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ORIGINAL ARTICLE

Strategic Recommendations to Bridge the Gaps in Awareness, Diagnosis and Prevention of Heart Failure in the Middle East Region and Africa

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Abstract

Objective: **With the increasing burden of heart failure (HF) in the Middle East Region and Africa (MEA), it is imperative to shift the focus to prevention and early detection of cardiovascular diseases. We present a broad consensus of the real-world challenges and strategic recommendations for optimising HF care in the MEA region.**

Method: **To bridge the gaps in awareness, prevention, and diagnosis of HF, an assembly of experts from MEA shared their collective opinions on the urgent unmet needs.**

Results: **Lack of awareness in the community, high prevalence of risk factors, poor accessibility and affordability of care and diagnostics are the major barriers for delayed or missed diagnosis of HF in MEA. Enhancing patient awareness, through digital or social media campaigns, alongside raising knowledge of healthcare providers and policymakers with training programmes, can pave the way for influencing policy decisions and implementation of robust HF programmes. Multicountry registries can foster development of guidelines factoring in local challenges and roadblocks for HF care. Region-specific guidelines including simplified diagnostic algorithms can provide a blueprint of care for early detection of at-risk patients and facilitate efficient referral, thus mitigating clinician "therapeutic inertia." Multidisciplinary care teams and HF clinics with expanded role of nurses can streamline lifestyle modification and optimum control of dyslipidaemia, blood pressure, and glycaemia through guideline-recommended prevention therapies such as sodium-glucose co-transporter-2 inhibitors—thus supporting pleiotropic effects in high-risk populations.**

Conclusion: **Development of regional guidelines, enhancing awareness, leveraging digital technology, and commitment for adequate funding and reimbursement is pivotal for overcoming structural and health system-related barriers in the MEA region.**

Keywords: Heart failure, Middle East region and Africa, Awareness, Prevention, Diagnosis, Diabetes

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1. Introduction

Heart failure (HF) is a multifaceted clinical syndrome with numerous aetiologies including, but not limited to, coronary artery disease, previous myocardial infarction, hypertension, valvular heart disease, cardiomyopathy, rheumatic heart disease and diabetes. HF with reduced ejection fraction (HFrEF) (left ventricular ejection fraction [LVEF] <40%) is influenced by diverse genetic, environmental risk factors, and comorbidities. With a global prevalence of 64.34 million cases and 9.91 million years lost due to disability, HF has a 1-year mortality rate of 17.4% in acute HF and 7.2% in chronic stable HF [1,2]. About 17%–45% of patients admitted in hospital with HF die within one year of admission, thus HF has worse survival outcomes compared to common cancers such as prostate and breast [3,4]. The International Congestive Heart Failure (INTER-CHF) cohort study reported a 1-year mortality rate of 16·5%— highest in Africa (34%) and India (23%), and lowest in China (7%), South America (9%), and the Middle East (9%) [5]. Approximately 1 in 5 people in general population after 40 years of age is expected to develop HF at some point in their lifetime [6]. The linear relationship between socio-demographic index and HF mortality foretell an enhanced risk for low- and middle-income countries [7]. The wide variations in epidemiology, risk factors, clinical interventions, and availability of resources across geographies warrant better insights into the region-specific practices for HF— to understand the determinants and precipitants in terms of patient outcomes. Although HF management is a common unmet need for the Middle East Region and Africa (MEA), diverse socioeconomic strata in this population may lead to region-specific limitations and unmet needs. To identify the current gaps and unmet needs for HF care in the MEA region, a multidisciplinary meeting with experts from different countries across the region was convened. The panel aimed to gain insights on the real-world challenges in HF awareness, prevention and diagnosis, and contribute region-specific strategic recommendations for optimising HF care and enhancing patient support.

2. Consensus methodology

The MEA steering committee meeting held on 05 December 2020 included a team of 14 members with expertise in the management of HF across the MEA region (Kenya [n = 1], South Africa [n = 1], Egypt [n = 2], Iraq [n = 1], Jordan [n = 1], Kuwait [n = 1], Lebanon [n = 1], Morocco [n = 1], Saudi Arabia [n = 2], Turkey [n = 2] and United Arab Emirates [UAE] [n = 1]) (Fig. 1).

The moderator-led sessions encompassed a comprehensive presentation of the current and future perspectives of HF in the MEA countries, followed by a discussion wherein the experts individually shed light on region-specific challenges in HF screening, diagnosis and management. The gap analyses was followed by a brainstorming session where the experts then presented possible solutions and suggested strategic recommendations, based on their experience in the HF arena. These responses were assimilated and a thematic analyses was performed to precisely categorise the region-specific recommendations.

List of abbreviations

ESC-HF-LT	European Society of Cardiology Heart Failure Long-Term Registry
HEARTS	Heart function assessment registry trial
HF	Heart failure
HFrEF	Heart failure with reduced ejection fraction
HFmrEF	HF with midrange ejection fraction
HFpEF	HF with preserved ejection fraction
INTER-CHF	International Congestive Heart Failure
MACE	Major adverse cardiovascular events
MEA	Middle East Region and Africa
MENA	Middle East and North Africa
NICE	National Institute for Health and Care Excellence
NT proBNP	N-terminal pro b -type natriuretic peptide
NYHA	New York Heart Association
PEACE	Program for the Evaluation and Management of the Cardiac Events
SPRINT	Systolic Blood Pressure Intervention Trial
SSA	Sub-Saharan Africa
WATCH-DM	(Weight [body mass index], Age, hypertension, Creatinine, high density lipoprotein cholesterol, Diabetes control [fasting plasma glucose], QRS Duration, myocardial infarction, and Coronary Artery Bypass Grafting)

3. Burden of heart failure in MEA

The age-standardised prevalence rates (per 100 000) of HF for MEA (972.3) are relatively higher compared to the global average (831.0) and other developed countries from Western Europe (811.7) and Southeast Asia (655.0) [8] (Table 1). Gulf CARE registry, including seven Middle Eastern countries, reported that 59% of the patients had HFrEF, 21% had HF with midrange ejection fraction (HFmrEF, LVEF 40%–50%) and 20% had HF with preserved ejection fraction (HFpEF, LVEF >50%) [9]. Underrepresentation of HFpEF (<30%) of the whole population of HF is reported in MEA region [10,11]. There are wide inter- and intra-regional disparities

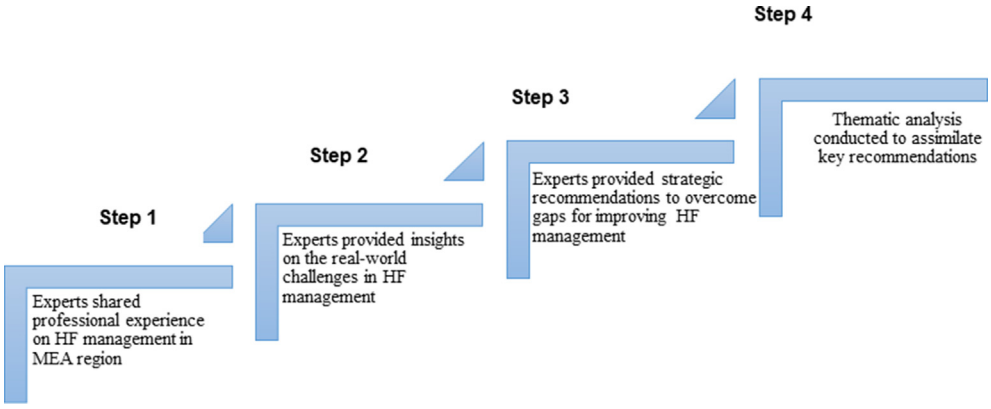

Fig. 1. Process of steering committee meeting for consensus methodology. HF=Heart failure; MEA = Middle East Region and Africa.

in patient characteristics and aetiology in the MEA region, particularly in the Sub-Saharan Africa (SSA) (including South Africa). The average age of affected individuals in this population is at least ten years younger than their Western counterparts—partly explaining the reason for lower prevalence of HFpEF. The mean age of HF patients is lowest in SSA (52 years), and Africa (53 years), followed by Middle East (56.4 years), North Africa (58.79 years), Asia (60 years) and Europe (70 years) [12–15]. Risk factors such as diabetes mellitus, obesity, smoking and socioeconomic transition, marked by increasing levels of sedentary life, lack of physical activities and increase in consumption of fatty foods contribute to the higher prevalence of HF in the MEA region [16]. In addition, people from Africa are more likely to lack health insurance and have severe symptoms with New York Heart Association (NYHA) functional classification class IV. The most common HF aetiology was hypertensive heart disease in Africa (including SSA) and ischaemic cardiomyopathy in the Middle East [13].

Table 1. Age-standardized prevalence rates (per 100 000) for heart failure.

Region	Age-standardized Prevalence Rates (per 100 000)
Global	831.0 (738.6–926.2)
Western Europe	811.7 (726.2–908.6)
North America	956.1 (895.8–1021.5)
Southeast Asia	655.0 (573.4–743.8)
North Africa and Middle East	972.3 (861.6–1091.6)
Egypt	1030.8 (892.2–1199.2)
Morocco	984.2 (854.1–1132.6)
Kuwait	1178.0 (1026.7–1343.3)
Lebanon	1027.9 (892.6–1180.1)
Saudi Arabia	1016.9 (885.0–1153.0)
Turkey	946.0 (865.6–1035.3)
United Arab Emirates	1047.8 (905.8–1200.2)
Sub-Saharan Africa	
Eastern	700.0 (614.4–796.8)
Central	675.0 (592.2–775.8)
Southern	761.7 (668.9–863.8)
Western	708.7 (621.4–805.9)

Global Burden of Disease study 2017 (Bragazzi et al., 2021).

HF is accompanied with significant morbidity and mortality, and it considerably impacts patients' health-related quality of life [4]. Prospective data from the European Society of Cardiology Heart Failure Long-Term Registry (ESC-HF-LT) reported significant between-region differences in 1-year HF outcomes, these being attributable to differences in medical practices, available resources, and health system structure. Per the ESC-HF-LT, cardiovascular related mortality rates among chronic HF in different European regions were as follows: Eastern (38.7%; N = 1335), Middle-East (23.3%; N = 289), Northern (65.3%; N = 435), North Africa (41.1%; N = 468), Southern (54.2%; N = 4321), Western (71.4%; N = 553), Total (49.8%; N = 7401) [17]. In the INTER-CHF study, the age-adjusted mortality was worse in SSA compared to other low- and middle-income regions [13]. The Gulf CARE registry reported in-hospital mortality rate of 5.2%, 12-month cumulative mortality rate of 8.8% and 12-month re-hospitalisation rate of 28% [9]. HF incurs substantial economic burden in the MEA region (total estimated costs is US $ 1.92 Billion), with inpatient admission being the major cost driver [18]. Notably recurrent hospitalisations account for the predominant economic burden of HF [19].

We present herein, the gaps and unmet needs, potential recommendations, and the way forward for enhanced prevention and diagnosis of HF in MEA region.

4. Gaps and recommendations for awareness and prevention of heart failure

The experts discussed that the lack of awareness in community, high prevalence of primary factors such as hypertension, diabetes, and in some areas

coronary artery disease, compounded by poor accessibility and affordability of healthcare, are major patient-related barriers for prevention of HF in the MEA region (Fig. 2). Lack of robust regional databases or registries and under-representation of MEA region in research studies are barriers for identifying the real-world burden of HF, hindering prevention strategies. In addition, the high prevalence of existing infectious diseases such as tuberculosis and human immunodeficiency virus in some countries shift the focus from non-communicable disease like cardiovascular disease—leading to a lack in momentum and economic support for implementation of HF awareness programmes and campaigns. Paucity of region-specific HF guidelines that would provide a blueprint of care and scarcity of specifically trained HF care workers has a negative impact on doctor and health funder awareness. This reduces the region's ability for early detection of patients at risk during their HF journey. Furthermore, political instability, difficulty in resource management (including manpower and medications), poor awareness among the medical community about HFpEF, and lack of patient support were cited as negative attributes hindering HF care in MEA region.

The experts recommended that it is imperative to focus on healthy life style, recognition and treatment of risks for ischaemic heart disease and hypertension, alongside optimal management of diabetes, obesity, and hyperlipidaemia for stage A HF, and timely diagnosis and treatment of asymptomatic left ventricular dysfunction for Stage B HF. Community/media guided social media campaigns and outreach programmes can pave the way for enhanced patient awareness regarding preventive strategies—and subsequently influence policy decisions for implementation and funding of HF programmes. Similarly, formulation of local HF societies focussing on training healthcare professionals (including nurses and pharmacists) should be encouraged. Formal HF societies would ensure wide dissemination of national HF management guidelines for increasing physician awareness and compliance to guideline-directed medication. HF therapy involves multiple drugs and often complex up-titrations; thus, local HF guidelines would be a major force in overcoming clinician "therapeutic inertia". The panel highlighted the need for utilisation and reimbursement of drugs targeted at primary prevention of HF, such as sodium-glucose co-transporter-2 inhibitors in "at risk" type 2 diabetes mellitus) individuals, alongside angiotensin-converting enzyme inhibitors, angiotensin receptor blockers and beta blockers in

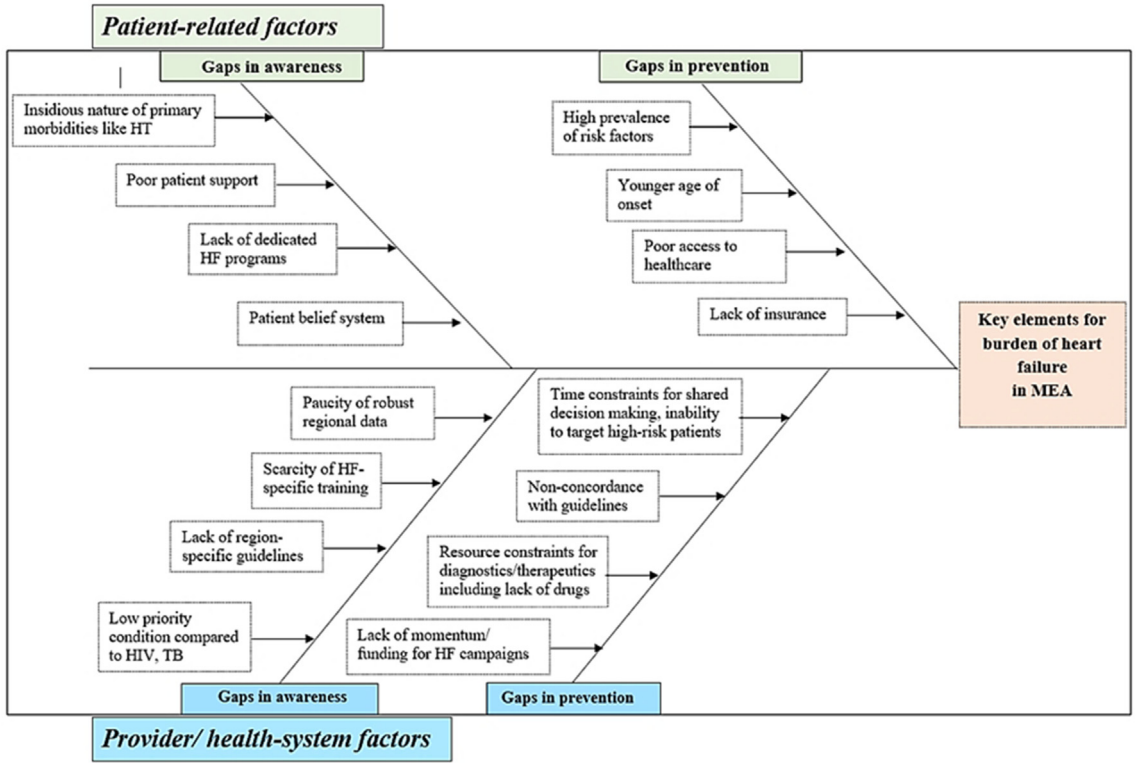

Fig. 2. Root cause analysis illustrating the multifaceted characteristics of heart failure. HF = heart failure; HIV = human immunodeficiency virus; HT = hypertension; MEA = Middle East region and Africa; TB = tuberculosis.

patients with asymptomatic left ventricular dysfunction. From a health-system perspective, the experts suggested formulating multi-country registries and national databases through electronic records for collection of relevant data that can appropriately gauge the region-specific needs and practices in MEA (Table 2).

5. Evidence supporting strategic recommendations

5.1. Enhance patient awareness

The experts agreed unanimously that enhanced patient awareness regarding prevention is the

Table 2. Provider/health-system level recommendations for enhanced awareness and prevention of HF.

	Provider-related Recommendations	Health System-related Recommendations
Training for enhancing awareness and knowledge	• Train healthcare professionals through outreach programs and disseminate the national HF management guidelines • Educate physicians for compliance to guideline-directed medication • Raise awareness to ensure clinicians prescribe evidence-based therapy and titrate the dose to the target dose	• Prioritizing HF alongside other infectious diseases • Create local HF societies to educate physicians • Improve access and insurance for novel therapies like SGLT2 inhibitor for primary prevention of HF
Prevention and strategic management	• Focus on prevention of HF by early identification patients at high risk such as those with hypertension and ischemic heart disease • Enhance concordance to guideline recommended therapy • Focus on optimal management of comorbidities like CVD, CKD, and T2DM and associated mortality • Enhance shared-decision making with patients	• Focus on primary healthcare centers for early detection and referral of patients • Improved access to care and follow-up through pooled sourcing, quality generic medications and targeted efforts for local manufacturing
Multidisciplinary care and task sharing	• Involve nurses in the care of HF • Conduct exchange training programs of nurses across the region for improving management, whilst mitigating language barriers • Encourage nurses and paramedics to engage in specialized HF care and patient support • Adopt MDT approach for HF management. The benefit can be immediate compared to HF clinics, which would require long time and high economic investments. • Increase HF clinics	• Initiate a structured approach to provide access to patients with HF • Develop centers for excellence for diagnosis of HFpEF
Data generation	• Publish guidelines and call to action paper to create awareness among the cardiologists about HFpEF including phenotypes like amyloidosis • Adopt innovative solutions for patient support such as follow-ups on a virtual platform to support HF management during pandemic times	• Initiate registries to increase the collection of relevant data through electronic records, and national databases • Generate country-specific unmet needs and recommendations for HF management focussing on clinical inertia and challenges with timely uptitration of doses • Develop local registries to give insights on HF management covering urban and rural areas • Initiate registry for the MEA region to generate robust region-specific database providing real-world insights on gaps and treatment patterns
Collaborative stakeholder partnership	• Prevent HF progression by optimal use and reimbursement of drugs that influence the course of HF such as SGLT2i, beta-blockers, RAASi, and ARNI	• Identify key partners from each country to solicit collaborative care and facilitate program implementation • Engage stakeholders to pave the way for novel therapies and new research activities, focusing on funding • Include HF in healthcare reforms in collaboration with health authorities • Involve policymakers for reimbursement resources

ARNI = angiotensin receptor II blocker - neprilysin inhibitor; CKD = chronic Kidney disease; CVD = cardiovascular disease; HF = heart failure; T2DM = type 2 diabetes mellitus; SGLT2 inhibitors = sodium-glucose cotransporter-2 inhibitors; MDT = multidisciplinary team; HFpEF = heart failure with preserved ejection fraction; RAASi = renin-angiotensin–aldosterone system inhibitors.

foundation stone for HF care. Maintaining optimum body weight, smoking cessation, alcohol intake restriction, regular exercise, heathy diet, and cholesterol reduction are associated with a lower lifetime risk of HF [20]. The World Heart Federation "heart failure gap review" estimated that globally 55% of people did not recognise a description of HF and 67% underestimated conditions such as diabetes, high blood pressure, and coronary heart disease as the leading risk factors for developing HF [21]. Despite a high burden of risk factors in Middle East and North Africa (MENA), the control of hypertension and dyslipidaemia is sub-optimal—70% of low income subjects had dyslipidaemia but only 4% were taking lipid-lowering medication [22,23]. This necessitates raising awareness for prevention through combined healthy lifestyle factors, particularly in the younger population due to the early age of HF onset in the region. Providing patient support by telecommunication-based education activities, leveraging digital technology such as smartphone applications, text messaging and social media campaigns, can effectively overcome barriers of access in a timely and cost-effective manner [24].

5.2. Enhance physician and provider knowledge

The experts acknowledged the need for enhancing physician and provider knowledge for recognising patients at risk of developing HF, symptom recognition, referral processes and treatment algorithms. Empowering nonphysician health-care workers such as nurses, pharmacists, or community-health workers to facilitate task shifting/sharing in limited resource settings can help eliminate the trade-offs between health-care accessibility and availability, thus effectively managing blood pressure and risk modification [25–27]. A study from rural Rwanda, Africa reported that nurse performed echocardiography had high sensitivity and specificity for mitral stenosis, hypertensive heart disease and isolated right HF. The study further demonstrated that patients had a significant improvement in NYHA class ($P<.0001$) over 10 years [28]. Gaps in physician adherence to guidelines can be explained by factors such as clinical inertia. A study focusing on interventions such as (1) health information technology; (2) optimising teamwork; and (3) providing education to patients and physicians, reported a reduction in the number of emergency department visits and hospital admissions [29]. Provider-level interventions encompassing audit and feedback, reminders, alongside enhanced medical records system, multidisciplinary teams, and continuity of care can be instrumental in increasing concordance to guideline uptake [30].

5.3. Development of robust real-world databases and registries

The majority of the panel were very keen to establish a robust database including electronic health records and registries to gain precise insights on real-world challenges for HF in the MEA region. According to the World Heart Federation review, only 12% of policymakers recognised HF as the leading cause of avoidable hospitalisations and 42% prioritised prevention [21]. Long-term prospective registries of HF can provide unique opportunities to assess disease burden, characterisation of risk factors, treatment patterns, gaps in clinical practice and outcomes— providing a comparative platform across different regions. Robust registries including larger populations can contribute to an ongoing quality assurance, indicating areas of improvement such as patient non-adherence, physicians' non-concordance to recommendations, voids in medical training or patient education— constituting a reliable, invaluable tool to guide routine clinical practice. Standardised national level registries can compare the disease management between several different countries, and provide benchmark estimates of mortality, morbidity and resource utilisation [31,32]. Although few registries such as the heart function assessment registry trial (HEARTS) from Saudi Arabia, Egyptian cohort of European Society of Cardiology Heart Failure Long-Term registry, Oman Acute Heart Failure Registry, Gulf CARE in 7 Middle Eastern countries and Program for the Evaluation and Management of the Cardiac Events (PEACE) MENA have set the foundation, well-designed national multicentre registries exploring sub-population with multiple morbidities, geriatric age group or from different ethnicities, across the disease spectrum, are further needed to reinforce and validate real-world data for the MEA region [11,12,33–36].

5.4. Pharmacotherapy for HF prevention

Major registries from the MEA region have revealed a high burden (nearly 50%) of type 2 diabetes mellitus, hypertension, or hypercholesterolaemia. As patients with these modifiable risk factors have a multifold risk for cardiovascular diseases (with HF becoming the major presentation of cardiovascular disease), aggressive implementation of evidence-based management through lifestyle and pharmacological

interventions should be at the core of HF prevention. Based on the pleiotropic benefit of novel therapies for prevention of major adverse cardiovascular events (MACE; cardiovascular death, nonfatal myocardial infarction, nonfatal stroke), reduction in HF hospitalisations and renal end points, recent evidence recommend utilisation of sodium-glucose co-transporter-2 inhibitor or glucagon-like peptide-1 receptor agonist to reduce HF risk in patients with diabetes [37–41]. Heart Failure Association of the European Society of Cardiology expert consensus (2019) recommends that canagliflozin and dapagliflozin should also be considered for patients with type 2 diabetes mellitus and either established cardiovascular disease or at high cardiovascular risk, in order to prevent or delay the onset of and hospitalisations for HF [42]. Similar to diabetes, hypertension management is pivotal to prevent HF. The Systolic Blood Pressure Intervention Trial (SPRINT) reported that intensive blood pressure control may be one of the most effective ways to delay the onset of HF [43]. There is reasonable evidence that statins can reduce the rate of cardiovascular events and thus prevent or delay the onset of HF [44,45]. Timely and optimal care management tailored to patient status and comorbidities through novel therapies such as beta-blockers, angiotensin receptor-neprilysin inhibitors, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, aldosterone antagonists, sodium-glucose co-transporter-2 inhibitors, vasodilators, or ivabradine can be crucial to improve patient outcomes across the spectrum of HF [37,46,47]. Although professional guidelines recommend sodium-glucose co-transporter-2 inhibitor or glucagon-like peptide-1 receptor agonist therapy for the primary benefit of cardiovascular risk management, their widespread utilisation is low, even for “at risk” patients with diabetes and clinical manifestations of cardiovascular disease [48]. Despite cardiologists being well-positioned to improve access to these cardioprotective drugs, lack of familiarity with the therapies and perception that management of diabetes is beyond their scope, hinder adequate prescription [49,50]. Formulation of treatment pathways that simplify prescribing, educational programmes for clinicians and patients, along with coordinated models of care can pave the way for bridging this gap [51].

6. Gaps and recommendations to enhance the efficiency of HF diagnosis

The experts discussed that a complicated diagnostic pathway, inadequate guidelines and practice of referral, as well as scarcity of trained healthcare workers can hinder the effective diagnosis and management of HF. Low utilisation of biomarkers such as N-terminal pro b -type natriuretic peptide (NT proBNP), because of even scarcer availability of echocardiography, can further compound a delayed or missed diagnosis. As HF is a complex disease (especially the HFpEF population), lack of expert participation in verifying the diagnosis of HF can create ambiguities in risk detection and subsequent delayed diagnosis. The experts discussed that formulation of simple region-specific diagnostic algorithms to identify HF and efficient referral mechanism at different tiers of health-care can be fundamental to improve diagnosis. Improving access and availability of essential diagnostics including cardiac echocardiography and engaging in discussions with policymakers for reimbursement can enhance diagnosis. Multidisciplinary care teams and development of centres for excellence to guide early referral in tertiary centres, along with creation of HF clinics can facilitate early diagnosis (Table 3). Creation of credible and dedicated HF task force can help establish HF clinics in hospitals, thus streamlining clear operation policies and standardised health care system.

7. Evidence supporting strategic recommendations

7.1. Screening and early detection of patients with heart failure

Algorithms such as the WATCH-DM (Weight [body mass index], Age, hypertension, Creatinine, high density lipoprotein cholesterol, Diabetes control [fasting plasma glucose], QRS Duration, Myocardial Infarction, and Coronary Artery Bypass Grafting) risk score can facilitate risk prediction of incident HF among patients with diabetes based on machine learning [52]. Similarly, the novel Thrombolysis in Myocardial Infarction risk score can facilitate risk stratification in patients with diabetes—identifying those at higher risk for HF and those who can derive greater absolute benefit from the therapeutic management [53]. Timely diagnosis of HF is critical, but identification of patients with suspected HF can be challenging, especially in primary care. The recently published universal definition describes HF as a clinical syndrome with current or prior symptoms and or signs caused by a structural and/or functional cardiac abnormality (as determined by ejection fraction <50%, abnormal cardiac chamber enlarge-

Table 3. Barriers and strategic recommendations for diagnosis of heart failure.

Barriers	Recommendations
Complicated diagnostic pathway for HF	Formulation of simple diagnosis algorithms to identify HF
Underutilization of diagnostics and failure to perform imaging techniques due to scarcity of trained healthcare workers	Improve access to advanced diagnostics and train primary care health workers for ECG and echocardiography ultrasound
Missed diagnosis due to inadequate referral	• Formulation of region-specific efficient referral mechanism at different tiers of healthcare • Adequate follow-up of patients in the general cardiology clinic
Lack of knowledge, poor access, high cost, and corresponding low utilization of biomarkers such as Pro-NT-BNP	• Improved access and training • Develop centers for excellence for biomarkers and ECG to guide early referral in tertiary centers
Lack of expert participation in verifying the diagnosis of HF	Formulation of multidisciplinary teams
Lack of HF clinics and lack of dedicated patient-centric HF programs	Dedicated HF clinics with dedicated resources such as nurses for early detection
Poor access and affordability to health facilities to diagnose HF	Engage with policy makers for reimbursement resources to help the patients financially
Financial barriers in some countries where NTproBNP is not reimbursed by third-party payers	Engage policymakers in HF for awareness campaigns and clinical decision-making

ECG = electrocardiogram; HF = heart failure; Pro-NT-BNP=N-terminal pro b-type natriuretic peptide.

ment, E/E'>15, moderate/severe ventricular hypertrophy or moderate/severe valvular obstructive or regurgitant lesion) and corroborated by at least one of the following: elevated natriuretic peptide levels or objective evidence of cardiogenic pulmonary or systemic congestion by diagnostic modalities such as imaging or haemodynamic measurement at rest or with provocation [54]. Though natriuretic peptides are currently not recommended as a screening tool for general population in the MEA region, its screening in high risk patients (especially patients with type 2 diabetes mellitus) can be helpful in preventing HF [55]. Guidelines recommend natriuretic peptide blood test for people presenting to primary care with suspected HF and subsequent referral for echocardiography and specialist assessment if the level is raised [46,56,57]. However, patients might follow diverse diagnostic pathways, which may or may not be aligned with the guidelines for investigation and referral—leading to missed opportunities for early HF diagnosis in primary care [58,59]. Adoption of simple and unambiguous diagnosis algorithms to identify HF (using the basic 12-lead electrocardiogram and a chest X-Ray), alongside enhanced access to advanced imaging modalities (echocardiography) and trained healthcare providers can drive early detection of HF [60]. A normal 12-lead electrocardiogram almost excludes a HFrEF diagnosis. The World Heart Federation Roadmap for HF illustrated a clear continuum for care pathway beginning with risk factor screening, culminating in the end of life care [61]. Adaptation of such pathways based on the region-specific characteristics can be instrumental in enhanced diagnosis of HF.

7.2. Multidisciplinary team approach to heart failure care

The experts highlighted fragmented care as the major barrier in HF management. Given the multifaceted aetiology of HF, a multidisciplinary team approach is considered the gold standard model for optimal care. The National Institute for Health and Care Excellence (NICE) guidelines recommend a multidisciplinary team including a core specialist working in collaboration with the primary care team (lead physician with subspecialty training in heart failure who is responsible for making the clinical diagnosis), a specialist HF nurse and a healthcare professional with expertise in prescribing for HF [56]. Other multidisciplinary team members may also include pharmacist, physiotherapist, palliative care, psychologist, or occupational therapist and administrator. Benefits of multidisciplinary team approach include engagement of health professionals across health care sectors, implementation of evidence-based management guidelines, monitoring of signs and symptoms for early identification of decompensation and/or deterioration, and effective protocols for symptom management. Multidisciplinary team further fosters involvement of patients and their families for care planning, development and implementation of individualised management plans for self-care. A growing body of evidence has shown improved patient outcomes with significant reductions in mortality and/or all-cause and HF hospitalisations through multidisciplinary team care [62,63]. Although a multidisciplinary team approach is ideal, it might be challenging in many countries of the MEA region at this stage. Hence, the members should be selected

depending on country-specific resources, primarily a HF nurse and physician with HF care experience. Local clinics with educated nurses who can communicate with a central hub having electrocardiogram, chest X-Ray and blood review via telemedicine, might also be a reasonable aim for the low- and middle-income countries countries.

7.3. Heart failure clinics based on hub-and-spoke model of integrated care

The experts advocated the development of HF clinics and emphasised on the crucial role of nurses for driving optimal HF care. Similar thoughts were echoed by cardiologists' who suggested implementation of a structured, patient-centered, and flexible model of disease management programme, along with integrated data approaches [64]. In comparison to general cardiology out-patient department, dedicated HF clinics were better in maintaining guideline-directed medication therapy, together with decreased rate of rehospitalisation and mortality [65,66]. A study from Saudi Arabia showed that a structured HF programme can significantly enhance quality of life and dramatically decline hospital admissions [67]. Nurse-led HF clinics can help early diagnosis in economically and socially vulnerable patients with advanced cardiovascular disease and facilitate initiation of guideline-directed therapy before seeing a specialist [28,68]. However, majority countries in the MEA region either do not have nurse practitioners or they are ineligible to prescribe the drugs. Considering the shortage of skilled resources and the extent of economic burden on healthcare systems in MEA [69], development of HF clinics based on the hub and spoke model of integrated care can be promising. Network of HF clinics with a multidisciplinary team of experts as the hub — offering full array of services, complemented by a network of primary care sector (spokes) — offering limited service for low-risk patients, while routing patients needing more intensive services to the hub for treatment, can potentially lead to better patient outcomes [70,71] (Fig. 3). In the MEA region, this would mostly apply to the larger cities that are better resourced. Peripheral and rural areas have significant challenges, wherein valvular heart disease may have a greater significance. Establishing effective screening and management of HF in these areas remain a significant challenge.

8. Way forward

Despite the heavy burden of HF in MEA, there are significant pitfalls in the arena of research and development. In addition, the policy initiatives are also limited. It is imperative for policy makers, healthcare professionals and administrative personnel to identify the strategic importance and prioritise HF at a national level through concerted efforts. Greater representation of MEA region in global studies and clinical trials is crucial to counter the significant under representation in large

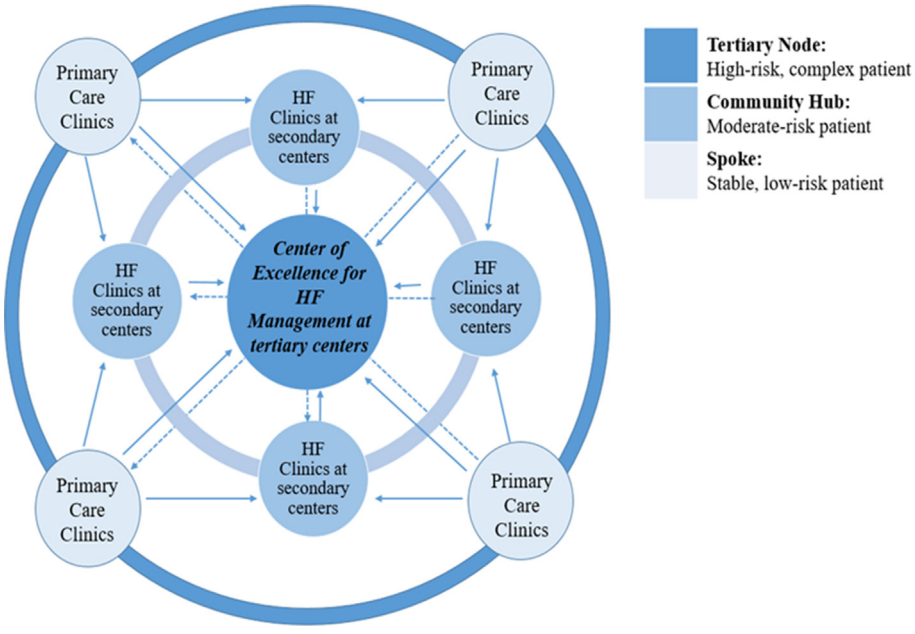

Fig. 3. Hub and spoke model for integrated heart failure care. HF = heart failure.

randomised HF studies. Developing a HF national roadmap for comprehensive primary prevention strategies, establishing patient advocacy groups, strong intersectoral policies, engaging professional societies and public health authorities is central to creating a sustainable health system [72]. Development of regional or national guidelines factoring in the local challenges and roadblocks can be instrumental in driving HF care. In addition, use of innovative tools, telemedicine and digital technology, such as artificial intelligence, for predicting diagnosis can be favourable, particularly where in-person representation is not feasible. In addition, commitment for adequate funding and reimbursement is pivotal for overcoming structural and health-system related barriers in the MEA region.

9. Conclusion

There are wide gaps and unmet needs in awareness, prevention, and diagnosis of HF in the MEA region. Enhancing patient awareness with emphasis on prevention through digital methods or social media campaigns, alongside raising awareness of providers and policy makers with streamlined training programs and referral process, can address deficiencies in knowledge for HF care. Utilisation of guideline-recommended pharmacotherapy such as sodium-glucose co-transporter-2 inhibitors for primary prevention of HF in at-risk patients with diabetes can support pleotropic effect in high-risk populations. Focusing on a multidisciplinary approach to care while ensuring concordance to evidence-based therapy can be crucial. Comprehensive real-world data collection through well-designed multicentre registries and widespread establishment of HF clinics encompassing expanded role of nurses can potentially drive the momentum of HF care across all tiers of healthcare in MEA.

Author contribution

Conception and design of Study: AB, ENO, EK, HNS, HBAS, HR, KWA, KAA, MA, MBY, RT, YÇ. Literature review: AB, ENO, EK, HNS, HBAS, HR, KWA, KAA, MA, MBY, RT, YÇ. Acquisition of data: AB, ENO, EK, HNS, HBAS, HR, KWA, KAA, MA, MBY, RT, YÇ. Analysis and interpretation of data: AB, ENO, EK, HNS, HBAS, HR, KWA, KAA, MA, MBY, RT, YÇ. Research investigation and analysis: AB, ENO, EK, HNS, HBAS, HR, KWA, KAA, MA, MBY, RT, YÇ. Data collection: AB, ENO, EK, HNS, HBAS, HR, KWA, KAA, MA, MBY, RT, YÇ. Drafting of manuscript: AB, ENO, EK, HNS, HBAS, HR, KWA, KAA, MA, MBY, RT, YÇ. Revising and editing the manuscript critically for important intellectual contents: AB, ENO, EK, HNS, HBAS, HR, KWA, KAA, MA, MBY, RT, YÇ. Data preparation and presentation: AB, ENO, EK, HNS, HBAS, HR, KWA, KAA, MA, MBY, RT, YÇ. Supervision of the research: AB, ENO, EK, HNS, HBAS, HR, KWA, KAA, MA, MBY, RT, YÇ. Research coordination and management: AB, ENO, EK, HNS, HBAS, HR, KWA, KAA, MA, MBY, RT, YÇ.

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Declaration of competing interest

AB, HS, HA, KA, KA, RT have no conflict of interest to disclose. EO received honorarium for lectures, presentations, speaker bureaus from Astra Zeneca, Bayer, and Novartis. EK received speaker honorarium, travel assistance (Astra Zeneca, Servier, Novartis) and has been the head of ethics and guideline committee, SA heart. HR received honoraria for lectures from Novartis, BI, AstraZeneca, MSD & Sanofi. MA received speaker honoraria from Bayer, Novartis, Boehringer-Ingelheim & Astra Zeneca. MY received Institutional fee from Novartis, Bayer, Amgen, Astra Zeneca. YÇ received honorarium for lectures or educational events from Astra Zeneca, Servier, Novartis, Roche Diagnostics, Sanofi Aventis, Otsuka Pharmaceuticals, Actelion, Bayer.

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