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Maaike Giezeman, Mats Arne & Kersti Theander

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

Maaike Giezeman\textsuperscript{a,b}, Mats Arne\textsuperscript{b,c} and Kersti Theander\textsuperscript{b,d} \footnote{School of Medical Sciences, Örebro University, Örebro, Sweden; \textsuperscript{b}Centre for Clinical Research, County Council of Värmland, Karlstad, Sweden; \textsuperscript{c}Department of Medical Sciences, Respiratory, Allergy and Sleep Research, Uppsala University, Uppsala, Sweden; \textsuperscript{d}Department of Nursing, Faculty of Health Science and Technology, Karlstad University, Karlstad, Sweden}

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 (SD 9) 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. Mineralocorticoid receptor 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.

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KEYWORDS
Guideline adherence; chronic heart failure; primary health care; pharmacological treatment; diagnostic assessment; 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 \cite{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 \cite{3}. The prevalence of CHF continues to rise worldwide, mainly due to ageing populations \cite{4–6}.

Practice guidelines have been issued to support health care professionals in delivering the best possible, evidence-based care to patients \cite{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 \cite{7,8}.

Structured care and a multidisciplinary approach are considered important to optimize the clinical management of patients with chronic diseases \cite{5,9}. Most hospitals in Sweden have started heart failure clinics for optimizing pharmacological treatment and patient education \cite{10}; however, primary health care centres usually lack a specific heart failure management programme \cite{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 \cite{12–16}. It is important to examine...
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 ≤ 40%. After logistic regression analysis, an EF of ≤ 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 ≤ 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 EHFS-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
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.

**Discussion**

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

**Diagnosis**

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

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Median (interquartile range)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>I weigh myself every day</td>
<td>5 (3–5)</td>
<td>5.8</td>
<td>7.1</td>
<td>20.0</td>
<td>13.5</td>
<td>53.2</td>
</tr>
<tr>
<td>If SOB increases I contact my doctor or nurse</td>
<td>4 (3–5)</td>
<td>11.0</td>
<td>9.0</td>
<td>14.8</td>
<td>14.8</td>
<td>47.7</td>
</tr>
<tr>
<td>If my legs/feet are more swollen, I contact my doctor or nurse</td>
<td>4 (2–5)</td>
<td>16.1</td>
<td>12.3</td>
<td>17.4</td>
<td>12.9</td>
<td>38.7</td>
</tr>
<tr>
<td>If I gain weight more than 2 kg in 7 days I contact my doctor or nurse</td>
<td>5 (3–5)</td>
<td>13.5</td>
<td>6.5</td>
<td>13.5</td>
<td>7.1</td>
<td>57.4</td>
</tr>
<tr>
<td>I limit the amount of fluids</td>
<td>3 (1–5)</td>
<td>30.3</td>
<td>11.6</td>
<td>20.0</td>
<td>10.3</td>
<td>24.5</td>
</tr>
<tr>
<td>If I experience fatigue I contact my doctor or nurse</td>
<td>4 (3–5)</td>
<td>11.0</td>
<td>10.3</td>
<td>16.1</td>
<td>13.5</td>
<td>47.1</td>
</tr>
<tr>
<td>I take my medication as prescribed</td>
<td>1 (1–1)</td>
<td>94.2</td>
<td>1.9</td>
<td>0.6</td>
<td>1.9</td>
<td>1.3</td>
</tr>
<tr>
<td>I exercise regularly</td>
<td>3 (2–5)</td>
<td>14.8</td>
<td>10.3</td>
<td>29.0</td>
<td>18.7</td>
<td>26.5</td>
</tr>
</tbody>
</table>

Likert point scale: 1 = I completely agree, 5 = I completely disagree.

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Percentages of responses per each Likert point</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE-inhibitor</td>
<td>Men, n (%)</td>
</tr>
<tr>
<td>N = 155</td>
<td>N = 89</td>
</tr>
<tr>
<td>N = 50*</td>
<td>N = 72*</td>
</tr>
<tr>
<td>72 (47)</td>
<td>50 (56)</td>
</tr>
<tr>
<td>52 (34)</td>
<td>27 (30)</td>
</tr>
<tr>
<td>120 (78)</td>
<td>74 (83)</td>
</tr>
<tr>
<td>45 (29)</td>
<td>35 (39)</td>
</tr>
</tbody>
</table>

* 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.
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 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 HFpEF and HFrEF 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).

Notes on contributors

Maaike Giezeman is a GP specialist, a PhD student at the School of Medical Sciences, Örebro University, Sweden and working at het Centre for Clinical Research, County Council of Värmland, Sweden.

Mats Arne is a Physiotherapist and researcher at the Centre for Clinical Research of the County Council of Värmland and the Department of Medical Sciences, Respiratory-, Allergy-, and Sleep Research at Uppsala University, Sweden.

Kersti Theander is the head of the Centre for Clinical Research of the County Council of Värmland and assistant professor at the Department of Nursing, Faculty of Health Science and Technology, Karlstad University, Sweden.

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