Monterey County EMS System Policy

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MECHANICAL CIRCULATORY SUPPORT DEVICES

I. PURPOSE

To provide guidance and standardization regarding prehospital management of the patient with a Mechanical Circulatory Support (MCS)device.

II. OVERVIEW OF MCS DEVICES:

A. Ventricular Assist Device (VAD)

1. Usually the patient will have a Left Ventricular Assist Device (LVAD), although Right Ventricular Assist Device (RVAD) and Biventricular Assist Devices (Bi-VAD) also exist.
    a. An LVAD does not preclude a patient from getting right sided heart failure.
2. The VAD assists the native ventricle pumping action and provides the cardiac output needed to survive.
3. VAD patients typically have no pulse because the device is continuously flowing. This will alter your assessments, as pulse oximetry and blood pressure cuffs do not generally work accurately.
4. The VAD is generally silent, and you will find the "driveline" or cable connecting the device implanted in the heart to the computer worn usually on the patient's belt or in a fanny pack coming out of the left upper quadrant of the patient's abdomen.

B. Total Artificial Heart (TAH)

1. The TAH is a pulsatile device which is attached via 2 drivelines to a power source called the "Freedom Driver".
2. If the device is functioning, you will hear an audible "gallop" indicating that the device is pumping.
3. TAH patients will have a palpable pulse, so blood pressure and pulse oximetry measurements will be accurate.

C. VAD and TAH

1. Information regarding the type of device, the implanting hospital, and/or the VAD/MCS Coordinator contact telephone/pager number may be on a tag on the device, on the refrigerator, or on a medical alert bracelet.
2. Do not remove the sterile dressing covering the driveline at the abdomen/ lower chest unless necessary.

III. ASSESSMENT OF A PATIENT WITH AN MCS

A. First, assess the patient, not the device.

1. VAD Patient
    a. Because these patients likely will have no pulses, use other parameters for assessment (skin signs, level of consciousness, capillary refill, sidestream EtC02).
2. TAH Patient
    a. These patients will have a pulse and a blood pressure.

B. Use the AHA's C-A-B recommendations with one addition:
    1. Circulation/ ***Connections (device)***
    2. Airway
    3. Breathing

C. Second, assess to see if the device is working:
    1. VAD patient:
        a. Auscultate the patient's upper left quadrant for the "hum" of the VAD.
    2. Determine whether the device has power.
        a. VAD:
            1) The computer driving the device will be attached to the driveline. This computer should have a green light, or have the liters per minute of blood flow showing.
            2) The patient will either have the device plugged into batteries worn on his/her person or to A-V power.
        b. TAH:
            1) You will hear an audible "gallop" indicating that the device is working.
    3. Check all connections from the driveline to the device and the power source to ensure nothing has come disconnected.
    4. Do your ABC's in conjunction with your VAD/ TAH assessment.

IV. CONTACT BASE HOSPITAL

A. ***Early*** base hospital contact is mandatory with MCS patients. Be prepared to give the following information to the base hospital:
    1. Name of implanting hospital
    2. Phone number or pager number for the VAD/MCS Coordinator
        a. The base hospital will need to contact the VAD/MCS Coordinator to obtain directions to give to EMS personnel.
        b. ***Orders may only be accepted from the base hospital, not from the VAD/MCS Coordinator.***

V. MEDICAL CARE

A. All MCS patients:
    1. Standard airway management

2. Oxygen as clinically indicated
3. IV initiation – prepare for orders for fluid resuscitation.
4. Full arrest – consult your base hospital regarding whether to perform chest compressions.
5. Morphine for chest pain management and trauma is appropriate.

B. VAD patients
   1. An ECG will show the patient's native heart rhythm, which may not be indicative of their current circulatory status.
      a. The patient could potentially be in a lethal heart rhythm, such as VT or VF while conscious.
      b. Follow the direction of the base hospital for these cases.
   2. Avoid Nitroglycerin and aspirin in VAD patients.

C. TAH Patients
   1. TAH patients are instructed to take nitroglycerin SL if their systolic blood pressure is >140 mmHg. Contact the base hospital for orders.
   2. An ECG will show nothing on these patients, since they have no ventricles.

VI. SPECIAL CIRCUMSTANCES

A. Trauma Patients with an MCS device
   1. Let the base hospital know that the patient has an MCS device and may be on anticoagulants.

B. Dysrhythmias
   1. Treat as per protocol.
      a. VAD patients may be defibrillated or cardioverted.
         1) Do not disconnect any of the equipment in order to use electrical therapy.
      b. Most VAD patients have an ICD.
      c. TAH patients may not be defibrillated or cardioverted.
      d. TAH patients will not have dysrhythmias due to the lack of ventricles.

VII. TRANSPORT

A. When possible, MCS patients should be transported to the implanting hospital.

B. Follow base hospital order for transport.
   1. If the patient is in extremis (CPR is indicated, patient is unconscious/ unresponsive with poor skin signs and capillary refill), transport to the closest receiving center.

C. Always take all of the patient's additional equipment for the MCS with you to the hospital

D. Bring the patient's caregiver with you to the hospital, if they are present. They have been trained in the device and are necessary to the patient's care.

VAD and TAH Differences

Ventricular Assist Device	Total Artificial Heart
Usually pulseless	Pulsatile
ECG shows native heart rhythm	ECG is meaningless since there is no heart
Pulse oximetry is inaccurate or absent	Pulse oximetry is accurate
Do not use nitroglycerin	Patients are ordered to use nitroglycerin for systolic blood pressure >140 mmHg
Consult base hospital regarding whether to perform chest compressions on VAD patients	No compressions on TAH patients
You may cardiovert or defibrillate	Do NOT cardiovert or defibrillate
Must auscultate the left upper quadrant of the patient's abdomen for the "hum" of the VAD	The TAH's Freedom Driver is audible without a stethoscope making a "galloping" type of sound.
Usually have an ICD	Do not have an ICD
May be able to obtain a Mean Arterial Pressure (MAP) using a Doppler device only. Normal sphygmomanometer will not work. MAP should be from 79 – 85 mmHg.	Blood pressure is obtainable utilizing a normal sphygmomanometer.

END OF POLICY

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