Heart failure: how can we prevent the epidemic?

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ABSTRACT

- Heart failure prevalence is increasing because of the ageing of the population and the longer survival of people experiencing myocardial infarction and heart failure. The lifetime risk of developing heart failure in Western countries is about 20%.
- The increasing prevalence of overweight, obesity and diabetes is likely to accelerate heart failure incidence.
- While there have been major advances in treating heart failure, a preventive approach promises greater benefit to a larger proportion of the community.
- The medical strategy for heart failure prevention, based on calculation of individual risk, is focused on the minority of individuals who exceed an arbitrary risk threshold.
- A public health strategy targeting the whole population offers a greater prospect of reducing the incidence of heart failure and other cardiovascular disease.
- A multitiered approach, encompassing environmental determinants of lifestyle, legislation, and education about healthy lifestyles throughout life, in addition to aggressive control of risk factors in high-risk individuals, is likely to have the greatest impact.

MJA 2003; 179: 422–425

HEART FAILURE affects 3%–5% of people aged over 65 years in Western societies and 10% of those over 75, with a lifetime risk of developing heart failure of about 20% in both men and women.[1,2] While there are no national data on the number of Australians with heart failure, extrapolation from overseas studies suggests that at least 300 000 Australians are affected, with 30 000 new cases diagnosed each year.[3] As the diagnosis is commonly missed in patients with mild heart failure, the actual numbers could be as high as twice these estimates.[4] The recent Cardiac Awareness Survey and Evaluation (CASE) study detected two new cases of heart failure for every 100 patients aged ⩾ 60 years presenting to their general practitioner.[5]

Heart failure is a major burden on the community, due to the costs of care and the poor quality of life and premature death of affected people. The prevalence of heart failure is increasing because of the ageing of the population and the improved survival of people experiencing myocardial infarction and heart failure. Moreover, the increasing prevalence of overweight, obesity and diabetes is likely to accelerate the incidence of heart failure.[3,6,7]

Horowitz and Stewart described heart failure in older people as "the epidemic we had to have".[8] They argued that current strategies for reducing the risk of ischaemic heart disease are a means of postponing rather than preventing disease, and therapies that have led to increased survival rates after myocardial infarction and heart failure have produced more individuals with chronic heart disease.

I propose that, rather than accept heart failure as "the epidemic we had to have", we seek more effective ways to prevent cardiovascular disease. At every age before retirement there is economic gain from any preventive action to reduce disability or improve working capacity, and after retirement there are economic savings from any policy that enhances independence and reduces the need for medical and social supports.[9] Strategies to reduce the incidence of heart failure will have the additional benefit of reducing the incidence of coronary heart disease, stroke, peripheral vascular disease, diabetes and renal disease.

Prevention strategies

Hypertension and myocardial infarction together account for about three-quarters of the population-attributable risk of heart failure, and both are largely preventable with currently available strategies.[7,10] Other preventable contributors to heart failure include obesity, diabetes, sleep apnoea and renal disease.[7] In 1995, more than 10 million adult Australians (over 80% of the adult population) had at least one of the following cardiovascular risk factors: tobacco smoking, physical inactivity, hypertension or overweight.[11] Obesity, which has doubled in prevalence in the past 20 years,[12] exerts its influence by promoting hypertension, diabetes, dyslipidaemia and atherosclerosis.[13]

Age-associated increases in endothelial dysfunction and in thickness and stiffness of large arteries, together with the ensuing increase in systolic and pulse pressure, predict a greater risk of developing cardiovascular disease.[6,14] Formerly thought to be an inevitable part of "normal" ageing, these age-associated vascular changes represent a potential target for treatment and prevention.[14]

Public health versus medical approaches

The issue of preventing heart failure, or preventing cardiovascular disease in general, brings into focus differences between public health and medical approaches to disease prevention. Whereas a public health approach to prevention might be based on environmental changes, legislation, and education about healthy lifestyles, the medical approach is based on absolute risk assessment for the individual

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patient.[15] Guidelines for preventing heart failure published by the National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand[16] recommend correction of reversible causes of cardiac disease and treatment of coronary risk factors, especially smoking, hypertension, dyslipidaemia and diabetes. The guidelines also recommend lifestyle interventions to reduce absolute cardiovascular risk, including smoking cessation, healthy eating, weight reduction, regular physical activity, and moderation of alcohol and salt intake.

Medical approach. For prevention in people who have yet to manifest cardiovascular disease, Tonkin et al advocate greater emphasis on absolute risk estimation to optimise health gains and produce more cost-effective treatment and prevention.[15] Calculations of absolute risk are based on Framingham risk scores for age, sex, cigarette smoking status, diabetes status, blood pressure, and levels of total and high-density lipoprotein cholesterol.[17] The Australian guidelines define "higher risk" as a calculated 5-year cardiovascular disease risk threshold exceeding 10%–15% and recommend that patients at greater risk may require drug treatment.[15,18] Tonkin et al argue that linking estimates of the likely absolute benefit of interventions with calculation of absolute risk should reinforce the rationale for lifestyle measures for all individuals and pharmacological treatment for those at high risk.[15]

The absolute risk model has several limitations as a preventive strategy. Firstly, the model fails to take account of the lifelong evolution of cardiovascular disease. Secondly, it presents a paradox, because the risk threshold for intervention requires cardiovascular disease to have already progressed to an extent sufficient to significantly increase the 5-year risk of cardiovascular events. Yet most cardiovascular events occur in people whose 5-year risk is less than 10%–15%, simply because the number of people at lower risk is far greater.[9] Thirdly, the absolute risk model provides no guidance for longer-term prevention strategies at a community level, particularly in young people.

The absolute risk model is also impractical as a prevention strategy. Many people with risk factors for heart failure and other cardiovascular disease avoid doctors. Even for those who do attend, the medical profession is currently failing to adequately implement prevention and treatment strategies. The CASE study showed that, even in the hands of an "interested" cohort of GPs, angiotensin-converting enzyme inhibitors were used in little more than half of the patients diagnosed with heart failure.[5] Furthermore, a recent Victorian study of patients with coronary heart disease[19] showed that many patients were not achieving their risk-factor targets: plasma total cholesterol level was > 4.0 mmol/L in 74% and > 4.5 mmol/L in 54% of patients; 40% of patients had blood pressure > 140/90 mmHg; 8% had unrecognised diabetes; 75% were overweight (body mass index > 25 kg/m^2); 15% were smokers; 26% were not walking regularly for exercise; and 29% were consuming more than two alcoholic drinks daily.

A similar failure to reduce risk-factor prevalence was reported by the Second Australian National Blood Pressure Study,[20] in which 38% of subjects with hypertension were previously untreated and only a third of subjects with hypercholesterolaemia were receiving lipid-lowering drugs. Moreover, once enrolled in the study, about half the participants failed to achieve a treatment target blood pressure of < 140/90 mmHg, despite their participation in a clinical trial, in which GPs might be expected to be more likely to try to achieve treatment targets.

Public health approach. Lifestyle modification (including changes in diet, increased exercise, quitting smoking, stress reduction) offers considerable potential for prevention of cardiovascular disease. A diet rich in fruits, vegetables and low-fat dairy foods and with reduced saturated fat and total fat content substantially lowers blood pressure — the reduction is greater in people with hypertension than in those with normal blood pressure, and further reduction is seen when sodium intake is reduced below 100 mmol/day.[21,22] Moreover, lifestyle modification is more effective than drug therapy for preventing diabetes in people with impaired glucose tolerance.[23,24] The combination of lifestyle changes with usual-care cholesterol-lowering therapy produces greater reduction of coronary events in people with coronary artery disease than cholesterol-lowering therapy alone.[25] However, strategies based on lifestyle modification have yet to be generally applied, and longer-term studies are required to determine whether they reduce the incidence of heart failure and cardiovascular disease.

From a public health perspective, legislation has played an essential role in reducing tobacco smoking. State governments are starting to address the obesity epidemic, and schools are encouraging students to exercise more. The National Heart Foundation of Australia and other organisations are working to promote a healthy lifestyle, but the increasing prevalence of heart failure and overweight and obesity indicates an urgent need for more effective prevention strategies.

Where do we go from here?

Preventing an epidemic of heart failure will require a combination of medical and public health approaches. Turning the tide will be a great challenge, requiring a sustained and well coordinated effort at many levels to bring about a major cultural change. While this task may be daunting, the means of achieving it are accessible and the potential benefits to society are enormous.

The challenge we face

Cardiovascular disease begins early in life in association with traditional risk factors for coronary heart disease. Behavioural and lifestyle patterns learned in childhood tend to continue into adulthood and are largely the same factors that predict cardiovascular events later in life.[26] Obesity and overweight in Australian children are strong predictors of adult weight from the age of 6 years.[27]

The doubling of obesity prevalence in the past 20 years can be described as a normal response to a "pathological" environment. There is an excess of available food and active

Suggested public health strategies for preventing heart failure

- Governments to introduce legislation to
  - restrict advertising of fast food, snack food, confectionery and soft drinks
  - ensure all food outlets provide a range of fresh fruit, vegetables and low-kilojoule drinks
- Media to promote healthy diet and exercise, optimal body weight, limited intake of high-energy foods, moderate alcohol consumption, and abstinence from tobacco products
- Local councils to remove disincentives to children walking or riding bikes to school
- Local councils to provide safe, readily accessible activity areas for children and young people, particularly in communities with high-density housing
- Schools to promote healthy diet and exercise and discourage consumption of confectionery and other high-energy snacks, fast food and drinks
- Schools (supported by media articles and programs) to teach students how to prepare healthy meals at home
- Governments to fund provision of free fresh fruit in all schools
- All individuals to be informed by their general practitioners and by public education programs about their ideal body weight, blood pressure and plasma cholesterol level,* to know their treatment targets, and to work with their GP and/or practice nurse to achieve these targets

*Plasma cholesterol level to be measured in everyone at age 50 years, and earlier if other cardiovascular risk factors are present.

encouragement (by advertisers and food outlets) to consume more salty, high-energy food than is required. The increased availability and active promotion of labour-saving technology and sedentary leisure activities (eg, television viewing, computer games), together with sedentary occupations, provide disincentives to engaging in physical activity.[28]

In the face of these environmental influences, strategies reliant on individual behaviour modification to reduce risk factors have little chance of long-term success. A multitiered approach to preventing heart failure and other cardiovascular diseases is likely to yield the greatest impact — one that encompasses environmental determinants of lifestyle, including urban planning, changing the nature of work to promote physical activity, legislation, and education about healthy lifestyles throughout life, in addition to aggressive control of risk factors in high-risk individuals (Box).[7,29]

Government legislation

Legislation played an essential role in raising community awareness of the harmful effects of tobacco products, and could play a similar role in the public health strategy to prevent heart failure and other cardiovascular disease. Laws could be introduced to restrict advertising of high-energy fast foods, snacks, and confectionery, particularly advertising directed at children. Legislation could also ensure that all restaurants and food outlets provide a range of fresh fruit and vegetables as part of their menu. McDonald's recently moved in this direction by introducing apples and side salads as an alternative to potato chips ("fries") and Coke with their burgers.[30] Food outlets could use their imagination to provide children with an inviting range of fruit and vegetables. Indeed, they could turn the requirement to provide fruit and vegetables to their advantage by reducing the size of servings of fries and offering free fresh fruit and a low-kilojoule drink with each burger or meal.

Public health campaigns

The "Slip! Slop! Slap!" campaign for control of sun exposure was so successful in modifying behaviour in our community that children are now instructing their parents on how to avoid excessive sun exposure. A similar strategy could encourage children to teach their parents the essentials of a healthy lifestyle. A conflict of interest makes it unlikely that television stations or their sponsors would actively encourage viewers to turn off the set and get some exercise. Nevertheless, the media could play an active role in imaginatively promoting a healthy diet and exercise.

Primary practice

GPs have an important role to play in preventive healthcare, by screening for, identifying and treating risk factors, and through education about strategies to prevent ill health. Practice nurses can greatly assist in this task by helping patients achieve treatment targets.[31] In a recent UK study, brief individual counselling by practice nurses in primary care elicited sustained increases in fruit and vegetable consumption.[32] Practice nurses could also educate patients in managing their risk factors. A Victorian study in which patients were coached by a dietitian on how to reduce cholesterol levels showed that coaching at 6-week intervals (by telephone) produced a reduction in plasma cholesterol levels equal to that produced by lipid-lowering drugs.[33] Practice nurses could assist people who require treatment for hypertension or a raised plasma cholesterol level to monitor these factors, know their treatment targets, and work with their GP to achieve these targets.

The family

For an increasing proportion of households, food is no longer prepared at home. Educative media articles or programs could assist families to resist their children's demands for salty, high-energy foods. We need to promote a dine-in rather than dine-out culture, and to teach young people how to prepare meals at home. Schools have an important role to play in these strategies.

Need for more research

There is a need to strengthen the evidence base for public health strategies to prevent heart failure. We need formal evaluation of different strategies to determine which is the most effective. To identify the best approach, it will be necessary to monitor potentially competing programs, measure exposure to the experimental (and other) programs, and observe implementation of the experimental programs.[34] Initially, research will focus on surrogate mark-

ers of cardiovascular disease (eg, tobacco use, body weight, blood pressure, plasma lipid levels, duration of daily exercise), but we also need to evaluate long-term outcomes in terms of cardiovascular health. The Australian Research Alliance for Children and Youth[35] is well placed to initiate and evaluate strategies to teach children healthy lifestyles that will reduce the lifetime risk of cardiovascular disease.

Acknowledgement

The author has received a Career Development Fellowship from the National Heart Foundation of Australia.

Competing interests

None identified.

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(Received 21 Feb 2003, accepted 21 Jul 2003) ❑