Heart to Heart:
All you need to know for better heart health
About SingHealth

Singapore Health Services (SingHealth) is the largest healthcare group in Singapore with 3 hospitals – Singapore General Hospital, KK Women’s and Children’s Hospital and Changi General Hospital, 5 national specialty centres – for Cancer, Dental, Heart, Neuroscience and Eye care – and a network of primary healthcare clinics.

With 42 clinical specialties and 1,000 internationally-qualified medical specialists, the group offers integrated care in a multidisciplinary setting. Well-equipped with advanced diagnostic and treatment medical technology, patients enjoy the benefit of leading-edge treatments in a wide range of medical procedures.

Acknowledgements

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Coronary heart disease and stroke are the most common cardiovascular diseases. They are the second and fourth leading causes of death in Singapore, accounting for nearly 28.4% of all annual deaths in 2008.

Thankfully, medical science is making rapid and continued progress with new diagnostic and treatment methods. It is thus heartening to know that heart disease is preventable and treatable. Recognising cardiac risk factors early is important as preventive measures can be taken to minimise any cardiovascular risks one may have.

Every individual should take responsibility for his / her own health, by being aware of the risk factors and early signs and symptoms, by going for proper health screenings and, most importantly, by leading healthy lifestyles.

Here at SingHealth, we are committed to giving you access to high quality, comprehensive and appropriate information, medical treatment and support to help you cope with cardiovascular disease. We have taken the initiative to compile this brochure for you, to empower you to take care of yourself. Knowing your risk factors, and being able to recognise preliminary signs and symptoms helps in the early detection and treatment of heart disease.

With an internationally-qualified faculty of doctors and dedicated healthcare professionals, coupled with the use of the latest medical technology and facilities, our institutions work together to offer a range of seamlessly integrated services, which includes a one-stop centre for screening, detection and treatment of cardiovascular disease. This ensures that you receive the most appropriate attention and care.

We want to be there for you in your time of need. You can count on us to provide the highest level of medical care possible.

Associate Professor Koh Tian Hai
Medical Director
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Did you know?
The heart is a fist-sized organ which lies in the centre of the chest. The right and left sides of the heart each have an upper chamber (atrium), which collects blood and lower chamber (ventricle), which ejects blood. To ensure that blood flows in only one direction, each ventricle has an inlet and outlet valve.

The heart pumps blood through the body. Oxygen-poor blood enters the right atrium of the heart (via veins called the inferior vena cava and the superior vena cava). The blood then flows into the right ventricle and through the pulmonary artery to the lungs, where the blood is enriched with oxygen (and loses carbon dioxide). The oxygen-rich (oxygenated) blood is carried back to the left atrium of the heart via the pulmonary veins. The blood then flows into the left ventricle, and is then pumped through the aorta to the rest of the body.
Why is your Heart Health Important?

FACTS:

Coronary heart disease and stroke are the leading causes of death in Singapore today. About 12 Singaporeans a day die from cardiovascular diseases. In women, 1 in 4 die from a cardiovascular disease; 5 times more than those dying from breast cancer. In 2008, more than 14,000 hospitalisations were due to coronary heart disease.

The good news is that these conditions are largely preventable if treated early.
What Puts You At Risk Of Coronary Artery Disease?

The presence of a risk factor increases the likelihood for heart disease. Some of them, such as age and gender, cannot be changed while others may be modified. By understanding and managing these factors, you can lower your risk for heart disease.

What are the Non-Modifiable Risk Factors?

<p>| | |</p>
<table>
<thead>
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<tbody>
<tr>
<td><strong>AGE</strong></td>
<td>Age increases a person’s susceptibility to heart disease. For women, the effects of menopause, including the loss of the hormone oestrogen, appear to increase their risks of coronary heart disease and stroke.</td>
</tr>
<tr>
<td><strong>GENDER</strong></td>
<td>Men are 3 to 5 times more likely to have coronary heart disease than women. However, the risk for women increases after menopause. By about 5 to 10 years following menopause, the risk for coronary heart disease for women increases to the same rate as men.</td>
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<tr>
<td><strong>ETHNICITY</strong></td>
<td>Risk for coronary heart disease varies with different ethnic groups. The likelihood for coronary heart disease is highest amongst South Asians in Singapore. Compared with the Chinese, South Asians are 3 times, and Malays are 2 times more likely to suffer from coronary heart disease.</td>
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<tr>
<td><strong>FAMILY HISTORY</strong></td>
<td>You can be at a higher risk of having heart disease if your immediate family members (parents, children, brothers and sisters) have a history of premature heart disease. Certain risk factors tend to run in some families. If there is a history of heart disease in the family, you should try very hard to control your other risk factors too.</td>
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What are the Modifiable Risk Factors?

HIGH BLOOD CHOLESTEROL
As high blood cholesterol itself does not cause symptoms, many people may not be aware that their cholesterol level is high.

The desirable level of cholesterol depends on your pre-existing risk for coronary heart disease.

HIGH BLOOD PRESSURE / HYPERTENSION
Hypertension is one of the major risk factors for coronary heart disease and cerebrovascular disease, such as stroke. Hypertension usually occurs without any symptoms. Hypertension, left untreated over the long term, can lead to damage of the heart and blood vessels leading to stroke or heart attack.

When your blood pressure is extremely high, headaches, dizziness or alterations in vision may be experienced. Marginally elevated blood pressure may normalise when you lose weight, exercise more and reduce salt intake. If these measures are not successful, then drug treatment may be needed. Once medication has started, it is essential to continue with the treatment, complemented by a healthy lifestyle.

Treatment of hypertension for most people is life-long. You should have your blood pressure checked at least once a year.

Therefore, it is important to check your cholesterol levels regularly. If the level is high, it should be lowered to reduce your susceptibility to coronary heart disease.
WHAT PUTS YOU AT RISK OF CORONARY ARTERY DISEASE?

DIABETES MELLITUS AND ABNORMAL BLOOD GLUCOSE (SUGAR) LEVELS

Diabetes mellitus is a chronic illness. It is often associated with other cardiovascular risk factors, such as high blood pressure, increased total cholesterol and triglyceride levels, decreased HDL-cholesterol levels (“good” cholesterol) and obesity.

The basic treatment strategy is to maintain good control over the amount of glucose in your blood. Maintaining a healthy weight, balanced diet and regular exercise routine can prevent the onset of diabetes mellitus.

MENOPAUSE

Many women before menopause seem to be partly protected from coronary heart disease, heart attack and stroke by natural oestrogen.
A woman’s oestrogen level is highest during her childbearing years and declines during menopause.

As a woman ages, the loss of natural oestrogen may contribute to a higher risk of heart disease and stroke.

If menopause is caused by surgery to remove the uterus and ovaries, the risk rises sharply. If menopause occurs naturally, the risk rises gradually. However, routine hormone replacement for women who have undergone natural menopause does not prevent heart disease.

OBESITY AND OVERWEIGHT

People with excess body fat - especially around the waist - are more prone to developing heart disease and stroke even if they have no other risk factors. Excess weight increases the strain on the heart, raises blood pressure, blood cholesterol and triglyceride levels, and lowers HDL. It is also associated with the development of diabetes mellitus.

Family history and environment play a part in determining obesity. Physical inactivity and a high fat diet also contribute to obesity.

As body fat increases when more food calories than required is consumed over a long period of time, weight control (fat loss) is possible by decreasing food intake together with increasing physical activity.

If you use more calories because of increased physical activity, a gradual decrease in body weight will take place. Diet alone can also cause weight loss, which leads to a decrease in blood pressure, blood glucose and blood cholesterol levels.
WHAT PUTS YOU AT RISK OF CORONARY ARTERY DISEASE?

PHYSICAL INACTIVITY
An inactive lifestyle is a risk factor for coronary heart disease. Regular, moderate physical activity helps prevent heart and blood vessel disease if done over a period of time.

Regular exercise may also lead to improvement in other cardiovascular risk factors, such as weight loss, lower blood pressure, decreased stress and improved cholesterol level.

Exercise is beneficial especially since the risks involved are minimal. Exercise programmes should start at a slow pace initially to avoid injury to muscles and ligaments.

People with known coronary artery disease or those above 40 years of age who have been inactive should seek medical advice before starting a regular exercise programme.

SMOKING
Smokers account for 40% of deaths caused by heart disease in patients younger than 65 years.

Smoking also leads to heart attack, stroke, high blood pressure, blood vessel disease, cancer and lung disease. Smoking also causes a decrease in HDL-cholesterol.

Smokers have 2 to 3 times the risk of non-smokers for sudden cardiac death.

STRESS
Your blood pressure goes up momentarily when you get angry, excited, frightened or when you are under stress.

If you experience constant stress over a prolonged period, you may be at a higher risk of developing high blood pressure, leading to a heart attack.
When Should I Go For A Health Screening?

If you have one or more of the risk factors mentioned earlier, you should see your family doctor for advice. If you are above 40 years old, it is advisable for you to go for regular heart health screening.

Heart health screening is a crucial first step towards preventing cardiovascular disease.

Early treatment improves the chances of preventing or delaying complications. You can also discover your health and fitness levels.

If you experience any symptom(s) that might suggest a heart disease, you should make an appointment for a heart health screening or see your family doctor.

The screening test may comprise the following:

- Medical history taking
- Physical examination
- Electrocardiogram (ECG)
- Blood tests
- Urine tests
- Chest radiograph (x-ray)
- Treadmill stress test

Generally, you should also go for a blood pressure and blood glucose check for diabetes every year and a blood cholesterol test once in three years (or more frequently if the results are abnormal or you have other risk factors).

For a cardiac health screening, you can approach the health screening coordinator at the National Heart Centre Singapore directly for an appointment. For more information, please contact:

Tel: (65) 6436 7738
Fax: (65) 6323 2113
Email: heartscreen@nhcs.com.sg
What Cardiac Diagnostic Tests Are Available For Me?

There are a wide range of diagnostic tests and procedures that are available to determine if you have heart disease, the type of disease if present, severity and the most appropriate treatment method to be used.

An important aspect of diagnosing and treating heart disease is through history taking and physical examination. These help the doctor determine the type of diagnostic tests or procedures necessary to fully diagnose the heart disease present.

All the tests listed here are available at National Heart Centre Singapore (NHCS) except Cardiac Magnetic Resonance Imaging, which NHCS provides jointly with the Department of Radiology of Singapore General Hospital. Your doctor will advise on the appropriate test for you.

**Stress Echocardiogram**

**WHAT IT IS**

A diagnostic procedure combining an echocardiogram, which uses high frequency sound wave to assess contraction of heart, and an exercise stress test, which assesses the capacity and reserve of the heart to function under stressful situations.

Two major forms of stress tests can be used. The first type of stress test is the standard treadmill exercise (called the Exercise Stress Echocardiogram), while the second type involves the use of medication to stress the heart, simulating an exercise environment (called pharmacological stress echocardiogram).

**WHY YOU NEED TO DO IT**

Information obtained will help the doctor to indirectly assess the status of blood supply to the heart muscles. It also provides indirect information on the viability and functionality of the heart muscles, as well as the functionality and competency of heart valves. This information is helpful to the physician in planning further treatment.
Transoesophageal Echocardiogram (TEE)

**WHAT IT IS**
Similar to the echocardiogram; but unlike the standard echocardiogram, a transducer is mounted onto the tip of a long and slim endoscope called TEE probe. This TEE probe will be introduced into your oesophagus through the mouth.

**WHY YOU NEED TO DO IT**
The images or pictures obtained may provide useful information for the physician to help in the management of the heart problem.

Transtelephonic ECG

**WHAT IT IS**
A test where the electrical signals of the heart are recorded by the patient either by a special handheld recorder or watch and then transmitted via telephone to a receiving centre at the National Heart Centre Singapore.

**WHY YOU NEED TO DO IT**
Ideal in detecting transient abnormal rhythms of the heart which occurs intermittently. It is also useful for prolonged monitoring of patients who have recurrent faints.

Upright Tilt Table Test

**WHAT IT IS**
A test where a patient is tilted upright and monitored continuously to see if this will reproduce the patient’s symptoms of recurrent fainting.

**WHY YOU NEED TO DO IT**
Used to detect recurrent syncope (faints) of unknown origin. It will confirm whether the patient has vasovagal syncope, i.e., fainting due to abnormally sensitive reflexes in the cardiovascular system.

Duplex Ultrasound (Vascular Investigation)

**WHAT IT IS**
This investigation consists of one or a combination of laboratory tests which includes imaging of the blood vessels outside the heart with a duplex scan or measuring the blood flow and pressure in the vascular system using specialised machines.

**WHY YOU NEED TO DO IT**
This ultrasound scan uses high frequency sound waves to image the blood vessels outside the heart so as to assess their patency and to document any abnormalities.
Ambulatory Blood Pressure Monitoring

| WHAT IT IS | A test where your blood pressure and the heart rate are recorded at fixed time intervals over 24 hours. This is done while you go on with your daily activities. This allows you to look at your variation in blood pressure. |
| WHY YOU NEED TO DO IT | For patients with high blood pressure, and is helpful for the doctor to see if the drugs prescribed is effective in controlling blood pressure. It is also used to monitor borderline hypertension, young hypertensives and those with poor blood pressure control. |

Cardiac Catheterisation / Coronary Angiography

| WHAT IT IS | Cardiac catheterisation is where a catheter is passed into the chambers of the heart to find out detailed information about your heart and coronary arteries. Usually performed after tests have found positive for heart disease. | Coronary angiography is performed in the same way as a cardiac catheterisation and allows the cardiologist to delineate the coronary arteries. |
| WHY YOU NEED TO DO IT | This procedure helps your doctor to precisely identify the heart problem. | Any narrowings in the arteries will be revealed by the contrast medium. |

Electrophysiological Study (EPS)

| WHAT IT IS | Uses cardiac catheterisation techniques to investigate patients who have irregular heartbeats (called arrhythmias). EPS shows how the heart reacts to controlled electrical signals. |
| WHY YOU NEED TO DO IT | The signals transmitted can help doctors find out where in the heart the arrhythmia starts and what medicines will work. EPS also helps doctors determine other catheter techniques that can be used to stop the arrhythmia. |
CT Coronary Angiography
(ALSO KNOWN AS MULTI-SLICE CORONARY TOMOGRAPHY ANGIOGRAPHY)

**WHAT IT IS**
A non-invasive procedure that provides visualisation of the heart’s arteries. It does not require any catheter or equipment to be inserted into the body; only an intravenous line and a small amount of dye are required, so there is minimal risk. This procedure creates 3-dimensional images of the heart.

**WHY YOU NEED TO DO IT**
Used to evaluate high risk patients with one or more of the recognised risk factors for coronary artery disease (CAD) such as elevated cholesterol, hypertension, family history of CAD; patients with atypical chest pain requiring further evaluation and patients with known CAD requiring further assessment of treatment. If there is narrowing found in the coronary arteries, a coronary angiography will still be required.

Cardiac Magnetic Resonance Imaging (MRI)

**WHAT IT IS**
MRI can help doctors look closely at the structures and function of the heart and major vessels quickly and thoroughly, without the risks associated with traditional and more invasive procedures.

**WHY YOU NEED TO DO IT**
Using MRI, physicians can examine the size and thickness of the chambers of the heart, and determine the extent of damage caused by a heart attack or other heart disease.

State-of-the-art 320-slice computer tomography at NHCS
Coronary Artery Disease

Coronary artery disease (CAD) occurs when the arteries that supply blood to the heart muscle (the coronary arteries) become hardened and narrowed.

The arteries harden and narrow due to build-up of fatty deposits called plaque on their inner walls. The build-up of plaque is known as atherosclerosis. As the plaque increases in size, the insides of the coronary arteries get narrower and less blood can flow through them. Eventually, blood flow to the heart muscle is reduced and can cause chest pain (angina). A sudden, complete blockage can lead to a heart attack.

Many people with this disease are not aware they have it, as it develops slowly and silently over decades. It can go virtually unnoticed until it produces a heart attack.

Causes and symptoms

Coronary artery disease (CAD) is caused by atherosclerosis or hardening of the arteries due to old age.

In atherosclerosis, plaque build-up in the arteries is made up of fat, cholesterol, calcium, and other substances from the blood.

Plaque build-up in the arteries often begins in childhood. Over time, plaque build-up in the coronary arteries can:

- narrow the arteries, reducing the amount of blood and oxygen reaching the heart muscle,
COMMON HEART DISEASES AND TREATMENT OPTIONS

- block the arteries completely which stops the flow of blood to the heart muscle,
- cause blood clots to form which can block the arteries that supply blood to the heart muscle.

The figure on page 16 shows a normal artery with normal blood flow and an artery containing plaque build-up.

CAD varies in signs and symptoms and in severity.

- **No symptoms** - Referred to as silent ischaemia, you do not have any symptoms although blood supply to your heart may be restricted.
- **Chest pain (Angina)** - Usually brought about by physical or emotional stress. It feels like a heavy weight on your chest.
- **Shortness of breath** - Occurs when the heart fails due to damage of heart muscles.
- **Heart attack** - Caused by a blood clot or rupture in a narrowed coronary artery. The part of the heart muscle fed by that artery dies. Pain from a heart attack is often described as a crushing pain and may feel similar to angina, but lasts longer.

**Detection**

Diagnosis normally starts with a physical examination, taking of your medical history and routine blood tests. Other tests recommended may include:

- Electrocardiogram (ECG)
- Exercise Stress Test
- Coronary Angiography
- Echocardiogram
- CT Coronary Angiography
Treatment
You can prevent or slow down coronary artery disease by improving the health of your heart and blood vessels.

Drugs and surgical techniques can open up narrowed coronary arteries. Making lifestyle choices to control the risk factors for coronary artery disease is the best long-term measure.

While many people are able to manage this disease with lifestyle changes and medications, others with severe coronary artery disease may need coronary angioplasty or surgery.

There are various procedures to improve coronary blood flow (revascularisation).

**PERCUTANEOUS CORONARY INTERVENTION (PCI)**
A common treatment for severe blockage of the coronary arteries, it is also known as coronary or balloon angioplasty / percutaneous transluminal coronary angioplasty (PTCA) with coronary stent placement.

In PTCA, a small balloon or stent is used to help keep the part of the artery that is blocked open. The latest option within PTCA is the use of drug-eluting stents, which are stents covered with a drug, which supposedly has been shown to reduce the rate of re-narrowing of the arteries.

If percutaneous coronary intervention does not widen the artery or if complications occur, you may need coronary artery bypass surgery.

**CORONARY ARTERY BYPASS SURGERY**
This is an open heart surgery where a new route is created for blood to go around a blocked part of a coronary artery to supply your heart with enough blood to relieve chest pain.
Valvular Heart Disease

Valvular heart disease is a disorder or disease of the heart valves, which are the tissue flaps that regulate the flow of blood into and out of the chambers of the heart.

Patients with valvular heart disease have a malfunction of one or more of the heart valves. There are several types of valvular heart diseases with distinct symptoms and treatment options.

Causes and symptoms

**Infective endocarditis.** Most people with a healthy, normal heart are not at significant risk of contracting this infection of the heart valve. Those who have had rheumatic fever, with resulting scarring, or congenital heart disease, may contract this disease. Dental surgery or any surgery involving the mouth, bladder, prostate, or female pelvic organs increases the risk for this infection. The disease also may occur in drug addicts who inject drugs into their veins using unsterilised needles, even if they have normal heart valves.

Patients who have developed the disease may report fever, fatigue, night sweats, chills, and joint inflammation.

In patients where the disease has developed more slowly, symptoms may include signs of a rapid heart rate, an enlarged spleen, various skin rashes or spots, and heart murmur.

**Rheumatic fever.** This results from an allergic response to certain types of streptococcal bacteria. If it occurs, it is most often in children who have had streptococcal infections that were not completely treated.

Chronic rheumatic heart disease can result from just one occurrence or repeated attacks of rheumatic fever.

The symptoms of rheumatic fever include fever, joint pains, and either lumps under the skin or raised red patches on the skin.

**Other valvular heart diseases.** With ageing, deposits of calcium can lead to thickening and leakage of heart...
valves. Heart attacks can also damage the mitral valve structures, and certain connective tissue disorders such as Marfan’s syndrome and myxomatous degeneration, can also adversely affect the heart valves.

Detection
Specific types of valvular heart disease are diagnosed using electrocardiogram, echocardiogram, certain x-ray studies, and/or cardiac catheterisation.

INFECTIVE ENDOCARDITIS
A diagnosis can be obtained through history, physical examination, lab tests, ECG and echocardiogram.

RHEUMATIC FEVER
Rheumatic fever may be suspected following a recent throat infection. Symptoms include joint ache, abnormal electrocardiogram or heart inflammation as indicated in a blood test. Heart murmurs may be detected from routine examination.

Treatment
The treatment of specific valvular heart disease will vary, depending on the valve involved and the extent of damage or malfunction. Some patients will not require any specific treatment and many can be treated with medications. Sometimes, patients need surgery. If multi-valvular disease is suspected, the different valves may be evaluated during surgery on one of the affected valves. Women with heart valve disease and want to become pregnant should receive a thorough check-up and see a cardiologist regularly throughout their pregnancy.

INFECTIVE ENDOCARDITIS
Depending on the type of bacterium that caused the disease, an appropriate antibiotic or combination of antibiotics will be used to treat infective endocarditis. Severe cases may be corrected by valve replacement surgery.

RHEUMATIC FEVER
Patients with rheumatic fever will be treated with antibiotics to eliminate streptococcal organisms that may still remain in the heart. Patients may receive antibiotics to prevent further infection, and inflammation may be treated with aspirin or cortisone-like drugs.
Arrhythmia

Arrhythmias refer to any change in the normal sequence of electrical impulses produced by the heart. The abnormal heart rhythms can be slow or fast, have an extra beat, or otherwise beat irregularly.

Age increases the probability of experiencing an arrhythmia. It can occur in people who do not have heart disease. Arrhythmias often occur during and after heart attacks.

Some types of arrhythmias, such as ventricular tachycardia, are serious and even life threatening.

Arrhythmias are the primary cause of sudden cardiac death, accounting for more than 200 deaths each year in Singapore.

Slow heart rates (less than 60 beats per minute) are called bradycardias. It can result in poor circulation of blood with resulting lack of oxygen throughout the body, especially the brain.

Fast heart rates (more than 120 beats per minute) or tachycardias compromise the heart’s ability to pump effectively.

Supraventricular Arrhythmia is less serious, and Ventricular Fibrillation is the most serious type of arrhythmia and is fatal unless medical help is available immediately.

Causes and symptoms

In many cases, the cause of an arrhythmia is unknown. Some known causes of arrhythmias include heart disease, stress, caffeine, tobacco, alcohol, diet pills and decongestants in cough and cold medicines.

Symptoms of an arrhythmia include a fast heartbeat, pounding or fluttering chest sensations, skipping a heartbeat, “flip-flops,” dizziness, faintness, shortness of breath, and chest pains.

Detection

It is diagnosed by examination with a stethoscope, electrocardiograms and electrophysiologic studies. Sometimes, arrhythmias can be identified by
listening to the patient’s heart through a stethoscope. But as arrhythmias are not always present, they may not occur during the physical examination.

**Treatment**

Many arrhythmias do not require any treatment. For serious arrhythmias, treating the underlying heart disease sometimes controls the arrhythmia. In some cases, the arrhythmia itself is treated with drugs, electrical shock (cardioversion), implanting automatic implantable defibrillators, pacemakers, catheter ablation, or surgery.

Supraventricular Arrhythmias are often treated with drug therapy while Ventricular Arrhythmias require more complex treatment.

**Drug therapy** can manage many arrhythmias, but finding the right drug and dosage requires care and takes time.

Common drugs for suppressing arrhythmias include beta-blockers, calcium channel blockers, quinidine, digitalis preparations, and procainamide. Because of their potential serious side effects, stronger drugs are used only to treat life-threatening arrhythmias. All the drugs used to treat arrhythmias have possible side effects, ranging from mild complications with beta-blockers and calcium channel blockers to more serious effects of stronger drugs that can cause or make arrhythmias worse. Response to drugs is usually measured by ECG, Holter monitor or electrophysiologic study.

**Pacemakers** that send electrical signals to make the heart beat properly can be implanted under the skin during a simple procedure. Pacemakers are used to correct bradycardia and are sometimes used after surgical or catheter ablation.
Automatic implantable defibrillators correct life-threatening ventricular arrhythmias by recognising them and then restoring a normal heart rhythm by pacing the heart or giving it an electric shock. They are implanted within the chest wall without major surgery and store information for future evaluation by physicians.

Ablation, a procedure to alter or remove the heart tissue causing the arrhythmia in order to prevent a recurrence, can be performed through a catheter or surgery. Supraventricular tachycardia can be treated successfully with ablation. Ablation treatments are used when medications fail.

Maze surgery treats atrial fibrillation by making multiple incisions through the atrium to allow electrical impulses to move effectively. This is often recommended for patients who have not responded to drugs or cardioversion.
Heart Failure

Heart failure is a condition in which the heart loses the ability to pump enough blood to the body’s tissues.

As a result, the main body organs and other tissues do not receive enough oxygen and nutrients to function properly.

A person with heart failure suffers a build-up of fluid in the tissues, called oedema. Heart failure as a result of fluid build-up is called congestive heart failure. Where oedema occurs in the body depends on the part of the heart that is affected by heart failure. For most people, heart failure is a chronic disease with no cure. However, it can be managed and treated with medicines and changes in diet, exercise and lifestyle habits. Heart transplantation is considered in some cases.

Causes and symptoms

The most common causes of heart failure are:

- coronary heart disease and heart attack (which may be “silent”)
- cardiomyopathy (disease of the heart muscles)
- high blood pressure (hypertension)
- heart valve disease
- congenital heart disease
- alcoholism and drug abuse

In coronary heart disease, the arteries supplying blood to the heart become narrowed or blocked. A person has a heart attack when blood flow to an area of the heart is completely blocked. The heart muscle suffers damage when its blood supply is reduced or blocked. If the damage affects the heart’s ability to pump blood, heart failure develops. Some heart attacks go unrecognised.

Cardiomyopathy may be caused by coronary artery disease and various other heart problems. Sometimes, the cause cannot be found, in which case it is called idiopathic cardiomyopathy.
Cardiomyopathy can weaken the heart muscle, leading to heart failure.

A person with heart failure may experience the following:

- shortness of breath
- frequent coughing, especially when lying down
- swollen feet, ankles, and legs
- abdominal swelling and pain
- fatigue
- dizziness or fainting
- sudden death

Defects of the heart valves, congenital heart diseases, alcoholism, and drug abuse cause damage to the heart that can all lead to heart failure.

High blood pressure is another common cause of heart failure. High blood pressure makes the heart work harder to pump blood. After a while, the heart cannot keep up and the symptoms of heart failure develop.

A person with heart failure may have shortness of breath and coughing caused by the fluid build-up in the lungs. Pulmonary oedema may cause
the person to cough up bubbly phlegm that contains blood. Other symptoms of heart failure include fluid build-up in the veins and body tissues causing swelling of the feet, legs and abdomen. When body tissues, such as organs and muscles, do not receive enough oxygen and nutrients, they cannot function well, leading to tiredness and dizziness.

Detection
Diagnosis of heart failure is based on:
- symptoms
- medical history
- physical examination
- chest radiograph
- electrocardiogram (ECG; also called EKG)
- other imaging tests
- cardiac catheterisation
Symptoms can provide important clues to the presence of heart failure.

**Shortness of breath while engaging in activities and episodes of shortness of breath during sleep are classic symptoms of heart failure.**

During the physical examination, the physician listens to the heart and lungs with a stethoscope for tell-tale signs of heart failure such as irregular heart sounds, “gallops,” a rapid heart rate, and murmurs of the heart valves. If there is fluid in the lungs, crackling sounds may be heard. Rapid breathing or other changes in breathing may also be present. Patients with heart failure may also have a rapid pulse.

By pressing on the abdomen, the physician can feel if the liver is enlarged. The skin of the fingers and toes may have a bluish tint and feel cool if not enough oxygen is reaching them.

Chest radiographs can show if there is fluid in the lungs or if the heart is enlarged. Abnormalities of heart valves and other structures may also be seen on chest radiograph.

An electrocardiogram gives information on the heart rhythm and the size of the heart and shows if the heart chamber is enlarged or if there is damage to the heart muscle from blocked arteries.

Echocardiography can show if the heart wall or chambers are enlarged and if there are abnormalities of the heart valves. An echocardiogram can be used to find out how much blood the heart is pumping.

Radionuclide ventriculography also measures the ejection fraction by imaging with very low doses of an injected radioactive substance as it travels through the heart.

Cardiac catheterisation is used to measure pressure in the heart and the amount of blood pumped by the heart. This test can help find abnormalities of the coronary arteries, heart valves, heart muscle, and other blood vessels. Combined with echocardiography and other tests, cardiac catheterisation can help find the cause of heart failure. However, this is not always necessary.

**Treatment**

Heart failure is usually treated with lifestyle changes and medicines. Dietary changes to maintain proper weight and...
reduction of salt intake may be needed. Reducing salt intake helps to lessen swelling in the legs, feet and abdomen. Appropriate exercise such as walking, cycling, swimming, or low-impact aerobic exercises may be recommended, but it is important that heart failure patients begin an exercise programme with the advice of their doctors. The National Heart Centre Singapore and Changi General Hospital offer good Cardiovascular Rehabilitation and
Preventive Cardiology Programmes for patients identified to have multiple risk factors for heart disease or who have just undergone open-heart surgery.

One or more of the following types of medicines may be prescribed for heart failure:

- diuretics
- digoxin
- vasodilators
- beta blockers
- angiotensin converting enzyme inhibitors (ACE inhibitors)
- angiotensin receptor blockers (ARBs)
- calcium channel blockers

Diuretics eliminate excess salt and water through the kidneys by making patients urinate more often. This helps reduce the swelling caused by fluid build-up in the tissues. Digoxin helps the heart muscles have a stronger pumping action. Vasodilators, ACE inhibitors, ARBs and calcium channel blockers lower blood pressure and expand the blood vessels making it easier for the heart to pump blood through the vessels.

Other lifestyle changes that may reduce the symptoms of heart failure include stopping smoking or other tobacco use, eliminating or reducing alcohol consumption and not using harmful drugs.

Congenital heart defects and abnormal heart valves can be repaired with surgery. Blocked coronary arteries can usually be treated with angioplasty or coronary artery bypass surgery.

Sometimes, surgery is needed to correct abnormalities of the heart or heart valves that cause heart failure.

With severe heart failure, the heart muscle may become so damaged that available treatments do not help. Patients with end-stage heart failure are usually considered for heart transplantation when all other treatments do not work.
Critical Heart Conditions

The following heart conditions are critical and require immediate medical attention to prevent death.

<table>
<thead>
<tr>
<th>HEART CONDITION</th>
<th>WHAT CAUSES IT?</th>
<th>SYMPTOMS</th>
</tr>
</thead>
</table>
| Heart Attack    | This happens when there is a sudden, complete blockage of the coronary artery, causing permanent damage to part of the heart muscle. This is usually due to a sudden rupture of the lining of fatty plaque inside the artery, causing clot formation and subsequent complete blockage of artery. It can also occur at rest. | • Prolonged (>30mins) severe central chest pain (heavy or crushing sensation) and not relieved with rest or usual medications  
• Nausea  
• Sweating  
• Apprehension  
• 25% of heart attacks are clinically silent |
| Aortic Dissection | The aorta is the largest artery in our body. Aortic dissection is caused by the disruption of the aortic wall allowing blood to flow between layers of the vessel wall. When origins of major branches from the aorta at the site of dissection get affected, it results in compromised blood flow to respective major organs. If the arteries to the heart or brain are affected, death, heart attack or stroke can result. | • Sudden, severe ripping chest or back pain. Pain may travel if there is extension of dissection  
• Heart attack  
• Stroke  
• Heart failure (valves involved)  
• Shock (blood trapped around the heart) |
## CRITICAL HEART CONDITIONS

### DIAGNOSIS METHOD

If any 2 of findings below are positive, diagnosis of heart attack is confirmed:

- Chest pain characteristics
- ECG with characteristic changes, within minutes of heart attack
- Blood tests which detect proteins released into blood stream when part of heart muscle dies

### TREATMENT

1. Analgesics
2. Prescribe a powerful blood thinning medication to dissolve clot and unblock artery. Success rate of unblocking artery is only slightly more than 50% and serious bleeding complications from other areas can result.
3. Unblock artery by inserting a balloon or stent through a small puncture in the groin or wrist to open up the artery. This is called Percutaneous Transluminal Coronary Angioplasty (PTCA). Success rate is 90%. NHCS offers round-the-clock emergency PTCA for patients with ongoing heart attack.

- For all patients with severe chest or back pain, especially patients with high blood pressure, a chest x-ray is needed
- Echocardiography
- CT angiography or MRI is needed to confirm diagnosis

1. Use of oral medications to reduce the blood pressure to prevent further extension of dissection.
2. If initial blood pressure is high and not controlled, intravenous medication is needed.
3. Dissection affecting initial part of the aorta will require surgery.
### CRITICAL HEART CONDITIONS

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| **Aneurysm**    | A localised abnormal widening of vessel wall due to weakening of the vessel wall. Most serious complication arising is rupture of the aneurysm when it increases to a certain size. It becomes fatal if rupture happens in the aorta or brain. | • Usually clinically silent; diagnosed incidentally or when it ruptures  
• Aortic aneurysm causes deep diffuse chest pain, difficulty in swallowing, hoarseness  
• Brain aneurysm causes headache | |
| **Viral Myocarditis** | Due to inflammation of the heart muscle from infections, usually viral. Inflammation may lead to global weakening and dilation of heart muscle causing severe heart failure. | • Usually preceded by flu-like symptoms with fever, fatigue and palpitations  
• Breathlessness | |

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## CRITICAL HEART CONDITIONS

### DIAGNOSIS METHOD

- **Abdominal aneurysm:** If large enough, aneurysm can be detected by examination as pulsatile mass
- **Chest / abdomen aneurysm:** Ultrasound, CT angiography, MRI
- **Brain aneurysm:** Diagnosed when it ruptures and causes a stroke

### TREATMENT

1. Control blood pressure to reduce risk of expansion and rupture of aneurysm.
2. Surgical repair is needed when aneurysm reaches a certain size or is expanding rapidly.

- **Diagnosis is difficult as initial symptoms are taken as flu**
- **Usually diagnosed when symptoms of heart failure appear or presented with abnormal ECG**
- **Cardiac MRI**
- **Ultrasound of the heart will show a dilated and weakened heart**
- **Definite diagnosis can only be made with biopsy of the heart muscle, which is a high-risk test**
- **Usually some ECG and blood test abnormalities will show signs of heart muscles damage**

1. **No proven effective treatment.**
2. **Can only relieve symptoms of heart failure.**
3. **Medication for heart failure usually recommended.**
4. **Bed rest during infection period is advised.**
National Heart Centre Singapore
- Specialist Outpatient Clinics

Patients referred by primary care physicians or polyclinics for diagnosis and management of their heart related conditions are seen at the Cardiology Clinics, the entry point for access to specialised heart care.

They are run by a team of more than 30 cardiac specialists with expertise in every aspect of cardiac care.

If patients require sub-specialised care, they will be referred to the other sub-specialty clinics as follows:

1. Cardiothoracic Surgery Clinic
   This clinic is for patients who are referred by cardiologists and require open-heart surgery or have just undergone some form of heart surgery.

2. Anticoagulation Clinic
   This clinic is for patients on anticoagulants (blood-thinners) and need close monitoring.

3. Adult Congenital Heart Disease (ACHD) Clinic
   This clinic looks after patients with operated as well as unoperated congenital heart conditions from age 16 onwards. Adults with congenital heart disease need regular monitoring and sometimes further surgical interventions. It also screens suspected Marfan patients and monitors ACHD patients closely during pregnancy.

4. Heart Failure Clinic
   The clinic adopts a team approach to treat heart failure through a structured outpatient programme to prolong
survival, improve quality of life and reduce hospital admissions. A specialist nurse clinician is on hand to provide phone consultations to patients.

5. Heart Transplantation Clinic
This clinic provides pre- and post-transplant care for patients on the waiting list for a heart transplant or who have undergone a heart transplantation.

6. Lung Transplantation Clinic
This clinic provides pre- and post-lung transplant care and treats patients with primary pulmonary hypertension.

7. Arrhythmia and Pacemaker Clinic
This clinic evaluates patients with cardiac arrhythmias, providing tertiary service for patients with complex cardiac arrhythmias that require further investigations and evaluations. It also evaluates and interrogates pacemakers and defibrillators implanted in the patients.
8. Cardiac Rehabilitation Clinic
The clinic screens patients’ suitability for cardiac rehabilitation, provides counselling on healthy lifestyle and risk factor modification and assesses the progress of existing patients undergoing rehabilitation.

9. Dietary Clinic
The clinic provides dietary advice to patients with the following risk factors / disease:
- hyperlipidaemia
- diabetes mellitus
- weight management
- renal failure
- post-organ transplant
- dysphagia
- eating disorders
- cancer
- anaemia

The dietitians will tailor the meal plans to take into account the patient’s medical condition and favourite foods.

10. Warfarin Counselling Clinic
A weekly clinic conducted by the pharmacist at the National Heart Centre Singapore to explain why warfarin is prescribed to patient, its use and side effects and other special precautions to note.

11. High Risk Cardiac Pregnancy Clinic
This joint clinic between National Heart Centre Singapore and Singapore General Hospital was set up in May 2009. The clinic, run concurrently by a cardiologist and an obstetrician, aims to manage the pregnancy process of high risk cardiac patients holistically, with improved outcomes for both the mother and baby.

For more information and appointments, please contact tel: 6436 7840 or fax: 6227 3562 www.nhcs.com.sg
KK Women’s and Childrens’ Hospital

The service also offers a wide range of diagnostic modalities for the management of heart problems in children. These include electrocardiogram, 24-hour ambulatory holter monitoring, two-dimensional echocardiography including fetal and transesophageal echocardiogram, cineangiography, cardiac CT and MRI.

Cardiac Centre (Children)
KKH’s Cardiology Service is the main paediatric cardiology referral centre in Singapore. It provides comprehensive care for congenital and acquired heart conditions in patients ranging from newborn babies to young adults. The service offers catheter-based interventions, including dilatation of heart valves and narrowed vessels, as well as closure of cardiac abnormalities such as patent ductus arteriosus, atrial septal defects and muscular ventricular septal defects.

Cardiothoracic Surgery (Children)
The Cardiothoracic Surgery Service provides complete care for all elective and emergency cardiothoracic surgeries in infants, children and adolescents up to 18 years of age. This includes inpatient and outpatient care for children needing cardiac surgical assessment and surgery.
Coronary Screening Test (Women) (CT Calcium Scoring Test)

This is a quick non-invasive scan to evaluate the risk of a heart-attack. The test uses the latest 64 multi-slice computerised tomography (CT) machine to detect areas of hardening in the arteries that supply blood to the heart. With calcium as a marker of plaque in the heart’s arteries, the test calculates the amount of calcium depositing on the plaque in a patient’s arteries. The more plaque a patient has in her arteries, the higher her risk of a heart attack.

The test is available as an optional test in our women wellness health programmes.

Weight Management Programme (Women and Children)

The hospital’s Weight Management Programme offers a comprehensive plan to help overweight women and children lose weight in a healthy way. The programme is managed by a multidisciplinary team of specialists including paediatricians, sports physicians, exercise specialists and dietitians.

The programme’s objective is to help individuals achieve significant and sustained weight loss by inculcating healthy eating habits, regular exercise, and other practical lifestyle changes. Concurrent health problems are also managed in tandem with the weight loss therapy.

For more information and appointments, please contact tel: 6294 4050 or fax: 6293 7933. www.kkh.com.sg
Cardiology Services

CGH has a strong team of cardiologists. Besides treating Singapore patients with heart problems, they also provide emergency treatment for many air transit international patients who develop cardiac complaints, such as chest pains. There are two main categories of cardiac procedures offered:

INVASIVE CARDIAC PROCEDURES
• Pacemaker therapy
• Right and left heart cardiac catherisation
• Emergency coronary angioplasty

NON-INVASIVE CARDIAC PROCEDURES
• Cardiology consultations in hospital wards or outpatient clinics

Heart Failure Programme

This programme is a multidisciplinary disease management program involving the cardiologist, nurse, pharmacist, dietitian, physiotherapist, and occupational therapist. It aims to improve outcomes in patients with heart failure with better quality of life and reduced re-admissions. This is done by providing appropriate, affordable and more accessible management in both the hospital ward and outpatient setting. All new heart failure admissions will be enrolled into the inpatient heart failure program. The more “at risk” heart failure patients will be offered participation in the outpatient heart failure program.
Acute Myocardial Infarction Programme

Patients with Acute Myocardial Infarction (AMI) have to be treated quickly as this is a condition with a high mortality rate.

This programme represents a coordinated effort by medical, nursing and allied health staff to ensure that patients go through timely treatment for myocardial infarction and are monitored and treated according to clinical guidelines.

In the course of the hospitalisation, a cardiac rehabilitation team of dietitian, physiotherapist and occupational therapists will work with patients to initiate and maintain lifestyle modification. Patients will be assessed individually and guided on the return to normal activities. They will also be motivated to be actively involved in their heart health and can continue with cardiac rehabilitation after discharge.

Cardiac Catheterisation Laboratory

CGH’s Cardiac Catheterisation Laboratory is fully equipped and staffed by experienced interventional cardiologists, nurses and technicians. AMI patients who are deemed suitable for an emergency angioplasty or in medical term, Percutaneous Coronary Intervention (PCI), will have it done at the Cardiac Catheterisation Laboratory. Aside from PCI, the laboratory also carries out diagnostic cardiac catheterisation, which is a special x-ray study of the blood vessels of the heart.

Clinical Measurement Unit

The CGH Clinical Measurement Unit conducts various cardiac investigations, including:

- 12 Lead Electrocardiography
- 24 Hour Ambulatory ECG Monitoring
- Dobutamine-Stress Echocardiography
- Exercise Stress Echocardiography
- Transthoracic Echocardiography
- Signal Averaging Electrocardiography
- Treadmill Exercise Test

CGH’s Heart Failure Programme and Acute Myocardial Infarction Programme received the stamp of approval from Joint Commission International in 2007 and 2010. CGH is the first hospital in the world to have two JCI certified programmes in cardiac care, and the first hospital in Singapore to receive JCI Disease-Specific Care certification for care programmes.

For more information and appointments, please contact tel: 6850 3333 or fax: 6781 1193 www.cgh.com.sg
Your Heart’s Preferred Soya Milk

- High in Calcium
- Lactose Free
- Cholesterol Free
Enquiries or appointments to see a SingHealth Specialist can be made through your GP/family doctor or you may contact us directly through the numbers below:

**SingHealth Hospitals**

- **Singapore General Hospital**
  - Tel: (65) 6222 3322

- **KK Women’s and Children’s Hospital**
  - Tel: (65) 6225 5554

- **Changi General Hospital**
  - Tel: (65) 6788 8833

**National Specialty Centres**

- **National Cancer Centre Singapore**
  - Tel: (65) 6436 8000

- **National Heart Centre Singapore**
  - Tel: (65) 6436 7800

- **Singapore National Eye Centre**
  - Tel: (65) 6227 7255

- **National Dental Centre Singapore**
  - Tel: (65) 6324 8910

- **National Neuroscience Institute**
  - Tel: (65) 6357 7153
  - [wwwnni.com.sg](http://wwwnni.com.sg)

**Primary Healthcare**

- **Polyclinics SingHealth**
  - Tel: (65) 6236 4800
  - [polyclinic.singhealth.com.sg](http://polyclinic.singhealth.com.sg)

**Overseas Referral & Liaison Services**

- 24-hr Hotline: (65) 6326 5656
- Fax: (65) 6326 5900
- Email: ims@singhealth.com.sg