



UNIVERSITY OF OTTAWA
HEART INSTITUTE
INSTITUT DE CARDIOLOGIE
DE L'UNIVERSITÉ D'OTTAWA

Left Ventricular Assist Device (LVAD)



A GUIDE FOR PATIENTS AND CAREGIVERS

About this guide

This guide will help you and your caregiver understand and feel more comfortable with your left ventricular assist device (LVAD). It does not replace your device's product manual.

Please read and familiarize yourself with your product manual, including how to use and maintain your equipment, how to respond to alarms, and how to do a controller exchange.

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This document is also available in French under the title | Cette publication est aussi disponible en français sous le titre : Votre dispositif d'assistance ventriculaire gauche (DAVG)

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When to call the LVAD coordinator

If you have new symptoms, such as those noted below, or any of the conditions listed in the “Medical Concerns” section of this handbook, please contact the LVAD coordinator.

LVAD coordinator: Monday to Friday, 8 a.m. to 4 p.m.

Phone: 613-696-7000, ext. 14973

Fax: 613-696-7165

Pager: 613-759-0443



In case of an after-hours emergency, please call 613-696-7000, press 0 and ask to speak to the nurse coordinator. Please state that the call is regarding an LVAD patient.

Call the LVAD coordinator if:

- You feel light-headed or dizzy.
- Your blood pressure (mean arterial pressure or MAP) is too high or too low.
- You have a fever.
- You are sick to your stomach and unable to take your pills.
- Your LVAD alarm goes off.
- Your LVAD might be damaged.
- You notice any changes in how the LVAD feels or sounds, or you feel different.
- You notice any damage to the driveline.
- A physician prescribes an antibiotic or another medication.
- You need any medical procedures.
- You need dental work (the LVAD coordinator will recommend antibiotics).
- You need your bloodwork results and warfarin (Coumadin) dosage.
- You need more anchors.
- You need refills for any of your medications prescribed by the heart failure team. Please prepare ahead and call two weeks before you run out of pills.

Continue to see your family doctor or specialist for health issues that do not pertain to your LVAD or heart failure. This includes refilling medication ordered by other doctors (such as your family doctor or other specialists).

When to call 9-1-1

If you are experiencing a medical emergency, call 9-1-1 first, and then call your LVAD coordinator to let them know what is happening.

If you live in Ottawa, ask the paramedics to bring you to The Ottawa Hospital Civic Campus emergency department. If you live outside Ottawa, go to your closest emergency department, and they will transfer you to the University of Ottawa Heart Institute if needed.

It is important to explain to the paramedics and the hospital that you don't have a pulse and that your blood pressure is measured using mean arterial pressure (MAP). This will allow healthcare providers to assess and treat you.

Your caregiver should travel with you to the hospital because they know about your LVAD. Make sure to bring your backup controller, batteries, clips, charger, and AC power module.



Here are some examples of when to call 9-1-1:

- The LVAD is not working
- You are worried you may have had a stroke
- You are bleeding heavily
- You suspect you have had a heart attack
- You lose consciousness
- You have a seizure

Medical concerns

An LVAD is a mechanical pump that helps the heart to circulate blood in patients with advanced heart failure. A surgeon implanted your LVAD to support your heart for one of the following reasons:

- **Bridge to transplant (BTT):** To help keep you stable while you wait for a heart transplant.
- **Bridge to candidacy (BTC):** To improve your condition and increase your chances of being listed for a heart transplant.
- **Destination therapy (DT):** To improve your quality of life if a heart transplant is not an option.

Having an LVAD and being on blood thinners can put you at a higher risk of certain medical conditions. If you are concerned you may be experiencing any of the following symptoms, call your LVAD coordinator as soon as possible.

Signs of worsening heart failure

If you have signs of worsening heart failure, it could mean you need adjustments to your medications or LVAD. Signs of heart failure include:

- Shortness of breath
- Swelling in your legs
- Swelling in your abdomen
- Fatigue/weakness
- Feeling light-headed or dizzy
- Sudden weight gain of five pounds or more in one week

Bleeding

Taking blood thinners means your blood cannot clot as quickly as before. You should watch for signs and symptoms of bleeding and report them to the LVAD coordinator.

If you have bleeding that won't stop, or is making you feel unwell, you should call 9-1-1 as this can be life-threatening. It's important that **you should never be given vitamin K or tranexamic acid** unless the doctor clears it with one of our heart failure doctors, as they can cause clotting in your LVAD.

Signs of bleeding can include:

- Dark (black) or bloody stools
- Rigid, painful abdomen
- Nose bleeds/bleeding gums

- Pink sputum
- Flecks of blood in your vomit
- Frequent new bruises
- Blood in the urine
- Any new bleeding

Stroke

The earlier a stroke is detected and treated, the better the outcome. Call 9-1-1 right away if you suspect a stroke, even if you aren't sure. Having an LVAD can put you at risk of ischemic stroke (blood clot) and hemorrhagic stroke (bleed). To minimize your risk of stroke, it's important to take your blood thinners and control your blood pressure.

Signs of stroke can include numbness or weakness (particularly on one side or in one area of your body), a change in consciousness, confusion, or slurred speech.

If you suspect a stroke, remember the **F.A.S.T. acronym and call 9-1-1.**

- **Face** – Is it drooping?
- **Arms** – Can you raise both?
- **Speech** – Is it slurred or jumbled?
- **Time** – To call 9-1-1 right away.

Driveline infection

Your driveline starts at your heart and exits your body at your abdomen. It is very important you don't get a driveline infection as this can cause an infection in your heart. Driveline infections need to be treated immediately with antibiotics. Notify the LVAD coordinator if you have a fever of 38°C or higher, or notice any of the following signs of infection at the driveline site:

- Redness
- Warmth
- Foul odour
- Discharge
- Pain
- Skin pulling away
- The white velour on the driveline starts to show

Arrhythmia (irregular heart rate)

You will no longer feel your pulse because your LVAD provides continuous blood flow. Even though you can't feel it, your heart will continue to beat, and you will still have a heart rate. Your LVAD will work best when your heart rate is regular. If you feel palpitations or experience a shock from your implantable cardioverter defibrillator (ICD), call the LVAD coordinator and go to your nearest emergency department. You should also notify the Cardiac Device Clinic.

Clot formation in the LVAD

The formation of a clot in the LVAD is rare but can be fatal. It's important to take your blood thinners as directed, and to call the LVAD coordinator if you suspect a clot formation. Signs and symptoms of a clot include:

- Increased heart failure symptoms
- A rise in power (watts) on your LVAD; if this happens, call the LVAD coordinator immediately
- Very dark urine (the colour of dark cola); if this happens, call the LVAD coordinator immediately

Accident

If you experience a blunt-force trauma event or if you hit your head, you should go to the emergency room to be checked out. Blunt-force trauma is when you are hit by an object, have a fall, or are involved in a car accident. Sometimes the skin isn't cut, but you may still have an injury such as internal bleeding. It is important to rule this out. It is also possible that your LVAD could become damaged.

Driveline dressing change

A home care nurse will change your driveline dressing according to the UOHI LVAD dressing change policy. Depending on where you live and the policies of your local home care agency, the nurse may come to you, or you may have to go to their office for your dressing change.

If you or your caregiver are interested in learning how to change your dressing, speak with your home care nurse and LVAD coordinator. It may be possible for you to perform some of your own dressing changes.

Your driveline dressing must be changed twice a week. However, if you develop a driveline infection, it could be more often.

Your driveline dressing must be changed using a sterile technique. The nurse should wash their hands and wear sterile gloves. You or your caregiver should look at the driveline site every time the nurse changes your dressing. This way, you will notice if there are changes that could suggest a driveline infection. If you are concerned about the appearance, you should take a picture and email it to the LVAD coordinator.

Your driveline must be well secured using anchors to prevent it from being accidentally pulled. The anchors should be changed weekly, or more often if they are loose or soiled. The anchors are provided by the hospital. Ask the LVAD coordinator if you need more.

To avoid damaging your driveline, scissors should never be used to remove any part of your dressing or anchor.

Avoid pulling, kinking or twisting your driveline or cables. This can cause them to break, which could cause your LVAD to stop working. If you think your driveline or cables are damaged, call the LVAD coordinator.



The best way to prevent infection is to practise good overall hygiene, including frequent handwashing.

Daily life

We encourage you to live a meaningful and active life. The following information is meant to help you live safely with your LVAD.

- Your caregiver should stay with you at all times for at least the first month after you return home from your LVAD surgery. The need for ongoing caregiver support can be discussed with the heart failure doctor and LVAD coordinator at your first clinic appointment.
- Remember, for the first eight weeks after your surgery, you will follow sternal precautions and need to consider this when choosing your activities. Your healthcare team will give you information about sternal precautions in hospital.



You must always bring your backup controller, fully charged spare batteries, and clips with you any time you leave your house.

Sleeping

- Switch your LVAD to wall power for naps and overnight sleep. If you stay connected to batteries, there is a risk you may run out of power and may not hear the alarms.
- Check all your connections before you go to sleep to make sure they're tight.
- Have your backup controller, charged batteries, and a flashlight near you when you sleep in case there is a power outage.
- Keep your controller uncovered while you sleep to prevent it from overheating.
- Avoid sleeping on your stomach.

Power outages

- In case of a power outage, go somewhere that has power. If you cannot stay with a friend or a family member or at a hotel, go to the emergency room. Please call the LVAD coordinator for assistance.
- Do not use a backup generator to power your LVAD.

Showering

- Never have a tub bath or go swimming with an LVAD.
- You can shower once your driveline site has healed and the heart failure doctor or surgeon says it's okay. Usually, this is after you've returned home and you've had one or two clinic appointments. This is to protect you from getting a driveline infection. Until then, you can take sponge baths.
- You must keep your driveline site dry by covering your dressing with plastic wrap and tape. To make sure the site is sealed, cut a piece of plastic wrap that is bigger than your dressing, and secure it with tape on all four sides.
- Change your dressing if it gets wet.
- When you are given the green light to start showering, do so on days when the home care nurse is scheduled to change your dressing. That way, if the dressing gets wet, it will be changed by the nurse. Once you are confident that you can keep your dressing dry, you can start showering whenever you choose.
- Keep your controller and batteries dry by using the shower bag provided.
- Shower on battery power, not plugged into AC power.
- If you have difficulty hearing, have your caregiver remain close enough to hear any alarms while you're showering.
- Make sure your shower is safe. Use a non-slip mat, a grab bar, and a shower chair.

Driving

- You must not drive for a minimum of two months after your LVAD implant. Your heart failure doctor must give their approval for you to start driving. You can discuss this with them at the clinic.

Dental work

- You must take antibiotics prior to any dental work or cleaning. You can ask for a prescription at the LVAD clinic, or you can call the LVAD coordinator to arrange this for you.

Travelling

- You may be able to travel with your LVAD. If you wish to travel, talk to your heart failure doctor to determine whether you are stable enough to do so.
- Give the LVAD coordinator advance notice of when and where you will be travelling. The LVAD coordinator can give you information for the nearest hospital that provides LVAD care in the event of an emergency and will notify that hospital that you will be in the area. Not all areas are able to provide LVAD care, so please discuss safe options with the LVAD coordinator.

- You can travel by airplane with your LVAD with some preparation. Please speak with the LVAD coordinator if you plan to fly. They can advise you how to travel with your equipment and give you a letter for airport security. It's important that you not go through the X-ray scanner, as this can cause electrical interference that may stop your LVAD.
- If you are travelling to another country, you may require a different plug for your equipment, which the LVAD coordinator will need to arrange.

Electrostatic discharge (ESD)

ESD is the sudden transfer of electricity from one object to another. A mild shock to your skin is fine, however, ESD to the LVAD controller could cause it to malfunction. It's important to avoid sources of ESD so you don't damage your LVAD. The following sources of ESD should be avoided:

- Touching computer monitors or TV screens
- Scuffing your feet on carpets
- Vacuuming
- Taking clothes out of the dryer
- Electric blankets

Using dryer sheets and a humidifier in the house can help prevent ESD. If you think you have experienced ESD, discharge the electricity by touching a metal surface before handling your LVAD controller or power sources.

Sexual activity

You can resume sexual activity six to eight weeks after surgery, once your sternum has healed. Be mindful of where your controller is and that your driveline does not get pulled.

Pregnancy is contraindicated with an LVAD. Please speak to your doctor about reliable birth control methods to prevent pregnancy. Pregnancy could cause your LVAD to become dislodged. In addition, the blood thinner warfarin (Coumadin) can cause birth defects.

Cardiac Rehabilitation

After getting their LVAD, all patients are required to attend rehabilitation to learn about exercising safely. The goal is to increase your strength and endurance, so that you can become more independent and enjoy a healthier lifestyle.

Rehabilitation is free at the UOHI and starts six to eight weeks after your surgery, once it's approved by your doctor. If you live outside Ottawa, your LVAD coordinator will work with you to find rehabilitation services where you live.

Exercise and diet

You should exercise regularly, not just in your rehabilitation class. A lot of people tend to put on weight after they get their LVAD. Usually, this is because you feel better, so your appetite improves.

It's important to continue to exercise and make healthy food choices. This means following a heart-healthy diet that is low in sodium. If you would like to speak to a dietitian, please ask the LVAD coordinator to arrange this.

After your surgery, you may feel full quickly. This is because of the location of your LVAD. Try eating smaller, more frequent meals. This feeling usually goes away.

Here are some other tips to help you eat healthy:

- Drink enough water. If you aren't sure how much water to drink or if you are supposed to restrict your fluids, please ask your heart failure doctor or LVAD coordinator.
- Maintain a consistent amount of vitamin K in your diet. Fluctuating amounts can affect your INR.

What to avoid with an LVAD

- Alcohol: Alcohol can impair your judgment, delay your ability to react safely in an emergency, and affect your INR. Alcohol is a diuretic and can also cause you to become dehydrated, which can affect how your LVAD operates. Drinking alcohol can increase your risk of bleeding.
- Nicotine/marijuana: Do not smoke or vape, and avoid second-hand smoke.
- Never submerge your LVAD in water. This means you cannot swim, have a bath, or go in a hot tub.
- Do not have an MRI.
- Do not go through or near security screening equipment or metal detectors.
- No contact sports or vigorous jumping (no trampolines).
- Never leave the house without a backup controller, batteries and clips.
- Avoid exposure to extreme heat or cold.
- Do not become pregnant.
- Keep your cellphone at least 20 inches (50 cm) away from your controller when not in use.
- Do not undergo procedures that require high-power electrical treatment or therapeutic ultrasound.
- Avoid radiation over the LVAD (discuss with the LVAD team).

Monitoring your health

Daily monitoring

Check and record your weight, temperature, MAP and LVAD numbers at the same time every morning. Email or fax your log sheets to the LVAD coordinator once a week or input your recordings in MyChart.

Blood pressure (MAP)

Your LVAD provides continuous blood flow. You will not have a pulse, and your blood pressure will be a one-number measurement, a mean arterial pressure (MAP), instead of two numbers (systolic/diastolic).

Your MAP is obtained using a Doppler ultrasound and an automatic blood pressure cuff. A nurse will teach you how to measure your MAP before you go home from the hospital. Check your MAP daily and record it on your log sheet. A normal MAP is between 65 and 90.

It's important that your MAP is well controlled to reduce your risk of stroke and to ensure that your LVAD can provide good blood flow. If your MAP is too high or too low, call the LVAD coordinator. If you can feel your pulse or are getting two numbers on your blood pressure cuff that are more than 20 points apart, let the LVAD coordinator know. Your LVAD speed may need to be adjusted.

What to expect at LVAD clinic visits

Clinic visits take around one hour and occur every one to six months.

- Bring your list of medications.
- We may sometimes ask you to bring some of your equipment for maintenance checks.

What happens during the visit:

- You will have an ECG before your appointment.
- Your driveline dressing will be changed.
- You may need to have a blood sample drawn.
- Your LVAD will be attached to a monitor so your numbers and alarm history can be reviewed.

Regular testing

Bloodwork

You will require frequent blood tests, up to twice a week. The goal is to reduce this to once every two weeks once you are stable.

You will be given a standing order for blood work when you leave the hospital.

Blood tests can be done at the UOHI or at an outside laboratory. If you're doing your blood tests at the UOHI, the order will be in your electronic chart.

Echocardiograms

You will have echocardiograms once or twice a year. This may be done as a regular echo, or as a speed optimization echo where we adjust the speed of your LVAD.

Right heart catheterization

If your LVAD was inserted for bridge to transplant or candidacy for transplant, you may require right heart catheterizations every six months.

Anticoagulation (blood thinners)

You must take warfarin (Coumadin) daily when you have an LVAD. This is to prevent the LVAD from developing blood clots.

A physician will prescribe your warfarin dose based on the results of a blood test called INR (international normalized ratio). The INR measures how long it takes your blood to clot and is needed to ensure your warfarin is working effectively and safely. Most patients with LVADs require an INR range between 2.0 and 3.0. The LVAD coordinator will tell you when to check your INR and will monitor your INR results.

Take your warfarin at the same time every day, with your evening meal. If you miss a dose and don't remember until the next day, do not take an extra dose. Call the LVAD coordinator.

You may need to have your warfarin dose adjusted frequently. The doctor will give you a prescription for pills of varying strengths. It is important to become familiar with the strengths of the pills and learn how to combine them for your dose. The LVAD coordinator will tell you what dose to take based on your INR results.

If your INR is too low, you may be asked to take enoxaparin. This is an injection given just under the skin that is usually administered every 12 hours. You will also continue taking your daily warfarin. The enoxaparin keeps your blood thin while your INR is too low. Once your INR is back in range, the LVAD coordinator will tell you to stop taking the enoxaparin.

Some medications can affect your INR, including over-the-counter medications. Please tell the LVAD coordinator if you have started a new medication.

You should never take vitamin K or tranexamic acid without consulting the heart failure doctors. These medications make your blood clot and could cause clots to form in your LVAD.

You can eat foods rich in vitamin K, but it's important to do so in moderation and with **consistency**, as these foods can lower your INR. These foods include:

- Green leafy vegetables (kale, spinach, Swiss chard, green leaf or romaine lettuce)
- Parsley
- Broccoli
- Asparagus
- Cabbage
- Brussels sprouts

You can eat the following foods in small amounts only:

- Flaxseed
- Garlic
- Cranberry juice
- Mango
- Ginger
- Green tea
- Avocado
- Soy (soy milk, tofu)
- Chamomile tea

Avoid eating the following foods:

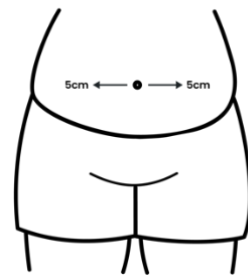
- Natto (fermented soy)
- Grapefruit
- Seville oranges
- Tangelos

Enoxaparin administration instructions

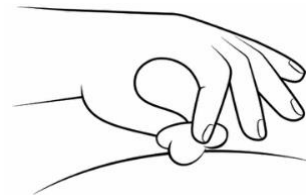
Wash your hands.



Lie down or sit and choose an injection site on your abdomen. The site should be at least 5 centimetres away from your belly button, in the fatty tissue of the left or right side of your abdomen. It is recommended to rotate injection sites.



Once you are in a comfortable position, clean the site with an alcohol swab prior to injection. Let the alcohol fully dry.



Remove the needle cap.



Pinch the cleansed area into a skin fold between your thumb and forefinger of the hand that is not holding the needle.



Hold the syringe at a 90-degree angle with your skin. While holding the skin fold, insert the needle as far as it will go. Once inserted, the needle should not be moved. Push the injection plunger down. Make sure the syringe is empty and the plunger is pushed completely down.



Pull the needle straight out at the same angle you inserted it. Release the skin fold. Apply light pressure with an alcohol swab for several seconds to help lessen the oozing of the enoxaparin or any bleeding. Do not rub the site.



Once the needle is removed, safely dispose of the needle and syringe in a sharps container



You can ask the LVAD coordinator or your pharmacist for more information, or consult the product pamphlet.

Resources

Information about HeartMate 3 LVAD:

cardiovascular.abbott/us/en/patients/treatments-therapies/heartmate-lvad-therapy.html

Patient education videos about HeartMate3 LVAD:

cardiovascular.abbott/us/en/patients/treatments-therapies/heartmate-lvad-therapy/living-with-lvad-therapy.html

Information about warfarin:

canada.ca/en/health-canada/services/drugs-medical-devices/warfarin

