

Left Ventricular Assist Device (LVAD)

i Important information for heart patients requiring a LVAD.

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About this booklet

The purpose of this booklet is to give you information about Left Ventricular Assist Devices as a treatment for heart failure.

This book does not replace any information and advice we may give you in person. If you have any questions, please ask any member of the heart failure team.

What is a Left Ventricular Assist Device?

A Left Ventricular Assist Device, or LVAD, is a mechanical device that is used to circulate blood throughout the body when the heart is too weak to pump blood on its own. It is sometimes called a “heart pump” or “VAD.”

An LVAD is not an artificial heart, nor is it a heart replacement. Your heart is not removed. An LVAD attaches to your heart and is designed to assist – or take over – the pumping function of your left ventricle - the main pumping chamber of the heart.

What are LVADs used for?

LVADs are used to improve your quality of life and reduce symptoms of severe heart failure.

An LVAD can be used:

- to control heart failure symptoms until a heart transplant operation can be carried out (this is known as “Bridge-to-Transplantation”); or
- to help the heart recover, however it is not possible to predict or guarantee when, or indeed if, the heart can recover.

If there is any change in treatments, the heart failure team will explain these options.

How does an LVAD work?

An LVAD is designed to take over the pumping function of your left ventricle. The device is placed just below your diaphragm in the abdomen. It is attached to the left ventricle and the aorta (the main artery that carries oxygenated blood from the left ventricle to the entire body). An external wearable system that includes a small controller and two batteries is attached by an external driveline. The wearable system is either worn under or on top of your clothing.

How does an LVAD help a heart failure patient?

An LVAD is designed to restore blood flow throughout the body, enabling you to breathe more easily and feel less tired. Your organs will receive more blood than they did before and this will likely improve their function. After receiving an LVAD, patients generally feel more energetic and are able to resume normal activities that they were unable to do before the device was implanted.

Is an LVAD a suitable treatment for me?

We have to do a number of tests before we can decide if you need an LVAD. These are the same tests that are performed to decide whether or not you should be listed for a heart transplant. Some of these tests may be repeated after you have received your LVAD to help monitor your progress. The heart failure team will explain all tests to you.

Tests we commonly use

- Height
- Weight
- Bacterial swabs
- Sputum and urine samples
- 24 hour urine collection
- Electrocardiogram (ECG)
- Echocardiogram (ECHO)
- Chest X-ray
- DEXA scan (bone scan)
- Coronary angiogram
- Right heart catheterisation
- Blood tests (full blood count, biochemistry, infectious disease and viral screen, clotting profile, tissue typing and antibody screen, blood group, HIV and Hepatitis B and C status)
- Cardiopulmonary exercise test
- Respiratory function test
- Cardiac MRI scan

You may have already undergone some of these tests recently, however these may need to be repeated. Following this assessment, the heart failure team will inform you of the best treatment option for you.

You will see some or all of the heart failure team. You may see nursing staff, perfusionists, doctors (cardiologists), surgeons and anaesthetists, transplant coordinators, a psychologist, a dentist, discharge coordinator, a dietician and a physiotherapist.

During your time on the ward, you may see a psychologist as part of your assessment as it is recognised that the LVAD process can be an emotional, and sometimes difficult, experience.

What are the benefits of an LVAD operation?

An LVAD takes over the function of pumping blood from the left side of the heart that is failing to work properly.

After the procedure, you should find that the symptoms of heart failure (such as feeling breathless, coughing, ankle swelling and feeling tired) either go away or become improved.

Most patients find they can return to many normal daily activities. Modern LVADs are quite small and function almost silently, so there are only a few restrictions on what you can do.

Are there alternatives to the operation?

There are no alternatives to the operation, drugs alone cannot give your heart the help it needs.

What will happen if I do not have the operation?

As your heart condition is very poor, you may get to the point where your heart is no longer able to keep you alive.

What are the risks of LVAD surgery?

All surgical procedures carry some risk. The risks for LVAD implantation are greater than for most other kinds of heart surgery.

However it is important to remember that this would not be recommended if we did not believe the likely benefits to your health would outweigh these risks.

Your surgeon will explain the risks that apply to you, but some of the most common risks of LVAD surgery include:

Bleeding

All heart operations carry a risk of bleeding. The risk of bleeding after the LVAD has been fitted is high compared to other heart operations. Sometimes a second operation is needed to eliminate the source of the bleeding.

Kidney problems

There is a risk of kidney failure because of the complex LVAD operation. If this happens, you may need support from a type of kidney machine (dialysis or haemofiltration); this is usually only temporary.

Infection

When you have an LVAD in place, it is possible for bacteria to get into your body where the driveline lead comes out through your skin. If you do get an infection here, it can be treated with antibiotics but it can be difficult to cure completely. Infection is one of the most serious complications of LVAD therapy. Although infection can be treated, it is usually not possible to cure an infection while the LVAD is in place.

Stroke

A stroke is an uncommon, but serious complication of LVAD surgery. It occurs when the supply of oxygen to the brain is interrupted. Occasionally the damage is minor and the effect is temporary but in some cases, the damage can be permanent. Similar problems may be caused by bleeding into the brain tissue.

Death

Having an LVAD fitted is a major operation and it does carry a risk of death. Your surgeon will discuss your anticipated risk with you when they ask you to sign the consent form for the operation.

The need for a right ventricular assist device (RVAD)

The LVAD only provides direct assistance to the left side of your heart. Occasionally, it is necessary to support the right side of the heart with an RVAD as well as an LVAD.

In the majority of cases, this would be a temporary measure and the RVAD would be removed once the right side of your heart has stabilised.

Which LVAD is used at GJNH?

We currently use the HeartMate 2 or HeartMate 3 by Thoratec. This is a miniature implantable LVAD that represents a breakthrough in medical technology and has rapidly become the most widely used device of its kind in the world. We are also able to implant the HVAD device by Heartware which is a miniaturised, full output device designed to be implanted in the pericardial space. The system allows rapid pump placement. The decision as to which LVAD to implant will be made by the hospital team after consideration of an individual patient's requirements.

Is an LVAD a treatment option for advanced heart failure patients?

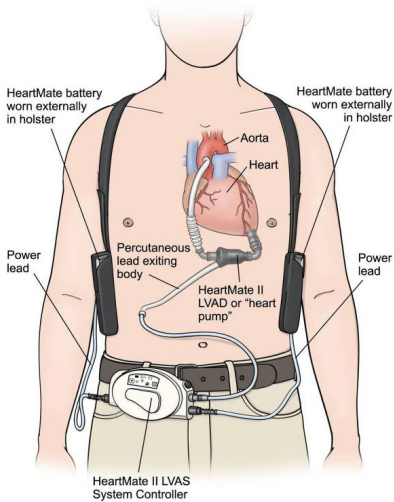
Yes. The LVAD is considered a standard of care in cases of advanced heart failure. Studies have shown that advanced heart failure patients treated with an LVAD can live longer and enjoy a much improved quality of life when compared with those being treated with drug therapy alone.

How long can an LVAD be used?

Studies on HeartMate II started five years ago and there are patients who have been supported for that entire period of time. This has been approved as a “bridge to transplant device” and has been in use in many centres for five years.

LVAD devices

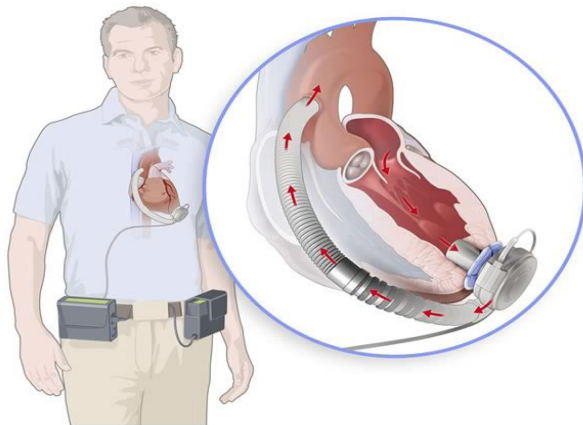
HeartMate II®



HeartMate III®



The Heartware HVAD device



Components of a LVAD device

The power module

The power module provides power while you are sleeping (A/C mains electrical power). It also provides power to a display screen to show you how the pump is working. The power module contains a back up battery in case of a power cut.

The pump

The pump moves blood from your heart to other parts of your body. The pump is implanted below your heart. A lead is attached to the pump, which passes through the skin of your abdomen. This lead connects the pump to the external system controller.

The battery charger

The battery charger is designed to charge the batteries that are used to power your device.

Batteries and battery clip

Batteries are a routine power source. They are used for powering the pump during mobile operation.

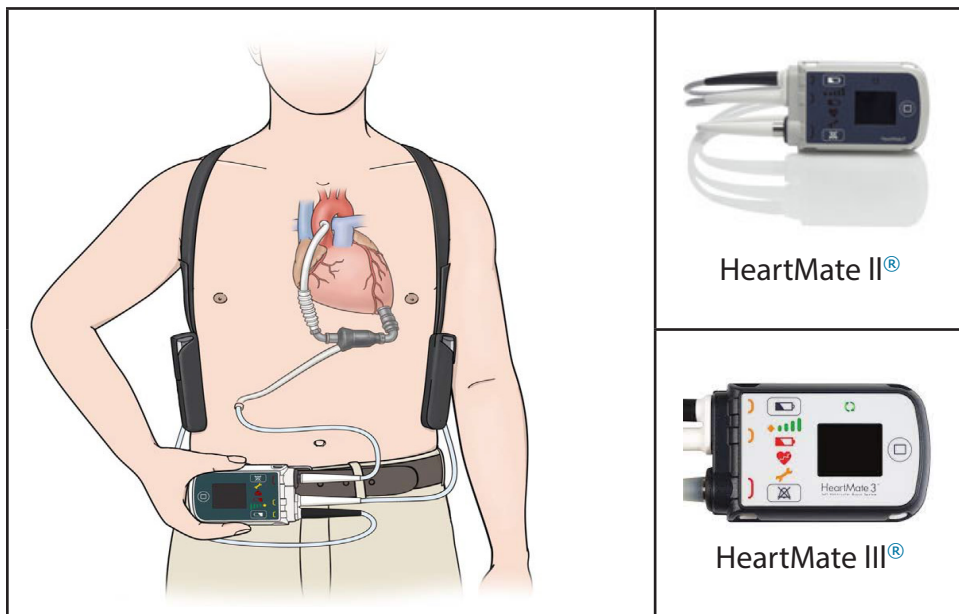
The system controller

The system controller is a small computer. It controls, and continually checks, how well the device is working.

Back up mode

This takes over system operation and control if the primary system controller fails or is unavailable.

The HeartMate II® and III® Pocket Controllers



We use a smaller system controller for some of our patients, the Pocket System Controller. This has visual on-screen alarms with instructions on which actions to take. It is useful for patients who have an active lifestyle, as it is more compact and lightweight.

Before surgery

Before the operation, different members of our team will meet you to discuss their specialist areas of the procedure.

Your consultant cardiologist will explain more about your condition and how the LVAD is expected to help you.

The anaesthetist will talk to you about what happens during the operation. The anaesthetists (or intensivists) will also look after you when you are recovering in intensive care.

Your surgeon will explain what is going to happen during the procedure and answer any questions you may have. They will then ask you to sign a consent (agreement) form, which shows that you have agreed to have the operation. They will perform the operation and look after you (along with the intensivists) in Intensive Care.

A perfusionist will talk to you in more detail about the LVAD device that has been selected for you and will give you advice about living with it.

You will have a chance to ask any questions you may have.

Immediately before the operation, we will take you to the anaesthetic room, where the anaesthetist will give you a general anaesthetic. This will ensure that you are unconscious and pain free during the operation. Once you are fully asleep and attached to the monitoring equipment, we will move you into the operating theatre for the procedure.

Day of surgery

To insert the LVAD, the surgeon makes a cut from your breastbone to the top of your abdomen. The chest is then opened to reveal the heart. The surgeon creates a pocket inside the chest to accommodate the pump and then connects you to the heart-lung machine. The heart-lung machine takes over the job of your heart and lungs and pumps blood around your body. This machine is necessary as the surgeon needs to stop your heart during the procedure.

The surgeon connects one tube from the LVAD to your left ventricle, places the pump inside the chest and connects the other tube to your aorta. Once they are both in place, the power lead is passed out of your body through a small hole made in the skin of the right side of your abdomen and connected to the pump controller.

Once this is done the heart and lung function is restored and you will be weaned from the heart-lung machine. The LVAD will support your circulation.

During your operation and immediately afterwards, you will be attached to some essential medical monitoring equipment. The procedure usually takes between five to eight hours, but it can sometimes take longer. Your friends and family are welcome to wait in the hospital during this time.

After surgery

Following implantation of your device you will be transferred to the Intensive Care Unit (ICU). Here you will be constantly monitored using specialist equipment and medication that support normal bodily functions. You will have a nurse who is dedicated to looking after you.

When you are admitted to ICU you will be attached to a ventilator that assists with your breathing. A tube is inserted through your mouth and connects you to the ventilator. As you recover from surgery and wake up from the anaesthetic, you will be gradually weaned off the ventilator. After the tube has been removed you will be given oxygen via a face mask until you no longer need it.

Following surgery, patients will have a variety of tubes and drips attached to them. All patients have a catheter placed into their bladder so that we can monitor urine output and assess how your kidneys are working.

Each day members of the heart failure team will assess your condition and a plan of care will be made. Blood tests and chest x-rays will be taken daily, or as frequently as is appropriate.

Can my friends and family visit me while I am in ICU?

We would encourage only immediate family to visit you at this time. Only two visitors are allowed at the bedside at any one time to minimise the risk of infection. Too many visitors can also be tiring for patients. Visiting is at the discretion of the ITU staff. Relatives should phone in advance to arrange visiting around your daily schedule. There is a bell outside the unit which your relatives should ring to gain entry. On occasion relatives may not get access to Intensive Care immediately; (there is a waiting area beside the unit).

To minimise the risk of infection, all visitors should use the alcohol hand gel before they enter and when they leave the unit.

The ICU staff will give your relatives the telephone number for the unit. If your relatives want to speak with the surgeon please ask a member of the ICU team to arrange a convenient time to do so.

How will I feel emotionally after the operation?

Patients react differently to having an LVAD operation. There is no right or wrong way to feel. Some patients may feel happy and relieved after surgery, but others may have periods of feeling down or depressed.

Most patients experience a time where they feel worried about their recovery, have concerns about looking after their LVADs, or have practical worries about going home.

Your emotional wellbeing is as important as your physical recovery and we will support you through these mixed emotions. Please do not hesitate to talk to us. We are always on hand to help and can refer you to our psychologist if you need extra help. As a general rule, you should find that you are having more good days than difficult days as your health improves. Please talk to a member of the team if this is not the case with you.

Physiotherapy after surgery

Having surgery will affect the depth of your breathing and you will be moving around less than normal.

The physiotherapist will assess your breathing and monitor your progress. They will go over the exercises described in this leaflet.

This will reduce the possibility of any complications after surgery and aid your discharge home.

What should I do?

- deep breathing exercise; and
- supported coughing.






Deep breathing exercises

1. Place your hands on your tummy.
2. Breathe out letting your tummy sink in as far as possible.
3. Breathe in, feel your tummy expand as far as you can.
4. Hold for a count of three.
5. Repeat three breaths three times with a 30 second break between each set (in order to avoid dizziness).
6. Do this every hour you are awake.

Muscular pain

Muscular aches and pains across the shoulders, chest, neck and back are common following surgery. Your pain will be assessed and you will be given medication to help these symptoms. These symptoms should improve over the next six weeks. You may find these exercises on the following page helpful.

Exercises

	<p>Sit up with a straight back. Pull your chin in, keeping your neck and back straight (not tipping your head forwards). Hold at the end position and feel the stretch in your neck. Repeat 5-10 times.</p>
	<p>Sitting. Turn your head to one side until you feel a stretch. Hold for five seconds. Repeat to other side. Repeat 5-10 times.</p>
	<p>Sitting. Tilt your head towards one shoulder until you feel the stretch on the opposite side. Hold for five seconds. Repeat to other side. Repeat 5-10 times.</p>
	<p>Sit or stand. Roll your shoulders in both directions. Repeat 5-10 times.</p>
	<p>Sit or stand. Lift your shoulders – relax. Repeat 5-10 times.</p>

Some arm movements and coughing may cause clicking of the breastbone. This is common and should disappear once the healing process is complete. Please inform a member of staff if you notice any clicking at your sternum. Women are advised to wear a non-wired support bra as soon as possible after surgery to reduce strain on the wound.

Your physiotherapist will advise you how to avoid undue stress when getting in and out of bed.

Returning to the heart failure unit

When you no longer require intensive care, you will be moved to the heart failure unit. Over the following days, monitoring equipment and supports will gradually be removed as you continue to improve. You will be encouraged to eat, drink, move about and take care of your own needs as you feel stronger.

Visiting in the heart failure unit should be arranged with the nurse in charge. There may be times where you are engaged in physiotherapy and these times should be avoided.

The heart failure team would like a close member of your family, a friend or your carer to be with you intermittently during your stay. This person will be encouraged to participate in your care so that by the time you go home, you will both feel more confident about what to do and how to avoid and manage complications. Amongst other things, this will involve learning about how to care for your VAD and how and when to administer your new medicines.

The physiotherapists and nurses will help you move about and become more independent. The physiotherapists will also plan an individual exercise programme for you, as explained later in this booklet.

You will also learn about looking after yourself and your device and complications, for example infection, as explained later in this booklet.

It is not usually long before you will be up and dressed and feeling quite well. However it is important not to overdo it, as you will feel tired. The nursing staff will discuss the need for rest periods with you. If, for whatever reason, you are not feeling well, or are experiencing strong or unusual emotions and need to talk to someone about your feelings, please let the nursing staff or heart failure team know.

Device management

In preparation for returning home and managing your LVAD, you and your designated care giver will require to be trained in all aspects of device management. This will usually begin when you have returned to the heart failure unit.

A member of the perfusion department will assist you with all aspects of device management. You will be given information in the form of booklets and DVDs to assist your learning. Before you return home, we will provide you with contacts for routine and emergency situations.

Clinical trials

Our unit sometimes takes part in national or international clinical trials or research. We may ask you if you want to take part. We will explain the details of the trial and what it might mean for you. You should not feel under pressure to agree to take part. You will have the opportunity to ask questions before you are asked to give consent.

You have every right to refuse to take part in any clinical trial; refusal will not affect the care you receive. The results of research may benefit you and future VAD/transplant patients.

Going home

Having an LVAD fitted is a big operation and it can take from four to six weeks before you are ready to go home. Some patients can take longer than this to recover, particularly if they have been sick for a long time before surgery, or if there have been complications. You and your family or carer will be given specific training in the care and use of your LVAD.

What happens before I leave hospital?

Before you return home, we will complete a home safety checklist with the help of you and your relative.

The heart failure team will liaise with your local hospital and your GP surgery to explain to them you have an LVAD and how it works. Letters will be sent to the ambulance service and your electrical supplier to inform them you are at home with an LVAD.

A local district nurse or a member of your family will be trained to regularly clean the area where the driveline leaves your body. Dressings will be supplied from the ward when you go home and from your GP once you are home. If you have any issues with, or related to dressings, please contact any member of the heart failure team.

In order to increase your confidence about going home, we will gradually get you ready to leave hospital. Our hotel facility allows increased independence while still being linked to the hospital.

Your spare equipment and batteries must be carried with you at all times.

Advice about your medications

After the operation, you will have to take some new medications to allow your VAD to work effectively. You may also have to continue to take some or all of the medications you were taking before the operation. The ward pharmacist will aim to see you on a regular basis during your stay (and at your discharge) to discuss your medications with you. No matter which medications you will be taking, the following general points should be noted:

- Ensure you re-order all of your medications in advance so that you do not run out.
- If you are treated by anyone other than your usual doctor, for example a dentist, please ensure that they are aware of all the medications you are taking. Please tell them they can talk to the heart failure team about you.
- Always seek advice from your local pharmacist if you are buying a medication over the counter or obtaining a new medication on prescription, to ensure that it does not interact with your regular medication.
- If you are having trouble with your medication regimen or wish to discuss any issues regarding your medications, please mention this to a member of the heart failure team, who will be able to help or who will direct your enquiry to the relevant pharmacist.

Warfarin

An important medication which you will need to take is Warfarin. When blood is being pumped through a mechanical device, there is a higher risk that the blood may form clots. Warfarin will reduce this risk by thinning your blood so that it will not clot as easily. You will have to remain on Warfarin for as long as you have the VAD in place.

There are a number of important points you will have to learn about Warfarin. In preparation for your discharge from hospital, you will be given a separate booklet about this medication. The ward pharmacist will also spend some time with you to talk you through the important points. You will be trained in checking your INR (warfarin blood level) prior to discharge home. You will be supplied with the relevant machine and strips to enable you to do this. Results have to be telephoned to the office as directed by the clinical team.

As well as taking Warfarin, your hospital doctor may also wish you to take Aspirin. Although this combination is not often taken together, it is common for patients with a VAD to require both medications. Aspirin should be taken after breakfast to reduce any upset to the stomach.

Antibiotics

Before and after your operation, you will take several antibiotics to ensure you do not develop an infection, particularly in the early stages. You will be monitored closely after your discharge to ensure you are not showing signs of an infection. If you develop an infection, you may need to take more antibiotics. Some antibiotics can affect the way in which Warfarin works. If you are started on antibiotics, you should inform the transplant coordinators. In some cases, you may need to be admitted to hospital to receive the antibiotics intravenously (as an injection).

There are many different types of antibiotics available to treat different types of infections. Should you require any advice about a particular antibiotic, please ask to speak to a pharmacist.

Whilst taking antibiotics the following points should be noted:

- Always follow the instructions closely about how to take your antibiotic, especially if there is any advice regarding when to take them, for example, after food.
- It is important to finish the course of antibiotics (unless your doctor advises otherwise) to ensure the infection has been treated fully.

Other medications

Your doctor may prescribe the following medications before or after your VAD insertion (or you may not have been on any regular medication at all):

- Furosemide/ Bumetanide / Metolazone – These medications are known as diuretics or water tablets, they will remove excess water from your body, for example if you had a puffy ankle. You may find you need the toilet a lot. If you are taking these tablets more than once a day, try to avoid taking the last dose after 2pm to prevent you waking in the night to go to the toilet.
- Spironolactone – This is also a type of ‘water tablet’ which has been shown to improve heart function and reduce the symptoms of heart failure.
- Bisoprolol or carvedilol – These medications are beta blockers; they improve heart function and reduce the symptoms of heart failure. Common side effects include tiredness and cold hands/ feet.
- Digoxin – This medication can affect the heart rate and is often used in patients who have an irregular heart rate, usually one that is too fast.
- Ramipril / Captopril / Enalapril – These medications are known as ‘ACE inhibitors’; they have been shown to improve heart function and reduce the symptoms of heart failure. A common side effect is a dry cough.
- Sacubitril Valsartan {Entresto} – This medication has been shown to improve heart function and reduce the symptoms of heart failure.

Mouth care

As the mouth is a common source of infection (particularly fungal infections) good mouth care is essential. It is important to ensure the mouth is kept clean by following good dental hygiene, such as brushing twice a day, using a mouthwash and having a regular check up at your dentist.

Eating for recovery

Due to your heart failure and subsequent VAD surgery, you may have reduced appetite, be losing weight, and/or be underweight. If this is the case, you need to ensure your protein and calorie intake is adequate.

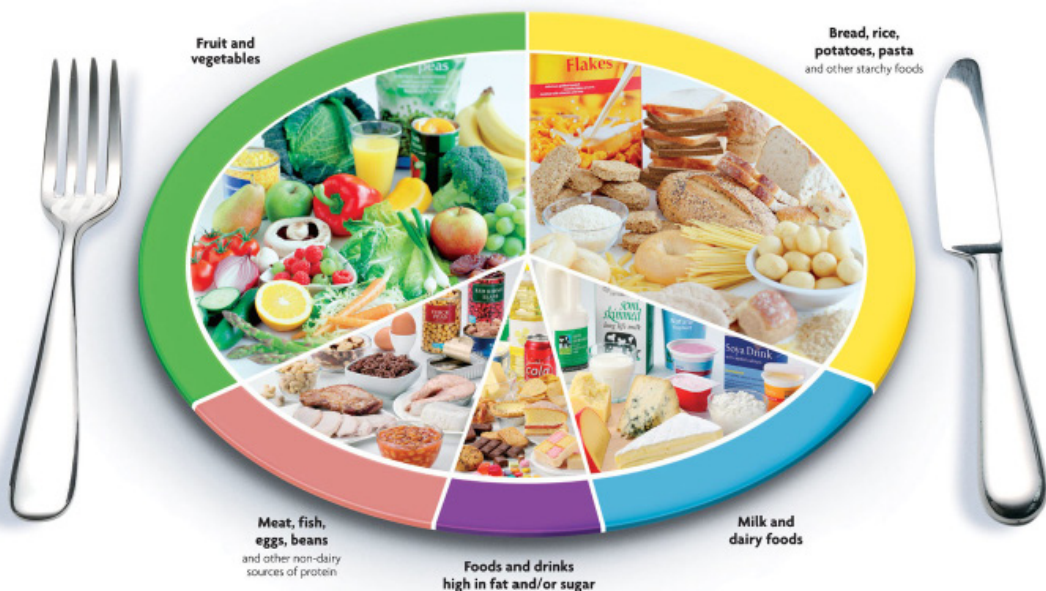
To achieve this:

- Eat regular meals (three per day) with snacks in between.
- Have at least three serving of protein foods daily, for example meat, fish, cheese, eggs or beans/pulses.
- Aim to have at least one pint of milk per day as drinks (milky coffee, hot chocolate), in cereals or puddings.
- Have snacks for example biscuits, cake, cheese and crackers, yogurts, chocolate or nuts. Watch the timing of snacks as important to also eat nourishing meals.
- If unable to take adequate calories and/or protein, information on food fortification and supplement drinks are available – please ask.

You should continue with this advice until your appetite has recovered and you achieve/maintain your healthy weight.

For longer term health

The aim is to have a healthy balanced diet as shown in the diagram on page 24.



- Include at least one portion of starchy food at each meal for example bread, cereals and potatoes.
- Eat at least five portions of fruits and vegetables a day.
- Have two or three portions of low fat milk and dairy products a day to meet your calcium requirements.
- Two portions of meat, fish, eggs or beans per day should provide adequate protein. This can include all lean meats, chicken, white and oily fish and pulses.
- Fats include spreads, oils and salad dressings. Choose unsaturated versions. The foods with 'hidden fats' will be high in calories for example pastries, pies and crisps.
- Sugars provide you with energy but no other nutritional value. You should reduce sugar in drinks and limit foods high in sugar, such as chocolate, sweets, biscuits or cake.

Weight

It is important to have and maintain a healthy weight. If you become overweight, you will be advised to get back to a healthy weight. You should aim for a steady loss of one to two pounds (half to one kilogram) a week. Please ask if you wish advice from a dietitian.

Fluids

Ensure you drink adequate amounts of fluid each day. Aim to have at least six to eight cups/glasses of water, squash or hot drinks per day. You may require more fluid if the weather is hot or if you are exercising.

Alcohol

Alcohol can impair judgement and may be contra-indicated with some of your medications. Please speak to a member of the heart failure team before taking any alcoholic drinks.

Physiotherapy advice after discharge

Benefits of exercise

When you go home, it is important that you continue with the walking programme and exercises you started in hospital. This will help you to return to as full and independent a life as possible. Regular exercise helps to:

- Strengthen your heart
- Improve your circulation and lung function
- Strengthen your muscles and bones
- Optimise your body in preparation for your heart transplant/removal of the LVAD
- Make you feel better by reducing stress and anxiety
- Control your weight by burning up extra calories

Types of exercise

Your heart will benefit most from exercise that builds up stamina. This is your ability to keep going without getting too out of breath. Walking is an excellent stamina-building exercise, which should be developed gradually.

Pace

You should walk at a pace that gets you breathing more deeply and slightly out of breath, but still allows you to keep a conversation going.

Start each walking session at a gentle pace, gradually increasing towards a brisk walk with a good stride, allowing your arms to swing. Slow down towards the end of the walk to enable the heart rate to gradually lower.

If you feel you are tiring or becoming uncomfortable during the walk, stop and rest. Breathing exercises help to gain control.

Improve your stamina

As everyone is different, your progress should be guided by how you feel rather than how many weeks it has been since your operation. It will also depend on how fit you were before surgery.

The following advice is for guidance only and should be modified to meet your individual needs. Progress at your own rate, setting realistic goals each day.

- For the first few days at home take frequent short walks about the house or garden, weather permitting.
- By the end of the first week, aim to progress to 10 minute walks outside. Ideally start walking on level ground and have someone with you.

- Gradually increase your walking over the next six to 12 weeks aiming to progress to 30-40 minutes daily exercise, if necessary split into two walks a day. During this time you should also be increasing the pace of your walking.

As you increase your level of activity, you may experience some minor discomfort around your chest wound. This is normal as the bones and muscles in your chest heal. Shortness of breath will settle as your fitness improves.

Activity guidelines after leaving hospital

Although your skin wound will normally have healed within six weeks of having your surgery, your breastbone will not be fully healed for about three months. This is one of the main limitations to returning to your daily activities and hobbies. In the early stages, do not strain your chest, as this may delay the healing process. This applies particularly to exercises that put undue strain on the breastbone (e.g. weightlifting).

Do not push, pull or lift anything heavy (greater than six to eight pounds / two to four kilograms) for at least eight weeks. Care should be applied when bending, stretching or walking the dog on a leash.

Avoid abdominal exercises and repetitive bending as this may cause irritation at your driveline site and lead to infection.

Remember to start activities slowly and build up the intensity gradually. When you are exercising, be sure to drink plenty of water to prevent dehydration. Avoid exercising in hot, humid or cold conditions.

There are certain activities which you should never perform while the pump is implanted:

- **Do not** play contact sports or engage in running or jumping activities as this could cause bleeding or damage to your pump.
- **Do not** swim or take baths as the system is not waterproof and this will cause your pump to stop.
- **Do not** perform abdominal muscle exercises (i.e. 'abdominal crunches') as this could pull or move the lead going through the skin and increase your chances of developing an infection.
- **Do not** use a rowing machine.
- **Do not** vacuum or engage in activities that may create static electricity, as a strong electric shock can damage the electrical parts of the system and make the pump stop.

Your physiotherapist will discuss returning to exercise and activity with you before you are discharged from hospital.

Activity and approximate timescale

Please be aware that the position of your driveline may limit your activities. Do not overstretch or perform vigorous or repetitive movements as this may cause movement at your driveline exit site. Excess movement can lead to irritation at the wound site and increase your chance of developing a driveline infection.

Gardening

- Light gardening such as weeding after four weeks.
- Raking after six weeks.
- Heavy digging and mowing the lawn after your breast bone heals, around three months.

Cycling

- Exercise bike after two to three weeks.
- Regular bicycle after eight weeks (check handlebar position to prevent overstretching).

Bowling:

- Light carpet bowls after six weeks.
- Progress gradually to a normal game.

Fishing:

- After eight weeks, beginning gradually.

Housework:

- Light housework, e.g. dusting, washing dishes and ironing small items can be attempted on discharge.
- More strenuous housework – sweeping and hanging heavy washing on the line after eight weeks.
- Do not vacuum, as this may create static electricity.

Signs and symptoms of overexertion

When exercising, you should expect to feel yourself becoming warmer, your breathing rate increasing and your heart beating faster. These are normal and good responses to exercise.

You should stop exercising if you experience any of the following:

- dizziness or light-headedness;
- excessive sweating;
- severe shortness of breath;
- chest pain or palpitations; and
- nausea.

These are signs that you could be dehydrated or exercising too hard.

If you have any concerns regarding exercise or returning to activity, please contact the Rehabilitation Department on 0141 951 5121 and speak to one of our physiotherapists.

Cardiac Rehabilitation

Before your discharge home, your physiotherapist will refer you to Cardiac Rehabilitation at your local hospital. You will normally be invited to join the Cardiac Rehabilitation programme six to eight weeks following your surgery. The programme usually involves attending one to two classes per week; either on an individual basis or in a group setting. Classes involve supervised exercise sessions and practical advice on diet, healthy lifestyle, medication and relaxation techniques.

It is important for you to attend Cardiac Rehabilitation as it will help to maximise your recovery, rebuild your confidence and strengthen your body as much as possible. This is particularly important if you will be going on to have a transplant or the LVAD removed in the future.

Discharge information for VAD driveline care

Following your VAD implant, you will have a permanent driveline exit site that requires further dressing and continuous care. A family member, carer or nurse has been trained in how to care for your driveline.

As the LVAD needs to be protected from water, please do not shower or bathe until you have discussed this with a member of the heart failure team at your return clinic appointment.

Trauma to the VAD exit site can lead to an increased risk of driveline infection. In order to minimise this, be careful with the driveline and ensure it is immobilised at all time. Try not to pull, twist or kink the driveline. Take care not to drop the controller or place unnecessary strain on the controller's electrical leads.

In the community, it can sometimes be difficult to obtain some of the items required to take care of the driveline. The Golden Jubilee National Hospital may be able to provide essential items that your GP cannot obtain.

Please contact the Transplant Coordinator immediately, if:

- you have a temperature of 37.5 or above;
- you experience new increased tenderness or pain around the driveline;
- your wound feels hot or looks red and inflamed;
- your wound begins to ooze or there is an increase in oozing since the previous dressing change; or
- your wound starts to smell.

What if I have problems when I am at home?

You will be given a folder containing emergency contact numbers.

Follow up after discharge

We will ask you to come back to the Golden Jubilee National Hospital for regular outpatient appointments to see how you are doing. Your first appointment will be booked before you are discharged from hospital.

Routine monitoring

The hospital is responsible for monitoring LVAD patients after discharge. Monitoring patients living at home typically consists of weekly clinic visits until you are medically stable, and then as necessary or as prescribed by your doctor.

Routine visits may include, but need not be limited to the following:

- Physical assessment: vital signs, pulses, Doppler blood pressure, weight change, symptoms of heart failure.
- Blood tests.
- System controller interrogation which includes attaching you to a system monitor to view the system controller event history
- Evaluation of the percutaneous lead exit site for ingrowth, trauma or signs of infection, i.e. pain, redness, drainage, etc.
- Inspection of the percutaneous lead for damage and to make sure the perc lock is in the locked position.
- Review with you and your caregiver medications, exit site care and emergency procedures.
- Interview you and your caregiver about system controller operation (including alarm history, changes in how the pump sounds or feels, or changes in pump parameters).
- Interview you and your caregiver about any problems, difficulties or concerns.
- Discuss performing equipment maintenance. Routine maintenance is important to keep the HeartMate II System functioning properly. Ensure that you are following a proper maintenance schedule.
- Verification of the device's fixed speed setpoint and low speed limit (primary and backup controller), and speed, flow, power, and PI of the LVAD.

Frequently asked questions

Can I take a bath or a shower?

As the LVAD needs to be protected from water, please do not shower or bathe until you have discussed this with a member of the heart failure team at your return clinic appointment.

Can I have sex?

Many patients have been able to resume sexual relations after having an LVAD fitted. If you are a female patient, please remember that you should not get pregnant because of the drug therapy you are taking. This can be discussed further with your transplant surgeon.

Will having an LVAD interrupt my periods?

Sometimes women find that their periods stop immediately after the procedure. This can happen after any major illness or major surgery. In these cases, periods may not restart for many months. If your periods have stopped, please discuss this with the heart failure team. Not having periods after surgery does not guarantee that you cannot become pregnant, therefore it is important you use precautions to ensure this does not happen.

Can I drive?

You are not permitted to drive for six months following your operation. After this time, it will be decided on an individual basis.

It is important that you contact the DVLA and your insurance company and explain your situation to them. The DVLA may request a medical report about your case from the hospital. If you are unable to drive and find it difficult to get to your clinic appointments, please let us know.

Can I exercise?

Most patients find they can exercise well with an LVAD, even if they were very unwell before the operation. We advise LVAD patients to do some moderate exercise and build up slowly over time. Your physiotherapist will give you an appropriate exercise programme to continue with at home.

It is important that you do not swim or take part in contact sports. You should avoid jumping, exercises that cause impact on your torso and abdominal exercises such as sit-ups.

You should also avoid activities that are repetitive or cause you to reach over, such as decorating or gardening. It is very important that you protect your driveline and LVAD equipment during physical activity. You should always discuss any new form of physical activity with the heart failure team before you start. Please ask if you would like your physiotherapist to give you more advice on specific types of exercise.

Can I go on holiday?

Once you are back home and feeling comfortable with the device, you may want to visit friends and family or spend some time away. We do not recommend that you travel abroad, but you can take holidays in the UK whenever you feel ready.

Please let us know if you are planning to spend some time away from home so that we can let the local Accident and Emergency departments and ambulance service know. This will allow them to be better prepared in the event of an emergency.

Are there any devices that could interfere with my LVAD?

Strong magnetic fields (such as those used for MRI scans) and static electricity can affect your LVAD. You should avoid touching television screens or computer monitors.

Mobile phones do not affect LVADs. You should keep a charged mobile phone on you at all times when you are not in the hospital building in the case of an emergency.

What lifestyle changes can I make to improve my health?

If you are a smoker, stop smoking. Try to avoid smoky environments. If you or your friends or relatives need help to quit, call the NHS Smoking Helpline on 0800 848484 or visit NHS Inform.

Drinking more than a glass of wine or beer can interfere with your blood-thinning medication. It can also cause your heart to work less well. Alcohol impairs your judgement and reactions and reduces your ability to deal with a problem relating to your LVAD.

Remember to eat a healthy, balanced diet and to stick to the right weight for your height. Being overweight is one factor that may reduce your chance of receiving a transplant in the future. Our dietitians can give you advice on this if you need it. You may need to avoid certain foods and/or drinks if they interact with your medications.

Take your prescribed medication regularly. Do not use any other medication (including over-the-counter medication).

Contact

If you have any concerns regarding your wound or any other issues, please contact:

Transplant Coordinators – 0141 951 5491/5472/5023
Out of hours, contact NSD Unit – 0141 951 5340

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