

Detection of heart failure at a primary care practice in a small town in central Poland

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Abstract

Background: Heart failure (HF) is commonly misdiagnosed, and the validity of diagnosis in primary care is poor. According to the guidelines, an electrocardiogram, a chest X-ray and a standard echocardiogram should be obtained and the level of B-type natriuretic peptide (BNP) should be determined in every patient with signs and symptoms suggestive of HF.

Aim: We performed a community-based study to evaluate the diagnostic evaluation of patients with HF and/or HF risk factors carried out by primary care physicians.

Methods: We screened the adult population of a small Polish town (5521 inhabitants). Inclusion criteria were as follows: age ≥ 55 years and either the diagnosis of HF or presence of at least one of the following HF risk factors: ischaemic heart disease and/or hypertension with complications and/or diabetes mellitus.

Results: A total of 218 patients who met the inclusion criteria were invited to participate in the study and 175 of them (80.3%) were evaluated and followed up for 58 ± 1 months. The diagnosis of HF was established in 38/175 patients (22%) (Group 1). The signs and symptoms of HF without the formal diagnosis of HF were present in 44/175 patients (25%) (Group 2) and 93/175 patients (53%) had neither HF nor its signs or symptoms (Group 3). During the follow-up, in some of patients from Groups 2 and 3, the diagnosis of HF was established and these patients crossed over to Group 1a. In 2009, there were 56 patients in Group 1a, 37 in Group 2a and 82 in Group 3a. At baseline, in years 2004/2005, echocardiograms were available in 37%, 25% and 17% of the patients in Groups 1, 2 and 3, respectively, chest radiograms in 86%, 54%, 58% of the patients, respectively, and BNP measurements in 5%, 5% and 0% of the patients, respectively. At the end of the follow-up we observed an increased number of diagnostic tests performed but the difference was not statistically significant.

Conclusions: Our study showed a considerable discrepancy between the guidelines and primary practice and underscores the need to change the practical approach to diagnostic investigations, especially echocardiography and BNP measurements in HF patients.

Key words: population, heart failure, standard of diagnosis

Kardiol Pol 2012; 70, 10: 1003–1008

INTRODUCTION

Heart failure (HF) is a chronic disease associated with high mortality and its incidence sharply increases with age. It is estimated that HF affects a total of about 2–4% of the European population [1, 2]. The effectiveness of detection of HF by primary care physicians is low [3]. The symptoms are not specific and the signs, although specific, are not sufficiently sensitive. The applicable guidelines recommend obtaining an electrocardiogram (ECG), a chest radiogram and a standard

echocardiogram and measuring the level of B-type natriuretic peptide (BNP) in every patient with signs and symptoms suggestive of HF [4, 5]. An echocardiogram is necessary to confirm the diagnosis of HF. Everyday practice, however, largely departs from the recommendations in the guidelines and access to echocardiography is still limited [6].

Despite the straightforward diagnostic recommendations, little is known about the realities of HF detection in the Polish population, especially in the primary care setting [7, 8].

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Received: 30.08.2011 Accepted: 18.04.2012

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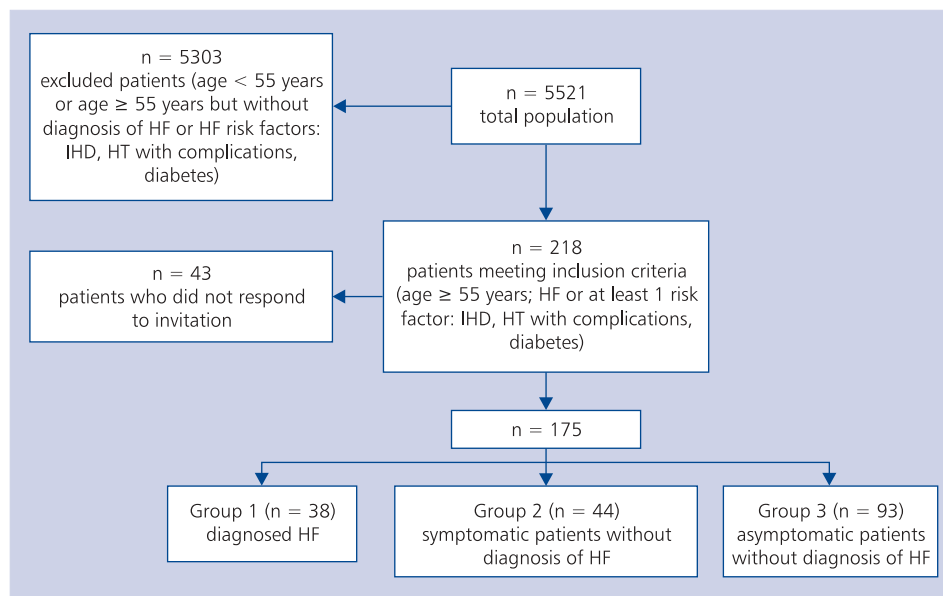


Figure 1. Study design; HF — heart failure; HT — hypertension; IHD — ischaemic heart disease

We therefore conducted a study in the population of a small Polish town to evaluate compliance with the HF diagnostic standard in patients with the diagnosis of HF or with one or more risk factors for HF in a group of patients under the care of a Communal Independent Public Primary Healthcare Establishment in a small town in central Poland.

METHODS

Study population

We enrolled adult patients under the care of the only local health centre in a small town 5521 inhabitants in central Poland. Based on the outpatient records of the Communal Independent Public Primary Healthcare Establishment we performed a preliminary selection of patients for the study. Inclusion criteria were as follows: age ≥ 55 years and either the diagnosis of HF or presence of at least one of the following HF risk factors: ischaemic heart disease, hypertension with complications, diabetes mellitus. A total of 218 patients who met the inclusion criteria were invited to participate in the study and 175 of them (80.3%) agreed to participate. During the initial visit, which took place in December 2004 or January 2005, medical history was taken from each patient and each patient underwent a physical examination, verifying the diagnosis of HF according to the standards. Based on the history and outpatient records we also collected detailed data on previous investigations, i.e. the frequency with which ECG, chest radiograms and echocardiograms had been obtained and the frequency with which BNP had been measured. Three groups of patients were distinguished based on the outpatient diagnosis and clinical manifestations. Group 1 consisted of patients with the diagnosis of HF. Group 2 comprised those with manifestations suggestive of HF (presence of at least

two of the following: exertional or resting dyspnoea, decreased exercise tolerance, ankle oedema, nycturia, presence of rhonchi or crepitations over the pulmonary fields, presence of the third heart sound) but without the diagnosis of HF established by their primary care physicians. Group 3 consisted of patients without the diagnosis of HF and without manifestations suggestive of HF. The study diagram is presented in Figure 1.

Data from the initial clinical assessment, which were particularly important for patients from Group 2, were passed on in writing to the patients' respective treating physicians. In September 2009, from the inpatient records of all the patients participating in the study, we collected again data on the diagnosis of HF and the frequency with which diagnostic investigations had been performed. As we expected a change in the frequency of HF diagnosis as the study progressed, we assumed that the numbers of patients in each of the groups would at the end of the follow-up would differ from those at baseline, i.e. that some of the patients from Groups 2 and 3 would cross over to Group 1. We called the resulting "new" groups Group 1a, Group 2a and Group 3a in order to emphasise the changes in the numbers of patients and the preservation of the unchanged definitions of each of the groups. As the clinical data collected in 2009 originated from medical records only (the physical examination was not performed again in the patients included in the study), it was impossible to conclude how many patients crossed over from Group 3 to Group 2a.

Statistical analysis

The statistical analysis was conducted using SAS (SAS Institute, Cary, NC, USA). The data were presented as means with

Table 1. Characteristics of the study population (n = 175)

	Total (n = 175)	Group 1 (n = 38)	Group 2 (n = 44)	Group 3 (n = 93)	P
Mean age [years]	66 ± 8	69 ± 8	66 ± 7	65 ± 7	0.02*
Females	99 (57%)	21 (55%)	33 (75%)	45 (48%)	0.01#
Hypertension:	143 (82%)	57 (40%)	15 (39%)	16 (36%)	NS
Systolic BP during the study ≥ 140 mm Hg	99 (57%)	26 (68%)	29 (66%)	54 (58%)	NS
Diastolic BP during the study ≥ 90 mm Hg	33 (87%)	37 (84%)	73 (78%)	32 (34%)	NS
Coronary artery disease:	69 (39%)	20 (52%)	17 (38%)	32 (34%)	NS
A history of myocardial infarction	48 (27%)	13 (34%)	14 (32%)	21 (22%)	NS
A history of CABG/PTCA	13 (7%)	2 (5%)	4 (9%)	7 (7%)	NS
Diabetes mellitus	61 (35%)	14 (37%)	17 (39%)	30 (32%)	NS
Preexisting heart failure	38 (22%)	38 (100%)	0 (0%)	0 (0%)	
Stroke/transient ischaemic attack	17 (10%)	3 (8%)	4 (9%)	10 (10%)	NS
Atrial fibrillation/flutter	25 (14%)	7 (18%)	11 (25%)	7 (8%)	0.02 ^
Smoking	61 (35%)	14 (37%)	12 (27%)	35 (38%)	NS

*Statistical significance between Groups 1 and 3, #statistical significance between Groups 2 and 3, ^ statistical significance between Groups 1 and 3 and between Groups 2 and 3; BP — blood pressure; CABG — coronary artery bypass grafting; PTCA — percutaneous transluminal coronary angioplasty

the respective standard deviations or as percentages. Individual groups were compared using the χ^2 test for categorical variables. When the sizes of the groups were too low, the Fisher test was used. The analysis of multiple comparisons was conducted using ANOVA (subgroup comparisons in post-hoc analysis using the Bonferroni method). In order to assess variables which might independently affect the decision to perform diagnostic echocardiography we performed logistic regression analysis, expressing it as odds ratio (OR) with a 95% confidence interval (CI). We included the following variables in the model: age, sex, diagnosis of HF, diagnosis of coronary artery disease, diagnosis of hypertension, diagnosis of diabetes mellitus and diagnosis of atrial flutter/fibrillation. The p values below 0.05 were considered statistically significant.

RESULTS

Initial visit assessments

During the initial visit the mean age was 66 ± 8 years with a female-to-male predominance. The most common HF risk factors included: hypertension, followed by ischaemic heart disease and diabetes mellitus. A total of 38 (22%) patients had the diagnosis of HF (Group 1). All the patients with a pre-existing diagnosis of HF had its manifestations during the examination (dyspnoea was present in 35 [90%] patients, oedema in 26 [68%] patients, fatigue in 25 [67%] patients, nycturia in 20 [53%] patients, rhonchi/crepitations over the pulmonary fields in 8 [21%] patients; none of the patients had the third heart sound). In addition, signs and symptoms suggestive of HF in patients without a formal diagnosis of HF were identified in 44 (25%) patients (Group 2) (dyspnoea was

present in 37 [84%] patients, oedema in 32 [72%] patients, fatigue in 31 [71%] patients, nycturia in 20 [45%] patients, rhonchi/crepitations over the pulmonary fields in 5 [11%] patients; none of the patients had the third heart sound). The remaining 93 (53%) patients comprised Group 3. Table 1 summarises the overall patient characteristics.

Investigations performed in patients before the initial visit

All the patients included in the study (100%) had previously had an ECG, 93 (53%) patients a chest radiogram, 41 (23%) patients an echocardiogram and 2 (1%) patients had undergone natriuretic peptide (specifically, BNP) determined. In 7 out of 38 (18%) patients from Group 1, the only previous investigation available at the time of the initial visit was an ECG. An ECG was also the only previous investigation in 20 (45%) patients from Group 2.

Investigations performed during the follow-up

The duration of follow-up was 58 ± 1 months. The final analysis covered data on all the patients originally included in the study (n = 175). During the follow-up 7 patients from Group 2 and 11 from Group 3 were diagnosed with HF. At the end of the follow-up Groups 1a, 2a and 3a had 56, 37 and 82 patients, respectively. During the follow-up there was an increase in the frequency at which echocardiography was performed in each of the groups, although the difference was not significant (for the group with the diagnosis of HF the result was borderline: p = 0.05). We also observed a non-significant increase in the frequency at which chest radiograms

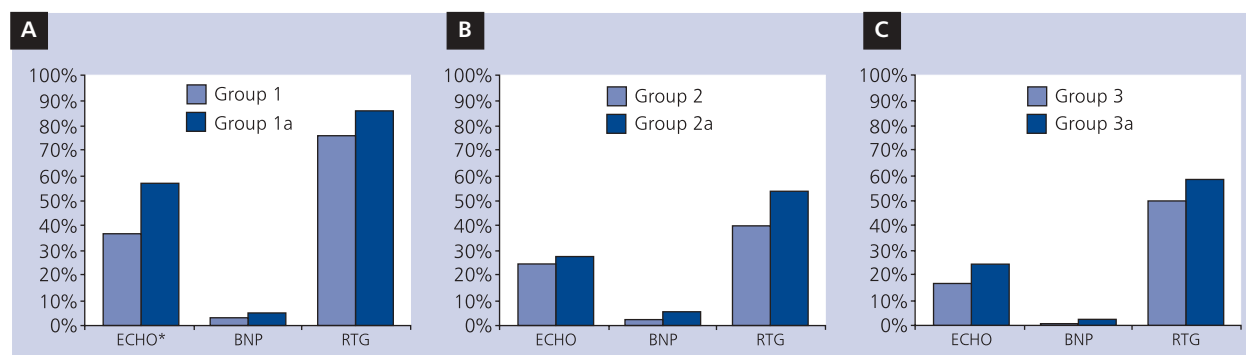


Figure 2. Frequency with which investigations were performed at the beginning and at the end of the follow-up: **(A)** in patients with the diagnosis of heart failure (HF) (Group 1 and Group 1a, respectively); **(B)** in patients with manifestations of HF but without a formal diagnosis of HF (Group 2 and Group 2a, respectively); **(C)** in patients without manifestations or a formal diagnosis of HF (Group 3 and Group 3a, respectively). The numbers of patients in each of the groups were as follows: 38 in Group 1, 56 in Group 1a, 44 in Group 2, 37 in Group 2a, 93 in Group 3 and 82 in Group 3a; *an increase in the frequency of echocardiograms (ECHO) was borderline significant ($p = 0.05$) in the group with HF and non-significant in the other groups ($p = \text{NS}$); BNP — B-type natriuretic peptide

and determinations of BNP were performed in all of the patient groups. At the end of the follow-up, there were still 4 (10%) patients in Group 1a who had not undergone a single echocardiogram or chest radiogram or determination of BNP. At the same time, in Group 2a, there were still 16 (36%) patients without any diagnostic investigation done (except for an ECG). Figure 2 presents the frequency at which specific investigations were performed at the beginning and at the end of the follow-up in the defined patient groups.

In multivariate logistic regression analysis, in a model that took into account age, sex and the diagnoses of HF, coronary artery disease, hypertension, diabetes mellitus and/or atrial fibrillation/flutter, at the end of follow-up, independent variables determining the performance of echocardiography in the entire study population were: female sex (OR 3.46; 95% CI 1.22–9.79; $p = 0.02$) and the diagnosis of HF (OR 2.25; 95% CI 1.04–4.85; $p = 0.04$) (Table 2).

DISCUSSION

This is to the best of our knowledge the first study to evaluate the detection of HF conducted in a relatively closed, well-defined population of a small Polish town located at a considerable distance from academic centres.

As in other European countries, primary care physicians in Poland order investigations for their patients less frequently than recommended by the guidelines [8]. It may be hypothesised that some of the diagnoses are based on signs and symptoms only. According to the data presented above, an ECG was the only diagnostic investigation performed in 18% of the patients with the diagnosis of HF in 2004 and in 10% of such patients in 2009. In the study population in 2004 a total of 76% of the patients with the diagnosis of HF (Group 1) and 39% of the patients with manifestations suggestive of HF (Group 2) had a chest radiogram performed. According to

Table 2. Multivariate logistic regression model for obtaining an echocardiogram at the end of the follow-up

	OR	95% CI	P
Female sex	3.46	1.22–9.79	0.02
Age	1.01	0.94–1.07	0.84
Hypertension	3.75	0.69–20.11	0.62
Coronary artery disease	1.22	0.43–3.41	0.69
Diabetes mellitus	0.85	0.28–2.56	0.77
Heart failure	2.25	1.04–4.85	0.04
Atrial fibrillation/flutter	0.30	0.09–1.11	0.07

CI — confidence interval

data reported by Rywik et al. [7] and covering the years 2004–2005, this investigation was performed in 97% of patients with HF. These data were, however, obtained for primary care physicians working in intermediate-sized and large cities. According to a study conducted in 2000 among Dutch primary care physicians, 98% of them considered the chest radiogram important in cases of suspected HF. Meanwhile only 51% of patients with the diagnosis of HF under their care actually had a chest radiogram done [9, 10]. As demonstrated in the SHAPE study (The European Survey of Primary Care Physicians' Perception on Heart Failure Diagnosis and Management), about 61–97% of European internists order this investigation in cases of suspected HF [11]. Data from the presented paper largely depart from the European means, as in 2009, 54% of the patients with manifestations suggestive of HF (Group 2a) had chest radiograms performed. This percentage was lower than the percentage in Group 3a (patients without HF or manifestations suggestive of HF), which equalled 58%.

Also, very few patients had echocardiography performed. In 2004 the percentage with an available echocardiogram was

37% in Group 1 and 25% in Group 2. During the nearly 5 years of follow-up the frequency with which echocardiography was done increased to 57% in patients with HF ($p = 0.05$) and to 27% in the group of patients with manifestations of HF but without the diagnosis of HF (the difference was not, however, significant). By comparison, Rywik et al. [7], in the paper cited above, report available echocardiograms in 79% of the patients with HF under the care of their primary care physicians. Our figures are comparable with those obtained in the IMPROVEMENT of Heart Failure Programme, in which only 45% of primary care physicians ordered an echocardiogram in patients presenting with manifestations of HF [12]. Almost identical results were obtained in the Euro-HF study, in which most diagnoses were established on the basis of the signs and symptoms, and only in 32% of the patients on the basis of investigations. Similar findings were obtained in the SHAPE study. A total of 75% of primary care physicians included in the study often or always established the diagnosis of HF on the basis of the signs and symptoms only. The same study showed that in nearly all the participating countries, the availability of echocardiography is significantly limited. Only 16% of the doctors involved in the study had the possibility to directly order an echocardiogram, and 34% of them could obtain an echocardiogram through a specialist within a month [11].

Cardiac peptides play an important clinical role in the diagnosis and risk stratification of patients with HF [13]. The results of numerous randomised studies indicate that treatment monitoring using BNP levels can significantly reduce mortality in this group of patients compared to patients receiving standard care [14]. No studies have been conducted on the frequency with which BNP are determined by primary care physicians in Poland in the diagnostic evaluation of HF. In our study this percentage is low, as it only concerns 5% of patients with HF or with risk factors for HF. Natriuretic peptide assays have been commercially available for a relatively short time and are relatively costly, which limits their accessibility and makes widespread use in primary outpatient care difficult.

The above findings are most likely only one of the reasons why primary care physicians in 2009 established the diagnosis of HF in 60% of the patients with manifestations of HF (Groups 1a and 2a combined).

Our study has its limitations. Firstly, it was conducted in a closed population with specific socioeconomic characteristics of a small town in central Poland, which is why the results cannot be directly extrapolated on the entire Polish population or the population of patients in large Polish cities. Secondly, the use of rigorous inclusion criteria, mainly the age criterion, resulted in a relatively small study population. As epidemiological analyses show, patients below 55 years of age make up a very small group of patients with HF [1]. Another

limitation is the collection of clinical data in 2009 solely on the basis of medical records (the physical examination was not repeated in the patients included in the study). No conclusions can therefore be drawn as to how many patients crossed over from Group 3 to Group 2a at the end of the follow-up period.

CONCLUSIONS

Our study showed a considerable discrepancy between the guidelines and everyday practice in primary outpatient care.

An increase in the frequency with which echocardiograms were obtained was observed only in patients with an established diagnosis of HF.

Conflict of interest: none declared

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Rozpoznanie niewydolności serca w praktyce lekarzy podstawowej opieki zdrowotnej w małym mieście centralnej Polski

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Streszczenie

Wstęp: Niewydolność serca (HF) jest przewlekłą chorobą związaną z poważnym rokowaniem, której rozpoznanie, ze względu na niespecyficzną objawów, sprawia trudność szczególnie lekarzom podstawowej opieki zdrowotnej. Standardy zalecają wykonanie elektrokardiogramu, zdjęcia radiologicznego klatki piersiowej, standardowego badania echokardiograficznego oraz oznaczenia stężenia peptydu natriuretycznego typu B (BNP) u każdego chorego z objawami sugerującymi HF.

Cel: Mimo jednoznacznych zaleceń diagnostycznych niewiele wiadomo na temat realiów rozpoznawania HF w praktyce lekarzy podstawowej opieki zdrowotnej. Dlatego też przeprowadzono badanie mające na celu ocenę przestrzegania standardu diagnostycznego HF.

Metody: Badaniem objęto dorosłych pacjentów będących pod opieką jedynej rejonowej poradni w małym mieście centralnej Polski, którego populacja wynosi 5521 mieszkańców. Kryteriami włączenia do badania były: wiek ≥ 55 lat i rozpoznana HF lub co najmniej 1 z jej czynników ryzyka: choroba niedokrwienna serca, nadciśnienie tętnicze z powikłaniami, cukrzyca.

Wyniki: Do wzięcia udziału w badaniu zaproszono 218 pacjentów, którzy spełnili kryteria włączenia, z czego 175 (80,3%) wyraziło chęć uczestnictwa. W trakcie wizyty wstępnej na przełomie 2004 i 2005 r. uczestników podzielono na 3 grupy: grupa 1 z rozpoznaniem HF ($n = 38$), grupa 2 z objawami mogącymi sugerować HF, ale bez jej dotychczasowego rozpoznania ($n = 44$) oraz grupa 3 bez objawów HF i bez jej rozpoznania ($n = 93$). Zebrano dane na temat częstości wykonywania zalecanych w HF badań diagnostycznych. Po 58 ± 1 miesiącach obserwacji (we wrześniu 2009 r.) ponownie dokonano weryfikacji danych na temat częstości badań diagnostycznych wykonanych w poszczególnych grupach pacjentów. Uwzględniono nowe rozpoznania HF, dlatego w 2009 r. liczba chorych z HF wyniosła 56 (grupa 1a), zaś zmalała do 37 liczba osób z objawami HF, ale bez jej rozpoznania (grupa 2a) i do 82 liczba chorych bez rozpoznania, bez objawów HF (grupa 3a). W czasie oceny wstępnej (2004/2005) badanie echokardiograficzne wykonano u 37% chorych z grupy 1, u 25% chorych z grupy 2 i u 17% z grupy 3. W 2009 r. było to odpowiednio 57% w grupie 1a, 27% w grupie 2a i 26% w grupie 3a. Nie odnotowano istotnego statystycznie wzrostu częstości przeprowadzania badań echokardiograficznych. Podobnie w czasie obserwacji nie zanotowano znamiennej zwiększenia częstości wykonywania pozostałych badań diagnostycznych (RTG klatki piersiowej i stężenie BNP). Po zakończeniu obserwacji wciąż u 4 (10%) chorych z grupy 1a nie wykonano badania echokardiograficznego, RTG klatki piersiowej ani oznaczenia stężenia BNP.

Wnioski: Wykazano istotną rozbieżność między zaleceniami a codzienną praktyką w podstawowej opiece ambulatoryjnej. Wzrost częstości wykonywania podstawowych badań diagnostycznych w ciągu prawie 5-letniej obserwacji, choć widoczny, wciąż jest niesatysfakcjonujący.

Słowa kluczowe: populacja, niewydolność serca, standard diagnostyki

Kardiologia 2012; 70, 10: 1003–1008

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Praca wpłynęła: 30.08.2011 r. Zaakceptowana do druku: 18.04.2012 r.