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Design and preliminary results of the Heart Function Assessment Registry Trial in Saudi Arabia (HEARTS) in patients with acute and chronic heart failure†

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Aims The *h*eart function *a*ssessment *r*egistry *t*rial in Saudi Arabia (HEARTS) is the first multicentre national quality improvement initiative in the Arab population to study the clinical features, management, and outcomes of inpatients admitted with acute heart failure (AHF) and outpatients with high-risk chronic heart failure (HCHF).

Methods and results We conducted a prospective pilot phase for the registry that included consecutive patients with AHF and HCHF in five tertiary care hospitals in Saudi Arabia between October 2009 and December 2010. The study enrolled 1090 patients, 722 (66.2%) of whom were admitted with AHF and 368 (33.8%) had HCHF. The mean age ± SD of AHF patients was 60.6 ± 15.3 years; 65.2% were men, 55.3% were *de novo* heart failure, 60.7% had diabetes mellitus, 72.5% had moderate or severe left ventricular (LV) systolic dysfunction, and 51.5% had coronary artery disease as the main aetiology. More than 80% of AHF and HCHF patients were treated with beta-blockers and angiotensin-converting enzyme inhibitors/angiotensin receptor blockers. Patients with HCHF had a similar clinical profile, but only one-third had implantable cardioverter defibrillators. In-hospital mortality was 5.3% for AHF patients and 7.5% at 30 days after hospital discharge.

Conclusion Heart failure patients in Saudi Arabia present at a relatively younger age, have a much higher rate of diabetes mellitus, and predominantly have LV systolic dysfunction, which is mainly ischaemic in origin, compared with patients in developed countries. The preliminary results of the study show potential targets for improvement in care.

Keywords Acute heart failure • Chronic heart failure • Saudi Arabia • Middle East • HEARTS • Registry

Introduction

Heart failure (HF) is a major cause of morbidity and mortality worldwide and has a significant negative impact on quality of life, health-care costs, and longevity.[1–3] In Europe, >1 million hospitalizations have been attributed to acute episodes of HF each year.[4,5] The cost for HF in the USA is estimated at $37 billion due to age-related increases in prevalence and readmission rates, despite advances in medical care.[6] The disease management approach views HF as a chronic illness spanning the home as well as outpatient and inpatient settings. Most HF patients have multiple medical, social, and behavioural challenges, and effective care requires a multidisciplinary approach that addresses these various difficulties.

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Observational studies and randomized-controlled trials have shown that disease management programmes can reduce the frequency of hospitalization and improve the quality of life and functional status of HF patients.[7,8]

However, most studies on HF epidemiology, treatment, and outcomes have been performed in North America and Europe, and scarce data are available in Arab populations, which have different ethnic and cultural backgrounds.[9,10] The *h*eart function *a*ssessment *r*egistry *t*rial in *S*audi Arabia (HEARTS) is the first multicentre survey conducted in the Kingdom of Saudi Arabia and the Arab population to study the clinical features, management, and short- and long-term outcomes of patients with acute heart failure (AHF) and high-risk chronic heart failure (HCHF). The HEARTS study also involves a quality improvement initiative that aims to identify 'knowledge-care' gaps and potentially improve the outcomes of these patients. Here, we report the overall design and rationale of the study, in addition to the preliminary results of the pilot phase.

Methods

HEARTS is a prospective registry and quality improvement initiative comprising consecutive inpatients and high-risk outpatients with HF aged 18 years or older. Ethics committees at each hospital approved the study.

Study design

The study was divided into three phases:

(1) Pilot phase: The current report describes the results of this phase, which aimed to identify the logistic challenges that will be faced during the study and test the feasibility of completing the Case Report Forms (CRF) in 'real-life' practice.
(2) Phase 1: This phase will measure the baseline clinical features and management practices and involve wider national representation of the health-care sectors in the country. The phase will last for 1 year and include the following quality improvement initiatives:
   (a) Online access to each hospital's own 'real-life' data in order to discover 'knowledge-care' gaps early in the study and allow for timely improvement in clinical practice.
   (b) Quality indicators (QIs), which will be decided upon by the study co-investigators at the end of this phase based on the clinical care variables that require further improvement. Subsequently, the results of these QIs will be distributed to each individual hospital along with comparisons to other hospitals in the form of 'Report Cards'. Benchmarks for achieving these QIs will be distributed to the hospitals in the form of posters and pocket cards, in addition to standard admission orders and protocols.
(3) Phase 2: This phase will start 6 months after the end of phase 1 and measure the same data variables to assess the effectiveness of these initiatives in improving the quality of care.

Study population

- Acute heart failure: Patients admitted to the hospital [coronary/intensive care units (CCU/ICU) or ward)] with acute HF, whether *de novo* or acute on chronic HF, who require treatment with intravenous diuretics, inotropes, or vasodilators.
- High-risk chronic heart failure: Patients at high-risk for hospital re-admission and/or death who are referred to the heart failure clinic (HFC) according to one or more of the following criteria:
  - Severe left ventricular (LV) dysfunction and persistent HF symptoms (ejection fraction (EF) $<30\%$ and persistent New York Heart Association (NYHA) class III or IV).
  - Heart failure associated with severe valvular heart disease.
  - Heart failure associated with significant renal impairment (creatinine >2 mg/dL $=$ 176 μm/L).
  - Poor tolerance or non-adherence to therapeutic regimens, or inadequate social or economic support.
  - Difficulty in up-titration of medications due to hypotension or other causes.
  - Multiple (≥ 2) hospitalisations and/or emergency department (ED) visits in the last year with HF exacerbation.

Heart failure clinics were established in two of the tertiary care hospitals involved in the registry, with a maximum of two clinics per week. The clinics are led by a HF cardiology consultant with the involvement of other staff, including qualified HF nurse practitioners, clinical pharmacists, dieticians, physiotherapists, physician assistants, and nurse coordinators. The multidisciplinary team aims for adherence to clinical guidelines and potentially reducing re-hospitalisation and mortality, which includes a proper assessment of the functional class and quality of life of HF patients, up-titration of medical therapies, evaluation of cardioverter defibrillator (ICD)/cardiac resynchronization therapy (CRT) indications, frequent in-hospital follow-up appointments if clinically required, and education about lifestyle behaviours, such as healthy diet and exercise suitable for HF patients. Patients living outside the city were excluded because of the difficulty in providing regular clinic follow-up assessments for such patients. This report focuses on the clinical features and treatment strategies of HCHF patients upon admission to the HFC. The short- and long-term outcomes after admission to the clinic will be reported in subsequent reports of this registry.

Study organization

A CRF was filled out online (www.hearts-ksa.com) for each patient throughout their hospital stay by dedicated research assistants, physicians, and/or trained HFC nurses working in each hospital using standard definitions. A log book was completed for all patients in each hospital and ensured enrolment of $>95\%$ of consecutively admitted patients. All CRFs were verified by a cardiologist and sent to the principal co-ordinating centre, where the forms were checked for incomplete data and mistakes before submission for final analysis. To avoid double-counting patients, each patient's national identification number was used.

Data variables on the case report form

The diagnosis of HF and other definitions were based on the American College of Cardiology/American Heart Association key data elements and definitions for measuring the clinical management and outcomes of patients with chronic HF and the European Society of Cardiology guidelines for the diagnosis and treatment of acute and chronic HF.[3,11] In particular, coronary artery disease (CAD) was diagnosed if any of the following conditions was present: at least one major epicardial coronary artery with $>70\%$ obstruction by coronary angiography, history of acute myocardial infarction associated with wall motion abnormality by echocardiography or gated blood pool imaging, and/or stress testing (with or without imaging) diagnostic of CAD. Idiopathic dilated cardiomyopathy was diagnosed if HF was associated with reduced systolic function but without evidence of CAD, hypertension, primary valvular disease, myocardial infiltrative disease,

Table 1 Baseline characteristics, investigations, and procedures of patients with acute and high-risk chronic heart failure

Variable	Acute heart failure *n* (%) = 722 (66.2)	High-risk chronic heart failure *n* (%) = 368 (33.8)
Demographics		
Age, mean (SD) years	60.6 (15.3)	56.9 (15.5)
Male, *n* (%)	471 (65.2)	261 (71.7)
Saudi, *n* (%)	636 (88.1)	347 (95.3)
Body mass index, mean (SD) kg/m^2	29.3 (6.8)	29.2 (5.8)
Central obesity, *n* (%)[a]	168 (65)	99 (27.2)
Medical history		
CAD, *n* (%)	357 (50)	152 (41.8)
PCI, *n* (%)	97 (13.4)	58 (15.9)
CABG, *n* (%)	81 (11.2)	42 (11.5)
RHD, *n* (%)	52 (7.2)	12 (3.3)
Atrial fibrillation, *n* (%)	112 (15.5)	45 (12.4)
VT/VF, *n* (%)	16 (2.2)	13 (3.6)
ICD, *n* (%)	72 (10)	105 (28.8)
CRT, *n* (%)	38 (5.3)	29 (8)
Stroke, *n* (%)	56 (7.8)	26 (7.1)
PAD, *n* (%)	30 (4.2)	16 (4.4)
Chronic renal insufficiency, *n* (%)	222 (30.7)	103 (28.1)
On dialysis, *n* (%)	15 (6.8)	7 (1.9)
Anaemia, *n* (%)	176 (24.5)	72 (19.8)
Major risk factors		
Ex-smoker, *n* (%)	112 (15.5)	83 (22.8)
Current smoker, *n* (%)	131 (18.2)	77 (21.2)
Hypertension, *n* (%)	502 (70)	272 (75)
Hyperlipidaemia, *n* (%)	263 (36.4)	208 (57.1)
Diabetes mellitus, *n* (%)	438 (60.7)	193 (53.0)
Diet, *n* (%)	9 (2.1)	1 (0.3)
Insulin, *n* (%)	182 (41.6)	76 (20.9)
OHA, *n* (%)	175 (40.0)	47 (12.9)
OHA and insulin, *n* (%)	72 (16.4)	69 (19.0)
Vital signs at presentation		
SBP, median (IQR) mmHg	125 (36)	115 (33)
DBP, median (IQR) mmHg	72 (20)	69 (18)
HR, median (IQR) bpm	88 (26)	77 (21)
Main investigations		
Positive serum troponin, *n* (%)	207 (30)	–
Serum sodium, median (IQR) mmol/L	135.2 (5.2)	137 (6)
Atrial fibrillation/flutter, *n* (%)	129 (18)	43 (11.8)
QRS $\geq$120 ms, *n* (%)	84 (11.6)	40 (11.0)
Serum NT-proBNP, median (IQR) pg/mL	4616 (5971)	1596 (2410)
Echocardiography, *n* (%)	701 (97.1)	358 (98.4)
Preserved LV function[b], *n* (%)	193 (27.5)	94 (24.7)
Moderate/severe LV systolic dysfunction, *n* (%)[c]	508 (72.5)	274 (75.3)
Right ventricular systolic dysfunction, *n* (%)	184 (27.2)	24 (6.6)
Pulmonary hypertension, *n* (%)[d]	246 (36.4)	66 (18.1)
Coronary angiogram, *n* (%)	228 (31.6)	–

CAD, coronary artery disease; PCI, percutaneous coronary intervention; CABG, coronary artery bypass graft surgery; RHD, rheumatic heart disease; CHF, congestive heart failure; VT, ventricular tachycardia; VF, ventricular fibrillation; ICD, implantable cardioverter defibrillator; CRT, cardiac resynchronization therapy; PAD, peripheral arterial disease; MI, myocardial infarction; OHA, oral hypoglycaemic agents; SBP, systolic blood pressure; DBP, diastolic blood pressure; HR, heart rate; bpm, beats per minute.
[a]Waist circumference measurement was missing in 463 patients.
[b]Preserved LV function, left ventricular ejection fraction >40%.
[c]Moderate/severe LV dysfunction, left ventricular ejection fraction <40%.
[d]Pulmonary hypertension, right ventricular systolic pressure >40 mmHg.

hypertrophic cardiomyopathy, toxins, pregnancy, or thyroid-related cardiomyopathy. Recurrent congestive HF in AHF patients was defined as patients who were managed initially out of their congestive state, who then developed in-hospital recurrence of symptoms and signs of congestive HF requiring restarting of intravenous diuretics, inotropes, or vasodilators. The following data were collected: patient demographics, clinical presentation, past medical history, laboratory investigations, medical therapies, cardiac procedures, and in-hospital outcomes, including mortality. Echocardiographic data were assessed by the daily-practising specialized cardiology consultants who were certified in echocardiography, a core laboratory was not used for data interpretation. Thirty-day and 1-year follow-up will be done in phases 1 and 2 and includes: death, NYHA class, hospital re-admission for HF, and use of diuretics, angiotensin-converting enzyme inhibitors (ACE-I), angiotensin receptor blockers (ARBs), beta-blockers, aldosterone antagonists, an ICD, or CRT.

Statistical methods

Baseline characteristics including risk factor profiles as well as clinical history and in-hospital management were summarized for patients with AHF and HCHF separately. In-hospital course and patient outcome of all AHF patients were also summarized. Continuous variables that are normally distributed were summarized using mean and standard deviation while those not normally distributed were presented as median and interquartile range (IQR). Categorical variables were summarized using frequency and percentages. Data were entered and analysed using SPSS version 17 (SPSS Inc., USA).

Results

Between October 2009 and December 2010, 1090 patients were included from five tertiary care hospitals in the Kingdom of Saudi Arabia. Three hospitals were in the central region, one in the west, and one in the north. *Table 1* shows the baseline characteristics and investigations for patients with AHF and HCHF.

Acute heart failure

The mean age ± SD of AHF patients was 60.6 ± 15.3 years; 65.2% were men, 55.3% had *de novo* HF, 50% had a history of CAD, and only 6.8% arrived at the hospital in an ambulance. Exacerbating factors for AHF admission were multifactorial: acute coronary syndrome (ACS) in 33.6% of patients, uncontrolled hypertension in 20.2%, infections in 19.7%, worsening renal failure in 23%, non-compliance with diet in 32%, and with treatment of HF in 19.3%. The main aetiologies of HF were CAD (51.1%), idiopathic dilated cardiomyopathy (20.1%), hypertension (10.7%), and primary valvular heart disease (9%). The prevalence of CAD risk factors was high: 60.7% had diabetes mellitus, 69.5% had hypertension, 33.7% were either current or ex-smokers, and 36.4% had hyperlipidaemia. Atrial fibrillation or flutter was found on clinical presentation in 18% of patients, wide QRS (≥120 ms) was observed in 11.6% of patients, median ± IQR values of N-terminal pro-brain natriuretic peptide (NT-proBNP) were 4616 ± 5971 pg/mL, and positive serum troponin was measured in 30% of patients. Admission to the CCU/ICU occurred for 49% of patients with a median ± IQR stay of 5 ± 6 days in the CCU/ICU and 8 ± 10 days for the total in-hospital stay. Most patients (92%) were treated with intravenous furosemide boluses and 48.3% with infusion. Intravenous nitrates were used in 21.3% of patients, dopamine in 17.2%, dobutamine in 11.6%, milrinone in 2.4%, levosimendan in 0.4%, and nesiritide in 0.4%. Echocardiography revealed that 27.5% of patients had preserved LV function (EF >40%), and 72.5% had moderate/severe LV dysfunction (EF ≤40%). Coronary angiography was performed during the hospital stay in 31.6% of patients. *Figure 1* shows the high use of oral diuretics, beta-blockers, and ACE-I/ARBs before hospital admission, which increased at hospital discharge. Aldosterone blockers were used in 38% of patients and digitalis in 24%. *Table 2* shows the in-hospital course, outcomes, and 30-day mortality. In-hospital recurrent congestive HF occurred in 26.2% of patients, cardiogenic shock in 8.3%, atrial fibrillation in 5%, and ventricular tachycardia or fibrillation in 2.6%. In-hospital mortality was 5.3%, and reached 7.5% 30 days after hospital discharge.

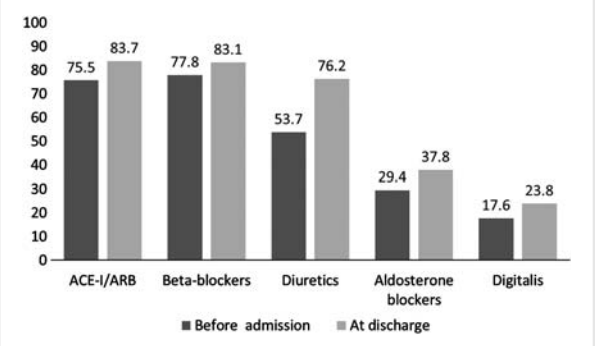

Figure 1 Medical therapy for the acute heart failure patients before hospital admission and at discharge. ACE-I, angiotensin-converting enzyme inhibitor; ARB, angiotensin II receptor blocker.

High-risk chronic heart failure

The mean age ± SD of the outpatients with HCHF was 56.9 ± 15.5 years, 71.7% were men, and 95.3% were Saudis. Cardiovascular risk factors included diabetes mellitus (53%), hypertension (74%), and smoking (43%) (*Table 1*). A history of ICD insertion was present in 29% of patients and CRT in 8%. The mean (± SD) number of ED visits for HF in the year prior to entry into the HFC was 1.8 ± 2.0 per patient, and 1.4 ± 1.0 for hospital admissions. The source of referral to the clinic was the cardiology service in 73.4% of patients, ED in 9.6%, and various other hospital services in 17%. The main aetiologies of HF were CAD (40%), idiopathic dilated cardiomyopathy (45%), hypertension (10.7%), primary valvular heart disease (3%), and pregnancy-related cardiomyopathy (2.2 %). Overall, 41% of patients were in NYHA class I/II and 59% in NYHA class III/IV. Other symptoms included orthopnoea or paroxysmal nocturnal dyspnoea (27.7%), fatigue (53.3%), lower-limb or abdominal swelling (33.8%), palpitations (5.2%), and dizziness or pre-syncope (17.0%). Gallop rhythm and inspiratory crackles were audible in 9 and 30.1% of patients, respectively. Increased jugular venous pressure and/or positive hepato-jugular reflux were documented in 32.1% of patients, whereas ascites and lower-limb or sacral oedema were observed in 4.4 and 28.8%, respectively. Atrial fibrillation or flutter was found on clinical presentation in 11.8% of patients, wide QRS was observed in 11% of patients, and the median NT-proBNP ± IQR value was 1596 ± 2410 pg/mL. Echocardiography revealed preserved LV function in 24.7% of patients and moderate/severe LV dysfunction in 75.3%.

Table 2 In-hospital course of acute heart failure patients

	n (%)
Recurrent congestive heart failure	189 (26.2)
Dialysis	13 (1.8)
Intra-aortic balloon pump	11 (1.5)
Sepsis	40 (5.5)
Shock	60 (8.3)
Pacing	10 (1.4)
VT/VF requiring treatment	19 (2.6)
Atrial fibrillation requiring treatment	36 (5.0)
CRT	12 (1.7)
ICD	36 (5.0)
Major bleeding	8 (1.1)
Stroke	10 (1.4)
Death	38 (5.3)

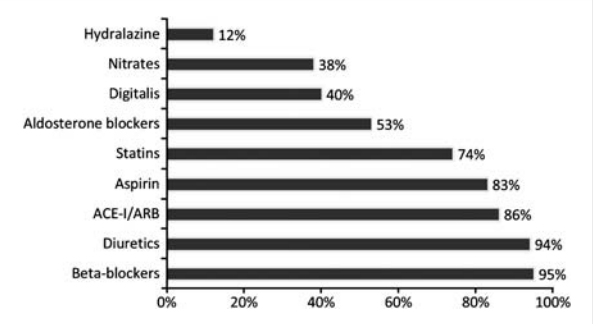

Figure 2 Medical therapy for the high-risk chronic heart failure patients. ACE-I, angiotensin converting enzyme inhibitors; ARB, angiotensin receptor blockers.

Figure 2 shows the high rate of evidence-based therapies in this patient cohort upon initial evaluation in the HFC. The most frequently used beta-blocker was bisoprolol (47.0%), followed by carvedilol (45.6%); the most frequent ACE-I was lisinopril (48.6%), followed by enalapril (4.4%) and perindopril (2%); and the most frequent ARB was candesartan (23%), followed by irbesartan (2.7%).

Discussion

Data about HF in the Arab population are scarce, and mainly originate from single-centre studies, with limited sample size. In a retrospective study of 155 non-valvular HF patients in Egypt, 66% had systolic HF, with hypertension, CAD, and diabetes mellitus being the predominant risk factors in this population.[9] In a registry of 1164 patients with HF from Oman, the most common causes of HF were ischaemia (51.7%), hypertension (24.9%), and idiopathic (8.3%), with valvular causes being the least common.[10] HEARTS is the first national multicentre registry and quality improvement initiative for both AHF and HCHF patients, not only in Saudi Arabia, but in the Arab population. This pilot report provides a reasonable snapshot of the clinical care of consecutive patients managed in major tertiary care hospitals. The study involved four out of six major health-care sectors (Ministry of Health, University, Security Forces, and Military) in three of the five main geographic areas of the country.

We made several unique findings compared with other international registries. The average age of our acute and chronic HF patients was 57–60 years, which is almost 10 years younger than their counterparts in developed countries.[12–18] Even more alarming is the fact that 44.7% of our AHF patients had a history of chronic HF in the past, suggesting an earlier age of onset in many of our patients. This earlier onset is likely related to the extremely high prevalence of CAD risk factors in our population,[19–21] in addition to the potential for a selection bias in referring relatively healthier and younger patients to the tertiary care hospitals involved in the study. In AHF patients, the prevalence of diabetes mellitus was 60.7%, which is at least double the rate reported in other AHF registries,[12–18] whereas the rate of hypertension (70%) was similar despite the much younger age of our patients. Similar findings were also made in HCHF patients, but with lower rates of diabetes mellitus and higher rates of hypertension than in AHF patients. Plausible explanations for this high rate of CAD risk factors include lack of regular exercise and adopting a diet high in calories and fat content.[19–22] Country-wide primary prevention programmes are urgently needed to reduce the high burden of CAD risk factors. Coronary artery disease was the main aetiology (50%) in our AHF patients, which is comparable to the rates reported in the recent ESC-HF pilot survey,[23] ADHERE,[12–14] and OPTIMIZE-HF[16] registries, but higher than the one-third rate reported in the EHFS[17] and Japanese ATTEND registry.[18] The proportion of women in our study population (around one-third) was comparatively less than in other registries (up to one-half), which is likely related to females typically being affected by CAD at an average higher age than our study population. Our AHF patients had a lower median systolic blood pressure (125 mmHg) on clinical presentation than the median range of 135–141 mmHg in other studies, and almost three-quarters of our patients had moderate/severe LV dysfunction compared with one-half in the other studies.[12–18] This difference is likely related to the fact that ACS was an exacerbating factor in over one-third of our AHF patients. In addition, we previously showed that patients with ST-segment elevation myocardial infarction tend to present late to the hospital, have delayed thrombolytic therapy, and are less likely to be treated with primary percutaneous coronary intervention compared with patients in developed countries.[24] The very low transfer rate (6.8%) of AHF patients by the ambulance services is one of the major factors for such delayed presentation and subsequently higher rates of myocardial injury and severe LV dysfunction.

The overall rates of intravenous and oral therapies for AHF patients were reasonably satisfactory according to the guideline recommendations, including the low use of intravenous inotropes.[2,3] This might have been one of the reasons behind the low rates of in-hospital complications, in addition to the relatively young age of our patients. The in-hospital mortality (5.3%) was comparable to other registries, with mortality ranging from 3.8 to 7.7%,[12–18] but a direct comparison should be drawn with caution in view of some of the differences in the clinical features of other AHF populations. In addition, exclusion criteria were implemented in other registries, such as the exclusion of patients with ACS in the ATTEND registry.[18]

Regarding HCHF, our focus in this report was to describe the clinical, diagnostic, and therapeutic features upon admission to the HFC. No unified standard design exists, that is, accepted internationally for HFCs. Some clinics include all HF patients, regardless of symptom severity.[25] Other clinics, like ours, manage only HCHF patients who are at an increased risk for hospital re-admission and/or mortality,[26] which is evident from the fact that 59% of our HFC patients were NYHA class III/IV and 75.3% had moderate/severe LV dysfunction compared with 27 and 63.9% in the ESC-HF Pilot survey, respectively.[23] The high rate (45%) of idiopathic dilated cardiomyopathy in our HCHF patients is likely related to the practice pattern of the referring cardiologists who prefer to continue following patients with ischaemic cardiomyopathy in their clinics and tend to refer patients with an unclear diagnosis for further work-up/management in the HFC. Continued education of the

hospital staff about the benefit of the HFC will hopefully reduce this referral bias in the future. The rate of use of evidence-based therapies in this patient cohort was satisfactory. Beta-blockers, ACE-I/ARBs, and aldosterone antagonists were used in 95, 86, and 53% of patients, respectively, use in the ESC-HF Pilot survey was 86.7, 88.5, and 43.7%, respectively.[23] This high-usage rate in our HFC is likely related to the fact that the clinics were conducted in two major tertiary care hospitals, and they were accepting referrals for 'the sickest of the sick' HF patients who, in most cases, were already managed by a cardiologist. Implantable cardioverter defibrillator and CRT devices were used in 29 and 8% of patients, respectively, on entry to the HFC. These rates are relatively sub-optimal as almost three-quarters of our patients had moderate/severe LV dysfunction.

Limitations

As with most other registries, hospital enrolment was voluntary; thus, the study results may not be representative of clinical practice in all hospitals in the country. In addition, hospitals that participated in the registry might be more enthusiastic about adherence to guidelines and quality improvement initiatives. An inherent selection bias is present because of the observational nature of the study design. The inclusion criteria of our HFC may not have captured all high-risk patients with HF, and there may have been a selection bias by including only outpatients who were living inside the city area. However, this is the first time that a multicentre national programme has been initiated for HCHF patients in our country. Furthermore, the small sample size recruited from a few tertiary care hospitals results in a limited representation of care in our country. However, the aim of this report was to describe the overall design of the study in addition to the preliminary results of the pilot phase.

Conclusions

HEARTS is the first multicentre HF registry and quality improvement initiative in the Kingdom of Saudi Arabia and the Arab population. We showed that our HF patients present at a relatively young age, have extremely high rates of diabetes mellitus compared with patients in developed countries, and predominantly have LV systolic dysfunction, mainly of ischaemic aetiology. The preliminary results of the study show potential targets for improvement in care, such as ICD/CRT device implantation in HCHF patients. Our aim in the future is to include more secondary and tertiary care hospitals in the next phase of the registry to more widely represent HF care in our country.

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Case report data collection: Kazi Nur Asfina, Abdiqani Qasim, Mohamed Baig, Mohamed Mones, Adil Yasin, Aftab Ahmad, Hassan Darwish.

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