

# **Wearable Cardioverter Defibrillators**

## **Zoll LifeVest External Defibrillator**

**Richard Childress**

# RICHARD CHILDRESS

- ◉ Who is this guy?

**WHAT...?!?**

- ◉ What makes him think he knows anything?



SHERV.NET

# DISCLOSURES

- Zoll Lifevest:
  - This is it, there is nothing else.

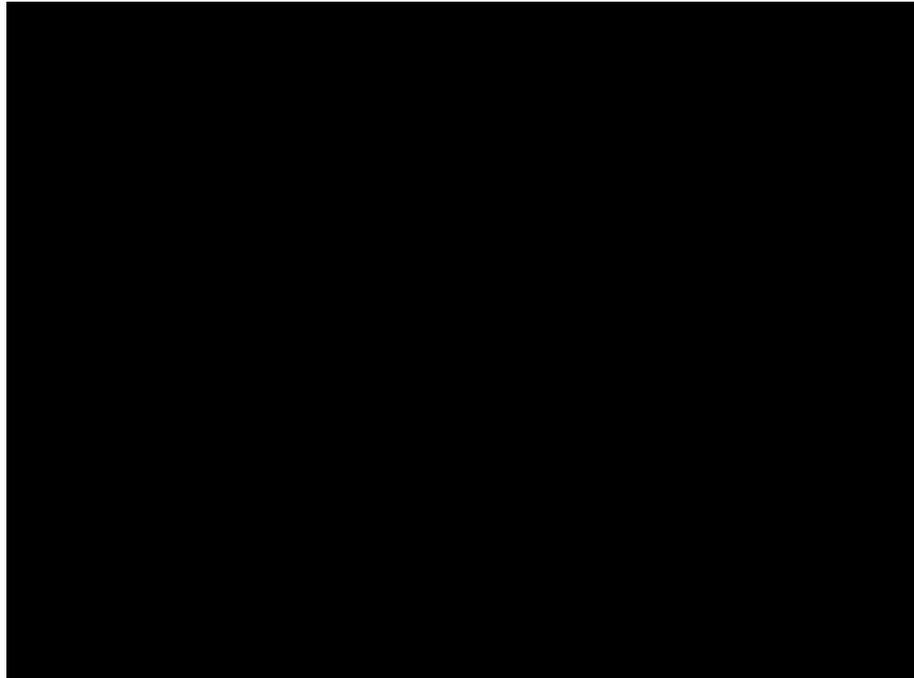


# TOPICS

## ○ Zoll LifeVest

- What it is
- Who it treats
- How does EMS handle these patients?

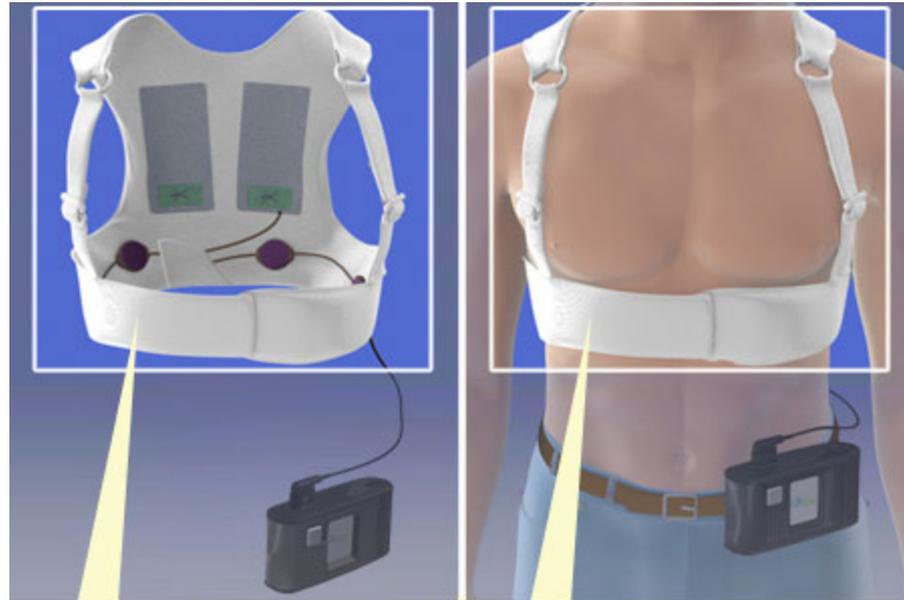
# ZOLL LIFEVEST: OVERVIEW



# ZOLL LIFEVEST

## ◉ Wearable AED

- Harness
- Control Module
- Battery
- Three Pads
- Electrodes

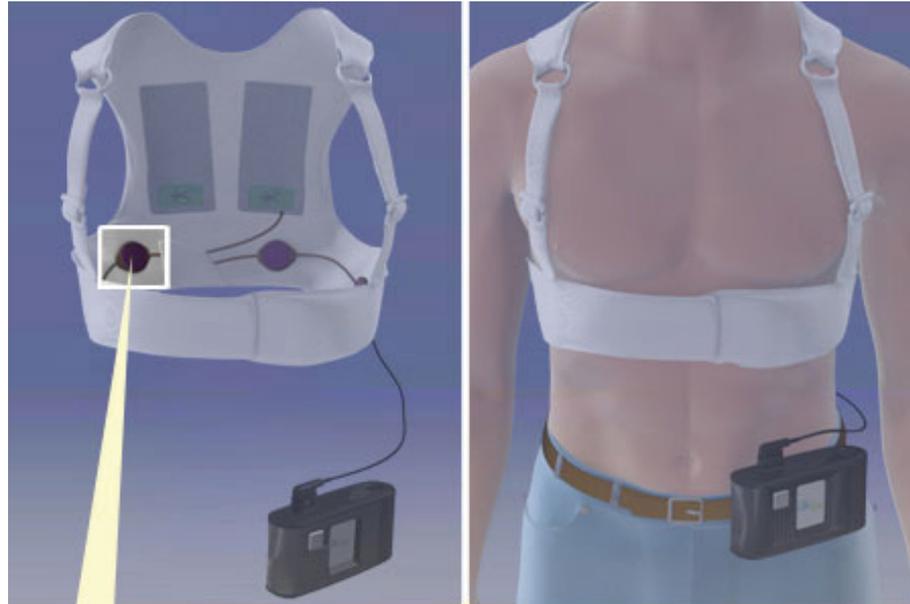


**Comfortable, lightweight garment is washable and can be worn all day, except when bathing and showering.**

# ZOLL LIFEVEST

## ○ Wearable AED

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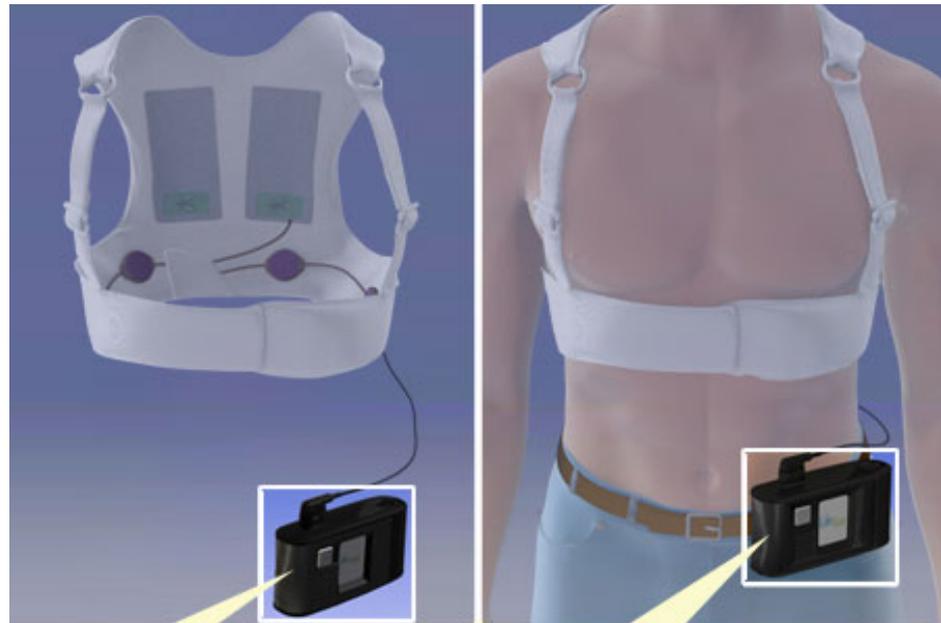


**Dry, non-adhesive sensing electrodes on this electrode belt continuously monitor patient's heart.**

# ZOLL LIFEVEST

## ○ Wearable AED

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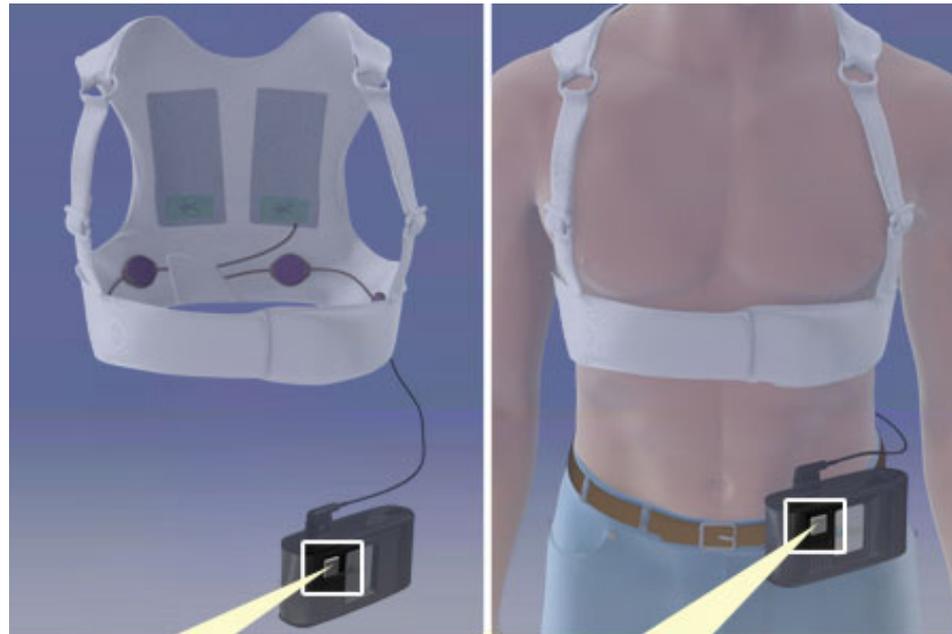


**This monitor is worn in a holster around the waist and collects ECG data from the sensing electrodes which can later be sent to a doctor via modem.**

# ZOLL LIFEVEST

## ◉ Wearable AED

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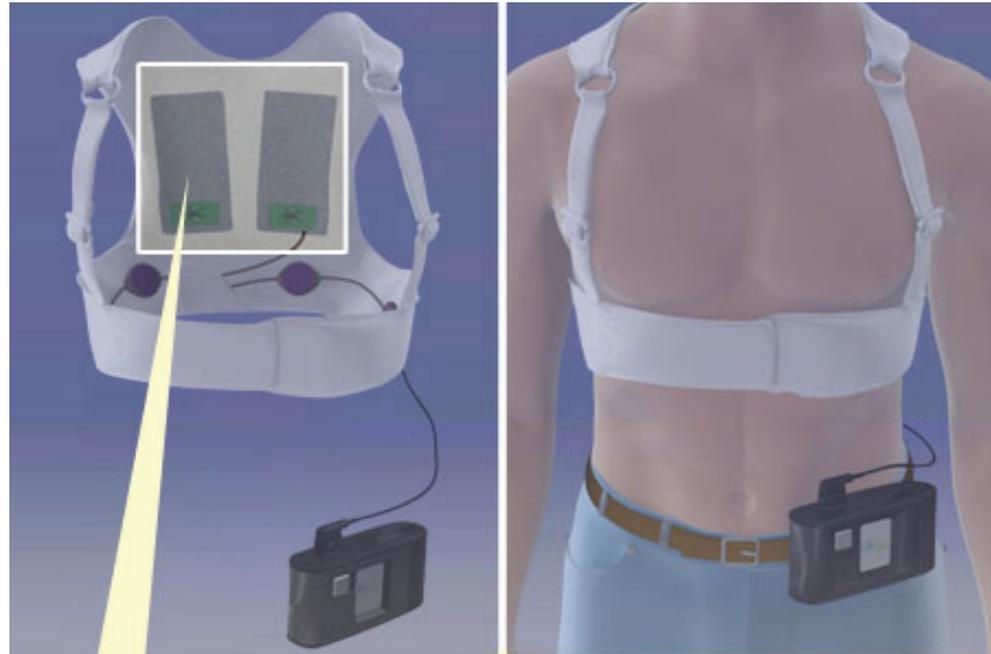


**If a life-threatening arrhythmia is detected, this alarm module alerts the patient with audible, visual and tactile alarms. A conscious patient can prevent a shock by simultaneously pressing two response buttons.**

# ZOLL LIFEVEST

## ◉ Wearable AED

- Harness
- Control Module
- Battery
- Three Pads
- Electrodes



**In the event of a life-threatening arrhythmia, these dry therapeutic electrodes will automatically deploy conductive gel prior to delivering a shock.**

# WHO USES THEM?

- ICD Removal
- Potential for SCA
- Current or old MI
- Cardiomyopathy Patients



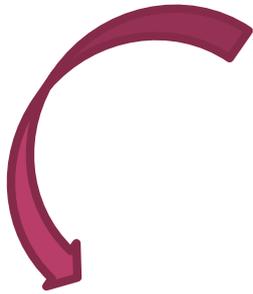
# STATISTICS

- Over 100,000 Patients have been RX
- 98% First Shock Success Rate
- Who is Wearing One in Your Community?
  - 90 Currently wearing in Upstate SC
- 2 Lives Saved Each Day Across the US.

# HOW DO WE TREAT THESE PATIENTS?

- ◉ Normal AED Patient
- ◉ Alarm will sound
- ◉ 45 seconds
- ◉ Disable Vest

# HOW THE DEVICE HAS MORPHED



# HOW IT WORKS



# WHAT WAS THAT INFORMATION?

**ZOLL.** LifeVest



## Questions & Answers

### 1. What is a LifeVest?

The LifeVest wearable defibrillator is worn by patients at risk for sudden cardiac arrest (SCA), providing protection during their changing condition and while permanent SCA risk has not been established.

### 2. What does the "Respond" message mean?

Before delivering a treatment shock, the LifeVest tests to see if a patient is conscious by providing the patient an opportunity to press and hold the response buttons to prevent a treatment shock. It is important that only the patient press and hold the response buttons.

### 3. What if the patient has Blue™ gel on their skin?

The LifeVest therapy pads release a Blue™ gel prior to a treatment shock to both improve shock conduction and mitigate burning. The gel should remain on the patient as long as the patient is wearing the LifeVest in case additional treatment shocks are required. If you choose to remove the LifeVest from the patient and monitor the patient with external equipment, the gel can be removed with water.

Questions & Answers continued on back

### 4. How long does it take for the LifeVest to treat a ventricular arrhythmia?

After the LifeVest detects a treatable arrhythmia, the time to treatment will be between 25 and 60 seconds depending on the type and rate of the arrhythmia and whether the patient presses the response buttons.

### 5. Can emergency personnel get shocked by the LifeVest?

Yes. No one should touch the patient while a shock is delivered. The LifeVest will warn bystanders with both a siren alert and a voice command stating "electrical shock possible, do not touch patient," or "bystanders do not interfere" before a shock is delivered.

### 6. Can emergency personnel use external defibrillation while the patient is wearing a LifeVest?

The monitor should be disconnected from the electrode belt prior to delivering an external defibrillation shock. The garment and belt do not need to be removed.

### 7. What if the patient describes or feels a vibration coming from the garment?

The vibrations, along with the alerts and voice prompts, are part of the LifeVest consciousness test, which requires the patient to press and hold the response buttons to avoid a shock. It is important that only the patient press and hold the response buttons.

### 8. What LifeVest items should the patient bring with them to the hospital?

If possible, the patient should bring the LifeVest, modem, charger, and extra battery to the hospital. This will allow the patient to download any stored event data from the monitor and charge the battery as required.

**24-hour technical support,  
please call: 800.543.3267**

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20C0002 Rev E

**ZOLL.** LifeVest

**LIFEVEST® WEARABLE  
DEFIBRILLATOR  
EMERGENCY PATIENT  
MANAGEMENT**



# WHAT WAS THAT INFORMATION?

## LIFEVEST® WEARABLE DEFIBRILLATOR EMERGENCY PATIENT MANAGEMENT

What **alert** sounds and **voice** prompts are being broadcast?

**ALERT:**

- Device Silent OR Gong Alert (SINGLE TONE)

**VOICE:**

- None — device silent
- "Contact physician"
- "Treatment has been given, call your doctor"

**STATUS:**

- Device is monitoring the patient
- Device may be alerting the patient to follow instructions on the screen

Proceed to First Responder Instructions Below

**ALERT:**

- Siren Alert (TWO TONE)

**VOICE:**

- "If patient is not responsive, call for help, perform CPR"
- "Device disabled, call ambulance"

**STATUS:**

- Device cannot detect ECG or the device has delivered the maximum number of treatments

Proceed to First Responder Instructions Below

**ALERT:**

- Siren Alert (TWO TONE)

**VOICE:**

- "Press response buttons to delay treatment"
- "Electrical shock possible. DO NOT TOUCH PATIENT"
- "Bystanders do not interfere"

**STATUS:**

- Device has detected a ventricular arrhythmia
- Device is preparing to treat the patient
- Shock likely
- Stop CPR
- Only the patient should press the response buttons (patient consciousness test)
- Do not touch patient
- Allow device to treat the patient

Proceed to First Responder Instructions Below

### First Responder Instructions

- Proceed with standard evaluation and treatment measures.
- CPR can be performed as long as the device is not broadcasting "press the response buttons," "electrical shock possible, do not touch patient," or "bystanders do not interfere."
- If external defibrillation is available, a decision can be made to remove the LifeVest and monitor/treat the patient with the external equipment.
- To remove the LifeVest, first pull out the battery, then remove the garment from the patient.



### Questions & Answers

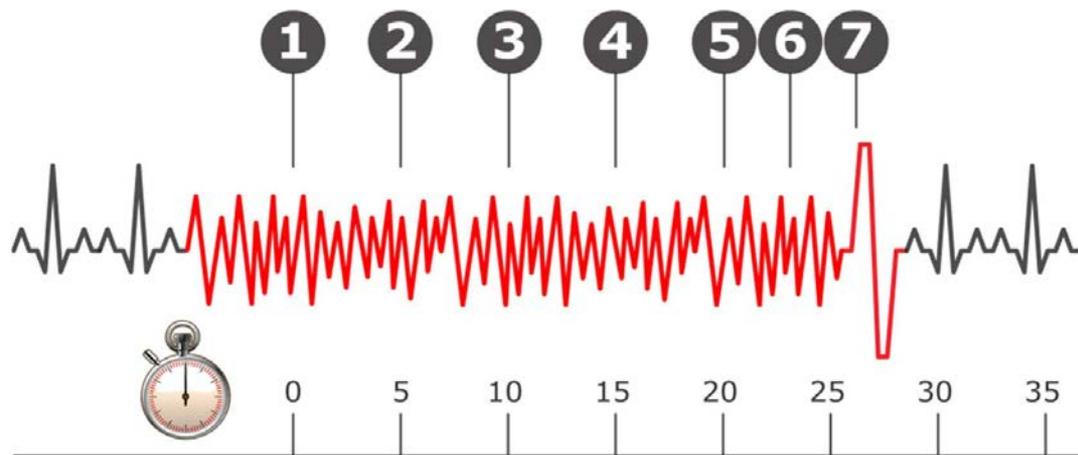
- 1. What is a LifeVest?**  
The LifeVest wearable defibrillator is used to deliver shocks to sudden cardiac arrest (SCA) patients, providing protection during heart stopping incidents and while personnel (EMTs, paramedics) have not been established.
- 2. What does the "Response" message mean?**  
When preparing a treatment shock, the LifeVest asks to use a patient's connection by pressing the patient's response buttons to proceed a treatment shock. It is important that only the patient press and hold the response buttons.  
The LifeVest Response pads release a "Beep" or "ping" as a treatment shock is both prepared and ready to be applied. The "ping" will occur if the patient is not responsive to the LifeVest or if the patient is not touching the pads. If the patient is not touching the pads, the LifeVest will not deliver a shock. The LifeVest will not deliver a shock if the patient is not touching the pads.
- 3. What if the patient has a "Beep" or "ping" on their chest?**  
The LifeVest Response pads release a "Beep" or "ping" as a treatment shock is both prepared and ready to be applied. The "ping" will occur if the patient is not responsive to the LifeVest or if the patient is not touching the pads. If the patient is not touching the pads, the LifeVest will not deliver a shock. The LifeVest will not deliver a shock if the patient is not touching the pads.
- 4. How long does it take for the LifeVest to treat a ventricular arrhythmia?**  
After the LifeVest pads are in contact with the patient, the time to treatment will be between 30 and 60 seconds depending on the type and size of the arrhythmia and whether the patient presses the response buttons.
- 5. Can emergency personnel get shocked by the LifeVest?**  
No. The LifeVest does not deliver a shock unless the patient is in contact with both pads and a voice command saying "electrical shock possible," "do not touch patient," or "bystanders do not interfere" before a shock is delivered.
- 6. Can emergency personnel use external defibrillation while the patient is wearing a LifeVest?**  
The patient should be disconnected from the external defibrillator prior to delivering an external defibrillation shock. The external defibrillator should be removed from the patient.
- 7. What if the patient disconnects or fails a connection coming from the garment?**  
The electrodes, along with the state status and voice prompts, are part of the LifeVest's continuous test, which requires the patient to press and hold the response buttons to proceed a shock. It is important that the patient press and hold the response buttons.
- 8. What if defibrillation should the patient bring with them to the hospital?**  
Patients who are unable to bring the LifeVest, including the pads and battery to the hospital, will allow the patient to be admitted and allow first aid from the medical provider to be initiated or resumed.

24-hour technical support, please call: 800.543.3267

**ZOLL**

LifeVest®

# ALARM SEQUENCE



## ○ Alarm Sequence

- 1. Arrhythmia detected, activating vibration alert (continues throughout sequence).
- 2. Siren alerts begin (continues throughout sequence).
- 3. Siren alerts get louder.
- 4. Patient audible prompt: "Electrical shock possible."
- 5. Gel release.
- 6. Bystander audible prompt: "Do not touch patient."
- 7. Treatment shock.

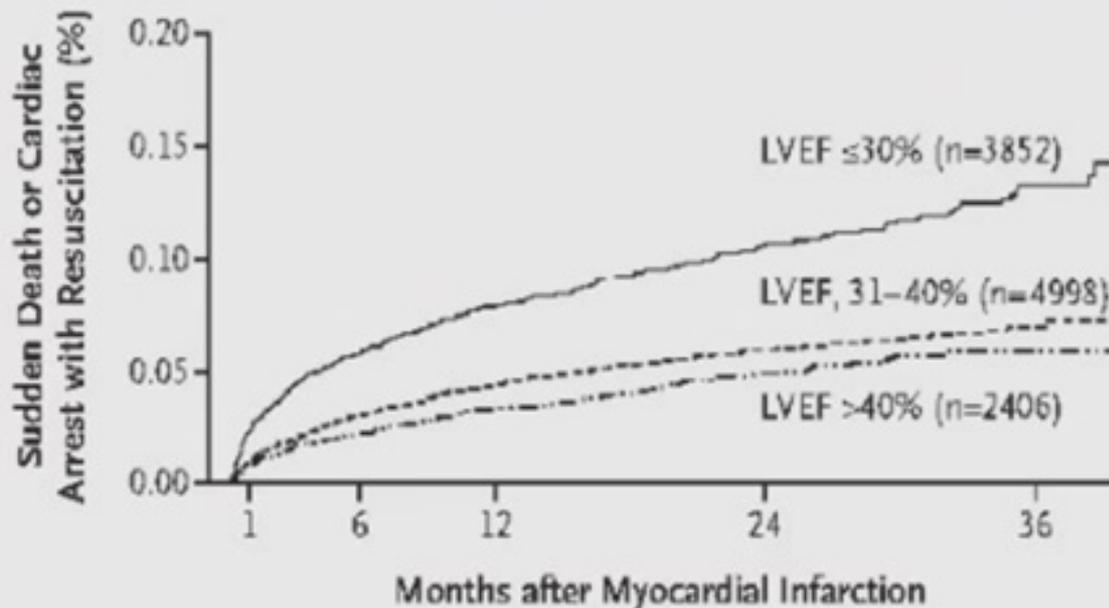
# PATHOPHYSIOLOGY



# HOW EJECTION FRACTION PLAYS A ROLE

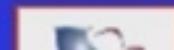
## Sudden Cardiac Death in the Post-MI and Post-PCI Population

Acute MI Patients  
VALIANT Trial



No. at Risk	11,256	10,183	9775	6262	994

- LVEF is an independent risk factor for SCD
- EF < 30% is the highest risk group but even those patients with EF < 40% have increased risk of SCD



# JUSTIFICATION

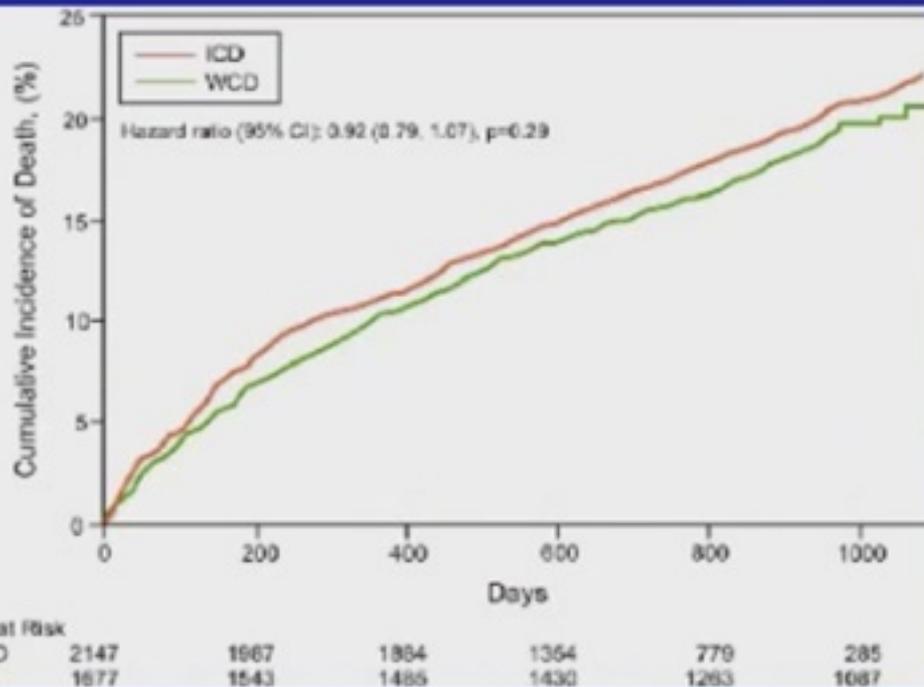
- Guidelines for Wearable Cardioverter-Defib
  - ACC/AHA/ESC 2006 Guidelines for Mgmt of Pts with VT/VF and Prevention of SCD
    - WCD (LifeVest) is a therapeutic option
  - 2006 International Society for Heart and Lung Transplantation Guidelines for the care of Cardiac Transplant Candidates
    - WCD is a Class 1 recommendation
  - Transvenous Lead Extraction: Heart Rhythm Society Expert Consensus on Facilities, Training, Indications and Patient Mgmt (endorsed by AHA)
    - WCD is an alternative to early re-implantation when there is concern for ongoing infection

# WHY/WHEN

- WCD Offers Protection From SCD
  - Protection from SCD during medical therapy titration
  - Protection from SCD during recovery from revascularization
  - Allows assessment of long-term arrhythmic rest at the end of the Medicare ICD waiting period (40 days post-MI with no revasc and 90 days post-PTCA/CABG)
  - Patients return for followup at the term of their WCD Rx
    - Should use be extended, ICD?

# WCD VS ICD

## Survival in WCD vs ICD patients



Survival was comparable to that of implantable ICD patients rationalizing the WCD use as an acceptable temporary alternative or bridge to long-term ICD implantation

# WHY IMPORTANT

- WCD helps to ensure that patients are screened for SCD risk
  - Creates a followup mechanism so the patient returns for evaluation at the end of Medicare ICD waiting period (40 days post-MI and 90 days post-PCTA/post-CABG)
  - Appropriate SCD risk stratification process increases and less patients lost to followup
  - ICD implants
    - Increase in appropriate ICD implants achieved by simple notification of PCP

# HOW DOES EMS HANDLE THESE PATIENTS?

- BLS crews may wish to leave the device in place. Remember, the patient must be conscious to cancel a shock.
- ALS crews will want to deactivate the device:
  - Remove the battery back to deactivate
  - Undo the front clasps and remove the device

QUESTIONS???