Evidence

The Health Foundation
Inspiring Improvement

Bridging the quality gap:
Heart failure

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Foreword

Heart failure is a debilitating, long-term condition that affects around 900,000 people in the UK. In 2008, 10,000 deaths were attributed to it. Heart failure creates a significant burden, both in terms of compromising patients' quality of life and economically as, every year, it costs the NHS approximately 1–2% of its annual budget – around £625 million.

This chartbook shows that in England, which lags behind international comparisons on heart failure prevention and treatment, there is a persistent gap between best and current practice in heart failure care. The Health Foundation would like to see a focus on closing this gap by improving quality in heart failure services.

This publication is aimed at those who are interested in improving services for people with the condition. It provides a comprehensive review of existing heart failure care by assessing quality in six domains: effectiveness, access and timeliness, capacity, safety, patient centredness and equity. The chartbook also captures the international evidence on what works to improve care, and assesses the value for money of different interventions.

The evidence presented in this chartbook shows that prevention is the most cost-effective intervention as well as providing improved patient outcomes. We would welcome further guidance for commissioners and providers on preventative services for this condition. The economic analysis also demonstrates that considerable gains – both in terms of reducing the number of avoidable deaths, and gains in quality-adjusted life years – would accrue from better identification and treatment of individuals with heart failure.

It is clear that heart failure services would benefit from the strategic attention given to other costly and common conditions, for example, stroke. Such a focus could result in significant potential gains, not only financially, but also by decreasing mortality and improving quality of life for those living with heart failure.

The Health Foundation

Overview

Heart failure is a complex syndrome that can result from any structural or functional cardiac disorder that impairs the pumping ability of the heart. It is characterised by signs and symptoms such as breathlessness, fatigue, and fluid retention.

The British Heart Foundation estimates that heart failure affects 1 to 2% of the population in the UK. Prevalence increases with age, with around 1% of men and women aged under 65 affected; this rises to between 6 and 7% of those aged 75 to 84, and between 12 and 22% of those aged 85 and over (British Heart Foundation Statistics website online a).

Heart failure is a debilitating condition that has profound implications for individuals who are affected in terms of life expectancy and quality of life. An English study from the mid-1990s found that just under 40% of patients diagnosed with heart failure die within a year (Cowie, Wood et al 2000). A more recent study found that 14% die in the first six months (Mehta, Dubrey et al 2009). The average life expectancy is only about three years following a diagnosis, which is much worse than for many other serious illnesses, such as breast or colon cancer (Royal College of Physicians 2005).

The most common underlying cause of heart failure is coronary heart disease (approximately 70%) and about a third of cases result from hypertensive heart disease (NHS Information Centre for Health and Social Care 2008a). In 2005, there were 9,140 deaths attributed to heart failure in England and Wales (Office for National Statistics 2008). However, the number of deaths directly attributed to heart failure is likely to be an underestimate of the actual number of deaths it causes. Guidance given on death certificates states that heart failure is not a *cause* but a *mode*

of death and discourages doctors from recording heart failure as the underlying cause of death. This means that precipitating causes for heart failure, such as coronary heart disease, are more commonly given as the cause of death.

Recent decades have seen an overall decline in mortality from coronary heart disease but an increasing number of patients with heart failure. The growing problem of heart failure is due, in many ways, to the success of the NHS and medicine generally. Heart failure is a condition that occurs predominantly in older people so, as the population ages, it becomes more prevalent. Also, coronary care has improved so much that the vast majority of those who suffer an acute myocardial infarction (heart attack), and reach hospital to be treated, survive. However, many will live with damaged hearts that, over time, are destined to fail.

Studies have shown that heart failure can have a devastating effect on quality of life (Archana and Gray 2002). Patients' functional status and sense of wellbeing are often severely compromised. Heart failure patients report, on average, more severe physical impairments than those with either chronic lung disease or arthritis. Even with optimal treatments, it is rarely possible for heart failure patients to have complete relief from symptoms.

Noncardiac co-morbidities – such as respiratory conditions, renal dysfunction, anaemia, arthritis, cognitive dysfunction and depression – complicate care for many patients with heart failure, particularly the elderly. Co-morbidities can contribute to the progression of the disorder, affect response to treatment and result in polypharmacy (the concurrent use of multiple medications), which is complex to manage.

Heart failure is a very expensive condition, accounting for 1 to 2% of the NHS budget. It has been estimated that the burden of heart failure will continue to grow over the coming decades, with hospital admissions projected to rise by 50% over the next 25 years (Ellis and Gnani 2001). The cost of managing heart failure is driven by inpatient care costs, which account for around 60% of the estimated £625 million annual cost of heart failure to the NHS (NHS Information Centre for Health and Social Care 2008a). Heart failure is responsible for approximately 5% of medical admissions, and the readmission rate within three months of discharge has been estimated to be as high as 50% (NHS Information Centre for Health and Social Care 2008a).

Reducing hospital admissions and readmissions offers the potential for freeing up resources for other activities. In addition, patients with heart failure have frequent contact with primary care, requiring on average 11 to 13 contacts per year with their GP or other members of the primary care team. By contrast, drug costs in heart failure account for around 9% of the total cost of care (Royal College of Physicians 2003).

The National Service Framework for Coronary Heart Disease (NSF CHD) (Department of Health 2000) emphasised the need to develop a systematic approach to the diagnosis, investigation, treatment and ongoing support of people with heart failure throughout the NHS. Evidence-based clinical guidelines published by the National Institute for Clinical Excellence (2003a) and the European Society of Cardiology (2008) aim to assist health professionals in clinical decision making.

Insights from this chartbook

This chartbook draws together data from disparate sources to develop a holistic picture of heart failure care in the NHS. Looking across the evidence and data, a number of insights emerge:

- The data reveal relatively low levels of compliance with evidence-based guidelines – particularly in prescribing beta-blockers.

- Quality and Outcomes Framework (QOF) prevalence figures (NHS Information Centre for Health and Social Care 2008b) are lower than data derived from epidemiological studies. There are a number of possible reasons for this discrepancy:
  - heart failure patients not presenting in general practice, not being diagnosed, or not being placed on the heart failure register
  - coding, record-keeping or definitional issues
  - methodological issues, such as the use of age stratification or standardisation.

- The QOF prevalence data suggest that a number of potential patients may be missing out on treatment that may both prolong life and improve its quality. Economic analysis indicates that considerable gains – both in terms of reducing the number of avoidable deaths, and gains in quality-adjusted life years (QALYs) – would accrue from better identification and treatment of everyone with heart failure.

- There are considerable potential gains in terms of both human and economic costs that would result from the prevention of heart failure. It is interesting to note the US approach, in which heart failure guidelines (see Jessup, Abraham et al 2009) encompass patients predisposed to development of the condition as well as those with clinically diagnosed heart failure. This 'more inclusive' approach has been adopted in the USA in order to encourage healthcare providers to initiate appropriate preventive care.

- A sense of fatalism surrounds heart failure. Perhaps the adoption of the broader US categorisation of heart failure that includes patients predisposed to development of the condition would recast heart failure away from the notion of an inevitable downward spiral.

There are a number of gaps in available data. There is little information available on safety, and on racial disparities both in terms of health outcomes and clinical care; and there is also little in the way of survey data focused on heart failure patients or carers in England.

PART ONE

Heart failure: what is it, how much does it cost the NHS and how is it treated?

Chapter 1: Introduction and background

Heart failure is a debilitating condition that has serious implications for individuals affected by it in terms of their life expectancy and quality of life. This chapter explains what heart failure is and how it develops, and includes two classifications of the stages of the condition. It also considers the underlying causes of heart failure, and complications that can arise, as well as explaining commonly used terms. The chapter concludes with statistics on public awareness of the disorder.

What is heart failure?

Heart failure is a progressive disorder in which the heart is unable to pump enough blood fast enough to meet the needs of the body. It can result from a variety of diseases that damage or overload the heart, such as myocardial infarction (heart attack), high blood pressure or a damaged heart valve. It can occur suddenly but, more commonly, becomes apparent over several years. Heart failure is generally characterised by two features:

- *Reduced blood flow*: the heart cannot pump enough blood to the muscles and organs, resulting in difficulty exercising, fatigue and dizziness. In early stages of the disease, these signs are apparent only when physical activity is increased. In advanced heart failure, many tissues and organs may not receive enough oxygen to function at rest.

- *Fluid congestion*: as the heart's pumping becomes less efficient, the body tries to compensate for it, often by increasing blood volume via fluid retention in the kidneys. Blood and fluid pressure result in excess fluid entering the lungs and other body tissues (however, not all swelling due to fluid retention is caused by heart failure). Symptoms associated with fluid retention include shortness of breath and oedema (pooling of fluid in the tissues).

The European Society of Cardiology defines heart failure as a syndrome in which patients have:

> symptoms of HF, typically shortness of breath at rest or during exertion, and/or fatigue; signs of fluid retention such as pulmonary congestion or ankle swelling; and objective evidence of an abnormality of the structure or function of the heart at rest.
>
> (Dickstein, Cohen-Solal et al 2008)

The normal functioning of the human heart is depicted in Figure 1 on page 7.

How the heart works

- Oxygen-depleted blood from the veins enters the right side of the heart.
- The right ventricle pumps that blood to the lungs where it picks up oxygen.
- Blood returning from the lungs enters the left side of the heart.
- The left ventricle pumps that blood through the arteries to the body.

Figure 1: How the heart works
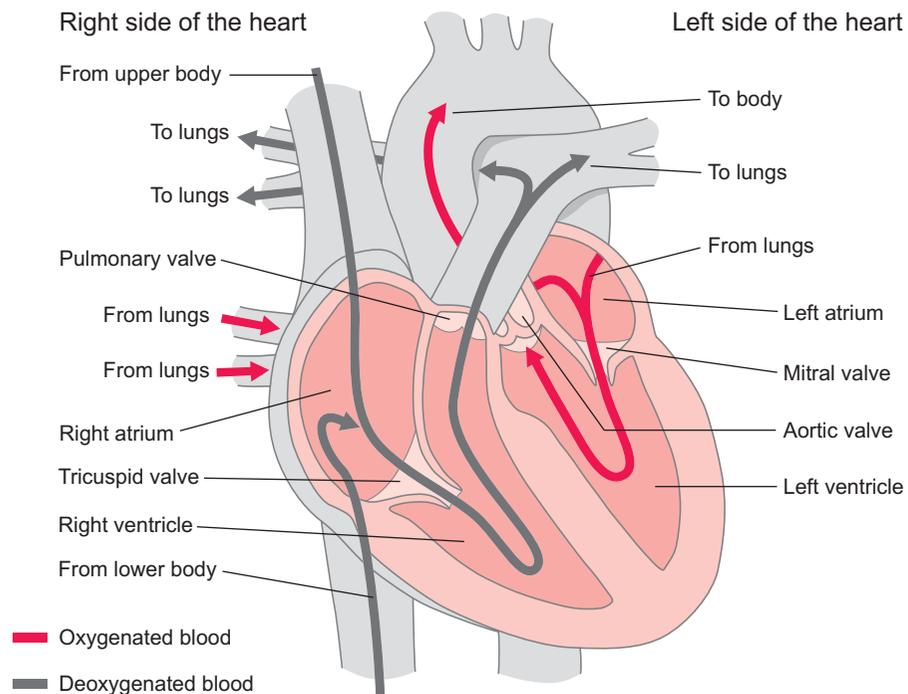
Development of heart failure

While heart failure is a result of an unresolved impairment of the heart that compromises its ability to work as a pump, it is not just a simple defect in the pumping function of the cardiac muscle. Rather it is a complex condition that is triggered by an initial injury or impairment, such as interrupted blood supply or increased workload due to hypertension. This then compromises the pumping actions of the heart and elicits a number of hormonal and neurochemical mechanisms to correct imbalances in pressure and blood flow. While these compensatory responses help in the short term, they ultimately increase the workload on the heart, further compromising its efficiency, and are now viewed as major contributors to the end stages of heart failure.

Figure 2: Causes of heart failure
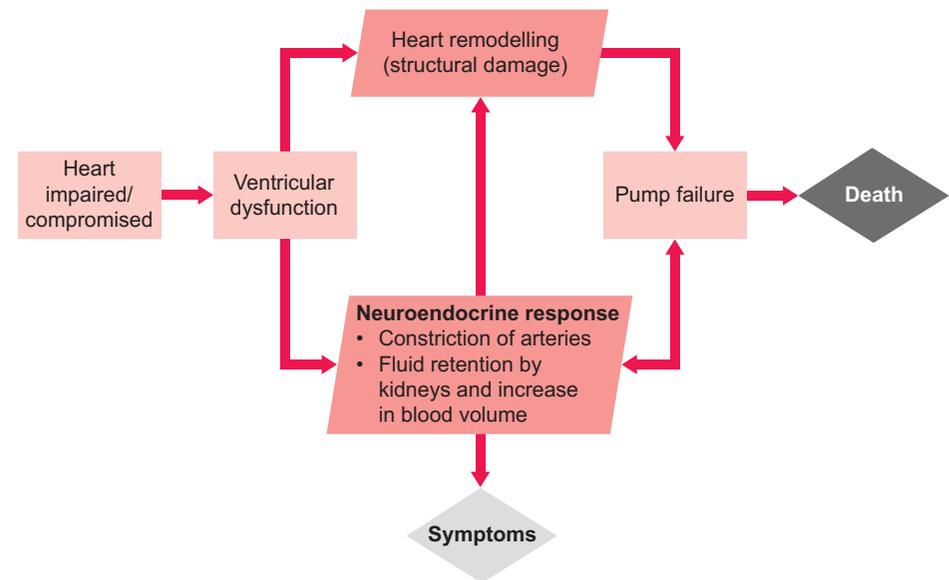
Source: Adapted from Heart Failure Online (online)

Compensatory mechanisms that contribute to heart failure

Compensatory responses to cardiac impairment are multifaceted and include the following.

Remodelling

The heart responds to high blood pressure and overload by enlarging in order to increase blood input. This leads to structural damage (referred to as remodelling) in a number of ways.

- In order to accommodate the increased blood input, the heart muscle cells elongate. The muscular walls of the heart therefore become thinner and inefficient.

- The muscle cells undergo other changes that result in calcium loss. Calcium is crucial for healthy heart contractions.

- The thinner heart muscles and the impaired heart contractions further weaken the pumping mechanism.

- Mitral valve regurgitation can occur as a result of remodelling. The mitral valve regulates blood flow between the two chambers on the left side of the heart. The structural changes caused by remodelling can distort the mitral valve so that the blood leaks backwards into the left atrium of the heart instead of flowing out into the body's circulation.

These changes are generally irreversible, although heart pacemakers and certain drugs, including beta-blockers and angiotensin-converting enzyme (ACE) inhibitors, may reverse some of the remodelling in some patients.

Immune system response

In response to injury in the heart muscle cells (or in other parts of the body that occurs as the heart fails), the immune system releases factors (primarily cytokines) intended to protect these areas. In excess, however, they can cause inflammation and damage. High levels of these cytokines have been observed in patients with the most severe classes of heart failure. Cytokines may play an important role in the process leading to remodelling as high levels are thought to trigger muscle cell growth and enlargement of the heart.

Activation of the sympathetic nervous system

The sympathetic nervous system is comprised of nerve cells that automatically govern and regulate the beating heart. The system responds to the failing heart pump via the release of stress hormones, in particular norepinephrine. The hormones flood the heart, causing it to beat even faster. These rapid heart beats, although intended to accommodate the weakened pumping actions, only accelerate the damage.

The renin-angiotensin-aldosterone system

The renin-angiotensin-aldosterone system (RAAS) is a group of hormones responsible for the opening and narrowing of blood vessels and the retention of fluids. The RAAS hormones respond to the decreased blood volume of the weakened heart by constricting the blood vessels and retaining fluids and sodium. The heart then works harder to pump blood through these narrowed vessels. Blood pressure is forced to increase, creating a vicious cycle.

Other factors

Other molecules or compounds have been identified that might play a positive or negative role in the process of the failing heart.

- Natriuretic peptides are a family of compounds released to counterbalance the effects of RAAS.

- Atrial natriuretic peptide (ANP) opens blood vessels and counteracts the sodium-retaining properties of aldosterone (one of the RAAS hormones).

- Endothelin is a powerful protein involved in blood vessel constriction, cell proliferation and build-up, and other negative effects on the heart.

- Nitric oxide is important for blood vessel dilation and elasticity.

Heart failure – nomenclature

A wide range of different descriptive terms are used in reference to heart failure. Key terms are defined below.

Box 1: Heart failure – key terms

Systolic heart failure: where the heart is unable to pump effectively, so less blood is pumped out of the heart with each beat. (Systolic refers to the period in the pumping cycle when the heart pumps and is not resting between pumps.)

Diastolic heart failure: where the heart is unable to relax normally between pumping so does not fill properly. (Diastolic refers to the period in the pumping cycle when the heart rests between beats.) The European Society of Cardiology states that the distinction between systolic and diastolic heart failure is somewhat arbitrary. Most patients with heart failure have evidence of both systolic and diastolic dysfunction at rest or during exercise.

Right-sided heart failure: results from failure of the pumping action of the right side of the heart and causes swelling in the body, usually in the legs and abdomen.

Left-sided heart failure: results from failure of the pumping action of the left side of the heart and causes congestion in the lungs.

Forward heart failure: the inability of the heart to pump enough oxygenated blood to meet the needs of the body during exercise or at rest.

Backward heart failure: where the heart can meet the oxygen needs of the body only when heart-filling pressures are abnormally high.

High output heart failure: differs from the usual heart failure in that the heart may pump out its usual amount of blood, but that still may not be enough to meet the body's needs. This may occur in certain conditions when the body's need for blood is increased (for example, hyperthyroidism or Paget's disease), and the heart cannot meet those increased needs for oxygen-rich blood.

Congestive heart failure: a general term used to describe heart failure.

Acute and chronic heart failure: terms used inconsistently according to the European Society of Cardiology, which recommends the following:

- new onset, which includes first presentation (acute or slow onset)
- transient, which includes recurrent or episodic
- chronic, which includes persistent (stable, worsening or decompensated).

Further, classifications based on structural abnormality and damage to the heart muscle (ACC/AHA, see page 11) – or based on symptoms and functional capacity (NYHA, see page 12) – are used.

Left ventricular ejection fraction (LVEF): refers to the fraction of blood pumped out of the left ventricle with each heartbeat. A distinction is often drawn between patients with *preserved* ejection fraction (usually defined as greater than 40 to 50%) and those with left ventricular systolic dysfunction (characterised by reduced LVEF).

Stages of heart failure – the ACC/AHA classification

The American College of Cardiology (ACC) and the American Heart Association (AHA) together regularly release guidelines for the diagnosis and management of patients with heart failure (Jessup, Abraham et al 2009). The guidelines use a classification schema of four stages of heart failure syndrome, shown in Figure 3 below. The first two stages (A and B) are not heart failure per se but include those with risk factors that clearly predispose them towards the development of the condition. Stages A and B

have been defined in an attempt to help early identification of patients who are at risk of developing heart failure. This schema is intended to complement, not replace, the New York Heart Association functional classification scheme (see page 12). The guidelines, although aimed at a US audience, are of interest internationally, particularly because they include patients deemed 'at risk' of heart failure and the associated focus on the prevention of disease development.

(An expanded version of this figure is shown in Chapter 3 – see page 37 – and includes recommended treatment at each stage.)

Figure 3: Stages in the development of heart failure

At risk of heart failure   **Heart failure**

STAGE A
At high risk of HF but without structural heart disease or symptoms of HF

eg patients with:
• hypertension
• atherosclerotic disease
• diabetes
• obesity
• metabolic syndrome

or patients
• using cardiotoxins
• with CM family history

Structural heart disease →

STAGE B
Structural heart disease but without signs or symptoms of HF

eg patients with:
• previous MI
• LV remodelling including LVH and low EF
• asymptomatic valvular disease

Development of HF symptoms →

STAGE C
Structural heart disease with prior or current symptoms of HF

eg patients with:
• known structural heart disease
and
• shortness of breath, fatigue, reduced exercise tolerance

Refractory symptoms at rest →

STAGE D
Refractory HF requiring specialised interventions

eg patients with:
• marked symptoms at rest despite maximal medical therapy (ie recurrently rehospitalised or cannot be safely discharged without specialised interventions)

CM = cardiomyopathy   LV = left ventricular
EF = ejection fraction   LVH = left ventricular hypertrophy
HF = heart failure   MI = myocardial infarction

Source: Adapted from Jessup, Abraham et al (2009)

Stages of heart failure – NYHA classification

The New York Heart Association (NYHA) classification grades the severity of heart failure symptoms as one of four functional classes, on the basis of symptoms and exercise capacity. The classification is used internationally in clinical practice and in research (including in the UK), as it provides a standard description of severity that can be used to monitor progression of the condition, assess response to treatment, and guide management. The classification is less useful for prognosis because symptoms can fluctuate, and the severity of symptoms does not always reflect the severity of the underlying heart problem: people with severe heart disease can have mild symptoms, and vice versa.

Table 1: The stages of heart failure

Class	Patient symptoms
Class I (Asymptomatic)	No limitation of physical activity. Ordinary physical activity does not cause symptoms (undue fatigue, palpitations, shortness of breath or angina pectoris). This can be suspected only if there is a history of heart disease that is confirmed by investigations such as echocardiography.
Class II (Mild)	Slight limitation of physical activity. In milder Class II disease, strenuous exercise causes symptoms but patients can continue to have an almost normal lifestyle and employment. In more severe Class II cases, patients can be short of breath on one flight of stairs and be unable to work except at a desk.
Class III (Moderate)	Marked limitation of physical activity. Comfortable at rest, but fatigue, palpitations or shortness of breath result from mild physical exertion. Walking on the flat indoors and washing and dressing produce symptoms.
Class IV (Severe)	Unable to carry out any physical activity without discomfort. Patients are breathless at rest and mostly housebound. If any physical activity is undertaken, discomfort is increased.

Source: Adapted from Davis, Davies and Lip (2006) and the Heart Failure Society of America (online)

Underlying causes of disease

Heart failure has many causes and can evolve in different ways. Causes include the following.

Myocardial infarction (heart attack)

Heart attack survivors can develop heart failure as a result of the physical damage done to the heart muscles by the attack. The marked improvements that have been seen in acute myocardial infarction (AMI) survival rates in recent years (Myocardial Ischaemia National Audit Project 2009; Department of Health 2009) are thought to be one of the major factors in the dramatic increase in heart failure cases.

Coronary artery disease/ischaemia

Coronary artery disease is the end result of a complex process called atherosclerosis (hardening of the arteries). It is the most common cause of heart attack and involves the build up of unhealthy cholesterol on the arteries, with inflammation and injury in the cells of the blood vessels. The arteries narrow and become brittle and are then subject to damage. Heart failure in such cases most often results from a localised pumping defect in the left side of the heart.

Hypertension

While uncontrolled hypertension can contribute to the development of myocardial infarction, it is also a major cause of heart failure, even in the absence of a heart attack. It has been estimated that more than 70% of cases of heart failure start with hypertension (Davis, Davies and Lip 2006). In response to increased blood pressure, the heart muscles thicken. Over time, the force of the heart muscle contractions weakens and the muscles have difficulty relaxing, thereby preventing the normal filling of the heart with blood.

Cardiomyopathy

Damage to the heart muscles can cause them either to thin out (dilate) or become too thick (hypertrophic). In either case, the pumping action is disrupted and leads to heart failure. Dilated cardiomyopathy involves an enlarged heart ventricle. The muscles thin out, reducing the pumping action, usually on the left side. Although this condition is associated with genetic factors, the direct cause is often not known (in which case it is called idiopathic dilated cardiomyopathy). Research strongly indicates that viruses, such as Coxsackie virus, or other infections may be precipitating factors (Davis, Davies and Lip 2006). An autoimmune response may occur in which infection-fighting antibodies attack a person's own proteins in the heart, mistaking them for foreign agents. In hypertrophic cardiomyopathy, the heart muscles become thick and contract with difficulty. Some research indicates that this occurs because of a genetic defect that causes a loss of power in heart muscle cells and, subsequently, diminished pumping strength (McKenna and Elliott 2009). To compensate for this power loss, the heart muscle cells grow. This condition, rare in the general population, is often the cause of sudden death in young athletes.

Valvular and congenital heart disease

The valves of the heart control the flow of blood into and out of the organ. Valvular abnormalities take two main forms: narrowing, which causes a backup of blood; and failure to close properly, which causes blood to leak back into the heart. Historically, rheumatic fever, which scars the heart valves and prevents them from closing, was a significant cause of death from heart failure. Birth defects may also cause abnormal valvular development. Although more children born with heart defects are now living to adulthood, they are at higher risk of heart failure as they age.

It is important to note that many of these underlying causes of heart failure are themselves influenced by behavioural risk factors, such as diet and smoking, and other conditions, such as diabetes.

Complications of heart failure

There can be several complications of heart failure. The main complications are listed below.

Arrhythmias

- Atrial fibrillation (AF) can be either a cause or a consequence of heart failure. The prevalence of AF increases with the severity of heart failure. Patients with NYHA functional Class I symptoms have an AF prevalence of less than or equal to 5%, while patients in NYHA Class IV have a prevalence of 50% (Maisel and Stevenson 2003).

- Most evidence suggests that patients with heart failure and AF have a worse prognosis than patients with heart failure but no AF. Patients with heart failure and AF have an increased rate of exacerbation, an increased rate of hospitalisation for heart failure, and an increased rate of death (Maisel and Stevenson 2003). Atrial fibrillation is associated with increased mortality in heart failure patients. However, it is unclear whether there is a causal relationship: that is, whether AF is an independent predictor of mortality in people with heart failure (Neuberger, Mewis et al 2007).

Depression

- Up to a third of people with heart failure develop severe and prolonged depression (Department of Health 2000; Rutledge, Reis et al 2006).

- Depression is associated with poor quality of life, functional limitations, suboptimal self-care behaviours, higher healthcare costs and poorer outcomes for all patients with cardiovascular disease (Thombs, de Jonge et al 2008).

Stroke and thromboembolism

- Heart failure predisposes patients to thromboembolism (including stroke, deep vein thrombosis and pulmonary embolism). Factors contributing to this increased risk include low cardiac output (with relative stasis of blood in dilated cardiac chambers), AF and patient immobility (Davis, Davies et al 2006).

- Eighteen of every 1,000 heart failure patients suffer a stroke during the first year after their diagnosis. The stroke rate increases to a maximum of 47.4 per 1,000 at five years (Witt, Gami et al 2007).

Cachexia (wasting)

- Wasting is a serious complication of chronic heart failure and affects 10 to 15% of chronic heart failure patients. An important predictor of reduced survival, clinical or subclinical malnutrition is common in patients with severe heart failure. It usually occurs with severe dyspnoea (breathlessness) and weakness (European Society of Cardiology 2008).

- The role of cachexia in heart failure disease progression is poorly understood, and it has not yet been established whether prevention and treatment of cachexia should be a treatment goal (European Society of Cardiology 2008).

Sexual dysfunction

- Sexual dysfunction is a common complication in heart failure (European Society of Cardiology 2008). This may be related to cardiovascular disease, fatigue, weakness, medications (such as beta-blockers), depression and anxiety.

Public awareness of heart failure

The Study group on Heart failure Awareness
and Perception in Europe (SHAPE) conducted
a survey in 2002 to ascertain public levels of
awareness about heart failure in nine European
countries. Overall, 86% of those surveyed said
that they had heard of heart failure; however,
closer questioning revealed limited knowledge
about the disease. The chart opposite shows the
generally small proportion of respondents who
correctly identified the signs and symptoms
of heart failure. Across Europe, 24% of
respondents indicated that heart failure was
a 'minor' complaint, and 34% believed heart
failure was a normal consequence of ageing
(data not shown).

Awareness of signs and symptoms of heart failure, public survey, Europe, 2002
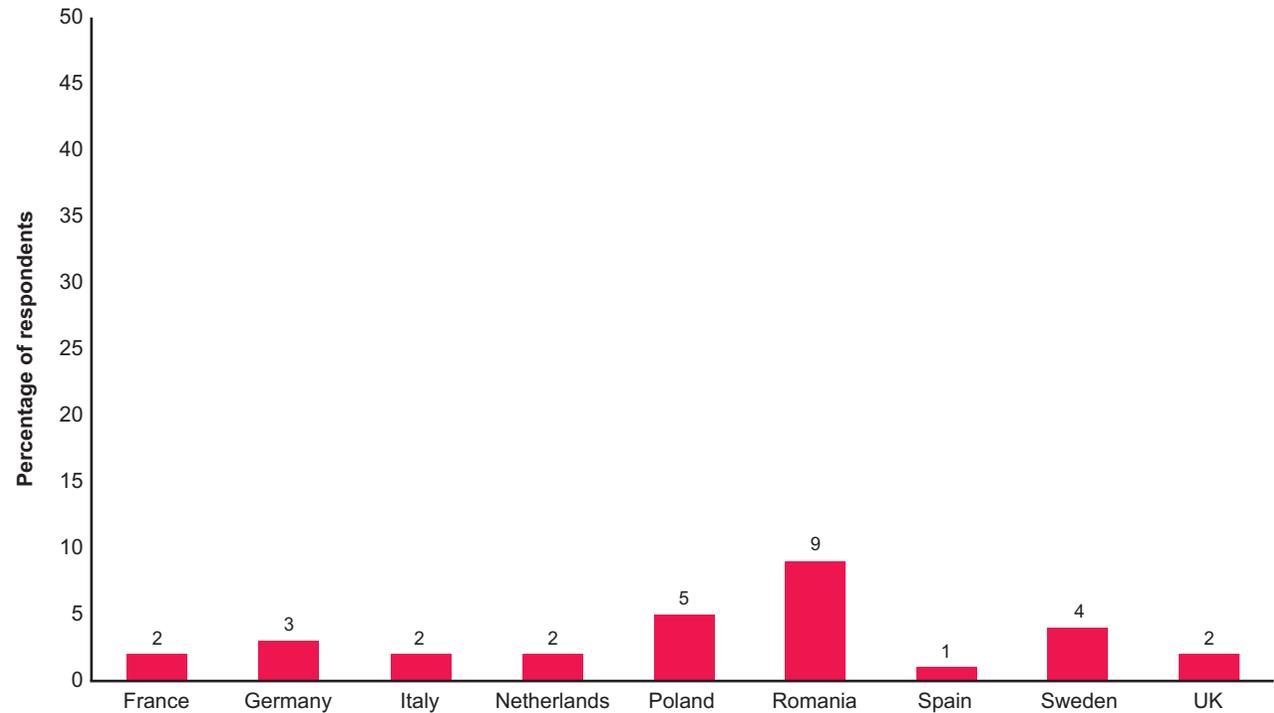
Source: Remme, McMurray et al (2005)

Chapter 2: The burden of disease

The British Heart Foundation estimates that 900,000 people in the UK live with definite or probable heart failure, and a further 60,000 people develop the condition each year (Mehta, Dubrey et al 2009). It has been estimated to affect 10 million people across Europe (Swedberg, Cleland et al 2005) and 5 million patients in the USA (Hunt, Abraham et al 2005).

Heart failure creates a significant burden, both in terms of compromising patients' quality of life and in an economic sense. This chapter presents data that quantify that burden.

Heart failure incidence – international

The World Health Organization (WHO) report on the global burden of disease (2008) quantifies the health effects of around 100 diseases and injuries across six geographic regions of the world. The chart below compares WHO data on the incidence of heart failure with stroke and cancer. (Heart failure is defined as the incidence of congestive heart failure due to rheumatic heart disease, hypertensive heart disease, ischaemic heart disease or inflammatory heart disease.) The chart opposite shows that, in 2004, there were an estimated 5.7 million new cases of heart failure around the world and 1.3 million in Europe.

Incidence of selected conditions, by WHO region, 2004
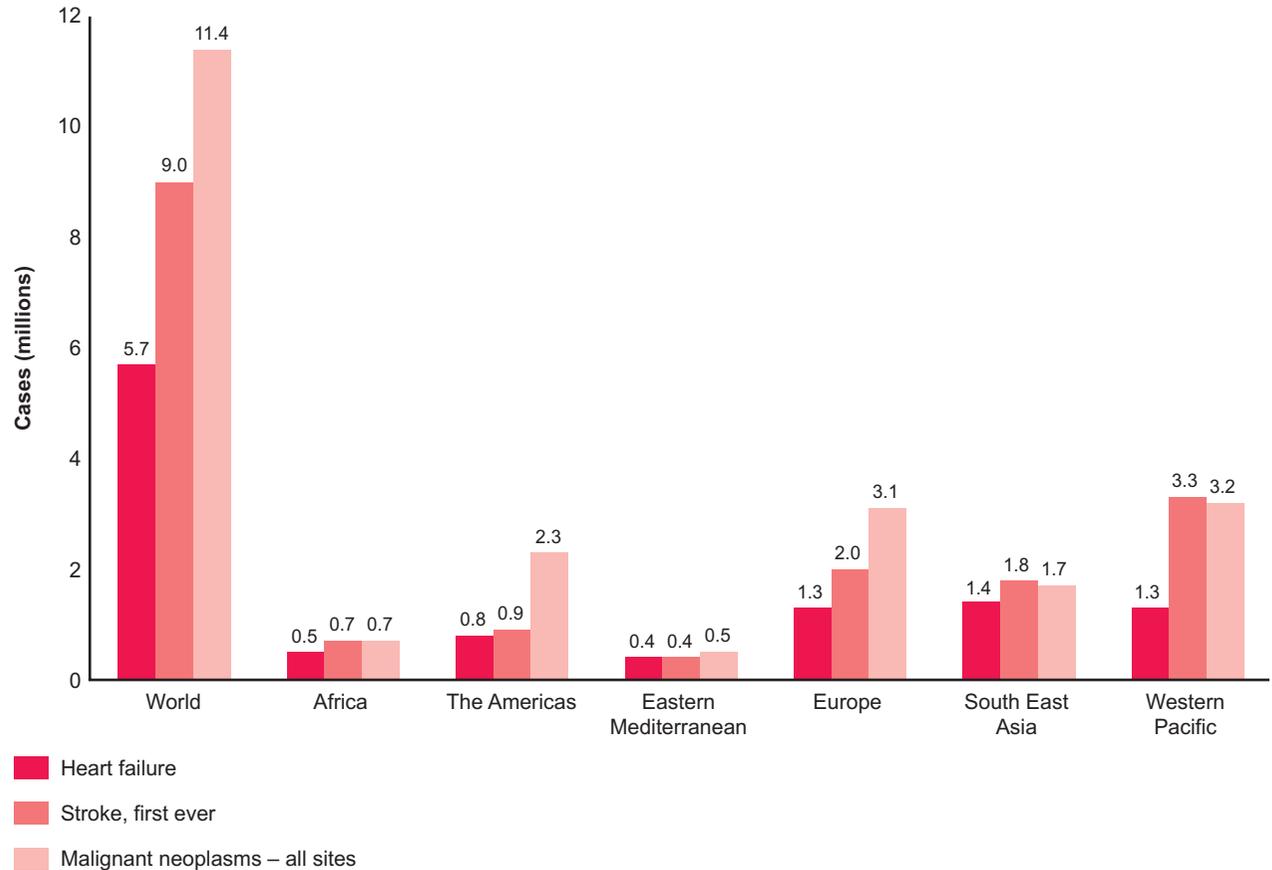
Source: World Health Organization (2008)

Heart failure incidence – England

Data on the incidence of heart failure are relatively sparse, with few population-based studies available (Mehta and Cowie 2006). Comparison between the studies that have been carried out is difficult because of differences in methodology. In brief, the key studies are as follows.

- In the USA, the Framingham study (Ho, Anderson et al 1993) reported the incidence of heart failure for those aged 50 to 59 years to be 0.3% per annum in men and 0.2% per annum in women; this rose tenfold to 2.7% in men and 2.2% in women aged 80 to 89 years. The mean age of the diagnosis of heart failure was 70 years. The incidence of the condition was significantly higher in men than women at all ages, with an age-standardised incidence ratio of 1.67.

- In England, the Hillingdon heart failure study (Cowie, Wood et al 1999) used clinical, epidemiological and echocardiographic data, and a case definition, based on three cardiologists applying the European Society of Cardiology definition of heart failure. The study reported an incidence rate of 0.2% per annum in men and 0.1% per annum in women aged 55 to 64 years, and rose markedly for those in the 85 and over age group to 1.7% in men and 1% in women. The median age at diagnosis was 76 years, and incidence was significantly higher for men than women in all age groups, with an age-standardised ratio of 1.75.

There are no European data available on changes over time in the incidence of heart failure (Mehta and Cowie 2006). In the USA, the Framingham cohort saw a 7% non-significant decrease in the age-adjusted incidence of heart failure in men, and a significant 31% reduction in women, between 1950 and 1999. A separate study in Olmstead County, Minnesota, reported no significant change in incidence in either men or women over two decades between 1979 and 2000 (Roger, Weston et al 2004).

The chart on page 19 illustrates the UK data from the Hillingdon study and clearly shows the age effect on incidence rates in both men and women. The British Heart Foundation has used the Hillingdon study to estimate that there are about 38,000 new cases of heart failure in men in the UK each year and about 30,000 in women, making a total of approximately 68,000 (British Heart Foundation Statistics website online b).

Incidence of heart failure by age and sex (age 25 and over), Hillingdon, 1996
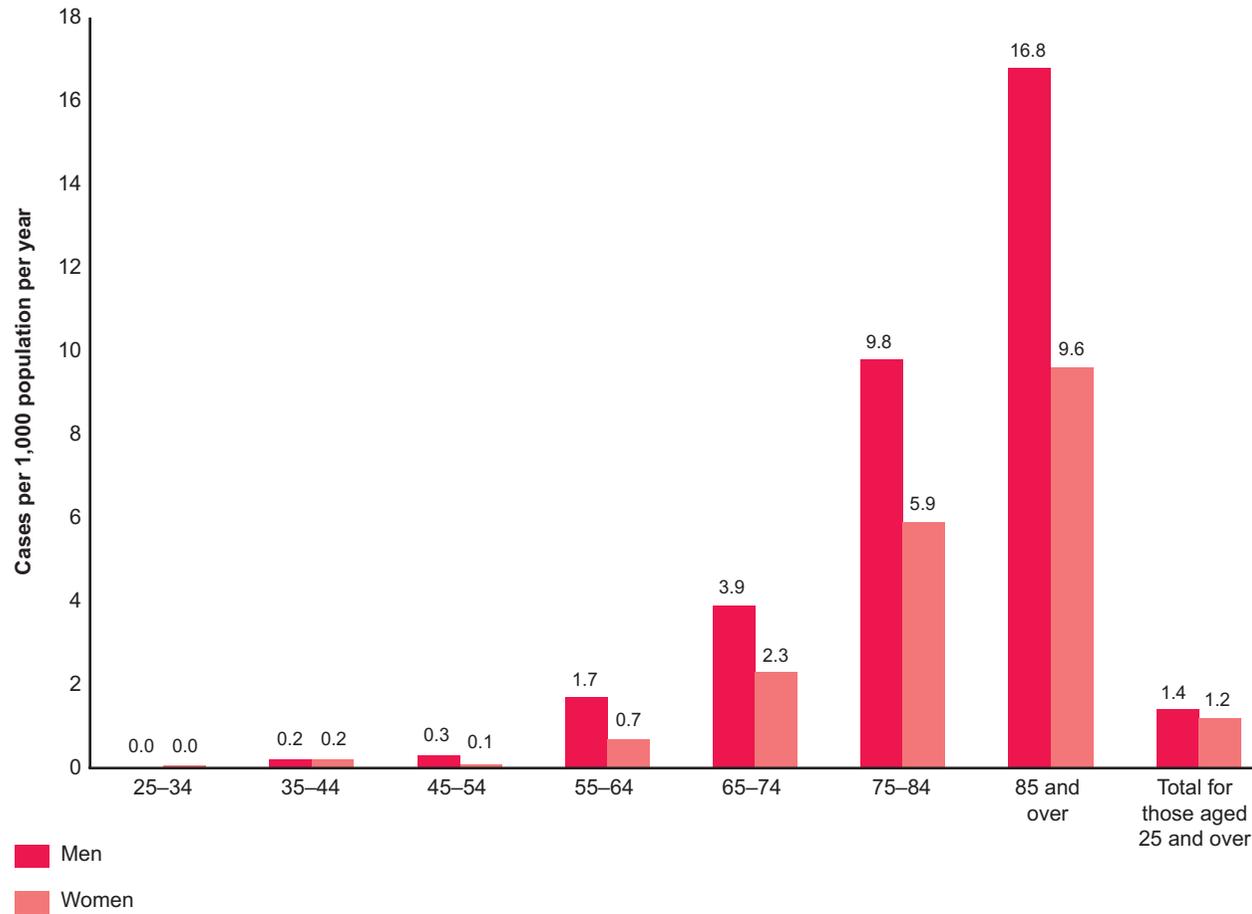
Source: Cowie, Wood et al (1999)

Heart failure prevalence – epidemiological studies

A number of studies have estimated the overall prevalence of heart failure. Two of the most recent UK studies (Davies, Hobbs et al 2001; Majeed, Williams et al 2005) are presented opposite. Both clearly depict the correlation between increasing age and heart failure, although there is a marked difference in prevalence in elderly males, probably as a result of differences in methodology. Data from the Framingham study show that the prevalence of coronary disease among new cases of heart failure has risen by 46% per decade (Mehta and Cowie 2006). The prevalence of diabetes has increased by 21% and 24% per decade in men and women respectively. By contrast, hypertension and valvular heart disease have decreased in prevalence.

Prevalence of heart failure by age group, two studies, 1995/99 and 2002/03

Legend:
- Davies, Hobbs et al (2001), males
- Davies, Hobbs et al (2001), females
- Majeed, Williams et al (2005), males
- Majeed, Williams et al (2005), females
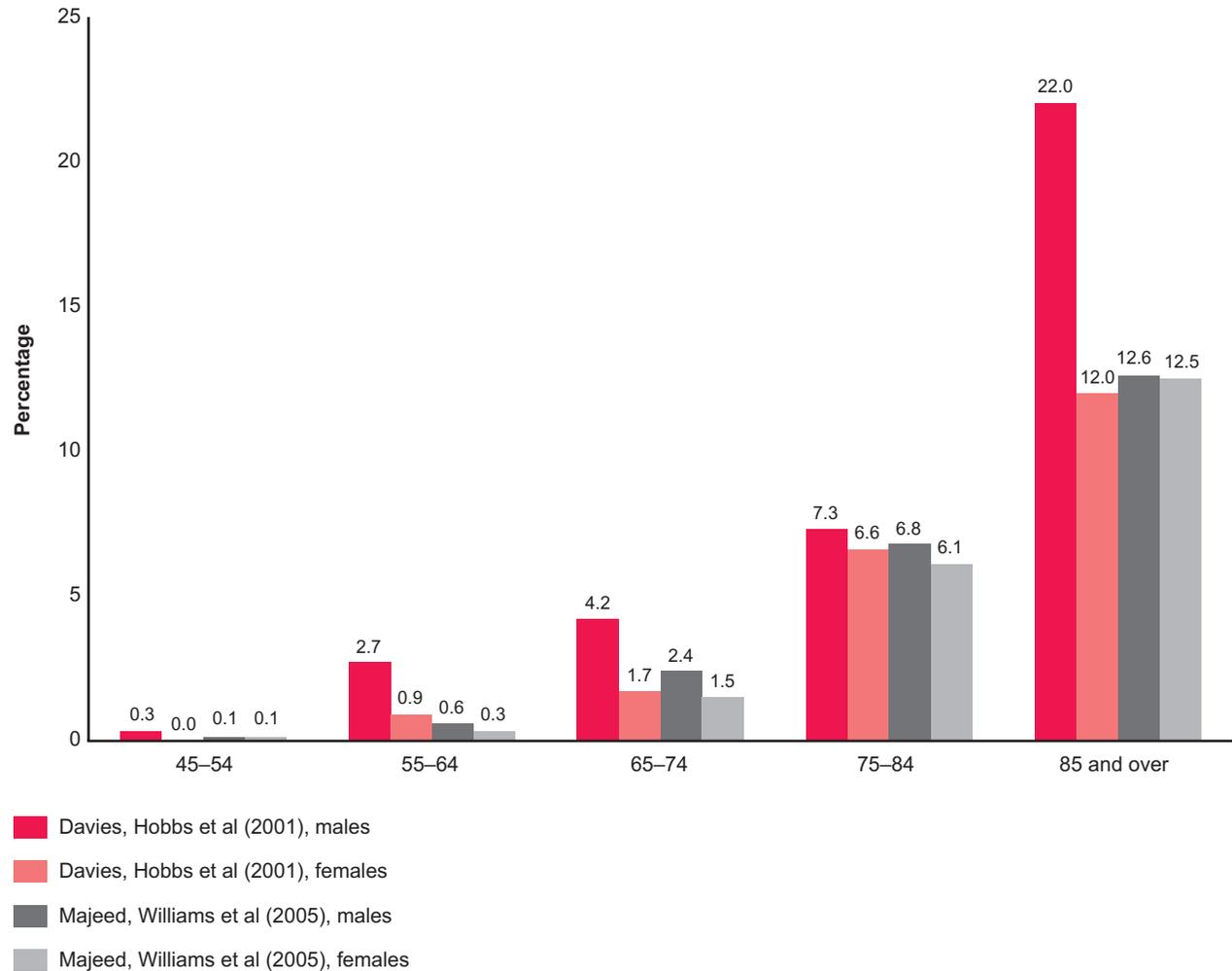
Heart failure prevalence – Quality and Outcomes Framework data

The Quality and Outcomes Framework (QOF) was introduced as part of the GP contract in the UK in 2004. It is a voluntary incentive scheme whereby general practices gain achievement points and payment on the basis of disease management, organisation, patient experience and extra services on offer. The chart opposite illustrates prevalence data from QOF across strategic health authorities (SHAs) for 2007/08 (NHS Information Centre for Health and Social Care 2008b). Across England, the prevalence is recorded in QOF as 0.75%, compared with the 1 to 2% reported in epidemiological studies (Royal College of Physicians 2005). This means that, at best, there are 127,500 sufferers in England alone who do not appear in the QOF datasets. This discrepancy may be a result of GPs not identifying all heart failure patients, thereby limiting access to diagnostic services and treatment that could improve patients' quality of life and prolong their lives.

Heart failure prevalence, QOF data, 2007/08

Strategic health authorities, 2006 boundaries
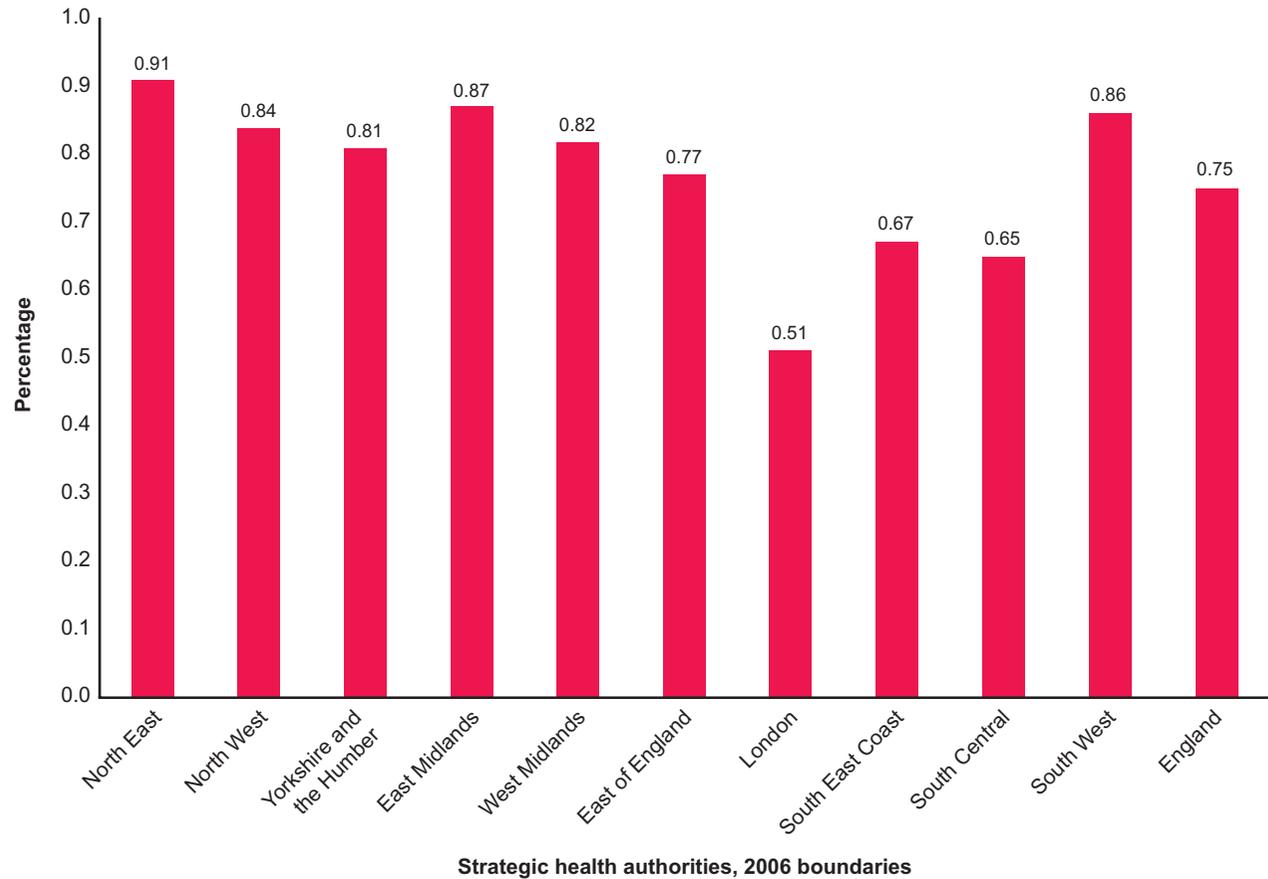
Note: these data are crude prevalence rates, and are not age nor sex standardised, so should be interpreted with caution.

Source: NHS Information Centre for Health and Social Care (2008b)

Costs of heart failure – international

Heart failure is diagnosed in 1 to 2% of the population in developed countries. The chart opposite illustrates the findings of an international study (Bundkirchen and Schwinger 2004) that estimated the direct costs due to heart failure (in €). Direct costs ranged from €26 per person in the UK to €70 per person in the USA.

Direct costs of heart failure, international estimates, 2004
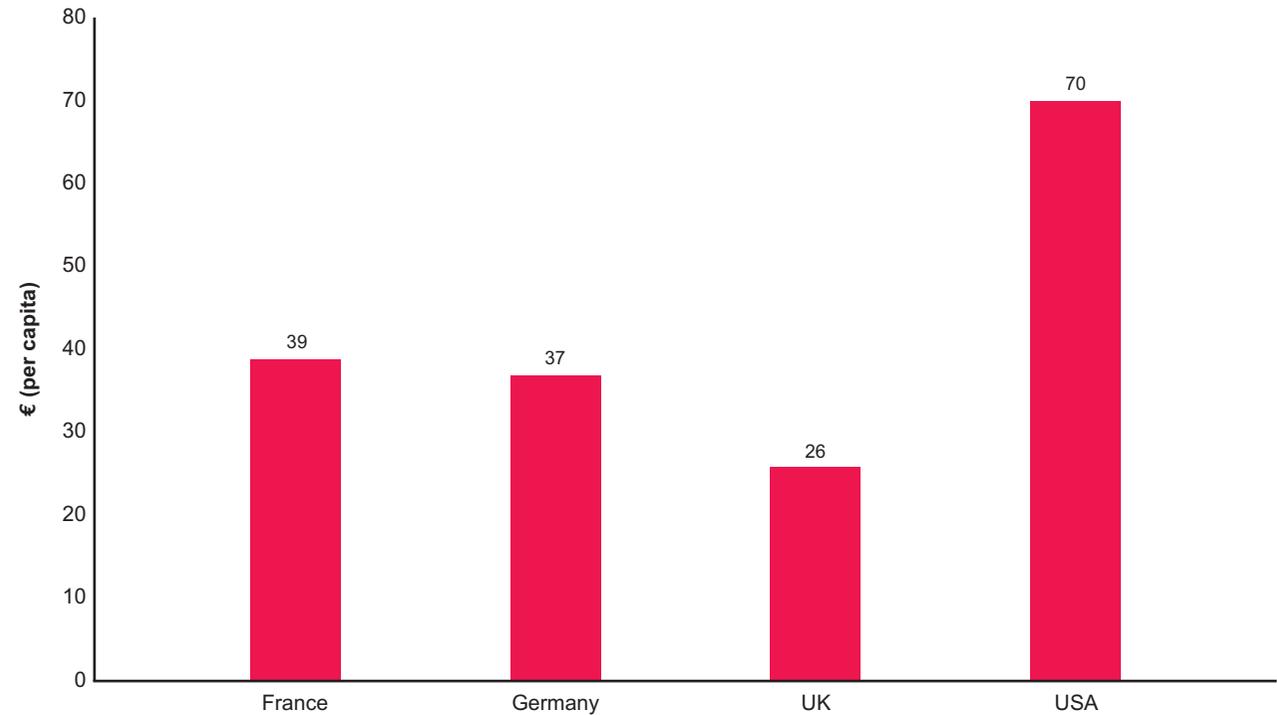
Source: Bundkirchen and Schwinger (2004)

Costs of care – number of bed days

The Hospital Episodes Statistics (HES) database is the English statistical data repository on the care provided by NHS hospitals, and for NHS hospital patients treated elsewhere. The chart opposite illustrates HES data on the number of bed days, grouped by three-character primary diagnosis codes recorded using International Classification of Diseases (ICD) 10 (World Health Organization online). The 25 codes with the highest number of bed days for 2007–08 are shown. Heart failure as the primary diagnosis was responsible for 754,476 bed days.

Number of bed days by primary diagnosis, 2007–08

Primary diagnosis	Bed days (thousands)
Unknown and unspecified causes of morbidity	2,334.5
Fracture of femur	1,722.8
Schizophrenia	1,609.4
Pneumonia – organism unspecified	1,258.3
Cerebral infarction	1,229.5
Other disorders of the urinary system	1,105.5
Other chronic obstructive pulmonary disease	818.5
Heart failure	754.5
Disorders relating to short gestation and low birth weight	616.1
Unspecified acute lower respiratory infection	585.0
Bipolar affective disorder	550.6
Acute myocardial infarction	539.0
Depressive episode	531.2
Arthrosis of knee	475.7
Chronic ischaemic heart disease	475.6
Senility	454.9
Abdominal and pelvic pain	417.0
Cellulitis	387.1
Arthrosis of hip	385.4
Stroke, not specified as haemorrhage or infarction	373.4
Unspecified dementia	365.8
Malignant neoplasm of bronchus and lung	354.7
Pain in throat and chest	345.9
Vascular dementia	341.0
Cholelithiasis	337.4

Bed days (thousands)

Source: Hospital Episode Statistics online (online)

Heart failure, average length of stay – international

The Organisation for Economic Co-operation and Development (OECD) collects, collates and reports on international health data. Its 2009 release reported the average length of stay (ALOS) for a number of conditions, including heart failure. ALOS is calculated by dividing the number of days stayed (from the date of admission in an inpatient institution) by the number of discharges (including deaths) for primary diagnosis recorded using ICD 9 and 10. The chart opposite shows that the UK has a longer ALOS than major comparators.

Average length of stay, heart failure, international, 1997–2007
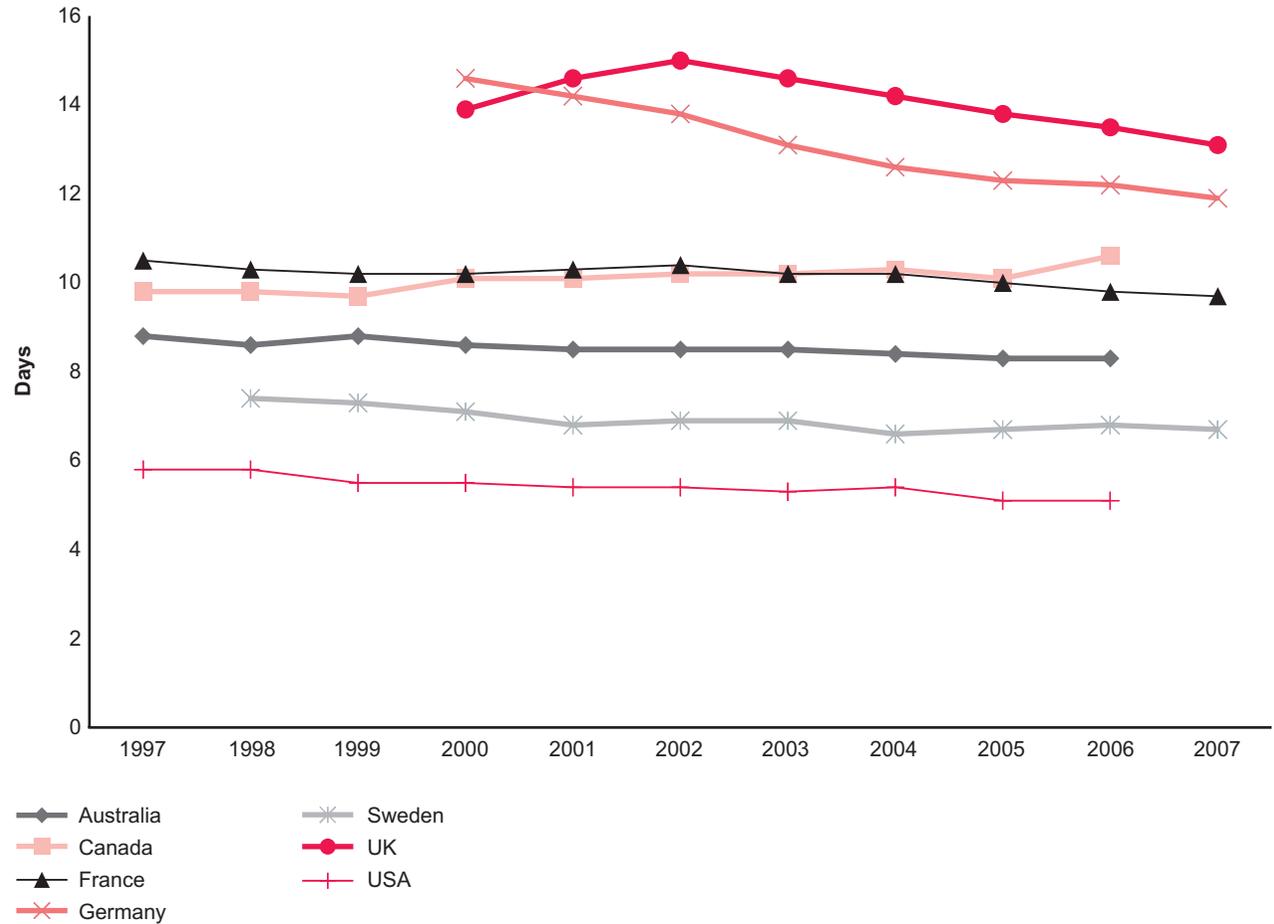
Note: some countries may include deaths and discharges as well as same-day separations.

Source: Organisation for Economic Co-operation and Development (2009)

Discharge rates for heart failure – international

The Organisation for Economic Co-operation and Development (OECD) collects data on discharge rates for major conditions. Discharge refers to the formal release of an inpatient from an acute care institution after a period of hospitalisation. It includes deaths in hospitals but usually excludes same-day separations and transfers to other care units within the same institution. The chart opposite illustrates that the UK has a relatively low discharge rate. Differences across countries may reflect different patterns of delivery of care, such as primary versus secondary, as well as differences in prevalence and disease severity. Examining these data alongside those in the chart on page 24 suggests that the UK admits relatively fewer heart failure patients than comparator countries. However, once admitted, heart failure patients stay longer in hospital.

Discharge rates, heart failure, international, 1997–2007
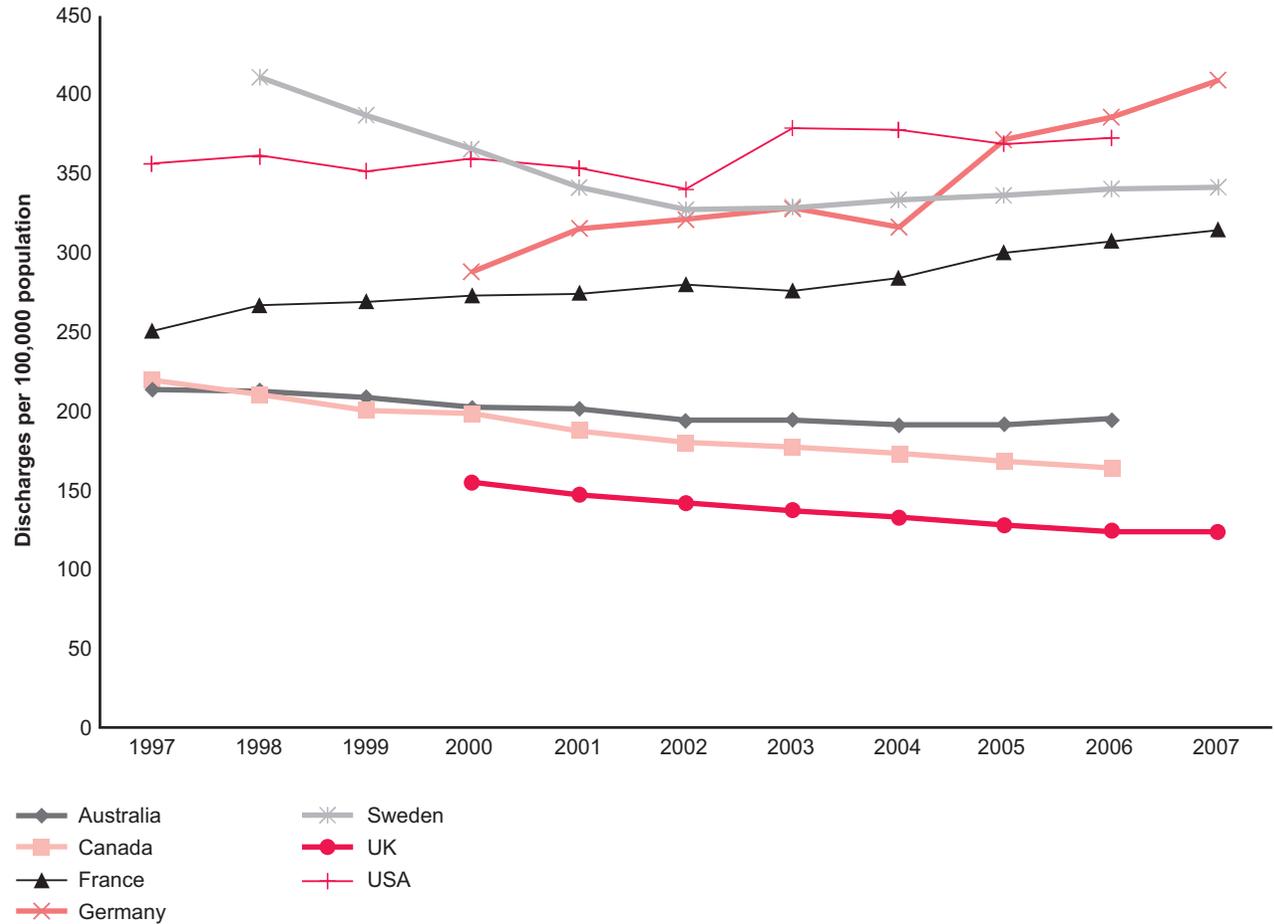
Note: the following countries include at least some same-day separations: France, the UK and the USA. The comparability of data from these countries is therefore limited compared with those countries that exclude same-day separations.

Source: Organisation for Economic Co-operation and Development (2009)

Costs of care – prescribing costs

The NHS Information Centre for Health and Social Care (online a) reports that, for 2008/09, drugs for hypertension and heart failure combined cost £401 million.

The chart opposite illustrates the net ingredient costs for 2008 for a number of key pharmaceuticals used to treat heart failure.

Net ingredient costs of prescribed drugs for hypertension and heart failure, England, 2008/09
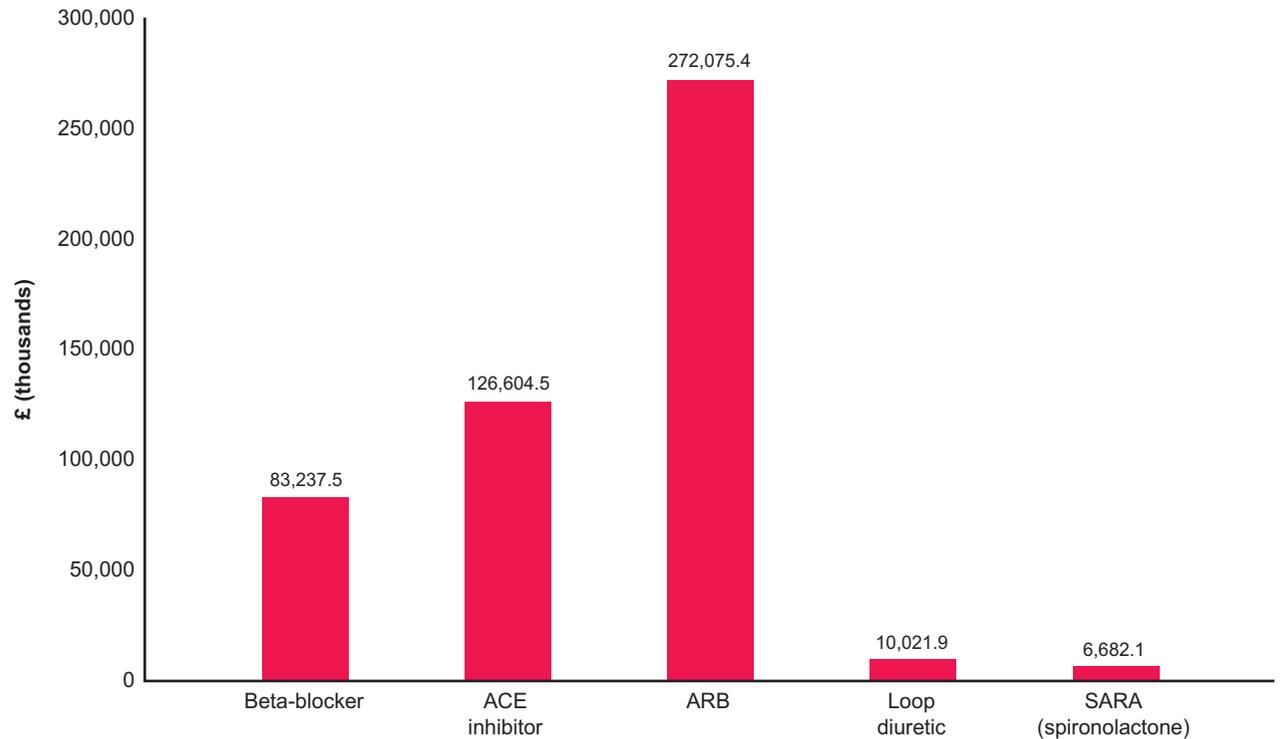
ACE = angiotensin-converting enzyme
ARB = angiotensin II receptor blocker
SARA = selective aldosterone receptor antagonist

Source: NHS Information Centre for Health and Social Care (2009a)

Overall cost estimate – heart failure

The British Heart Foundation has estimated the overall cost of heart failure to the NHS (British Heart Foundation Statistics website online c). The total cost for 2000 was estimated to be £629 million, with hospital inpatient care representing the major expense. The breakdown of their estimates is shown in the chart opposite.

Estimated total cost of heart failure to NHS, 2000
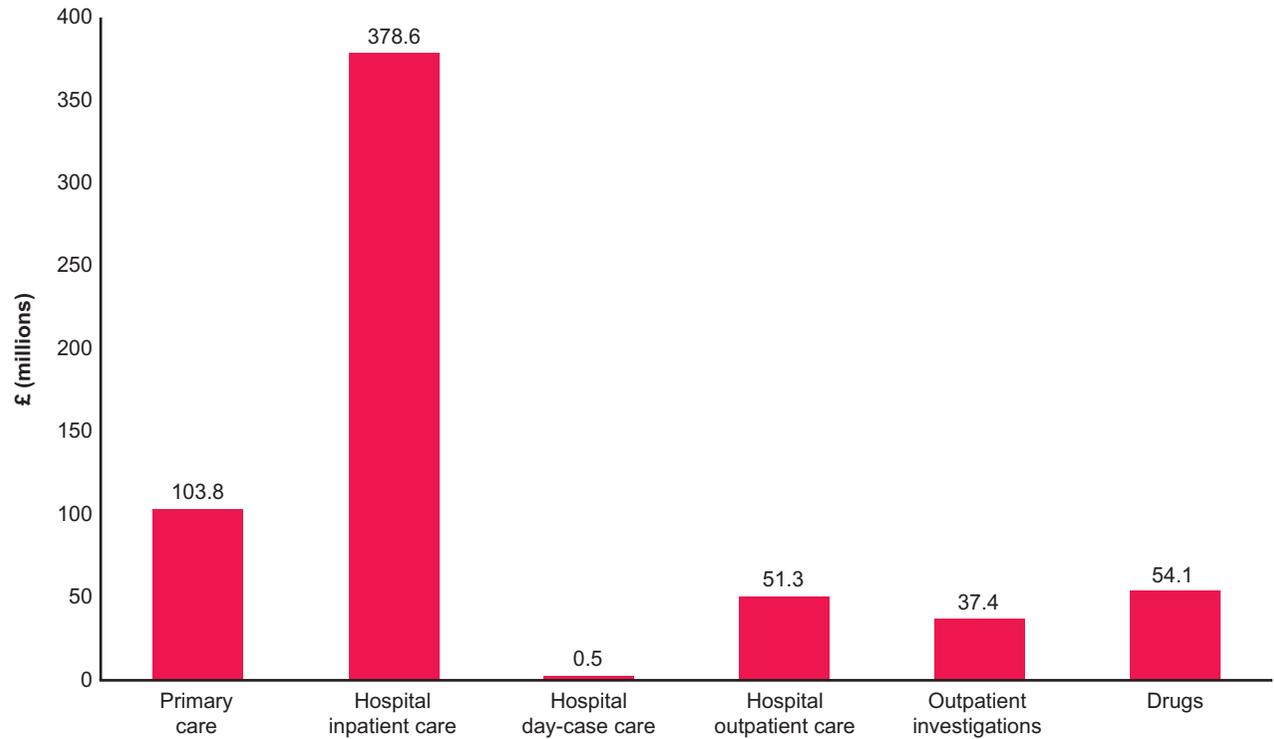
Source: British Heart Foundation Statistics website (online c)

Chapter 3: The policy and practice context in England

In recent years, concern has increased about the growing problem of heart failure: it is the only major cardiovascular condition that has become more prevalent in recent decades; it is responsible for dramatic impairment of quality of life; it carries a poor prognosis for patients; and it is very costly for the NHS to treat. This concern has resulted in a number of policy publications, reports, guidelines and programmes, many of which are outlined in this chapter.

Key publications and programmes

The last decade has seen a great deal of effort, investment and progress in improving the quality of care delivered to patients with circulatory diseases. In particular, there have been considerable achievements in the treatment of acute myocardial infarction (heart attack) and, more recently, a focus on stroke care. The table below identifies some of the key publications released since 2000 that have focused on heart failure.

Table 2: Key publications relating to heart failure

Source	Title
National Institute for Clinical Excellence – NICE (now the National Institute for Health and Clinical Excellence)	*Chronic heart failure: management of chronic heart failure in adults in primary and secondary care (CG5)* (2003a)
	Secondary prevention in primary and secondary care for patients following a myocardial infarction (CG48) (2007)
	Commissioning a heart failure service for the management of chronic heart failure (online a)
Department of Health	*National Service Framework for Coronary Heart Disease* (2000)
Healthcare Commission (now the Care Quality Commission)	*Pushing the boundaries: improving services for people with heart failure* (2007a)
Royal College of Physicians	*Chronic heart failure: national clinical guideline for diagnosis and management in primary and secondary care* (basis for NICE guideline) (2003)
	Managing chronic heart failure: learning from best practice (2005)
NHS Information Centre for Health and Social Care	*National Heart Failure Audit* (2007; 2008a; 2009b)
NHS Institute for Innovation and Improvement	*Focus on: heart failure* (2009)
European Society of Cardiology (ESC)	*ESC guidelines for the diagnosis and management of acute and chronic heart failure* (2008)

National Service Framework for Coronary Heart Disease – heart failure

In 2000, the Department of Health published the *National Service Framework for Coronary Heart Disease*, which lays out standards of care and performance milestones for the NHS. Chapter 6 was dedicated to heart failure. The stated standards and goals are:

Box 2: NSF standard

Doctors should arrange for people with suspected heart failure to be offered appropriate investigations (eg electrocardiography, echocardiography) that will confirm or refute the diagnosis. For those in whom heart failure is confirmed, its cause should be identified – the treatments most likely to both relieve symptoms and reduce their risk of death should be offered.

The NSF goal for heart failure in primary care

Every primary care team should: ensure that all those with heart failure are receiving a full package of appropriate investigation and treatment, demonstrated by clinical audit data no more than 12 months old.

The NSF goal for heart failure in secondary care

Every hospital should: offer complete and correct packages of audited effective interventions to all people discharged with a diagnosis of heart failure, demonstrated by clinical audit data no more than 12 months old.

Source: Department of Health (2000)

Since the publication of the National Service Framework (NSF) there have been huge improvements made in coronary heart disease (CHD) treatment, prevention and revascularisation. However, the Royal College of Physicians notes that the NSF was vague about what the interventions for heart failure patients should be and the evidence base for those interventions. In contrast to the advances in CHD, the quality of heart failure management has progressed rather more slowly (Royal College of Physicians 2005).

The NHS Heart Improvement Programme

The NHS Heart Improvement Programme, launched in 2005, is a national approach that supports cardiac networks and local teams to redesign their services and achieve sustainable changes to their services for patients and staff.

Its work is closely aligned to the National Service Framework for CHD, and the team works closely with clinical leads and the Department of Health to implement policies and strategies to improve services for patients, carers and staff.

Supported by national clinical leads until 2011, the Heart Improvement Programme focuses on:

- prevention and earlier diagnosis
  – vascular checks
  – rehabilitation – implementing the NICE guidelines (2007)
- sustainable cardiac pathways
- pathways for heart failure care
- reperfusion, primary angioplasty and pre-hospital thrombolysis.

Evidence-based clinical practice guidelines

There is a wealth of evidence available on heart failure. A number of organisations around the world have incorporated the available evidence into clinical practice guidelines. As well as setting out the current state of knowledge about best practice in the care of heart failure, these guidelines form the basis for measuring performance and gauging quality.

The following pages summarise three key sets of guidelines from the following organisations:

- the National Institute for Health and Clinical Excellence (NICE)
- the European Society of Cardiology (ESC)
- the American College of Cardiology/the American Heart Association (ACC/AHA).

Unsurprisingly, all give broadly similar advice; however, interesting differences exist. While the NICE guidelines are most relevant for a

UK audience, many British specialists are affiliated with the ESC through the British Cardiovascular Society, and these guidelines are widely cited in peer-reviewed literature. A brief overview of the US guidelines is also provided (see page 37). These are of particular interest because they explicitly address appropriate care for patients 'at risk' of developing heart failure. This approach is notable because it places greater emphasis on preventing (or arresting) the development of heart failure at early stages, which can then result in potential benefits in patient welfare and in decreased costs to the healthcare system.

New recommendations for diagnosis from a recently published systematic review are also included (see page 38).

Part two of this publication reviews performance and quality of care on the basis of the evidence on heart failure and the guidelines included in this chapter.

NICE guidelines

The box below outlines the key recommendations from the NICE guidelines (2003a, due for partial update in 2010).
On the following pages, NICE guideline algorithms for diagnosis and treatment are shown.

Box 3: Key recommendations

Diagnosis

1. The basis for historical diagnoses of heart failure should be reviewed, and only patients whose diagnosis is confirmed should be managed in accordance with this guideline.

2. Doppler 2D echocardiographic examination should be performed to exclude important valve disease, assess the systolic (and diastolic) function of the (left) ventricle and detect intracardiac shunts.

Treatment

3. All patients with heart failure due to left ventricular systolic dysfunction should be considered for treatment with an ACE inhibitor.

4. Beta-blockers licensed for use in heart failure should be initiated in patients with heart failure due to left ventricular systolic dysfunction after diuretic and ACE inhibitor therapy (regardless of whether or not symptoms persist).

Monitoring

5. All patients with chronic heart failure require monitoring. This monitoring should include:
   • a clinical assessment of functional capacity, fluid status, cardiac rhythm, and cognitive and nutritional status
   • a review of medication, including need for changes and possible side effects
   • serum urea, electrolytes and creatinine.

Discharge

6. Patients with heart failure should generally be discharged from hospital only when their clinical condition is stable and the management plan is optimised.

7. The primary care team, patient and carer must be aware of the management plan.

Supporting patients and carers

8. Management of heart failure should be seen as a shared responsibility between patient and healthcare professional.

Source: National Institute for Clinical Excellence (2003a)

Figure 4: Algorithm summarising NICE recommendations for the diagnosis of heart failure

Suspected heart failure
because of history, symptoms, and signs

Seek to exclude heart failure through:
• 12-lead ECG
• and/or natriuretic peptides (BNP or NT-proBNP) – where available

Other recommended tests:
(mostly to exclude other conditions)
• chest x-ray
• blood tests: U&Es, creatinine, FBC, TFTs, LFTs, glucose, and lipids
• urinalysis, peak flow or spirometry

Both normal
Heart failure unlikely: consider alternative diagnosis

One or more abnormal

Imaging by echocardiography*

No abnormality detected
Heart failure unlikely, but if diagnostic doubt persists consider diastolic dysfunction and referral for specialist assessment

Abnormal
• Assess heart failure severity, aetiology, precipitating and exacerbating factors and type of cardiac dysfunction
• Correctable causes must be identified
• Consider referral

BNP = B-type natriuretic peptide
ECG = electrocardiogram
FBC = full blood count
LFTs = liver function tests
NT-proBNP = N-terminal pro-B-type natriuretic peptide
TFTs = thyroid function tests
U&Es = urea and electrolytes

* Alternative methods of imaging the heart should be considered when a poor image is produced by transthoracic Doppler 2D echocardiography – alternatives include transoesophageal Doppler 2D echocardiography, radionuclide imaging or cardiac magnetic resonance imaging

Source: Adapted from the National Institute for Clinical Excellence (2003a)

Box 4: Explanation of diagnostic tests

Current NICE guidance (2003a) states that patients in whom heart failure is suspected should undergo an electrocardiogram (ECG) and/or a B-type natriuretic peptide (BNP) test, where available, and if either of these is positive, then they should be referred for echocardiography as part of their diagnostic work up.

Echocardiography: a technique that uses high frequency sound waves (ultrasound) to produce images of the heart. These images are used to detect structural and/or functional abnormalities of the heart. The test is performed either by putting a probe on the external surface of the chest or, in a more invasive procedure, by passing a probe into the oesophagus. Echocardiography provides visual information about the function of the heart, enables inspection of the heart valves to check whether they are opening and closing properly, and allows for measurement of the heart's chambers, major blood vessels and the thickness of the heart walls. Doppler ultrasound studies give information about the direction and velocity of blood flow within the heart.

Electrocardiography: this measures the electric activity of the heart. The contraction and relaxation of cardiac muscle results from the depolarisation and repolarisation of myocardial (heart) cells. These electrical changes are recorded via electrodes placed on the limbs and chest wall and are transcribed onto graph paper to produce an ECG (Meek and Morris 2002). The ECG cannot reliably measure the pumping ability of the heart.

B-type natriuretic peptide test: BNP is a substance secreted from the ventricles in response to changes in pressure that occur when heart failure develops and worsens. The level of BNP in the blood increases when heart failure symptoms worsen, and decreases when the heart failure condition is stable. The BNP level in patients with heart failure – even those who are stable – is higher than in a person with normal heart function. BNP is co-secreted along with the biologically inactive N-terminal pro-B-type natriuretic peptide (NT-proBNP). Either can be used as the basis for a screening tool or diagnostic marker.

Figure 5: NICE algorithm for the pharmacological treatment of symptomatic heart failure due to left ventricular systolic dysfunction
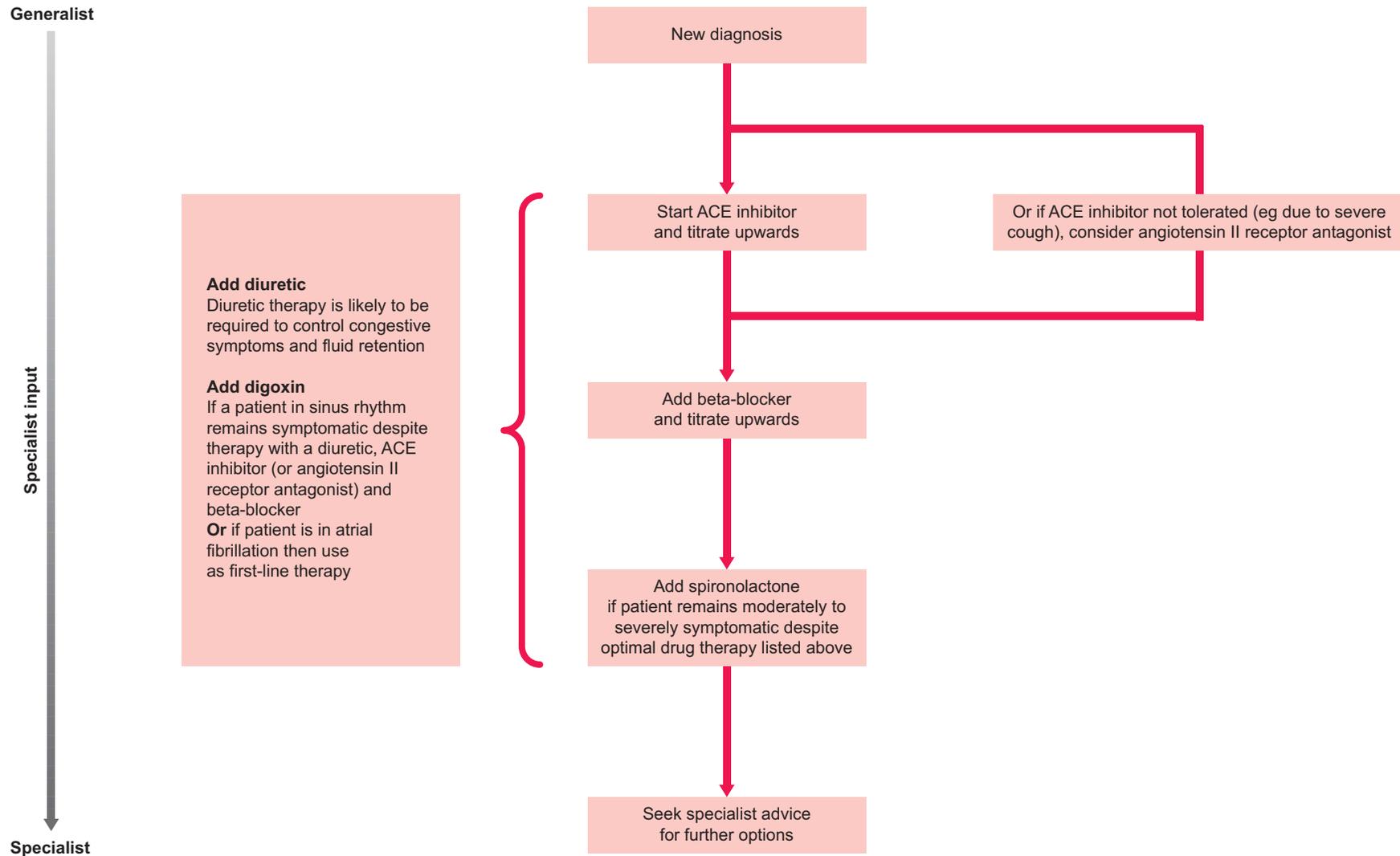
Source: Adapted from the National Institute for Clinical Excellence (2003a)

Box 5: Key therapeutic agents

People with heart failure due to left ventricular systolic dysfunction should be treated with several medications in order to relieve symptoms, enhance life expectancy and reduce hospital admissions. The key medications are:

- *Angiotensin-converting enzyme (ACE) inhibitors*: these act to dilate blood vessels and reduce blood pressure, which improves the function of a failing heart. When used with diuretics, ACE inhibitors can improve symptoms, the tolerance for exercise, and survival, and can reduce hospital admission rates.

- *Beta-blockers*: clinical trials have shown the unequivocal benefits of beta-blockers in patients with chronic systolic heart failure. These benefits include improved survival and a reduced need for hospitalisation.

- *Angiotensin II receptor antagonists (ARB)*: these work in a similar way to ACE inhibitors and can be substituted if ACE inhibitors are poorly tolerated.

- *Loop diuretics*: these act on the loop of Henle (in the kidney) to inhibit sodium and chloride reabsorption. This prevents urine from becoming too concentrated and increases urine production, leaving less water for reabsorption and resulting in a decrease in blood volume.

- *Selective aldosterone receptor antagonists (SARA)*: aldosterone is a hormone that increases the reabsorption of sodium and water and the secretion of potassium in the kidneys. This increases blood volume and blood pressure. Aldosterone antagonists (for example, spironolactone) act to block aldosterone and have been shown to reduce mortality in patients with severe heart failure.

Note: clinical trials have shown decreased mortality from the use of cardiac resynchronisation therapy and implantable defibrillators in selected patients with heart failure (see Mehta, Dubrey et al 2009 – however, in their study, there was not a high level of use).

European Society of Cardiology guidelines

Figure 6: A treatment algorithm for patients with symptomatic heart failure and reduced ejection fraction

Detect co-morbidities and precipitating factors

Non-cardiovascular
• Anaemia
• Pulmonary disease
• Renal dysfunction
• Thyroid dysfunction
• Diabetes

Cardiovascular
• Ischaemia/CAD
• Hypertension
• Valvular dysfunction
• Diastolic dysfunction
• Atrial fibrillation
• Ventricular dysrhythmias
• Bradycardia

Symptomatic heart failure + reduced ejection fraction

Diuretic + ACEI (or ARB)
Titrate to clinical stability

Beta-blocker

Persisting signs and symptoms?
Yes — **No**

Add aldosterone antagonist *or* ARB

Persisting symptoms?
Yes — **No**

QRS >120ms?
Yes — **No**

LVEF <35%?
Yes — **No**

Consider CRT-P or CRT-D

Consider digoxin, hydralazine/nitrate, LVAD, transplantation

Consider ICD

No further treatment indicated

ACEI = angiotensin-converting enzyme inhibitor
ARB = angiotensin II receptor blocker
CAD = coronary artery disease
CRT-D = cardiac-resynchronisation therapy defibrillators
CRT-P = cardiac-resynchronisation therapy pacemaker
ICD = implantable cardioverter defibrillator
LVAD = left ventricular assist device
LVEF = left ventricular ejection fraction
QRS = the QRS complex is a recording of a single heartbeat on the ECG that corresponds to the depolarisation of the right and left ventricles (QRS refer to points on the trace)

Source: European Society of Cardiology (2008)

American College of Cardiology/American Heart Association guidelines

Figure 7: Stages in the development of heart failure/recommended therapy by stage

At risk of heart failure

Heart failure

STAGE A
At high risk of HF but without structural heart disease or symptoms of HF

eg patients with:
• hypertension
• atherosclerotic disease
• diabetes
• obesity
• metabolic syndrome

or patients:
• using cardiotoxins
• with CM family history

Structural heart disease

STAGE B
Structural heart disease but without signs or symptoms of HF

eg patients with:
• previous MI
• LV remodelling including LVH and low EF
• asymptomatic valvular disease

Development of HF symptoms

STAGE C
Structural heart disease with prior or current symptoms of HF

eg patients with:
• known structural heart disease
and
• shortness of breath, fatigue, reduced exercise tolerance

Refractory symptoms at rest

STAGE D
Refractory HF requiring specialised interventions

eg patients with:
• marked symptoms at rest despite maximal medical therapy (ie recurrently rehospitalised or cannot be safely discharged without specialised interventions)

Therapy

Goals
• Treat hypertension
• Encourage smoking cessation
• Treat lipid disorders
• Discourage alcohol intake, illicit drug use
• Control metabolic syndrome

Drugs
• ACEI/ARB in appropriate patients for vascular disease or diabetes

Therapy

Goals
• Measures under Stage A

Drugs
• ACEI/ARB in appropriate patients
• Beta-blockers in appropriate patients

Devices in selected patients
• Implantable defibrillators

Therapy

Goals
• Measures under Stage A
• Dietary salt restriction

Drugs for routine use
• Diuretics for fluid retention
• ACEI
• Beta-blockers

Drugs in selected patients
• Aldosterone antagonists
• ARBs
• Digitalis
• Hydralazine/nitrates

Devices in selected patients
• Biventricular pacing
• Implantable defibrillators

Therapy

Goals
• Measures under Stages A, B, C
• Decision regarding appropriate level of care

Options
• Compassionate end-of-life care
• Extraordinary measures eg heart transplant, chronic inotropes, permanent mechanical support, experimental surgery or drugs

ACEI = angiotensin-converting enzyme inhibitor
ARB = angiotensin II receptor blocker
CM = cardiomyopathy
EF = ejection fraction

HF = heart failure
LV = left ventricular
LVH = left ventricular hypertrophy
MI = myocardial infarction

Source: Adapted from Jessup, Abraham et al (2009)

New recommendations for diagnosis

A recently published systematic review (Mant, Doust et al 2009) sought to determine the potential value of clinical features in the diagnostic assessment, and the relative value of the different diagnostic tests that are available in primary care, with the ultimate aim of making recommendations about the optimal approach to diagnosis of heart failure in primary care in the UK. The report recommended that the B-type natriuretic peptide (BNP) test – or N-terminal pro-B-type natriuretic peptide (NT-proBNP) test – be used in preference to the electrocardiogram, based on greater accuracy of the BNP test. The review also developed clinical rules for diagnosis pathways, illustrated below.

Figure 8: The optimal approach to diagnosing heart failure

In a patient presenting with symptoms such as breathlessness in whom heart failure is suspected, refer directly to echocardiography if the patient:

- Has a history of myocardial infarction or basal crepitations
- Is male with ankle oedema

Echocardiography

Otherwise carry out a BNP test and refer for echocardiography depending on the results of the test:

- Female, no ankle oedema – refer if BNP >210–360pg/ml (or NT-proBNP >620–1,060pg/ml) depending upon local availability of echocardiography
- Male, no ankle oedema – refer if BNP >130–220pg/ml (or NT-proBNP >390–660pg/ml)
- Female, with ankle oedema – refer if BNP >100–180pg/ml (or NT-proBNP >190–520pg/ml)

BNP, followed by echocardiography if indicated

Source: Mant, Doust et al (2009)

PART TWO

Quality of care

Chapter 4: Measuring quality of care

The fundamental first step in identifying and bridging gaps in the quality of healthcare is setting standards of care by developing evidence-based clinical practice guidelines. The evidence-based processes that guidelines identify can then be used to develop performance measures that evaluate the quality of care provided by organisations and clinicians.

This chapter outlines the six key domains of quality and then presents available data relating to those domains.

What is quality of care? General principles

Quality in healthcare is a multifaceted concept that is not amenable to definition by a single performance measure or simple metric. In the past decade, there has been a concerted effort to improve measurement and reporting. A growing consensus about the key domains of quality in healthcare, and relevant measures and indicators to populate those domains, has emerged (Agency for Healthcare Research and Quality 2003; Institute of Medicine 2001; Organisation for Economic Co-operation and Development 2002). The table on page 41 outlines six key domains that have been used to evaluate and monitor quality of care.

In this chartbook, these domains are used to present the data on quality of heart failure care in the NHS in England. The data have been configured to illustrate various aspects of performance including:

- international comparisons to contextualise performance

- longitudinal time series to track changes over time

- one-off 'snapshots' to gauge performance at a single point in time (often against predefined standards)

- variation charts to illustrate variability of performance within the healthcare system.

The criteria used to determine which indicators to include in the chartbook were:

- *relevance*: indicators are clinically meaningful or important to patient experience

- *methodological rigour*: the data have credence and validity, and the indicators draw on a sound evidence base

- *balance*: the data contribute to a multifaceted picture of quality in heart failure care

- *timeliness*: the data provide an up-to-date assessment of quality.

Table 3: Six key domains to evaluate and monitor quality of care

Quality domain	Principle	Examples of measures
Effectiveness	Healthcare services should be based, as far as possible, on relevant rigorous science and research evidence.	• Mortality rates • Compliance rates with evidence-based guidelines
Access and timeliness	Healthcare services should be provided at the time they are needed, within the appropriate setting.	• Provision of emergency care • Availability of specialist care or rehabilitation
Capacity	Healthcare systems should be sufficiently well resourced to enable delivery of appropriate services.	• Staffing levels • Number of scanners • Information technology
Safety	Patients should not be harmed by the care that they receive or be exposed to unnecessary risk.	• Nosocomial/healthcare-associated infections • Medication errors • Falls

Patient centredness	Healthcare should be:
	1. based on a partnership between practitioners and patients (and, where appropriate, their families)
	2. delivered with compassion, empathy and responsiveness to the needs, values and preferences of the individual patient.
		• Survey data on:
		  – patient evaluations of care
		  – shared decision making
		  – patient experiences and interactions with staff

Equity	Healthcare should be provided: 1. on the basis of clinical need, regardless of personal characteristics such as age, gender, race, ethnicity, language, socio-economic status or geographical location 2. in such a way as to reduce differences in health status and outcomes across various subgroups.	• Comparisons of care provided across different sub-populations (for example, older people versus entire population) • Mortality rates by socio-economic status

Source: Leatherman and Sutherland (2008; 2005; 2003)

Measuring quality of care in heart failure

Heart failure, although a complex and multifaceted condition, can boast an abundance of randomised controlled trials and well-vetted practice guidelines.

Guidelines that are particularly relevant to England are those published by the European Society of Cardiology (2008) and the National Institute for Clinical Excellence (2003a but currently undergoing review – see Chapter 3 for more details). These guidelines provide the basis for developing performance indicators.

The American College of Cardiology/American Heart Association (ACC/AHA) guidelines from the USA (Jessup, Abraham et al 2009) are accompanied by a set of clinical performance measures for adults with heart failure (Bonow, Bennett et al 2005). These indicators are outlined in Table 4. (Note: with the exception of the anticoagulant for atrial fibrillation indicator, the inpatient set comprises reportable metrics for Joint Commission accreditation.) Recent data from the USA have found improving performance in the ACC/AHA indicators at a national level, albeit with great heterogeneity at regional and local levels. However, there is growing concern that process metrics, such as those shown below, may not accurately predict short-term outcomes in terms of death and hospital readmission rates (Bonow 2008).

Table 4: Clinical performance indicators for adults with heart failure – ACC/AHA indicator set

Performance indicator	Description
Inpatient measures	
1. Evaluation of left ventricular systolic (LVS) function	Heart failure patients with documentation in the hospital record that LVS function was assessed before arrival, during hospitalisation, or is planned after discharge.
2. Angiotensin-converting enzyme inhibitor (ACEI), or angiotensin receptor blocker (ARB) for left ventricular systolic dysfunction (LVSD)	Heart failure patients with LVSD and without both ACEI and ARB contraindications who are prescribed ACEI or ARB at hospital discharge.
3. Anticoagulant at discharge for heart failure (HF) patients with atrial fibrillation (AF)	Heart failure patients with chronic/recurrent AF and without warfarin contraindications who are prescribed warfarin at discharge.
4. Discharge instructions	Heart failure patients discharged home with written instructions or educational material given to patient or caregiver at discharge or during the hospital stay addressing *all* of the following: activity level, diet, discharge medications, follow-up appointment, weight monitoring, and what to do if symptoms worsen.
5. Adult smoking cessation advice/counselling	Heart failure patients with a history of smoking cigarettes, who are given smoking cessation advice or counselling during hospital stay.

Table 4 *continued*

Performance indicator	Description
Outpatient measures	
1. Initial laboratory tests	Initial laboratory evaluation of patients with newly diagnosed HF.
2. LVS function assessment	Heart failure patents with documentation that LVS has been assessed.
3. Weight measurement	Measurement of patient's weight at each outpatient visit to assess change in volume status.
4. Blood pressure measurement	Measurement of patient's blood pressure at each outpatient visit.
5. Assessment of clinical symptoms of volume overload (excess)	Assessment of clinical symptoms of volume overload at each outpatient visit (eg, dyspnoea, orthopnoea).
6. Assessment of clinical signs of volume overload (excess)	Completion of a physical examination pertaining to volume status assessment in patients diagnosed with HF at each outpatient visit. Signs include peripheral oedema, rales, hepatomegaly, ascites, elevated jugular venous pressure.
7. Assessment of activity level	Evaluation of the impact of HF on activity level at each outpatient visit.
8. Patient education	Percentage of patients who were provided with patient education on disease management and health behaviour changes during one or more visits within the period of assessment.
9. Beta-blocker therapy	Prescription of beta-blockers in patients with HF and LVSD.
10. ACEI or ARB therapy for patients with heart failure who have LVSD	Prescription of ACEI or ARB for management of outpatients with LVSD.
11. Warfarin therapy for patients with AF	Use of warfarin in patients with both HF and AF.

Source: Adapted from Bonow, Bennett et al (2005)

In England, a nationally run clinical audit has defined a range of performance measures (see page 45); and the Quality and Outcomes Framework (QOF) reports on achievement levels in primary care. Additionally, the Better Metrics project (Healthcare Commission 2007b) seeks to:

- develop new metrics that are more relevant to the work of doctors, nurses and others who provide care to patients

- identify metrics that organisations are already using successfully to monitor and improve performance

- share metrics with the NHS Connecting for Health programme, as part of the process for developing electronic patient records.

The most recent release contains only two indicators specifically for heart failure:

Indicator 2.10 The percentage of patients with a diagnosis of CHD and left ventricular dysfunction who are currently treated with ACE inhibitors (or A2 antagonists): data collected by QMAS system for the QOF; and

Indicator 10.06 Proportion of deceased older people with evidence of good end of life care prior to death (one of preferred place of care, Liverpool Care Pathway, Gold Standards Care or equivalent): data currently unavailable.

(Healthcare Commission 2007b)

The Department of Health and the NHS Information Centre for Health and Social Care have compiled a set of indicators to describe the quality of a broad range of services – the Indicators for Quality Improvement. It is envisaged that this will be an evolving dataset. Currently, there are six indicators:

QOF HF 1 – The practice can produce a register of patients with heart failure

QOF HF 2 – The percentage of patients with a diagnosis of heart failure (diagnosed after 1 April 2006) which has been confirmed by an echocardiogram or by specialist assessment

QOF HF 3 – The percentage of patients with a current diagnosis of heart failure due to LVD who are currently treated with an ACE inhibitor or Angiotensin Receptor Blocker, who can tolerate therapy and for whom there is no contra-indication

CV32 – Percentage of patients following myocardial infarction discharged on ACE inhibitors

CV37 – Participation rates in the Heart Failure Audit

CV38 – Participation rates in the Cardiac Rehabilitation Audit

(NHS Information Centre for Health and Social Care online b)

For 2009/10, a new QOF indicator will be introduced:

QOF HF 4: The percentage of patients with a current diagnosis of heart failure due to LVD who are currently treated with an ACE inhibitor or Angiotensin Receptor Blocker, who are additionally treated with a beta-blocker licensed for heart failure, or recorded as intolerant to or having a contraindication to beta-blockers.

(NHS Employers online)

The National Heart Failure Audit

Clinical audit plays a pivotal role in ascertaining whether standards of care are being met, in monitoring changes in quality, and in identifying variation in practice. Since publication of the National Service Framework for Coronary Heart Disease – NSF CHD – (Department of Health 2000), data on acute myocardial infarction (AMI) outcomes and quality of care have shown significant improvements (Leatherman and Sutherland 2008; Myocardial Ischaemia National Audit Project 2009). However, heart failure services have been slower to improve, and it has been acknowledged that one of the factors holding them back has been the lack of good data (Roger Boyle, Foreword, NHS Information Centre for Health and Social Care 2009b).

The National Heart Failure Audit is run jointly by the NHS Information Centre for Health and Social Care and the British Society for Heart Failure, and is funded by the Healthcare Quality Improvement Partnership (HQIP). The audit's stated aim is:

> to provide national comparative data to help clinicians and managers improve the quality and outcomes of their services. Findings can be used to assess achievement against NSF targets and NICE guidelines for heart failure on an ongoing basis. Information can also be used to inform patients about the quality of local care and to support patient choice.
>
>   (NHS Information Centre for Health and Social Care 2008a)

To date, the audit has focused only on secondary care services. Before its launch in July 2007, there was no national audit relating to the care of heart failure. At a local level, fewer than 20% of organisations were able to meet the NSF CHD criteria for auditing the delivery of heart failure services in 2006. This is despite an NSF standard relating to heart failure.

As of March 2009, 113 out of 166 trusts (68%) had registered with the audit, with 71 (43%) submitting data. For 2008/09, the latest reported year, hospitals submitted clinical data on 6,170 patients. Nationally, this represents approximately 11% of patients discharged from hospital with a primary discharge diagnosis of heart failure, and about 2% of all heart failure discharges.

The charts that contain data from the 2007/08 and 2008/09 audits appear on pages 54, 57, 74 and 94.

EFFECTIVENESS

Effectiveness refers to the extent to which an intervention produces its intended result. In the context of the quality of healthcare, effectiveness is concerned with the extent to which an intervention – such as a service, visit, procedure or diagnostic – results in the intended outcome for the patient. It also encompasses the concept of appropriateness: that is, the extent to which interventions are provided to those patients who would benefit, and withheld from those who would not. Effectiveness indicators can measure:

- *outcomes*, such as mortality rates, survival rates or changes in health or functional status, which reflect the impact of prevention, diagnosis and treatment of disease or ill-health; or

- *processes*, such as prescribing rates, medical procedures and compliance with evidence-based guidelines, which have been proven to affect outcomes in specific clinical conditions and can provide a more immediate measure of quality.

Key findings in this section include:

- Although short-term mortality remains high in patients diagnosed with heart failure, survival rates have improved in the past 10 to 15 years.

- A 2002 European survey of doctors treating heart failure (Remme, McMurray et al 2008) found that among UK respondents, 94% of cardiologists and 81% of geriatricians/internists (internists is the term used in Europe to denote physicians who are equivalent to members of the Royal College of Physicians in the UK) routinely used echocardiography to diagnose the condition (as recommended by NICE 2003a). However, the same survey found that 51% of GP respondents diagnosed heart failure *only* after diagnostic

investigations. By contrast, Quality and Outcomes Framework (QOF) data (NHS Information Centre for Health and Social Care 2008b) indicate that 96.4% of registered heart failure patients in 2007/08 had had the diagnosis confirmed by echocardiography or specialist assessment.

- The 2007/08 National Heart Failure Audit, conducted by the NHS Information Centre for Health and Social Care (2008a), reported that for patients hospitalised with heart failure, only 32% had echocardiography results recorded. The data for 2008/09 revealed a dramatic improvement (NHS Information Centre for Health and Social Care 2009b), with more than 75% of patients receiving echocardiography.

- Prescribing of recommended drugs is suboptimal. The 2008/09 National Heart Failure Audit (2009b) found that more than half of patients hospitalised with heart failure (and with prescribing information noted) were not prescribed beta-blockers; and one-fifth were not prescribed angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs). Data from primary care are also cause for concern: in a study of 163 general practices prescribing between 2001 and 2006 (Calvert, Shankar et al 2009), fewer than a third of heart failure patients were prescribed the recommended combination of ACEI/ARBs and beta-blockers.

- Very few heart failure patients receive cardiac rehabilitation. An audit of the cardiac rehabilitation programme (British Heart Foundation 2008) found that only 1% of participants had a diagnosis of heart failure.

Fuat, Hungin and Murphy (2003) reported that the three main reasons for general practice not following guidelines were:

1. uncertainty about clinical practice, including lack of confidence in establishing an accurate diagnosis; and worries about using drugs (including ACE inhibitors) for patients who are often elderly and frail, with co-morbidities and polypharmacy. For example, GPs lacked confidence in establishing an accurate diagnosis of left ventricular systolic dysfunction, even if open access echocardiography was available

2. lack of awareness of relevant research evidence in what is perceived to be a complex and rapidly changing therapeutic field

3. being influenced by individual preferences and local organisational factors, such as the availability of services and of cardiologists.

Heart failure – mortality

In 2005, there were 9,140 deaths officially attributed to heart failure in England and Wales (Office for National Statistics 2008). However, this figure is widely acknowledged to be an underestimate. This discrepancy is a result of guidance given on death certificates stating that heart failure is not a cause of death but a mode of death: this discourages doctors from recording heart failure as the underlying cause of death. The charts below illustrate data from a research study into heart failure mortality in England and Wales (Sutcliffe, Phillips et al 2007) and highlights that after a steep downward trend in mortality between the 1970s and mid-1990s, the rate of decline has levelled off.

Trends in heart failure mortality from death certification data for men and women in England and Wales

(a) Deaths per year
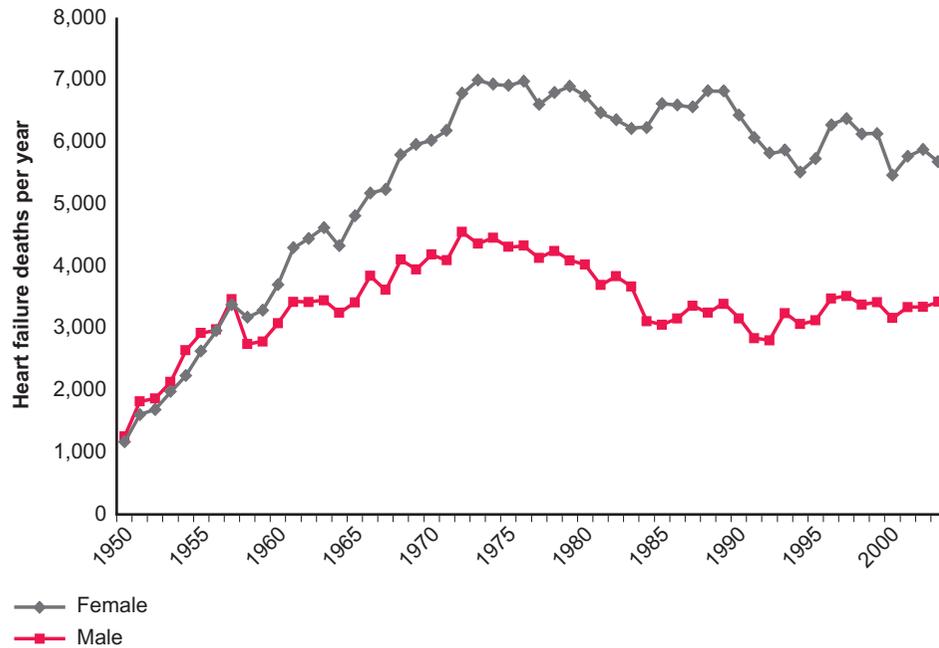
(b) Age-standardised mortality rates (ASMR) data per 1,000 population
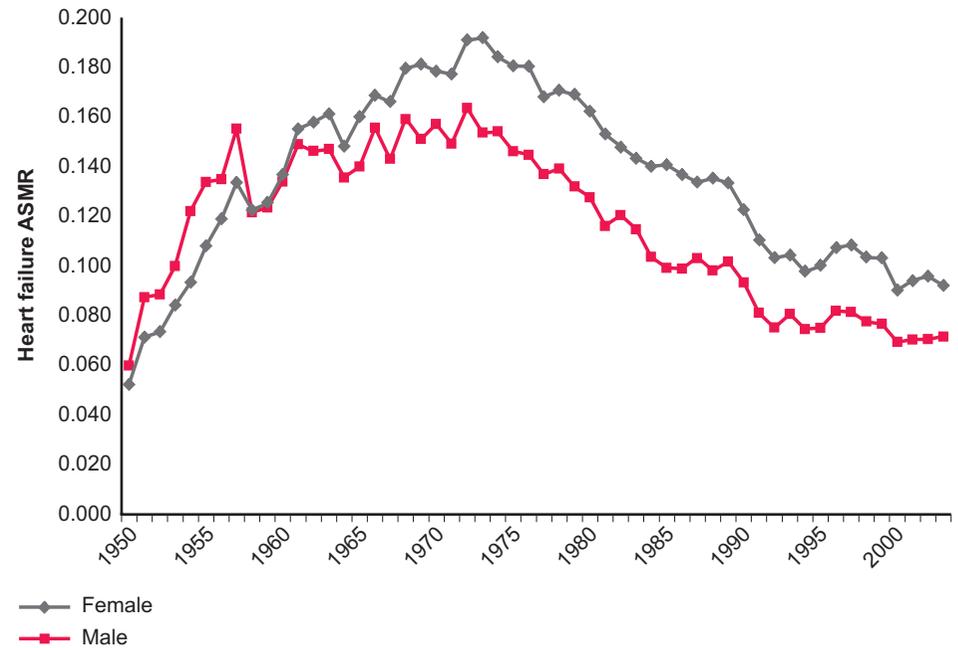
Note: correction factors have been used between 1984 and 1992, when the rules for the selection of the underlying cause of death were temporarily changed.

Source: Sutcliffe, Phillips et al (2007). Copyright 2007, with permission from Elsevier

Perhaps a more accurate picture is provided by a study undertaken by Goldacre, Mant et al (2005), which analysed all mentions on the death certificate, not just underlying cause, for the Oxford region in England.

The data are depicted below and compare the steep declines in mortality from coronary heart disease (CHD) with the more modest declines recorded for heart failure.

Age-standardised rates for coronary heart disease (ICD 9 410–4, ICD 10 150) and heart failure (ICD 9 428, ICD 10 120–125)

(a) Men
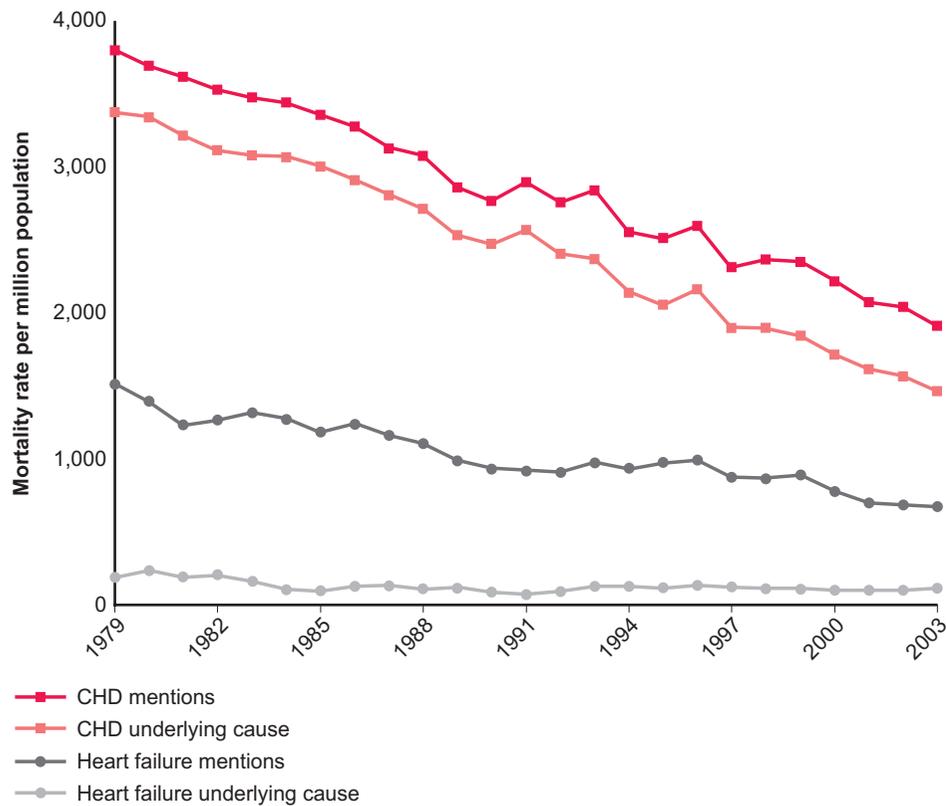
(b) Women
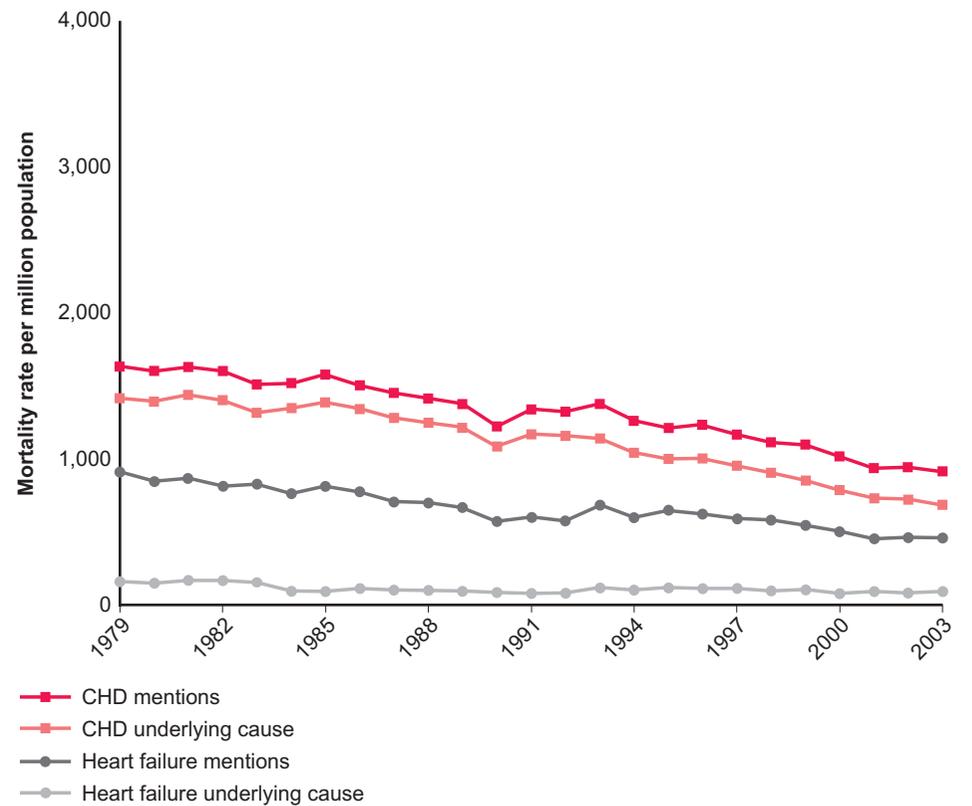
Source: Reproduced from Goldacre, Mant et al (2005) with permission from BMJ Publishing Group Ltd

Survival rates – heart failure versus other conditions

The prognosis of heart failure, although improved by modern treatments, is poor. The chart opposite provides some context for interpreting the relative survival of heart failure patients. It shows that one-year survival rates are better for patients with three of the four most common causes of cancer deaths (breast, prostate and colon cancer) compared with heart failure sufferers.

One-year survival rates, heart failure and major cancers compared, mid-1990s, England and Wales

Condition	One-year survival rate (%)
Melanoma of skin	94
Breast cancer	92
Cancer of the uterus	87
Bladder cancer	79
Prostate cancer	79
Cancer of the lip, mouth and pharynx	74
Non-Hodgkin's lymphoma	66
Colon cancer	63
Heart failure	62
Ovarian cancer	58
Cancer of the kidney	56
Leukaemia	54
Stomach cancer	28
Cancer of the oesophagus	25
Lung cancer	20
Cancer of the pancreas	11

One-year survival rates (%)
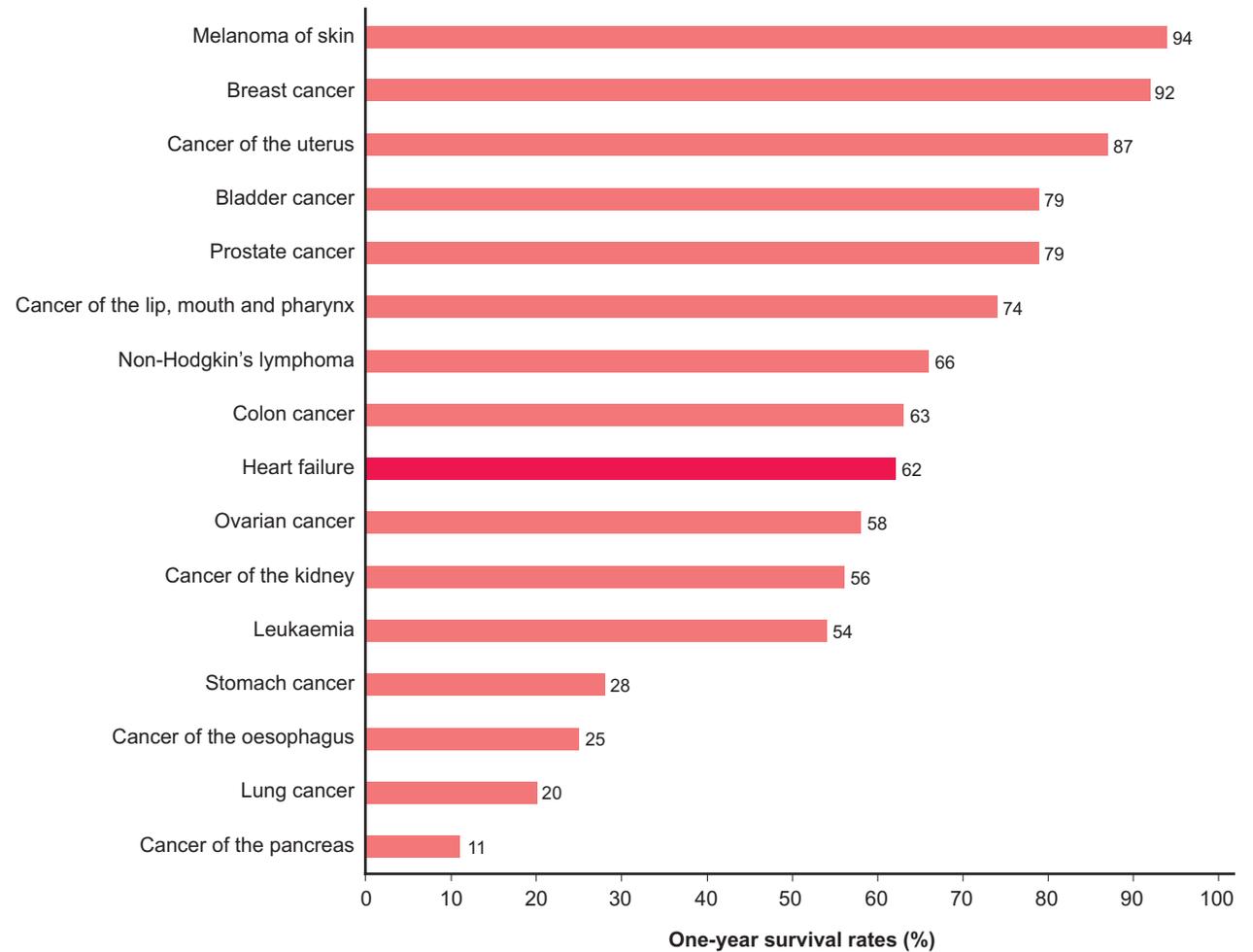
Source: British Heart Foundation Statistics website (online d); Cowie, Wood et al (1999); Quinn, Babb et al (2000)

Heart failure – six-month survival

Heart failure's prognosis is poor, with a particularly high risk of mortality in the first months after diagnosis (Ho, Anderson et al 1993; Cowie, Wood et al 1999). US data on the temporal trend on survival from the Framingham study showed no change in survival up until the early 1990s (Senni, Tribouilloy et al 1999), but more recent reports have suggested improving long-term survival, albeit with a continuing pattern of high early mortality. The chart opposite illustrates data from a study conducted by Mehta, Dubrey et al (2009) in South East England. It compared all-cause mortality in the six months after a diagnosis of heart failure from two population-based studies: in 1995 to 1997 (Hillingdon-Bromley) and 2004 to 2005 (Hillingdon-Hastings). The study shows that between 1995 and 1997 and 2004 and 2005, there was a marked improvement in survival, which was not explained by demographic differences or severity of symptoms at diagnosis. Rather, the improvement was probably due to increased use of neurohormonal antagonists (ACE inhibitors and beta-blockers). Despite this, six-month mortality rates remained high at 14%.

Survival rates at one month, three months and six months post diagnosis, SE England, 1995–97 and 2004–05
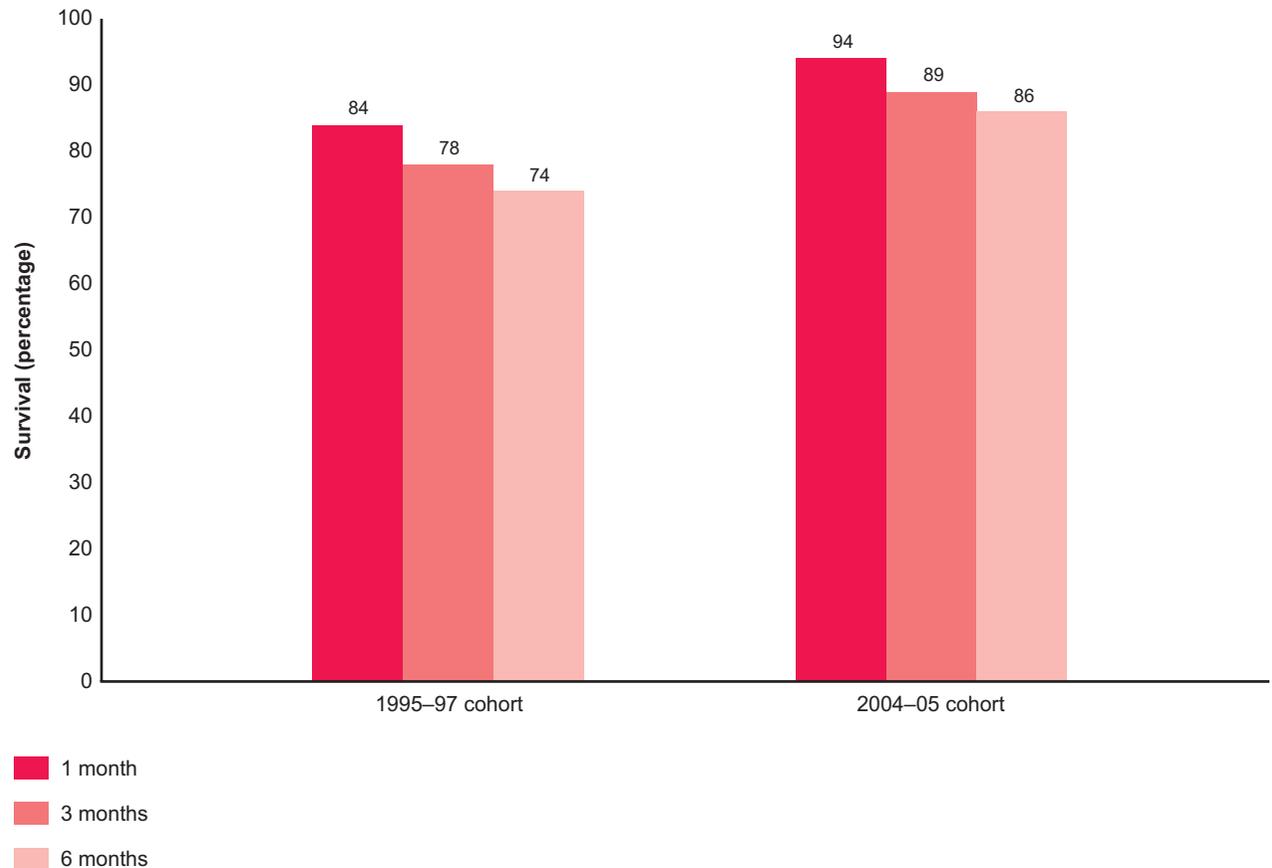
Source: Mehta, Dubrey et al (2009)

Heart failure – five-year survival

The London Heart Failure Study drew on data from Hillingdon and Bromley and consisted of 552 incident cases of heart failure, identified from a combined population of 443,000 (Cowie, Wood et al 1999; Fox, Cowie et al 2001). The chart opposite shows the survival rates of this cohort at various time periods, illustrating the marked effect that a heart failure diagnosis has on survival.

Survival after initial diagnosis of heart failure (diagnosed 1995–97), London
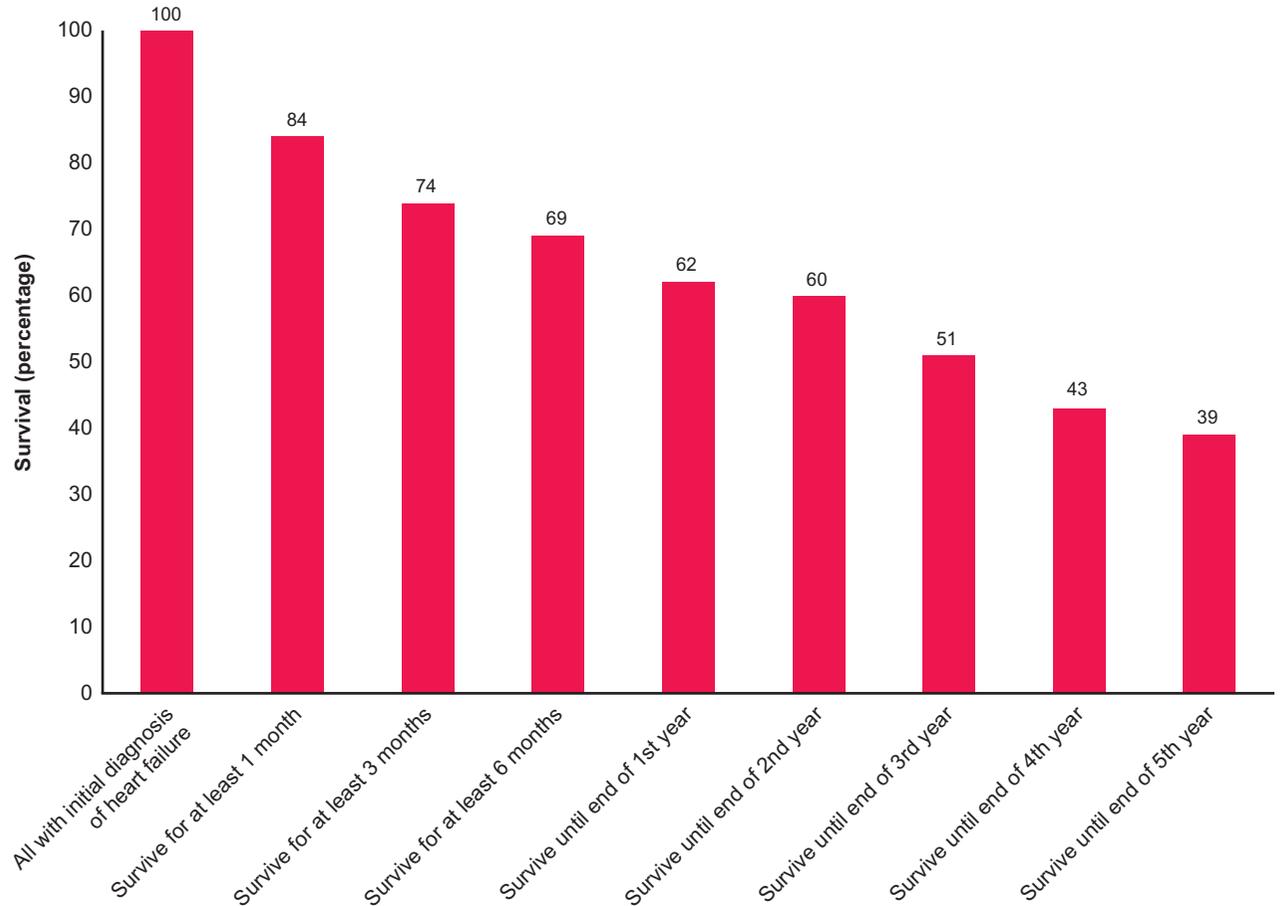
Source: British Heart Foundation Statistics website (online e)

Routine use of echocardiography and BNP to diagnose heart failure – Europe

Clinical guidelines consistently emphasise the importance of having a confirmed diagnosis of heart failure because many of the symptoms are similar to those of other conditions. If heart failure is suspected, a number of tests – such as electrocardiogram, chest x-ray and B-type natriuretic peptide (BNP) blood tests – are recommended. If heart failure is not ruled out, echocardiography (ECHO) should be used to confirm and identify the cause. The Study group on Heart failure Awareness and

Perception in Europe (SHAPE) surveyed randomly selected cardiologists, internists, geriatricians and primary care physicians across France, Germany, Italy, the Netherlands, Poland, Romania, Spain, Sweden and the UK in 2002. The survey asked respondents about which diagnostic procedures they use in a patient with a clinical suspicion of heart failure of unknown aetiology. The charts below illustrate responses relating to the routine use of echocardiography and BNP testing from hospital cardiologists and from internists/geriatricians, and show that specialists are more likely to use recommended diagnostic tests.

Use ECHO routinely to diagnose heart failure, hospital specialists versus generalists, survey, Europe, 2002
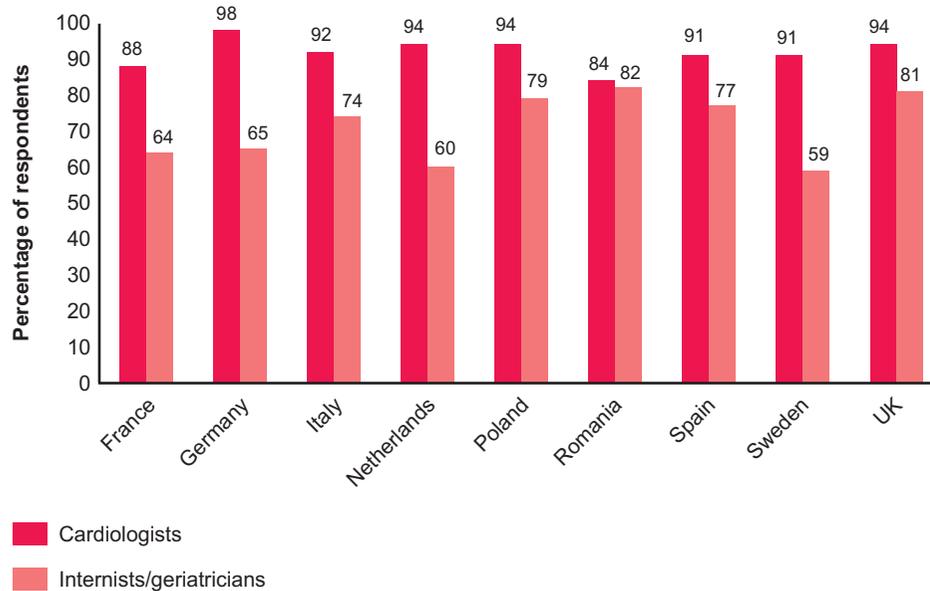
Use BNP routinely to diagnose heart failure, hospital specialists versus generalists, survey, Europe, 2002
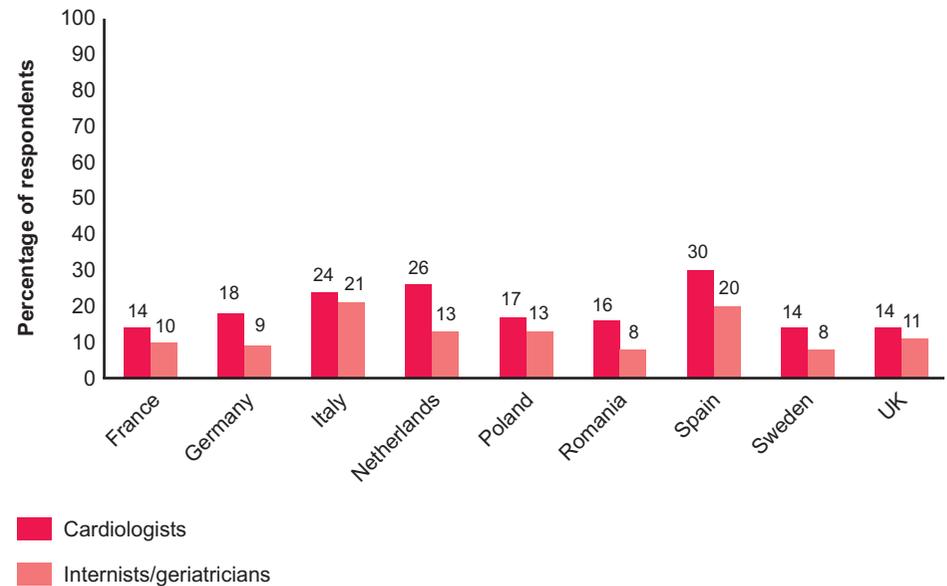

Source: Remme, McMurray et al (2008)

Heart failure diagnosis – hospitalised patient audit

Within the secondary care sector of the NHS, use of recommended diagnostic tests can be gauged from the National Heart Failure Audit. The chart opposite shows that in 2008/09, echocardiography results were recorded in 75% of cases (for a further 6% of patients echocardiography was planned for after discharge). This represents a substantial improvement in relation to the 2007/08 result of 32%. Of those who had an echocardiogram in the 2008/09 audit, the vast majority had evidence of substantial cardiac dysfunction. Most patients (78%) had left ventricular systolic dysfunction (with LVEF of less than 40%); 9% had valve disease; 5% had left ventricular hypertrophy; and only 9% were considered normal.

Echocardiography recorded in hospital patients, National Heart Failure Audit, 2007/08–2008/09
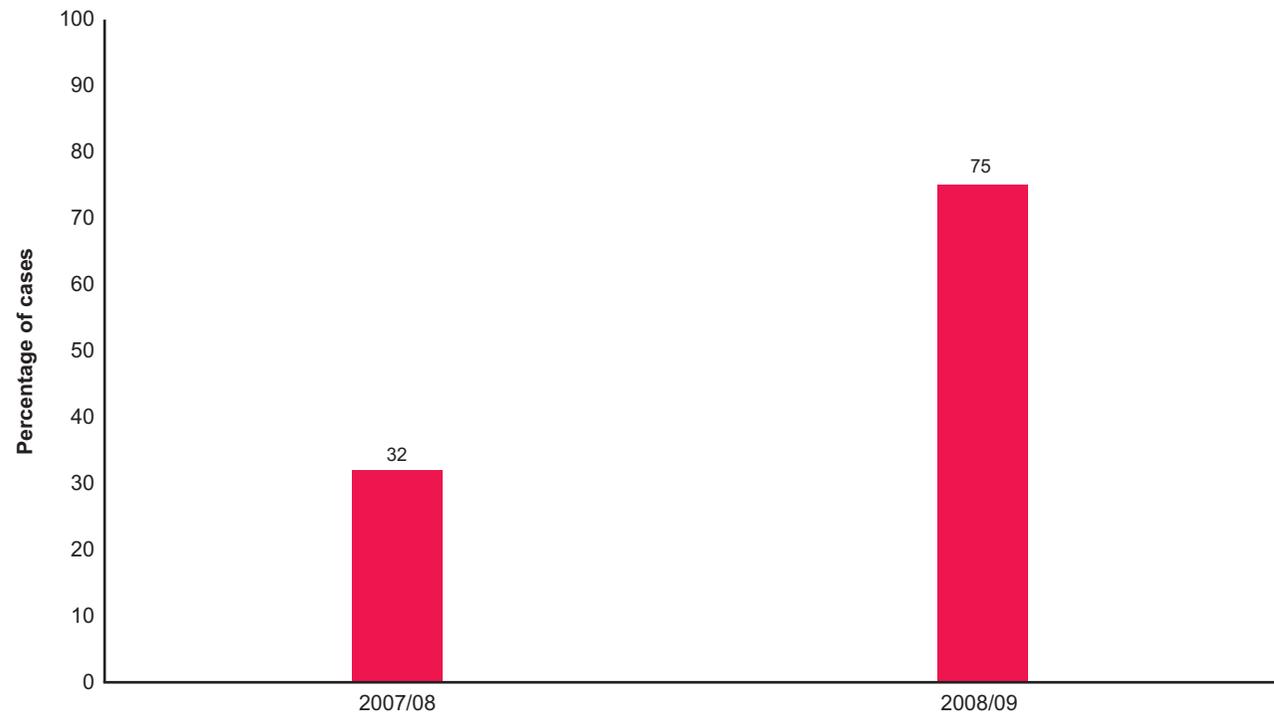
Source: NHS Information Centre for Health and Social Care (2009b; 2008a)

Diagnosis in primary care – international

The Study group on Heart failure Awareness and Perception in Europe (SHAPE) survey asked primary care physicians: 'Of those patients you have diagnosed with heart failure, how did you come to that conclusion?' The chart opposite shows the proportion of respondents who indicated they used signs and symptoms 'often' and those who used further investigations 'often'. (These answers are not mutually exclusive so figures do not add up to 100%.) With 51%, the UK had the highest proportion of respondents who were diagnosed only after further investigations (as is recommended by NICE – 2003a).

Primary care physicians' diagnosis of heart failure, Europe, 2002

On symptoms plus signs

Only after further investigations
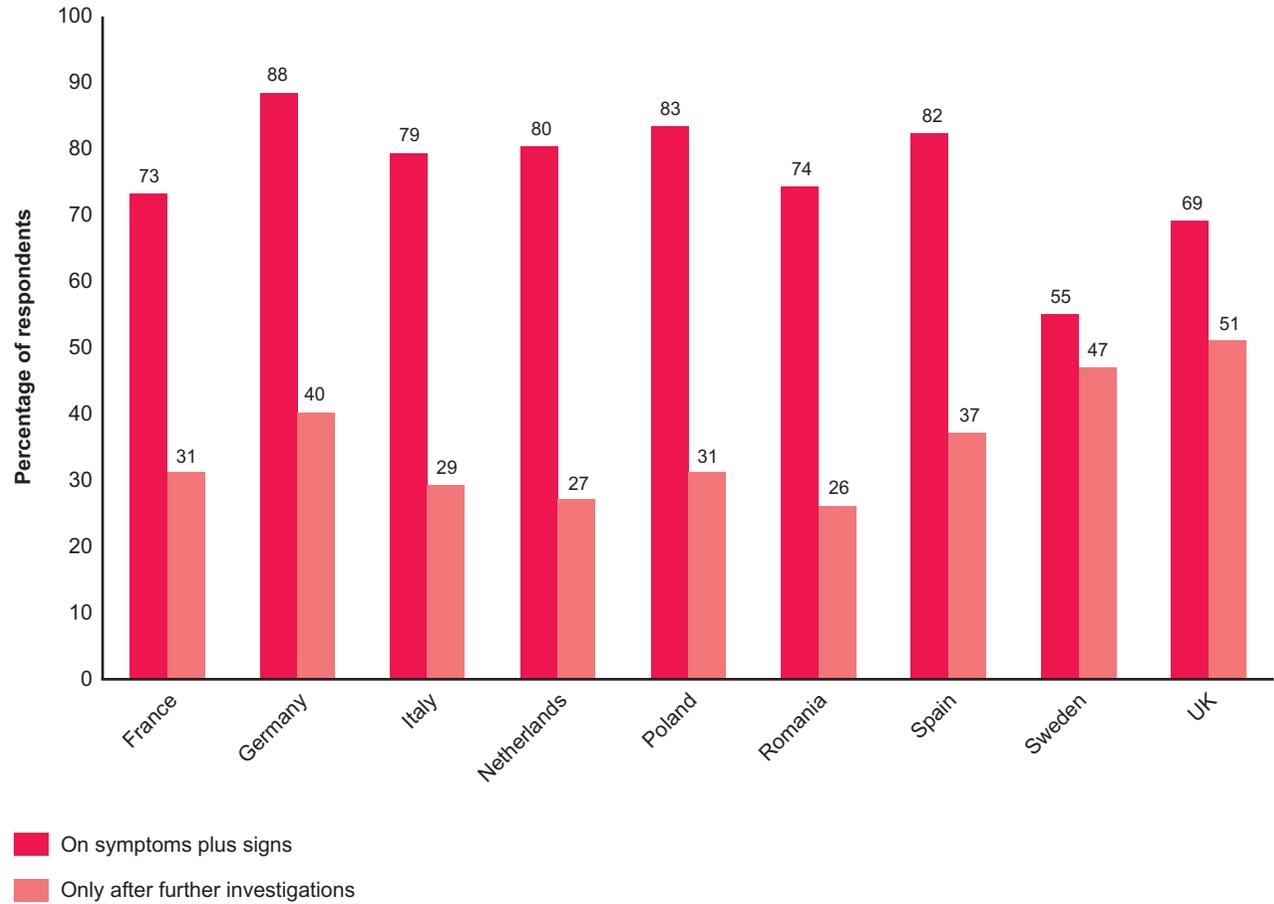
Source: Remme, McMurray et al (2008)

Heart failure diagnosis – Quality and Outcomes Framework in primary care

The chart opposite illustrates Quality and Outcomes Framework (QOF) data on the proportion of patients with a diagnosis of heart failure that has been confirmed by an echocardiogram or by specialist assessment (up to three months before and within 12 months of being added to the heart failure register). The chart shows that achievement scores are high. Across primary care trusts (PCTs) in 2007/08, performance ranged from 89.4% in Luton PCT to 100% for Richmond and Twickenham PCT in London. This chart illustrates data that indicate much higher use of diagnostic tests than in the earlier SHAPE survey. It is unclear whether this discrepancy is the result of:

- improved performance (incentivised by QOF) since 2002 when the SHAPE survey was conducted

- incomplete registers of heart failure patients at general practice level

- a methodological issue

- or some other factor.

Heart failure patients with diagnosis confirmed by echocardiogram or by specialist assesment, QOF data, 2005/06 to 2007/08
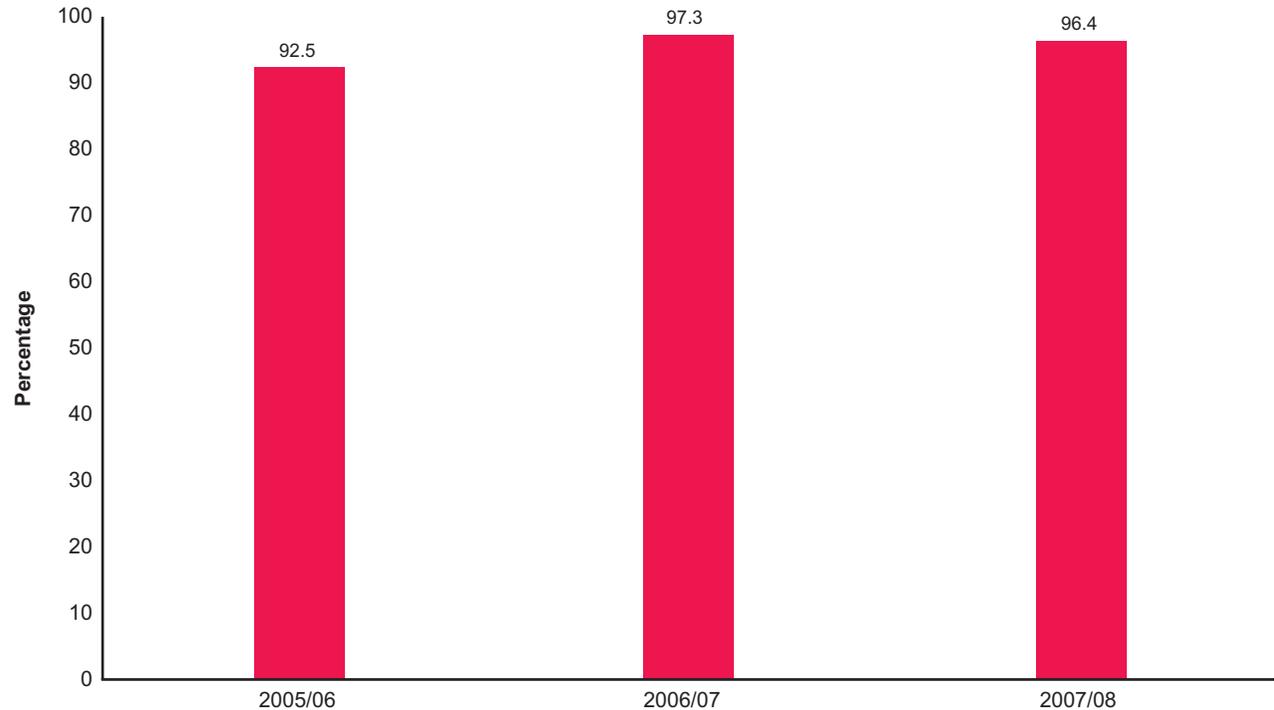

Source: NHS Information Centre for Health and Social Care (online c)

Recommended treatments – hospital audit data

The chart opposite presents data from the National Heart Failure Audit 2007/08 and 2008/09. It illustrates the proportion of hospitalised patients (with prescribing information recorded) that were prescribed two key treatments: ACE inhibitors and beta-blockers. Of all audited cases in 2008/09, 80% were prescribed ACE inhibitors, compared to 46% in 2007/08. Forty-six per cent of patients in 2008/09 were prescribed beta-blockers, compared to 36% in 2007/08. Despite these improvements, the data indicate that a large proportion of patients are not receiving treatments that have been shown to be beneficial in clinical trials and that are recommended by evidence-based practice guidelines.

ACE inhibitor and beta-blocker prescription, national audit of hospital patients, 2007/08–2008/09
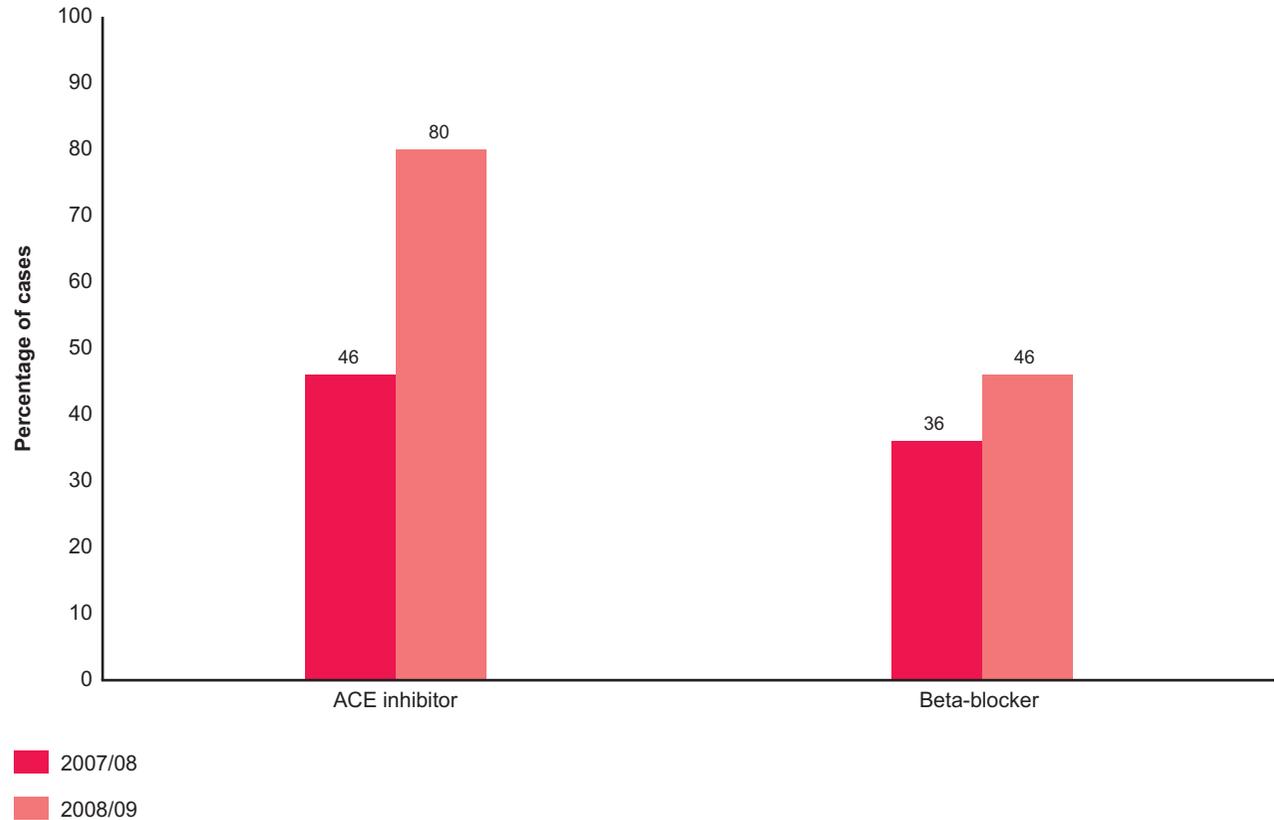
Source: NHS Information Centre for Health and Social Care (2009b; 2008a)

## Use of recommended treatments in primary care – international

The Study group on Heart failure Awareness and Perception in Europe (SHAPE) survey was conducted in 2002 among randomly selected cardiologists, internists, geriatricians and primary care physicians across France, Germany, Italy, the Netherlands, Poland, Romania, Spain, Sweden and the UK. The chart on page 59 shows the proportion of primary care physicians who indicated they use recommended treatments 'often' or 'always'. Most notable is the low level of reported beta-blocker usage. That beta-blockade reduces mortality and morbidity when used with ACE inhibitors became evident in 1999 (Remme, McMurray et al 2008). Despite this, fewer than 5% of respondents across Europe indicated that they 'always' used beta-blockers (this ranged from 1% of respondents in the UK to 11% of respondents in Germany). Of UK respondents, 22% indicated

that they never prescribed beta-blockers. Reasons for not prescribing a beta-blocker included:

- chronic obstructive pulmonary disease (COPD)/asthma (cited by 93%)
- bradycardia (81%)
- unstable heart failure (61%)
- mild symptoms on ACE inhibitors and diuretics (47%).

Current evidence suggests that while beta-blockade may lead to worsening heart failure, bradycardia and hypotension in a few patients, these effects are usually not dangerous and are rapidly reversible, provided that patients are stable, and up-titration is slow. There is a misconception that bronchospasm often occurs with beta-blockade in heart failure. Combined non-selective beta- and alpha-adrenergic blockade is well tolerated in heart failure patients with COPD.

Use recommended treatments 'often' or 'always', primary care physician survey, Europe, 2002
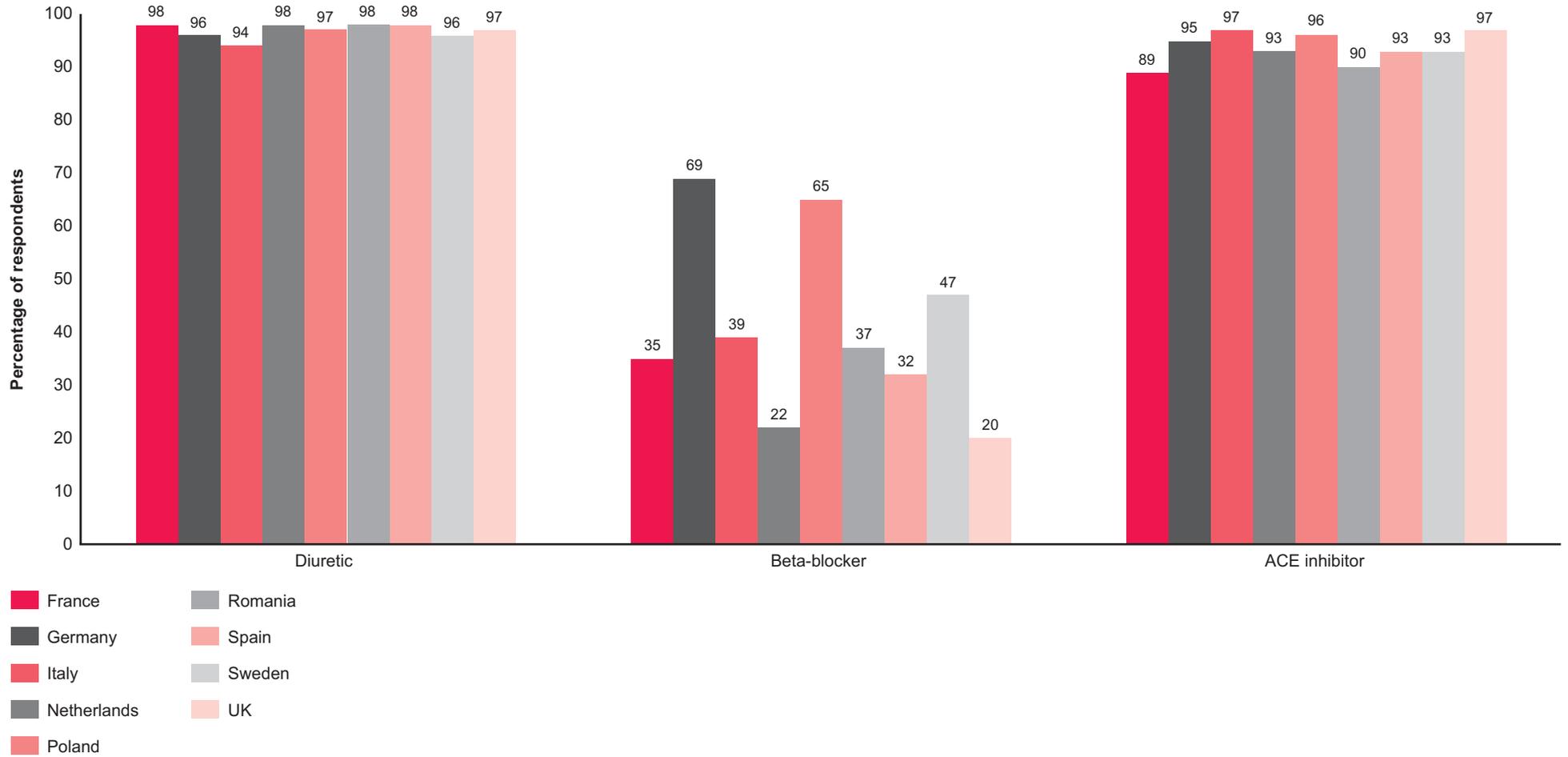

Source: Remme, McMurray et al (2008)

Recommended treatments for heart failure – primary care

In a retrospective cohort study using routinely collected data from 163 general practices in Great Britain, Calvert, Shankar et al (2009) found that, as in the SHAPE study, the use of recommended treatments was far from universal. The chart opposite shows the proportion of various heart-failure-prescribed treatments. Fewer than one-third of heart failure patients were receiving both ACE inhibitors (ACEI) and beta-blockers as recommended in guidelines. The study noted that 15.5% of patients had beta-blocker intolerance and also found that the selection of particular agents and dosages were problematic. Among those patients prescribed beta-blockers, only two-thirds were prescribed an agent currently recommended in the European Society of Cardiology (2008) guidelines. Of those prescribed a recommended treatment, only 16.8% were on the target dose.

**Treatment of heart failure patients in primary care, Great Britain, 2001–2006**
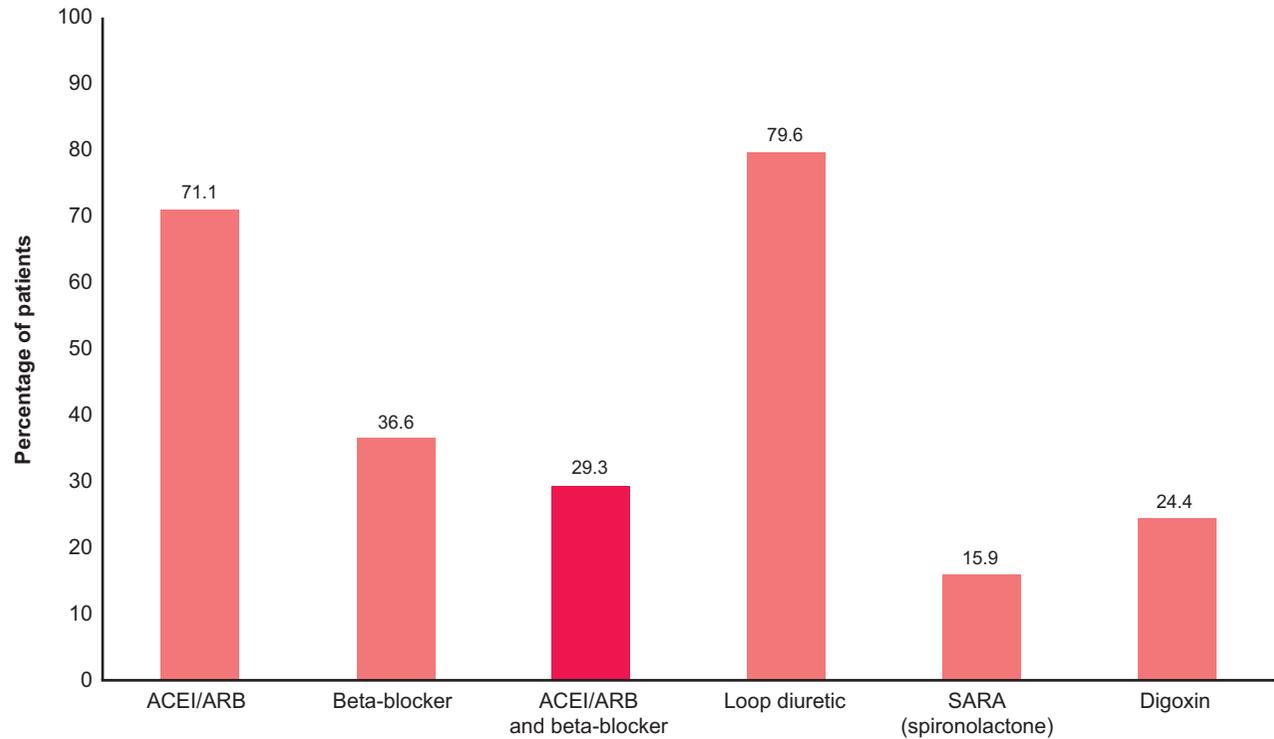
ACEI = angiotensin-converting enzyme inhibitor
ARB = angiotensin II receptor blocker
SARA = selective aldosterone receptor antagonist

Source: Calvert, Shankar et al (2009)

# Recommended treatments – Quality and Outcomes Framework data

Quality and Outcomes Framework (QOF) indicator HF 3 measures the proportion of patients with a diagnosis of heart failure due to left ventricular dysfunction (LVD) who are currently treated with an ACE inhibitor (ACEI) or angiotensin II receptor blocker (ARB), unless contraindications or side effects are recorded. There is evidence that ACE inhibitors delay the onset of symptomatic heart failure, reduce cardiovascular events and improve long-term survival, and their use (or that of ARBs if ACEIs are not well tolerated) is recommended in NICE guidelines (2003a). In 2007/08, for England as a whole, 89.9% of LVD heart failure patients received ACE inhibitors. In 2006/07, the figure was 89.6%. Across primary care trusts (PCTs) there was relatively little variation, from 85.13% in Bassetlaw PCT in Nottinghamshire to 94.96% in Kensington and Chelsea PCT in London.

Heart failure patients currently treated with ACE inhibitor or angiotensin II receptor blocker, QOF data, 2005/06 to 2007/08
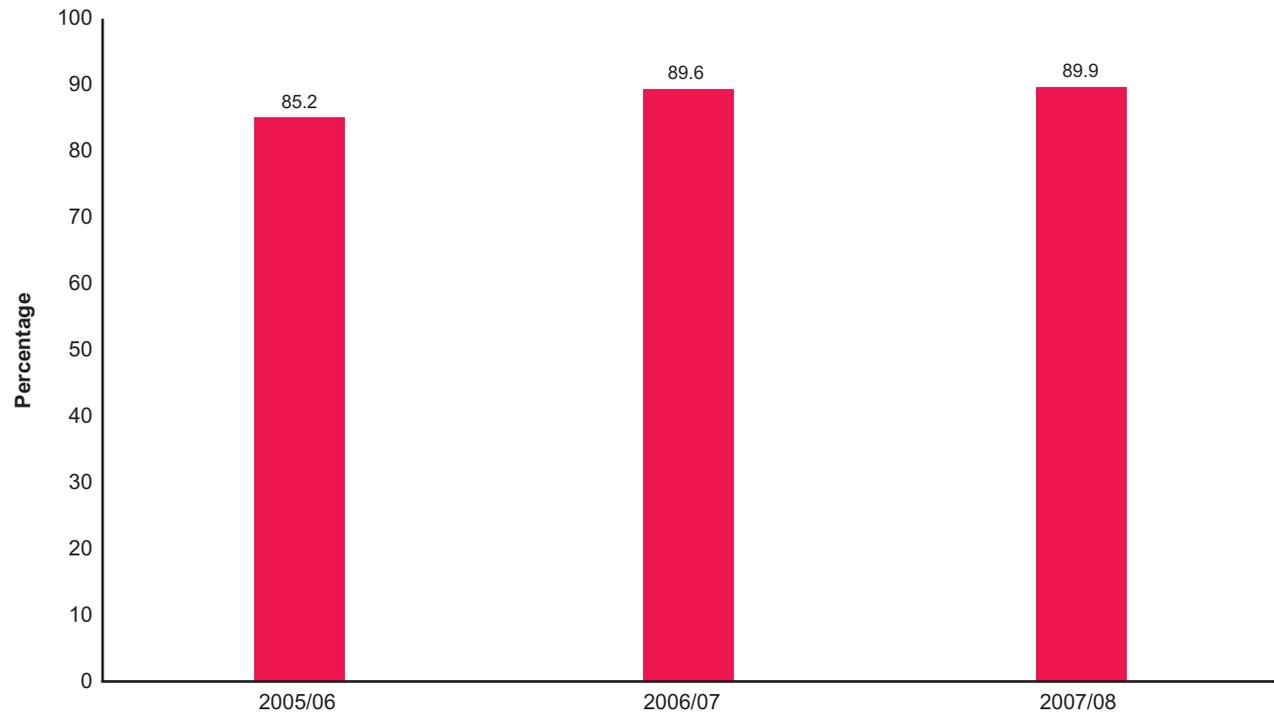
Source: NHS Information Centre for Health and Social Care (online c)

Recommended treatments for heart failure – emergency admissions

In a study that drew on a Healthcare Commission retrospective survey of heart failure emergency admissions, Nicol, Fittall et al (2008) report on the treatment of previously diagnosed patients on admission and at discharge. For both men and women, discharge data indicate slightly improved compliance with guidelines relative to admission data. It is notable that more than one in ten patients who were discharged were prescribed a diuretic only. Some of these data appear at odds with the Quality and Outcomes Framework (QOF) data on page 61, which indicate that in the same time period, 85.2% of diagnosed patients were receiving ACE inhibitors (ACEIs)/angiotensin II receptor blockers (ARBs), compared with less than 70% on admission in this study.

Heart failure treatment on admission and on discharge, men and women, England, Wales and Northern Ireland, 2005/06
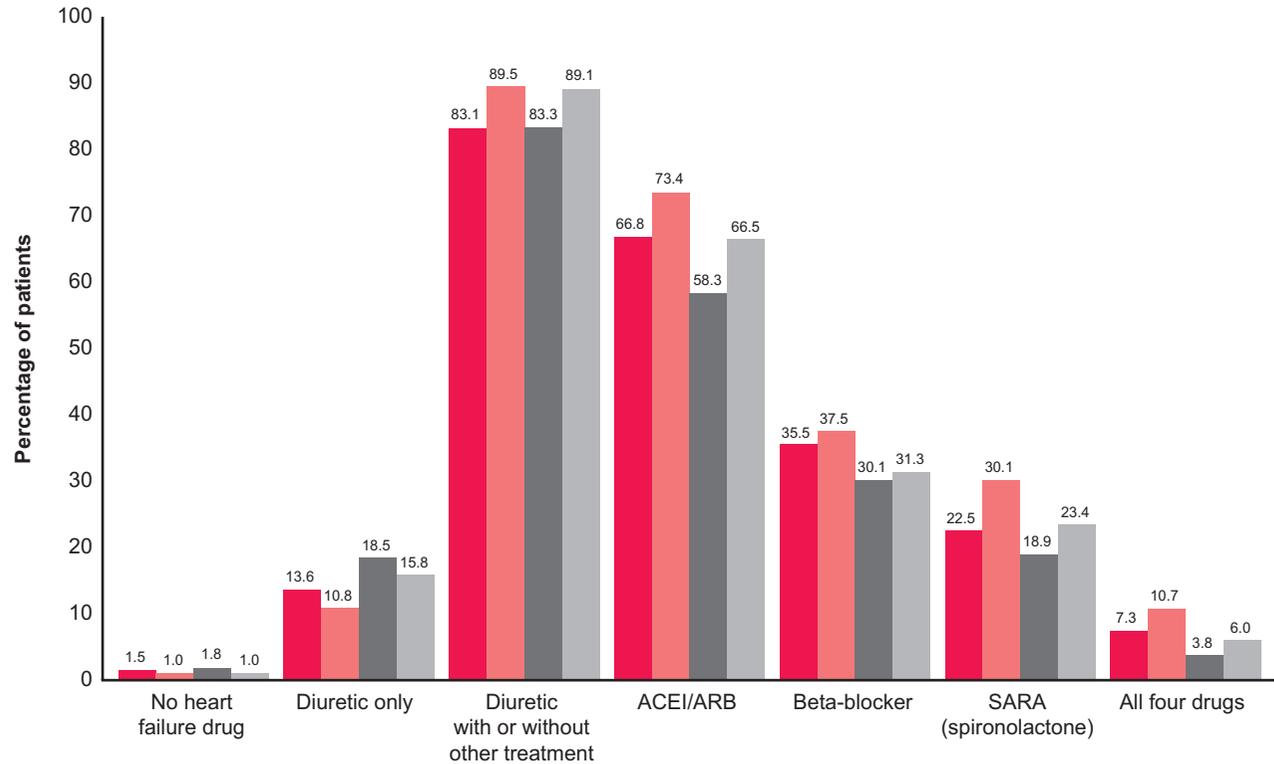
Men on admission

Men on discharge

Women on admission

Women on discharge

ACEI = angiotensin-converting enzyme inhibitor
ARB = angiotensin II receptor blocker
SARA = selective aldosterone receptor antagonist

Source: Nicol, Fittall et al (2008)

Patient review

Guidance from NICE (2003a) recommends that patients should be monitored regularly and effectively at an interval of no more than six months for patients who are stable and no more than two weeks for patients whose clinical condition or medication has changed. As a minimum, the assessment should:

- review patient's management plan (and concordance) in terms of diet, alcohol consumption, exercise and rehabilitation

- make a clinical assessment of functional capacity, fluid status, cardiac rhythm, cognitive and nutritional status

- review medication (including side effects and need for changes)

- measure serum urea, electrolytes and creatinine levels.

The Healthcare Commission's review of heart failure services asked NHS organisations about their arrangements for monitoring. The findings are shown in Table 5 opposite.

Notably, 10% of organisations had no written guidelines on the scope of monitoring and around one-third had no written guidelines on recommended monitoring intervals. The Healthcare Commission could not obtain any definitive data on the extent to which patients did in fact receive a review.

Table 5: Monitoring arrangements in heart failure services

Recommendations for review	% of NHS organisations achieving recommendations as at March 2006
Organisation has guidelines that met minimum requirements (in terms of scope) for monitoring	49
Organisation has local guidelines on monitoring intervals consistent with NICE guidance	66.5

Source: Healthcare Commission (2007a)

Prevention of heart failure

Heart failure is the common final pathway for a range of diverse cardiac pathologies. In developed countries, the most common precipitating cause is coronary artery disease (Cowie, Wood et al 1999; Fox, Cowie et al 2001). Heart failure is difficult to treat successfully once it presents as heart failure. Prevention is therefore key to lowering the burden of disease.

According to Wood (2002), if it were possible to reduce the incidence of acute and chronic coronary artery disease (both new and recurrent) and the underlying determinants of atherosclerosis, such as hypertension and dyslipidaemia in the population, then the incidence of clinical heart failure could be reduced by at least half.

Prevention – blood pressure prevalence

The Health Survey for England (HSE) has been conducted every year since 1991 and aims to monitor the health of the population. For each participant, the survey includes an interview and a physical examination by a nurse, at which various physical measurements, tests and samples of blood and saliva are collected. The chart opposite illustrates the proportion of adults (age standardised) with hypertension: that is, with a systolic blood pressure (SBP) equal to or greater than 140 and/or a diastolic blood pressure (DBP) equal to or greater than 90, whether or not they are currently on any antihypertensive drugs (hypertensive treated and hypertensive untreated). Also included are those with blood pressure readings below the above thresholds, but who are currently on antihypertensive drugs (normotensive treated). The counts include all adults with a valid blood pressure reading (that is, with SBP or DBP), and with information recorded on medications specifically prescribed for controlling blood pressure. Additional findings from the HSE 2006 suggest that overall 'the rule of halves' applies for detection, treatment and control. This means that only half of cases are diagnosed in men; fewer than half the survey-defined cases in men were being treated; and only half of treated cases were controlled in men and women.

Prevalence of hypertension, age 16 and over, Health Survey for England, 2000–06

Source: Craig and Mindell (2008)

Prevention – blood pressure control, Quality and Outcomes Framework data

Effective lowering of blood pressure in patients with hypertension reduces the risk of heart failure. A meta-analysis of randomised trials conducted by Law, Morris and Wald (2009) found that lowering systolic blood pressure by 10mm Hg, or diastolic blood pressure by 5mm Hg, using any of the main classes of blood-pressure-lowering drugs – thiazides, beta-blockers, ACE inhibitors, angiotensin II receptor blockers (ARBs), and calcium channel blockers – reduces the incidence of heart failure by 25%, with no increase in non-vascular mortality. In 2007/08, Quality and Outcomes Framework (QOF) results indicated that 78.3% of patients on the hypertension register had a last blood pressure reading of 150/90mm Hg or less. In primary care trusts (PCTs), the level ranged from 73.1% in Lewisham PCT in London to 82.9% in Havering PCT in London.

Hypertension patients with last blood pressure reading (measured in preceding nine months) of 150/90mm Hg or less, England, 2005/06–2007/08
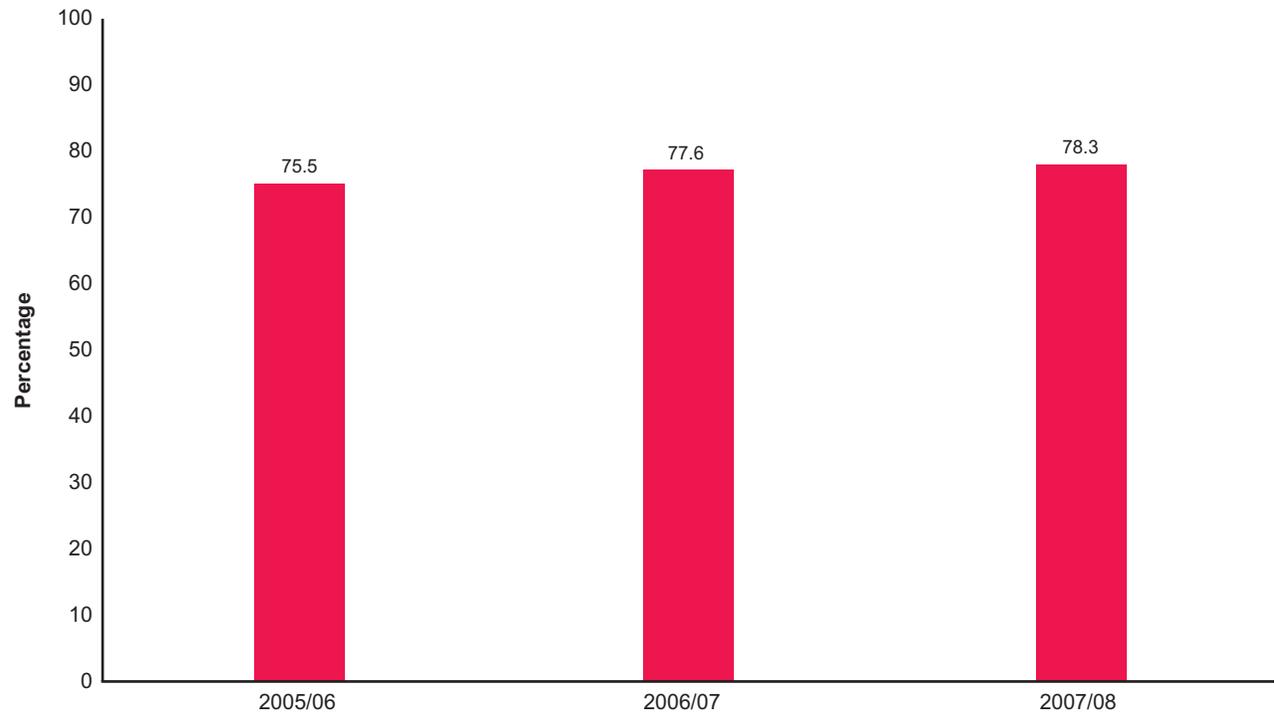
Source: Law, Morris and Wald (2009)

Secondary prevention – cardiac rehabilitation

Cardiac rehabilitation (CR) has been shown to improve functional capacity and quality of life for patients:

- with the following conditions:
  – congestive heart failure
  – angina pectoris
  – recent myocardial infarction (heart attack)
  – coronary artery bypass graft surgery or angioplasty
  – other forms of cardiovascular disease

- having had a pacemaker implanted

- being a heart transplant candidate or recipient.

CR programmes typically include:

- provision of information on disease processes and progression

- instigating and supporting an appropriate exercise programme

- counselling on nutrition

- help for patients to modify risk factors such as high blood pressure, smoking, high blood cholesterol, physical inactivity, obesity and diabetes

- providing vocational guidance to enable the patient to return to work

- supplying information on physical limitations

- giving emotional support

- advising on appropriate use of prescribed medications.

The National Audit of Cardiac Rehabilitation collects data on the type of patients referred to cardiac rehabilitation (CR) services. The results for 2006/07 are illustrated in the chart opposite and highlight that only 1% of all patients referred for cardiac rehabilitation were heart failure patients. The mean cost per patient of providing CR services in 2006/07 was £625 (median £421).

Main diagnostic groups of patients, cardiac rehabilitation audit, UK, 2006/07
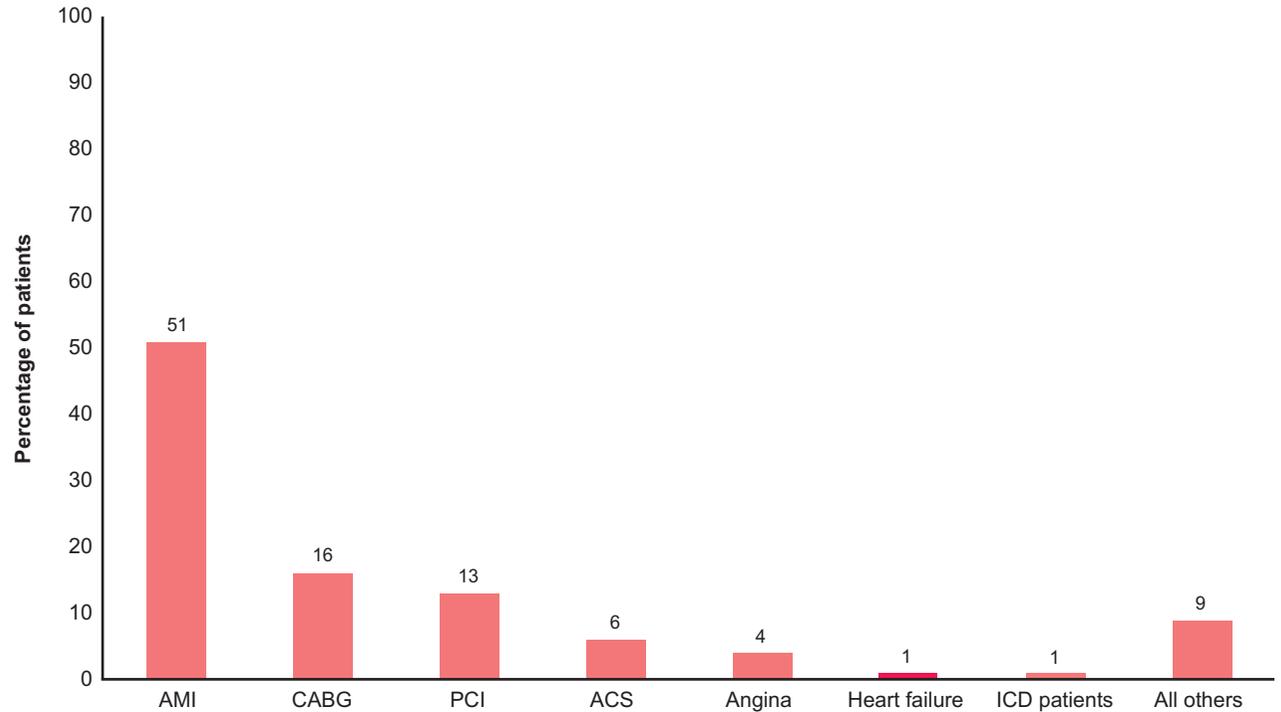
ACS = acute coronary syndrome
AMI = acute myocardial infarction
CABG = coronary artery bypass graft
ICD = implantable cardioverter defibrillator
PCI = percutaneous coronary intervention (angioplasty)

Source: British Heart Foundation (2008)

ACCESS AND TIMELINESS

Access to healthcare is a prominent concern of patients and the public around the world. Access encompasses a range of issues: the timeliness of services received; whether services are provided within an appropriate setting; and whether they are delivered by skilled providers (see, for example, Davis, Schoen et al 2007; Grol, Wensing et al 1999).

Barriers to access are many and varied. They include long waits for service, charges for services, costs for insurance coverage, lack of personal or public transport, and cultural or language differences between patients and health professionals. Poor access has potentially serious

consequences, including deterioration in individuals' health status and subsequent extra costs for healthcare systems.

Key findings from this section include:

- Waits for echocardiography have fallen dramatically since 2006.
- Hospitalised patients receive better quality care in specialist units; however, a minority of heart failure patients are admitted to cardiology wards.

Waits for echocardiography – international

The Study on Heart failure Awareness and Perception in Europe (SHAPE) survey was conducted in 2002 among randomly selected cardiologists, internists, geriatricians and primary care physicians across France, Germany, Italy, the Netherlands, Poland, Romania, Spain, Sweden, and the UK. Primary care physicians were asked how long their patients had to wait to receive echocardiography and their responses are shown in the chart opposite. Of UK respondents, around one quarter could access echocardiography within one month. However, more recent data from England, Wales and Northern Ireland (see page 71) show that waits for echocardiography have decreased substantially since 2002.

Waits for echocardiography, primary care physicians, Europe, 2002
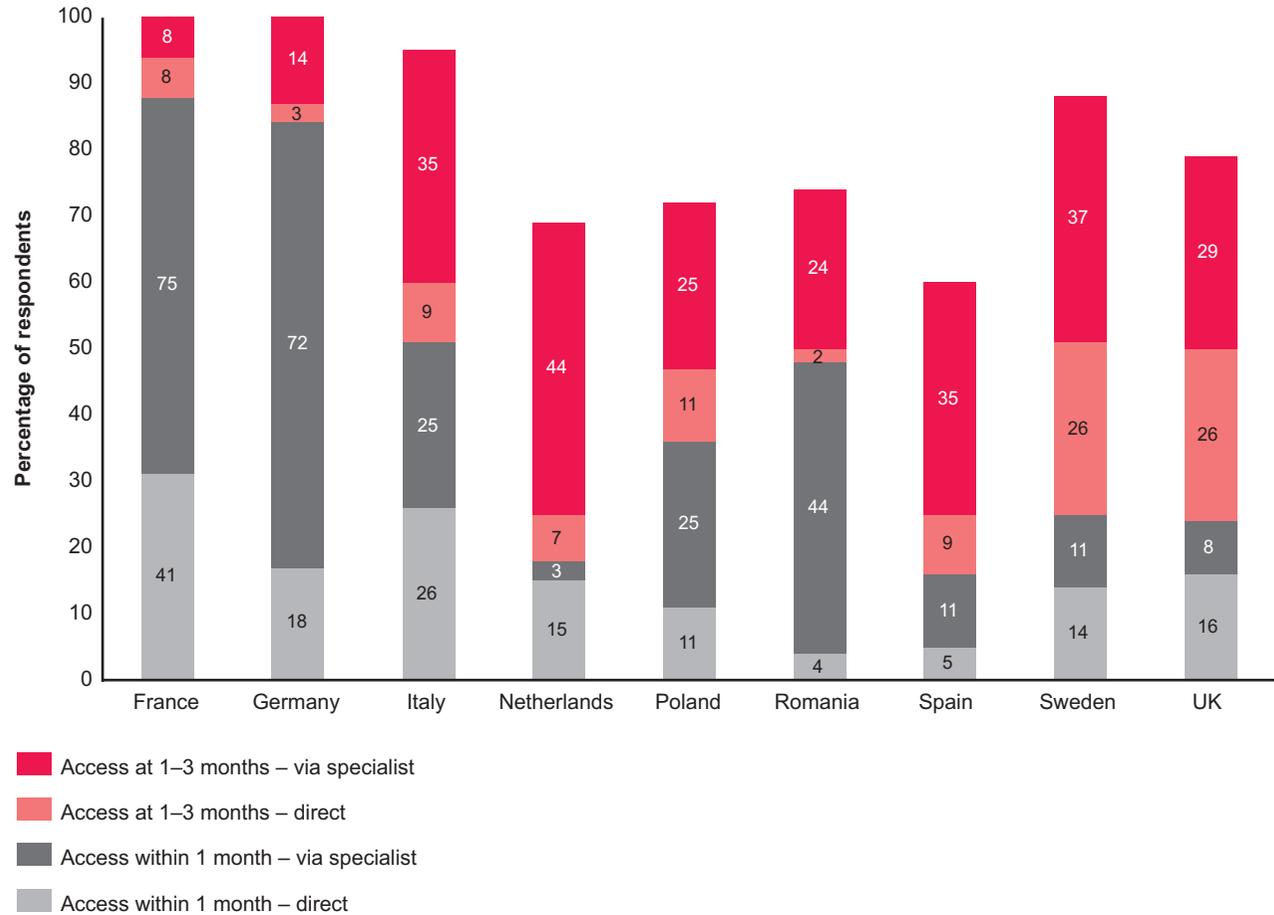

Note: categories are not mutually exclusive and columns may tally to more than 100%.

Source: Remme, McMurray et al (2008)

Echocardiography waits in hospital

NICE guidelines (2003a) recommend that all heart failure patients undergo echocardiography for diagnosis. Nicol, Fittall et al (2008) undertook a large survey of emergency heart failure admissions to acute NHS trusts in England, Wales and Northern Ireland during 2005/06. The survey was based on a retrospective audit of patient notes and found that 32% of all patients admitted with heart failure were assessed by echocardiography at some point during their hospital stay. Of these, half had not received echocardiography previously. The chart opposite shows the time that heart failure patients had to wait for imaging in hospital.

**Echocardiography waits in hospital, England, Wales and Northern Ireland, 2005/06**
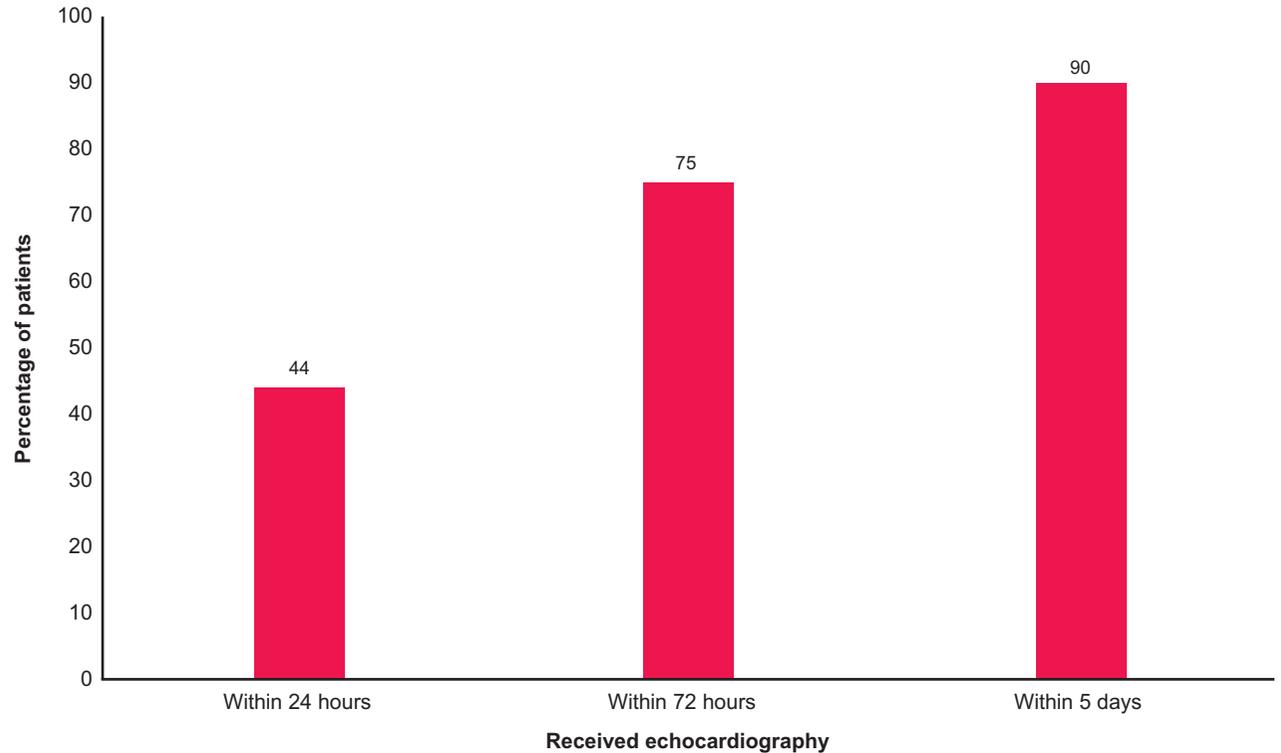
Source: Nicol, Fittall et al (2008)

Diagnostic test waits – echocardiography

According to official data, the length of time patients wait for echocardiography has fallen markedly in recent years. In March 2006, 33,938 people had been waiting longer than six weeks for imaging, compared with only 199 patients in June 2009. The overall size of the waiting list has also fallen from 64,877 in March 2006 to 30,942 in June 2009 (data not shown).

**Number of patients waiting for echocardiography, England, 2006–09**
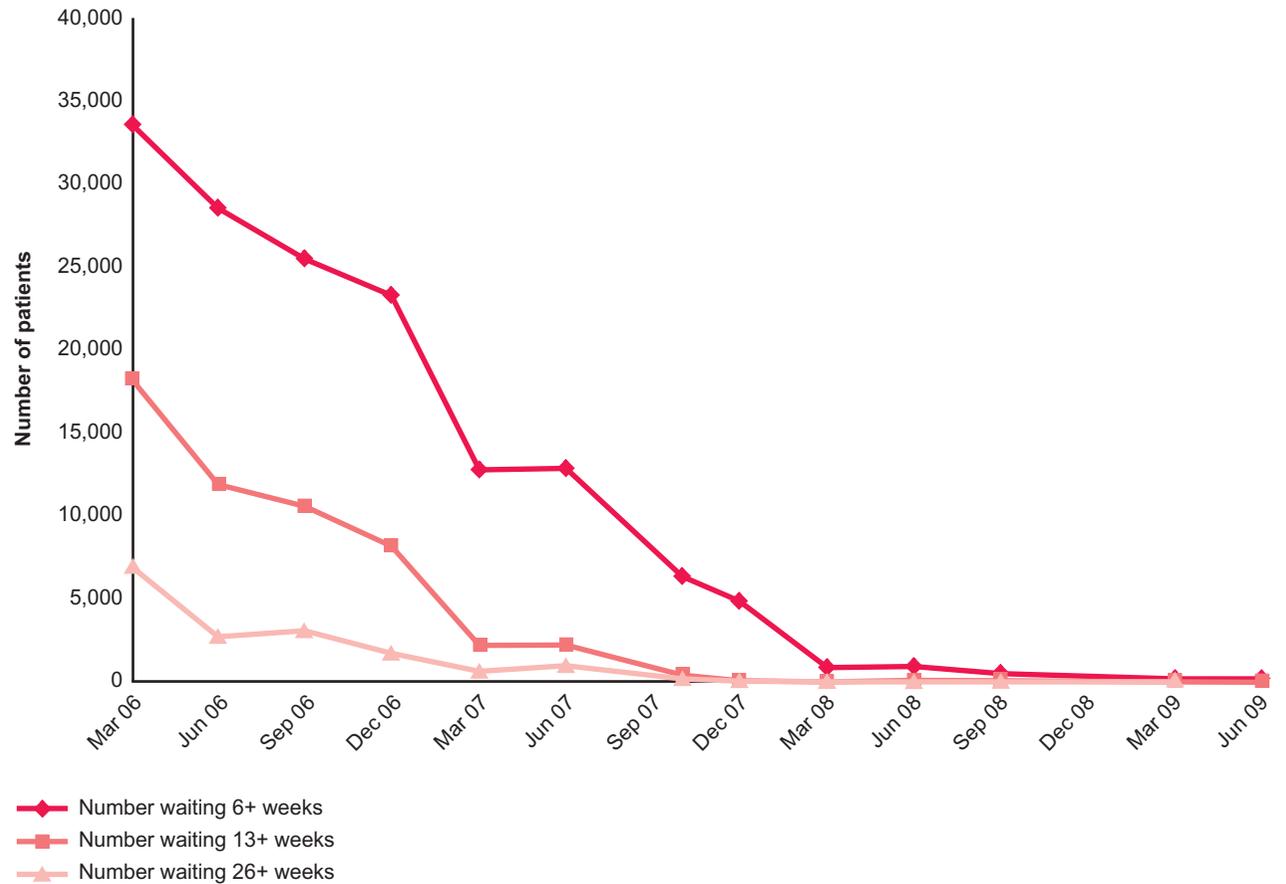
Source: Department of Health (online)

Access to specialist care – admitting team

There is evidence to suggest that heart failure patients who are treated by cardiologists are more likely to receive evidence-based care and probably have better outcomes (Go, Rao et al 2000). A large survey of acute NHS trusts (Nicol, Fittall et al 2008) used a retrospective audit of patient notes to examine the quality of care delivered to patients admitted as emergencies with heart failure. The chart opposite shows that almost three-quarters of hospitalised heart failure patients were admitted under the care of the on-call medical team, with around one in 10 coming under the direct care of a cardiologist or lead heart-failure clinician. Supplementary data indicate that for patients admitted through medical assessment units, and transferred to inpatient wards, more than half changed consultant at least once. However, only 14% of all those admitted were referred to a specialist (data not shown).

**Admitted under heart failure specialist or generalist care, England, Wales and Northern Ireland, 2005/06**
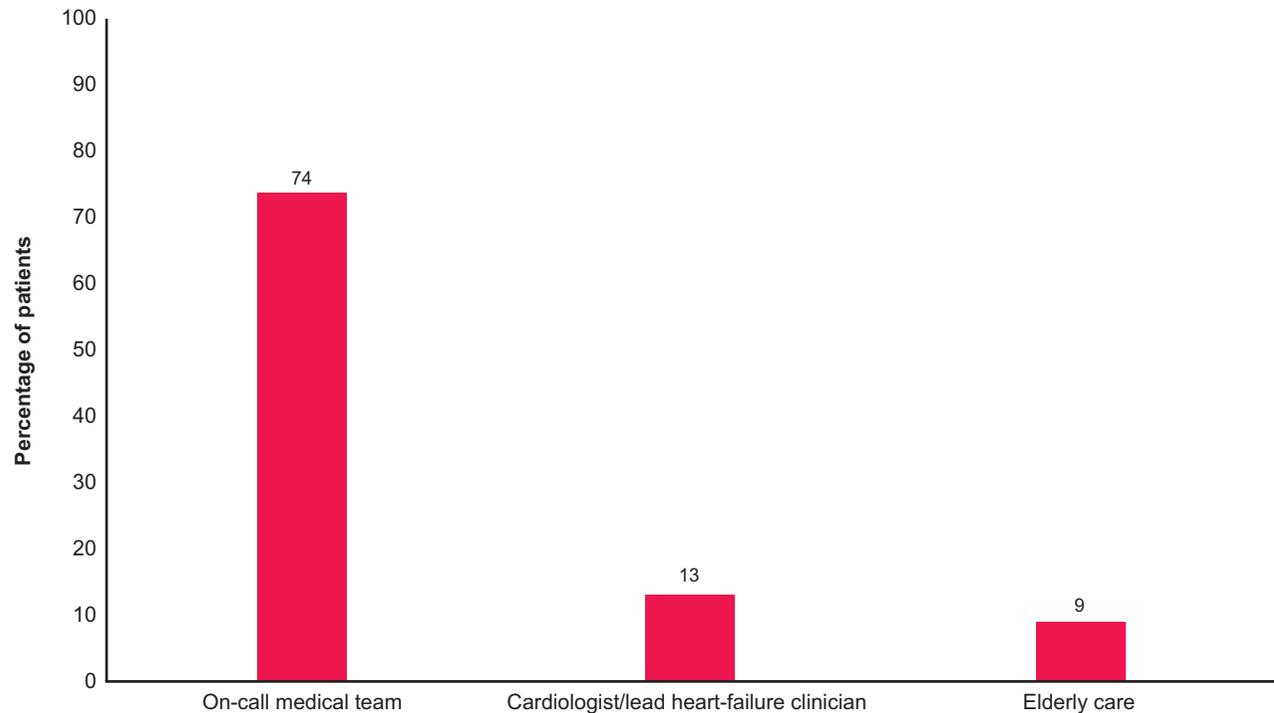
Source: Nicol, Fittall et al (2008)

Access to specialist care in hospital – specialised wards

Work undertaken by the Healthcare Commission highlighted that many patients admitted to acute hospitals are not managed fully, in accordance with evidence-based guidelines. Factors, such as access to specialist wards and services, and sex of the patient, may affect access to key treatments. In 2007/08, the National Heart Failure Audit of hospitalised heart failure patients reported that the majority of patients (61%) were treated in general medicine, with just under a third (31%) treated on a cardiology ward and 7.9% treated on other wards. This situation improved in 2008/09 with 46% of patients treated on a general ward and 44% receiving care on a cardiology ward.

Access to specialist care in hospital, 2007/08–2008/09
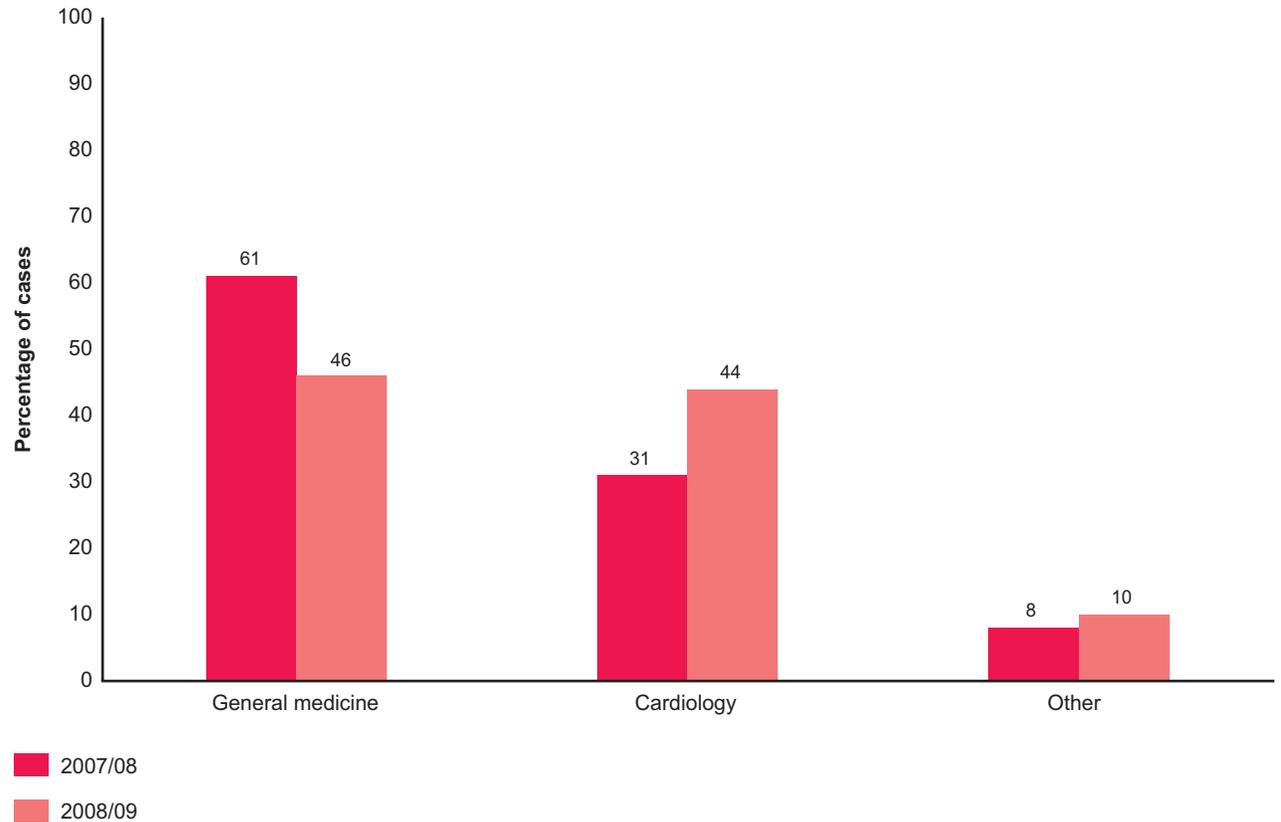
Source: NHS Information Centre for Health and Social Care (2009b; 2008a)

The implication of variation in access is demonstrated in the chart opposite, which shows the percentage of patients with heart failure who were cared for within each type of ward and prescribed the key drug therapies. Patients treated on general wards were less likely to receive guideline-recommended treatments.

Admission ward by core NICE treatments, 2008/09

Number of core NICE treatments prescribed per person
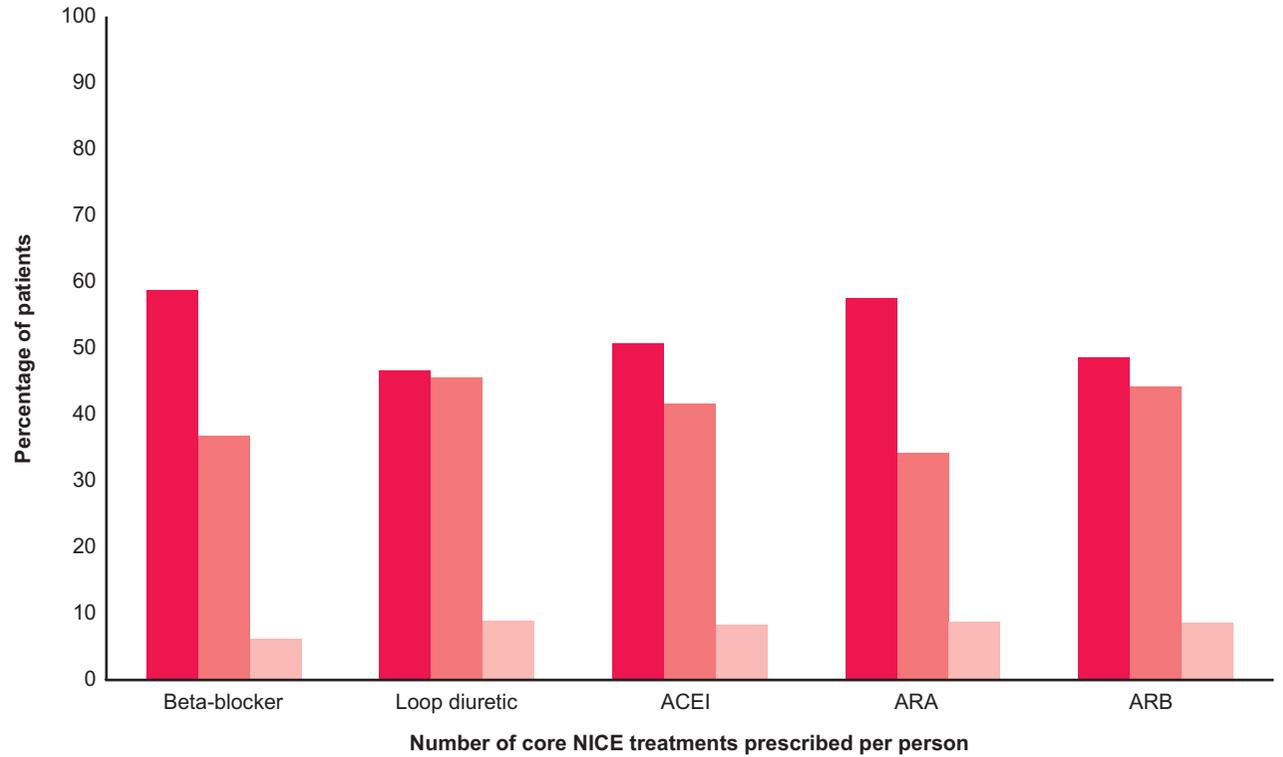
Cardiology

General medicine

Other

ACEI = angiotensin-converting enzyme inhibitor
ARA = angiotensin receptor antagonist
ARB = angiotensin II receptor blocker

Source: NHS Information Centre for Health and Social Care (2009b)

CAPACITY

The provision of reliably high-quality healthcare depends on a complex network of critically important elements, including:

- efficiency of operations
- compliance with scientific evidence
- sufficient resources and optimal distribution of them
- compassionate and responsive interactions between staff and patients.

The delivery of these elements depends on the capacity of the system to provide healthcare that meets both individual and population needs.

Key findings from this section include:

- The availability and composition of multidisciplinary teams for heart failure varies across England.
- Specialist heart failure clinics and rehabilitation services are not widely available.

Specialist staff

The Healthcare Commission (HCC) 2007 review of heart failure services aimed to find out about the availability and quality of services across the country. It found that over 80% of communities served by primary care trusts (PCTs) had some access to specialist heart failure nurses in primary or secondary care. However, the HCC study found that only 24.4% of patients were referred to a heart failure service following admission (this ranged from 0 to 94% across all PCTs).

Proportion of PCTs served by specialist staff, England, 2005/06

Specialist heart failure nurse working in primary or secondary care — 81.6

Specialist heart failure nurse working in primary care — 64.9

Specialist heart failure nurse working in secondary care (excluding general nurses in cardiology/care of the elderly) — 46.2

Other healthcare professional with specific responsibility for heart failure (working in primary care) — 16.1

Other healthcare professional with specific responsibility for heart failure (working in secondary care) — 11.7

GP with a special interest in cardiology working in primary care — 16.7

GP with a special interest in cardiology working alongside consultant in hospital — 8.0

Percentage of PCTs

Source: Healthcare Commission (2007a)

Multidisciplinary teams – acute and primary care

Heart failure patients have a wide range of needs as a result of differences in severity and complexity of their condition, and various co-morbidities and underlying aetiologies. There is evidence to suggest that quality of care is enhanced when multidisciplinary teams provide services (Bernard, Brodie and Lohr 2007). The service review undertaken by the Healthcare Commission in 2007 collected data on the extent to which specialist heart failure staff worked as multidisciplinary teams. Around 60% of organisations reported that specialist staff worked as part of such teams. Data on the professions taking part in multidisciplinary teams in acute and primary care are shown in the following two charts.

Professions forming part of the extended multidisciplinary team for heart failure: acute trusts
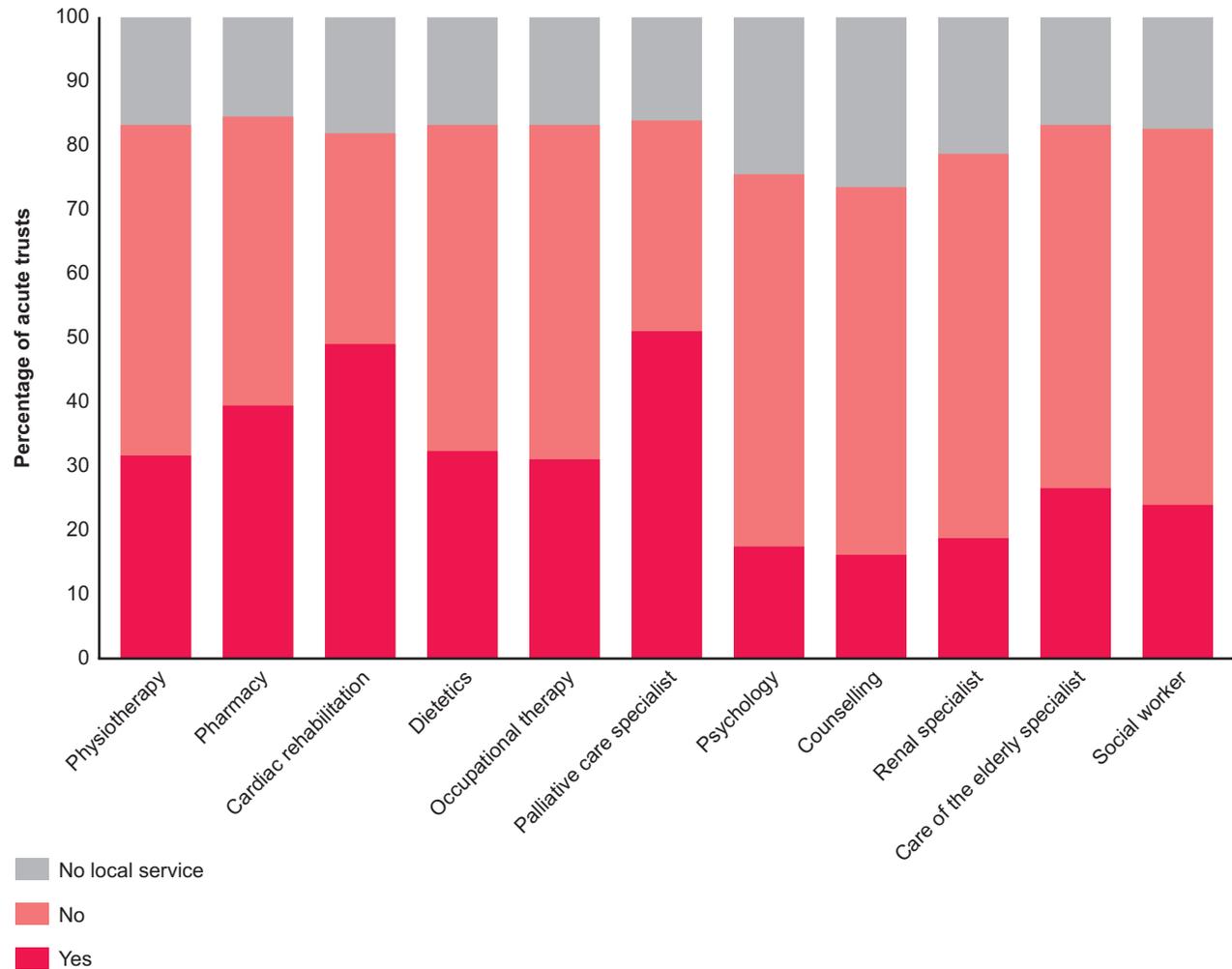
Source: Healthcare Commission (2007a)

Professions forming part of the extended multidisciplinary team for heart failure: PCTs
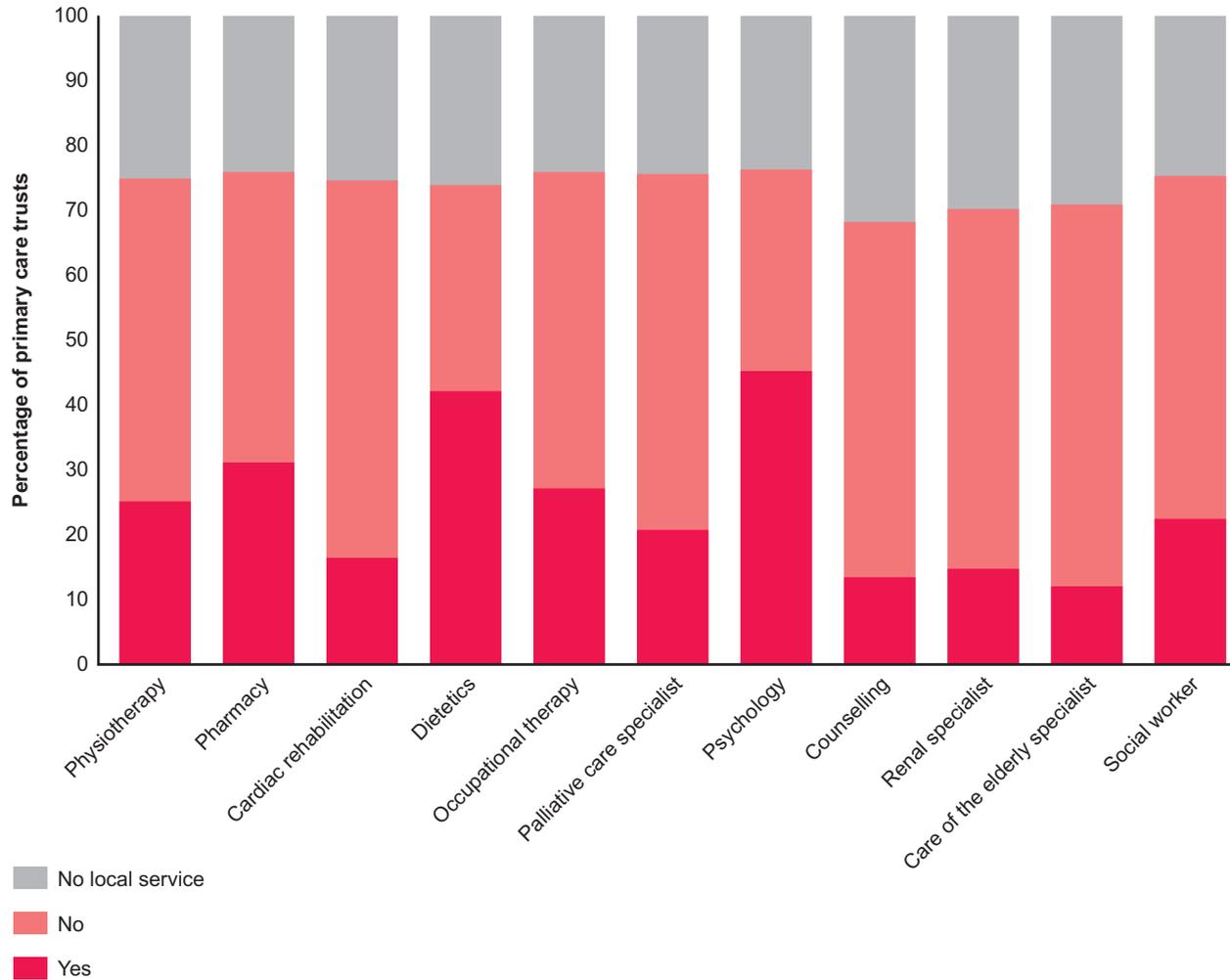

Source: Healthcare Commission (2007a)

Capacity for quality care – hospital echocardiography

The British Society for Echocardiography (BSE) has set out standards for hospital-based echocardiography services, covering:

- leadership, staffing, training and qualifications

- reporting and record-keeping

- systems and processes for reviews and alerts

- facilities, equipment and maintenance

- patient information.

On the basis of these standards, the BSE accredits echocardiography services, differentiating between 'basic' (mandatory), 'favoured' or 'desired' levels of achievement. In 2007, the Healthcare Commission (HCC) conducted a review of heart failure services and found that only 24 NHS trust departments had achieved accreditation through the BSE scheme. However, the data collected for the review suggested that most units were compliant with the BSE standards. The chart opposite shows the level of achievement that the HCC considered NHS trusts had attained. Almost half reported achieving the basic (mandatory) level of attainment. Notably, 11.8% of units declared that either they did not meet the basic standards or they did not know (data not shown).

**Capacity for quality care, echocardiography units, England, 2005/06**
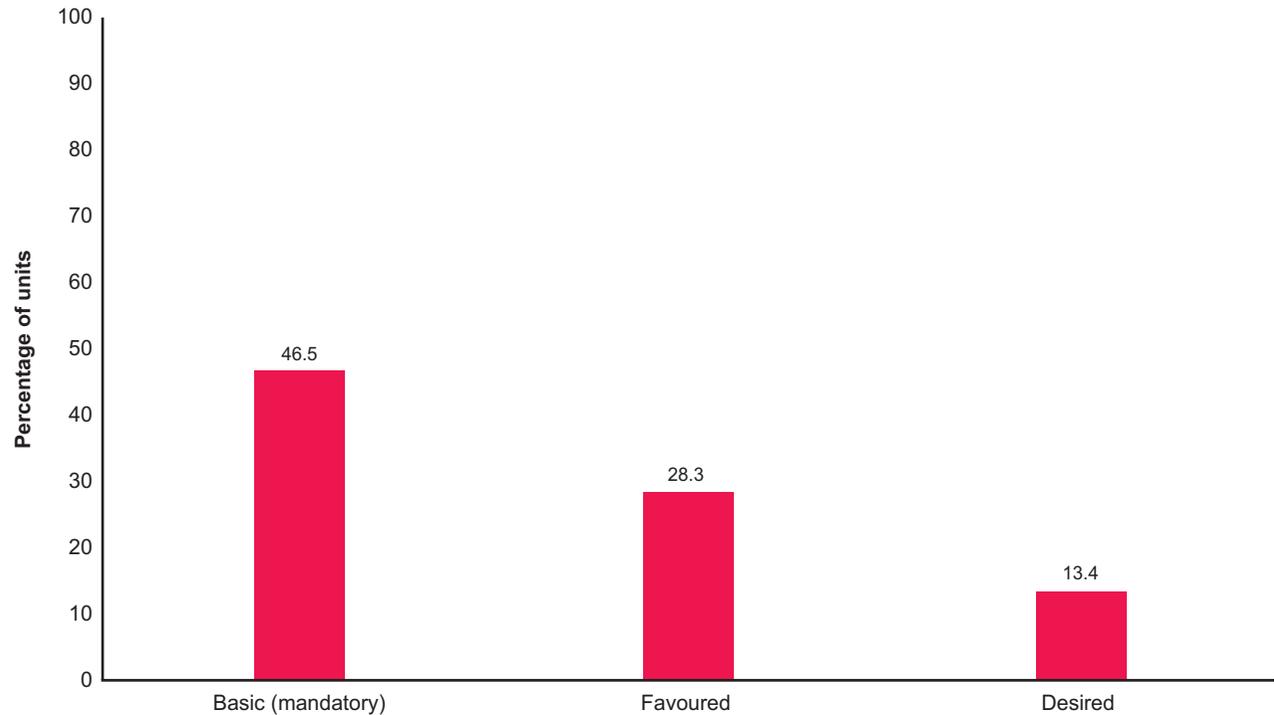
Source: Healthcare Commission (2007a)

Availability of services – primary care trusts

Murphy, Chakraborty et al (2008) conducted a survey of coronary heart disease leads and chief executives of primary care trusts (PCTs) in England in 2005. The chart opposite illustrates their findings in relation to the availability of various services for heart failure patients. The low availability of rehabilitation services is notable as is the finding that 14% of PCTs at the time of the survey did not have access to echocardiography nor a heart failure clinic. Heart failure clinics are important as there is evidence to suggest that patients who attend have lower hospitalisation rates and fewer deaths (Lainscak and Keber 2006).

Availability of services, PCT survey, England, 2005


Percentage of respondents
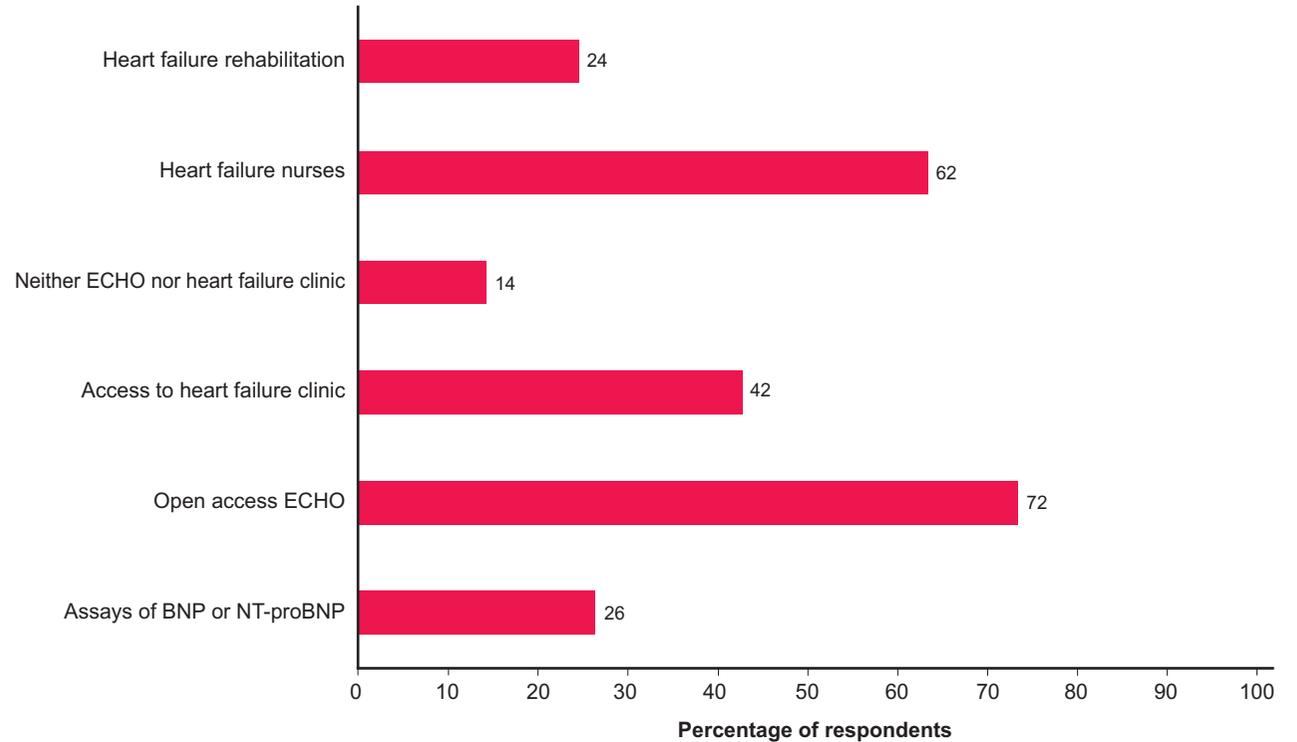
BNP = B-type natriuretic peptide
ECHO = echocardiography
NT-proBNP = N-terminal pro-B-type natriuretic peptide

Source: Murphy, Chakraborty et al (2008)

Leadership of heart failure services

A survey of primary care trusts (PCTs) in 2005 conducted by Murphy, Chakraborty et al (2008) asked PCT chief executives or coronary heart disease leads about the services in the main hospitals to which patients were referred. The chart opposite shows responses relating to whether a cardiologist, elderly care physician or other physician led the hospital heart failure service. Almost two-thirds of respondents indicated that a cardiologist led heart failure services. However, 4% of respondents (eight PCTs) indicated that there was no coordinated secondary care service available.

Leadership of heart failure services in hospitals, PCT survey, 2005
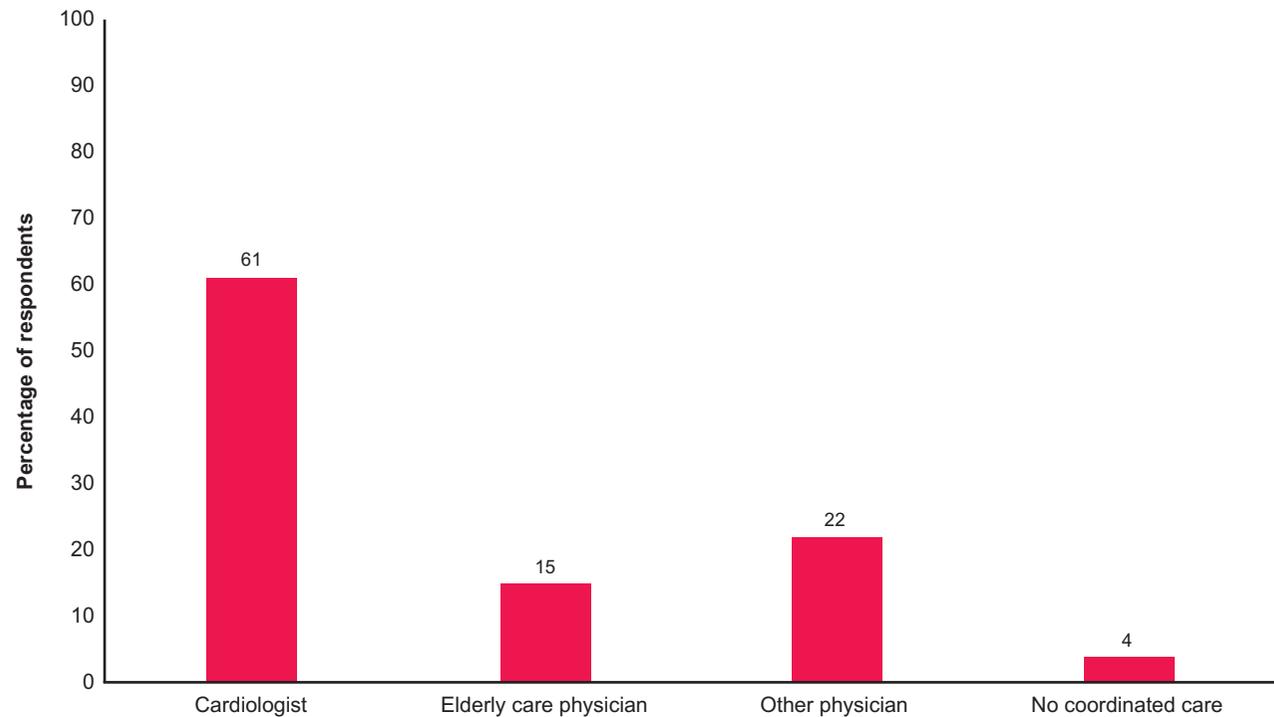
Source: Murphy, Chakraborty et al (2008)

SAFETY

Safety – the elimination of unnecessary risk of harm to patients – is a fundamental attribute of quality in healthcare. In recent years, safety has come to the fore as a pressing concern of health policy makers, patients, managers and healthcare professionals.

Despite this, there is a dearth of data regarding safety issues in heart failure, which is why there are no charts in this section.

PATIENT CENTREDNESS

Reliably providing high-quality healthcare requires the use of best-available scientific evidence, diagnostic acumen and technical proficiency, all applied in safe and managerially efficient environments. While these factors are necessary for high-quality care, they are not sufficient. Equally important is patient centredness: that is, a concern for – and responsiveness to – patient preferences, attitudes and experiences.

Patient centredness is a particularly apposite concept in sets of heart failure indicators. Heart failure has a profound effect on patients' quality of life in that functional status and sense of wellbeing are often severely compromised. Cowie, Komajda et al (2006) conducted the Prospective Outcomes Study in Heart Failure – a pan-European study that looked at acute heart failure admissions to hospitals with a particular expertise and interest in heart failure. The study showed that, on admission, the vast majority of patients were greatly restricted in their functional status (that is, NYHA Class III or IV – see page 12), as might be expected. However, on discharge, 41% of patients remained symptomatic at rest or on mild exertion. This is when patients should have been at their 'best'. Even with optimal treatment, it is rarely possible to achieve complete relief from symptoms in heart failure patients.

In recent years, there have been large national surveys about patients' experiences of care, in relation to coronary heart disease and to primary care. While both of these cohorts would include a considerable number of heart failure patients, respondents were not stratified by diagnosis, so no specific data on the views and attitudes of heart failure patients were available. However, a focused study conducted by the Healthcare Commission (2007a) did elicit views of heart failure patients, and these data are included in this section along with findings from the EuroHeart Failure Surveys I and II (see, for example, Komajda, Hanon et al 2009; Lainscak, Cleland et al 2007a). Key findings from this section include:

- Patients value easy access to services, coordinated care, and information and honesty about their prognosis.

- Only around half of NHS organisations seek patients' views about the quality of care they have received.

- Across Europe, more than a third of surveyed patients did not recall receiving lifestyle advice that would help with their condition.

In the USA, indicator sets include a process measure, such as whether patients are discharged from hospital with written instructions about how to manage their condition and when to seek help. There is evidence to suggest that patients provided with comprehensive written instructions are less likely to be readmitted for any cause, and for heart failure, than those who do not receive such instructions (VanSuch, Naessens et al 2006). Such indicators would be valuable in the NHS.

Patient priorities for heart failure services

As part of its heart failure service review, the Healthcare Commission (2007a) surveyed patients about their experiences and views. The following are factors that patients most often identified as being important to them:

- Access to quick and accurate diagnosis without delays in the pathway

- Good links between services, organisations and professions

- Having a point of contact and someone who can coordinate care requirements

- Easy access to specialist advice and medication

- Access to specialist services such as rehabilitation and counselling

- Regular follow-up and ability to seek advice at short notice

- Information

- Honesty about their prognosis.

<div align="right">(Healthcare Commission 2007a)</div>

Quality of life for patients with heart failure – Europe

The EuroHeart Failure Survey II examined the clinical profile, 12-month outcomes and care processes delivered to heart failure patients in hospital across 30 European countries. The survey compared data for those aged 80 years and older with those who were younger than 80 years. The chart opposite illustrates the findings on quality of life for the two groups of patients, highlighting some of the difficulties that all heart failure patients, but particularly elderly sufferers, face.

Quality of life, by age, hospitalised heart failure patients, 2004/05

Age <80yrs
Age ≥80yrs
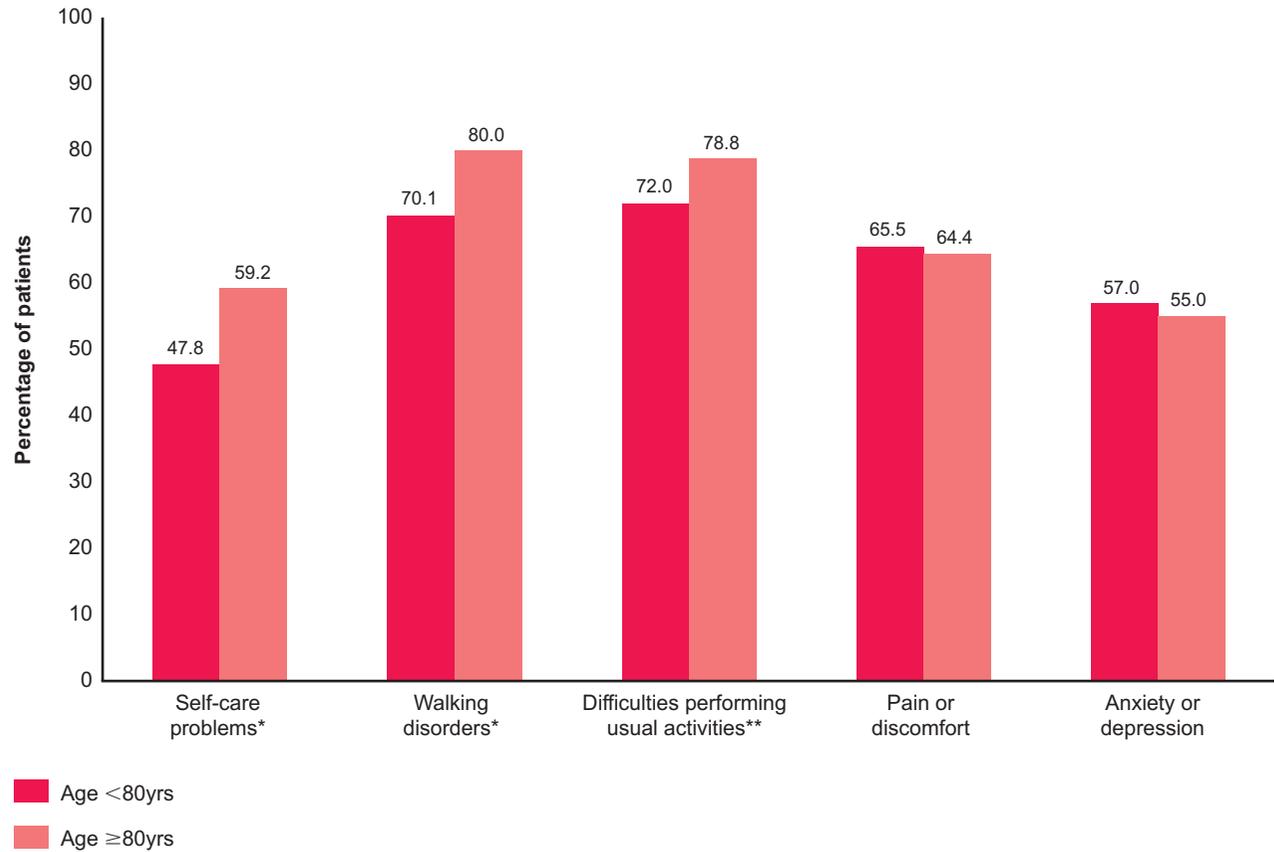
* $p < 0.001$
** $p = 0.003$

Source: Komajda, Hanon et al (2009)

Patient engagement in service development and evaluation

The Healthcare Commission's review of heart failure services (2007a) asked acute trusts and primary care trusts (PCTs) whether they had mechanisms in place to actively engage heart failure patients in the development or evaluation of services. Such mechanisms might include:

- a patient representative on a steering or planning group for heart failure services

- patient focus groups

- a heart failure or cardiac support group being consulted on quality or on development of services

- the British Heart Foundation 'hearty voices' programme.

The chart opposite shows that 79% of acute trusts and 88% of PCTs indicated that they had at least one such mechanism in operation.

Patient engagement in service development and evaluation, England, 2005/06
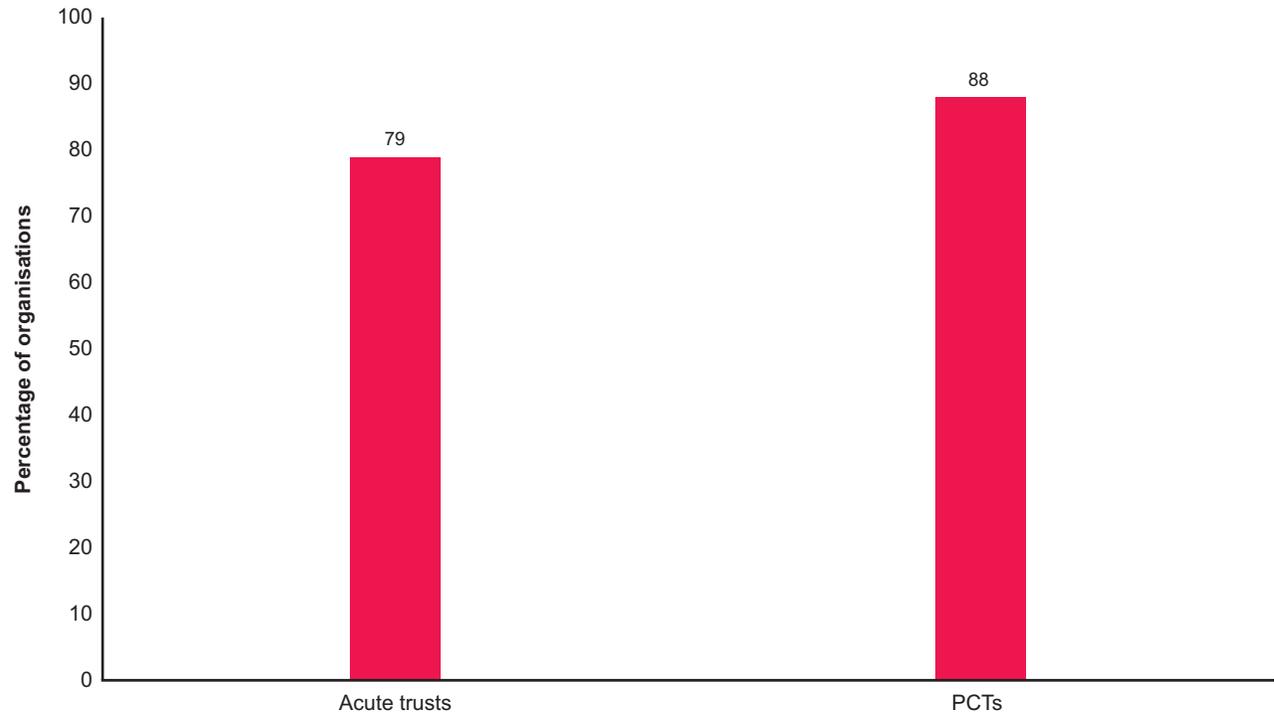

Source: Healthcare Commission (2007a)

Assessing patients' views – NHS organisations

The Healthcare Commission's evaluation of heart failure services (2007a) aimed to find out the extent to which NHS organisations sought and acted on patients' views, both in terms of patient satisfaction and quality of life. The chart opposite shows that 52.0% of organisations indicated that they had undertaken an evaluation of patient satisfaction with heart failure services, and 35.6% indicated that they carried out systematic evaluations of patients' quality of life.

Assessing heart failure patients' views, England, 2005/06
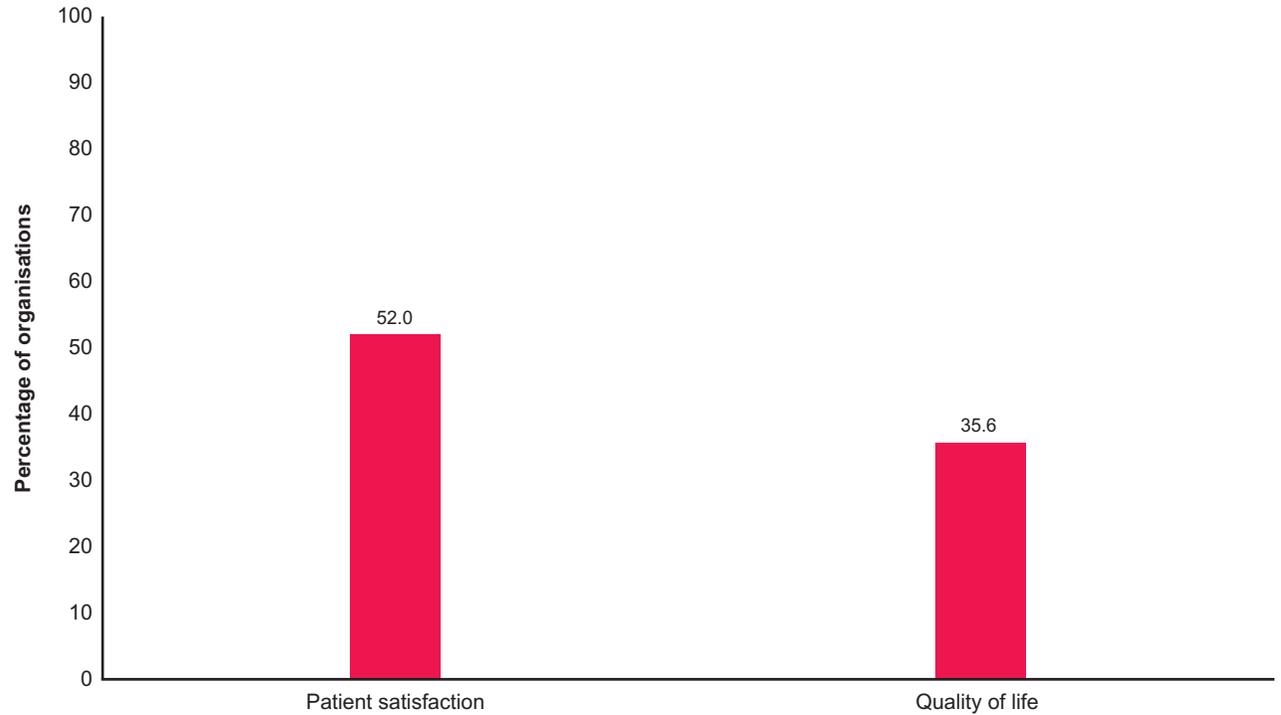

Source: Healthcare Commission (2007a)

Advice and self-care

The EuroHeart Failure Survey I was conducted across 24 countries that are members of the European Society of Cardiology, and involved 115 hospitals. A health professional interviewed patients participating in the survey 12 weeks after hospital discharge. The chart opposite illustrates the proportion of respondents who recalled receiving elements of lifestyle advice 12 weeks after discharge, stratified by those who indicated that they followed the advice completely and those who did not.

Lifestyle advice recalled and followed, EuroHeart Failure Survey I, 2001
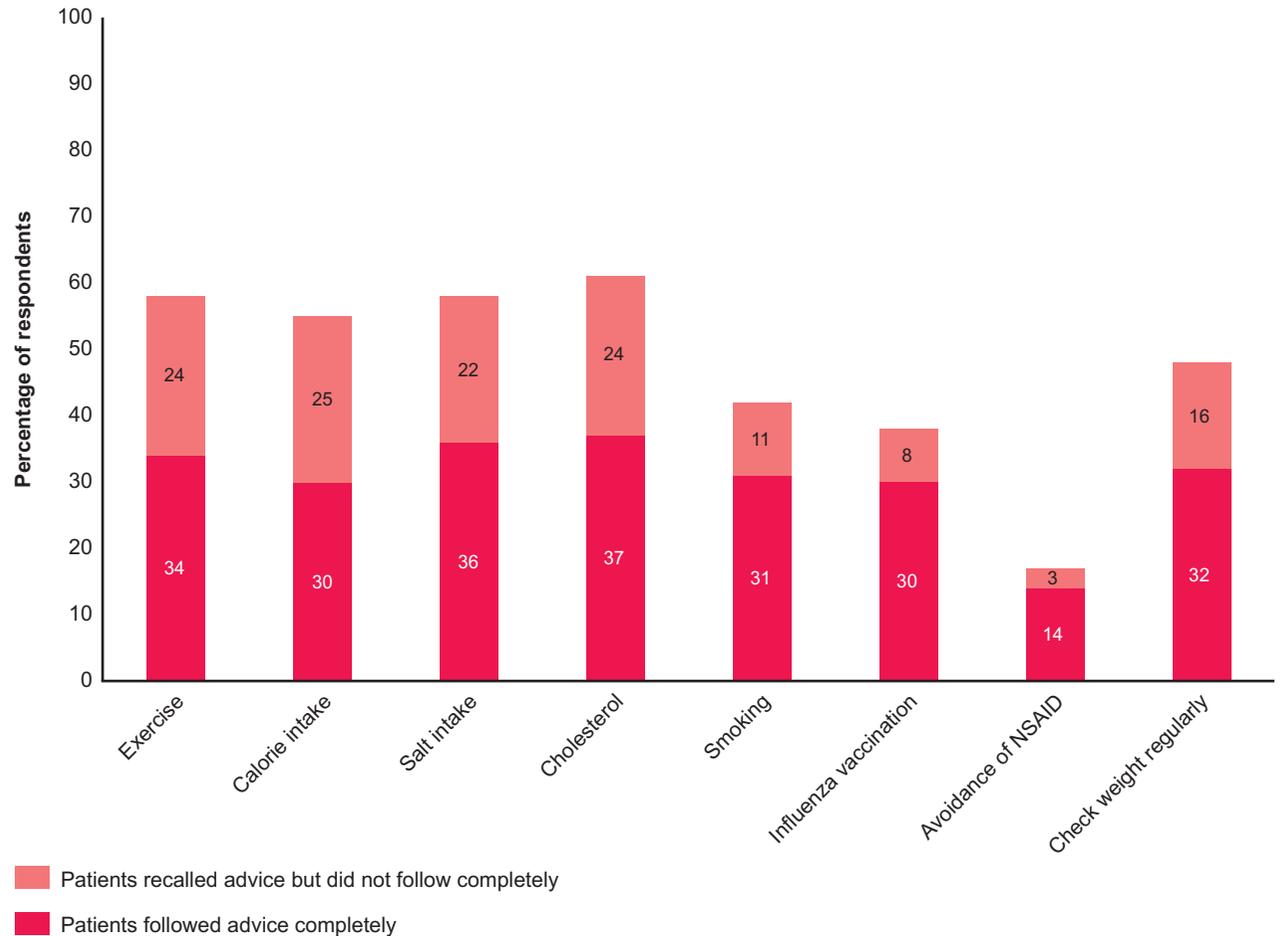
NSAID = non-steroidal anti-inflammatory medication

Source: Lainscak, Cleland et al (2007b)

EQUITY

Equity is an underlying value and a much-cherished tenet of the NHS. It embodies the principle that patients should receive the healthcare they need regardless of their background, characteristics or ability to pay.

This section examines whether there is evidence of differences in care provided to heart failure patients, on the basis of sex and age. Equity measures normally encompass indicators that are stratified on the basis of socio-economic status and race. The risk of developing coronary heart disease is higher among people of South-Asian descent (Department of Health 2000). However, no recent datasets specific to heart failure in England or the UK were available.

In the USA, Fonarow, Abraham et al (2009) evaluated differences in medical care and patient outcomes by age and sex among hospitalised patients with heart failure. They found that, in general, female patients received similar medical care to male patients, and had similar risks of adverse clinical outcomes as them. Older patients with heart failure were less likely to receive guideline-recommended therapies and remained at greater risk of adverse outcomes.

Incidence and prevalence of heart failure is lower in women than in men at all ages. However, due to the steep increase in incidence with age, and the proportionally greater number of elderly women in the population, the total number of men and women living with heart failure is similar.

Main findings from this section include:

- Women and older patients in primary care are less likely to receive recommended treatments than men and younger patients.

- The 2008/09 National Heart Failure Audit found that patients were prescribed loop diuretics irrespective of age, whereas the proportions receiving ACE inhibitors/ARBs, beta-blockers and aldosterone antagonists decreased with age. Patients admitted to a cardiology ward were younger and were more often men; men were also more likely to access cardiology follow-up (NHS Information Centre for Health and Social Care 2009b).

Cardiac investigations for elderly patients with heart failure – Europe

The EuroHeart Failure Survey II examined the clinical profile, 12-month outcomes and care processes delivered to heart failure patients in hospital across 30 European countries. The survey compared data for those aged 80 years and older with those younger than 80 years. The chart opposite illustrates significant differences between these groups in two types of cardiac investigations performed on heart failure patients in 2004/05. It is well established that outcomes for elderly heart failure patients are particularly poor and that treatment is often complicated by multiple co-morbidities. Low angiography rates may partly be explained by a high rate of renal dysfunction and co-morbidities in older patients. Nevertheless, the findings indicate that the management of elderly heart failure patients in Europe does not comply with international guidelines (European Society of Cardiology 2008; Jessup, Abraham et al 2009; NICE 2003a).

**Cardiac investigations for heart failure patients, by age, Europe, 2004/05**
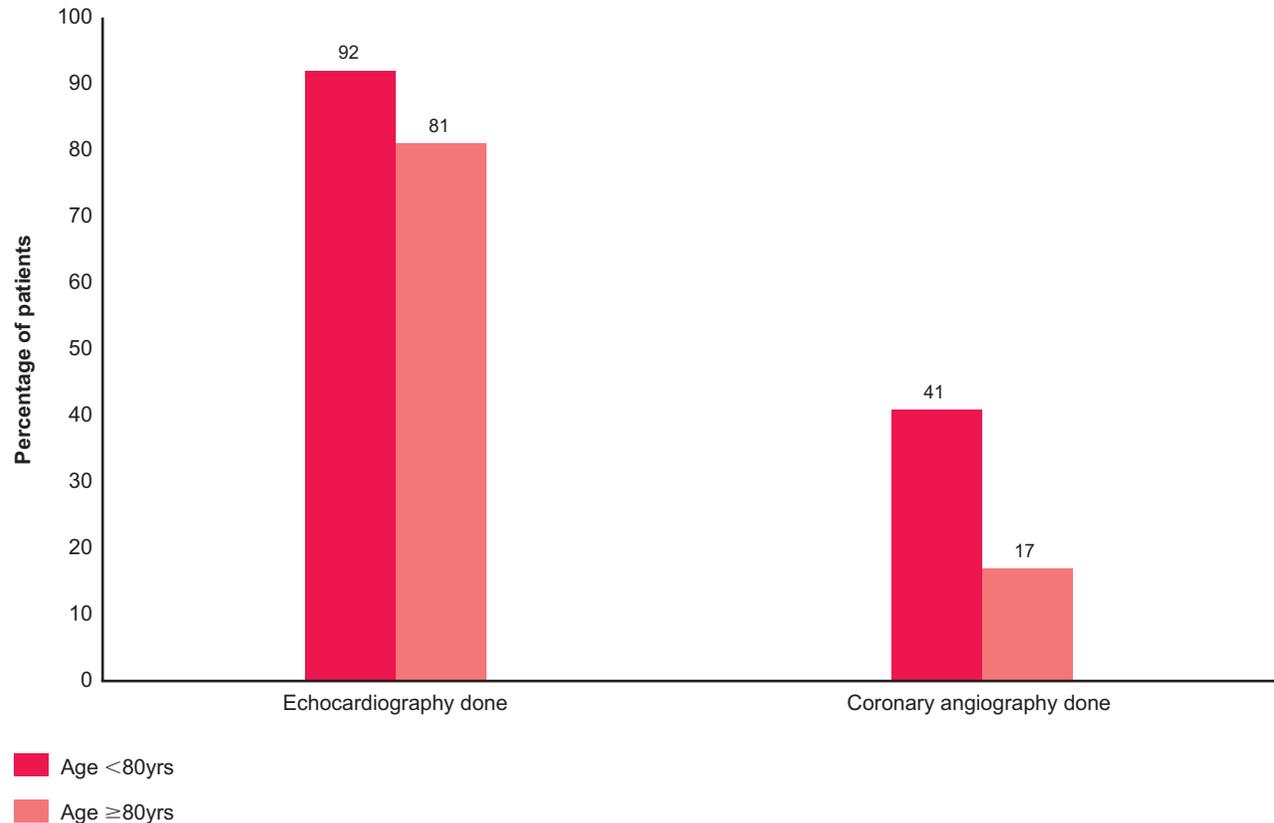
Source: Komajda, Hanon et al (2009)

Medications for elderly patients with heart failure – Europe

The EuroHeart Failure Survey II examined prescribing patterns for hospitalised heart failure patients across 30 countries. The chart opposite illustrates the proportion of patients prescribed recommended medications at discharge from hospital. It shows that while the gap between older and younger patients reduced between 2000/01 and 2004/05, significant differences remain between prescribing patterns for the two groups.

Heart failure medications at discharge, by age, Europe, 2000/01 and 2004/05
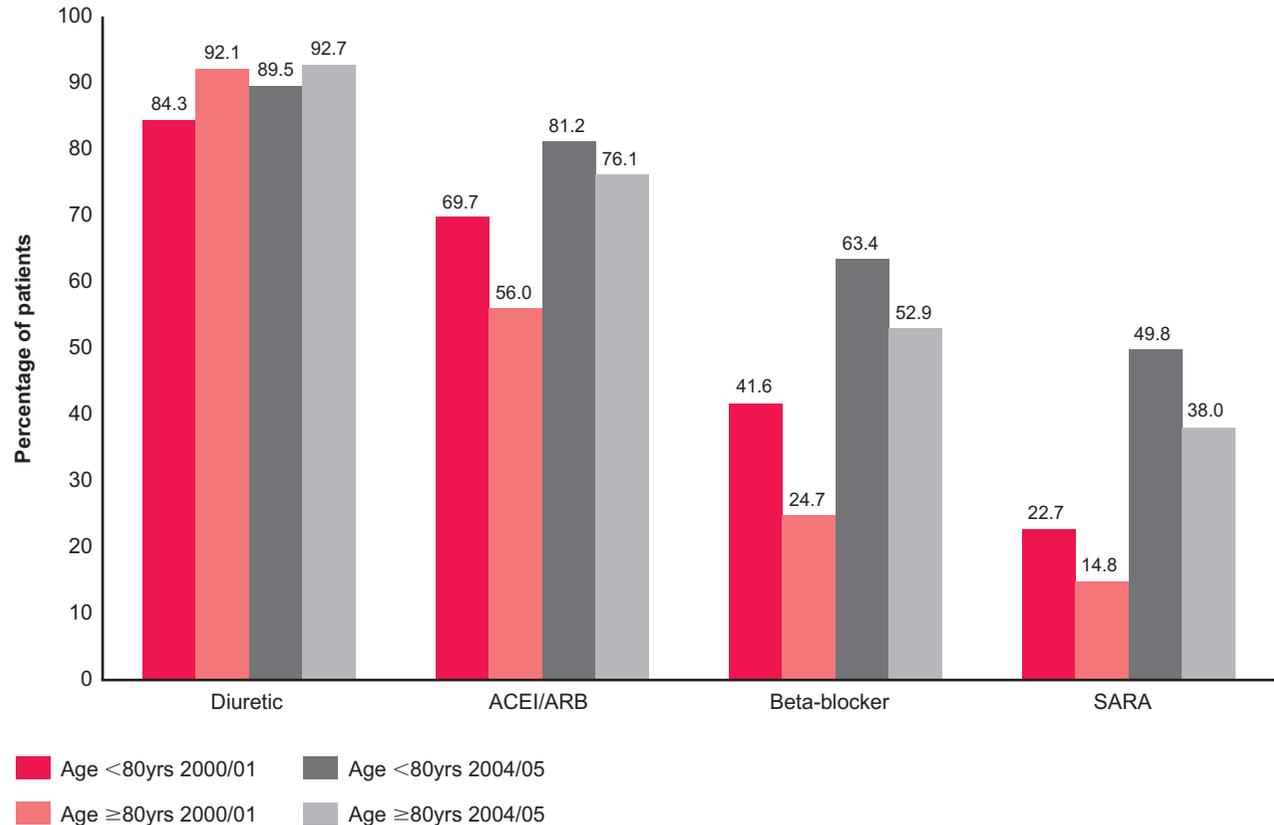
ACEI = angiotensin-converting enzyme inhibitor
ARB = angiotensin II receptor blocker
SARA = selective aldosterone receptor antagonist

Source: Komajda, Hanon et al (2009)

Beta-blocker treatment in general practice – differences by age and sex

Randomised controlled trials have shown that beta-blocker therapy improves survival and reduces hospitalisation for patients with left ventricular systolic dysfunction. This is reflected in international guidelines (see Chapter 3), which recommend their initiation in combination with ACE inhibitors for patients with heart failure and systolic dysfunction. Shah, Carey et al (2008) analysed data from 152 general practices in England with high-quality data recording between 2000 and 2005. Age-adjusted prevalence of heart failure across the cohort for 2005 was 2.88% for men and 2.16% for women (this accords with larger prevalence studies and is considerably different to Quality and Outcomes Framework data). The study examined whether heart failure patients had been prescribed guideline-recommended beta-blockers (bisoprolol, carvedilol, metoprolol or nebivolol). The chart opposite shows the proportion of heart failure patients, by age and sex, who received beta-blockers (both recommended and other types). Between 2000 and 2005, the age-adjusted use of beta-blockers (both recommended and not) in those with actively managed heart failure rose from 14.9 to 38.7% for men and from 14.0 to 34.0% for women (data not shown). The chart shows that a smaller proportion of women received beta-blocker treatment compared with men, as did a smaller proportion of older patients compared with younger age groups.

Proportion of actively managed patients treated with beta-blocker, by age and sex, England, 2005
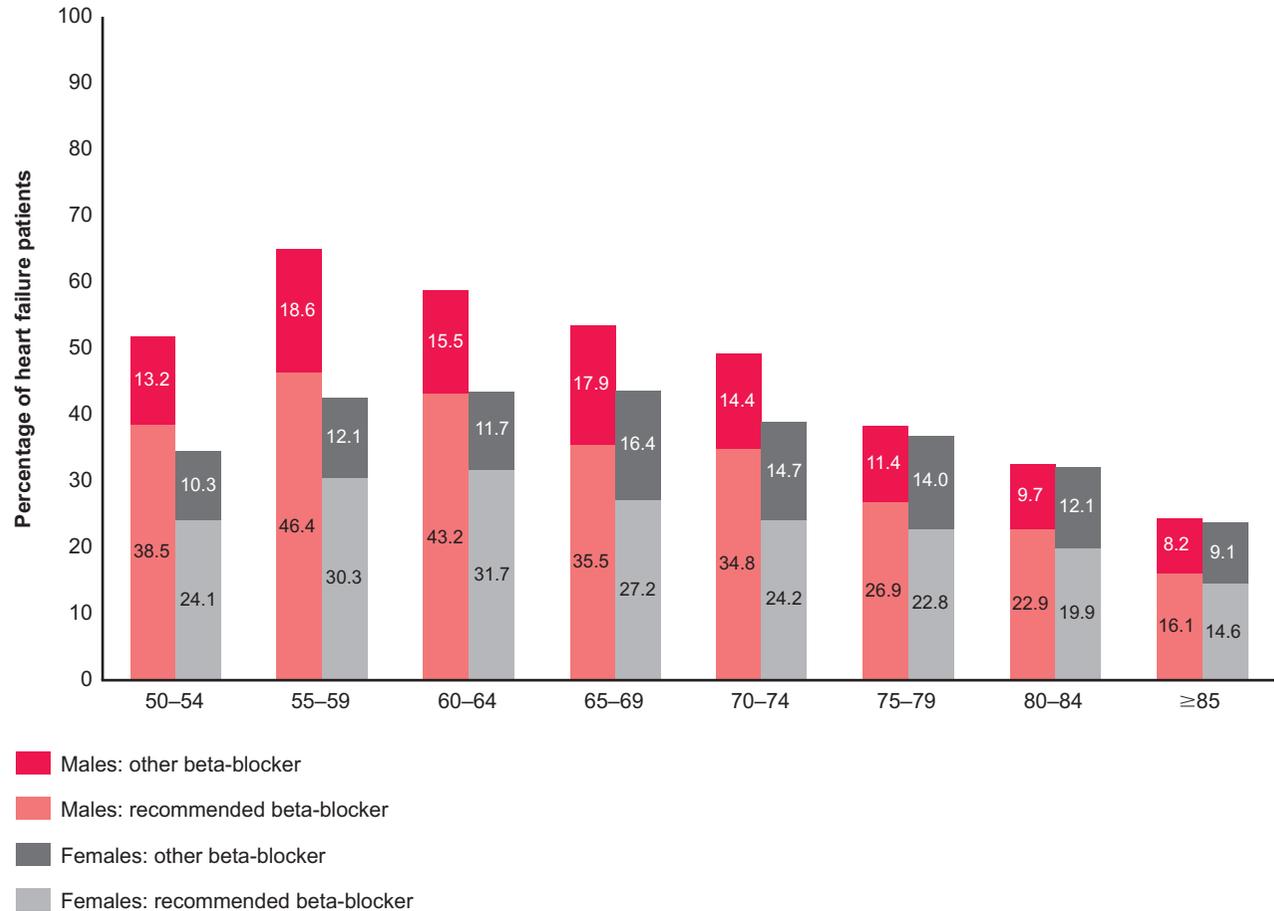

Source: Shah, Carey et al (2008)

Recommended treatments in hospitalised patients – by age and sex

The National Heart Failure Audit 2008/09 reported on the prescribing of recommended treatments to hospitalised patients. Its results, stratified by age and sex, are shown in the chart opposite. Patients were prescribed loop diuretics irrespective of age, whereas the proportions receiving ACE inhibitors/ARBs, beta-blockers and aldosterone antagonists decreased with age. Supplementary data indicated that patients admitted to a cardiology ward were younger and were more often men; men were also more likely to access cardiology follow-up (data not shown).

Core treatments by age (55 and older) and sex in patients with left ventricular ejection fraction less than 40%
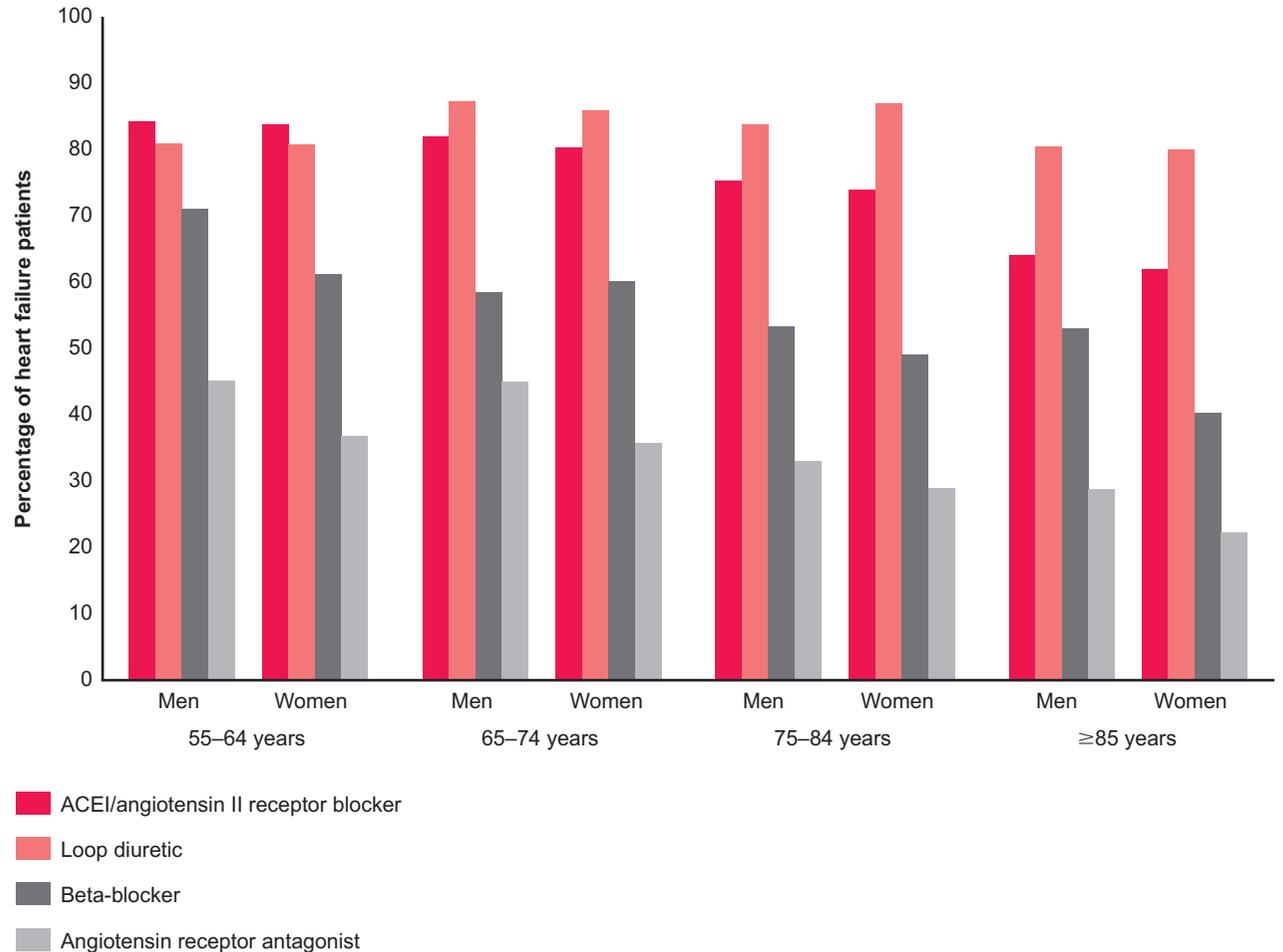
Source: NHS Information Centre for Health and Social Care (2009b)

PART THREE

Closing the quality gap

# Chapter 5: The costs and benefits of improving care

With ever-tightening budgetary constraints, providing adequate resources for care is extremely challenging. Cost-effectiveness analysis is the main economic tool to establish value for money and potential gains.

This chapter examines the topic of setting priorities to implement change.

Cost effectiveness of heart failure treatments

A study conducted by Fidan, Unal et al (2007) estimated the cost effectiveness of various treatments for heart failure. Set against the cost-effectiveness threshold range that NICE is said to use of £20,000–30,000 per quality-adjusted life year (QALY), all of the treatments shown are very cost effective. The cost-effectiveness ratios range from £223 per life year gained for beta-blockers in hospitalised patients to £3,093 per life year gained for statin use in community patients.

Estimated cost-effectiveness ratios for heart failure treatment, England and Wales, 2000–10
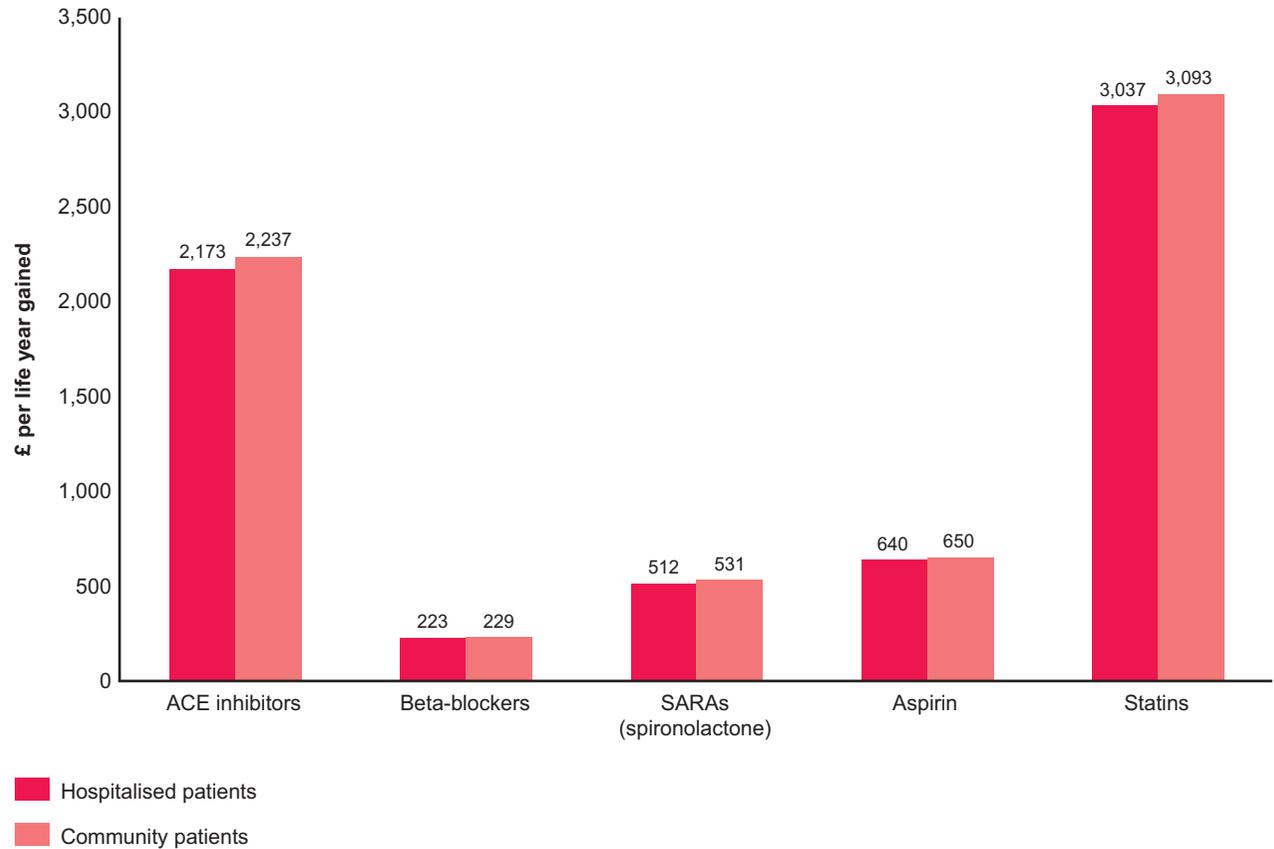
SARA = selective aldosterone receptor antagonist

Note: life years gained does not take into account quality of life unlike QALYs. Costings are based on 2000 costs.

Source: Fidan, Unal et al (2007)

Reducing the avoidable burden of disease

A team at the London School of Economics modelled the extent to which six different interventions provide gains in quality-adjusted life years (QALYs) for heart failure patients (Oliveira, Bevan et al 2009). Their findings are outlined in the charts on page 99. The highest health gains are made from extending prescription, from extending compliance and from an earlier diagnosis of incident patients. Although there is a high burden of disease that cannot be reduced with the defined interventions, all the interventions together have the potential to reduce the current burden of disease by 24%, and the annual number of deaths by 1,300.

The study found that all of the interventions have a potential of producing an average of 0.19 QALY gains per case treated. The earlier diagnosis of incident patients (2.68 QALYs) generates the highest QALY gains per case treated. With regard to the net monetary value of health gains, Oliveira, Bevan et al (2009) found that all the interventions were cost effective, as the monetary gain of health outputs more than compensates for the additional costs incurred in delivering the interventions.

By decreasing order of magnitude, the net monetary value of health gains (as measured by QALY health gains, multiplied by £30,000, minus additional costs for the defined interventions) are as follows:

- extended compliance (£357 million)
- earlier diagnosis of incident patients (£275 million)
- extending prescription of drugs (£236 million)
- extending treatment to all the prevalent population (£176 million)
- extending treatment to the incident population (£51 million)
- diagnosing the undiagnosed prevalent population (£48 million).

Additional costs associated with diagnosis and treatment of heart failure are mainly due to increases in primary care and outpatient costs, with additional hospitalisation costs assuming a lower magnitude. Nevertheless, the highest component of direct NHS costs related with heart failure is due to hospitalisations.

Potential gains from various interventions, deaths avoided, circa 2008

Intervention	Deaths avoided
Achieving 100% patient compliance with ACEI treatment	292
Extending treatment to all cases diagnosed with ACEI (with left ventricular systolic dysfunction)	244
Treating with ACEI all prevalent undiagnosed cases (with left ventricular systolic dysfunction)	103
Extending treatment to all prevalent diagnosed cases with primary and outpatient care	180
Providing treatment to all newly diagnosed cases	53
Earlier diagnosis of all heart failure cases identified by emergency admission	153

Source: Oliveira, Bevan et al (2009)

Potential gains from various interventions, QALYs gained, circa 2008

Intervention	QALYs gained
Achieving 100% patient compliance with ACEI treatment	11,300
Extending treatment to all cases diagnosed with ACEI (with left ventricular systolic dysfunction)	9,600
Treating with ACEI all prevalent undiagnosed cases (with left ventricular systolic dysfunction)	2,700
Extending treatment to all prevalent diagnosed cases with primary and outpatient care	7,000
Providing treatment to all newly diagnosed cases	2,100
Earlier diagnosis of all heart failure cases identified by emergency admission	9,500

Source: Oliveira, Bevan et al (2009)

Chapter 6: Bridging-the-gap evidence reviews

A comprehensive literature review conducted by the Research Triangle Institute has collated available evidence on what works to improve heart failure care (Bernard, Brody and Lohr 2007). The review adopted a 'best evidence' approach, focusing primarily on evidence for review articles and guidelines issued by national professional organisations. The findings are presented here in two categories: diagnosis and acute care; and chronic care.

This chapter also contains an extract from the commissioning guidance released by the National Institute for Health and Clinical Excellence (online b), and an overview of a report published by the NHS Institute for Innovation and Improvement (2009) on the characteristics of systems that provide high-quality heart failure services.

An evidence review

Table 6: Summary of evidence – healthcare delivery models for heart failure: diagnosis and acute care

Area of focus	Summary of evidence
Adequate diagnosis so that appropriate treatment can be initiated	• Evidence supports the use of an algorithm for heart failure investigation that uses less expensive tests such as electrocardiogram and/or blood test if natriuretic peptides, as a means of triaging patients who need an echocardiograph. • Evidence of effectiveness if open access to echocardiography is limited.
Inpatient treatment for acute exacerbations	• Evidence supports transitional care, begun during the hospital stay and continuing into the community, delivered by an advanced practice nurse; it can reduce length of hospital stay and risk of readmission. • The evidence supports starting care management strategies during the inpatient hospital stay to lower the risk of readmission.

Source: Bernard, Brody and Lohr (2007)

Table 7: Summary of evidence – healthcare delivery models for heart failure: chronic care

Area of focus	Summary of evidence
Chronic care management	• The extant evidence on the effectiveness of disease management programmes is mixed. • The evidence supports multidisciplinary management and multifaceted interventions; however, there is no conclusive evidence about how to organise the delivery of these programmes. • There is some evidence to suggest that, compared with general practitioners (GPs), cardiologists provide care that is more consistent with guidelines and have better patient outcomes. • Chronic care management activities can be delivered effectively by nurses with advanced training and support and back-up from physicians. • The evidence supports the delivery of chronic care interventions in multiple ways including specialty clinics, home-based interventions and disease management programmes; no one model emerged as superior. • The evidence suggests that chronic care management can be provided in a GP's office with the support of a nurse specially trained to monitor these patients. • There is some evidence that suggests that telemonitoring may be as effective as, or more effective than, other disease management programmes for decreasing patient risk of hospitalisation and increasing quality of life. Additional research is needed to fully assess the value of telemonitoring for improving patient outcomes.

Source: Bernard, Brody and Lohr (2007)

NICE commissioning guidance

Box 6: Ensuring corporate and quality assurance

Commissioners should ensure that the services they commission represent value for money and offer the best possible outcomes for patients. Commissioners need to set clear specifications for monitoring and assuring quality in the service contract.

Commissioners should ensure that they consider both the clinical and economic viability of the service, and any related services, and take into account patients' and carers' views and those of other stakeholders when making commissioning decisions.

A heart failure service needs to:

- be effective and efficient
- be responsive to the needs of patients and carers
- provide treatment and care based on best practice, as defined in the NICE clinical guideline CG5 on chronic heart failure (2003a)
- deliver the required capacity
- be integrated with other elements of care for people with chronic heart failure

- define agreed criteria for referral, local protocols and the care pathway for people with chronic heart failure
- be patient centred and provide equitable access, ensuring that patients are treated with dignity and respect, are fully informed about their care and are able to make decisions about their care in partnership with healthcare professionals
- audit the percentage of patients with chronic heart failure whose diagnosis has been confirmed by echocardiography, and who have been prescribed ACE inhibitors and beta-blockers; ensure that those who receive a copy of *Management of heart failure. Understanding NICE guidance – information for people with heart failure, their carers, and the public* (NICE 2003b) are reviewed six-monthly; and where appropriate, have a pre-discharge management plan in place to ensure treatment is optimised
- demonstrate how it meets requirements under equalities legislation
- demonstrate value for money.

Source: Adapted from the National Institute for Health and Clinical Excellence (online b)

The NHSIII key characteristics of systems providing high-quality care and value in heart failure

The NHS Institute for Innovation and Improvement (NHSIII 2009) has recently published a set of 17 key characteristics it has found optimise quality and value for patients with heart failure. However, the set of characteristics, summarised in the box below, has been criticised as a set of platitudes that fail to communicate exactly what is needed and how much it will cost (Hobbs 2009).

Box 7: Optimising quality and value for patients with heart failure – key characteristics

Overarching characteristics

- Executive teams across primary and secondary care are committed to developing heart failure services.
- The use of information across a whole system facilitates high-quality patient care.
- The whole system of care is focused on service improvement.
- A fully integrated service delivers high-quality and seamless care for patients with heart failure.
- Investment in leadership development.

Self-care

- Patients and carers can support themselves and each other when they have good access to support groups and information.

Primary care

- GPs are pivotal and valued as professionals for the ongoing management of patients with heart failure.
- Heart failure specialist nurses impact within GP practice.
- There is access to timely echocardiography services.

Acute care

- Developing a competent workforce and appropriate skill mix enables the delivery of seamless and timely care for the patients at any stage in the care pathway.
- Competent clinical leadership is focused on quality, providing senior-level decision making from cardiology services in acute care. Leadership offers expertise and advice to other professional groups.
- Expertise provides audit support, advice and training to heart failure teams across the system.
- Solutions are found to avoid inappropriate admissions and facilitate timely discharge.

Intermediate care

- An intermediate care team proactively manages heart failure.
- Dedicated rehabilitation for patients with heart failure results in improved patient outcomes.
- Integrated palliative care services with effective communication systems in place ensure easier access to hospices, day care and specialist expertise.
- Heart failure nurses offer seamless care across the system for heart failure patients.

Note: intermediate care is delivered 'between' primary and secondary care and includes social services, occupational therapy, physiotherapists and other professionals.

Source: NHS Institute for Innovation and Improvement (2009)

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