Contemporary Strategies in the Diagnosis and Management of Heart Failure

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Abstract

Heart failure (HF) is an important public health problem, and strategies are needed to improve outcomes and decrease health care resource utilization and costs. Its prevalence has increased as the population ages, and HF continues to be associated with a high mortality rate and frequent need for hospitalization. The total cost of care for patients with HF was $30.7 billion in 2012, and it is estimated to more than double to $69.8 billion by 2030. Given this reality, there has been recent investigation into ways of identifying and preventing HF in patients at risk (stage A HF) and those with cardiac structural and functional abnormalities but no clinical HF symptoms (stage B). For patients who have symptoms of HF (stage C), there has been important research into the most effective ways to decongest patients hospitalized with acute decompensated HF and prevent future hospital readmissions. Successful strategies to treat patients with HF and preserved ejection fraction, which has increased in prevalence, continue to be sought. We are in the midst of a rapid evolution in our ability to care for patients with end-stage HF (stage D) because of the introduction of and improvements in mechanical circulatory support. Left ventricular assist devices used as destination therapy offer an important therapeutic option to patients who do not qualify for heart transplant because of advanced age or excessive comorbidity. This review provides a thorough update on contemporary strategies in the diagnosis and management of HF by stage (A to D) that have emerged during the past several years.

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An estimated 5.8 million adults in the United States are currently living with heart failure (HF), and its prevalence is projected to increase to 25% by 2030.[1] Heart failure is primarily a disease of the elderly, with prevalence increasing from 0.9% in patients aged 55 to 64 years to 17.4% in those 85 years and older.[2] The increasing prevalence of HF is attributed to aging of the population and improved survival from HF and other cardiovascular diseases. Given the increased prevalence and epidemic of hospitalizations in patients with HF, total costs are projected to increase from $30.7 billion in 2012 to $69.8 billion in 2030.[1] Although most of the focus in HF is aimed at treatment of affected patients, in 2001, the American College of Cardiology Foundation (ACCF)/American Heart Association (AHA) revised the HF classification to also include patients who are at high risk for the disease (stage A; Figure 1) but do not yet have structural cardiac abnormalities or clinical evidence of HF.[3] In 2010, Ramani et al[4] reviewed the contemporary diagnosis and management of HF in *Mayo Clinic Proceedings*, including a review of guideline-based management for patients with HF. Since

then, there has been an expansion of indications for drug and device therapy, important progress made with mechanical circulatory support (MCS), and new clinical trials aimed toward enhancing the care of patients with HF. This complementary review will provide a thorough update on contemporary strategies in the diagnosis and management of HF by stage (A to D) that have emerged in the past several years, with a focus on new guidelines and research results that may affect clinical practice.

STAGE A HF: PATIENTS AT RISK

Stage A HF includes patients who do not yet have HF or cardiac structural abnormalities but are at risk because of coronary artery disease, diabetes, hypertension, or other conditions. Because many of these predisposing conditions are highly prevalent, stage A HF is common. In one community study, it was estimated that 56% of the population aged 45 years or older had stage A or B HF.[5]

Predicting Risk for the Development of HF

Although only patients with stage C and D disease would meet criteria for HF, this focus on

identifying patients at risk for HF (stage A) has prompted the development of several incident HF risk scores. The Health ABC (Health, Aging, and Body Composition) study included 3075 community-dwelling elderly patients (aged 70-79 years) who were followed up for 7 years for clinical events, including the onset of HF, which developed in 258 participants.[6] A simple point score based on independent predictors of HF was developed (Figure 2). Although the risk score is easy to calculate, the ability to discriminate is only acceptable (C statistic, 0.72). Similarly, a model to predict incident HF validated in the ARIC (Atherosclerosis Risk in Communities) cohort[7] included many of the same variables (age, coronary artery disease, blood pressure, smoking, heart rate), as well as race, sex, diabetes, and body mass index. The investigators reported predictive ability similar to that of the Health ABC score and found that both models performed better with the addition of N-terminal pro-B-type natriuretic peptide. Either risk model would be acceptable to use in clinical practice to help identify patients who may be at higher risk for the development of HF.

Genetic Testing in Patients With Suspected Familial Cardiomyopathy

A high proportion (20%-35%) of patients with dilated cardiomyopathy (DCM) may have familial cardiomyopathy (defined as 2 or more closely related family members with DCM).[8] A thorough family history should be obtained in patients with newly diagnosed DCM. If familial cardiomyopathy is suggested on the basis of history, genetic testing and referral to a genetic counselor should be considered. However, because pathogenic mutations are identified in only 30% to 35% of familial cases,[9] negative results on a genetic screen do not eliminate the possibility of an inherited DCM. Unaffected first-degree relatives of patients with familial DCM should undergo screening with echocardiography at least every 3 to 5 years.[8] Hypertrophic cardiomyopathy and arrhythmogenic right ventricular dysplasia can also be inherited, and genetic screening, counseling, and testing in these conditions are thoroughly covered in a recent review.[10]

Treatment Aimed at Controlling Modifiable Risk Factors

Treatment of patients identified to be at high risk for the development of HF should be aimed

at reducing their risk by treatment of modifiable risk factors, including aggressive treatment of hypertension, diabetes, hyperlipidemia, and obesity. In particular, long-term hypertension control may reduce the risk of incident HF by more than 50%.[11,12] The choice of antihypertensive therapy should be based on published guidelines,[8,13] although a meta-analysis suggested that diuretics, angiotensin-converting enzyme inhibitors (ACE-Is), and angiotensin receptor blockers are the most effective classes of drugs for reducing HF risk.[12]

STAGE B HF: STRUCTURAL HEART ABNORMALITIES BUT NO CLINICAL HF SYMPTOMS

Stage B HF includes patients with prior myocardial infarction, left ventricular remodeling including left ventricular hypertrophy and reduced ejection fraction (EF), and asymptomatic valvular heart disease who have never had active HF symptoms. The number of patients who have stage B HF is estimated to be 3 to 4 times the number of patients with stage C and D combined.[4,14] The prevalence of asymptomatic reduced EF is estimated at 3% to 6%[15] and increases with age. Asymptomatic diastolic dysfunction is more common, with an estimated prevalence as high as 27%.[16] Patients with stage B HF are at high