Heart failure

James Ker, MBChB, MMed(Int), MD
Deputy Dean and Senior Specialist, Department of Internal Medicine, Faculty of Health Sciences, University of Pretoria

Abstract
Heart failure is a clinical syndrome that can result from any structural or functional cardiac disorder that impairs the performance of the ventricle: either to eject blood (systolic dysfunction or reduced ejection fraction), or to fill with blood (preserved ejection fraction, or diastolic heart failure).

Introduction
About half of all clinical heart failure patients have preserved ejection fraction, and this condition seems to be increasing in prevalence, especially with increasing age. The most effective therapy for this form of heart failure is currently unknown.

Co-morbidities have a large influence on worse outcome in heart failure. Systemic hypertension, ischaemia of the ventricle, diabetes mellitus, chronic obstructive pulmonary disease, sleep apnoea, depression, anaemia and chronic renal disease add considerable complexities to diagnosis and management of heart failure.

Biochemical testing for heart failure
Measurement in plasma of brain natriuretic peptide or its precursor, N-terminal pro-brain natriuretic peptide (NT-proBNP), has aided in the diagnosis of heart failure. An elevated NT-proBNP is caused by the stretching of cardiac myocytes. Therefore, the test cannot distinguish left ventricular failure or right ventricular failure from other causes. A low pro-brain natriuretic peptide (BNP) or NT-proBNP has a high negative predictive value, making it a useful rule-out test.

Stages of heart failure
There are four recognisable stages in the progression of heart failure.

- **Stage A:** There are no symptoms or signs of heart failure. The heart has a normal structure and function, but the patient has the risk factors for heart failure: hypertension, elevated cholesterol, diabetes, alcohol abuse, and cardiotoxic drugs (e.g. chemotherapeutic drugs and cocaine).
- **Stage B:** There are no symptoms or signs, but the heart of the patient has a structural abnormality, such as left ventricular hypertrophy, myocardial infarction, heart murmur or left ventricular dilatation, or is functionally abnormal (e.g. reduced ejection fraction and diastolic dysfunction).
- **Stage C:** There are now symptoms and signs of heart failure.
- **Stage D:** These patients have progressed, and still have marked and resistant symptoms, despite maximal medical therapy.

Therapy for heart failure (what works)
Physical activity is now recommended for all heart failure patients, except for those who are acutely decompensated.

Prevention of heart failure is possible through adequate blood pressure control of hypertension, control of ischaemic heart disease occurrence, and diabetes mellitus (Stage A). Preventative treatment with an angiotensin-converting enzyme (ACE) inhibitor, or angiotensin-receptor blocker (ARB), is given to individuals with high risk, but normal ejection fraction [The Heart Outcomes Prevention Evaluation (HOPE) study, and Ongoing Telmisartan Alone and in Combination with Ramipril Global Endpoint Trial (ONTARGET)], or those with asymptomatic left ventricular dysfunction (Stage B). Treatment post-myocardial infarction with a beta blocker (Stage B) can also slow progression of heart failure. For Stage C heart failure (symptoms and signs of heart failure), neurohormonal inhibition for patients with reduced ejection fraction has mortality benefits. ACE inhibitors, ARBs, beta blockers (bisoprolol and metoprolol), alpha-beta blockers (carvedilol), and aldosterone antagonists are evidence-based therapies for mortality reduction. Cardiac resynchronisation therapy for heart failure with biventricular pacemakers, with or without intracardiac defibrillators, is a recent addition to mortality reduction therapy. Isosorbide dinitrate plus hydralazine therapy has mortality benefits, especially in African patients, but can be tried in others as well.

What does not reduce mortality?
Statins given purely for heart failure do not reduce mortality. Digoxin, once considered to be the standard treatment, has not reduced mortality compared to placebo in patients with low ejection fraction, and in patients with normal ejection fraction. Digoxin is used to control atrial fibrillation, should it occur in heart failure.

Calcium-channel blockers also have no mortality benefit.

Inotropic therapy is associated with increased mortality.
What is the problem with treatment?
The majority of randomised clinical trials in heart failure were carried out on patients with reduced ejection fraction. These patients have improved mortality on standard anti-neurohormonal therapy.

However, the therapy of heart failure patients with preserved ejection fraction has very little evidence. The few trials conducted on this condition have not shown the same mortality benefit. Considerable work needs to be carried out on patients with heart failure and preserved ejection fraction (almost half of all heart failure patients).

Bibliography