antagonist; RAS: renin angiotensin system.
aEF is known in 122 patients.

Table 4. Item analysis of the nine-item European Heart Failure Self-care Behaviour Scale ($N = 150–155$).

		Percentages of responses per each Likert point				
Item	Median (interquartile range)	1	2	3	4	5
1. I weigh myself every day	5 (3–5)	5.8	7.1	20.0	13.5	53.2
2. If SOB[a] increases I contact my doctor or nurse	4 (3–5)	11.0	9.0	14.8	14.8	47.7
3. If my legs/feet are more swollen, I contact my doctor or nurse	4 (2–5)	16.1	12.3	17.4	12.9	38.7
4. If I gain weight more than 2 kg in 7 days I contact my doctor or nurse	5 (3–5)	13.5	6.5	13.5	7.1	57.4
5. I limit the amount of fluids	3 (1–5)	30.3	11.6	20.0	10.3	24.5
6. If I experience fatigue I contact my doctor or nurse	4 (3–5)	11.0	10.3	16.1	13.5	47.1
7. I eat a low-salt diet	3 (2–5)	23.2	9.7	40.0	13.5	13.5
8. I take my medication as prescribed	1 (1–1)	94.2	1.9	0.6	1.9	1.3
9. I exercise regularly	3 (2–5)	14.8	10.3	29.0	18.7	26.5

Likert point scale: 1 = I completely agree, 5 = I completely disagree.
aSOB: shortness of breath.

percentages of 31–68% found in Sweden in prior studies [13,19]. The difference found between primary care and hospital care might be due to patients who receive hospital care often having more symptoms and a higher disease burden that give motive to further investigation. In addition, previous research has shown that general practitioners base their diagnosis on clinical judgement to a larger extend than cardiologists [16]. More recently, the algorithm, where an ECG and assessment of natriuretic peptides is the first step in diagnosing CHF, has made it easier for general practitioners to rule out the diagnosis of CHF or make the decision to proceed with a referral for a TTE as the next step in the diagnostic process [3]. ECGs and laboratory work are available at every PHCC in Sweden. Despite this, not all patients with a CHF diagnosis are examined with a TTE. It is important to confirm suspected CHF by TTE, not only to prevent overdiagnosis and risk for unnecessary medication but also

to distinguish between heart failure with reduced EF (HFrEF) and heart failure with preserved EF (HFpEF). This is important because these two groups have different recommended treatments in the current guidelines. In the most recent ESC guidelines published in 2016, a group of heart failure patients with medium range EFs (>40% and <50%) is also distinguished [20]. The clinical implications of this are not yet clear but will probably influence the management of CHF patients in the future.

Pharmacological treatment

In this study, the prescription of RAS inhibitors and BBs is better than in studies performed in the early 2000s [13,19,21], and at the same level as more recent studies from other countries [12,15]. Only a small percentage of patients received the recommended target dose of the pharmacological treatment. The cause of

underusing different drugs and target doses has previously been studied and seems to be due to side effects or fear of side effects, adjustment to other comorbidities, lack of knowledge of the guidelines and uncertain diagnoses [15,22].

We found no significant difference in the prescription of loop diuretics, RAS-inhibitors and MRA between the group with EF ≤40% and >40%, but BBs and the combination of BBs and RAS inhibitors were prescribed significantly more frequently to those with lower EF. This latter finding is in line with the guidelines that recommend different pharmacological approaches to HFrEF and HFpEF. Recommended medication and target doses are based on research from hospital settings and younger patients with HFrEF. There is no solid evidence that they influence mortality and morbidity in patients with HFpEF. Patients with HFpEF are often older with higher levels of comorbidity and are mainly monitored in primary health care [4,6,12]. The guidelines recommend focusing on reducing symptoms with diuretics and the screening and treatment of cardiovascular and non-cardiovascular comorbidities in this group [3,23]. The fact that we only found a modest difference in treatment between the patients with HFrEF and HFpEF has been described before [24] and might be due to the fact that cardiovascular comorbidity such as coronary artery disease, hypertension and atrial fibrillation, is treated with the same medication groups as recommended for HFrEF. It is also possible that prescribers are unaware of the different pharmacological recommendations for HFrEF and HFpEF.

The sex-difference in prescribed RAS inhibitors in this study could not be explained by age, EF, or comorbidity and we have not found prior reports on this. There are, however, reports of disparities in medical care for other diseases between men and women and even between various age-groups that can only partly be explained by differences in diagnoses and symptoms in medical care [25].

Self-care behaviour

In this study, we found a low adherence to self-care recommendations in the patient group, particularly concerning daily weighing and consulting behaviour. The same pattern is seen in a previous study including different countries [26]. The fact that there was no difference in self-care behaviour between the participants that were aware of their CHF diagnosis and those who were not, suggests an insufficient system of patient education and monitoring. Patients' non-compliance with self-care recommendations is associated with adverse outcomes. In particular, daily weighing and physical activity have been proven to reduce re-hospitalization and mortality [8].

In this study, participants who had attended a hospital based heart failure clinic had a significantly better self-care, which is in line with study results that show that heart failure clinics improve CHF self-management and reduce re-hospitalization [5,9]. The majority of patients that had attended a heart failure clinic suffered from HFrEF. Patients managed in general practice differ clinically from patients in hospital settings in terms of comorbidity, sex and age and often have HFpEF [4,6]. Elderly patients with multimorbidity and patients that are dependent on others for their transportation could benefit from more accessible multidisciplinary structured care near their homes [27,28].

Limitations

Some limitations could be discussed. Firstly, patients were included only from three PHCCs within a restricted area. The prevalence of chronic heart failure in these PHCC's was 1.7%, which is in line with international literature [6,20]. The percentage of women (48,1%) in this study, is slightly under the expected 50-53% [2,6]. The mean age of the patients is over the 75 years found for the total Swedish population [2], but in line with what can be expected in primary health care [6]. There was no difference in age between the participants and non-participants, but comparison of those two groups indicates a participant selection bias in that the women, especially those over 85 years old, were not fully represented in this study. The generalization of results must therefore be done cautiously. However, results of this study were in line with the results of similar studies done on larger populations and other countries [12,15].

Furthermore, the study population of 155 patients is relatively small. Certain sub-groups include low number of patients, for example when considering sex-differences in certain health care contacts or medication target dosage. This can cause that possible significant differences are not detected. To be able to investigate this further, a study in a larger population is needed.

Finally, the logistic regressions performed with EF as a covariate excluded patients that were not investigated with TTE, which could cause a bias in the results. The group with missing EF information, however, did not differ significantly from the group with EF information regarding age, sex, and pharmacological treatment.

Conclusions

Adherence to guidelines for diagnostic and pharmacological treatment practice in primary care is still suboptimal but seems to be improving when compared to prior studies. There is still room for further improvement in the areas of patient education and patient self-care behaviour.

Only a small percentage of patients are treated with target doses of RAS inhibitors and BBs. For optimization of this treatment it is important to have a confirmed diagnosis and differentiate between HFrEF and HFpEF in clinical practice.

Easy access to structured multidisciplinary care, even in primary health care, is needed, as is further research on how this care and the therapy guidelines can be adapted to the specific needs of the often older and multimorbid patient population.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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References

[1] Ryden-Bergsten T, Andersson F. The health care costs of heart failure in Sweden. J Intern Med. 1999;246: 275–284.

[2] Zarrinkoub R, Wettermark B, Wändell P, et al. The epidemiology of heart failure, based on data for 2.1 million inhabitants in Sweden. Eur J Heart Fail. 2013;15: 995–1002.

[3] McMurray JJV, Adamopoulos S, Anker SD, et al. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2012. Eur Heart J. 2012;33: 1787–1847.

[4] Läkemedelsverket. Diagnostik och behandling av kronisk hjärtsvikt - Behandlingsrekommendation [Diagnostics and treatment of chronic heart failure]. 2006.

[5] McDonagh TA, Blue L, Clark AL, et al. European Society of Cardiology Heart Failure Association Standards for delivering heart failure care. Eur J Heart Fail. 2011;13:235–241.

[6] Mosterd A, Hoes AW. Clinical epidemiology of heart failure. Heart. 2007;93:1137–1146.

[7] Komajda M, Hanon O, Hochadel M, et al. Contemporary management of octogenarians hospitalized for heart failure in Europe: Euro Heart Failure Survey II. Eur Heart J. 2009;30:478–486.

[8] van der Wal MHL, van Veldhuisen DJ, Veeger NJGM, et al. Compliance with non-pharmacological recommendations and outcome in heart failure patients. Eur Heart J. 2010;31:1486–1493.

[9] Takeda A, Taylor SJC, Taylor RS, et al. Clinical service organisation for heart failure. Cochrane Database Syst Rev. 2012;9:CD002752.

[10] Jaarsma T, Stromberg A, De Geest S, et al. Heart failure management programmes in Europe. Eur J Cardiovasc Nurs. 2006;5:197–205.

[11] Martensson J, Dahlstrom U, Johansson G, et al. Nurse-led heart failure follow-up in primary care in Sweden. Eur J Cardiovasc Nurs. 2009;8:119–124.

[12] Bosch M, Wensing M, Bakx JC, et al. Current treatment of chronic heart failure in primary care; Still room for improvement. J Eval Clin Pract. 2010;16:644–650.

[13] Dahlstrom U, Hakansson J, Swedberg K, et al. Adequacy of diagnosis and treatment of chronic heart failure in primary health care in Sweden. Eur J Heart Fail. 2009;11:92–98.

[14] de Groote P, Isnard R, Clerson P, et al. Improvement in the management of chronic heart failure since the publication of the updated guidelines of the European Society of Cardiology. The Impact-Reco Programme. Eur J Heart Fail. 2009;11:85–91.

[15] Hirt MN, Muttardi A, Helms TM, et al. General practitioners' adherence to chronic heart failure guidelines regarding medication: the GP-HF study. Clin Res Cardiol. 2015;105:441-450.

[16] Rutten FH, Grobbee DE, Hoes AW. Differences between general practitioners and cardiologists in diagnosis and management of heart failure: a survey in every-day practice. Eur J Heart Fail. 2003;5:337–344.

[17] Jaarsma T, Stromberg A, Martensson J, et al. Development and testing of the European Heart Failure Self-Care Behaviour Scale. Eur J Heart Fail. 2003;5:363–370.

[18] Jaarsma T, Arestedt KF, Mårtensson J, et al. The European Heart Failure Self-care Behaviour scale revised into a nine-item scale (EHFScB-9): a reliable and valid international instrument. Eur J Heart Fail. 2009;11:99–105.

[19] Hobbs FDR, Korewicki J, Cleland JGF, et al. The diagnosis of heart failure in European primary care: the

IMPROVEMENT Programme survey of perception and practice. Eur J Heart Fail. 2005;7:768–779.

[20] Ponikowski P, Voors AA, Anker SD, et al. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: the task force for the diagnosis and treatment of acute and chronic heart failure of the. Eur J Heart Fail. 2016;18:891–975.

[21] Cleland JGF, Cohen-Solal A, Aguilar JC, et al. Management of heart failure in primary care (the IMPROVEMENT of Heart Failure Programme): an international survey. Lancet (London, England). 2002;360: 1631–1639.

[22] Hancock HC, Close H, Fuat A, et al. Barriers to accurate diagnosis and effective management of heart failure have not changed in the past 10 years: a qualitative study and national survey. BMJ Open. 2014;4:e003866.

[23] Basaraba JE, Barry AR. Pharmacotherapy of heart failure with preserved ejection fraction. Pharmacotherapy. 2015;35:351–360.

[24] Maggioni AP, Anker SD, Dahlstrom U, et al. Are hospitalized or ambulatory patients with heart failure treated in accordance with European Society of Cardiology guidelines? Evidence from 12,440 patients of the ESC Heart Failure Long-Term Registry. Eur J Heart Fail. 2013;15:1173–1184.

[25] Brannstrom J, Hamberg K, Molander L, et al. Gender disparities in the pharmacological treatment of cardiovascular disease and diabetes mellitus in the very old: an epidemiological, cross-sectional survey. Drugs and Aging. 2011;28:993–1005.

[26] Jaarsma T, Strömberg A, Ben Gal T, et al. Comparison of self-care behaviors of heart failure patients in 15 countries worldwide. Patient Educ Couns. 2013;92:114–120.

[27] Agvall B, Alehagen U, Dahlström U. The benefits of using a heart failure management programme in Swedish primary healthcare. Eur J Heart Fail. 2013;15:228–236.

[28] Dickson VV, Melkus GDE, Katz S, et al. Building skill in heart failure self-care among community dwelling older adults: results of a pilot study. Patient Educ Couns. 2014;96:188–196.