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Current treatment of chronic heart failure in primary care; still room for improvement

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Abstract

Rational and aims In recent years, guidelines for treatment of patients with chronic heart failure (CHF) have been updated. Insight in current pharmacological and non-pharmacological treatment of CHF in primary care, which was non-optimal in earlier studies, is limited. We aim to describe current pharmacological and non-pharmacological treatment of CHF in primary care.

Methods In this cross-sectional observational study, we included a representative sample of 357 patients diagnosed with CHF from 42 primary care practices in the Netherlands. We combined medical record data with data from patient and doctor questionnaires.

Results Mean age of patients was 75.7 years (SD 10.2), 53% were male, and 73% of patients had mild heart failure (New York Heart Association class I or II). 76.5% of patients received diuretics. Angiotensin-converting enzyme inhibitors were prescribed in 40.6% and angiotensin-II receptor blockers in 20.7%; β-blockers were prescribed to 54.6%, while 24.9% received spironolactone. Patients with more severe heart failure had a lower probability of being treated according to guideline recommendations. Relevant lifestyle advice was given to 40–60% of the patients, depending on the specific lifestyle advice.

Conclusions Implementation of evidence-based pharmacotherapy for heart failure in primary care has improved since clinical guidelines have been updated; especially with respect to prescription of β-blockers. However, there still seems ample room for improvement, as in the case for providing lifestyle advice.

Introduction

The prevalence of chronic heart failure (CHF) is estimated to be around 1–2% in western countries and several developments – such as the ageing population – ground expectations that this figure is rising [1]. The costs of CHF are estimated to account for 1.5–2.5% of the health care budget, with approximately 70% of this being spent on hospitalizations [2]. Among patients older than 65 years, heart failure is the most common diagnosis at hospital discharge and a main cause of hospital readmission [3].

Several important advances in improving treatment for patients with CHF led to recent updates of major guidelines [4]. Guidelines strongly recommend pharmacological treatment targeted at reducing heart failure symptomatology as well as morbidity and mortality in (virtually) all patients: most notably angiotensin-converting enzyme inhibitors (ACEI) or angiotensin-II receptor blockers (ARB) and β-blockers [5–7]. In addition to pharmacological treatment, guidelines [5–7] incorporate disease management principles. Patients should be monitored regularly and be given lifestyle advice, such as (daily) body weight measurements, reducing salt intake, limiting fluid intake, and advices regarding exercise and taking rest. These aspects of self-management and continuity of care are considered increasingly important in gaining high-quality care for patients with chronic diseases [8].

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In most primary care-orientated health care systems, the general practitioner (GP) has a crucial role in managing CHF patients [9,10]. Earlier studies, however, have suggested suboptimal pharmacological treatment, in particular in primary care. In particular β-blockers were reported to be under-used and under-dosed [11,12]. However, these studies used data from 2001 or earlier, when it was likely that information regarding use of β-blockers in patients with CHF had not been widely disseminated to primary care doctors [11], as several landmark trials were published only in 1999 [13,14].

Few studies examined treatment of patients with CHF in general practice since guidelines have been updated. Our study aimed to assess current pharmacological and non-pharmacological treatment of CHF in a representative sample of heart failure patients in primary care.

Methods

Study design and population

An observational study was performed in primary care in the Netherlands in 2005–2006. Ethical approval of the study was obtained from the ethics committee Arnhem-Nijmegen. A total of 415 general practices in 15 different hospital regions were invited to participate in this study of which 72 GPs in 42 practices agreed to participate. The sample of practices was representative for Dutch practices regarding urbanization rate and type of practice.

Telephone interviews were conducted to identify the type of electronic medical record system (EMR) and the registration behaviours of each participating GP. Eight different EMRs were used by GPs and included in this study. Based on search options in the varying EMRs and the registration behaviours, GPs were sent tailored written information on how to extract a list of patients with CHF from their EMR. In seven practices a research assistant visited the practice to identify the patients in the EMR. GPs were then asked to critically judge whether the patients on the list they extracted from their EMR met the diagnostic criteria of the International Classification for Primary Care code K77 (heart failure), to limit the number of false-positives. All patients with a diagnosis of CHF according to the GP were eligible to be included. Reasons for exclusion were: terminal illness; Dutch language problems; mental impairment or other reasons (such as severe illness of partner) that made the GP decide not to involve the patient in this study. In total GPs sent 893 patients an invitational letter and 511 patients gave their informed consent.

Measurements

Information on pharmacological treatment, patient characteristics including relevant comorbidities and risk factors for CHF [e.g. a history of hypertension or myocardial infarction (MI)], and the number of (house) visits during the period from inclusion to the date of medical record extraction (10.8 months on average) was obtained by scrutinizing the patients' medical records. Pharmacological treatment included all medication for cardiovascular diseases reported at the date of medical record extraction. Specific drug groups are listed in Table 2. Specialist correspondence (e.g. cardiology, pulmonology, internal medicine and geriatrics specialties) was studied to identify whether a patient was diagnosed in hospital or primary care. Medical records in the practices were assessed by trained research staff. Because of limited resources, collection of medical record data was limited to a random sample of a maximum of 15 patients per practice.

Demographics, New York Heart Association (NYHA) class and lifestyle advice delivered to the patient by the GP were measured in a written patient questionnaire that was sent around the date of medical record extraction. Reminders were sent after 3–4 weeks.

Doctor and practice characteristics such as type of practice (solo vs. group), age and number of years of experience since qualified were measured using written questionnaires for doctors.

Data analysis

Patients without a date of diagnosis or medical record data were excluded from the study ($n = 121$). A further 33 (6.4%) patients had died between inclusion and medical record abstraction, leaving 357 patients for this study. Excluded patients did not differ significantly from included patients with respect to age, sex and NYHA class.

We analysed data on the lowest possible level (patient level). Patient data were merged with doctor data, and if several GPs were seeing the same patients their data were aggregated before merging. Descriptive analyses of patients' characteristics were performed and proportions of patients receiving a specific drug or lifestyle advice were calculated. For the description of doctor characteristics, means and proportions were calculated across doctor groups (one or more doctors seeing the same patients).

In addition, for key pharmacological recommendations [5–7] a global adherence index (GAI) was constructed in line with previous research [15]. For each patient, this index indicated the proportion of evidence-based recommendations followed by the GP out of the total number of recommendations that applied for that particular patient. The GAI included the prescription of ACEI (or ARB) for all patients, β-blockers of proven efficacy in CHF (bisoprolol, carvedilol or metoprolol [5–7] in patients with previous MI or NYHA class ≥ II) and spironolactone (in patients NYHA class ≥ III). Also, for each single recommendation, the proportion of indicated patients in whom this particular recommendation was met was calculated.

We also explored the data on differences between patients that had been diagnosed by specialists and patients diagnosed in primary care (χ^2-tests for differences in proportions and *t*-tests for differences in means) because these groups may have different clinical characteristics [1].

The influence of NYHA class [16] and the number of comorbidities [17] on the estimated GAI were explored using multilevel logistic regression analyses (mixed models) with patients (level 1) nested within doctor groups (level 2). For this purpose, GAI outcomes were dichotomized. Per patient, scores lower than 100% (less than optimal treatment) were scored '0', whereas a score of 100% (optimal treatment) was scored '1'. Patient age and sex were also studied as these might confound the association with the outcomes [18,19]. Finally, the associations between age, sex, NYHA class, number of comorbidities and the prescription of target doses for ACEI, ARB and the indicated β-blockers as recommended in the guidelines were studied. Per drug, dosages prescribed were dichotomized, scores lower than the target dose were scored '0', whereas '1' was scored when the target dose was reached.

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All analyses were performed using SPSS 14 (SPSS Inc., Chicago, IL, USA), except for the multilevel logistic regression analyses that were performed using the Glimmix procedure in SAS for Windows V8.2 (SAS Institute Inc., Cary, NC, USA).

Results

Characteristics of primary care doctors

The GP response on the questionnaire was 88%, derived from 49 doctor groups in 42 separate practices. Of these, 63.3% were (small) group practices. The mean age of the GPs across groups was 49.2 years and mean number of years of experience since qualification as a GP was 18.6. Only few GPs (10.4%) had special hours for patients with heart disease, while 18.8% had regular clinical meetings on CHF.

Patient characteristics

Table 1 presents the patient characteristics. As expected, patients diagnosed in hospital (48% of patients) were younger than patients diagnosed in primary care (74.1 vs. 77.1; $P = 0.006$), and had more often suffered from previous MI (47.6% vs. 29.4%; $P < 0.001$). Around 73% of patients were classified as NYHA I or II. The mean number of comorbidities as presented in Table 1 was 2.7, with a standard deviation of 1.4.

Pharmacological treatment

Table 2 describes the percentages of patients receiving specific medication groups. The vast majority of patients received diuretics (76.5%). Of all patients, 40.6% received ACEI, and ARB were prescribed in 20.7% of patients. The percentage of patients receiving both an ACEI and ARB was small: 2.5%. Of all patients, 54.6% received a β-blocker, and 24.9% were prescribed spironolactone. A combination of a β-blocker and an ACEI or ARB was prescribed to 36.7% of the patients, a combination of a β-blocker and an ACEI or ARB and spironolactone to 10.4%, while a combination of diuretics, β-blocker, and an ACEI or ARB was present in 29.7% of the patients.

The overall score for the pharmacological GAI, which includes only patients indicated for a specific drug, was 53.3% ($n = 357$). The single drug scores were as follows: 58.3% for ACEI/ARB (in all patients); 46.9% for recommended β-blockers (bisoprolol, carvedilol and metoprolol) in 179 indicated patients and 31.0% for spironolactone in 71 indicated (NYHA III or IV) patients.

Daily target doses as recommended in the guidelines were seldom reached. A limited proportion of patients who received an ACEI or ARB received the daily target dose (21.7% and 27.1%, respectively), and only 12% of patients received the recommended target dose of the indicated β-blockers.

There were very few differences in pharmacological treatment between patients diagnosed in hospital and patients diagnosed in primary care, but patients diagnosed in hospital more often received amiodarone (7.1% vs. 2.1% in patients diagnosed in primary care; $P = 0.04$) and nitrates (36.5% vs. 24.6%, respectively; $P = 0.02$). Also, the percentage patients receiving an ACEI in the suggested target dose was higher in the patients diagnosed in secondary care (29.4% vs. 14.3%; $P = 0.03$).

Non-pharmacological treatment

The vast majority of patients received information on influenza vaccination (91.1%) (Table 3). Of patients, 41.6% received advice regarding physical exercise; 54.7% were instructed to regularly monitor body weight; and 37.5% received advice to reduce salt intake and limit fluid intake. Some patients reported contacts related to heart failure with a non-doctor [practice assistant or (heart failure) nurse] in the primary care practice (18.1%). The median number of contacts with the GP in the inclusion period [(house) visits] was 7.

Table 1 Characteristics of the study population ($n = 357$)

Mean age in years (SD)	75.7 (10.2)
Male (%)	52.9
Current smoker (%)	12.9
BMI > 30 (%)	25.8
NYHA class (% I and II)	73.1
Comorbidities/risk factors	
COPD (%)	30.3
Atrial fibrillation (%)	35.3
Angina pectoris (%)	36.4
Myocardial infarction (%)	38.1
Valvular disease (%)	23.0
CABG (%)	20.4
Stroke (%)	5.9
Hypertension (%)	49.9
DM II (%)	30.5

BMI, body mass index; CABG, coronary artery bypass graft; COPD, chronic obstructive pulmonary disease; DM, diabetes mellitus; NYHA, New York Heart Association; SD, standard deviation.

Table 2 Pharmacological treatment received by 357 patients diagnosed with CHF

	(%)
Diuretics	
Loop	65.0
Any	76.5
ACEI	40.6
ARBs	20.7
β-blockers	54.6
Spironolactone	24.9
Cardiac glycoside (Digoxine)	17.9
Amiodaron	4.5
Calcium blockers	21.8
NSAIDs	5.3
Nitrates	30.3
Anticoagulant	36.7
Lipid lowering	42.3

ACEI, angiotensin-converting enzyme inhibitors; ARB, angiotensin-II receptor blockers; CHF, chronic heart failure; NSAID, non-steroidal anti-inflammatory drugs.

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Table 3 Lifestyle advice given by GP and monitoring items for 278 patients diagnosed with CHF

	(%)
Lifestyle education	
Heart signs and symptoms	58.3
Type of heart disorder	52.8
Medication intake	54.2
Reduced salt and limited fluid intake	37.5
Physical activity	41.6
Smoking behaviour	53.2
Flu prevention	91.1
Weighing regularly	54.7
Coping behaviour	42.8
Monitoring patients	
GP discussed referral to the hospital	39.7
New appointment directly planned after visit	37.3
Task delegation	18.1
GP contacts at least every 3 months	86.3

CHF, chronic heart failure; GP, general practitioner.

There were no statistically relevant differences in non-pharmacological treatment between patients diagnosed in hospital and patients diagnosed in primary care.

Relation between NYHA class, comorbidities and the Guideline Adherence Index

Patients with lower NYHA classes had a higher probability of being treated according to pharmacological recommendations, as measured by the dichotomized overall GAI ($P < 0.0001$). As compared with patients in NYHA class I, odds ratios (OR) were 0.67 for patients with NYHA class II [95% confidence interval (CI) = 0.36–1.24; $P = 0.20$], 0.05 for patients with NYHA class III (95% CI = 0.02–0.15; $P < 0.0001$), while 0.18 for patients in NYHA class IV (95% CI = 0.02–1.47; $P = 0.11$). The number of comorbidities was not associated with the prescription of evidence-based pharmacotherapy ($P = 0.40$).

Sex was not associated with the probability of being treated according to the guidelines ($P = 0.73$), whereas decreasing age was (OR 0.97, 95% CI = 0.95–0.99, $P = 0.001$). Controlling for age and sex did only marginally change the associations between NYHA class and prescription.

We did not find associations between age, sex, number of comorbidities and NYHA class on the one hand and target doses prescribed for ACEI, ARB and the indicated β-blockers on the other.

Discussion

Summary of main findings and comparison with previous studies

Our study shows that the previously suggested gap between recommended pharmacological treatment and actual practice in primary care is narrowing, but still considerable. Especially, β-blockers are currently prescribed more often than reported in previous studies, albeit that the dosages received (for both β-blockers and ACEI or ARB) are frequently suboptimal. Patients with more severe heart failure had a lower probability to be treated according to pharmacological recommendations. Relevant lifestyle advices were given in about 40–60% of patients, depending on the item, suggesting – again – significant room for improvement. Whether the patient had been diagnosed in primary care or in a hospital did not seem to influence treatment.

Previous studies that examined prescription rates in CHF patients in primary care also found that most patients received diuretics (about 85%) [19,20]. Prescription rates for ACEI varied between 46% and 60% [11,19,20] and β-blockers prescription rates were considerably lower (around 33%) [11,19,20]. Our study shows that – ever since updated guidelines have been published – use of β-blockers has improved appreciably; of patients in our sample, 54.6% received a β-blocker. To a lesser extent, use of spironolactone has risen. Combination therapy of ACEI (or ARB) and β-blockers was given in 36.7% of patients as compared with 18–20% of patients in earlier studies [11,19].

To estimate the achievable prescription rates at population level, we searched for recent studies that could serve as 'benchmark'. Several studies assessing the efficacy and tolerability of carvedilol in β-blocker ambulatory patients with CHF (baseline NYHA II/III 95% and 86%, respectively) [21,22], carvedilol in 1030 CHF patients aged > 70 years in a 'real-world setting' [23] and nebivolol in elderly CHF patients (aged > 70 years) [24] showed that lack of tolerability appeared in only about 10–20% of patients. So, these agents are well tolerated, even in patients aged over 80 years (76.8%), in patients with NYHA class IV (62.5%) and in patients with obstructive airways disease (71.8%) [23]. Studies focusing on tolerability of captopril and losartan in patients with NYHA class II to IV heart failure [left-ventricular ejection fraction (LVEF) ≤ 40%] [25], and of carvedilol and/or enalapril in patients with stable mild heart failure (LVEF < 40%) [26] show similar tolerability figures. Given these results, our findings regarding pharmacological treatment still show ample room for improvement.

As for the GAI – based on only the patients that were indicated for a specific drug – Komajda and others [15], in a study among CHF patients (64% NYHA class II, 34% III and 2% class IV) managed primarily by cardiologists, found an overall adherence of 60%, whereas we found 53.3%. Also, two of the three drug specific indicator scores were higher in their study than those we found (85.4% vs. 58.3% for ACEI; 58% vs. 46.9% for β-blockers; and 36% vs. 31% for spironolactone). Given the fact that the case mix of patients in general practice is different from that in hospital settings (e.g. more patients in higher NYHA classes), one can expect lower scores in patients treated in primary care [19,27].

With respect to patient characteristics influencing pharmacological treatment, our study found that patients with severe heart failure had a lower probability to be treated according to recommendations. Although one would expect more optimal treatment in sicker patients, this finding is in line with an earlier study [16], which found that patients with less severe heart failure were 4–8 times more likely to receive evidence-based treatment than those with more severe heart failure. We failed to find an association between the number of comorbidities of patients and pharmacological treatment as did Muntwyler *et al.* [17]. A high number of comorbidities might increase non-adherence [28,29]. However, a

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recent study showed that the higher the number of medical conditions, the higher quality of care received [30].

Few studies on management of heart failure in primary care took non-pharmacological treatment into account, while aspects such as lifestyle advice and monitoring tend to be considered increasingly important in gaining good results in quality care for patients with chronic diseases [8]. Rutten *et al.* [12] studied non-pharmacological treatment and found that lifestyle advice were given in less than 20% of included CHF patients. Our study showed a considerable improvement as compared with these figures. However, they used medical record data to measure these items, so therefore it is likely that their numbers are underestimated, because of lack of recording lifestyle advice by the professional in the EMR [31]. We used patient-reported data to measure lifestyle advice, because preventive and counselling activities have been found to be under-recorded in EMRs [31]. Over 90% of our patients indicated to have been advised flu prevention, which indicates that our patient-reported data seem reasonably valid.

Limitations

Some limitations of the study should be mentioned. First, although we presented percentages of patients receiving the indicated medication and in the doses suggested by the guidelines, we have to interpret these figures with some caution. A general problem with measuring guideline adherence is that patients in practice may differ from patients in clinical trials on which guidelines are based [27,32]. This is particularly relevant in the case of CHF because the majority of patients with CHF are managed in general practice, while the guidelines are based on clinical studies in hospital settings [6]. These two patient groups tend to differ clinically from each other in terms of comorbidity, sex, and age [1,12] and left-ventricular function [33]. Therefore, several reasons might exist to deviate from the suggestions in the guidelines such as contra indications and intolerance for drugs, or, simply, lack of robust evidence in case of CHF with preserved systolic function. Moreover, most clinical guidelines provide guidance for managing single diseases, but fail to address the needs of elderly patients with multiple comorbidities [28,34]. The need to address individual needs may therefore – especially in general practice – hamper compliance to guidelines. For proper estimations of adherence including doses given, these factors – which may have caused underestimation of rates in our study – should be taken into account in the measures [35]. A recent study, reporting on a community-based cohort of patients with both reduced LVEF (61%) and normal LVEF (39%), showed a strong beneficial effect of the implementation of guideline-based pharmacotherapy on all-cause mortality risk, independent of CHF severity, and also observed in women and subgroups with high age [36]. In addition, Komajda *et al.* [37] found that, although patients older than 80 years showed poor outcomes in comparison to younger patients, prescription of ACEIs and ARBs was an independent determinant of a better outcome. These findings support the application of guidelines also in subgroups with less solid evidence from clinical trials.

No specific financial arrangements with insurers were in place at the time of the study, which may have influenced prescribing practices. However, we cannot rule out the possibility that other confounding factors may have influenced heart failure management such as increased knowledge and experience in uptitrating pharmacotherapy.

Finally, although we asked the GP to reconsider their diagnosis of heart failure, we did not formally validate the diagnosis because of resource and time constraints. In contrast to cardiologists, GPs often base their diagnosis on clinical judgment [20,38], which could have led to considerable proportions of false-positive diagnosis in this study [39]. This may have artificially lowered the prescription rates because the lack of effect of pharmacotherapy targeted at heart failure in false-positive patients may lead to non-adherence [38]. Other studies in special practice networks [12,19] in one of which training is given on diagnosis and coding, and correction of appropriate diagnosis is done if necessary [19], find somewhat higher mean age of patients (78 and 79 years vs. 75.7 in our study), and higher percentages of women (58% and 55% vs. our 52%), which suggests that the doctors in our sample may have under-diagnosed – or at least – under-reported older women as heart failure patients. However, we were primarily interested in current treatment of patients considered to be CHF patients by GPs in a representative sample of GPs. Moreover, we explored whether differences in treatment were present between patients diagnosed in primary care and those diagnosed in hospital, which was not the case.

In conclusion, our findings suggest that management of CHF in primary care recently improved, and that in particular uptake of β-blockers increased. However, there still seems to be significant room for improvement. Only small percentages of patients received drugs in the suggested daily target doses, which seems problematic. To gain better insight in (non-)pharmacological management in primary care, future research should preferably study 'appropriateness' of guideline suggestions at the patient level more in detail, i.e. taking intolerability, contra indications, the need to deviate from advices because of comorbidity and also patient willingness to undergo intensive treatment into account. Non-pharmacological treatment should be included in future studies as evidence is growing that structured care and disease management principles such as self-management can contribute to higher quality of care for patients with chronic conditions, and therefore to – ultimately – healthier patients [40].

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