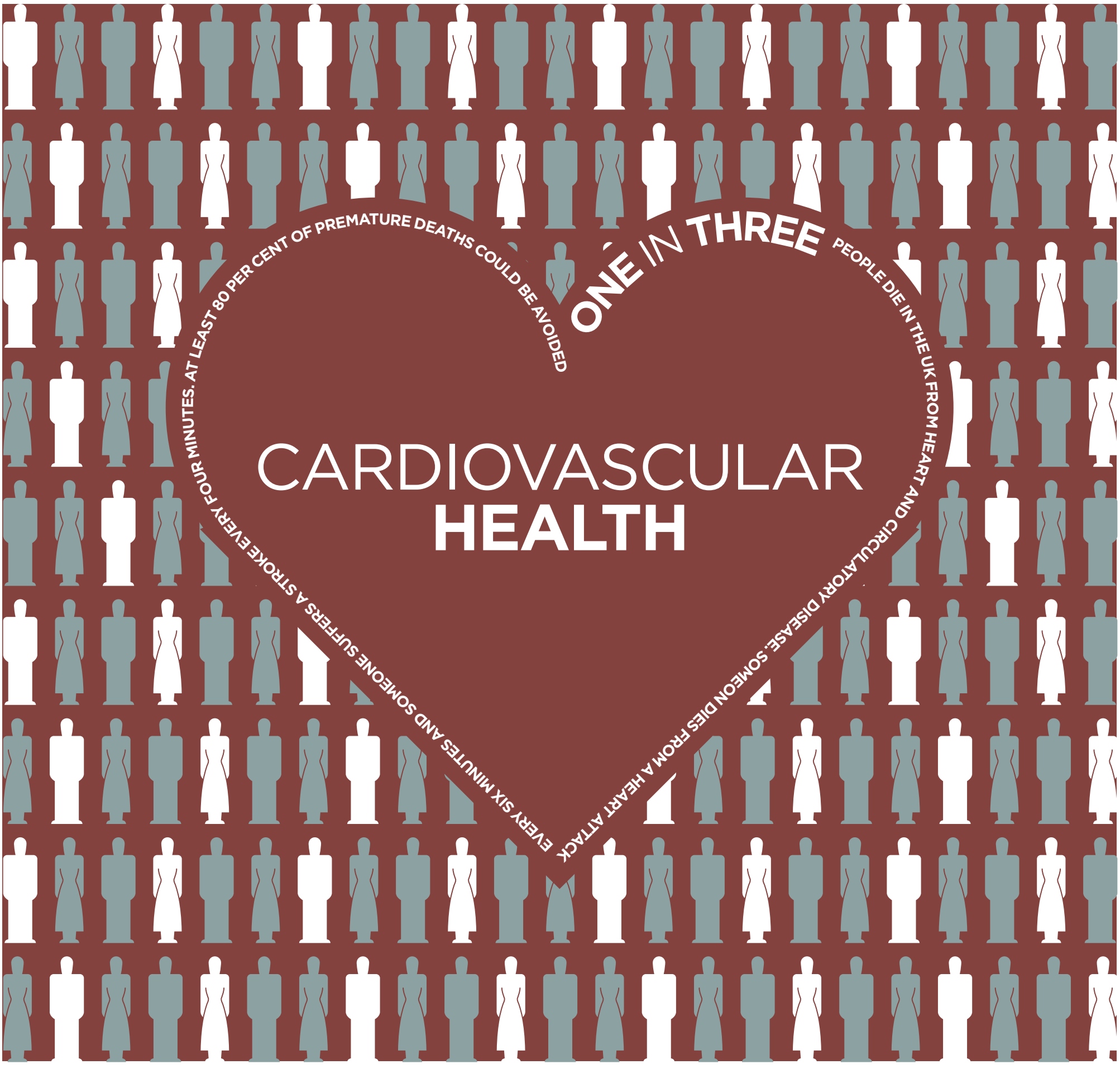

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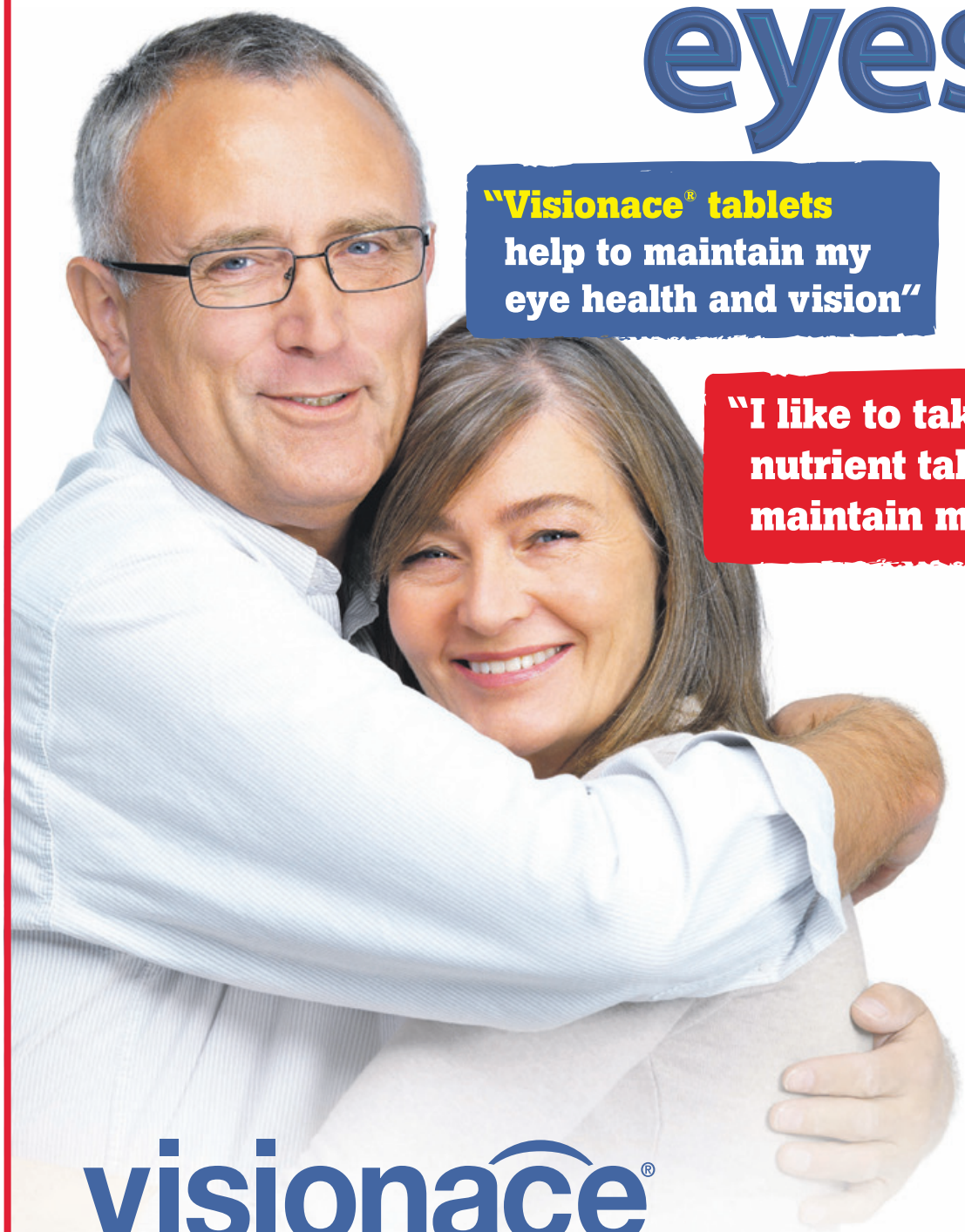

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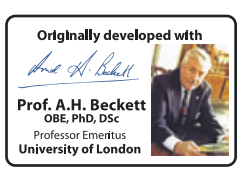

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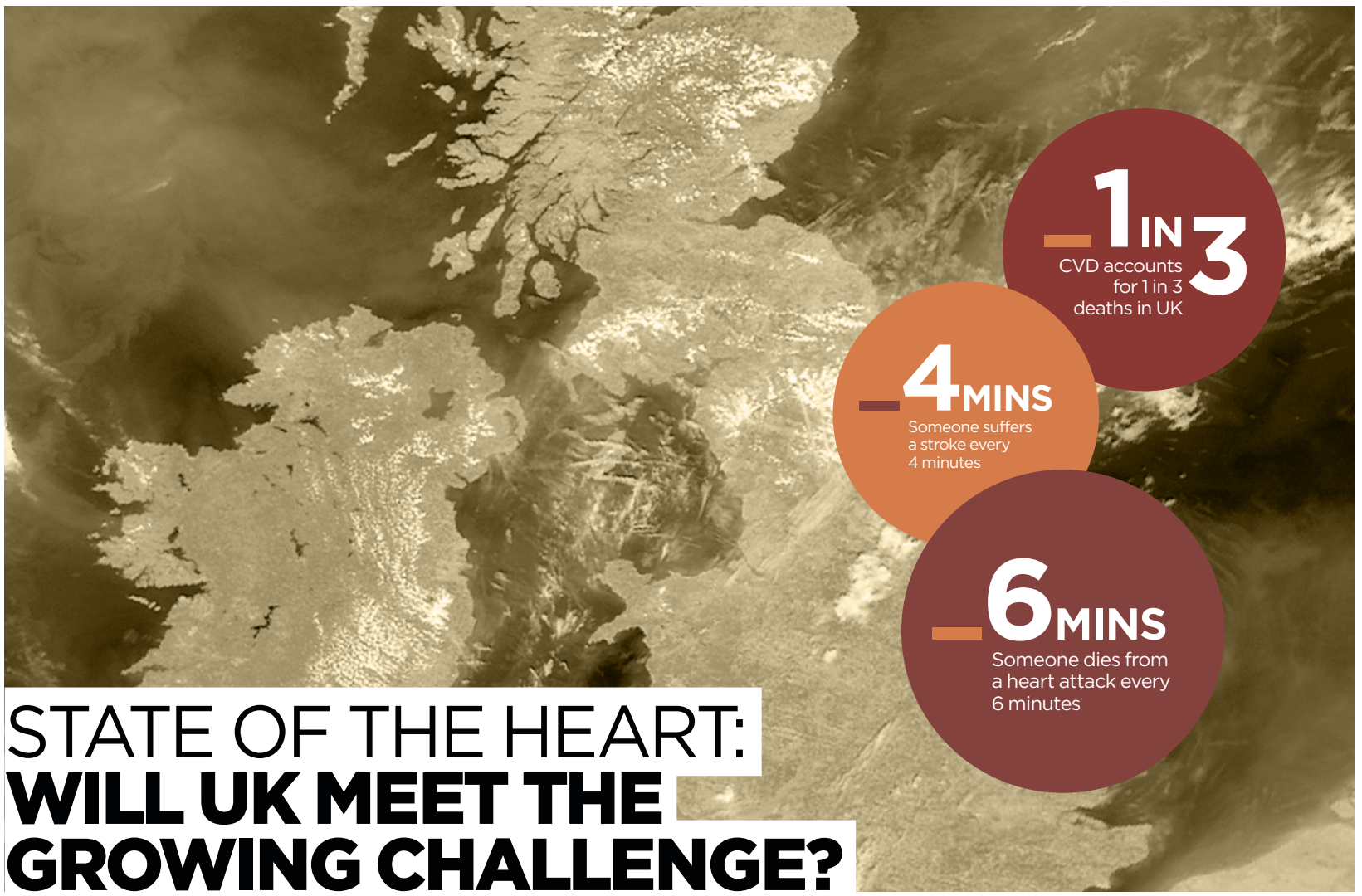


Death rates from coronary heart disease are highest in Scotland and the North of England

STATE OF THE HEART: WILL UK MEET THE GROWING CHALLENGE?

OVERVIEW Today is World Heart Day when campaigners send a wake-up call that at least 80 per cent of premature deaths from heart disease and stroke could be avoided, writes **Peter Archer**

Cardiovascular disease (CVD), affecting the heart and circulation, is the UK's biggest killer. Latest annual figures show that more than 190,000 people died from CVD in 2007 – that's about a third of all deaths.

CVD is a major cause of premature death, accounting for 29 per cent of early deaths in men and 21 per cent in women.

Someone dies from a heart attack every six minutes. Deaths from coronary heart disease – mainly from heart attacks – totalled more than 91,000 while strokes claimed the lives of over 53,000 people.

This compares to around 34,500 deaths from lung cancer and almost 12,000 deaths from breast cancer.

Approximately 1.4 million people have had a heart attack at some point during their lives and survived, while two million people suffer from angina, the most common symptom of heart disease.

However, since the late-1970s, heart-related death rates have been falling in the UK. For adults under 65, they have fallen by more than 45 per cent in the last ten years.

But, although fewer people are dying, the prevalence of heart and circulatory disease appears to be rising, especially among older men. Since the late-1980s, for example, it has risen by 52 per cent in men aged 75 and over. Altogether around 2.6 million people are living with coronary heart disease and as many again with other cardiovascular complaints.

Obesity, diabetes, lack of exercise and smoking are major risk factors. Levels of overweight and type 2 diabetes are rising fast. Since 1994, obesity has increased by 75 per cent in men and 41 per cent in women. Despite some advances, food still contains too much fat and salt. Diabetes has doubled in men and increased by almost two-and-a-half times in women.

Rates of physical activity are low with only 40 per cent of women and 28 per cent of men taking the recommended amount of exercise. And estimates suggest smoking causes more than 25,000 deaths from CVD each year. Raised blood pressure, cholesterol and glucose levels are all major problems.

A number of psychosocial factors are associated with increased risk of heart disease, notably stress, depression, anxiety, anger, and lack of social support and social networks.

UK death rates from heart disease are relatively high compared to other Western European countries, Japan and Australia. However, they are lower than in Eastern and Central Europe.

Significantly, there are national and regional differences within the UK in the number of people dying from heart disease. Deaths are highest in Scotland and the North of England, lowest in Southern England, and intermediate in Wales and Northern Ireland.

> Studies have shown that social class, income and occupation appear to affect levels of CVD

The premature death rate for men living in Scotland is 63 per cent higher than in South-West England and 100 per cent higher for women.

Many studies in the UK and abroad have shown that social class, income and occupation all appear to affect levels of CVD. Death rates are highest in the lowest socioeconomic group and lowest in the highest group.

This inequality is more striking in women than in men, with the death rate in female workers in routine jobs five times higher than those with managerial or professional roles.

Furthermore, the inequalities between the most and least deprived areas in the UK show a strong relationship between mortality rates and increasing levels of deprivation. More poor people die from CVD than rich people.

There are also ethnic differences. South Asians – Indians, Bangladeshis, Pakistanis and Sri Lankans – are among the most vulnerable groups in the UK. Men living in the UK, but born in Pakistan or Bangladesh, are more than twice as likely to die from heart disease compared to the national average. With Pakistani women, the rate is over two-and-a-half times higher.

In addition, cold weather can potentially affect the heart. During the winter of 2007-8, for example, almost 9,000 more people died of CVD compared to the summer months.

As well as the physical and emotional suffering caused to thousands of families, the economic healthcare costs to the UK of heart and circulatory disease are huge – around £3.2 billion a year, rising to £9 billion with lost productivity due to ill health.

GETTING TO THE HEART **OF THE MATTER**


© REZA ESTAKHRIAN

FACT FILE Diseases of the heart and blood vessels are responsible for one in three of all deaths in the UK. **Roger Dobson** answers the most frequently asked questions about cardiovascular disease

> Cardiovascular disease and its associated conditions remains the most common cause of death in the Western world

■ Cardiovascular disease (CVD) is not a single condition. It's a label for a number of complaints which affect the heart, veins and arteries. It includes heart attack, stroke, angina, peripheral artery disease and heart failure.

Other heart conditions, including infections and conditions that affect the heart's muscle, valves or beating rhythm, also come under the CVD umbrella.

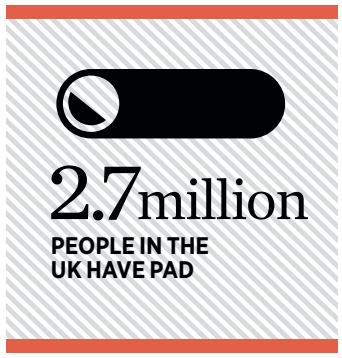
It is estimated that more than five million men and women in the UK are currently living with one or more of the cardiovascular diseases, including around 2.6 million with coronary heart disease.

Dr Jonathan Lyne, cardiologist at the Mater Private Hospital, Dublin, says: "Cardiovascular disease and its associated conditions remains the most common cause of death in the Western world, and results in much suffering for affected individuals and their families.

"Over recent years there has been great investment in not only the treatment of these conditions, but also improved detection by both imaging and risk assessment. Ongoing efforts are focused on the treatment of affected individuals and identifying those at significant risk in whom events may be prevented or the risk of such events reduced, and improving access to these treatments and procedures for all appropriate patients. The identification and provision of these therapies to all those who may benefit remains a significant challenge."

CVD IN DETAIL

PERIPHERAL ARTERY DISEASE



Peripheral artery disease (PAD) is caused by a gradual build-up of fatty material within the walls of the arteries – atherosclerosis – making them so narrow they cannot deliver enough oxygen-containing blood to the muscles in the limbs. It most commonly affects the legs and the most frequent symptom is pain in the calf muscles, thighs or buttocks when walking or exercising. PAD may increase the risk of heart attack or stroke because these arteries may also be diseased. Changes within the vessels may be seen at very young ages. Smoking is the biggest risk factor, with smokers up to 16 times more likely to be affected. There are strong links with age, with up to 19 per cent of people over 70 affected. However, being overweight, having diabetes, high blood pressure or lacking frequent physical exercise, are risk factors too.

STROKES

Strokes are caused when the blood supply to part of the brain is cut off and brain cells are damaged or die. Ischaemic strokes, the most common, are when something, usually a clot, blocks an artery carrying blood to the brain. In haemorrhagic strokes, a blood vessel may burst or leak and bleeds into the brain tissue. Strokes affect people in different ways, depending on which part of the brain is affected, and can damage both mind and body.

ANGINA

Angina is a symptom of an underlying heart problem, usually when the heart's blood supply is restricted or interrupted by a build-up of fatty substances in the coronary arteries. It feels like pressure or squeezing of the chest, and pain can be felt in the shoulders, arms and neck. Pain occurs when part of the heart muscle is not getting enough blood. Not everyone may experience chest pain or tightness. There are two main types of angina – stable, the most common, and unstable. Stable angina occurs when the heart is working harder than usual. This condition has a regular pattern, in terms of severity, frequency and trigger factors,

Technical advances have helped cut death rates but the disease is spreading

and goes away after rest or medication. Unstable angina doesn't follow a pattern and can occur with or without physical exertion, and rest or medicine may not relieve the pain completely. In this situation, urgent medical attention should be sought.

HEART FAILURE

MORE THAN
700,000
SUFFER HEART FAILURE

Heart failure is when a person's heart is unable to pump enough blood to the body, usually because it has been damaged, often after a heart attack or due a disease of the muscle cells (cardiomyopathy). It is also linked to high blood pressure and abnormal heart rhythms, and to diabetes. Risk factors include atherosclerosis and narrowing of the arteries, high blood pressure, diabetes, abnormal heart rhythms and excessive alcohol intake. Symptoms include blood and fluids backing up into the lungs, a build-up of fluid in the feet, ankles, legs and abdomen, tiredness or lethargy, and shortness of breath or coughing.

HEART ATTACK

124,000
HAVE A HEART ATTACK

Heart attack or myocardial infarction occurs when a coronary artery, which supplies the heart with oxygen-rich blood, becomes blocked, usually by a blood clot. Part of the heart muscle may be starved of oxygen, can become damaged and may die. An attack may weaken the heart leading to heart failure and the greater the damage, the higher the risk. Most heart attacks are caused by the coronary arteries narrowing because of a build-up of fatty material. Other risk factors include being overweight, poor diet and smoking. People who smoke 20 or more cigarettes a day are 60 to 90 per cent more likely to have a heart attack. Symptoms can vary between individuals and range from severe chest pain, to mild chest discomfort that makes you feel generally unwell. The pain can feel like tightness around the chest and it may spread to the arms, neck, jaw, back or stomach. Some people may feel sick or vomit and short of breath, or have a light-headed sensation. But a heart attack can also produce discomfort that is so mild, it is only detected in a routine medical or during tests for other health problems, sometimes many months or years later.

ATRIAL FIBRILLATION

600,000
ARE AFFECTED

Atrial fibrillation (AF) is the most common heart rhythm problem. The heart's natural pacemaker sends out regular electrical impulses, but in AF chaotic electrical activity develops in the upper-heart chambers or atria. As a result, the atria no longer beat in an organised way and pump less efficiently, reducing the output of the heart by around 15 per cent. It is linked to heart valve disease and high blood pressure. AF is a risk factor for stroke due to the sluggish blood flow that may result in certain parts of the heart, predisposing to clot formation which may break away and travel to the brain and cause a stroke. Risk factors include high blood pressure, congenital heart disease and it has also been linked to thyroid disorders, heart valve disease and alcohol or drug abuse. Symptoms include palpitations, tiredness, shortness of breath, dizziness and chest pain, but some people will get no symptoms.

HEART VALVE DISEASE

1in2,000
ARE AFFECTED

Heart valve disease is when one or more of the four valves aren't working properly, affecting efficient blood flow through the heart and placing it under extra strain. Valve stenosis occurs when a valve is narrowed or has a restricted opening, making it difficult for blood to flow through. Valve regurgitation is when it fails to close properly or leaks, allowing blood to flow in the wrong direction. Main causes include congenital heart disease, rheumatic fever, cardiomyopathy – a disease of the heart muscle – heart attack and ageing. Symptoms may include shortness of breath, tiredness, palpitations, angina, dizziness, and swollen ankles and feet.

FAT IS AT THE HEART OF THE PROBLEM

PREVENTION Unless drastic measures are taken immediately to tackle obesity, increasing numbers of our children and grandchildren will have heart attacks in their 30s and 40s, warns **Judy Hobson**

There are already 15 million obese people in the UK who are at increased risk of heart disease, stroke and type 2 diabetes. If measures are not taken to shock the population into eating more healthily and taking regular exercise, by 2030 an extra 11 million will be obese, increasing the healthcare costs due to obesity by £2 billion a year. Such an increase in obesity would result in 668,000 extra cases of diabetes and 461,000 extra cases of heart disease.

An essential first step would be to teach children from primary-school age onwards what it means to eat healthily. This could be complemented by segments in popular children's TV programmes such as *Blue Peter*. In New Zealand healthy eating is already part of the school curriculum.

A second measure would be to impose a tax on added sugar which is something that is being considered by some states in America. At the same time, subsidies could be given to fruit growers under the European Common Agricultural Policy so that healthier foods would become cheaper.

Peter Corder, professor of experimental therapeutics at Queen Mary, University of London and author of *The Wine Diet,* says: "The whole nation needs to wake up to what is happening. Although it is not very politically correct, we need to tell people when they're fat and get them to see it just isn't healthy. What is particularly frightening is the realisation that one in four primary school children are overweight.

"We need to educate mums so that they know what the normal intake of calories for a child of a certain height should be and get them to realise that if they give their children too much to eat they're going to get ill."

Neil Poulter, professor of preventive cardiovascular medicine at Imperial College London, agrees: "The age of presentation is getting younger. It's no longer just an old-person's disease and has been seen in kids as young as eight or nine. Primary school pupils should have the importance of eating healthy food explained to them so they can understand why Jamie Oliver's dinners are good for them. Then they can tell their mums off for giving them the wrong kind of food."

A 1p tax on every gram of added sugar, Professor Corder believes, would dissuade people from consuming too much and help them stay healthy. Every year 2.25 million tonnes of sugar is consumed in the UK. It is estimated that the sugar tax would bring in £22.5 billion which would cover the cost to the NHS of heart disease, diabetes and obesity.

"Sugar," Professor Corder says, "is the toxic component of many a diet and has no nutritional value. It's responsible for the bad cholesterol that causes cardiovascular disease. A 500-millilitre bottle of Coke, for example, has 60 to 75 grams and a glass 25 to 35 grams, the equivalent of five to seven spoonfuls, and is unacceptable.

"Taxing sugar would be unpopular. Whenever I suggest it, I get offensive emails. But, if sweets and sugary drinks were more expensive, then they'd be rationed and young people would be healthier."

Another initiative would be to provide people with tables so they can work out their individual daily calorie requirement.

Professor Corder adds: "Working out your daily calorie intake only takes a little mental arithmetic and, if you do need to lose weight, cutting down your calorie intake is a lot easier than anything else."

One of the problems, Professor Poulter believes, is that people just don't understand food.

"They think red meat is bad for them, yet a vegetable quiche has far more fat than a grilled lean steak," he says. "They think they've had a healthy breakfast if they've eaten a bowl of cornflakes and a slice of brown bread, but the cornflakes have so much salt in them it is the equivalent of drinking a bowl of seawater, and there's more salt in that slice of brown bread. We need much better labelling of food products so that people know exactly what they're eating."

There is some good news for adults. A moderate consumption of alcohol, particularly if taken with food, could lower the risk of developing type 2 diabetes because it raises HDL (high-density lipoprotein) cholesterol. People are more prone to develop diabetes if their HDL is low.

> It's no longer just an old-person's disease and has been seen in kids as young as eight or nine

But, as Professor Corder points out, this benefit is only experienced by those who are non-smokers, eat a healthy diet and exercise.

"Red wine is good for your heart, but again it must be drunk in moderation – not a bottle a day, just one or two glasses. Studies show that people who drink good red wine have a lower risk of heart disease than non-drinkers and heavy drinkers. A man can have 300 millilitres and a woman 200 millilitres. If you drink more than this, it raises your blood pressure and that increases your risk of stroke."

RISK FACTORS

HEALTH CHECKS FOR THE OVER-40s

In an attempt to reduce the number of people having heart attacks and strokes in England, face-to-face health checks are being offered to those aged 40 to 74. The checks assess whether someone is at risk of vascular disease. If they are, appropriate advice and treatment are given. But progress is slow.

The NHS Health Check programme, which is costing £332 million, was first rolled out in 2009 with Primary Care Trusts (PCTs) responsible for assessing their local populations. Figures for the April-June quarter this year show that 15,967,356 people are eligible; 434,672 offers were made, but only 209,121 checks were carried out. At this rate, it will take nine years for all those eligible to be offered a check. Full roll-out had been expected by the end of next year.

The Department of Health says: "While performance on the NHS Health Check programme is a little disappointing for the first quarter of the year, PCTs are planning to increase progressively the number of checks offered throughout 2011-2012 to achieve their overall plans for the year. We will be working with Strategic Health Authorities to help ensure PCTs deliver against their plans."

Professor Neil Poulter, professor of preventive cardiovascular medicine at Imperial College London, believes screening is important because it enables people to be picked up before they get into a diabetic state, putting them at increased risk of heart disease and stroke.

He says: "If we find they have impaired glucose levels, we can intervene and help them make lifestyle changes. Sometimes people need to be semi-sick before they take preventative measures."

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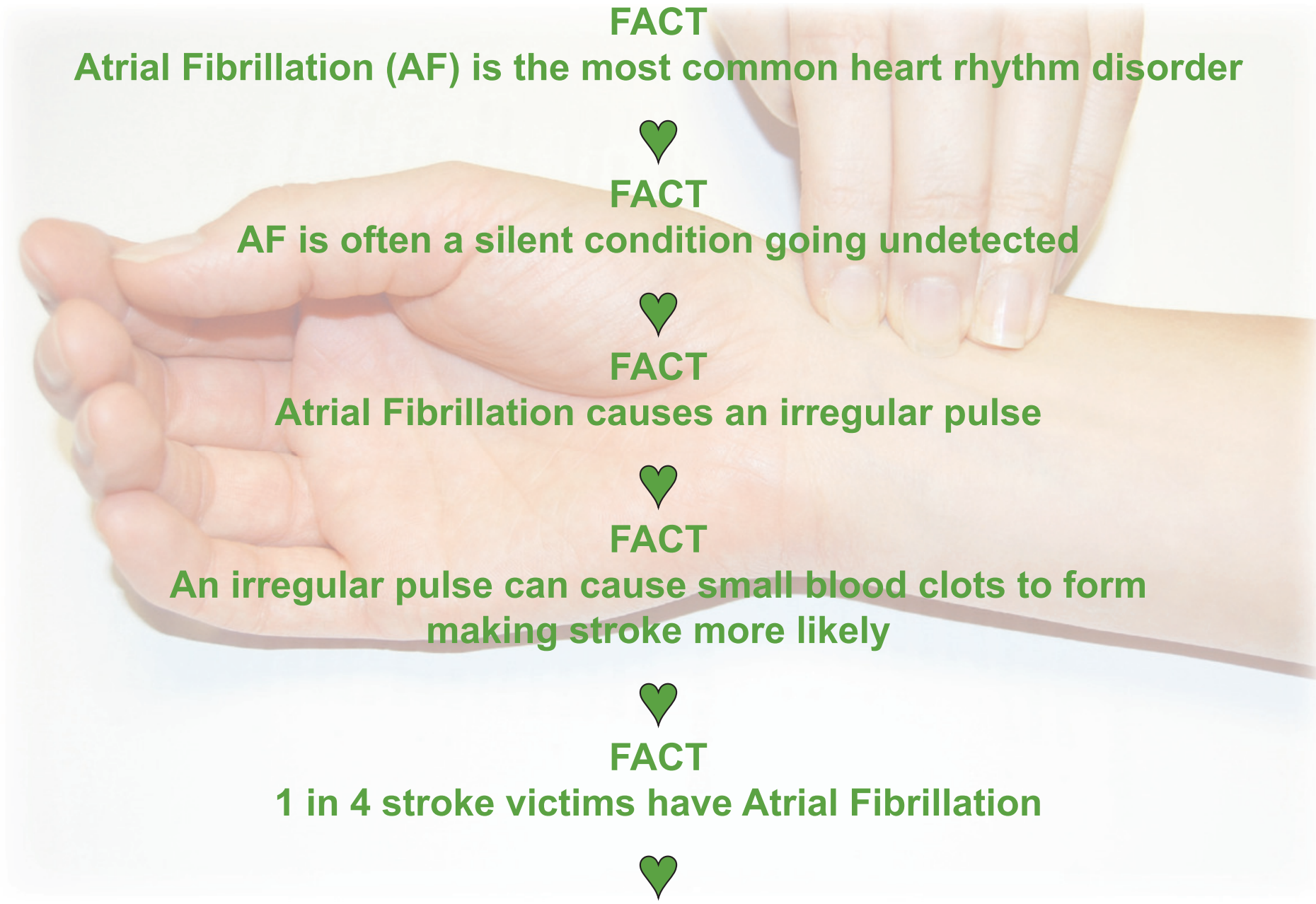

FACT

Atrial Fibrillation (AF) is the most common heart rhythm disorder

FACT

AF is often a silent condition going undetected

FACT

Atrial Fibrillation causes an irregular pulse

FACT

An irregular pulse can cause small blood clots to form making stroke more likely

FACT

1 in 4 stroke victims have Atrial Fibrillation

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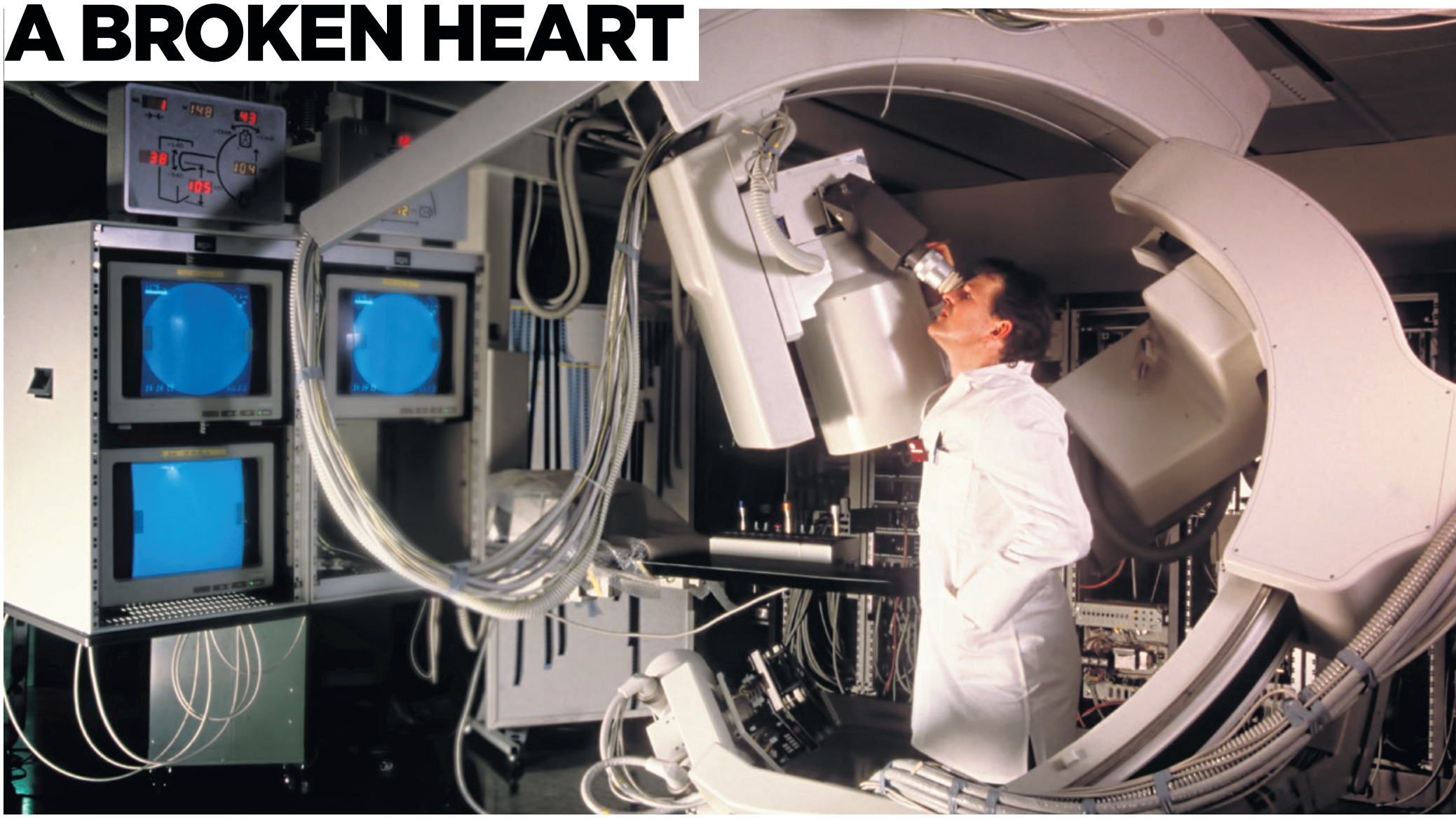
NEW WAYS OF MENDING A BROKEN HEART



MODERN PROCEDURES Technical advances have revolutionised the treatment of heart disease, benefiting patients and the National Health Service, as **Jane Hilton** reports

■ New techniques for the detection and treatment of heart disease are developing all the time. The good news is that many procedures now offer patients quicker recovery times and shorter hospital stays compared with conventional surgery.

One key test is an angiogram, which usually takes less than half an hour and can be carried out as a day-procedure. It enables surgeons to see parts of an artery that may be causing chest pain or could have led to a heart attack. The patient is given a local anaesthetic in their arm or groin and, using an X-ray, a catheter is directed through an artery and into the heart. Dye is then flushed through to highlight problem areas, such as where the artery has become blocked or narrowed.

If treatment is required, the patient may be offered angioplasty, where a stent is inserted in to the artery to keep it open and improve blood flow. This technique was pioneered in 1964 by the American Charles Dotter, who used it on the femoral artery of an 82-year-old woman with severe leg pain and gangrene. The first procedure on a waking patient did not come until 1977, when German cardiologist Andreas Gruentzig laid the foundations for angioplasty as we know it today.

Angioplasty is now very common, with more than 61,000 procedures carried out in England every year. Increasingly, it is being used in an emergency for heart attack patients or those with unstable angina, where pain occurs with less and less physical exertion or at rest. During an angioplasty, a small incision is made in the groin or wrist and a catheter is inserted that has a small, inflatable balloon at its tip. Using X-ray screening, the catheter is manoeuvred into the artery until the blocked or narrow section is reached. The balloon is then inflated to open up the artery and a small tube of stainless steel mesh, called a stent, is put in place to hold open the vessel. The balloon is then let down and removed, leaving the stent behind.

Dr Bernard Prendergast, clinical director of cardiology at the John Radcliffe Hospital in Oxford, says the introduction of mesh stents in the 1980s meant angioplasty became much safer and suitable for more patients. While he believes all modern procedures are exciting in their own way, it is stenting that has made an enormous difference to tackling the problem of clogged or narrowed arteries. "One of the major developments over the last ten years has been drug-coated stents, which reduce the risk of re-narrowing and are now used for 60 to 70 per cent of patients," he says. Another evolving area of research is bioabsorbable stents, which slowly dissolve and may reduce the possibility of blood clots.

Coronary artery bypass graft surgery (CABG) is also a common procedure and accounts for around 28,000 operations in the UK every year. CABG involves taking a blood vessel graft and bypassing one or more blocked arteries to restore healthy blood flow, relieving chest pain and cutting the risk of heart attack. It underwent rapid development in the 1970s and 1980s, and bypass vessels are now increasingly taken from inside the patient's chest rather than their leg. If three or more arteries need to be bypassed, traditional CABG is usually recommended, but for some patients minimally-invasive CABG (known as MIDCAB) is a good option. It results in a smaller incision (three to four inches instead of six to eight with conventional surgery), less scarring, and a lower risk of bleeding and infection. MIDCAB is also "beating-heart" surgery, meaning there is no need to stop the heart or use a heart and lung machine. Furthermore, patients tend to leave hospital in two or three days rather than five to ten, and usually get back to normal within two weeks rather than six to eight.

Also among those enjoying shorter hospital stays are patients needing a heart valve replacement. Some can benefit from Transcatheter Aortic Valve Implantation (TAVI), which offers an alternative to standard valve replacement. The procedure is performed on the beating heart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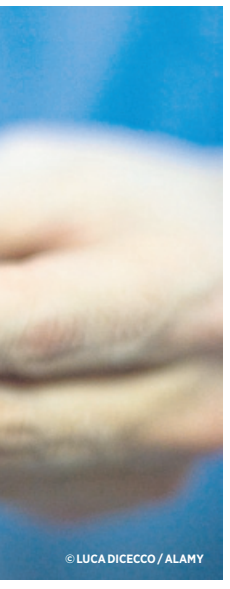
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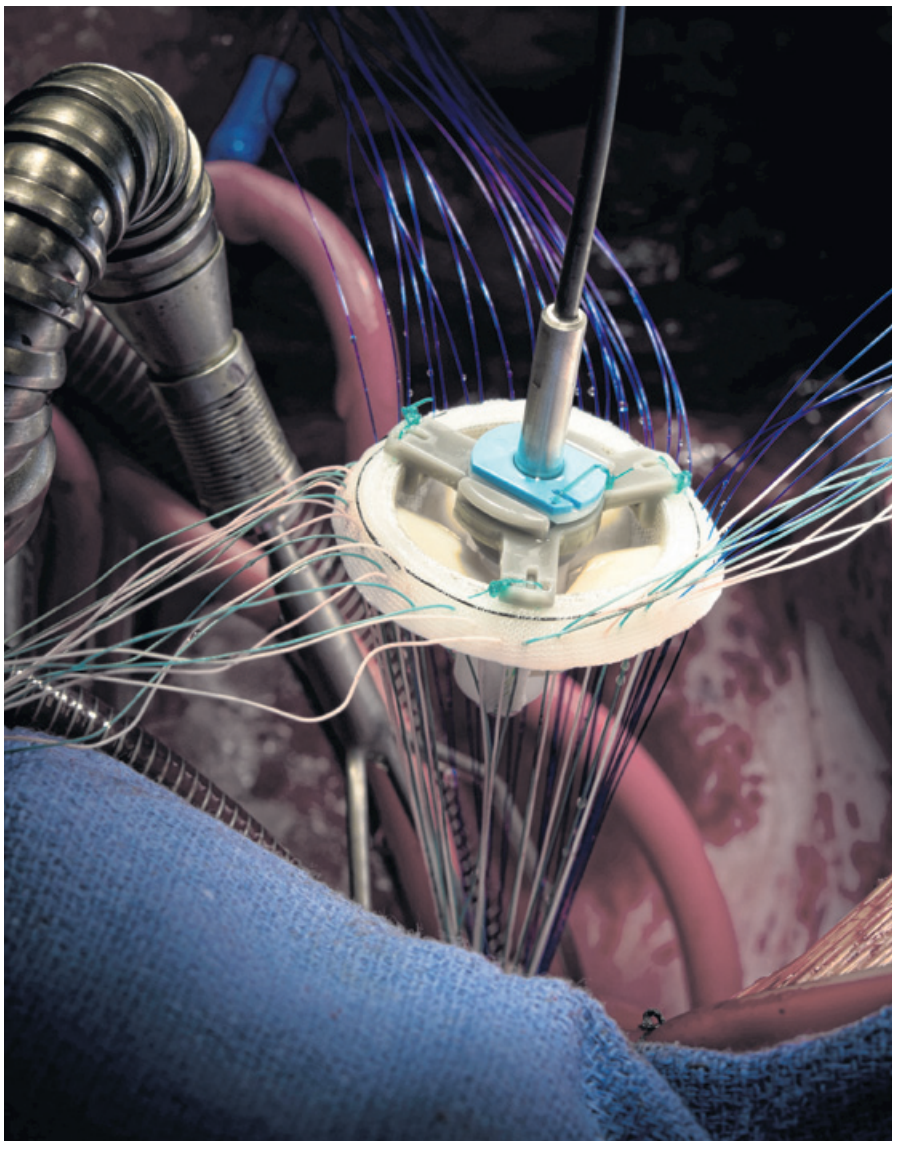
SURGEONS PERFORM MORE THAN

61,000

ANGIOPLASTY PROCEDURES A YEAR

30,000

PEOPLE MAY SUFFER MITRAL VALVE DISEASE



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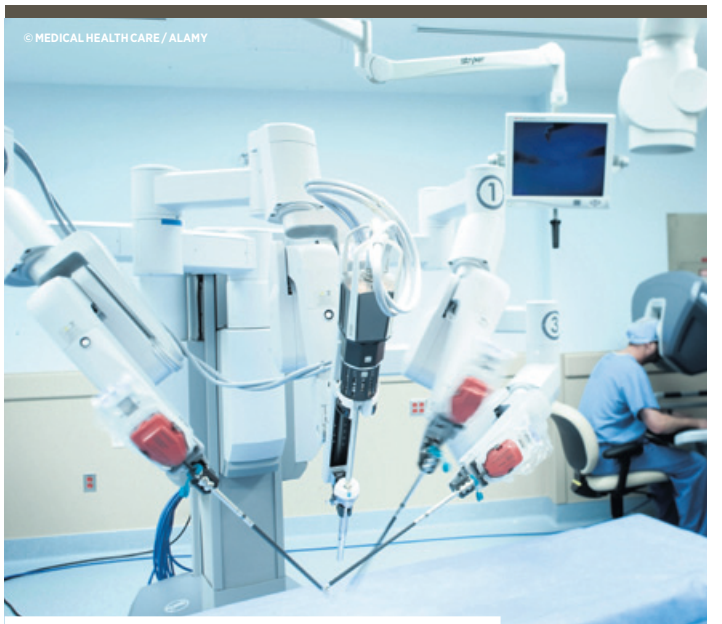
01 Angiography apparatus is assembled for radiology

02 A covered endograft stent used to repair aortic aneurysms

03 A replacement aortic valve ready to be lowered into position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DA VINCI ROBOTS TO MAKE YOU SMILE

The use of super-robots in remote procedures can lead to greater accuracy, removing much of the guesswork from surgery. Roberto Casula, a consultant cardiothoracic surgeon at Imperial College London, uses a Da Vinci robot to repair damaged heart valves. "With a procedure like mitral valve repair, the surgeon can be in one room while the patient is in another, although you can also be with the patient," he explains. "Rather than breaking ribs and opening the chest up as in traditional surgery, we can make a small 1.5-inch incision, which leads to much quicker recovery and shorter hospital stays."

During the operation, the surgeon inserts three pencil-sized instruments into the patient's chest, between the ribs, which are then connected to the surgical robot. Sitting at a console, Mr Casula can see inside the chest via a small 3D camera, which magnifies the heart 15-fold. By manipulating two joysticks, his exact movements are reproduced in the chest, meaning common problems – such as a surgeon's natural hand tremor – can often be eliminated.

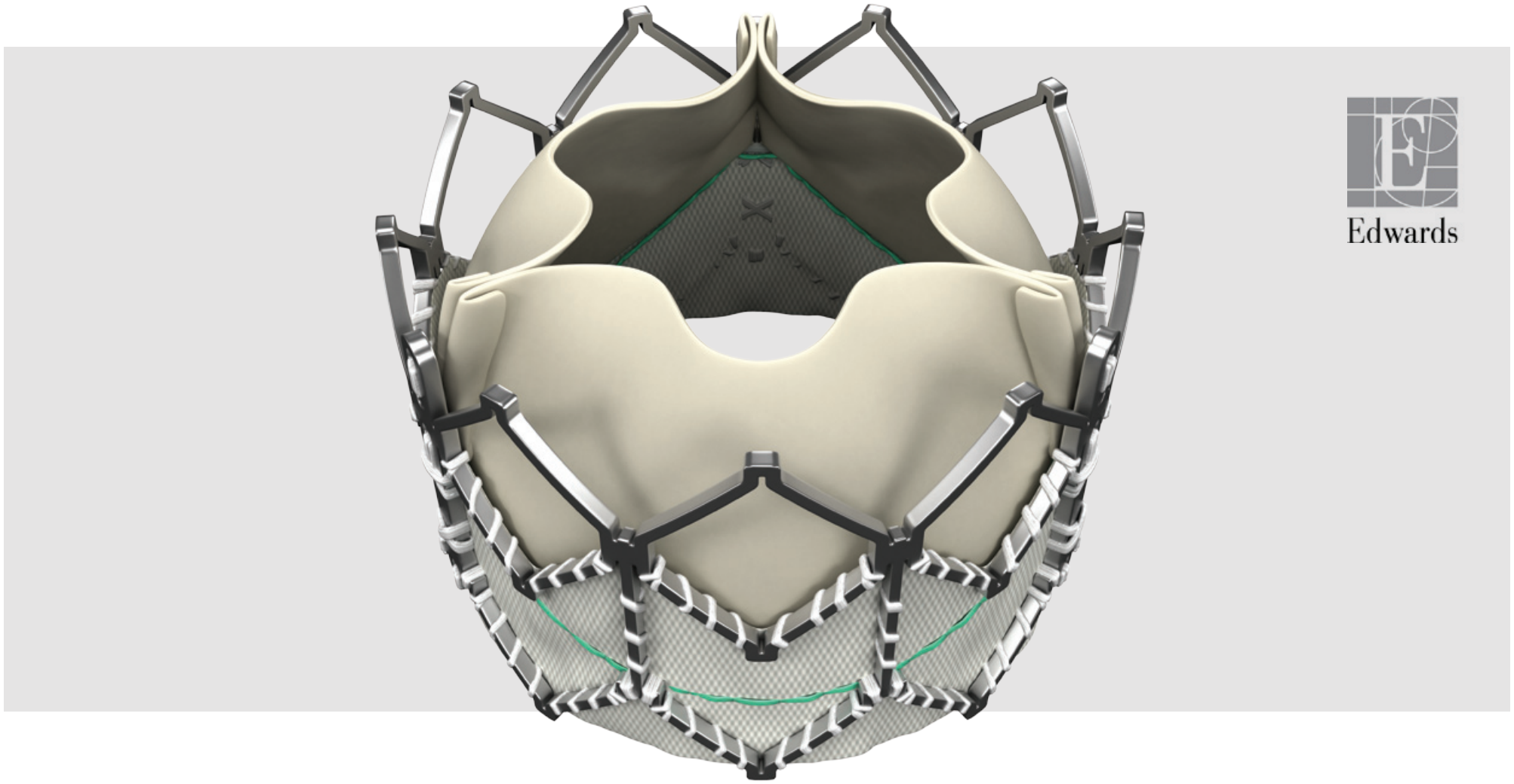
Other centres around the UK are also encouraging the use of robotics. Last year, Dr Andre Ng, senior lecturer in cardiology at the University of Leicester, used a robotics system at Glenfield Hospital to treat a patient with abnormal heart rhythm. Dr Ng was able to control the robotic arm via a remote controller in an adjacent room, watching movements and electrical signals on monitors. Being outside the X-ray zone also meant he did not have to wear a heavy lead apron as protection, which would have impeded his movement.

> Many procedures now offer patients quicker recovery times and shorter hospital stays compared with conventional surgery

without the need for opening up the chest and can be particularly beneficial for the elderly. "People are now living longer lives and valve disease is increasingly a disease of the elderly," Dr Prendergast explains. "Not all these patients are ideal candidates for open heart surgery."

Other minimally-invasive treatments include catheter ablation, which was introduced into clinical practice in the early-1980s to help correct an abnormal heart rhythm. The procedure is carried out under sedation and involves passing a catheter through a vein or artery in the groin and into the heart. Small electrodes enable the cardiologist to tell which parts of the heart are causing problems with heart rhythm. Tiny parts of the heart are then destroyed or scarred using electrical energy, offering a potential cure for most types of arrhythmia.

Despite the fact less invasive techniques often cost more in the initial stages of research, the longer term savings are clear. "In terms of cost to society, there are advantages, such as people needing less time off work and less time in hospital," Dr Prendergast says. "Less invasive procedures also tend to be more comfortable for the patient – they don't need a general anaesthetic and there's no big wound to heal. In the long run this must be cheaper overall for the health service." However, Dr Prendergast warns that minimally-invasive techniques are not suitable for every patient and there is no single approach to treating heart disease. For example, some patients can expect greater life expectancy following traditional open- heart surgery. "The benefits of minimally invasive techniques have to be weighed in some patients against the medical benefits of a conventional operation," he says. "While these are exciting times, it's not a 'one-size-fits-all' approach."



Edwards

New hope for aortic stenosis

Edwards SAPIEN XT™ transcatheter valve

Britain's population is ageing fast and statisticians predict a 40-per-cent rise in the number of over-60s during the next 30 years

With an ageing population comes a wide range of age-related diseases, including aortic stenosis. Already the most common form of valvular heart disease in England, it is expected to affect more than 150,000 people by 2020.

Aortic stenosis causes hardening and narrowing of the aortic valve which pumps blood into the body's main artery. Symptoms can be extremely debilitating and restrict normal day-to-day activities. Patients may experience severe shortness of breath, chest pain, fainting or extreme fatigue.

With no medication to reverse or slow the progression of aortic stenosis, surgical valve replacement still remains the "gold-standard" treatment with excellent short and long-term results, even in high-risk patients.

However, while this is an established technique, a large number of patients with severe aortic stenosis are not treated. Some are deemed too high-risk and many simply do not want to undergo major heart surgery. The prognosis for patients who remain untreated is extremely poor with an average survival rate of just 2.3 years.

All this is changing thanks to a new, proven technique of replacing diseased aortic valves, known as transcatheter aortic valve implantation or TAVI for short. The valve, which can be crimped to a tiny size before being introduced via an artery or minimal incision, is being pioneered by Edwards Lifesciences, the global leader in the science of heart valves and one of the world's leading manufacturers of products for the surgical repair of hearts.

Edwards has been at the forefront of developing the technology for TAVI, and spent years in the research and development of the SAPIEN and SAPIEN XT valves. The SAPIEN valve was used in the landmark PARTNER trial; this was designed to test the TAVI technique, and its results were later published in *The New England Journal of Medicine.*

THE PARTNER TRIAL

The PARTNER (Placement of AoRTic traNscathetER valve) Trial is the world's first and only randomised, controlled trial of a transcatheter aortic heart valve. It successfully demonstrated the phenomenal impact TAVI can have in terms of mortality, morbidity and quality of life. The Edwards SAPIEN transcatheter aortic heart valve was used in patients with aortic stenosis, who were considered either high-risk or unsuitable for traditional open-heart surgery.

The trial was designed in two phases and involved two groups of patients. In the first group, known as cohort B, there were 358 patients with severe, symptomatic aortic stenosis, who were deemed inoperable for traditional open-heart surgery. These patients were evenly randomised to receive either the Edwards SAPIEN valve or standard medical therapy.

> The options for aortic stenosis have expanded dramatically with the introduction of TAVI

The results of the first phase of the trial were presented in December 2010 and published in *The New England Journal of Medicine.* This phase found that, compared with medical therapy, patients who were too ill or old for surgery had a 20 per cent improvement in survival after one year with TAVI. In addition these patients felt much better and had fewer hospitalisations.

Patients in this group also experienced both cardiovascular and physical-health benefits, and a 25-point improvement in quality-of-life scores after one year. The study's authors suggested that these physical improvements were roughly comparable to a ten-year reduction in age.

The authors also concluded in *The New England Journal of Medicine* that balloon expandable TAVI, using the Edwards SAPIEN valve, "should be the new standard of care for patients with aortic stenosis who are not suitable candidates for surgery".

In the second group, cohort A, 699 patients with the same condition were evenly randomised to receive either the Edwards SAPIEN valve with transfemoral or transapical delivery or traditional open-heart surgery (with the Carpentier-Edwards Magna Ease valve).

The results of cohort A were announced at the 2011 American College of Cardiology's 60th Annual Scientific Session and Expo in New Orleans. This arm of the study compared long-term outcomes of traditional aortic valve replacement with the TAVI technique.

The data demonstrated that survival of patients treated with the Edwards SAPIEN transcatheter aortic valve was equivalent to those treated with surgical aortic valve replacement (AVR).

In this cohort, the study found that TAVI was as good as surgical aortic valve replacement for all-cause mortality at one year – 24.2 per cent in the TAVI group compared to 26.8 per cent in those who had AVR. Mortality at 30 days was also lower than expected in both arms of the trial with TAVI at 3.4 per cent and AVR at 6.5 per cent.

HOW DOES IT WORK?

The TAVI technique involves using a catheter to carefully introduce a collapsable valve into the femoral artery and then up into the aortic valve, before it is put in place by balloon inflation. Another option is to introduce the valve via a catheter into a tiny incision in the chest. The valve replaces the patient's existing valve without the need for traditional open-heart surgery. This minimally invasive technique takes place under local or general anaesthesia while the patient's heart continues to beat. For patients who are unsuitable for conventional surgery, TAVI is a real breakthrough and a genuine hope where none previously existed.

More than 1,500 procedures have now been successfully performed in the UK with outcomes which match or exceed the international norms. TAVI will enable patients with severe aortic stenosis and who are at high-risk for open-heart surgery, to have access to a safe and proven treatment option.

A MULTIDISCIPLINARY APPROACH

The success of TAVI relies not just on a groundbreaking technology and procedure, but on a multidisciplinary approach to caring for patients. A heart team, which includes cardiologists, cardiac surgeons, anaesthetists, intensive-care staff, vascular specialists and care-of-the-elderly physicians, can ensure that all treatment options are fully explored.

Care-of-the-elderly physicians are key as many older patients tend to be frail and suffering from a variety of other health problems, which makes assessment very complex and difficult.

The options for aortic stenosis have expanded dramatically with the introduction of TAVI and, if applied to the right patients, the results have been outstanding.

Overall, the data from the PARTNER study has shown that TAVI also has a significant impact on mortality and quality of life for patients, moving them from a sedentary lifestyle to an independent and fulfilling life, while achieving a survival rate at one year equivalent to that of conventional surgery.

STEM-CELL THERAPY COULD OFFER GAINS IN HEART SURGERY

RESEARCH Advances in surgical techniques, equipment and post-operative care have contributed to a radical reduction in the number of deaths during heart surgery, writes **Lilian Anekwe**

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Stem-cell treatments have the potential to alleviate suffering

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01
PROFESSOR KAUSIK RAY
Professor of cardiovascular disease prevention at London's St George's Hospital NHS Trust

02
DR RUBAIY HUSSEIN
Researcher at the University of Leicester's Department of Cardiovascular Sciences

03
PROFESSOR GIANNI ANGELINI
British Heart Foundation professor of cardiac surgery, Bristol University and Imperial College London

04
PROFESSOR RAIMONDO ASCIONE
Chair of cardiac surgery and translational research, Bristol University

■ A decade ago, the Department of Health set a ten-year target of cutting deaths from coronary heart disease and stroke by 40 per cent in people aged 75 and under.

Cardiovascular disease experts were taken somewhat by surprise when the target was not only met, but achieved five years early and then exceeded. By 2010, deaths from cardiovascular disease among the target group had fallen by 44 per cent.

But there's still some debate around what made the greater contribution to the reduction in mortality – healthier living or improved medical interventions?

A 2004 study, based on data for England, suggested that risk-factor changes – better diet, reduced smoking and more exercise – explain more of the decline in mortality than treatments.

But Professor Kausik Ray, professor of cardiovascular disease prevention at London's St George's Hospital NHS Trust, says: "I think the biggest contributor is early diagnosis, better screening, and better and greater use of evidence-based treatments. Greater use of statins, better blood-pressure control has been hugely effective also."

Statins are prescribed to treat high cholesterol, which has been shown to vastly increase the risk and worsen the outcome of a heart attack. The risk of a stroke, another leading cause of death from cardiovascular disease along with heart attacks, can also be reduced by taking drugs to treat high blood pressure. Both these drugs are now widely prescribed – some 60 million statins and 133 million blood-pressure drugs were prescribed in England last year.

The study that convinced doctors of the benefits of treating high cholesterol and high blood pressure, and which drugs to use, was the *Anglo-Scandinavian Outcomes Trial,* led by researchers at Imperial College London and funded by the pharmaceutical company Pfizer.

The trial, Europe's largest study of its kind involving more than 19,000 people, showed that giving patients statins lowered their risk of suffering a heart attack or dying from coronary heart disease by 36 per cent more than patients on placebo pills, while treating patients with newer drugs to lower their blood pressure reduced their risk of dying from cardiovascular disease by 24 per cent compared with patients who took older blood-pressure drugs.

But there is still a need for new drugs for cardiovascular disease, says Dr Rubaiy Hussein, a researcher at the University of Leicester's Department of Cardiovascular Sciences.

He studies potassium channels which are vital component parts of cells that open and close to allow electrical signals to pass between cells. A better understanding of how these cells are able to pass signals between cells in the heart and the nervous system – and control the heart's rhythm – could lead to the development of new drugs for cardiovascular disease.

"This means you can possibly improve the effect of current drugs, for example, by opening the channel during a heart attack for fast recovery of the heart and to decrease the size of heart attack," he says.

For other cardiovascular diseases, such as hypertension, Dr Rubaiy says doctors already have plenty of drugs. But there are still mortality gains to be had from ongoing work on stem-cell therapy in treating heart attacks, he says.

This is an area Professor Gianni Angelini, British Heart Foundation professor of cardiac surgery, Bristol University and Imperial College London, is working on.

In a study funded by the charity, Professor Angelini, along with his colleague Professor Raimondo Ascione, is running the only surgical study of the use of stem cells in heart surgery in the world.

Some 60 patients, who have recently had a heart attack, will be injected directly into the heart with a particular type of stem cell, called CD133 cells, which are derived from bone marrow cells taken from their own hip bone.

The technique has a major benefit over current techniques. "These patients can have coronary surgery, but this does very little for the dead scar tissue that has been damaged as a result of their heart attack," Professor Angelini explains. "We hope we can use stem cells to replace the scar tissue that was damaged, improve the heart's function and stop patients from having debilitating, long-term problems, like shortness of breath and poor circulation."

Professor Angelini also pioneered the "beating-heart" technique used in heart bypass surgery. Most forms of heart surgery require the patient's chest to be opened so that an artificial heart and lung machine can be used to keep them alive during the operation. This is an extremely invasive and traumatic procedure, with a significant recovery time.

Instead, the beating-heart technique uses a device to section off the area of the heart on which the surgeon is operating, allowing the heart to keep beating and patients to breathe on their own.

More than 1,000 beating-heart surgeries are performed in the UK every year, representing around a quarter of all heart operations – a big increase in a technique that Professor Angelini began working on in 1996.

The technique reduces costs by 25 per cent and avoids complications, such as blood loss and infections, and allows patients to be discharged much sooner. But, even so, Professor Angelini says: "The uptake in the UK has been slow because the technique involves a learning curve and surgeons can be quite conservative."

He is proud of what has been achieved in the field of cardiovascular disease. "When we started, 25 per cent of patients would die due to the risks of heart surgery, but now it's 2 per cent. We can now operate on patients in their 80s – ten years ago it was just too risky. A lot is down to better techniques, skill and the equipment. Also, post-operative management is unrecognisable from how it used to be. The improvements have been astronomical."

> Heart-attack patients will be injected with stem cells derived from bone marrow taken from their own hip bone

Conventional heart surgery can be the best option in some cases

MEDICATION CAN PLAY A KEY ROLE IN TREATING A HEART CONDITION AFTER SURGERY:

THE NUMBER OF PRESCRIPTIONS FOR HEART MEDICATION HAS INCREASED MORE THAN FIVE FOLD IN THE LAST 20 YEARS TO OVER 266 MILLION

Source: British Heart Foundation

SUCCESS RATES SOAR FOR CUTTING-EDGE SURGERY

SURGERY More than 30,000 men and women have heart surgery in the UK each year. With success rates approaching 100 per cent for some procedures, demand is rising rapidly, writes **Roger Dobson**

Although a heart operation is still major surgery, techniques have advanced so much that it has become a routine operation.

Surgeons are increasingly using less-invasive techniques, rather than traditional open-heart surgery which involves cutting through the chest wall to access the heart.

While heart bypass surgery is the oldest and most commonly used heart surgery, new techniques, and the use of robots, have been developed.

"Success rates for heart surgery of all kinds are increasing," says Mohamed Amrani, consultant cardiac and transplant surgeon at BUPA Cromwell Hospital in London, who performed the UK's first double-valve replacement through a small incision.

"Coronary bypass surgery, for example, now has a success rate of 99 per cent compared to around 50 to 60 per cent in the 1960s. On average, the bypass works for 18 years, but it can be done again and again. Valve surgery also has a high success rate of around 98 per cent and transplant rates are improving all the time."

Mr Amrani, who worked with Professor Sir Magdi Yacoub at Harefield Hospital, has pioneered new minimally invasive approaches to heart surgery.

"We developed a minimally invasive technique for bypass surgery and valve repair or replacement," he says. "Instead of conventional surgery, where the breast bone has to be cut in two, a small incision is made on the right hand side of the chest and the procedure is performed by gaining access to the heart between the ribs.

"This has the benefits of conventional open-heart surgery, but with less traumatic injury, a shorter stay in hospital and a quicker recovery time. Many heart surgeries can now be done through small incisions between the ribs. In valve surgery, for example, we work through a two to three-inch diameter incision. This minimally invasive heart surgery is very much the way forward."

Open-heart surgery, where a large incision is made either through the breast bone or between the ribs to access the heart, is used for all heart operations, including bypass surgery for blocked arteries in the heart, repair or replacement of heart valves, atrial fibrillation and heart or lung transplants.

The patient may be connected to a heart-lung bypass machine which takes over the heart's pumping action and that means surgeons can work on a heart with no blood flowing through it. In off-pump surgery, the heart is kept beating.

Most heart transplants, where diseased organs are removed and donor heart implanted, are carried out on patients with severe heart failure. Around 130 a year are performed in the UK and about one in four are on young people under 16.

A heart transplant is complicated surgery and normally takes between three and five hours with the patient under general anaesthetic and connected to a heart bypass machine.

An incision is made over the breastbone to allow the surgeon access to the heart, which is then removed. A portion of the right and left atria – the top-right chambers – are preserved and the new donor heart is connected to the aorta, the main artery from the heart, the pulmonary artery, and the remaining part of the original atria.

Drugs that weaken the immune system must be taken for life so the body does not reject the new heart.

Heart valve surgery involves repairing or replacing one or more heart valves that may be diseased or damaged, putting strain on the heart and making it pump less efficiently. Surgery, which can take up to three hours, is aimed at eliminating or improving symptoms and may prevent permanent damage to the heart.

In healthy valves, flaps open and close in sequence to maintain a healthy blood flow.

If the valve isn't seriously damaged, it may be repaired. A narrowed valve may be widened or an artificial ring added to strengthen the valve. But if the valve is seriously damaged, it may have to be replaced. Artificial mechanical valves are made of carbon fibre and can last a lifetime, while biological valves, made from human or animal tissue, wear out faster with surgery needing to be repeated after ten years. Full recovery can take two to three months.

An aneurism is an abnormal ballooning in the wall of an artery or the heart muscle and occurs when the wall weakens. It is often the result of pressure from blood moving through the artery, and can grow and burst, causing dangerous – often fatal – bleeding. Aneurisms mostly occur in the heart's lower-left chamber, and repair involves surgery to replace the weak section of the artery or heart wall with a patch or graft.

A congenital heart defect is a condition that you were born with. About a quarter of adults, who have a congenital heart defect, have a condition called atrial septal defect. This is really a hole in the wall (atria) that separates the two upper chambers of the heart. This causes blood with oxygen and blood without oxygen to mix together. Usually, too much blood from the left atrium goes into the right atrium and then into the lungs.

> Coronary bypass surgery now has a success rate of 99 per cent compared to around 50 to 60 per cent in the 1960s

NEW PILL TO PROTECT AGAINST STROKE AND HEART DISEASE?

OBESITY AND DIABETES Often the first time some people realise they have type 2 diabetes is when they wake up in hospital after a heart attack. For some the diagnosis comes too late because the heart attack has killed them, writes **Judy Hobson**

Many of those diagnosed early enough with type 2 diabetes do not understand just how serious the disorder is or what the consequences can be if they fail to lose weight and make lifestyle changes.

Diabetes is a disease of the blood vessels which puts sufferers three to four times more at risk of having a stroke or heart attack.

Vascular changes can occur before someone discovers they have type 2 diabetes which is why it is so important everyone watches their weight. Being overweight and having a large waist are danger signs of increased risk of type 2 diabetes. Symptoms include being thirsty, tiredness and having skin infections.

Mark Kearney, professor of cardiology at Leeds University, says: "People think of diabetes as a bit of raised blood sugar – something that affects older people – but we're seeing it in young people and, as a result, 30 to 40-year-olds are having heart attacks.

"If someone with diabetes does have a heart attack, in spite of the best medical care, they are three times more likely to die from it."

From 2007 to 2025, a 55-per-cent global increase in type 2 diabetes is predicted with 7.5 million new cases diagnosed every year.

Neil Poulter, professor of preventive cardiovascular medicine at Imperial College London, says: "The reason for this is simple – obesity. People are taking in too many calories and not exercising enough. We all used to walk everywhere, but now we've got cars and don't any more.

> Diabetes puts sufferers three to four times more at risk of having a stroke or heart attack

"We have easy access to fast food and so people's intake of fat and salt has shot up. The food is over-salted so that people will get thirsty and buy cans of soft drinks full of sugar and calories. Treating diabetes and its consequences costs the NHS £1million per hour."

He disputes any suggestion that there is a gene that makes some people prone to gaining excess weight.

Professor Poulter says: "Being overweight does seem to run in families but, in my view, it is not genetic. You don't get obese on your own. You can't make calories unless you take them in. "People are in denial about being overweight. They ask: 'Am I fat doctor?' Don't they ever look in the mirror and see their wobbly bits."

Professor Kearney adds: "If you sit at a computer all day and then in front of the TV all night, it is very easy to pile on weight, particularly if your food is high in calories. We need to get into people's minds and make them aware of the risks they're facing and get them to take responsibility for their health by making changes. A series of TV ads like the ones the Department of Health ran on stroke could have an impact. It would ensure people didn't remain ignorant of what the consequences of obesity and having type 2 diabetes can be."

Professor Poulter says: "We can't stand by and watch while increasing numbers of people die from heart disease and stroke or wait until people understand what fast food and sugary drinks are doing to them. We need tablets to prevent this from happening."

With his team at Imperial College, he has combined four drugs into one pill and is attempting to set up a worldwide trial. "The formula is ready but we need £50 million to fund our trial," says Professor Poulter.

In the meantime, he advises: "Weigh yourself once a week. If you notice you're putting on weight, eat less. It's that simple."

A CASE OF GENDER BIAS? **HOW WOMEN ARE SEEN AS THE SAFER SEX**

WOMEN Cardiovascular disease has traditionally been thought of as an illness affecting men, but the reality is it strikes both sexes, as **Jane Hilton** discovers

■ Some 13.6 per cent of men and 13 per cent of women in England are living with heart disease which kills one in three. While breast cancer often hits the headlines, cardiovascular disease actually kills three times more women.

But is the message getting through, and are there any warning signs and symptoms women should be looking out for?

Research shows that female hormones can offer some protection against heart disease before a woman reaches menopause. However, after this point her risk increases significantly and, by the age of 60, men and women have similar rates of illness. Even hormone replacement therapy (HRT), designed to help menopausal women cope with symptoms, has been shown to slightly increase the risk of heart disease and stroke.

Furthermore, common risk factors, such as smoking, may pose more of a threat to women. A study published in *The Lancet* medical journal last month found that women who smoke cigarettes are 25 per cent more likely than male smokers to develop heart disease, which could be down to their physiology or differences in how they smoke. Another paper published in the journal *Circulation* earlier this year found that women whose mothers have a stroke are at higher risk of heart disease, but there is no link for men.

So are women simply in the dark about their risks or are they choosing to ignore the warnings? Dr Rachael James, consultant cardiologist at the Royal Sussex County Hospital, says women tend to see themselves as low risk, but there is a lack of recognition among health professionals.

"I think there is a perception among a lot of doctors, particularly for coronary disease, that this is a problem that affects men," she explains. "Then we have women who just don't see themselves as at risk in the same way. There is a lot of surprise when people become aware of the statistics that are out there."

Some health professionals may also not be up to speed on the specific risk factors affecting women. Although the numbers are small, cardiac disease is the leading cause of death in pregnancy in the UK and mothers-to-be, who have pre-eclampsia in pregnancy, appear to be at higher risk of heart disease in later life.

Historically, women have also been excluded from clinical trials of new treatments, although this has changed in recent years. Nevertheless, women may still not be getting the right treatments all of the time.

Dr James says: "Standard treatments have proven benefit in women, but there is evidence of underuse." She suggests the UK develop an awareness campaign similar to that run by the American Heart Association, called Go Red for Women. "In the US, they have been confronting the incorrect perception among doctors, but also in society as a whole, that heart disease affects men and not women," she says. "I don't think we have been as good in this country at getting the message across, despite the efforts of the British Heart Foundation."

Even when women experience symptoms of heart disease, they are less likely to seek help than men. During a heart attack, women generally experience fewer classic symptoms, such as crushing chest pain, and surveys have shown they put off calling 999.

Researchers in the US found 64 per cent of women who died suddenly did not experience classic warning signs of an attack, compared to 50 per cent of men. Pain in the jaw, back or stomach, nausea, fatigue and indigestion – all possible symptoms – can also be put down to other causes.

Despite this, a 2003 study published in *Circulation* found that 95 per cent of women, who suffered a heart attack, knew in the back of their mind something was wrong. Many had new symptoms or felt different in the four weeks leading up to an attack, with the most common symptoms being unusual fatigue (70 per cent), insomnia (48 per cent), shortness of breath (42 per cent), indigestion (39 per cent) and anxiety (35 per cent). Only 30 per cent of the women reported chest discomfort before their heart attack.

Arkansas University's Professor Jean McSweeney, who led the study, says: "Lack of significant chest pain may be a major reason why women have many more unrecognised heart attacks than men, or are mistakenly diagnosed and discharged from emergency departments. Many clinicians still consider chest pain as the primary symptom of a heart attack." Such delays in getting the right help could be a major reason why more women than men die from their first heart attack.

> Delays in getting the right help could be a major reason why more women than men die from their first heart attack

Despite these bleak statistics, women should be encouraged by the fact that many deaths from heart disease can be prevented through healthy living. Maintaining an ideal weight, keeping cholesterol levels low and following a balanced, low-fat and low-salt diet can dramatically bring down the risk of heart disease.

While some risk factors cannot be altered, such as a genetic predisposition, many can be modified. Quitting smoking, exercising and understanding how stress plays a role can all help women stay healthy.

And while the jury's still out on whether there is media bias against covering stories on women and heart disease, it is certainly true more could be done to get the message across about risk.

At present, 30 per cent of women in England and Scotland have high blood pressure and 20 per cent of British women smoke – figures that could go down with the right campaign. Some 60 per cent also have high cholesterol levels and more than half of women in the UK are overweight or obese.

Dr James says: "One of the factors is the increase in the number of young women smoking. Smoking in women has been shown to increase the risk of coronary artery disease more than in men. As a nation we are also getting more sedentary – obesity is on the rise. These are things we can do something about."

Heart disease kills three times more women than breast cancer

A HEART SET ON **COURSE FOR RECOVERY**

REHABILITATION Diagnosis of heart disease can be a wake-up call for people with an unhealthy lifestyle. But help is at hand for patients to recover fitness through cardiac rehabilitation programmes, as **Ellie Broughton** reports

Cardiac rehabilitation helps patients get back to an active life

■ For many, a heart attack or disease is a warning sign of poor lifestyle choices. Health professionals recognise the impact of a major heart event and the help they offer makes the most of the patient's desire to change, learn and live better.

Cardiac rehabilitation is a programme of care for people who have suffered a heart attack, or undergone bypass surgery or angioplasty. Completing a programme cuts the relative risk of mortality by 26 per cent for five years, and will also reduce the symptoms of heart disease and improve quality of life.

Programmes vary in length and content, but all should have four aspects in common. Firstly, every programme starts with an assessment of the patient's physical, emotional and practical needs, followed by realistic goal-setting for the course.

During the sessions, which usually last for eight to twelve weeks, the patient learns about the causes of heart disease and ways to reduce risk factors associated with it. Those running the course will assess the patient's health throughout, review their goals, and provide ongoing clinical and emotional support.

Sushma Sanghvi, a consultant physiotherapist at the Sherwood Clinic, Harrow, finds that most of her patients consider a heart attack or surgery to be a big turning point. "Having a major event like that is an eye-opener," she says, "and if you want to target lifestyle issues it's a brilliant time to do it."

Some heart-disease risk factors, such as family history, can't be resolved during rehab but others, such as an inactive lifestyle, can be tackled.

Ms Sanghvi emphasises the fact that the exercise aspect of rehabilitation is always tailored to the individual: "It's about doing something the patient is likely to adhere to afterwards. The rehab professional looks at physical activity the patient enjoys and is able to continue on a long-term basis."

Patients may also be reassured to know that, due to the nature of heart medicines such as beta blockers, the pace of exercise is deliberately kept low to avoid dizziness.

Dr Susan Connolly, consultant cardiologist, Imperial College Healthcare NHS Trust, agrees that the patient must feel in control of their treatment. "The idea that people might be forced to do something they don't want to, puts them off," she says. "So rehabilitation has to be patient-centred. It's not about what the doctor or nurse wants."

She points out that many of the necessary lifestyle changes have already taken root before a patient joins a programme. For example, typically a third of heart-attack victims are smokers and, by the time they come to rehabilitation, less than one in ten still has the habit.

Dr Connolly says: "Most of them quit at the time of their event. They've had a life-threatening experience and that's a great inducement to stop."

In most programmes, she says, patients are encouraged to bring a partner, friend or family member for support. Smoking cessation, healthy eating and exercise tend to have better outcomes when a couple or family attends the course together. Furthermore, studies have shown that around one in four partners of patients with heart disease also suffer from the condition.

While it can be a life-changing experience, rehabilitation can be stressful too. Social anxiety, fear of pain from exercise, taking time off work and problems of access can all hold people back from joining a programme, but clinicians and charities are keen to make the service available to everyone.

The NHS offers home-based support, evening sessions and women-only classes for patients who prefer not to attend mixed day-time programmes. It also offers consultations with a psychologist to patients inhibited by depression and anxiety. The widest range of rehabilitation programmes are free through the NHS, although some may find paying for a programme improves their adherence to it.

In its latest report, *The National Audit of Cardiac Rehabilitation* found that four in ten patients joined a cardiac rehab programme and, despite the fact that service provision was "patchy", it is the most effective moment for many patients to tackle the health issue of a lifetime.

> Completing a programme cuts the relative risk of mortality by 26 per cent for five years

CASE STUDY: **A WALK ON THE WILD SIDE**

Ian Wild is a 50-year-old stockbroker in the City. He has just finished a cardiac rehabilitation programme at the London Chest Hospital.

"I had a small heart attack last December," he says. "I used to eat and drink a lot, and I had genetic risk factors, so I was a racing certainty for heart disease.

"In hospital I found out that my arteries were badly blocked. I had to have three stents put in and I needed cardiac rehabilitation.

"I joined a group programme a tube hop away from my office, which took place once a week from 2 'til 4pm. There were usually 14 or 15 of us at the sessions and they were a great bunch of people. Anything like cardiac rehab, you need to enjoy, otherwise you won't keep going back to the classes.

"I had to make changes to my diet, but the simplest things delivered the most benefit. The hardest thing was losing weight. I had a target of four stone and in the early days every time I got on the scales I was lighter. Two-and-a-half stone later, it's much harder; having said that, it's only seven or eight months since the heart attack. The memory's still fresh in my mind, so it doesn't take much will power to say no to chocolate puddings.

"I've spent a lot of time with specialists, learning about my condition and I know it's not too late to change. During the cardiac rehabilitation programme, I found out that the more you understand about your condition, the more you know about how you should be living.

"Yes, I have health problems, and yes, the medication has side effects. For a person who's never really ill, having to take a handful of pills every day is a big change. Unfortunately, that's the price I paid – but still, it's a sight better than the alternative."

ASK FIRST

TO HELP PREVENT A STROKE LATER

If you have AF (which is a type of irregular heartbeat), you may be at risk of a stroke. Be aware of your risk by ASKING your GP for a pulse check.

Stroke Helpline 0303 3033 100

www.stroke.org.uk/askfirst

The STROKE Association