



# Mechanical Circulatory Support LVAD, RVAD, and Bi-VAD

## History

- SAMPLE
- Bridge to transplant
- Destination therapy
- Estimated downtime
- LVAD, RVAD, Bi-Vad, TAH
- DNR, MOST, or Living Will
- Contact with LVAD coordinator

## Signs and Symptoms

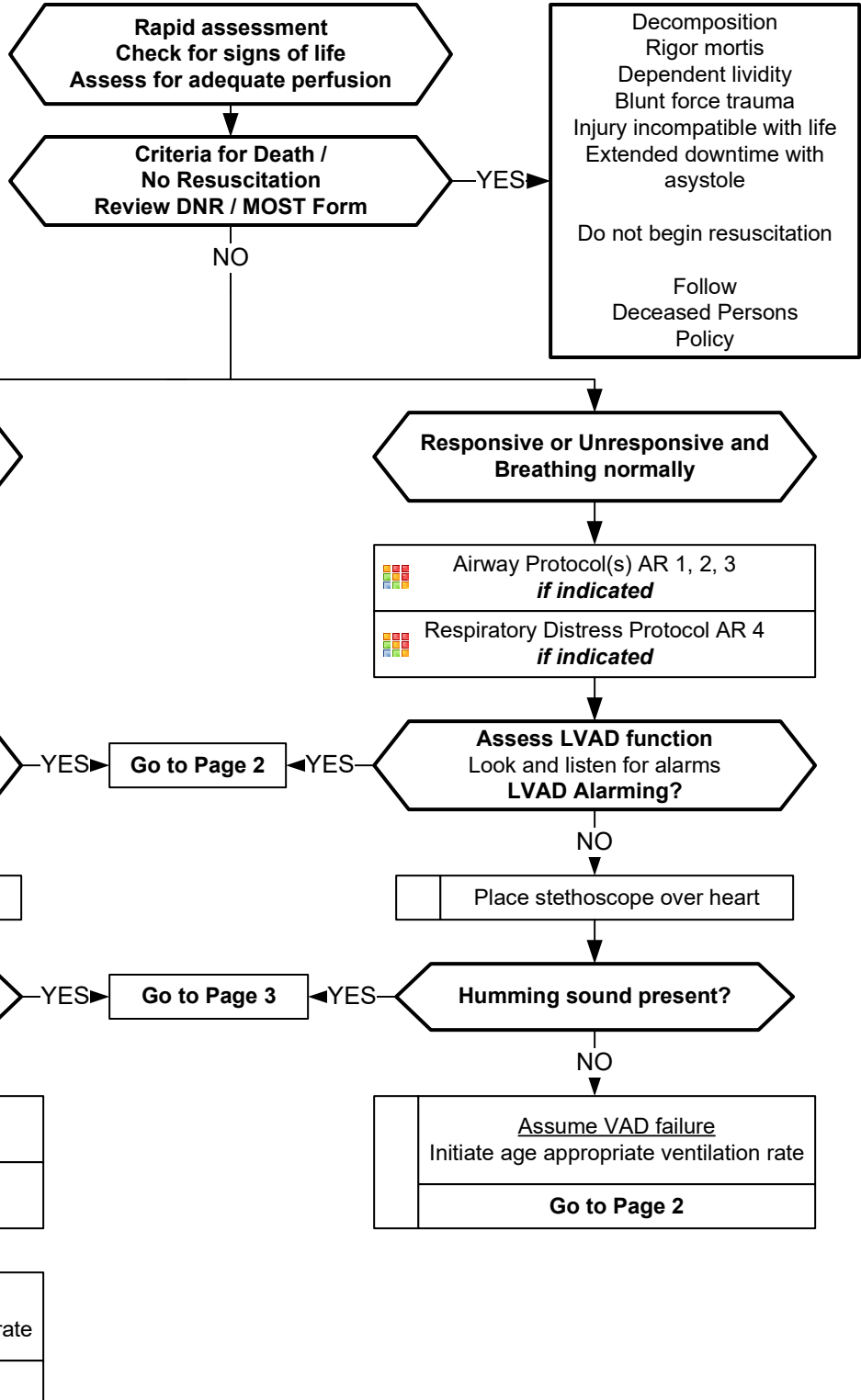
- Unconsciousness
- Pulseless
- Apneic
- Poor capillary refill / skin color
- AMS or decreased mental status
- No electrical activity on ECG
- No heart tones on auscultation

## Differential

- See Reversible Causes below
- Infection/Sepsis
- Hypovolemia
- Cardiac arrest
- Hemorrhage

### Contact VAD coordinator:

- As quickly as possible for troubleshooting and treatment advice, but do not delay emergency treatment
- Follow patient specific emergency plan if present





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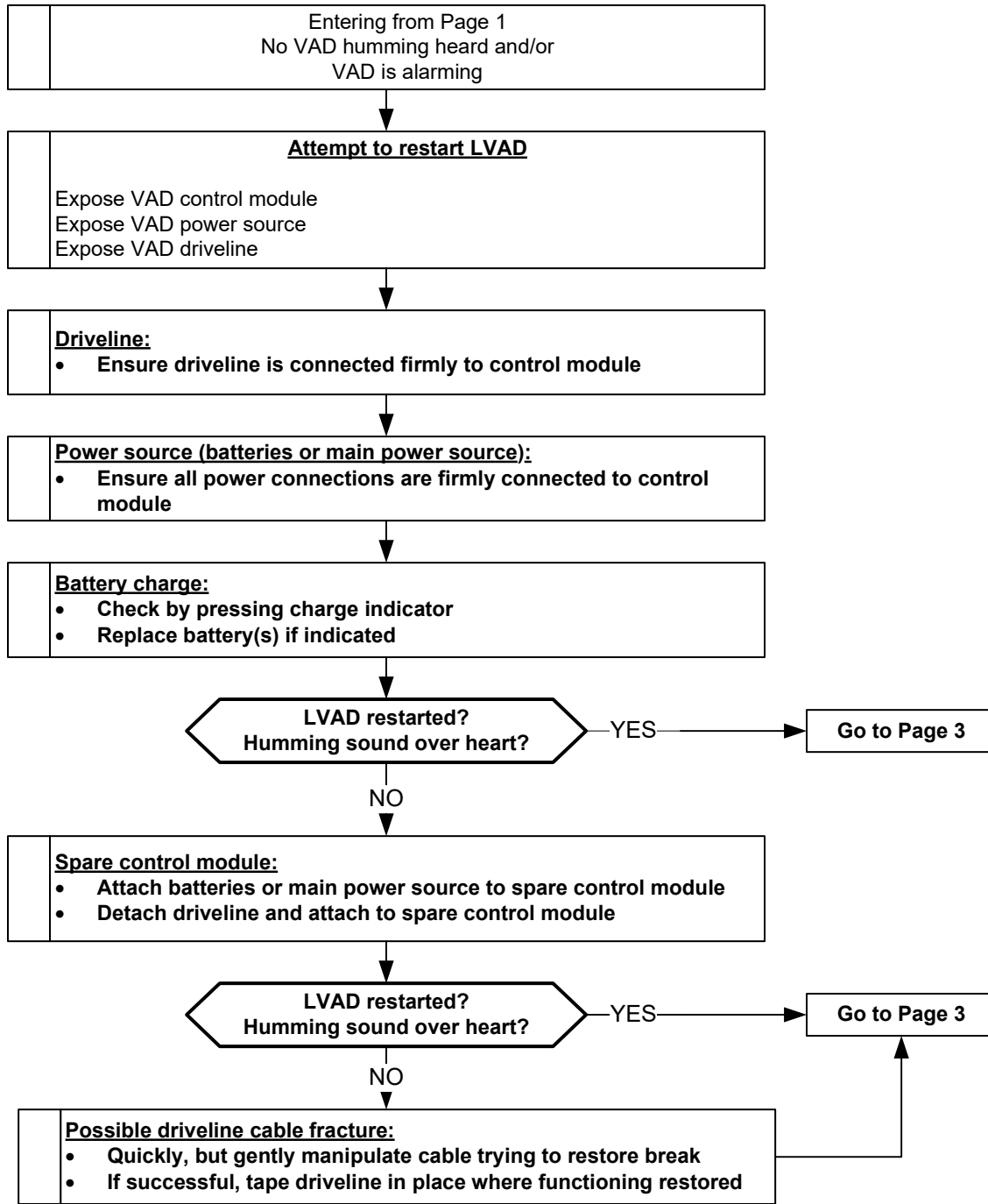
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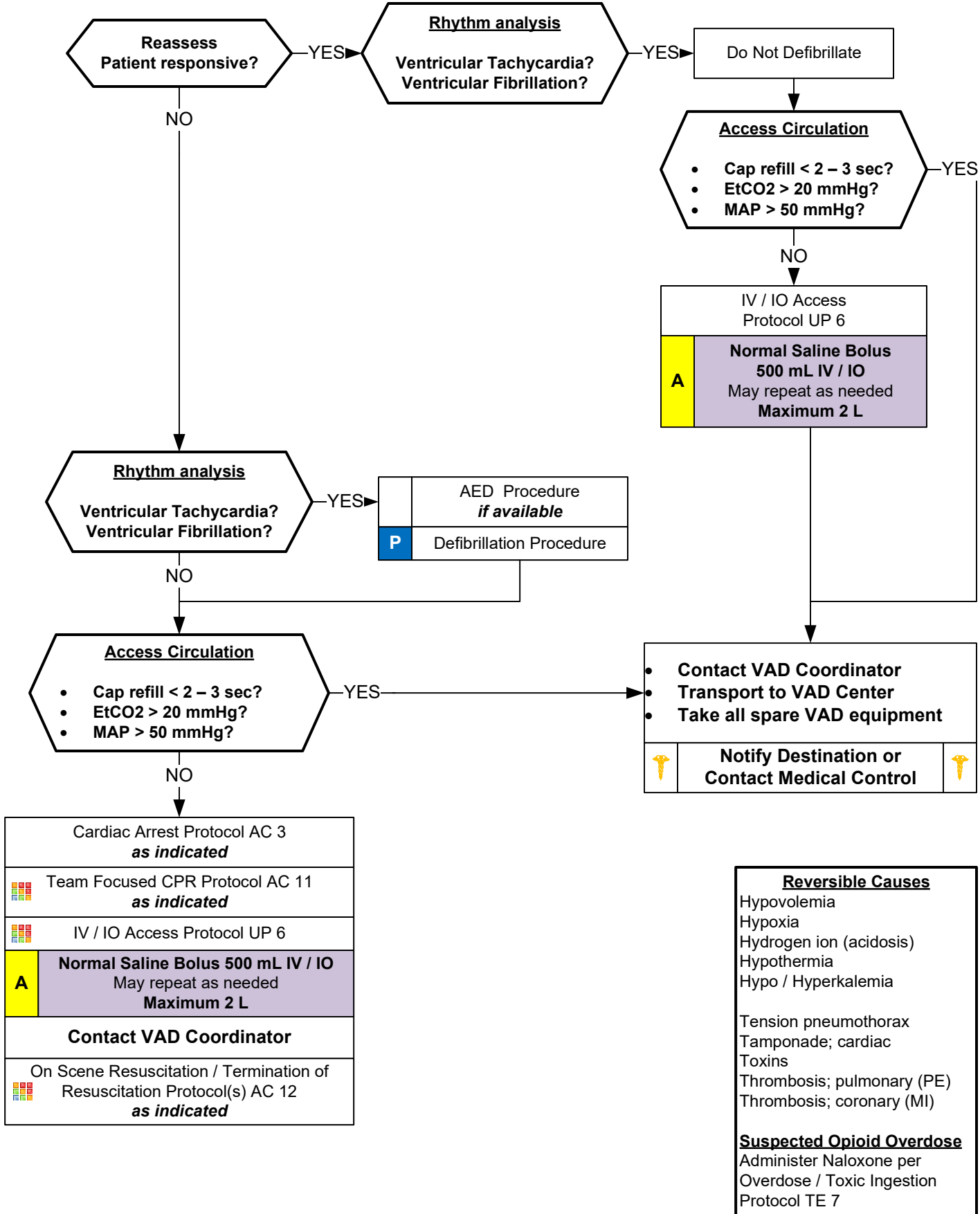
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- Reversible Causes**
- Hypovolemia
  - Hypoxia
  - Hydrogen ion (acidosis)
  - Hypothermia
  - Hypo / Hyperkalemia
  - Tension pneumothorax
  - Tamponade; cardiac
  - Toxins
  - Thrombosis; pulmonary (PE)
  - Thrombosis; coronary (MI)
- Suspected Opioid Overdose**
- Administer Naloxone per Overdose / Toxic Ingestion Protocol TE 7



# Left Ventricular Assist Device LVAD Unresponsive or AMS

**TRANSPORT TO VAD / ARTIFICIAL HEART CENTER - May UTILIZE AEROMEDICAL**

## Pearls

- **Recommended exam: Mental status, skin color, capillary refill, peripheral pulses, blood pressure.**
- **Assessment of blood flow and perfusion status:**
  - **Optimal BP attained by manual BP and Doppler.**
  - **Automated BP devices can measure a BP in about 50% of attempts and is not reliable to assess perfusion**
  - **A MAP of  $\geq 60$  mmHg is adequate for most LVAD patients.**
  - **Skin color, skin temperature, capillary refill**
- **Mechanical Circulatory Support devices:**
  - **LVAD – Left Ventricular Assist Device**
  - **RVAD – Right Ventricular Assist Device**
  - **BiVAD – Biventricular Ventricular Assist Device**
  - **TAH – Total Artificial Heart**
- **Reasons for use:**
  - **Bridge therapy – patients awaiting transplant or anticipated recovery.**
  - **Destination therapy – advanced heart failure, not candidate for transplant, and will live rest of life with device.**
- **Pump type and assessing pulses:**
  - **Pulsatile flow pumps – older units, not commonly in use now, but generate blood flow with a pulsatile flow and patient will have a palpable pulse.**
  - **Continuous flow pumps – majority of pumps now used and create blood flow in a continuous stream, no pulsatile flow, so patient will not have a palpable pulse.**
  - **Most devices are implanted inside the chest and have an internal pump, a driveline connected from the pump to the controller unit, and a power source consisting of batteries and electrical cord for receptacles.**
- **Common complications:**
  - **Disconnection of power supply, either battery disconnect, or electrical cord to receptacle disconnection.**
  - **Driveline failure or disconnection from controller unit.**
  - **Controller failure**
  - **Blood clot formation, acute stroke, and bleeding (mucosal and gastrointestinal most common sites)**
  - **Infection**
- **Abnormal heart rhythm:**
  - **Pseudo-PEA: Normal cardiac electrical activity in a patient who is alert and well perfused with no palpable pulse.**
  - **Tachyarrhythmias are usually well tolerated.**
- **End Tidal CO<sub>2</sub> (EtCO<sub>2</sub>)**
  - **If EtCO<sub>2</sub> is  $< 10$  mmHg, improve chest compressions. Goal is  $\geq 20$  mmHg.**
  - **If EtCO<sub>2</sub> spikes, typically  $> 40$  mmHg, consider Return of Spontaneous Circulation (ROSC)**
- **Transcutaneous Pacing:**
  - **Pacing is NOT effective in cardiac arrest and pacing in cardiac arrest does NOT increase chance of survival**