

What is the heart?

Your heart is a muscular pump that provides blood to all the other organs in your body so that they can work properly, for example, your brain, kidneys and muscles.

Your heart has two main functions:

1. It squeezes or pumps blood. The pumping function produces your heartbeat. Medically, this is called systole.
2. Between each beat the heart must relax properly so it can fill with blood for the next squeeze. This is the filling function and is known as diastole.

If something goes wrong with either the pumping or filling part of your heart's work you may get heart failure

What is heart failure?

Heart failure happens when your heart doesn't provide as much blood as the body normally needs to carry out its usual functions.

What can cause heart failure?

Many different diseases that affect the pumping or filling of your heart can cause heart failure. Your doctor will try to find out what has caused your heart failure, as this can influence the type of treatment or therapy most suitable for you.

Reduced pump function may be caused by the following:

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Weakened heart muscle caused by a heart attack. A heart attack can damage some of your heart muscle. This happens when one of the blood vessels supplying blood to your heart becomes blocked. Coronary artery disease causes the blockage to develop. You may not have been aware of having a heart attack in the past. (For more information, see our booklet Step by step through heart attack).

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Long-term high blood pressure that has not been controlled. This can also weaken your heart muscle and reduce pump function.

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Weakened heart muscle from leaking or narrowed heart valves.

Heart valves make sure that the blood flows in the correct direction through your heart. If valves stop working properly (as a result of narrowing or leakage), extra strain will be put on your heart muscle, which will eventually weaken the pump function.

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Alcohol-related damage to the heart muscle.

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A viral infection of the heart.

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No obvious cause. This is the case for as many as 20% to 30% of people with heart failure. In these cases, the cause of heart failure is said to be unknown or idiopathic.

Rare causes of heart muscle damage. Sometimes your doctor will investigate some rare causes of heart failure if your general medical condition suggests that these investigations may be useful.

Reduced filling function can be caused by the following:

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Thickening of the heart muscle can affect the way your heart fills in between heartbeats. Thickening of the heart muscle may be a result of high blood pressure or problems with a heart valve. Depending on your medical history, there are also other rare causes which your doctor may investigate.

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Narrowing of the blood vessels supplying blood to your heart (coronary

artery disease) may also affect how your heart fills.

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Do not be worried if your doctor cannot find a cause for your heart failure.

This does not mean that there will be any change in outlook. Therapy is the same once the causes listed above have been considered.

Hereditary heart failure

People with heart failure have concerns that their condition may be hereditary (passed on from generation to generation). Some causes of heart failure are based on genetics. Your doctor will investigate this if it is felt to be necessary depending on your medical history.

What are the symptoms of heart failure?

The main symptoms associated with heart failure are:

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Fluid retention.

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Shortness of breath.

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Tiredness.

Fluid retention

It is important that you recognise the early signs of fluid retention. To keep well and stay out of hospital, you must learn to detect signs of fluid retention early and contact your GP or heart failure unit. Signs of fluid retention include:

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Sudden weight gain

It is important to record your weight every morning. A weight gain of two kilograms or four pounds over two days is an indication that your body may be retaining fluid. By identifying this increase, you may be

able to treat it with extra diuretic tablets if your doctor advises. This can stop you from becoming breathless or needing to go in to hospital.

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Swollen ankles

Your ankles may swell if fluid builds up because we are on our feet most of the day. If you press the inside part of your legs along your shin with your thumb and it leaves an indentation (dimple mark), this is usually a sign of fluid retention.

Shortness of breath

Fluid building up in your lungs can lead to shortness of breath. You can measure your breathing when you are exercising or when resting (see the next page).

Sudden weight gain

A good way to measure your breathing is climbing the stairs. If you can usually walk to the top without stopping, this is your baseline. If you find that you have to stop before you reach the top because you are gasping, your breathing is now worse.

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At rest

An easy way to measure your breathing at rest is while you are lying in bed at night. If you have to add an extra pillow to the number you usually use it could mean that you have some fluid building up in the bottom of your lungs. In more severe forms of fluid retention, you can wake suddenly from your sleep gasping for air because you felt you were slowly drowning. This is a serious sign called paroxysmal nocturnal dyspnoea (PND) and you need to see a doctor as soon as possible or go to hospital.

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Loss of appetite

Fluid can also build up around your tummy and liver and make you feel full all of the time. When this happens you do not absorb your medication properly and then this can mean you retain more fluid, starting a vicious circle. Some people feel too ill to eat because of the swelling in their abdomen. If your symptoms get worse you should contact your heart failure unit or GP as soon as possible. Drinking normal amounts of water should not cause you to retain more fluid. However, some people need to control their intake of fluids, so you should discuss this with your doctor.

Extreme tiredness and loss of energy

When you retain fluid your heart has to work harder and this causes you to feel extremely tired.

Irregular heart rhythm

People with heart failure are more likely to have rhythm disturbances in their heart. There are a number of different types of irregular heart rhythms and some are more serious than others. If you are aware of having rhythm disturbances, it is important to tell your doctor promptly so that it can be investigated.

Detecting a rhythm disturbance - palpitations, dizziness and blackouts

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Palpitations are when you feel your heart beating fast in your chest, and sometimes in your neck.

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Sometimes you may also feel short of breath.

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Dizziness happens because irregular heart rhythms can cause your blood pressure to drop and can even result in fainting or blackouts.

As with all of your symptoms, the earlier you report them to your doctor the easier they are to treat and cause you less discomfort. Any new palpitations or dizziness should be reported. Sometimes the dizziness may be related to the tablets you are taking. However you should report any dizziness to your doctor.

Occasionally heart rhythm disturbances need to be treated with medicines or devices such as pacemakers or defibrillators (ICDs).

Coping with heart failure

Heart failure is a serious chronic disease and even with the best medical care, this condition can get worse over time. How heart failure changes and worsens over time varies from person to person.

Your doctor will explain the cause of your heart failure to you and you will begin a disease management programme. This will include education on the signs and symptoms of heart failure and the best treatment options for your specific condition, enabling you to take a more active role in managing your heart failure. With good heart failure management you can live very well for a long time.

Your diagnosis of heart failure, your symptoms and your concern for the future may cause you to feel depressed or worried. These feelings are common and are perfectly normal.

Low spirits can make you feel sad and tired. You might not feel like eating and find that you wake up much earlier than normal.

When you are worried, you can lose interest in how you look and in doing your normal activities such as hobbies and meeting friends. You may have thoughts like:

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“My memory isn’t working anymore.”

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“I can’t concentrate.”

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“I can’t be bothered doing things.”

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“I can’t do any of the things I used to do before.”

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“I keep thinking my heart is failing and can’t stop worrying about it.”

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“I’d better not do anything just in case I do damage to myself.”

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“I can’t sleep. As soon as I go to bed terrible thoughts come into my mind.”

However as you begin to actively take charge of your health and make positive changes you may find these feelings start to fade. It is important to learn how to manage these feelings. Try to:

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Get dressed every day.

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Go out for a short walk even if it’s only five minutes.

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Keep up with activities or hobbies you enjoy.

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Share your feelings and thoughts with people you are close to.

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Get a good night’s sleep.

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Listen to your body. You know your limitations better than anyone.

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Focus on following your treatment plan, enabling you to make informed choices on your health now and into your future.

If negative feelings continue to interfere with your ability to enjoy life, talk to your doctor as counselling might help you feel better.

What will my doctor do to investigate heart failure?

The diagnosis of heart failure is based on the information the doctor gets from asking you questions and from what he or she finds when they examine you. Then your doctor will order certain tests to confirm the diagnosis and to search for the cause of your heart failure.

Questions

The questions your doctor will ask you will focus on your symptoms, to try and assess how serious these complaints are. For example, if you report feeling breathless, your doctor will ask questions to see how this symptom is interfering with your day-to-day activities. Does the breathlessness prevent you from doing your job, managing your home or going to the shops? Are you breathless even when you don't do strenuous activity such as walking up the stairs?

These questions will assess how serious the symptom is, as well as acting as a starting point against which the effectiveness of your medical treatment can be assessed. Your doctor will also ask questions to find a cause for your heart failure.

These will include a thorough review of your health in the past and the health of your family, as well as questions on your personal habits, particularly cigarette smoking and drinking alcohol.

Examination

The physical examination will start with a check of your blood pressure and pulse rate. The doctor will also closely examine your neck as there are blood vessels in the neck, which will show any signs of congestion

and examine the ankles for swelling. He or she will also listen closely to your heart and lungs to check for valve problems, and again look for signs of congestion.

Tests

When the questions and physical examination are complete, your doctor will do several tests to confirm the diagnosis and search for a cause of the heart failure.

Blood tests

Basic tests will be carried out to make sure that your blood is normal (called a normal blood count) and to check that your kidneys are working properly. If your kidneys are not working properly, this may be a sign that you have more severe heart failure. This can restrict the use of certain medication. Blood tests to check your liver function will also be carried out. Sometimes a blood test called BNP (B-type natriuretic peptide) will be checked. This can help the doctor or nurse decide how your condition is progressing.

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Chest x-ray

This is a test which provides information on the size of your heart (remember it can be enlarged in heart failure) and whether there is any lung congestion. It is also useful to check your lungs for some other problem, which could be causing some of your symptoms, especially breathlessness.

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ECG (Electrocardiogram)

This is a recording of the electrical pattern of your heart. It can provide important information about the rhythm of your heart.

Some people with heart failure develop an irregular heart rhythm called atrial fibrillation. It can also give clues about any previous history of heart attacks. Not all people are aware of having a heart attack in the past.

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Echocardiogram

This is an ultrasound scan, which allows your doctor to look at how your heart pumps and fills. It is an important assessment of someone with heart failure for several reasons. This scan is performed by simply placing a probe on your chest (it is a similar test to one used to scan babies before they are born). You may feel pressure on your chest as the technician tries to get the best possible picture.

It will show whether your heart's pumping function is abnormal or whether the pumping function is normal, but you have a reduced filling function.

It will show up any dilation of your heart or increase in the thickness of your heart muscle.

An echocardiogram is also the best way of looking at the heart valves and may provide important information on valve problems that have been missed or underestimated during an examination.

Like the ECG it can also provide information on previous heart attacks by showing areas of scarred heart muscle.

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Dobutamine Stress Echocardiogram (DSE)

This is essentially the same test as an echocardiogram. During this test, however, a medicine called dobutamine is given through a small plastic tube inserted into one of the veins in your arm. This medication causes your heart to contract faster and more vigorously as it would during exercise.

Your blood pressure and heart rate will be monitored. The images of your heart produced during this test show what your heart is doing during exercise-type conditions. This is helpful to determine the cause of heart failure, the need for further tests, and the potential need for stenting or

bypass procedures.

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Exercise stress test

This is a treadmill or stationary bike test designed to assess your ability to do exercise. It is also used to check for coronary artery disease, one of the causes of heart failure. During this test your heart rhythm will be monitored by an ECG and a technician or doctor will ask you how you are feeling as you exercise. Occasionally, a more elaborate test will be performed which will look at how your lungs are working during the exercise test. The only difference from the normal exercise test is that you will need to wear a mouthpiece so the doctor can measure how much oxygen you need when you exercise.

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CT Scan

Your doctor may want you to have a CT scan of your heart to look for any coronary artery disease. This is a non-invasive test and may avoid the need for you to have an invasive angiogram. A CT scan may not be suitable for people with irregular heart rhythms or too fast a heart rate as the CT scanner may not get good enough images. If your doctor thinks you probably don't have coronary artery disease, a CT scan will confirm this. If your doctor thinks you are likely to have coronary artery disease, or you are not suitable for a CT scan for other reasons, a coronary angiogram may need to be performed.

Cardiac MRI

Cardiac MRI is a non-invasive test, involving no radiation, which is used to get high quality pictures of your heart. For people with heart failure, a cardiac MRI helps identify the cause of heart failure, especially in cases where the cause is uncertain. It is also of use to help doctors decide if you would benefit from having a stent or a coronary artery by-pass or

certain types of pacemaker therapies.

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Holter monitor

This is a recording of your heart rhythm over a period of 24 or 48 hours. It is done by attaching a monitor around your waist that is hooked up to leads placed on your chest. This test can provide important information on rhythm control in your heart. It is often ordered for people with heart failure who have complained about dizzy spells or blackouts where rhythm disturbances are suspected.

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Blood pressure monitor

This is often called ABPM (ambulatory blood pressure monitor) and is a recording of your blood pressure over a period of 24 hours. It is done by placing a blood pressure cuff on one arm, which is attached to a monitor placed on a belt at your waist. The blood pressure cuff inflates every half hour for 24 hours. The information is stored in the monitor and transferred to a computer when the monitor is removed. This test will give your doctors information on how well your blood pressure is being controlled by your medication.

Cardiac catheterization (angiogram)

This is a test where fine tubes are inserted into your groin area or arm, after you've been given a local anaesthetic. These tubes are guided, using x-rays, to your heart, dye is injected and the blood vessels supplying blood to your heart can be seen to assess whether any blockages or coronary artery disease could be causing heart failure.

The pumping function of your heart can also be assessed during this test, this is called a ventriculogram. Sometimes the pressure in the right side of your heart is also measured. To do this, a small tube is placed in

your vein and guided up to your right heart and lungs. Sometimes you will need to stay in hospital for at least one night after this procedure. Please see our cardiac catheterization booklet for more information on this investigation.

Remember, you will need some or perhaps all of the tests above at some stage to help you manage your condition.

The tests can all be performed with little or no risk to you. They provide important information for the people looking after you about how serious your heart failure is and give clues to the cause of the condition.

Treating heart failure

Monitoring your symptoms

Whatever your treatment plan, it is very important that you monitor your heart failure symptoms every day and take action when you notice any deterioration. Your doctors can then adjust your treatment to improve or stabilize your symptoms.

Your nurse will teach you the important symptoms to look out for. These symptoms are described in this book to help remind you. You can monitor your condition easily by taking note of everyday activities. Some helpful tips for doing this include:

Recording your weight

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Keep your weight book next to the weighing scales in the bathroom.

When you wake up each morning, after going to the toilet stand on your scales and write your weight in your booklet. You should weigh yourself at the same time of day with the same amount of clothing.

Take a look back at the earlier recordings to check if you have put on weight. Sudden weight gain (two kilograms or four pounds over two days) can be an early sign of congestion or fluid build-up and should

be reported to your nurse or doctor. Treating early congestion is usually quick and easy and prevents more serious symptoms developing.

Checking for swollen ankles

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As you are putting on your socks or tights in the morning, check your ankles as your nurse has shown you. Press your legs with your thumb. If it leaves an imprint or a hole there may be fluid. Swollen ankles may mean that fluid has built up.

Measuring your breathing

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An easy way to measure your breathing is taking note while climbing the stairs. If you can normally get to the top of the stairs without having to stop to catch your breath, use this as your measurement. If you find that you have to stop because you are gasping this may mean that there is some congestion. Remember, treating early congestion is usually quick and easy and prevents more serious symptoms developing.

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Alternatively, if you are not able to climb the stairs, you can measure your breathing while you are dressing. If you notice you have to stop and rest while you are getting dressed in the morning, this may mean that fluid is building up.

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You can also measure your breathing in bed. If you find that you have to place an extra pillow behind you at night to make your breathing easier it may be a sign that fluid is building up in your lungs.

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It is more serious if your breathing causes you to wake during the night gasping. You should always contact your nurse or doctor the next morning if this happens.

Treatments for heart failure are aimed at:

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Improving your symptoms and maintaining that improvement.

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Stabilising your heart function and preventing it from getting worse.

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Preventing heart rhythm problems.

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Helping you live longer.

To achieve these aims, effective therapy needs a good partnership between you, your family or friends and the heart failure team with the adoption of a comprehensive treatment plan specific for you.

Therapy can be divided into the following three categories:

1. Lifestyle factors.

2. Medicines.

3. The need for an operation.

Lifestyle Factors

Physical activity and heart failure

Heart failure not only affects your heart, it also affects your muscles and how the blood is pumped around your body. You may experience fatigue with cramps and tiredness in your muscles. Gradually doing more physical activity will reduce these feelings and help your body work more efficiently.

If you are exercising, you need to take it slowly at the beginning and then work up your time and speed as you feel better. These are some guidelines for you to follow:

Frequency

You should aim to do some physical activity most days of the week.

Try not to take two days off together, as it will be harder to return to

your activity on day three.

Intensity

It is important that you are able to talk at the same time as you are exercising or doing any activity. This means your body is able to cope with the activity. If you are not able to talk it means your body is not working efficiently and your heart has to work a lot harder. Of course if you are out for a stroll you will be able to talk at the same time but you will not get all of the benefits. The correct level is that you are able to talk but not able to sing. Remember that the activity will be harder if it is hot, cold or windy or going up hills. You will need to slow down your activity to cope with this.

Type

A combination of aerobic exercise and gentle weight training is best. This includes walking, swimming and cycling. It is important that you speak to your doctor about weight-training, he or she will tell you what is best for you.

Time

Ideally you should exercise for 30 minutes continuously. Start with just 5 or 10 minutes and gradually increase up to 30 minutes in about six to eight weeks. Start off slowly to allow your body to adapt to the new activity and gradually increase the pace. You should start to slow down gradually for the last 10 minutes. Avoid physical activity after heavy meals when your heart has to use energy to help your body digest food.

Points to remember

If you have heart failure, you will benefit from regular physical activity and regular rest. You should remember the following:

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Avoid sudden bursts of more intense activity.

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Try to find some physical activity you enjoy, as it will be much easier for you to do regularly. If you are not sure about what level of activity you should do, you should talk to your doctor or nurse who will advise you what level is good for you.

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Do not feel that you have to be active when you are tired.

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Avoid physical activity for 1 hour after a meal. This allows your body time to digest your food and you will benefit more from the physical activity.

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Combine rest periods during the day with periods of activity. To make sure you get a good night's rest, do not take diuretics (water tablets) at night and don't eat a heavy meal just before bedtime.

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Your doctor and nurse specialist will give you advice about the activities that are suitable for you to do.

Sexual activity

Heart failure can affect your sex life. Your desire for sexual activity may be reduced, especially during periods when you are not feeling well. Also, some of the medicines prescribed for heart failure can reduce sexual drive and cause impotence. If you experience any of these symptoms, you should discuss them with your doctor or nurse specialist. They may be able to adjust your medication or prescribe drugs, such as Viagra, to help you, if there are no contra indications.

Healthy eating

A balanced healthy eating plan is one of the important lifestyle factors for

people with heart failure.

It is important to eat a wide variety of foods and to reduce your salt intake.

You need to follow a low-salt eating plan because the more salt you eat, the more likely it is that fluid will build up in your body. Any build-up of fluid in your body will make your condition worse and make you feel unwell. Many foods have salt added to them especially processed foods and these foods may worsen your symptoms. See the Irish Heart Foundation booklet, Time to Cut Down on Salt, for more information.

The dietitian or heart failure nurse at your hospital can give healthy eating advice suitable for you.

Helpful tips for a healthy low-salt eating plan

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Choose a wide variety of foods.

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Try to follow the advice of your nurse or dietitian.

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Don't add salt while cooking.

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Don't have a salt cellar on the table.

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Flavour your food with pepper, herbs, spices, garlic or lemon juice instead of adding salt.

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Eat plenty of fruit and vegetables - aim for five or more servings every day.

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Try not to eat too many ready-meals, canned, tinned and processed foods.

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Eat oily fish (such as salmon, mackerel, trout or herrings) once or twice a week. Limit the amount of shellfish you eat, as they are high in salt and cholesterol.

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Avoid foods that are high in salt - salty meats, tinned or packet soups, salted snacks such as crisps, ketchups and processed sauces.

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Use low-fat foods as much as possible.

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Always check before using salt substitutes as they can have side effects.

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Try to use other flavourings instead.

Check labels on foods to see how much salt or sodium they contain and choose food that has less salt in it.

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Try to eat as much fresh food as possible.

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See our booklet, Time to Cut Down on Salt, for more information.

Taking your medication

Taking your medicines regularly is very important. Your doctor or nurse may give you some useful advice on how to remember to take your medication.

For example, you can

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Make an easy-to-follow schedule.

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Keep a copy of this schedule with you at all times, for example, in your wallet or handbag.

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Programme your mobile phone to remind you to take your medicines.

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Take your medication when you do other daily activities such as having breakfast - make sure you know whether to take your medicines with food, on an empty stomach or at any specific time.

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Know what each pill is, what it does, what it looks like and what you should do if you accidentally miss a dose.

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Make sure you do not take other non-prescribed medicines without telling your doctor. Some medicines can make your heart failure worse, such as anti inflammatory pain medications (for example ibuprofen) and steroids.

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If you do not feel well when your medicines are adjusted or when you start to take new medicines as part of your care plan, let your heart failure team know as soon as possible as they may need to make further changes.

Your heart failure team will prescribe one or a combination of medicines for you to take. The amount (dose) of each medicine will be changed and improved over time to best help your symptoms. Your heart failure team and GP will assess you from time to time and make changes to your medicines depending on your symptoms, how you respond to your drugs, your blood pressure and kidney function and levels of hormones in your blood.

Occasionally people don't suit a certain medication. If you think this is the case, please discuss it with your doctor. Rarely you could have an allergy to any medicine. If you get a rash after starting a medication, see your doctor. If you suddenly get wheezy or get facial or throat swelling (angioedema),

seek urgent medical attention. If you get side effects with any medication you are taking, talk to your doctor, pharmacist, or nurse. This includes any possible side effects not listed on the information leaflet that comes in the pack. You can report side effects at <http://www.hpra.ie/> . By reporting side effects you can help provide more information on the safety of your medication.

Most common medication or tablets used

Most medicines have two names. The name the company gives is called the brand name. The generic name is the name of the drug itself. Both these names are usually on the packet. Common brand names are listed here in brackets.

Diuretics (water tablets)

Common forms used: Furosemide (Lasix®, Frumil®), Bumetanide (Burinex®) and Bendroflumethiazide (Centyl®).

Why are they used?

Fluid retention (congestion) is the basis for many of the symptoms of heart failure, whether it involves your lungs making you feel breathless, your abdomen making you feel bloated or your legs causing swollen ankles.

Diuretics reduce congestion in all these areas by increasing the amount of water and salt the kidneys produce and removing this from the body as urine. These pills work very quickly and can make your symptoms better in a few hours or days. As diuretics will make you pass more urine you should take them at a time of day when you can get to the bathroom easily. Avoid taking diuretics too late at night because the need to go to the toilet will disturb your sleep. Sometimes diuretics can be given as an injection.

Are there any problems to watch out for?

The most commonly prescribed diuretics cause you to lose potassium. A low potassium level is a cause for concern in heart failure because it can make

the rhythm of your heart change. For this reason, your potassium level will be checked two or three days after you start taking diuretics. You may be told to change your diet to include more high-potassium foods, such as bananas and potatoes.

Sometimes, potassium tablets may be prescribed or diuretics may be combined with other medicines that maintain potassium levels. Frumil ® and Centyl K® are examples of diuretics that contain potassium or a substance that keeps your potassium level in balance.

Occasionally diuretics can cause gout, and if you pass urine very often, low blood pressure and dizziness may develop as a result of fluid loss.

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Angiotensin II receptor blockers

Common forms used: Candesartan (Atacand®, Blopress®), Losartan (Cozaar®), Valsartan (Diovan®), Irbesartan (Aprovel®), Eprosartan (Teveten®), Telmisartan (Micardis®), Olmesartan (Omesar®, Benetor®)

Why are they used?

These drugs are similar to ACEI medicines. They are used in people who cannot have ACEI medicines.

Are there any problems to watch out for?

One of the strengths of these tablets is that they do not have many side effects. Like ACEI medicines, some people experience dizziness when they start taking this type of medicine as a result of a drop in blood pressure. Again this problem becomes less of an issue as your body gets used to the drug.

Angiotensin receptor - neprilysin inhibitors (ARNI)

Currently the only drug available in this class is the combined pill containing Sacubitril and Valsartan (Entresto®).

Why is it used?

It is a drug for patients with symptomatic heart failure. It helps reduce the blood pressure and manage fluid retention. By doing so, it reduces the strain

on the heart. This medicine may help you live longer with an improved quality of life and fewer hospital admissions.

Are there any problems to watch out for?

Some people may experience dizziness when they start taking this medicine because of a drop in their blood pressure.

These drugs (ACE, ARB and ARNI) can also increase potassium levels and affect the kidneys so usually a blood test will be done after this medicine is started.

Beta blockers

Commonly used forms: Carvedilol (Eucardic®), Bisoprolol (Cardicor®, Emcor®, Bisopine®, Bisocor®, Emcolol®, Soprol®), Metoprolol (Betaloce®, Lopresor®, Metocor®, Metop®), Nebivolol (Nebilet®).

Why are they used?

Beta blockers are widely used to treat many heart problems including high blood pressure, angina and abnormal heart rhythms. Now studies strongly suggest that when started in very small doses and gradually increased, these medicines can improve the symptoms of heart failure and make the heart stronger in the long term. Recent medical trials have shown that people who are given beta blockers live longer. There are many beta blockers available however the ones listed above are those known to be of benefit in treating heart failure.

Are there any problems to watch out for?

Sometimes people may complain of dizziness, extreme tiredness, increased breathlessness or wheeze and, reduced energy. However, these effects can often be prevented by reducing the dose of other medicines such as diuretics. These difficulties will normally go away as your body gets used to the medicine. If not, your doctor may decide not to continue with this form of treatment.

Cardiac glycosides

Common form used: Digoxin (Lanoxin®, Lanoxin-PG®)

Why is this medicine used?

This is an old medicine, that isn't used very often now. It increases the strength of contraction of weakened heart muscle. The other role of digoxin in heart failure is when the condition is complicated by heart rhythm problems. Digoxin can prevent the heart from beating too quickly.

Are there any problems to watch out for?

Too much digoxin in your body can make you feel sick. Occasionally your doctor may take a blood sample to monitor how much digoxin is in your blood.

Nitrates and hydralazine

Common forms used - Nitrates: Isosorbide Mononitrate (Imdur®, Elantan®), Glyceryl Trinitrate (Transiderm Nitro®, Glytrin® spray, Nitrolingual® spray), Hydralazine (Apresoline®)

Why is this used?

These medicines make the blood vessels in the heart and elsewhere relax, allowing blood to be pumped more easily around the body. This medicine is known to improve heart failure symptoms. Nitrates are also effective in treating angina. Angina can be an accompanying symptom if your heart failure is caused by coronary artery disease. In these cases, nitrates may be used to treat heart failure. Nitrates can be given in tablet form or as a patch applied to your skin. They can also be taken as a spray under your tongue for immediate relief of angina symptoms.

Are there any problems to watch out for?

Nitrates can cause a headache and flushing which often goes after a few days. These problems usually get better as you continue to take the medicine.

Aldosterone antagonists

Common forms used – Spironolactone (Aldactone®), Eplerenone (Inspra®)

Why is this used?

Aldosterone antagonists block the effects of hormones that can increase heart failure symptoms. By doing this they also cause increased production of urine, and so act like a weak diuretic. This medicine is used to improve heart failure symptoms. It is used most often in people with worsening heart failure or in people who have had a recent heart attack. This medicine has proven to be very successful in managing heart failure in people with poor pumping function of the heart, much like ACEI. It is often used along with ACEI therapy or occasionally in place of ACEI if the person is intolerant of ACEI. People with heart failure can live longer as a result of this medicine.

Are there any problems to watch out for?

Aldosterone antagonists may cause an increase in the potassium level in your body. This will be monitored by a blood test after you start taking the medicine and at regular intervals afterwards. Spironolactone can cause a painful enlargement of the breasts in about 10% of patients. This is normally reversible when spironolactone is discontinued.

Sinoatrial current inhibitors

Common form used – Ivabradine (Procoralan®)

Why is it used?

Ivabradine is used to treat people who have heart failure or angina. For people with a regular heart rhythm (sinus rhythm) Ivabradine works by slowing their heart rate, enabling the heart to beat more efficiently and pump the blood all around the body, without affecting blood pressure. Lower heart rates are better for people with heart failure. Ivabradine is known to improve heart failure symptoms and recent medical trials have shown that people who are on Ivabradine have improved outcomes, they

are less likely to be hospitalised for heart failure and have an improved quality of life. It should be prescribed for symptomatic patients who have a high heart rate despite taking a beta-blocker or for those who cannot tolerate beta blockers.

Are there any problems to watch out for?

Your doctor will monitor your heart rate when you start this medicine or if the dose is increased, because in a small number of people Ivabradine may lower the heart rate too far. Some people taking Ivabradine may experience mild vision problems - brief moments of increased brightness. If this occurs the effect will typically resolve itself during treatment or when treatment with Ivabradine is stopped.

Blood thinners (antiplatelet and anticoagulant medicines)

Common forms – Aspirin (Nuseals Aspirin®), Clopidogrel (Plavix®) and Prasgruel (Effient®) are antiplatelet drugs. Warfarin (Warfant®) and Dabigatran (Pradaxa®) are anticoagulant medicines. Rivaroxaban (Xarelto®), Apixaban (Eliquis®), Edoxaban (Lixiana®) are drugs that may be used, usually to reduce the risk of clots if you have an irregular heart rate (atrial fibrillation).

Why are they used?

Antiplatelet drugs reduce platelet stickiness and are mainly used in patients with narrowing in the coronary arteries, after heart attacks and/ or after stenting. Anticoagulants thin the blood in a different way and are used to reduce the risk of clots developing if you have an irregular heart rate (atrial fibrillation) or sometimes if there has been a clot to the lung or legs.

Warfarin is also used if you have a metal valve replacement.

Some patients with heart failure have an increased risk of blood clots or stroke. If your heart failure team think you are at increased risk (for example if you have already had a stroke or if you have an irregular heartbeat), they

may recommend blood thinners. Some people will have had a heart attack or had coronary stents. The exact kind of blood thinner used will vary according to your condition.

Are there any problems to watch out for?

Bleeding

If you have serious bleeding (particularly internal) you should seek urgent medical attention. If you get a nosebleed or a minor cut, the bleeding should stop when you put pressure on it. Do not stop taking your blood thinners, or any medicine, without talking to your doctor.

Vaccinations

People with heart failure are more prone to getting chest infections, including the flu. You are also more likely to get very sick with the flu than people without heart failure. It is essential that you get the flu vaccine every year (a new one comes out each autumn). You should also get a vaccine against pneumonia at least once in your lifetime. This is called the pneumococcal vaccine. If you are under 65 years old or have other medical conditions, you may need to get the vaccine more than once during your life.

You may be taking medicines that are not listed above. As always, you should ask your doctor or pharmacist for information on these and all your medicines. Remember, never hesitate to ask questions.

Will I need to have an operation?

Coronary artery by-pass surgery and angioplasty

Both of these procedures are used to manage narrowed or blocked blood vessels around your heart caused by coronary artery disease. This disease is the most common cause of heart failure. Your doctor may recommend either of these procedures, if tests such as exercise stress testing and an angiogram (cardiac catheterization) show that you would benefit from having your blood supply restored.

Valve surgery

If one of your heart valves is seriously narrowed or leaking (or both), replacing the damaged valve may improve your heart failure. Newer, less invasive ways of treating heart failure are being developed for patients with valve disease. Feel free to ask your heart failure team about these and if you may be suitable.

Heart transplant

If you are not responding to medication or other treatments, your doctor may consider that you need a heart transplant.

Other treatments

Cardiac device therapies

These are metal devices (boxes) which are placed under your skin, with one or more wires leading to your heart. These devices include pacemakers, to treat slow heart beats and, implantable cardioverter defibrillators (ICDs), to monitor and treat dangerously fast heart beats. A special type of pacemaker, called a bi-ventricular pacemaker, can improve the pumping function of your heart.

Intra-aortic balloon pump

This is a plastic balloon which is put into your heart's main blood vessel, the aorta, through a very small puncture in your leg. The balloon is inflated by an external pump and helps your heart to deliver blood around the body. It is inserted in hospital and you must stay in bed while it is in. It is used to help heart failure patients while they are waiting for more effective treatments.

Ventricular assist devices

These are pumps that are put inside the body. They are designed for people with very weak hearts who are waiting for a heart transplant. Patients can get up and walk around and take exercise after they are implanted. Very few patients undergo insertion of these devices.

Research Developments

There are promising developments on the horizon for managing heart failure. Your doctor may ask you to think about taking part in a research study. Do not feel that you have to take part. However it is through patient research that more effective treatment strategies are developed, such as the ones you are now receiving.

What if I am not getting better?

Heart failure generally responds very well to a combination of lifestyle changes and medicines. Some people may need operations or pacemakers or similar devices.

Despite this, some people may not get better and their heart failure worsens.

Though rare, it is important to understand that the progression of heart failure can be unpredictable, and varies from person to person. Many people when diagnosed with heart failure will choose to make a will.

Some people, towards the end of their disease, need palliative care and may wish to let their families know in advance what they would like to be done if they become very ill and no longer respond to any treatment. More information on this topic can be found online at www.heartfailurematters.org

An explanation of medical terms used in this booklet:

Angina

Angina is chest pain or chest discomfort. It happens when not enough oxygen-rich blood gets to your heart muscle.

Angiogram

This is another name for cardiac catheterization. An angiogram is a test using dye and x-ray to see if you have any problems in your arteries, valves or the chambers of your heart.

Angioplasty

Angioplasty is a treatment to unblock your arteries and increase the blood flow to your heart muscle. A small device like a balloon is put into your artery and inflated to flatten the blockage against your artery wall.

Arrhythmia

Arrhythmia is an irregular heart rhythm.

Blood pressure

Blood pressure shows the amount of work that your heart has to do to pump blood around the body. The two numbers in your reading shows the level of your blood pressure. One number records blood pressure when the pressure is at its highest as the heart muscle squeezes out the blood from the heart - this is called systolic pressure. Then the heart relaxes, which allows the blood to flow back into the heart - this is called diastolic pressure. The normal level of blood pressure is usually about 120 (systolic) over 80 (diastolic). If you have been told that your blood pressure is higher than 140 over 90, you should discuss this with your family doctor.

BNP blood test

A B-Type natriuretic peptide (BNP) is a substance that your body produces when your heart is under a certain type of stress such as that caused by fluid retention due to heart failure. The higher the BNP reading, the more fluid a person is retaining

Chronic disease

A health problem that is persistent and long-lasting.

Congestion

A build-up of fluid in your lungs and other organs.

Coronary artery by-pass surgery

A healthy artery or vein is connected to a blocked coronary artery. It creates a new channel for blood to flow through, by-passing the blockage.

Coronary artery disease

Heart problems caused by narrowed arteries. When arteries are narrowed, less blood and oxygen reaches your heart muscle.

Electrocardiogram (ECG)

An ECG test measures the rhythm and electrical activity of your heart. Small sticky pads are put on your body connected to wires that link up to the ECG machine. The machine reads and records the electrical signals from your heart.

Gout

Gout is a form of arthritis caused by a build-up of uric acid in your blood that leads to joint inflammation. Some diuretic medicines can increase the amount of uric acid in the blood.

Heart attack (Myocardial infarction - MI)

Heart attack is when blood cannot get to part of your heart muscle and the muscle dies or is permanently damaged.

Heart valves

Heart valves control how blood flows between the different chambers of your heart.

Paroxysmal nocturnal dyspnoea (PND)

Severe breathing difficulties experienced while you are sleeping or lying down. If this happens, you should go to hospital or see a doctor as soon as possible.

Palpitations

A feeling that your heart is beating very fast in your chest.

Stent

A stent is a piece of wire mesh used to keep open part of your coronary artery. Some stents release medicine into your bloodstream to prevent clots forming on the stent. These are called drug-eluting stents

How does your heart work?

Your heart is a muscular pump that pushes blood around your body through your blood vessels. The blood provides your body with the oxygen and nutrients it needs.

Your heart has an electrical system, which sends electrical signals telling the heart when to pump (or beat). This pumping action pushes blood from the right side of your heart out to the lungs where it collects oxygen. The blood then returns to the left side of the heart and is pushed out to be carried around the rest of your body by the blood vessels. Valves between the chambers of your heart keep the blood flowing in the right direction.

To work properly, your heart (just like any other muscle in your body) needs a good blood supply. The heart is supplied with blood from the coronary arteries. The main coronary arteries branch off from the aorta (the large artery that takes blood from the heart to the body). The main arteries then divide into smaller branches that take blood to all parts of the heart muscle.

What is a heart attack?

A heart attack (also known as a myocardial infarction) happens when one of the coronary arteries becomes blocked and the blood supply to part of your heart is interrupted. If the blood supply is not restored quickly, the heart muscle can become damaged.

Aorta

Circumflex

artery

Left

coronary

artery

Right

coronary

artery

Why does the artery become blocked?

The arteries become blocked as the result of a disease process that has usually been going on for some time – coronary heart disease or CHD (sometimes also called coronary artery disease or ischaemic heart disease).

Coronary heart disease is a condition in which there is a build up of a fatty substance in the coronary arteries. This fatty substance is called plaque or atheroma. As the plaque grows, the artery narrows and blood flow is reduced. This process is known as atherosclerosis.

Sometimes the narrowed section becomes damaged or inflamed and the plaque can tear or break. If this happens, your blood cells rush to try to repair the damage by forming a blood clot. Usually this heals the damage, but sometimes the blood clot grows too large and it blocks the artery.

As a result of this blockage, less blood (and therefore oxygen) reaches the heart muscle, and the part of the heart muscle affected becomes damaged.

The size and location of the blood clot will determine which part of the heart muscle is affected

So, as you can see, in most cases a heart attack is caused by coronary heart disease (a disease of the blood vessels), not because there is a problem with your heart, or because your heart is 'worn out'.

Whilst coronary heart disease is the most common cause of a heart attack, other disease processes can cause the supply of blood to the heart to be reduced or blocked

Examples of these more unusual causes include:

- Coronary artery spasm: a severe spasm (tightening) of a coronary artery cuts off blood flow to the heart.
- Spontaneous coronary artery dissection (SCAD): a tear or a bruise develops in one of the coronary arteries resulting in a blockage that prevents normal blood flow. It is the leading cause of heart attacks for women under 50.

Many of the treatments and advice contained in this booklet will still be relevant in these situations, but for more specific information and advice contact the CHSS Advice Line nurses.

What causes atherosclerosis and coronary heart disease?

Everybody is at some risk of developing the small fatty plaques described earlier. However, there are some factors have been shown to increase your risk of developing atherosclerosis.

These are called cardiovascular risk factors.

Some of these risk factors cannot be changed.

These include:

- A strong family history of CHD or stroke that occurred:
 - In your father or brother aged below 55 or
 - In your mother or sister aged below 65
- Your age (risk increases with age)
- Your sex (men are more at risk than women)
- Your ethnic group: certain ethnic groups, such as British Asians, have a higher risk of heart disease and stroke

There are some medical risk factors that, with the help of healthcare professionals, can be identified and managed to reduce your risk of coronary heart disease. These include:

- High blood pressure
- High levels of cholesterol in your blood
- Diabetes

Other risk factors are to do with lifestyle. With the right help and support, you can make changes to reduce your risk of coronary heart disease. Modifiable risk factors include:

- Smoking
- Being physically inactive
- Being overweight
- Poor diet
- Drinking more alcohol than the recommended amount
- Stress

What are the symptoms of a heart attack?

Symptoms will differ from person to person. Common symptoms of a heart attack include:

- Chest pain or tightness that doesn't go away
- Pain in your neck, jaw or back and down your left arm or down both arms
- Sweating
- Feeling sick or faint (light-headed)
- Feeling short of breath

How do the healthcare professionals know if

I've had a heart attack?

You should be given an electrocardiogram (ECG) as soon as possible to find out whether you are having a heart attack. This

may be done initially by the ambulance crew.

An ECG is a painless test that records the rhythm and electrical activity of your heart. Sticky patches called electrodes will be placed on your body and connected to a recording machine.

Particular electrical patterns are associated with a heart attack. However, it is possible to have a normal ECG even if you have had a heart attack.

When you arrive at the hospital the doctor or nurse will take blood for tests.

The main blood test that can help the doctors know if you have had a heart attack is to measure the amount of troponin in your blood. Troponin is a protein found in your heart muscle. When your heart muscle is damaged, for example during a heart attack, troponin leaks into your blood. The level of troponin in your blood is increased if you have had a heart attack.

Acute coronary syndrome

Acute coronary syndrome (ACS) covers a range of conditions, including heart attack and unstable angina, caused by a sudden reduction in blood flow to part of your heart muscle. The type of ACS is determined by the location of the reduced blood flow, the amount of time that blood flow is reduced for and the amount of damage to the heart muscle.

There are two different types of heart attack, based on what is seen on your ECG. These are called:

- ST-elevation myocardial infarction (STEMI) — the artery supplying an area of the heart muscle is completely blocked and the whole thickness of the heart muscle is affected.

Non-ST-elevation myocardial infarction (NSTEMI) — the artery is only partly blocked, so only part of the heart muscle supplied by the affected artery is affected.

In unstable angina the artery is also only partly blocked, but to a lesser extent than NSTEMI. The heart muscle is not damaged and there will be no increase in troponin levels.

The type of heart attack you have (STEMI or NSTEMI) will affect what treatment you get.

How is a heart attack treated in hospital?

Early treatment of a heart attack is important to get the blood flowing to the affected part of the heart again and limit the amount of damage to your heart muscle.

The main aim of emergency treatment is to restore blood flow through the blocked artery and to your heart muscle as quickly as possible. The quicker the blood flow is restored, the less heart muscle will be damaged.

The treatment you receive will depend on:

- What type of heart attack you have had (a STEMI or an NSTEMI)
- How stable your condition is
- How far it is to the hospital and what facilities are available

There are two treatments that can be used to restore blood flow through the blocked artery:

Primary (or emergency) angioplasty. This is the preferred treatment for most people who have had a STEMI, but only if it can be given soon after your symptoms start.

Not every hospital has the facilities to carry out primary angioplasty, so the ambulance may take you to a hospital

outside your area.

Thrombolysis. If it is not possible for you to receive primary angioplasty within 2 hours of your diagnosis, you should receive a clot-busting medicine (unless this is not suitable for you because of other health conditions). This is known as thrombolysis, and it helps to dissolve any blood clots that may be blocking your arteries. If you have thrombolysis, you may still need angioplasty at a later date to unblock the narrowed artery.

What other treatments might I receive?

Within the first 12 hours of your heart attack, you may also be given some or all of the following treatments:

Aspirin: You should be given a dose of aspirin as soon as a heart attack is suspected. Aspirin is an 'antiplatelet' medicine, which helps to stop the blood clotting.

An additional antiplatelet medicine (clopidogrel, prasugrel or ticagrelor): If you have had a heart attack you may also be given a second antiplatelet medicine.

Injection of an anticoagulant: Depending on whether you have had angioplasty and when you were admitted to hospital, you may be given injections of heparin (an anticoagulant) for a few days to help prevent further blood clots forming.

A beta-blocker (atenolol, bisoprolol, metoprolol, propranolol): If you have had a heart attack you should be offered a beta-blocker (unless this is not suitable for you).

Beta-blockers help protect the heart muscle and prevent abnormal heart rhythms from developing.

Pain relief: You may be given a strong painkiller, such as

morphine.

Insulin: Some people have a raised blood sugar level during a heart attack, even if they do not have diabetes. If this happens, you might need to be treated with an injection of insulin to control your blood sugar levels.

Find out more about your medicines on page 55 of this booklet.

Where should I be treated?

The first 24-48 hours after a heart attack is when your condition will be most unstable. During this time, your heart rhythm should be monitored to check whether there are any problems with the way your heart is beating. You should be cared for in an area that specialises in treating heart conditions. This might be in a coronary care unit (CCU) or on a medical admission unit. You should be cared for by healthcare professionals who have specialised in treating people with heart conditions.

Other conditions that can develop as a result of a heart attack include:

Heart failure: A heart attack may damage so much heart muscle that the remaining muscle can't adequately pump blood around your body. This is known as heart failure. Heart failure after a heart attack may be temporary, or it can be a long-term condition, depending on the damage to your heart.

Arrhythmias: Damaged heart muscle can disrupt the heart's electrical signals. This can result in abnormal heart rhythms (arrhythmias).

Heart valve disease: Heart valves may be damaged during a heart attack, putting an extra strain on your heart.

How long will I have to stay in hospital?

Depending on the severity of your heart attack, the treatment you have received and your home situation, you will usually be in hospital for 3 to 5 days.

What information should I receive when I leave hospital?

Before you leave the hospital, you should receive:

- Information about cardiac rehabilitation (cardiac rehab), and an idea of when you should expect to be contacted by your cardiac rehab team.
- A discharge letter to give to your GP with details of your diagnosis, treatment and the medicines you will need to take.
- Details of any follow-up appointments with the cardiac team and, if appropriate, a telephone helpline card.
- Advice about practical issues such as how much physical activity you should be doing, resuming sexual activity, driving and returning to work.
- A supply of medicines. The doctor or nurse should make sure that you understand when to take each of these.
- Instructions about what to do if you have any more chest pain.
- Details of where you can get more information and support.

What follow-up should I receive?

Cardiac rehabilitation

You should hear from your cardiac rehab team shortly after you leave the hospital. If you haven't heard anything after 2-3 weeks, check with your GP or practice nurse.

Your cardiac rehab team will be in regular contact with you for the initial stages after you leave hospital. As well as supporting you through this rehabilitation period, they will be able to answer any questions or concerns that you might have.

Specialist / hospital cardiac team

When you leave hospital you should also receive a follow-up appointment with a member of the hospital cardiac team.

This will usually be a few months after your cardiac event.

GP / practice nurse

Because you have had a heart attack and are on regular medicines your GP or practice nurse will want to review you regularly. Each practice will have its own systems for follow up. They will check any risk factors you might have (such as blood pressure) and may need to take blood tests to monitor the medicines that you are taking.

This is a great opportunity to discuss any concerns you may have. But don't save any concerns up – if you have any worries, make an appointment to see your GP, contact your cardiac rehab team or call the CHSS Advice Line nurses.

You will probably be glad to get back home after being in hospital.

However, you may also feel anxious about leaving the 'safe' environment of the hospital and the support you got there. If you can, try to have someone with you at home for the first few days or weeks, depending on how you feel.

The first few days and weeks at home

When you first get home, try to take things easy and just do the same amount of moving around as you did in hospital. For the first week or so:

Get up and dressed each day Drive a car

Walk around the house

Do any gardening

Walk up and down the
stairs a few times a day

Play sport

Carry out light activities such
as making a drink or a snack

Do housework such as Hoovering
or making beds

Take a gentle stroll around
the garden

Lift, push or drag heavy objects

Have a few visitors

Stand for long periods of time

Get plenty of rest

You will probably find that you get tired quickly in the first few weeks. This is normal and will usually pass as you get better.

About 10 days after a heart attack most people will be ready to start doing some gentle physical activity. The key is to start slowly and gradually build up the amount you can do. How quickly you are able to do this will depend on the condition of your heart and on how active you were before your heart attack.

Walking is a great way to start getting physically active after a heart attack. You can go at your own pace, you don't need any special equipment, you can walk on your own or with others, and best of all it is free!

- On your first day out walking, just walk between 50-100 metres.

- If this feels okay then the next day you can go a little further.

Gradually you will be able to do a little more and be more energetic.

- Gradually increase the distance you walk, and then start to increase your speed

- Don't push yourself too hard – you should be able to hold a conversation whilst you are walking without being out of breath.

- If possible walk where there are other people around, or near a bus route, in case you get tired.

- If you have chest pain or become too breathless to talk whilst you are walking, then stop. Rest for a few minutes and then start again if you feel better, but go more slowly.

The following table shows a suggested walking programme to increase the amount you walk week-by-week, based on distance and time. However, everyone will be different and progress at different rates. Be aware of how you feel, and only work to the suggested times if you feel comfortable.

The weeks refer to the date you begin (usually about 10 days after your heart attack) to show how you are progressing.

Week 1*

200m

In approx 5 mins

Week 2

400 – 500m

In approx 10 mins

Week 3

500 – 750m

In approx 15 mins

Week 4

750 – 1250m

In approx 20 mins

Week 5

1250 – 1750m

In approx 25 – 30 mins

Week 6

1750 – 3000m

In approx 30 – 40 mins

Some people find it helpful to keep a daily diary of their home exercises and daily activities. This will allow you and your doctor or nurse to see your progress. It can also help to rebuild your confidence.

Common questions asked after a heart attack

You may have a number of unanswered questions when you first get home. In this section we will try to answer some of those questions.

“Will it happen again?”

Many people worry that they will have another heart attack.

Having one heart attack does increase the risk of having another, but you can dramatically reduce this risk by following a healthy lifestyle and taking the right medicines.

As you recover from your heart attack, it is a good time to think about your lifestyle and about the things you can change to reduce the risk of having another one. It is never too late to reduce your risk of another heart attack and there is plenty of support available to help you make any necessary changes.

Many people go on to live life better than before their heart attack because they make healthier choices.

“Will too much activity bring on another heart attack?”

It is natural to be afraid of doing too much in case it brings on another heart attack but being active will help your heart to become stronger and improve your recovery. Remember to start slowly and gradually build up the amount of physical activity you do. It’s OK to be a little bit short of breath, but not so breathless that you can’t talk.

“What should I do if I get chest pain?”

Because you have coronary heart disease, you may get chest discomfort from time to time. This could be angina, which you can manage at home with a GTN spray (if you have one) or it could just be part of the normal healing process.

However, it could also be a symptom of another heart attack.

Try not to worry about every twinge in your chest, but if you get chest pain or discomfort that does not go away when you rest, then use your GTN tablets or spray as instructed by your doctor.

The following is an example of how to use your GTN:

- Stop what you are doing, sit down and try to relax
- Use your GTN spray (1-2 puffs under your tongue)
- If the pain goes away within 5 minutes, continue what you were doing at a slower pace
- If the pain does not go away within 5 minutes, use another dose of GTN spray
- If the pain continues after a further 5 minutes (that is 10 minutes since the onset of your pain), phone 999

for an ambulance

If your pain is unbearable, gets worse or you develop other symptoms (such as breathlessness, sweating, palpitations or nausea) do not wait for 10 minutes – phone 999 for an ambulance straight away.

“When will I feel fully recovered?”

There is no ‘normal’ time for recovery from a heart attack. Some people feel fully recovered within weeks, while for others recovery can take several months. Week by week you will be getting stronger. Try not to worry if you have any setbacks. Just think about the progress you have been making and don’t rush your recovery.

Cardiac rehabilitation

Cardiac rehabilitation (or cardiac rehab) is about getting the help and support you need to help you get yourself back to as full a life as possible after an event such as a heart attack, heart surgery or other cardiac procedure. It’s about supporting you to live with your heart condition, to stay as healthy as possible, and to reduce the chance of you having another heart event.

When you leave the hospital after your heart attack, you will usually be referred to the local cardiac rehab team.

The cardiac rehab team may include a wide range of healthcare professionals, such as cardiac rehab nurses and physiotherapists.

You should be invited to a cardiac rehab assessment shortly after you leave the hospital. This will allow you to discuss what matters to you in terms of your recovery and how the cardiac rehab team can support you with this.

If you have not been invited for an assessment within 2-3 weeks of leaving hospital, check with your GP, practice nurse or hospital doctor.

Your assessment will be with a member of the cardiac rehab team. They will discuss a number of issues with you, including:

- What you understand about what happened and how you have been feeling since your heart event
- Any other health conditions you have
- Risk factors such as what your diet is like and whether you smoke
- The medication that you are taking and if you are having any problems with your medicines.

They may take some measurements too, including your weight, height and waist measurement and your blood pressure.

Using this information, the cardiac rehab team will work with you to develop an individual care plan based on your needs.

This will often include referral to a cardiac rehab programme. Cardiac rehab programmes can vary throughout Scotland but they will usually cover the following:

- Exercise. This will mostly be ‘aerobic’ exercises to improve your muscles, heart and circulation and to help you gain confidence. Aerobic exercises are exercises such as walking and cycling that increase your heart rate and get you breathing faster.
- Education. This may cover areas such as how the heart works, risk factors for CHD, treatments for heart conditions, healthy lifestyles, practical issues such as driving

or returning to work, and what to do if you feel unwell.

- Relaxation. You may be taught relaxation techniques and how to manage stress.
- Emotional support. During your cardiac rehab your emotional and mental health will be assessed regularly to make sure that you are getting the support you need. If you and the cardiac rehab team think it is appropriate you may be referred for psychological support to help with stress management, anxiety or depression.

Programmes usually run for about 6 weeks. Sessions take place once or twice a week and last between one and a half and two hours each time. These programmes are usually run in the hospital or at a community or leisure centre

Returning to everyday life

Going back to work

You should usually expect to be able to return to work 4-6 weeks after your heart attack. Exactly when and how you return to work will depend on what your job is and how well you are recovering. A member of your cardiac rehab team or your GP can support you to decide when to go back to work and plan this with you. For some people, a gradual return to work may be better. If you need to, discuss with your employer about starting on reduced hours or part-time and gradually increase your hours. Or you might need to look at doing something that is less physical or less stressful.

Driving

If you drive a car or motorbike, you don't have to tell the Driver and Vehicle Licensing Agency (DVLA) if you have had a

heart attack, but the DVLA recommends that you stop driving for at least 4 weeks after a heart attack. Your GP or a member of your cardiac rehab team can guide you about when you can start driving again.

If you have a specialist licence (such as large goods vehicles or passenger-carrying vehicles) you must tell the DVLA if you have had a heart attack. You will need to stop driving for at least 6 weeks and will have to pass a basic health and fitness test before you can start driving again.

Whatever type of driving licence you have, it is important to tell your insurance company that you have a heart condition and let them know what type of treatment you have had. If you don't, your insurance might not be valid.

Insurance

Finding adequate insurance after a heart attack can be difficult. However, there are insurance companies available who specialise in providing insurance for people with long-term conditions.

Resuming sexual activity

Whether you are recovering from a heart attack or heart surgery, you can usually resume sexual activity as soon as you feel well enough. For most people this will be after 4-6 weeks. Some people are, understandably, nervous about resuming sexual activity, thinking that it might cause another cardiac event. However, there is no evidence that this is the case. If you are able to walk 300 yards or climb 2 flights of stairs without getting breathless or feeling chest pain then it is safe to resume sexual activity. If you have any concerns at all,

Speak to your GP or a member of your cardiac rehab team.

Men and women can have a loss of sex drive or sexual dysfunction after a heart attack. Some men may find that they are unable to get or maintain an erection. This can be because of emotional stress associated with having a heart attack or it can be a side effect of some medications. If you are having difficulties, do not stop taking your medication, but speak to your pharmacist or your GP as he or she may be able to recommend a change of medication.

Holidays and flying

There is no reason why you shouldn't travel after a heart attack, once you feel fit enough.

If you are thinking of going a long way or for a long time, speak to your GP and insurance company before organising anything.

If you are thinking of flying, check with the airline whether you need to tell them about your heart condition. Guidelines on flying will vary between airlines – most airlines will allow you to travel 10 days after a heart attack. Give yourself plenty of time to get to the airport before your flight to avoid rushing and additional stress.

Remember:

- Check that your travel insurance covers your holiday.
 - Take enough medication with you to last for the whole time you will be away.
 - Get advice if you are going to miss any hospital appointments whilst you are away
- coming to terms with having a heart attack

After an event such as a heart attack, it is quite normal to experience a range of emotions. Some people feel shocked by the experience or worried that it will happen again, whilst others feel relieved to have survived and use the experience as a 'wake-up call' to re-focus on what matters to them.

Identifying and understanding your reactions is the first step in coming to terms with what has happened.

Some things that you can do to help you cope with your feelings include:

- Talking about what has happened and how you feel. This can help you to make sense of the way you are feeling, and realise that your reactions are very normal.
- Finding ways to relax. Maybe try some relaxation and breathing techniques, join a yoga or Tai Chi class, do some gentle gardening, read a book – whatever helps you to relax.
- Joining a support group to find out how other people have coped after a heart event.

Feeling low for some of the time is a natural reaction as you start to accept, and adapt to, what has happened. You will probably find that you have good days and bad days – this is quite normal.

However, if you are feeling low for most of the time or you don't feel able to cope, speak to your GP or cardiac rehab team about getting help.

Up to 1 in every 4 people who have a heart event experience some degree of anxiety and depression – you are not alone!

What can close family members do to help?

Remember that those close to you may also be feeling emotions such as fear, sadness, guilt or anger.

- It can be difficult for loved ones to find a balance between wrapping you up in cotton wool and encouraging you to do too much.
- You might find it annoying when people keep asking “how are you” or “are you ok”.
- You might feel hurt if they don’t ask how you are!
- You may be irritated by people trying to do too much for you.
- Many people don’t look ill after a heart attack. In this case, people might not realise the extent of what you have been through.

It is important to keep the channels of communication open – talk about what has happened and how you feel. Tell people how you would like them to behave towards you, and discuss ways that they can help you; for example reminding you to take your tablets or encouraging you to make healthy changes.

One of the hardest things after a heart attack can be talking to young children or grand children about what has happened, and helping them adjust.

One of the main things that is likely to change when you are recovering from a heart attack or have a heart condition is that you may not be able to be as active with your children as you are both used to. Try to find ways of spending quiet time with them instead; for example, reading with them. Use all the help that you have available to you: use a pushchair

instead of carrying young children or ask someone else to pick them up and pass them to you if you find lifting difficult.

It can also be difficult for older children to come to terms with the changes. While they might be able to understand what has happened, it can still be difficult for them if you can't keep up with their level of activity.

- Get help from other people – ask them to come and take over when you need a break. It's important not to exhaust yourself, even if you feel up to it.
- Working out ways to help involve them in your health (like reminding you to take your medication or helping you with the shopping) can help you all adjust together.

PREVENTING ANOTHER HEART ATTACK

As you read earlier, there are certain risk factors that make coronary heart disease more likely. There are some risk factors that can't be changed, such as your age and whether other people in your family have heart disease. However, there are a lot of other things you can do that will significantly reduce your risk of having another heart attack. These include:

Stopping smoking

Keeping active

Eating a healthy, balanced diet

Maintaining a healthy weight and body shape

Limiting the amount of alcohol you drink

Controlling your cholesterol and blood pressure levels

If you have diabetes, making sure your blood sugar levels are controlled

Learning ways to manage stress

Taking any medication as prescribed

Stop smoking

If you are a smoker, quitting smoking is one of the most important things you can do to reduce your risk of having another heart attack.

Smoking increases the risk of blood clots forming, which can increase the likelihood of stents or arteries blocking. Smoking also reduces the amount of oxygen to your heart, meaning that your heart has to work harder and receives less oxygen.

Keep active

Physical activity is an important part of your recovery after a heart attack. Regular exercise will help to:

- Prevent further coronary heart disease
- Reduce stress
- Reduce your blood pressure
- Lower your cholesterol
- Help you to maintain a healthy weight

The best type of exercise for your heart is exercise that gets your heart and lungs working, such as walking, cycling, swimming or dancing. This is often referred to as exercise.

This type of aerobic exercise will help to strengthen your heart, improve your circulation and lower your blood pressure.

You may be given an exercise plan as part of your cardiac rehab programme. This should increase your fitness and give

you confidence. When the programme has finished, it is really important that you continue to exercise regularly.

- Your cardiac rehab team may be able to refer you to an exercise class.
- Some leisure centres or gyms run classes for people with heart conditions and have specially trained instructors who can help you.
- Some heart support groups include exercise sessions, or you may prefer to exercise on your own or with a friend.

Try to be active every day to stay healthy. Find something that suits you and that you can fit into your lifestyle.

Remember to start gradually and slowly build up the amount of activity you do. If you can, aim to build up to doing 150 minutes (2 and a half hours) of moderate-intensity activity over the course of a week. (Moderate-intensity activity means being slightly breathless but still able to hold a conversation.)

This can be broken down in to manageable amounts of time to suit you. Just ten minutes at a time on a regular basis can provide physical and health benefits.

Also include muscle strengthening activity at least two days a week to keep your muscles, bones and joints strong. Ask your cardiac rehab team how to do this safely.

Sit less and move more. Try to reduce the amount of time you spend sitting; for example, by reducing time spent watching TV or using a computer. Or break up the time spent sitting down by standing up and walking every so often; perhaps you could stand up and walk around during the advert breaks on TV.

Is there any activity I shouldn't do?

At this stage of your recovery, it is best to avoid strenuous activity such as:

- Lifting or pushing heavy weights such as a fully loaded wheelbarrow
- Straining with all your strength, as in pushing a car
- Exercising until you are too breathless to talk
- Making short, heavy, sharp efforts like digging or shovelling snow

Check with your GP or cardiac rehab team before you start playing any sport again.

Eat a healthy balanced diet

Eating a healthy, balanced diet can protect your heart and help to reduce your risk of having another heart attack. Making changes to your diet, such as having less salt and choosing the right types of fat, can help to control high blood pressure and high cholesterol, which are risk factors for heart disease.

Try to:

- Eat at least 5 portions of fruit and vegetables each day.
- Eat more beans and pulses and less red or processed meat.
- Fill up on fibre — choose wholegrain or higher fibre foods.
- Eat 2 portions of fish a week, one of which should be an oily fish such as salmon or mackerel.
- Reduce your fat intake, especially saturated fats. Choose healthier oils, such as rapeseed, sunflower or olive oil.
- Eat less sugar.
- Limit your salt intake.
- Keep well hydrated — try to drink at least 6-8 glasses of

non-alcoholic fluid a day (water, milk, sugar-free drinks, tea and coffee count). If you have a heart condition, you may need to limit your fluid intake; if you have been told to limit or restrict your fluids then continue to do so.

Maintain a healthy weight and body shape

Being overweight increases the work the heart has to do, causes high blood pressure, and can lead to abnormal levels of fat in the blood. Losing weight and maintaining a healthy weight can help to lower cholesterol and reduce blood pressure.

Try to keep as close as you can to your ideal weight, this is best achieved by controlling your weight through a balance of eating healthily and keeping as active as you can.

Your shape can also affect your health risk. Fat around your middle (known as central adiposity) can increase your risk of heart disease or developing other long-term health problems. You can work out if you're at an increased risk simply by measuring your waist.

If necessary, your cardiac rehab team will be able to refer you to a weight-loss programme.

Limit the amount of alcohol you drink

It is important to limit your alcohol intake because regularly drinking large amounts of alcohol can:

- Increase your blood pressure
- Increase your cholesterol levels
- Make you gain weight (alcohol is high in calories)

There is no safe level of alcohol to drink. However, if you do choose to drink alcohol you can keep your risk low by

drinking within the recommended limits:

- Men and women should not regularly drink more than 14 units per week
- If you do choose to drink 14 units in a week, don't save it all up to drink in one session.
- Spread it over 3 days or more, and have at least 2 alcohol-free days each week.
- Avoid binge drinking (drinking large amounts over a short period of time). Binge drinking is particularly harmful and can increase your risk of a heart attack or stroke.

Managing your cholesterol and blood pressure levels

If you have coronary heart disease you will probably be offered a medicine called a 'statin' even if you don't have a high cholesterol level. Statins (such as atorvastatin, simvastatin or pravastatin) will help to reduce the level of 'bad' cholesterol in your blood and reduce your risk of having another heart attack.

Some people experience side effects such as muscle pain or weakness when they are taking a statin. If you think you have any side effects from your medicines, speak with your pharmacist or GP. It may be possible to reduce the dose or try an alternative.

If you have high blood pressure, you may need to take medication to reduce it. Your GP or nurse should discuss your target blood pressure with you, and monitor your blood pressure regularly to help you get as close as possible to your target. Your individual target will depend on other

risk factors that you might have.

Managing diabetes

Having diabetes increases your risk of developing coronary heart disease. This is because:

- Uncontrolled blood glucose levels can cause damage to the blood vessels, allowing fatty deposits to build up and cause narrowing of the arteries.
- People who have Type 2 diabetes often have low HDL ('good') cholesterol levels and raised triglyceride (a type of fat) levels in their blood, both of which are risk factors for heart disease.
- People with Type 2 diabetes are also more likely to have high blood pressure.
- People with Type 2 diabetes tend to be overweight.

By controlling the levels of glucose in your blood, you can help to reduce this risk.

Managing stress

Stress does not directly cause a heart attack, but if it is severe and goes on for a long time it can affect your health. If you are unable to deal with stress it can increase anxiety, disturb your sleep and become a trigger for unhelpful behaviours such as smoking, drinking too much alcohol, eating poorly and not getting enough physical activity. These behaviours can limit your recovery and increase your risk of another heart attack or further heart disease.

There are lots of ways to help you manage your stress or anxiety. For example, you may find it helpful to learn relaxation or meditation techniques, breathing control

exercises or activities such as yoga. If you are concerned about coping with stress or anxiety, talk to your GP or a member of your cardiac rehab team. They will be able to help you decide how best to manage it.

Take medication as prescribed

There are a number of medicines that you may need to take if you have had a heart attack. The purpose of these medicines is to:

- Protect your heart and reduce your chances of having another heart attack
- Reduce risk factors such as high cholesterol and high blood pressure
- Relieve angina
- Strengthen your heart and prevent heart failure
- Help your heart muscle recover

These medicines form an important part of your treatment.

As such, it is important that you know what medicines you have been prescribed and how to take them, and you understand what they do and what side effects to look out for.

You may be taking several different medicines following a heart attack. For many people this is quite a change; however, it is important that you take these medicines as you have been instructed and do not stop taking them suddenly. If you think you may have a side effect from any of your medicines, go and see your GP or speak to your cardiac rehab team.

It can be helpful to keep an up-to-date list of the medicines you take, including when and how you need to take them.

For more information about the medicines that you may have been prescribed after your heart attack, see page 56 of this

booklet.

Goal setting

Setting goals, or having an idea of what you would like to achieve, will increase your chance of successfully achieving a healthier lifestyle. Talk to your cardiac rehab team about setting yourself achievable goals.

Tips for setting achievable goals:

- Choose just one thing to change at a time.
- Be specific. Instead of saying ‘I want to do more exercise’ think about what you will do, when you will do it and how you might overcome any obstacles.
- Make goals realistic – you may need to break down larger goals into smaller steps.
- Tell friends and family about your goal so that they can support you
- Reflect on your progress and see how far you have come.
- Don’t give up!

UNDERSTANDING YOUR TREATMENT

Primary angioplasty

In this procedure a tiny wire with a balloon at the end is put into a large artery in the groin or arm. It is then passed up into the blocked section of a coronary artery, using special X-ray guidance. The balloon is blown up inside the blocked part of the artery to open it

wide again.

A stent may be left in the widened section of the artery to keep it open. A stent is like a wire mesh tube which gives support to the artery and helps to keep the artery widened.

Thrombolysis

Thrombolysis (or clot-busting treatment) is a treatment that helps to dissolve any blood clots that may be blocking your arteries. The thrombolytic medicine is given through a vein in your arm. Side effects of thrombolytic medicines include nausea, sickness and bleeding. There is a low risk of stroke associated with thrombolysis.

Medicines

Antiplatelet medicines help to prevent the blood from clotting, which reduces the risk of another heart attack.

Aspirin helps to prevent your blood clotting by reducing the 'stickiness' of the platelets. Platelets are small blood cells that clump together to form a blood clot. The dose that is recommended after a heart attack is smaller than the dose that you might take to relieve pain. You will need to continue taking low-dose aspirin for the rest of your life.

You may also be given a second antiplatelet medicine (for example, clopidogrel, prasugrel, ticagrelor). This combination of aspirin plus an additional antiplatelet is more effective than just having one type of antiplatelet medicine. Most people will be advised to take this additional antiplatelet therapy for at least 6 months. Your doctor will discuss with you how long you need to keep taking this treatment.

Antiplatelet medicines can cause stomach aches, nausea and

vomiting. To help prevent these side effects, always take them with food. Sometimes, antiplatelet medicines can cause bleeding from the stomach. To help prevent this, your doctor may also prescribe a medicine to reduce the amount of acid your stomach produces. Beta-blockers (for example, metoprolol, propranolol, timolol or atenolol) reduce the risk of another heart attack in people who have already had one. They work by slowing your heart rate and lowering your blood pressure, so the heart does not have to work so hard.

Beta-blockers are not usually recommended for people with asthma as they can make it worse. They can be used for people with some lung conditions and diseases, such as chronic obstructive pulmonary disease (COPD), but you might need to be monitored more closely than usual.

Other side effects include tiredness or fatigue, cold hands and feet, erectile dysfunction (impotence), dizziness, and disturbed sleep or even nightmares. These will usually improve over time. It is important that you do not stop your beta-blockers suddenly. If you do experience side effects, speak to your doctor, pharmacist or nurse as they may be able to reduce the dose or try another beta-blocker.

Statins (for example, simvastatin, atorvastatin) help to lower the amount of cholesterol in your blood. If you have had a heart attack, you should be offered statin even if you have a normal cholesterol level. Statins have been shown to reduce the risk of further heart events. You will need to continue taking the statin for the rest of your life.

Before you start taking a statin, you will need to have a blood

test to check your liver function. If your liver is not working normally, you may need to take a lower dose.

Side effects of statins include tiredness, nausea and vomiting and headaches. Some people experience muscle pain or weakness when they are taking a statin. Occasionally this can be due to an inflammation of the muscles. If you have any unexpected muscle pain, tenderness or weakness, tell your doctor immediately.

Angiotensin-converting enzyme (ACE) inhibitors

(for example, lisinopril, perindopril, ramipril) reduce the risk of death after a heart attack. They work by making the blood vessels relax and widen. This lowers your blood pressure and reduces the work that your heart has to do to pump blood around your body. You will need to keep taking an ACE inhibitor if you have had a heart attack.

You will need to have regular blood tests to check your kidney function and potassium levels. ACE inhibitors may increase the level of potassium in your blood, so you should avoid having salt substitutes because these contain potassium too. Your blood pressure will also be monitored.

Up to 15 in every 100 people who take an ACE inhibitor develop a cough. If you develop a cough and it becomes troublesome, speak to your doctor.

Angiotensin receptor blockers (for example, telmisartan, valsartan) work in a similar way to ACE inhibitors. However, they are less likely to cause the persistent dry cough that some people get when taking an ACE inhibitor. You may be given an angiotensin receptor blocker instead of an ACE inhibitor if you have had a heart

attack that was caused by the left side of your heart not working properly or if you are unable to take an ACE inhibitor.

As with an ACE inhibitor, you will need to have regular blood tests if you are taking an angiotensin receptor blocker.

The human heart is a vital organ that functions as a pump to circulate blood throughout the body. It is a complex structure comprising various chambers, valves, and vessels, each with a specific role in maintaining the circulatory system. This document provides an extensive overview of the heart's anatomy and structure, detailing each part and its purpose.

2. Anatomy of the Heart

2.1 External Features

Base and Apex:

Base: The broad, upper part of the heart where the major blood vessels (aorta, pulmonary arteries, and veins) are attached.

Apex: The pointed, lower end of the heart, directed downward, forward, and to the left, usually located in the fifth intercostal space.

Surfaces and Borders:

Anterior (Sternocostal) Surface: Formed mainly by the right ventricle and part of the right atrium.

Inferior (Diaphragmatic) Surface: Formed mainly by the left ventricle and part of the right ventricle.

Left Pulmonary Surface: Formed mainly by the left ventricle.

Right Pulmonary Surface: Formed mainly by the right atrium.

2.2 Internal Features

2.2.1 Chambers of the Heart

Atria:

Right Atrium: Receives deoxygenated blood from the body via the superior and inferior vena cavae and the coronary sinus.

Left Atrium: Receives oxygenated blood from the lungs via the four pulmonary veins.

Ventricles:

Right Ventricle: Pumps deoxygenated blood to the lungs through the pulmonary artery.

Left Ventricle: Pumps oxygenated blood to the body through the aorta.

2.2.2 Heart Valves

Atrioventricular (AV) Valves:

Tricuspid Valve: Located between the right atrium and right ventricle; has three cusps.

Mitral (Bicuspid) Valve: Located between the left atrium and left ventricle; has two cusps.

Semilunar Valves:

Pulmonary Valve: Located between the right ventricle and pulmonary artery; prevents backflow into the right ventricle.

Aortic Valve: Located between the left ventricle and aorta; prevents backflow into the left ventricle.

2.3 Heart Wall Structure

Three Layers:

Endocardium: The innermost layer; a thin, smooth membrane that lines the inside of the heart chambers and valves.

Myocardium: The thick, muscular middle layer responsible for the heart's contractile function.

Epicardium: The outermost layer; a thin layer of connective tissue that provides a protective layer over the heart.

3. Structure of the Heart

3.1 Pericardium

Pericardial Sac:

Fibrous Pericardium: The tough, outer layer that protects the heart and anchors it to surrounding structures.

Serous Pericardium: Composed of two layers (parietal and visceral) with a pericardial cavity between them filled with lubricating fluid to reduce friction during heartbeats.

3.2 Coronary Circulation

Coronary Arteries:

Right Coronary Artery: Supplies blood to the right atrium, right ventricle, and part of the left ventricle.

Left Coronary Artery: Divides into the left anterior descending artery and the circumflex artery, supplying blood to the left atrium, left ventricle, and part of the right ventricle.

Coronary Veins:

Great Cardiac Vein: Drains blood from the front of the heart.

Middle Cardiac Vein: Drains blood from the back of the heart.

Small Cardiac Vein: Drains blood from the right side of the heart.

Coronary Sinus: Collects blood from the coronary veins and empties into the right atrium.

4. Purpose of Each Part of the Heart

4.1 Atria

Right Atrium:

Collects deoxygenated blood from the body and pumps it into the right ventricle.

Left Atrium:

Collects oxygenated blood from the lungs and pumps it into the left ventricle.

4.2 Ventricles

Right Ventricle:

Pumps deoxygenated blood to the lungs for oxygenation via the pulmonary artery.

Left Ventricle:

Pumps oxygenated blood to the entire body via the aorta; has the thickest walls to generate the necessary force.

4.3 Valves

Tricuspid Valve:

Prevents backflow of blood into the right atrium during ventricular contraction.

Mitral Valve:

Prevents backflow of blood into the left atrium during ventricular contraction.

Pulmonary Valve:

Prevents backflow of blood into the right ventricle after it has been pumped into the pulmonary artery.

Aortic Valve:

Prevents backflow of blood into the left ventricle after it has been pumped into the aorta.

4.4 Heart Wall Layers

Endocardium:

Provides a smooth lining for the heart chambers, minimizing resistance to blood flow.

Myocardium:

The muscular layer responsible for the contractile force that pumps blood.

Epicardium:

The protective outer layer that also contains blood vessels and nerves supplying the heart.

4.5 Coronary Circulation

Coronary Arteries:

Deliver oxygen-rich blood to the heart muscle itself, ensuring it functions effectively.

Coronary Veins:

Remove deoxygenated blood and metabolic waste from the heart muscle.

5. Conclusion

The heart is an intricately designed organ essential for maintaining life by ensuring continuous blood flow throughout the body. Each part of the heart, from the chambers and valves to the coronary vessels, plays a critical role in this process. Understanding the detailed anatomy and structure of the heart is crucial for diagnosing and treating various cardiac health issues.