Management of Congestive Heart Failure by General Practitioners - Results from the Styrian Heart Failure Survey

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Congestive heart failure (CHF) is a major cause of morbidity and mortality affecting 2–10 million individuals in Europe [1], and approximately 2 million new cases are reported world-wide each year. CHF is the leading cause of hospitalisation in persons aged over 65 years in Europe and the US [2, 3]. The costs of managing patients with heart failure exceed USD 10 billion per year [4], with approximately 75 % of this amount spent on hospitalisation. Although there has been a significant downward trend in morbidity and mortality from most cardiovascular diseases over the past decades [5, 6], the incidence and prevalence of CHF continues to increase [1–3, 6–8]. CHF is a complex disorder with a high rate of treatment failures and rehospitalisations [9] and medical treatment is often less than optimal [10]. General practitioners, internists and cardiologists in hospitals or practice are encouraged to manage CHF patients according to the guidelines [1, 11]. Our study surveyed how general practitioners (GPs) diagnose and treat CHF and compared their responses to the recommendations of the European Society of Cardiology (ESC) [1, 11]. A further goal was to determine who is mainly responsible for first-line treatment and follow-up in this potentially life-threatening disease.

Methods

Study group

Questionnaires were sent to all 827 registered general practitioners (GPs) in the province of Styria in Austria. These GPs care for a total population of about 1 million people in urban and rural regions.

Survey instrument

A 5-page, 24-question, self-administered survey instrument was specifically designed for this study. Questions focused on the major points of the ESC guidelines [1, 11]. Information was sought concerning:

1) demographic data of CHF patients;
2) tests used to diagnose CHF; and
3) approaches to initial and long-term pharmacologic therapy. The survey was conducted from December 1998 through January 1999. The mailing included a letter describing the purpose of the study and a prepaid return envelope. The deadline for returning the questionnaire was March 31st, 1999.

Data analysis

Daily doses of ACE inhibitors categorised as:

- **high dose**: > 20 mg enalapril or lisinopril, > 10 mg ramipril, > 100 mg captopril;
- **medium dose**: 10–20 mg enalapril or lisinopril, 2.5–10 mg ramipril, 50–100 mg captopril;
- **low dose**: < 10 mg enalapril or lisinopril, < 2.5 mg ramipril, < 50 mg captopril.

Diuretics (daily doses):

- **high dose**: > 80 mg furosemide, > 80 mg thiazide, > 40 mg xipamide, > 100 mg spironolactone;
- **medium dose**: 40–80 mg furosemide, 12.5–50 mg thiazide, 40 mg xipamide, 50–100 mg spironolactone;
- **low dose**: < 40 mg furosemide, < 5 mg thiazide, < 10 mg xipamide, < 50 mg spironolactone.

Key words: congestive heart failure, diagnosis, medical treatment, general practitioners, survey
• “low dose”: < 40 mg furosemide, < 12.5 mg thiazide, < 40 mg xipamide, < 50 mg spironolactone.

Digitalis (daily doses):
• “high dose”: > 0.1 mg digitoxin, > 0.5 mg digoxin, > 0.15 mg methyldigoxin, > 0.4 mg acetyldigoxin;
• “medium dose”: 0.07–0.1 mg digitoxin, 0.25–0.5 mg digoxin, 0.1–0.15 mg methyldigoxin, 0.2–0.4 mg acetyldigoxin;
• “low dose”: <0.07 mg digitoxin, <0.25 mg digoxin, < 0.1 mg methyldigoxin, < 0.2 mg acetyldigoxin.

Results
The GPs returned 231 (31 %) of the 827 questionnaires. The majority of patients (70 %) diagnosed by GPs were 61–75 years of age; 36 % were older than 75 years and 4 % were 46–60 years. Patients younger than 45 years were not reported. The main symptoms of CHF were dyspnoea (89 %), oedema (60 %), cardiac rhythm disorders (12 %) and angina pectoris (8 %).

The most important and the most inappropriate tests for the diagnosis of CHF as reported by the GPs are shown in Figure 1. Therapy was usually initiated by GPs with ACE inhibitors, diuretics and digitalis. Details are given in Table 1. Table 2 gives the preferred ACE inhibitor, diuretic and digitalis preparations as well as the percentage of use and preferred dosages. Figure 2 shows that there is a strong tendency for the GPs themselves to follow CHF patients and to modify their medications as needed. Most CHF patients saw their GPs monthly; follow-up frequency is shown in detail in Figure 3.

Discussion
This study was designed to survey how GPs in the province of Styria (Austria) diagnose, treat and follow up CHF patients. Overall, our findings indicate that the majority of patients with CHF are managed by their GPs with respect to initiation of treatment as well as supervision and follow up. The drugs used are in accordance with current guidelines although the prescribed dosages leave room for improvement.

Diagnosis and follow up
CHF is associated with high mortality rates and has emerged as one of the most prevalent chronic disorders among older

![Figure 1](image1.png)

Figure 1. Most appropriate (II) and least appropriate tests (III) for the diagnosis of CHF as reported by the general practitioners in Styria. Differences to 100 % are caused by multiple responses.

![Figure 2](image2.png)

Figure 2. Institution performing follow up (II) of patients with CHF and institution who did modification of medical therapy (III). Differences to 100 % are caused by multiple responses.

![Figure 3](image3.png)

Figure 3. Frequency of follow-up of CHF patients in Styria. Difference to 100 % is caused by multiple responses.

Table 1. Institution that commences initial medication with ACE inhibitors, diuretics and digitalis

<table>
<thead>
<tr>
<th>ACE-inhibitors</th>
<th>Diuretics</th>
<th>Digitalis</th>
</tr>
</thead>
<tbody>
<tr>
<td>General practitioner</td>
<td>83 %</td>
<td>89 %</td>
</tr>
<tr>
<td>Internist</td>
<td>34 %</td>
<td>28 %</td>
</tr>
<tr>
<td>Cardiologist</td>
<td>13 %</td>
<td>10 %</td>
</tr>
<tr>
<td>Hospital</td>
<td>17 %</td>
<td>14 %</td>
</tr>
</tbody>
</table>

Differences to 100 % are caused by incomplete answers or by multiple responses.

Table 2. Dosages of ACE inhibitors, diuretics and digitalis given by the GPs

<table>
<thead>
<tr>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enalapril (90 %)</td>
<td>42 %</td>
<td>42 %</td>
</tr>
<tr>
<td>Lisinopril (88 %)</td>
<td>39 %</td>
<td>41 %</td>
</tr>
<tr>
<td>Ramipril (82 %)</td>
<td>29 %</td>
<td>47 %</td>
</tr>
<tr>
<td>Captopril (74 %)</td>
<td>46 %</td>
<td>27 %</td>
</tr>
<tr>
<td>Furosemide (94 %)</td>
<td>50 %</td>
<td>48 %</td>
</tr>
<tr>
<td>Xipamide (76 %)</td>
<td>14 %</td>
<td>61 %</td>
</tr>
<tr>
<td>Thiazide (71 %)</td>
<td>11 %</td>
<td>60 %</td>
</tr>
<tr>
<td>Spironolactone (70 %)</td>
<td>39 %</td>
<td>30 %</td>
</tr>
<tr>
<td>Digitoxin (86 %)</td>
<td>10 %</td>
<td>85 %</td>
</tr>
<tr>
<td>Methyldigoxin (83 %)</td>
<td>10 %</td>
<td>80 %</td>
</tr>
<tr>
<td>Acetyldigoxin (82 %)</td>
<td>21 %</td>
<td>63 %</td>
</tr>
<tr>
<td>Digoxin (51 %)</td>
<td>15 %</td>
<td>38 %</td>
</tr>
</tbody>
</table>

Differences to 100 % are caused by incomplete answers or by multiple responses. Beside the generic names the frequency of usage by the GPs is given. For classification into low/medium/high dose see text.
individuals [1, 3, 6, 8, 14]. Accordingly, the CHF patients treated by physicians who responded to our survey were usually older than 60 years. The majority of the GPs regarded clinical signs and symptoms as the most important findings in patients with CHF and none of the GPs wanted to dispense with these criteria. According to ESC guidelines [1], a diagnosis of CHF demands that symptoms of heart failure are present. This requires a careful history and physical examination with further assessment of cardiac function when CHF is suspected. An electrocardiogram is the next logical diagnostic step.

A normal ECG is rare in patients with CHF and therefore has a high negative predictive value. On the other hand, ECG abnormalities seen in CHF patients do not suggest any specific underlying cause. Echocardiography is the gold standard in non-invasive testing for suspected CHF and should be used routinely for diagnostic work-up of heart failure [1, 12, 13]. In our study echocardiography was the most important test for 59 % of the GPs. Our findings are supported by the results of other investigators [7, 15, 16], who found that echocardiography is used by 15–43 % of GPs. Furthermore, Baker et al. [17] found an even higher rate (90 %–99 %) for the evaluation of both diastolic and systolic dysfunction by family physicians, while cardiologists used this imaging method in 98 % and 91 %, respectively. They also reported that some GPs did not distinguish between types of CHF (ie, systolic versus diastolic dysfunction). They concluded that poorer understanding of CHF pathophysiology may explain differences between family physicians and cardiologists in the perceived importance of echocardiography as part of the diagnostic strategy.

Several other non-invasive tests support or oppose the diagnosis of CHF; while some tests are necessary to identify an underlying cause. Invasive testing procedures are generally not required to diagnose chronic heart failure [1], but right heart catheterisation may be necessary to assess haemodynamic parameters [1, 12]. Coronary angiography is necessary for the definite diagnosis of coronary heart disease, which may well be underdiagnosed in CHF patients [1]. Six of the GPs (2 %) in our survey considered this invasive procedure to be the most important test, but for the majority (65 %) it was the least important test. Edep et al. [7] found that 5 % of GPs compared to 20 % of cardiologists would do a cardiac catheterisation and coronary angiography for the diagnostic work-up of patients with CHF. Reis et al. [15] reported that GPs ordered fewer right heart catheterisation (0 %) than cardiologists (2.9 %) to guide their care plan for CHF patients admitted to the hospital. In another survey, significant differences in the diagnostic evaluation of new patients with CHF were reported between cardiologists and specialists for CHF [18]. Cardiologists stated that they would perform right heart and left heart catheterisation in 7 % and 20 % respectively, while CHF specialists would do it in 22 % and 36 %, respectively.

The guidelines do not provide any advice concerning the interval between routine check-ups for patients with stable CHF. We found that the majority of the GPs saw their CHF patients on a monthly basis (Figures 2 and 3). We have found no further studies on this.

Medical treatment
Angiotensin converting enzyme (ACE) inhibitors are the most important drugs for the treatment of heart failure [11] because they reduce morbidity and mortality [19–22]. We found that ACE inhibitors were given by the GPs in only 85 % of cases. Van Veldhuisen et al. [23] reported that 92 % of the CHF patients in Europe used ACE inhibitors without significant differences between countries. Differences between general practitioners and cardiologists in the approach to CHF treatment were found by Edep et al. [7] and Baker et al. [17] with a prescription rate of ACE inhibitors of about 60–77 % by the GPs. Not surprisingly, GPs were less familiar (53 %) with the guidelines for heart failure than cardiologists (82 %) [17].

The recommended daily target doses exceed at least 20 mg for enalapril and lisinopril, 10 mg for ramipril and 150 mg for captopril [11, 13]. The GPs in Styria used those high doses in only 2–11 %, medium doses were reached in 27–74 %, while 29–46 % of the GPs prescribed ACE inhibitors in low doses. In nine European countries high-dose ACE inhibitors were given to approximately 25 % of CHF patients, varying from 17 % to 35 % [23]. These findings are supported by Roe et al. [24] and Nohria et al. [25]. They found that 33 % and 45 % of the study sample, respectively, received the adequate daily dose used in large clinical trials. Furthermore, Edep et al. [7] found that only 3 % of the GPs compared to 35 % of cardiologists routinely up-titrated ACE inhibitors to higher doses. Seventy-four percent of the GPs and 22 % of cardiologists used the lowest dose that produced clinical improvement. However, high doses were used in most ACE inhibitor trials [19–22]. While high doses have shown an additional benefit without a higher rate of side effects [21], the dosages used in clinical practice are often much lower [26]. Treatment of patients with CHF by cardiologists compared to GPs had a higher conformity with published guidelines and improved clinical outcome with lower CHF readmission rates and better quality-of-life measures [7, 15–17]. Therefore the authors [7, 15–17] concluded that a better co-operation between GPs and cardiologists or CHF specialists would be of additional benefit for patients with CHF.

Diuretics are essential for treatment of all patients with symptoms of heart failure who have evidence of or prior history of fluid retention [11, 13]. We found that 89 % of the GPs gave diuretics. Differences in their use between primary care physicians and cardiologists have been reported earlier [7, 15]. Reis et al. [15] found that GPs used less diuretics (76.6 %) than cardiologists (87.3 %). Furthermore, Edep et al. [7] reported significant differences between GPs and cardiologists regarding the use of diuretics in the initial therapy of mild to moderate and severe CHF as well as in the maintenance therapy of severe CHF.

Although high doses of spironolactone should be avoided, 30 % of the GPs prescribed 50 to 100 mg and 2 % gave more than 100 mg of spironolactone. Unfortunately, we have no information about the combination with ACE inhibitors in these patients. In our survey high dosages of furosemide (> 80 mg) were given by 5 % of the GPs. Van Veldhuisen et al. [23] reported a different use of high-dose furosemide (> 120 mg) among several European countries ranging from 2–56 %.

Cardiac glycosides are specifically indicated when a fast ventricular rate in atrial fibrillation is present with any degree of symptomatic heart failure. Along with diuretics and ACE inhibitors, administration of digitalis may be of symptomatic benefit in patients with NYHA class III and IV heart failure in sinus rhythm [11, 13]. In our study, cardiac glycosides were given by 71 % of the GPs. Van Veldhuisen et al. [23] reported differences between the European countries ranging from 39–87 %. The recommended doses are 0.25–0.375 mg daily for digoxin and 0.07–0.1 mg daily for digitoxin [11]; the GPs achieved these goals in 38 % for digoxin and 85 % for digitoxin.

Limitations of the study
(1) This report is based on a survey, and it is uncertain whether the responses reflect the physicians’ actual prac-
It is well known that actual practices may differ substantially from self-reported practices.

(2) Although the absolute number of physicians taking part in this survey is comparable with those in other studies, the response rate of 31% is lower than in other surveys [7, 18]. It is possible that the results cannot be generalised because of a selection bias related to the level of knowledge and comfort in treating CHF among physicians who chose to respond. Furthermore, there is the possibility that the 231 GPs who participated in this survey have a special interest in CHF and may be more familiar with the guidelines than other GPs.

(3) Although we have no information about different treatment patterns according to the severity of CHF, we have an overall insight into the usage and doses of the medications. It may be possible that a differentiation for the therapy of different NYHA classes would have shown higher or lower conformity to the guidelines.

(4) Surveys of CHF outpatient clinics or cardiological practices were not performed.

Conclusion

Our results suggest that diagnostic and treatment guidelines for CHF need to be more uniformly applied by all GPs caring for patients with heart failure. In particular, the application of high doses of ACE inhibitors would additionally benefit CHF patients.

References

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