ORIGINAL ARTICLE

# Adherence to the guidelines on the management of systolic heart failure in ambulatory care in Poland

## Data from the international QUALIFY survey

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**KEY WORDS**

adherence, ambulatory care, guidelines, heart failure, registry

**ABSTRACT**

**INTRODUCTION** Adherence to guidelines is associated with improved patient prognosis.

**OBJECTIVES** The aim of this study was to evaluate adherence to guidelines on the management of heart failure (HF) in ambulatory care in Poland.

**PATIENTS AND METHODS** The study included 209 outpatients with HF who participated in the prospective, observational QUALIFY survey. The inclusion criteria were as follows: age of 18 years or older, systolic HF with left ventricular ejection fraction of 40% or lower, and hospitalization for HF exacerbation within the previous 1 to 15 months. We assessed prescription of medications for HF and dose selection (classified as a target dose or as 50% or more of the target dose). The adherence score was calculated on the basis of the use of angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), β-blockers, mineralocorticoid receptor antagonists (MRAs), and ivabradine. The use of all indicated medications was scored as good adherence; of more than half of the medications, as moderate adherence; and of half of the medications or fewer, as poor adherence.

**RESULTS** The mean (SD) age of the patients was 67.4 (10.9) years; men constituted 77.0% of the population. Almost 92.0% of the patients were prescribed ACEIs or ARBs, of whom only 27.4% and 4.0%, respectively, reached the target doses. Nearly 97.0% of the patients received β-blockers, with only 17.7% reaching the target dose. MRAs were prescribed in 73.2% of the patients, of whom 66.0% reached the target dose. Ivabradine was prescribed in 13.9% of the patients, but the target dose was attained only in 13.8%. The adherence was good in 72.2%, moderate in 23.9%, and poor in 3.8% of the study population.

**CONCLUSIONS** Most patients with HF in Poland receive adequate treatment, but the proportion of patients reaching the target doses is suboptimal.

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Received: May 4, 2017.
Revision accepted: July 27, 2017.
Published online: August 8, 2017.
Conflict of interest: see at the end of the text.
Pol Arch Intern Med. 2017; 127 (10): 657-665
doi:10.20452/pamw.4083


**INTRODUCTION** Improvements in the treatment of cardiovascular diseases have resulted in a steady increase in the prevalence of chronic heart failure (HF). According to the POLKARD study, HF is the principal cause of hospitalization in adults and generates major health care costs in Poland.[1,2] In recent years, there has been an increase in mortality due to HF in Poland.[3] Therapies found to improve the prognosis in HF with reduced ejection fraction (HFrEF) include the use of angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), β-blockers, mineralocorticoid receptor antagonists (MRAs), ivabradine (and, more recently,

angiotensin receptor–neprilysin inhibitor), as well as implantable devices (cardiac resynchronization therapy [CRT] and implantable cardioverter defibrillator [ICD]).[4,5] Despite strict guidelines on the treatment of HFrEF, the readmission rate within 6 months of hospitalization for HF is as high as 50%.[1,2] The main goals of HF management are to evaluate the clinical characteristics of patients and to provide proper ambulatory care to prevent unnecessary hospitalizations. However, there are limited data on the quality of treatment of outpatients with chronic HF in Poland. Data obtained from registries are particularly important because they reflect real-life practice. These registries allow an assessment to what extent the European Society of Cardiology (ESC) guidelines for HF treatment have been implemented.

The aim of this study was to assess the adherence of physicians to the ESC guidelines in terms of prescribing recommended medications, as well as to evaluate the clinical characteristics of outpatients with chronic HFrEF.

## PATIENTS AND METHODS

**Study design and population** The QUALIFY survey (QUAlity of adherence to guideline recommendations for Life-saving treatment in heart failure) was an observational, prospective, longitudinal study, which was conducted internationally from September 2013 to September 2014 and included outpatients with chronic HFrEF.[6] The study included 547 centers in 36 countries from Asia, Africa, Australia, the Middle East, Europe, and the Americas.[6] Using available epidemiological data, national coordinators selected physicians to enroll patients. The current analysis includes outpatients enrolled in 22 centers by cardiologists (94.7%), geriatricians (3.8%), and internal medicine physicians (1.6%) in Poland. Each physician was obligated to recruit 10 to 15 patients over a short period of time to minimize selection bias.

The study included Polish adults (>18 years old)—outpatients with chronic HF (diagnosed according to the current guidelines) with left ventricular (LV) ejection fraction (LVEF) of 40% or lower and hospitalized for an exacerbation of HF within the previous 1 to 15 months. The exclusion criteria were as follows: hospitalization for cardiovascular disease during the 4 weeks before enrollment, conditions expected to impede participation or 18-month follow-up (limited cooperation, life expectancy of less than 2 years), recent valve intervention (<3 months), planned revascularization, heart transplantation, implantation of LV assist device, or valve repair. Scheduled CRT and pacemaker implantation were not among the exclusion criteria.

For all patients, data on demographics, medical history, clinical presentation, laboratory and diagnostic test results, and current treatment were collected using electronic case report forms.

The QUALIFY survey aimed to assess the global adherence of physicians to the guidelines, as well as clinical characteristics and general management of outpatients with chronic HFrEF.[6] For that purpose, the adherence score was constructed based on the use of the following 5 classes of medications that have been shown to be beneficial in terms of morbidity and mortality: ACEIs, ARBs, β-blockers, MRAs, and ivabradine.[6] The prescription of an adequate medication and dose (classified as a target dose or as 50% or higher of the target dose) was evaluated. The target doses of ACEIs, ARBs, β-blockers, and MRAs were defined according to the ESC guidelines.[4] The target dose of ivabradine was 7.5 mg twice daily. The adherence score was calculated for each patient as follows: 1 point for the prescription of ACEIs or ARBs, β-blockers, MRAs, and ivabradine (if indicated), and 0 points if not prescribed. If patients were not prescribed medications due to contraindications or intolerance, 1 point was given. Consequently, the use of all indicated medications in eligible patients was considered as good adherence (score, 1); the use of more than half of the medications, as moderate adherence (score >0.5 to <1); and the use of half of the medications or fewer, as poor adherence (score ≤0.5). Adherence referred only to physicians and not to compliance of patients.

Currently, a 6-, 12- and 18-month follow-up studies are underway to evaluate the association between the adherence score and outcomes.

**Statistical analysis** Normally distributed continuous variables were reported as mean (SD) values. Nonnormally distributed continuous variables and ordinal variables were presented as median values and interquartile ranges. Categorical data were reported as the number and percentage of patients, and compared by the $\chi^2$ test or by the Fisher exact test in case of the insufficient number of observations. For all tests, a $P$ value of less than 0.05 was considered significant. Statistical analyses were performed using the SAS software (SAS Institute, Inc., Cary, North Carolina, United States).

## RESULTS

A total of 7250 patients were enrolled in the QUALIFY survey. The current analysis included 211 Polish outpatients enrolled between April and September 2014. Two patients were excluded because they were discharged from the hospital (hospitalization due to HF) more than 15 months before the inclusion. The flow chart of patient enrollment in the study is shown in FIGURE 1.

The mean (SD) age of the overall population was 67.4 (11) years. A marked predominance of men was observed (77.0%). The mean (SD) duration of HF was 6.3 (5.9) years, and 17.8% of the patients were hospitalized at least twice for HF worsening during the 1 year prior to recruitment. Approximately 55% of the patients had at least 3 comorbidities, including a history of hypertension (77.5%), atrial fibrillation (42.6%), myocardial infraction (48.8%), chronic kidney disease (25.6%), and chronic obstructive pulmonary disease (15.9%). The mean LVEF was 30.8%, and nearly 90% of

**FIGURE 1** Flow chart of patient enrollment to the study

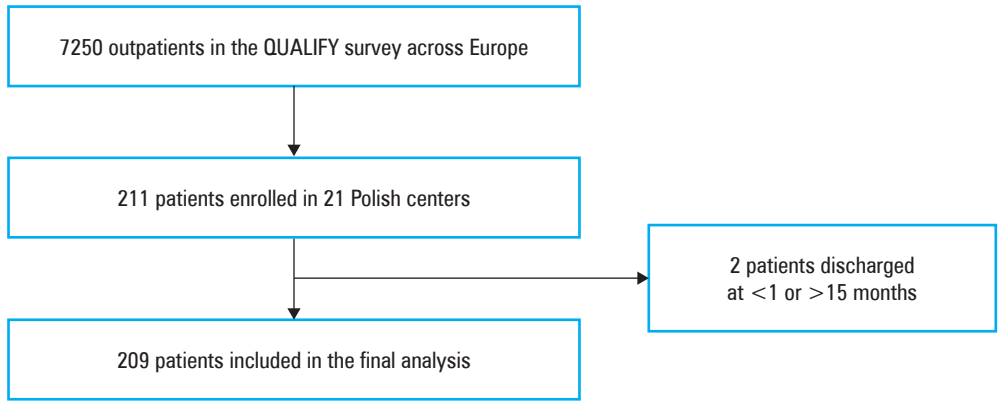



**TABLE 1** Baseline characteristics of the patients

| Parameter | | Value | Total no. of patients |
|---|---|---|---|
| **Demographic data** | | | |
| Age, y, mean (SD) | | 67.4 (11) | 209 |
| Male sex, n (%) | | 161 (77.0) | |
| BMI, kg/m$^2$, median (IQR) | | 29 (26–32) | 206 |
| Smoking status, current or former, n (%) | | 159 (76.1) | 209 |
| Alcohol intake, daily or sometimes, n (%) | | 184 (88.0) | |
| **Heart failure status** | | | |
| Ejection fraction, %, mean (SD) | | 30.8 (7.9) | 193 |
| End-diastolic left ventricular diameter, mm, mean (SD) | | 61.9 (9.8) | 192 |
| Time since first HF diagnosis, y, mean (SD) | | 6.3 (5.9) | 207 |
| ≥2 hospitalizations for HF worsening, 12 months before baseline, n (%) | | 37 (17.8) | 209 |
| Time since last HF hospitalization, mo, mean (SD) | | 6.5 (2.9) | |
| Time since last HF hospitalization, n (%) | <6 months | 101 (48.3) | |
| | ≥6 months | 108 (51.7) | |
| Ischemic etiology, n (%) | | 122 (58.4) | |
| Dilated cardiomyopathy, n (%) | | 45 (21.5) | |
| Valvular etiology, n (%) | | 19 (9.1) | |
| **Medical history, n (%)** | | | |
| Atrial fibrillation/flutter | | 89 (42.6) | 209 |
| Myocardial infarction | | 101 (48.8) | 207 |
| Percutaneous coronary intervention | | 77 (37.2) | |
| Coronary artery bypass grafting | | 42 (20.3) | |
| Stroke | | 18 (8.7) | |
| Transient ischemic attack | | 10 (4.8) | |
| Peripheral arterial disease | | 23 (11.1) | |
| Diabetes mellitus | | 87 (42.0) | |
| Dyslipidemia | | 135 (65.2) | |
| Hypertension | | 158 (77.5) | 204 |
| Thyroid dysfunction (hypothyroidism or hyperthyroidism) | | 31 (15.0) | 207 |
| Chronic obstructive pulmonary disease | | 33 (15.9) | |
| Chronic kidney disease | | 53 (25.6) | |
| Depression | | 4 (1.9) | |
| Cancer | | 5 (2.4) | |
| ≥3 comorbidities | | 114 (54.5) | 209 |

Abbreviations: BMI, body mass index; HF, heart failure; IQR, interquartile range

the patients were in New York Heart Association (NYHA) functional class II or III. Most patients (92.3%) had symptomatic congestive heart failure and more than 86% received at least 1 diuretic.

The mean (SD) resting heart rate was 73.6 (11.3) bpm, and 60.8% of the patients were in sinus rhythm. Among the patients in sinus rhythm, 60.8% had a heart rate of 70 bpm or higher and 25.4%—of 75 bpm or higher.

The baseline characteristics with regards to demographic data, HF status, and medical history are presented in TABLE 1, while TABLE 2 presents data on the clinical status and laboratory findings. Pharmacological management and number of patients with implantable devices are presented in TABLE 3. The prescription rates for the recommended classes of medications were as follows: 91.9% for ACEIs or ARBs, 96.7% for β-blockers, 73.2% for MRAs, and 13.9% for ivabradine. All recommended medications were underdosed. Only 27.4% of the patients receiving ACEIs reached the target dose, while 68.5% received 50% or higher of the target dose. Even fewer patients obtained the target dose of ARBs (4.0%), and the 50% or higher of the target dose was achieved by 52.0% of the patients. For β-blockers, nearly 18% received the target dose, while 64% of the patients reached the target dose of 50% or higher. In MRAs, adherence was better and a large proportion of the patients reached the target dose (66.0%) and the target dose of 50% or higher (97.4%). Only 13.8% of the patients obtained the target dose of ivabradine, while 69.0% of the patients obtained the target dose of 50% or higher. The number of patients reaching the target doses of guideline-recommended medications is presented in TABLE 4, while the reasons for the lack of prescription of those medications are listed in TABLE 5. A moderate use of implantable devices was also observed: CRT-D, 6.3%; CRT-P, 1.4%; and ICD (20.8%).

The evaluated adherence scores for the whole population were as follows: good in 72.2%, moderate in 23.9%, and poor in 3.8%, as shown in FIGURE 2. Adherence to guidelines was lower in patients with a history of stroke or transient ischemic attack and depression.

**TABLE 2** Baseline characteristics of the patients: physical examination, vital signs, and laboratory findings (performed within the 12 months prior to the baseline visit)

| Parameter | | Value | Total no. of patients |
|---|---|---|---|
| **Clinical status** | | | |
| NYHA class, n (%) | I | 20 (9.6) | 209 |
| | II | 119 (56.9) | |
| | III | 68 (32.5) | |
| | IV | 2 (1.0) | |
| Congestive heart failure symptoms, n (%) | Total | 193 (92.3) | 193 |
| | Breathlessness | 155 (80.3) | |
| | Orthopnea | 17 (8.8) | |
| | Paroxysmal nocturnal dyspnea | 34 (17.6) | |
| | Fatigue/Tiredness | 139 (72.0) | |
| Pulmonary rales, n (%) | | 31 (14.8) | 209 |
| Elevated jugular venous pressure, n (%) | | 21 (10.0) | |
| Peripheral edema, n (%) | | 109 (52.2) | |
| Third heart sound, n (%) | | 34 (16.3) | |
| Peripheral hypoperfusion, n (%) | | 7 (3.3) | |
| Systolic blood pressure, mm Hg, median (IQR) | | 128 (110–135) | |
| Diastolic blood pressure, mm Hg, median (IQR) | | 80 (70–80) | |
| Resting heart rate, bpm, median (IQR) | | 74 (66–80) | |
| Sinus rhythm and resting heart rate ≥75 bpm, n (%) | | 53 (25.4) | |
| Sinus rhythm and resting heart rate ≥70 bpm, n (%) | | 127 (60.8) | |
| **Laboratory findings, median (IQR)** | | | |
| Fasting blood glucose, mmol/l | | 5.7 (5.3–6.8) | 174 |
| Glycated hemoglobin, mmol/mol | | 73.2 (67.1–88.5) | 26 |
| Serum creatinine, μmol/l | | 97.8 (79.1–114.9) | 192 |
| Hemoglobin, g/l | | 137.0 (125.0–148.0) | 193 |
| Sodium, mmol/l | | 139.0 (136.5–141.0) | 190 |
| Potassium, mmol/l | | 4.4 (4.1–4.7) | 192 |
| Total cholesterol, mmol/l | | 4.0 (3.4–4.8) | 154 |
| Uric acid, μmol/l | | 466.5 (368.8–575.0) | 70 |
| Brain natriuretic peptide, pmol/l | | 153.8 (76.8–328.2) | 18 |
| NT-proBNP, pmol/l | | 369.3 (90.0–647.7) | 61 |

Abbreviations: NT-proBNP, N-terminal pro-B-type natriuretic peptide; NYHA, New York Heart Association; others, see TABLE 1

**DISCUSSION** In this paper, we reported data on the adherence of physicians to prescribing medications recommended by the guidelines, as well as on the clinical characteristics of outpatients with chronic HFrEF in Poland.

The mean age of the population in our study was similar to that in HF registries of the ESC (Pilot and Long-Term), POLKARD study, and the IMPROVE HF study (67, 66, 70, and 68 years old, respectively) and older than that reported in the international version of the QUALIFY survey (63 years old).[6-10] This difference suggests a higher mean age of ambulatory patients in Poland, Europe, and the United States than in other countries. The QUALIFY survey also included patients from Africa, Asia, Middle East, and South America, where the mean age of patients with HF tended to be significantly lower, as presented recently in the INTER-CHF study (59 years old).[6,10]

In the current report, as well as in the general QUALIFY data, the proportion of men was higher (77%) than in the previous reports (71%–53%).[6-12] The prevalence of comorbidities such as atrial fibrillation, stroke, diabetes, arterial hypertension, and chronic kidney disease was also higher than in the previous Polish and European registries.[8,9,13,14] Polish patients were also more burdened with additional diseases compared with the data from the general QUALIFY survey, including higher prevalence of atrial fibrillation (43% vs 29%), chronic kidney disease (27% vs 18%), diabetes (42% vs 34%), and arterial hypertension (78% vs 65%). At least 3 comorbidities were observed in 55% of Polish patients compared with only 43% of the general population of the survey.[6] This can be partially explained by the higher age (mean [SD], 67.4[11] vs 63.1[12.5] years) and a very frequent current or former smoking status (76% vs 55%) of Polish participants.[6]

Due to the multiple risk factors of coronary heart disease, approximately 60% of Polish patients had an ischemic etiology of HF, unlike in previous European registries where it was observed in 40% to 43% of the patients with chronic HF.[8,9] Therefore, nearly 60% of our patients required coronary revascularization in the past, while in the international QUALIFY survey, this was less than 40%.[6] We also observed only a slight difference between the Polish and international populations in terms of a history of myocardial infarction (49% vs 46%) and LVEF (mean 31% vs 32%).[6] The ischemic etiology was even more prevalent (75%) in the Polish DATA-HELP registry of patients with systolic HF.[12]

The mean time since first diagnosis of HF in Poland was longer than in other countries participating in the QUALIFY survey (6.3 vs 4.0 years).[6] Polish patients were also characterized by a worse clinical state represented by a higher NYHA functional class. During physical examination, almost all patients had symptoms of congestive HF and, consequently, more often were prescribed at least 1 diuretic (87% vs 83%).[6] The most frequent abnormalities were dyspnea (80%), fatigue/tiredness (72%), and peripheral edema (52%). Moreover, only 39.2% of patients reached resting heart rate level <70 bpm. suggesting unsatisfactory heart rate control, probably due to suboptimal doses of β-blockers and ivabradine (in patients in sinus rhythm). Higher resting heart rate in HF patients was proven to be associated with increased long-term mortality.[15,16] The mean time since previous HF hospitalization was similar in both versions of the QUALIFY study—on average 6 months.[6]

Outpatients with chronic HF usually tend to present a less severe profile than hospitalized patients with acute HF. In our study, there were no deviations in laboratory test results, which is in line with the registries of ambulatory patients.[1,8-11] In hospitalized patients, hyponatremia,

**TABLE 3** Management of outpatients with chronic heart failure

| Parameter | Value | Total no. of patients |
|---|---|---|
| **Pharmacological treatment** | | |
| ACEIs | 161 (77.0) | 209 |
| ARBs | 32 (15.3) | |
| ACEIs or ARBs | 192 (91.9) | |
| β-blockers | 202 (96.7) | |
| MRAs | 153 (73.2) | |
| Ivabradine | 29 (13.9) | |
| ≥1 diuretics | 181 (86.6) | |
| Loop diuretics | 169 (80.9) | |
| Digoxin | 31 (14.8) | |
| Amiodarone | 26 (12.4) | |
| Other antiarrhythmic agents | 18 (8.6) | |
| Antiplatelets or anticoagulants | 194 (92.8) | |
| Antiplatelets | 117 (56.0) | |
| Anticoagulants | 98 (46.9) | |
| Statins | 155 (74.2) | |
| Dihydropyridine CCB | 26 (12.4) | |
| Nondihydropyridine CCB | 6 (2.9) | |
| Nitrates | 20 (9.6) | |
| Antidiabetic agents | 77 (36.8) | |
| **Devices** | | |
| CRT-D | 13 (6.3) | 207 |
| CRT-P | 3 (1.4) | |
| ICD | 43 (20.8) | |
| Non–CRT-P | 27 (13.2) | 204 |

Abbreviations: ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; CCB, calcium channel blocker; CRT-D, cardiac resynchronization therapy defibrillator; CRT-P, cardiac resynchronization therapy pacemaker; ICD, implantable cardioverter–defibrillator; MRA, mineralocorticoid receptor antagonist

proteinuria, anemia, and higher creatinine, uric acid, brain natriuretic peptide, and N-terminal pro-B-type natriuretic peptide levels are frequently seen.[8,9,13,17-20] However, the clinical characteristics of Polish participants of the QUALIFY survey were more similar to those of hospitalized patients in previous studies in terms of the high prevalence of comorbidities, frequent symptoms of congestive HF, and use of diuretics, as well as high NYHA functional class.[8,9,13,17-21]

There is a consensus that ACEIs and β-blockers are complementary, and they are recommended to be started as soon as HFrEF is diagnosed, while MRAs should be added in symptomatic patients with a LVEF of 35% or lower.[5] Another drug decreasing risk of hospitalizations and mortality is ivabradine.[5] In Poland an increase in use of ivabradine has been observed, while in the current study this was nearly 14% of patients. However, it is still significantly lower than what was reported in the international QUALIFY study where 33.4% of patients were treated with ivabradine.[6] In the QUALIFY study, the optimal ivabradine dose was established at 7.5 mg,[6] but in fact the therapeutic goal in clinical practice is a heart rate rather than a specific dose of the drug. However, as mentioned before, in our study only 39.2% of the patients in sinus rhythm reached a resting heart rate level of less than 70 bpm.

It has been demonstrated that improvement in adherence to guidelines is associated with better survival in ambulatory patients with HFrEF.[22] The international data of the QUALIFY survey showed satisfactory adherence to guideline-recommended drug classes.[6] Similarly, in Poland, most patients were prescribed adequate drug classes for HF. In international and Polish data of the QUALIFY survey, the adherence was mainly good (67% and 72%, respectively) or moderate (25% vs 24%, respectively).[6] In comparison to the previous European survey (published in 2005), improvement in adherence to drug classes was observed.[23] Therefore, our results suggest a high level of recommended drug class implementation, which is in line with European trends. The frequencies of using the recommended drugs in Poland and in other European countries are compared in **FIGURE 3**.

However, similarly to the general QUALIFY data, our study clearly showed the underdosage of all HF medications, which requires significant improvement. The rates of patients reaching the target dose was low: 27.0% for ACEIs, 4.0% for ARBs, 17.7% for β-blockers, 66.0% for MRAs, and 13.8% for ivabradine, which proves the lack of maximization of drug doses after hospital discharge. Interestingly, as shown by Komajda et al,[6] patients with multiple cardiometabolic comorbidities are more likely to receive the target dose of ACEIs, ARBs, or MRAs.[6] In our study, 95% of the patients were enrolled by cardiologists. However, as shown in POLKARD (performed in Poland from April to December 2005) and DATA-HELP (performed in Poland from October to December 2009), cardiologists were more likely to prescribe the recommended HFrEF treatment than general practitioners.[7,12] Unfortunately, the DATA-HELP study did not assess the doses of HF medications, making it impossible to evaluate trends in adherence over time.

Previous observational studies have shown that reaching the target doses of the medications recommended for HF is associated with reduced mortality and need for hospitalizations.[8,10,23] Recent data from a 6-month follow-up of the international QUALIFY survey showed that good adherence (score, 1) to pharmacological treatment with ACEIs, ARBs, β-blockers, MRAs, and ivabradine, with at least moderate adherence (score ≥0.5) to the recommended doses was associated with improved outcomes.[24] Poor adherence was strongly associated with overall mortality (hazard ratio [HR], 2.21; $P = 0.001$), HF mortality (HR 2.26; $P = 0.032$), cardiovascular mortality (HR, 2.27; $P = 0.003$), and combined HF hospitalization or HF death (HR, 1.26; $P = 0.024$).[24] It should be highlighted that the significant improvement of outcomes in patients

**TABLE 4** Guideline-recommended medications for the treatment of heart failure

| Drug, target dose, mg/d | | Patients, n (%) | Total no. of patients | Dose, mg/d, mean (SD) | Target dose, % | |
|---|---|---|---|---|---|---|
| | | | | | ≥50% of target dose | 100% of target dose |
| Any ACEIs | | 161 (77.0) | 209 | | 68.5 | 27.4 |
| ACEIs | Ramipril, 10 mg/d | 110 (68.3) | 161 | 5.7 (3.12) | 69.1 | 28.3 |
| | Captopril, 150 mg/d | 1 (0.6) | | 25.0 (0.0) | 0.0 | 0.0 |
| | Cilazapril | 2 (1.2) | | 3.0 (2.8) | | |
| | Enalapril, 20–40 mg/d | 5 (3.1) | | 9.0 (2.2) | 80.0 | 0.0 |
| | Lisinopril, 20–35 mg/d | 2 (1.2) | | 20.0 (0.0) | 100 | 100 |
| | Perindopril | 31 (19.3) | | 6.0 (2.7) | | |
| | Quinapril | 3 (1.9) | | 23.3 (15.3) | | |
| | Trandolapril, 4 mg/d | 6 (3.7) | | 1.6 (1.4) | 50.0 | 16.7 |
| | Other | 1 (0.6) | | | | |
| Any ARBs | | 32 (15.3) | 209 | | 52.0 | 4.0 |
| ARBs | Valsartan, 320 mg/d | 14 (43.8) | 32 | 111.4 (75.53) | 35.7 | 7.1 |
| | Candesartan, 32 mg/d | 11 (34.4) | 32 | 14.2 (5.47) | 72.7 | 0.0 |
| | Telmisartan | 7 (21.9) | 32 | | | |
| Any β-blockers | | 202 (96.7) | 209 | | 64.1 | 17.7 |
| β-blockers | Bisoprolol, 10 mg/d | 81 (40.1) | 202 | 5.8 (2.75) | 79.0 | 22.2 |
| | Carvedilol, 50–100 mg/d | 72 (35.6) | | 25.8 (14.67) | 61.1 | 19.4 |
| | Metoprolol succinate, 200 mg/d | 30 (14.9) | | 60.9 (39.62) | 26.7 | 3.3 |
| | Nebivolol, 10 mg/d | 9 (4.5) | | 4.9 (2.38) | 77.8 | 11.1 |
| | Metoprolol tartrate | 6 (3.0) | | 66.7 (25.8) | | |
| | Other | 4 (2.0) | | | | |
| Any MRAs | | 153 (73.2) | 209 | | 97.4 | 66.0 |
| MRAs | Spironolactone, 25–50 mg/d | 101 (66.0) | 153 | 30.6 (17.35) | 99.0 | 88.1 |
| | Eplerenone, 50 mg/d | 52 (34.0) | | 31.5 (14.95) | 94.2 | 23.1 |
| Ivabradine | | 29 (13.9) | 209 | 8.97 (3.57) | 69.0 | 13.8 |

Abbreviations: see TABLE 3

with HF receiving the recommended drugs in the QUALIFY study was observed after only several months of follow-up.

Our results show that it is necessary to improve ambulatory treatment of HF in Poland. This could be achieved mainly through creating a system of ambulatory HF clinics, which is currently not available in Poland. Moreover, the access to the doctor is frequently difficult, mainly in rural areas and smaller cities, which impedes ambulatory care. It is also necessary to implement continuous education programs that would increase the awareness of the need for optimization of pharmacotherapy after hospital discharge among physicians, especially general practitioners. It has been proved that dissemination of treatment guidelines through information campaigns improves the rate of prescription of the recommended drugs.[25] The improvement of outpatient treatment may result in the reduction of mortality and hospitalization rates, which may translate into a reduction of health care costs. The improvement of the outpatient care, also through the intensification of pharmacotherapy could also limit the number of patients with implantable devices (ICD, CRT), thereby reducing the number of complications and costs.

Decompensation of HF is the most common cause of hospitalization in Poland, and approximately half of the patients with HF are readmitted to the hospital within 12 months from discharge.[1,12,26] Furthermore, recent data have shown an increase in the rates of HF-related mortality in Poland.[3] In 2012, the National Health Fund (Narodowy Fundusz Zdrowia [NFZ]) financed health benefits in HF for an amount of over 672 million PLN, mostly hospital benefits (94%), while ambulatory care received only 2%.[26] This suggests that outpatient care may be insufficient because of the suboptimal treatment of comorbidities, underdosage of guideline-recommended medications, and a small number of outpatient clinics, and requires improved cooperation at the level of the national health care system, physicians, and patients. The reduction in the number of hospitalizations may also have a measurable impact on the costs borne by the NFZ.

Patients with HF in our study often required antiplatelet therapy (56.0%), anticoagulants (46.9%), statins (74.2%), amiodarone (12.4%), and other antiarrhythmics (8.6%) because of the high

**TABLE 5** Reasons for the lack of prescription of guideline-recommended medications

| Reason | | ACEIs | ARBs | β-blockers | MRAs | Ivabradine |
|---|---|---|---|---|---|---|
| No intake, n (%) | Total | 48 (23.0) | 177 (84.7) | 7 (3.3) | 56 (26.8) | 180 (86.1) |
| | Contraindicated | 8 (16.7) | 21 (11.9) | 1 (14.3) | 16 (28.6) | 44 (24.4) |
| | Not tolerated | 33 (68.8) | 5 (2.8) | 6 (85.7) | 8 (14.3) | 1 (0.6) |
| | Not indicated | 0.0 | 142 (80.2) | 0.0 | 26 (46.4) | 127 (70.6) |
| | Other | 7 (14.6) | 9 (5.1) | 0.0 | 6 (10.7) | 8 (4.4) |
| Specific reasons, n (%)[a] | Cough | 26 (63.4) | – | – | – | – |
| | Hypotension | 11 (26.8) | 10 (38.5) | 2 (28.6) | – | – |
| | Worsening renal function | 7 (17.1) | 12 (46.2) | – | – | – |
| | Renal artery stenosis | 2 (4.9) | 2 (7.7) | – | – | – |
| | Bradycardia | – | – | 5 (71.4) | – | – |
| | Asthma / COPD exacerbation | – | – | 3 (42.9) | – | – |
| | Fatigue | – | – | 2 (28.6) | – | – |
| | Worsening of claudication related to PAD | – | – | 2 (28.6) | – | – |
| | Atrioventricular conduction disorders | – | – | 1 (14.3) | – | – |
| | Renal dysfunction | – | – | – | 14 (58.3) | – |
| | Hyperkalemia | – | – | – | 6 (25.0) | – |
| | Gynecomastia | – | – | – | 4 (16.7) | – |
| | Non-sinus rhythm | – | – | – | – | 35 (79.5) |
| | Pacemaker-dependent | – | – | – | – | 16 (36.4) |
| | Resting heart rate <50 bpm | – | – | – | – | 2 (4.5) |
| | Other | 2 (4.9) | 10 (38.5) | – | – | – |

a Multiple answers possible

Abbreviations: COPD, chronic obstructive pulmonary disease; PAD, peripheral artery disease; others, see TABLE 3

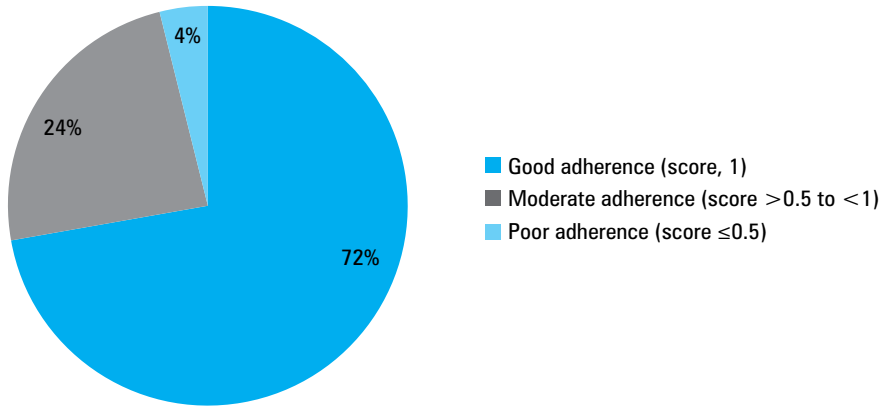
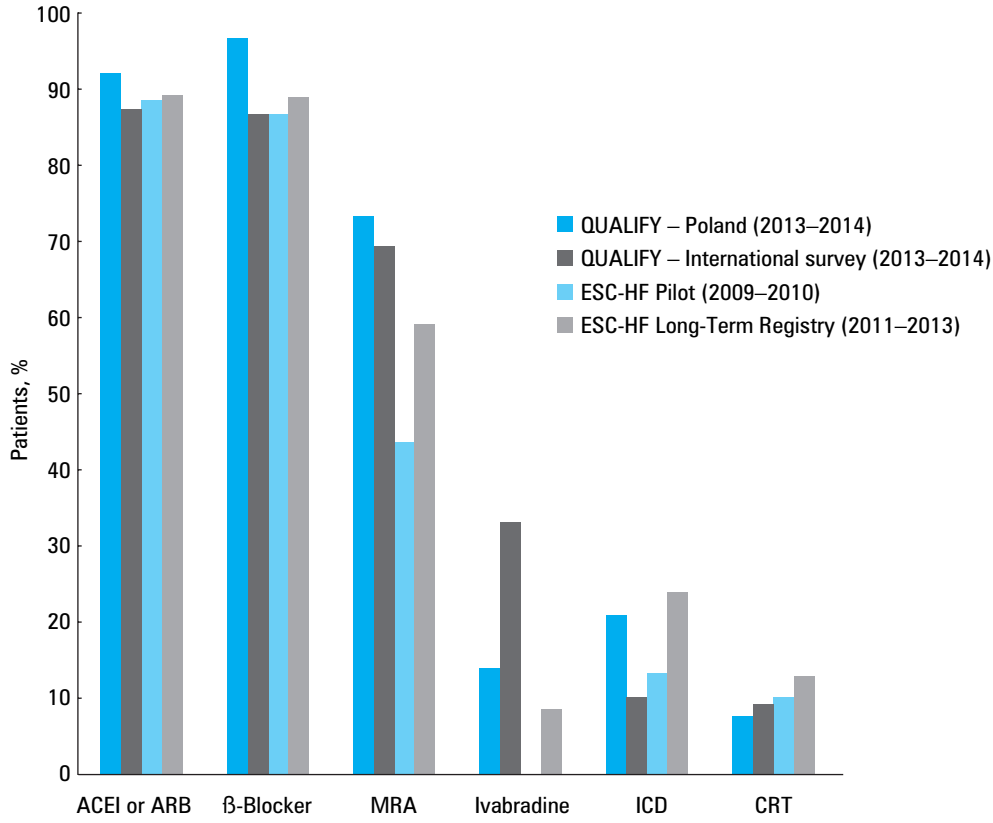



**FIGURE 2** Physicians' adherence to prescribing guideline-recommended medications in Poland

prevalence of comorbidities such as coronary heart disease and atrial fibrillation. In recent years, a declining role of digoxin has been noted.[9,21] According to the current guidelines, its use may be considered in patients with symptomatic HF in sinus rhythm to reduce the risk of hospitalizations.[5] Recent studies have shown a higher risk of mortality and readmissions in patients with concomitant atrial fibrillation who receive digoxin.[27,28] In our study, only 14.9% of the patients received digoxin.

The HF Pilot Registry of the ESC showed significantly lower use of implantable devices (ICD and CRT) in Eastern Europe (including Poland), suggesting important economic differences between these countries and those of Western Europe.[29] However, a steady increase in their use is observed in subsequent registries.[8,12,30] According to the current guidelines, around two-thirds of outpatients have no indications for ICD implantation, with a similar trend for CRT.[8] In the current study, we observed a lower rate of using implantable devices compared with the previous European data of the ESC-HF Long-Term Registry (FIGURE 3).[8] This gap between the guidelines and clinical practice should be considered; however, the underuse of CRT and ICDs seems to be smaller than in previous studies on the management of Polish outpatients.[12]

**FIGURE 3**
Management of patients with chronic heart failure in Poland and in large European registries: QUALIFY, ESC-HF Pilot, and ESC-HF Long-Term. Ivabradine was not available during patient enrollment to the ESC-HF Pilot.
Abbreviations: see **TABLE 3**




Despite the fact that most previous studies used the same methodology for the selection of practitioners, we cannot exclude a selection bias in the process of patient inclusion to the study. Moreover, the study does not appropriately represent the management of chronic HF by internal medicine physicians or general practitioners, who provide care for the majority of patients with chronic diseases. The relatively small number of recruited patients is another limitation of our study. Based on our results, there is a need for coordinated actions aimed at the nationwide evaluation of physicians' adherence to guidelines on HF therapy, especially at the level of primary care. Only then will we recognize the exact implementation of HF treatment guidelines in Poland.

In conclusion, our analysis of the QUALIFY study revealed satisfactory adherence scores for guideline-recommended medications in Poland. However, the proportion of patients reaching the target dose was suboptimal. Polish patients with systolic HF are typically symptomatic elderly individuals with numerous concomitant diseases.

**Acknowledgments** The study was designed and conducted by independent investigators and funded via grants from Servier France. The sponsor provided assistance for study set-up and management in each country. The sponsor had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

**Contribution statement** GO, ML, AW and PP conceived the idea for the study. GO, KO, ML, PB, and PP researched data. GO, KO, and PB designed the analysis, conducted data interpretation, performed statistical analysis and drafted the manuscript. GO, KO, ML, PB and PP performed a critical revision of the manuscript. All authors approved the final version of the manuscript.

**Conflict of interest** GO reports receiving steering committee fees from Servier during the study, and personal fees from Amgen, Astra Zeneca, Bayer, Menarini, Novartis, Sanofi, and Servier, not related to this study. ML reports receiving personal fees from Novartis and Servier, not related to this study. PB reports receiving personal fees from Servier, KRKA, Adamed, Novartis, and Bayer, not related to this study. AW reports receiving fees from Servier. PP reports receiving steering committee fees from Servier during the study, and grants and personal fees from Vifor Pharma, Servier, Amgen, Novartis, Johnson & Johnson, Abbott Vascular, Respicardia, Coridea, Celladon, and Cardiorentis, not related to this study.

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