



ADVANCED MEDICAL DEVICES

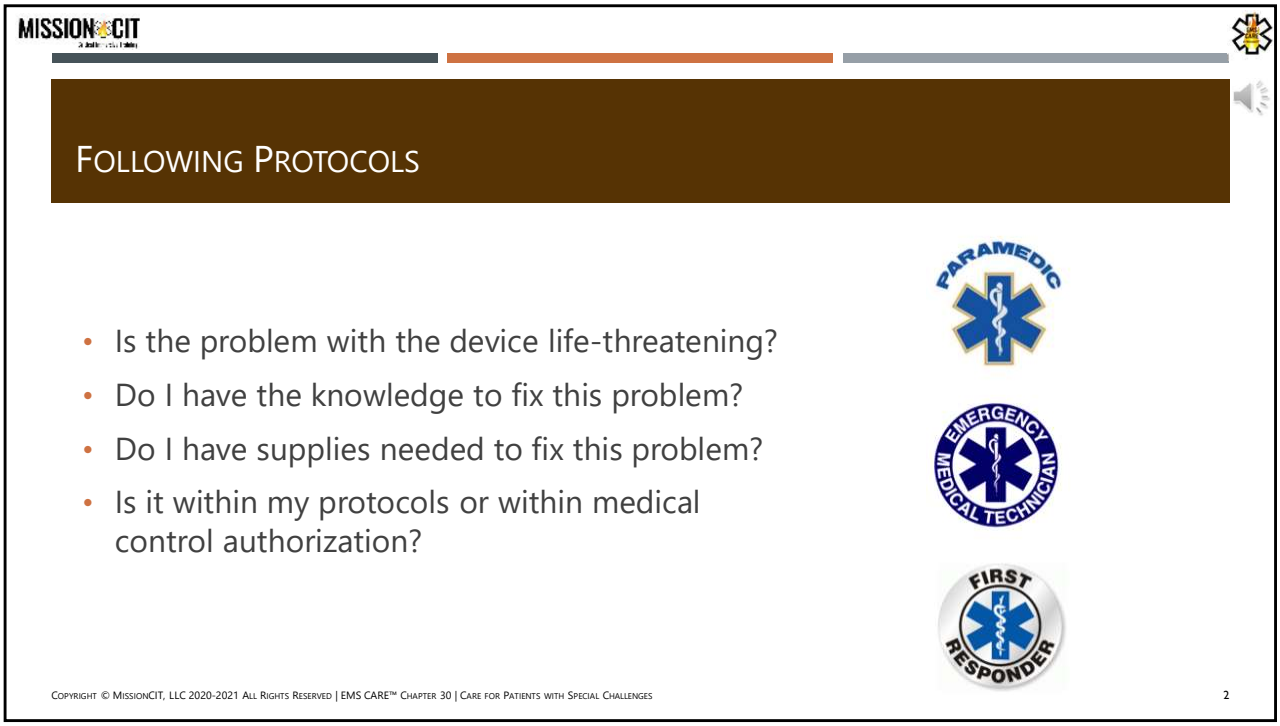
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Thank you Justin. In this two-part lesson, we continue to examine Advanced medical devices. We start off with an introduction that considers the importance of the caregiver and the patient in the process. We then discuss cardiac devices and in Part B, Gastrourinary and Neurologic systems.

The lesson focuses on devices actively aiding the patient's life functions. Other Examples of home care equipment you may encounter, but we do not cover, include nebulizers, wheelchairs, infusion pumps, blood glucose meters, and other monitoring devices.

We begin Part A starting with EMT protocols for assessment of advanced medical devices.

Good studying.



So the first thoughts, when confronted with a patient using an Advanced Medical Device, is to understand the severity of the situation, know the protocol for the device based on your level of training, and don't hesitate to call for ALS or medical control as indicated.

The questions to ask yourself are: Is the problem with the device life threatening? Do I have the knowledge to fix this problem? And, do I have the supplies needed for the situation?

Of course, follow all the standard protocols for scene size-up, primary, and secondary assessment as indicated

by the call.

Knowledgeable Caregivers

- Caregivers likely trained on device
- Ask caregivers:
  - ✓ Has problem occurred before? What fixed it?
  - ✓ Have you been taught how to fix this problem?
  - ✓ Have you tried to fix this problem? What happened?
  - ✓ How do you normally move patient?



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Often, the best resources on a call for a mechanical device failure is the family or caregivers of the patient. They will be most familiar with the machines and devices and will be able to assist you in identifying the cause of the failure.

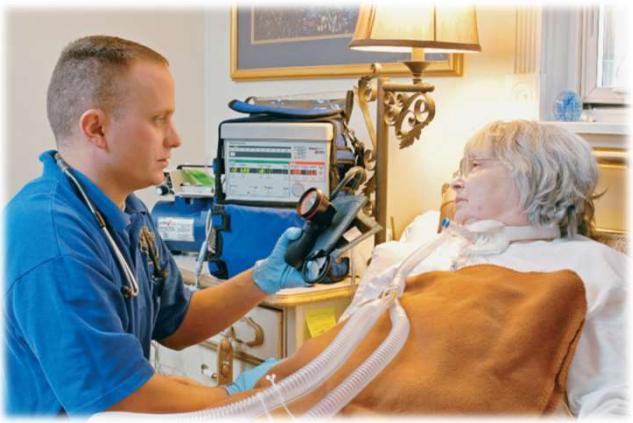
If there is an alarm sounding that the family or caregivers are not familiar with, you can look for the service phone number, or name of the manufacturer which is noted somewhere on the device. You are able to contact them via phone for their technical support and assistance. If necessary the company can then dispatch a

technician to that location for immediate repair of the device.

Some helpful questions for the caregivers are on this slide.

A Knowledgeable Patient

- The patient is often an expert on the device
- Enlist the patient's advice as you discuss the condition, special devices, and the assessments and care you plan to perform
- Explain what you are doing



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In addition, a responsive coherent patient able to effectively communicate, may also be a knowledgeable resource and are often an expert on the device you encounter. They can often relate why the device is required, and its importance to life.

Enlist the patient's advice as you discuss the condition, special devices, the assessments and care you plan to perform. Always explain what you are doing.

Device Overview

- Cardiac (AICD, LVAD)
- Gastrourinary Devices
  - ✓ Indwelling | Urinary Catheters
  - ✓ Feeding Tubes
  - ✓ Insulin Pumps
  - ✓ Ostomy Pouches
  - ✓ Dialysis
- Medication Delivery
- Neurological – Shunts – Vagus Stimulator



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So in the last lesson, Justin discussed various respiratory devices. And in lesson 3b, we gave a brief overview of the need for dialysis.

Over the course of this lesson, we will discuss some more of the devices you may encounter. We have organized them into four areas: Cardiac, Gastrourinary, Medication Delivery and Neurological.

In the first part of this lesson, we discuss cardiac devices including

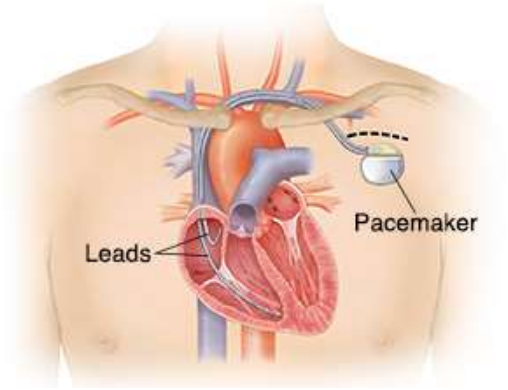
A I C Ds: An implantable cardioverter-defibrillator or

pacemakers which are designed to correct most life-threatening cardiac arrhythmias. And

L-VADs: A left ventricular assist device which is a pump for patients who have reached end-stage heart failure. If taking the EMT Recert course, these were covered in far more detail in a chapter on Day 1.

Cardiac Devices | Pacemaker

- A small device is implanted under the skin and wires are implanted into the heart.
- Designed to prevent the heart rate from becoming too slow
- Delivers a series of low-energy pulses as set intervals to stimulate the heart to beat at a faster rate



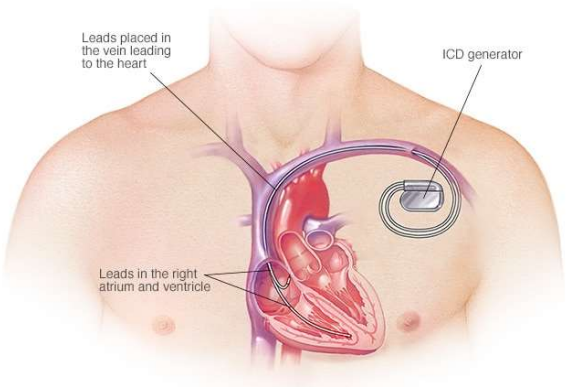
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A cardiac pacemaker, is a medical device that generates electrical impulses delivered by electrodes to cause the heart muscle chambers to contract and therefore pump blood. Hence, by doing so this device replaces and regulates the function of the electrical conduction system of the heart.

Modern pacemakers are rate-responsive, meaning that they detect what the patient is doing and modify the heart rate accordingly. Pacemakers emit a low energy pulse that is not felt by the patient and cannot be detected on the skin or felt by providers.

Cardiac Devices | AICD

- Automatic implanted cardiac defibrillator (AICD)
- Implanted in upper left chest or upper left abdominal quadrant
- Detects life-threatening cardiac rhythms
- Delivers shock to correct dysrhythmia
- Shock very painful to patient
- Cannot be felt by caregivers



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An implantable cardioverter-defibrillator (ICD), or automated ICD is a device implantable inside the body, able to perform cardioversion, defibrillation, and pacing of the heart. The device is therefore capable of correcting most life-threatening cardiac arrhythmias.

According to the American Heart Association, ICDs are useful in preventing sudden death in patients with known, sustained ventricular tachycardia or fibrillation.

Newer-generation ICDs may have a dual function which includes the ability to serve as a pacemaker. The pacemaker feature would stimulate the heart to beat, if

the heart rate is detected to be too slow.

Cardiac Devices | External Defibrillator Vest

- Vest with built-in monitoring electrodes and defibrillation pads
- Worn by the patient under his or her clothing
- Attached to a monitor that provides alerts and delivers a shock
- If patient is in cardiac arrest, vest should remain in place while you perform CPR

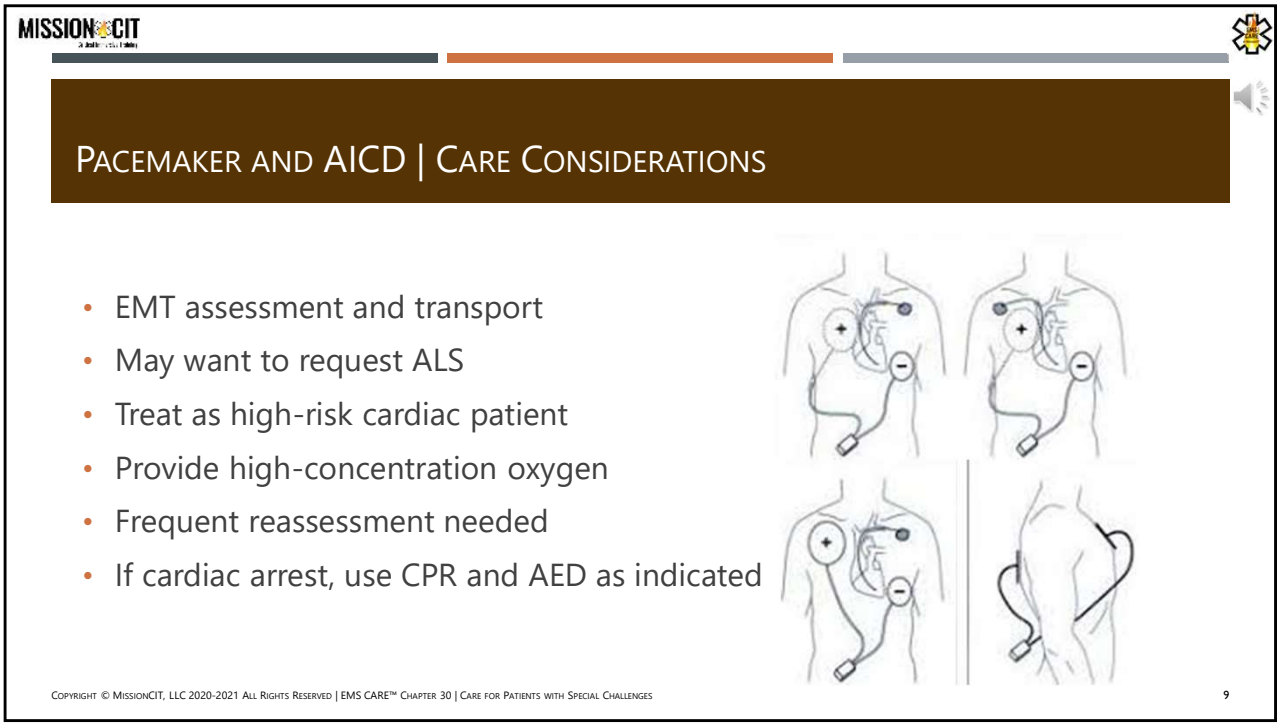


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An External Defibrillator Vest is worn by a patient at risk for sudden cardiac arrest. It is often used as a bridge to an AICD or cardiac implantation.

The Vest includes built-in monitoring electrodes and defibrillation pads and is worn by the patient under their clothing. It is attached to a monitor that provides alerts and delivers a shock.

If the patient is in cardiac arrest, the vest should remain in place while the EMT performs CPR.



Treat calls for individuals with these devices as a high-risk cardiac patient. You may want to request ALS upon arrival.

If the patient is in cardiac arrest, follow CPR and AED protocols.

If providing BLS, use standard pad placements. However, avoid placement over AICDs and pacemakers.

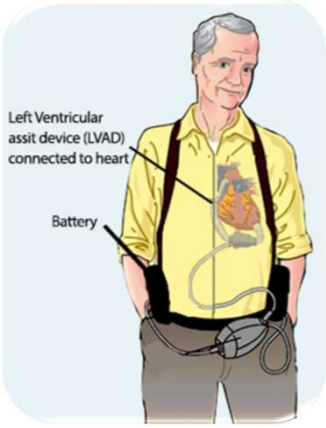
When patient is responsive, provide high-concentration oxygen.

Finally, frequently reassess the patient as needed and

per protocol.

Cardiac Devices | LVAD

- While patient waiting for suitable donor for heart transplant, LVAD serves as a "bridge"
- Moves blood from left ventricle through inserted tube to a pump implanted in the abdomen
- Blood pressurized and sent to aorta for transport to the body
- Patient has no Pulse or Blood Pressure
- CPR SHOULD NOT BE PERFORMED ON LVAD PATIENTS UNLESS DIRECTED
- Contact the VAD coordinator as soon as possible



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For a patient waiting for a suitable donor for a heart transplant, the Left **Ventricular** Assist Device or LVAD, serves as a "bridge."

The device moves blood from the left ventricle through an inserted tube to a pump implanted in the abdomen. The blood is pressurized and sent to the aorta for transport to the body.

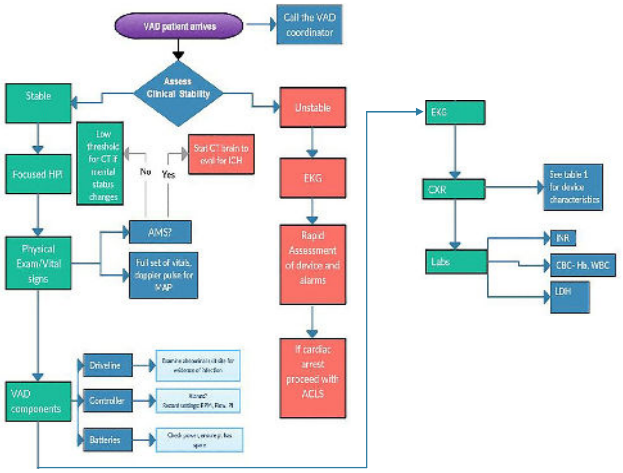
Keep in mind some important considerations for LVAD devices. First, the Patient has no Pulse or Blood Pressure. And CPR SHOULD NOT BE PERFORMED ON L-VAD

PATIENTS UNLESS DIRECTED by medical control.

Therefore, it is critical to get connected to Medical Control or ALS and VAD support as soon as you suspect an issue that may require help.

Evaluating an LVAD Patient

- Recognize that you have a patient with an LVAD
- Determine if your patient has an LVAD problem, or an unrelated illness or injury
- A completely stable patient may have no palpable pulse or measurable blood pressure
- Mental status and skin color must be used to determine patient stability
- CPR should almost never be performed on an LVAD patient



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First thing is to recognize that you have a patient with an LVAD. You should know that the LVAD patient has a control unit attached to their waist, or in a shoulder bag. The control unit is attached to a power cord exiting from the patients' abdomen. And the control unit will be attached to batteries mounted to the belt, in shoulder holsters, or in a shoulder bag. At home, it could be attached to a long cord that connects to a large power unit.

The best medical resource available to you for LVAD related problems is the patient's VAD coordinator. The

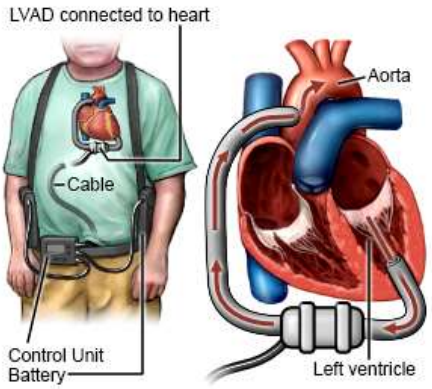
patient will always have a contact sheet and contact them as soon as possible.

Determine if your patient has an LVAD problem, or an unrelated illness or injury. Be aware that alarms on the control unit will most likely indicate an LVAD problem. Follow resource guides with the patient or caregiver to trouble shoot. Remember that the patient and their family are experts on this device. Listen to what they have to say.

During your assessment, skin color and mental status are the most reliable indicators of LVAD patient stability. And remember that a completely stable patient may have no palpable pulse or measurable blood pressure. And that CPR should almost never be performed.

LVAD | Care Considerations

- Changing batteries
- Sepsis and Stroke
- Presence of AICD or pacemaker
- Treat ECG changes according to protocol
- ACLS medication protocol unchanged
- Beware – patient is on anti-coagulant



Left Ventricular Assist Device (LVAD)

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When assisting a patient to change batteries or power source, never remove both batteries at the same time. This will cause the LVAD pump to immediately stop!

Sepsis and stroke are leading causes of death for LVAD patients. Carefully assess a patient with an altered mental status.

Many LVAD patients already have an implanted defibrillator or a pacemaker in place. These devices will often respond to an ECG change before you can.

The continuous flow of the LVAD means changes in ECG

rhythms may have minimal to no short-term effect on the patient's cardiac output and stability.

The use of external pacing or defibrillation is unchanged for LVAD patients. Use standard pad locations, but be sure to avoid placement over an ICD or pacemaker.

Finally, LVAD patients are always on anticoagulant medications. As a result, when treating traumatic injuries, even minor appearing chest or abdominal trauma could be hiding a very serious wound.

LVAD Patient Transport

- Transport to assigned facility
- Spare batteries, PBU and the display module should be brought to the hospital with the patient
- All modes of emergency transportation are acceptable
- Aviation electronics will NOT interfere with LVAD and visa versa


EPC Controller


HMII Pocket controller


HM3 Pocket controller


Power Module


MPU (mobile power unit)


Battery Charger and Batteries

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When transporting an L-VAD Patient, keep in mind they should be transported to their VAD resource hospital, if possible. Check with the patient or caregiver to see which hospital is their resource center.

- Always bring the patient's resource bag with you. It should have spare batteries, possibly a spare control unit, contact sheets for the VAD coordinator and directions for equipment and system alarms.
- Always bring spare batteries for the L-VAD with the patient, even if it is not an L-VAD problem. Fresh batteries generally last 3-5 hours. Dead batteries

means a dead patient!

- If you have a long transport or expect that the patient may be away from home for more than 4-5 hours, then try and bring the patient's power base unit.

Note that all modes of emergency transportation are acceptable; and Aviation electronics will NOT interfere with the L-VAD and vice versa.

So that's the end of Part A of this lesson. I will be right back with part B on the next set of Advanced Medical devices.

Good Studying.