

NO Pulse! No Problem!

Trauma Patients with an Artificial Heart

Joan Somes RN-BC, PhD, CEN, CPEN, FAEN, NRP

with a side dish of: **“Stop The Bleed!”**

Disclosures

- 40 yrs. Emergency Dept.
RN HealthEast
- Part time Critical Care
Educator Regions EMS
- Paramedic 8 yr. ALF
ambulance
- Nothing to disclose
- No conflicts of interest
- Sponsored by MNENA



Consider the following:

Call for MVC, find vehicle with moderate damage, patient in driver seat.

Appears to be “OK”.

Slightly disoriented.

You feel for
a radial pulse.

You cannot find one!

3

But!..... As you assess.....

- He answers questions
- Appears to be breathing
- Skin is pink, warm, dry
- Capillary refill is 2 sec.
- But HE HAS NO PULSE!

- **What is going on?**

4

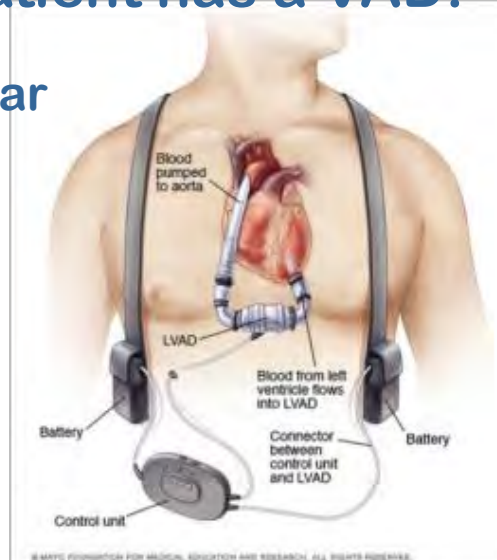
You open his shirt to check for injuries!

- There is a scar on the chest
- A tube coming out of the abdomen
- A set of “holsters” & a thing with lights on a belt around his abdomen

5

This Patient has a VAD!

Ventricular Assist Device



6

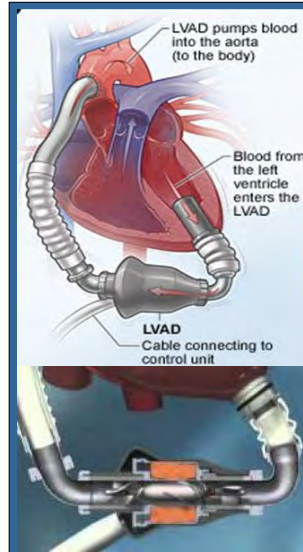
There are approximately 400 patients that have had VAD's inserted in MN hospitals over the last several years.

The University of Minnesota,
Abbott Northwestern,
Mayo Clinic, and
St. Cloud are VAD hospitals
FYI ~ The U of MN is a
Level II trauma center

Many of these patients are on "Destination Therapy"⁷

What is a 'VAD'?

A VAD is a small pump, inserted into the chest that takes blood from a poorly functioning ventricle & boosts it along to either the aorta or the pulmonary artery. The flow is smooth with tiny pulsations; hardly any systole, or diastole, or pulses.



9

It should be noted that the patient's heart works - but not that well.
The VAD helps move the blood!

- May have a left VAD (LVAD)
- May have a right VAD (RVAD)
- Or both
- Patient's heart was failing & the patient would have most likely died or confined to bed without device

10

Heart Mate II & III

Commonly found non-pulsatile VAD in our area

The batteries can be worn a number of ways

- Shoulder harness
- Waist belt
- Other bag
- Pocket

Placed in pocket

Worn on belt

11

www.thoratec.com

**Most patients look & feel better than
prior to surgery – in fact look “normal”**

12

Let's watch a video about VAD's

<https://www.youtube.com/watch?v=GrHBS1e4DXA>

Bill Hallinan RN, MS, EMT-P
University of Rochester

13

So, back to our patient

- Warm
- Dry
- Pink
- Capillary refill
~ 2 seconds
- Alert, but slightly
confused

He looks pretty good.

He was driving a car
until just a few minutes
ago! And you have most
of the information you
need to make a
decision.

14

Remember

Ventricular Assist Devices

Do:

- Assist heart to move the blood forward
- Make a whirring noise
- Require fluid to work
- Need anti-coagulants to prevent clotting
- Cause circulation of blood

Do NOT:

- Control heart rhythm
- Affect breathing
- Generally create pulses, a blood pressure, or pulse oximeter reading
- Affect level of consciousness*

15

If a VAD patient looks bad – look for something other than the VAD to be wrong, unless you are also hearing a high pitched screeching alarm sound and see flashing lights*!

***Power loss
Disconnected drive line
Less than 2L/min flow**

Reason to Look Bad ~ Bleeding

- Very anti-coagulated
- Trauma causes bleeding
 - Pelvis
 - Femur
 - Humerus
 - Internal organs
 - Head
- Disconnected
 - VAD tubing is rare

17

Looking for signs of shock

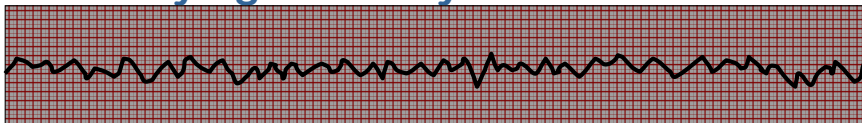
- Obvious bleeding
- Swelling
- Bruising
- Skin becoming
 - cool
 - pale /cyanotic
 - clammy
- Changing mental status
- Can bleed out due to anti-coagulants

18

VAD patients are usually so anti-coagulated that they need to be evaluated no matter how minor the trauma. This swelling – a minor injury – could lead to loss of the leg, if not life. ¹⁹

Other reasons to “look bad”

- Unresponsive due to:
 - head injury?
 - hypovolemia?
 - dehydrated?
 - drunk?
 - drugs?
 - hypoglycemia?
 - hypoxic?
 - stroke?
 - fever?
- Underlying heart rhythm



Risks with/to VAD – like chest trauma?

- **Disconnecting drive cable**
- **Dislodging outflow graft**
- **Decreased flow to VAD ~**
 - bleeding**
 - dehydration**
 - change in heart rate**
 - medication changes**
 - nitroglycerine**
 - other vasodilating drugs/**
 - issues, i.e. distributive shock**
- **Flow less than 2 L/min**

21

Can you do CPR?

Follow your guidelines, but

- **If patient looks dead –**
 - CCC – you cannot make**
 - them worse, If patient is**
 - WDP – you are not going**
 - to help them with CPR**
- **Patients can look OK in**
 - V.fib if blood is being**
 - circulated by pump**

22

A patient that looks bad and is in V. fib. or V. Tach may need defibrillation putting the patient back into a regular beat. It is OK to defib the patient. Some patients tolerate these rhythms for several days, as long as the pump is functioning.

23

So, back to our patient

- Warm
- Dry
- Pink
- Capillary refill
~ 2 seconds
- Alert, but slightly confused

But what about

- Pulse Oximetry?
- Blood Pressure?

24

Both require pulsatile flow

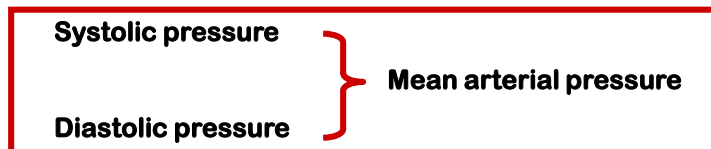
- Mean Arterial Pressure (MAP)
- Try a doppler BP using manual cuff
- Check, but don't waste time trouble shooting pulse oximeter

"Don't waste time trying to find numbers that may, or may not be reliable."

Leigh Hamann of MN VAD coordinator



VAD keeps blood flow constant instead of the average of the high and low numbers that make a blood pressure.



Typical MAP will be around 60, much higher causes VAD to work harder

Use Basic Assessment Skills

- Look at respirations
- Look at & touch skin
- Capillary refill
- Look at heart rate on monitor, or listen for heart sounds
- Check mental status
- Might try side stream capnography



WDP?
or
CCC?

27

Remember
capnography
gives you
information
about
circulation &
CO₂ returning
from the body



28

Other Considerations

- Most will have a pacemaker and ICD
- Cardiac monitor can tell you what heart rate should be, but not always patient's condition
- Treat patient, not machine - check connections
- A fluid bolus of 500 cc to start, may need more
- You may need pressors –
epi 0.01mg/kg/min
- It may be appropriate to defib or attempt to pace the patient if symptomatic
- Be careful when strapping patient onto the stretcher

29

More Considerations

- POLST (Provider Orders for Life Sustaining Treatment), DNR,
- Family members are trained – use them
- VAD coordinator number either
on VAD
on paperwork
on medic alert bracelet
- CALL ASAP and they can walk you through alarms, or other trouble shooting, including questions about CPR

30

**Start with basic care for patient, then call VAD coordinator
who can walk you through buttons, lights, and alarms**

31

Should pt. have been driving?

- **Most are on sternal precautions for 6 weeks, then may drive**
- **Will use battery power to get around**
- **Grab their “go bag”**

32

- Batteries are usually good for 12-14 hours
- Patient's may sustain life if VAD stops working – may c/o palpitations, weakness
- Patients should have rhythm on cardiac monitor that looks consistent with life ~ but can easily have a Life-threatening rhythm that requires fixing
- You should hear a hum by apex of heart if VAD is working
- Hemorrhage is biggest risk for VAD patient
- Treat patient, not machine – but check connections & wires

33

HEARTMATE III

HEARTMATE II

HEARTWARE

JARVIK 2000

HEARTMATE XVE

THORATEC PVAD/IVAD

FREEDOM DRIVER
Total Artificial Heart

<https://www.mylvad.com/sites/default/files/EMS%20Field%20Guides/MCSO%20EMS%20GUIDE%202016.pdf>

34



35

The objectives of the stop the bleed campaign are to:

- **make the general public aware of the Stop the Bleed slogan and logo**
- **educate the public on how to stop major bleeding and,**
- **provide access to personal bleeding control kits (both for purchase and in public gathering places) that include just-in-time audio and visual training.**

<https://www.youtube.com/watch?v=ZlVl5qh-cGQ>

36



Bystanders will always be the first on scene

Their actions can save lives before the arrival of professional emergency responders

Stop the Bleed calls for simple life-saving equipment and training to be widely available

37




No matter how rapid the arrival of professional emergency responders, bystanders will always be first on the scene. A person who is bleeding can die from blood loss within five minutes, so it's important to quickly stop the blood loss.

Remember to be aware of your surroundings and move yourself and the injured person to safety, if necessary.


Call 911.

Bystanders can take simple steps to keep the injured alive until appropriate medical care is available. Here are three actions that you can take to help save a life:

1. Apply Pressure with Hands
 EXPOSE to find where the bleeding is coming from and apply **FIRM, STEADY PRESSURE** to the bleeding site with both hands if possible.




2. Apply Dressing and Press
 EXPOSE to find where the bleeding is coming from and apply **FIRM, STEADY PRESSURE** to the bleeding site with bandages or clothing.



3. Apply Tourniquet(s)
 If the bleeding doesn't stop, place a tourniquet 2-3 inches closer to the torso from the bleeding. The tourniquet may be applied and secured over clothing.

PULL the strap through the buckle, **TWIST** the rod tightly, **CLIP** and **SECURE** the rod with the clasp or the Velcro strap.

If the bleeding still doesn't stop, place a second tourniquet closer to the torso from first tourniquet.



The "Stop the Bleed" campaign was created by a federal interagency working group convened by the Homeland Security Council's Staff, The White House. The purpose of the campaign is to build national momentum by better preparing the public to seek help by clearly communicating critical actions to stop the threatening bleeding following a violent emergency and to make and deliver decisions. Advances made by military medicine and research in hemorrhage control during the war in Afghanistan and Iraq have informed the work of this initiative which maximizes transfer of knowledge back to the Department to the benefit of the general public. The Department of Defense owns the "Stop the Bleed" logo and graphic trademark pending.



Office of Health Affairs

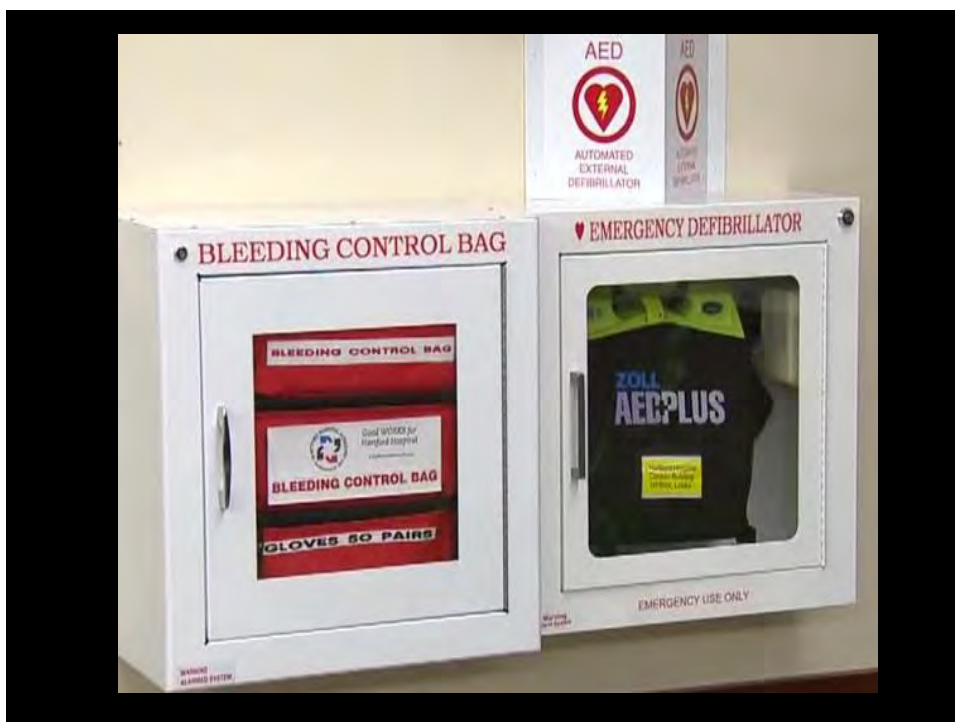
38



“Stop the Bleed” with Tourniquets

**Help teach correct method
& debunk myths about tourniquets!**

39



Thanks drive home safely!

somes@black-hole.com