

First Response to Cardiac Arrest

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The Victim

- <https://www.youtube.com/watch?v=S7P7NkYhNOc>



AHA Statistical Update 2013

- 389,000 cardiac events (out of hospital)
- Bystander CPR (40%)
- Survival to hospital discharge (9%)



Morbidity Contributors of Patients with Cardiac Events

- High blood pressure (40%)
- Smoking (14%)
 - Student 9-12 grade smoke (18%)
- Poor diet (13%)
- Physical deconditioning (12%)
- Diabetes (16%), pre-DM (38%)



The Sobering Facts

- Rates of CV death has declined but the disease burden has increased
- CV deaths (cardiac and stroke) account for 1 in 3 deaths
- 1 in 6 have a coronary death event
- Each year 635,000 have a new MI event
- Every 34 seconds 1 American will have a coronary event and every 1 minute 1 will die



- Every 34 seconds 1 American will have a coronary event
- Every 60 seconds 1 American will die





Search: 78630279

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"It was unfortunate timing that he suffered his heart attack while playing charades."



Out of hospital cardiac arrest (OHCA) Surveillance Cardiac Arrest Registry to Enhance Survival (CARES) US 2005 – 2010

- 32,000 OHCA events (61% male)
- 22% were pronounced dead pre-hospital by EMS
- Survival to hospital admission was 26%
- Survival to hospital discharge 9.6%
- 37% were witnessed by bystander
- 33% of these got bystander CPR
 - Survival was 11.2% compared to those who did not get CPR 7%
- 3.7% were treated by an AED by bystander



Who wins?

- Persons most likely to survive were ones found to be in a shockable rhythm (Vfib or pulseless Vtach) – survival to discharge was 30%

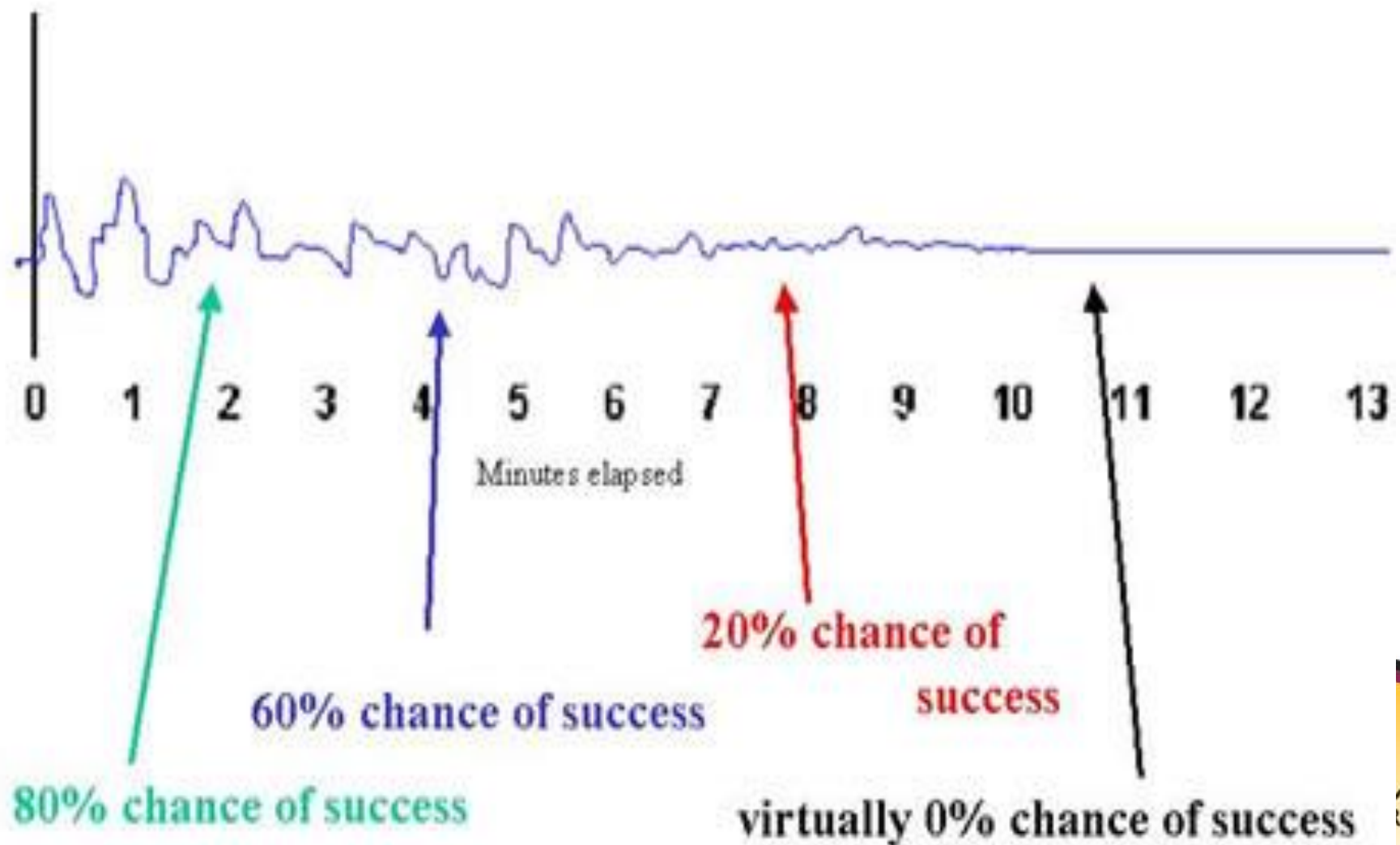


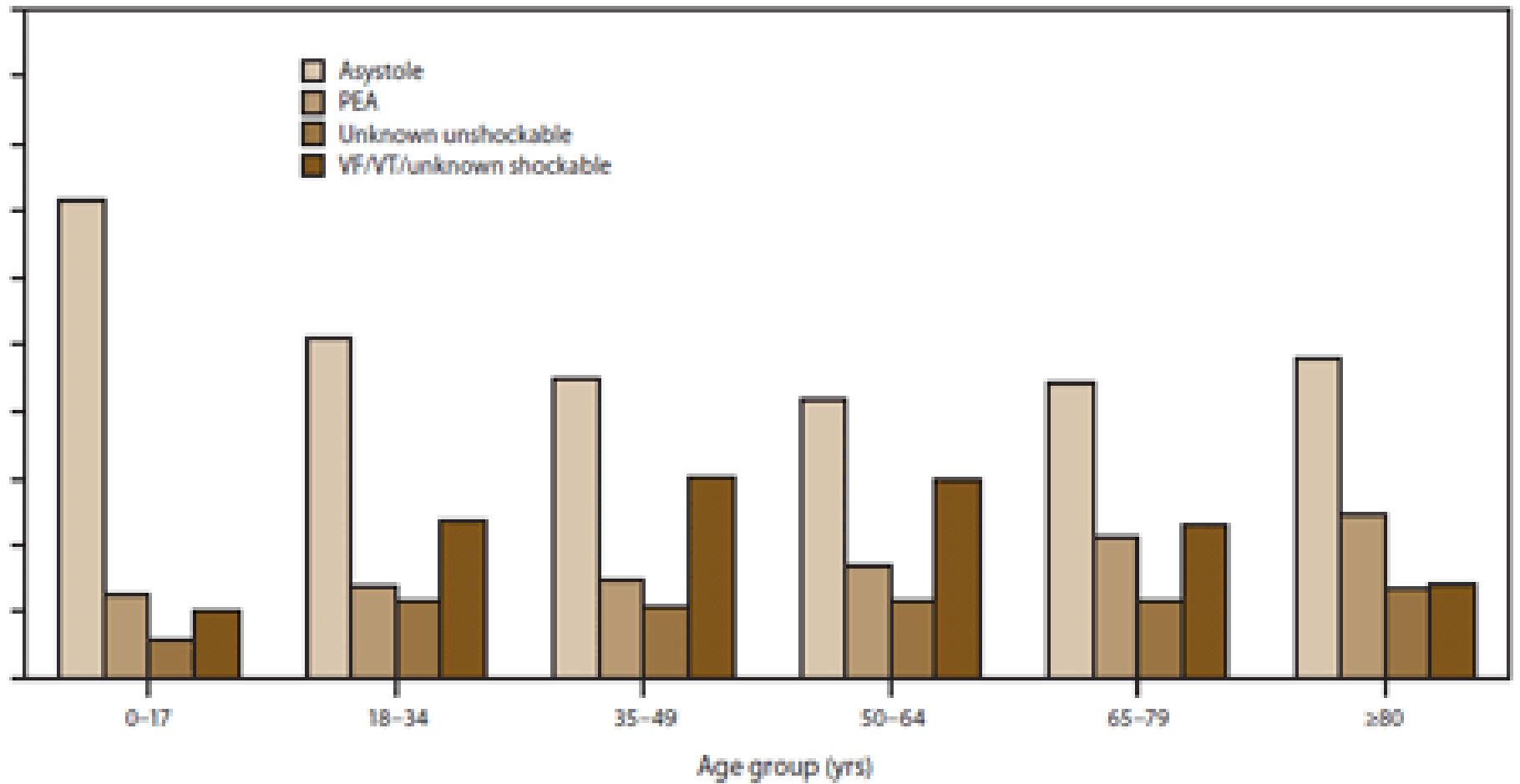
OHCA - Presenting Rhythm

- VT / VF more likely to survive event
 - A shockable rhythm (37% survival rate)
- PEA / Asystole (non shockable rhythm)
 - Less likely to survive (10%)



Defibrillation's chances of restoring a pulse decrease rapidly with time



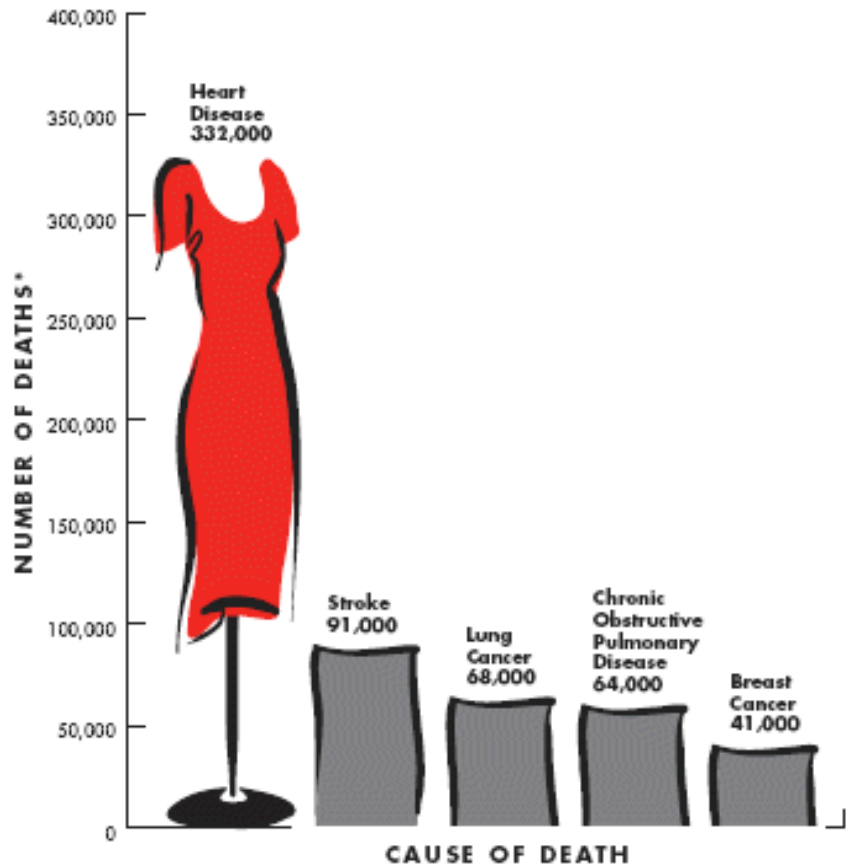


Heart Disease in Women

- Heart disease is the #1 killer in women
- Women less likely to ask for help
- Women tend to shrug off the symptoms
 - I have the flu, I am just getting old, I have GERD
- Go Red Campaign for Women



LEADING CAUSES OF DEATH FOR AMERICAN WOMEN (2004)



Women and CV Event

- https://www.youtube.com/watch?v=t7wmPW_TnDbE



Basic Life Support

- Look / listen to see if patient is breathing
- Check for pulse (10 seconds)
- If no pulse (or not sure) begin chest compressions at rate of 100 bpm
- Place AED on patient and follow prompts
- If not breathing 1 breath every 6 seconds or 10 breaths per minute



Advanced Life Support

The Cardiac Event

- Bradycardia
- Cardiac Pulmonary Edema
- Tachycardia with a Pulse
 - Narrow vs Wide
- Unstable Vtach / Vfib
- Asystole/PEA
- The STEMI
- Hypothermia treatment
- Cardiogenic Shock



Bradycardia - History

- Medications (beta-blocker, calcium channel blockers, clonidine, digoxin)
- Pacemaker
- Insecticide exposure
- Renal failure /dialysis



Bradycardia – Signs/Symptoms

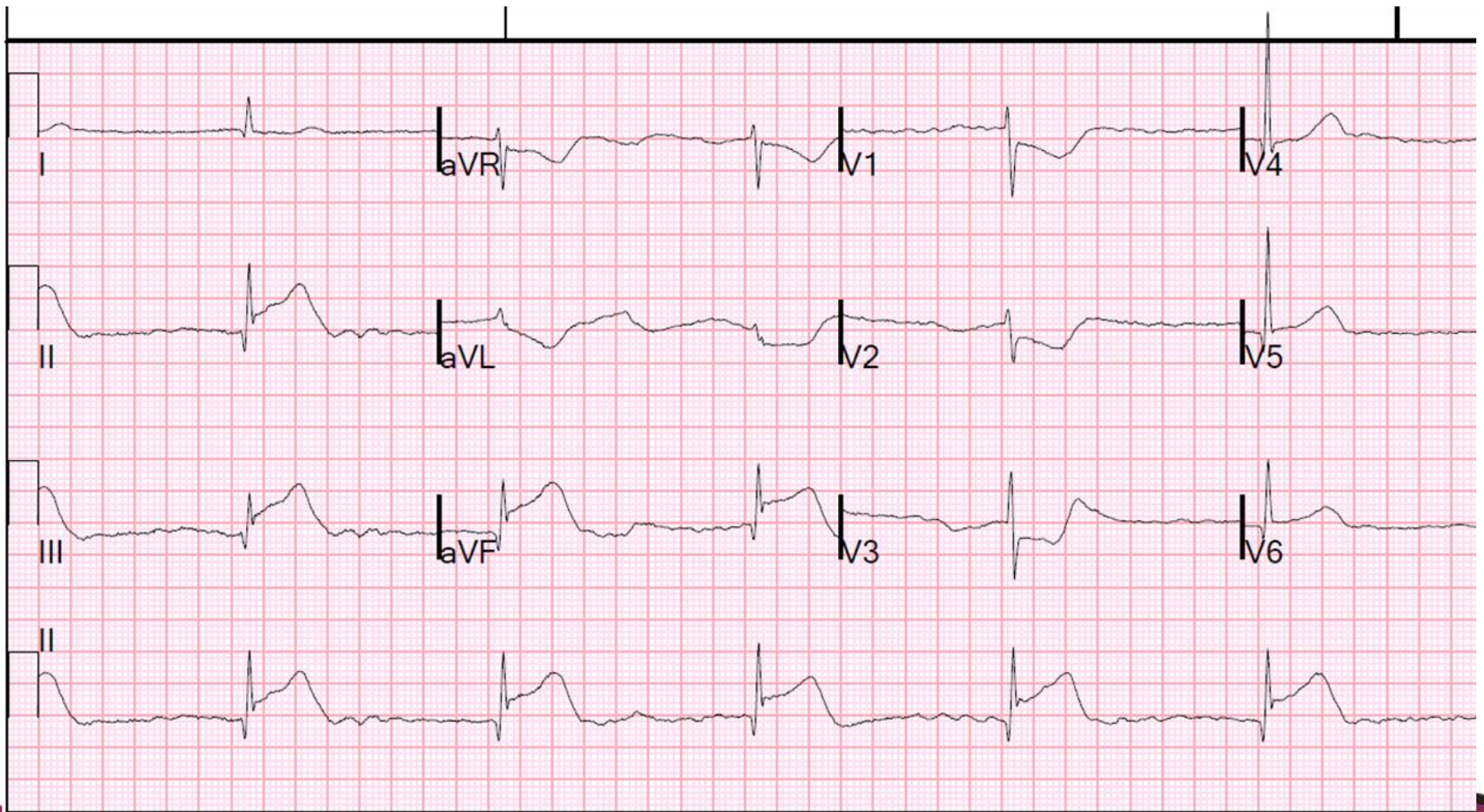
- Heart rate < 60 bpm
- Hypotension
- Altered mental status
- Chest pain
- Acute heart failure
- Syncope
- Respiratory distress
- Right coronary artery occlusion



Bradycardia - Treatment

- Normal saline or LR
- Atropine (0.5mg IV) may repeat 3-5 minutes
 - 0.02mg/kg pediatric
- Dopamine 2-10mcg/kg/min IV
- Epinephrine 2-10mcg/min IV
 - (0.01mg/kg IV pediatric)
- Avoid NTG if hypotensive or Inferior MI





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Cardiac Pulmonary Edema - History

- History of heart failure
- Hypertension
- Myocardial infarction
- Medications (lasix, digoxin)
- Viagra, levitra, cialis



Cardiac Pulmonary Edema – Signs/Symptoms

- Respiratory distress
- Bilateral rales
- Orthopnea
- Jugular venous distention
- Pink, frothy sputum
- Peripheral edema
- Diaphoresis
- Hypotension/shock
- Chest pain



Cardiac Pulmonary Edema - Treatment

- Respiratory support (intubate?)
- If systolic BP is > 110
 - NTG
 - Nitro-paste
- Consider continuous positive airway pressure
- Consider lasix



Tachycardia with a Pulse - History

- Stimulant medications/street drugs
- Previous MI/cardiac history
- History of Afib, SVT, WPW syndrome
- Pacemaker, ICD
- Syncope or near syncope
- Heart failure

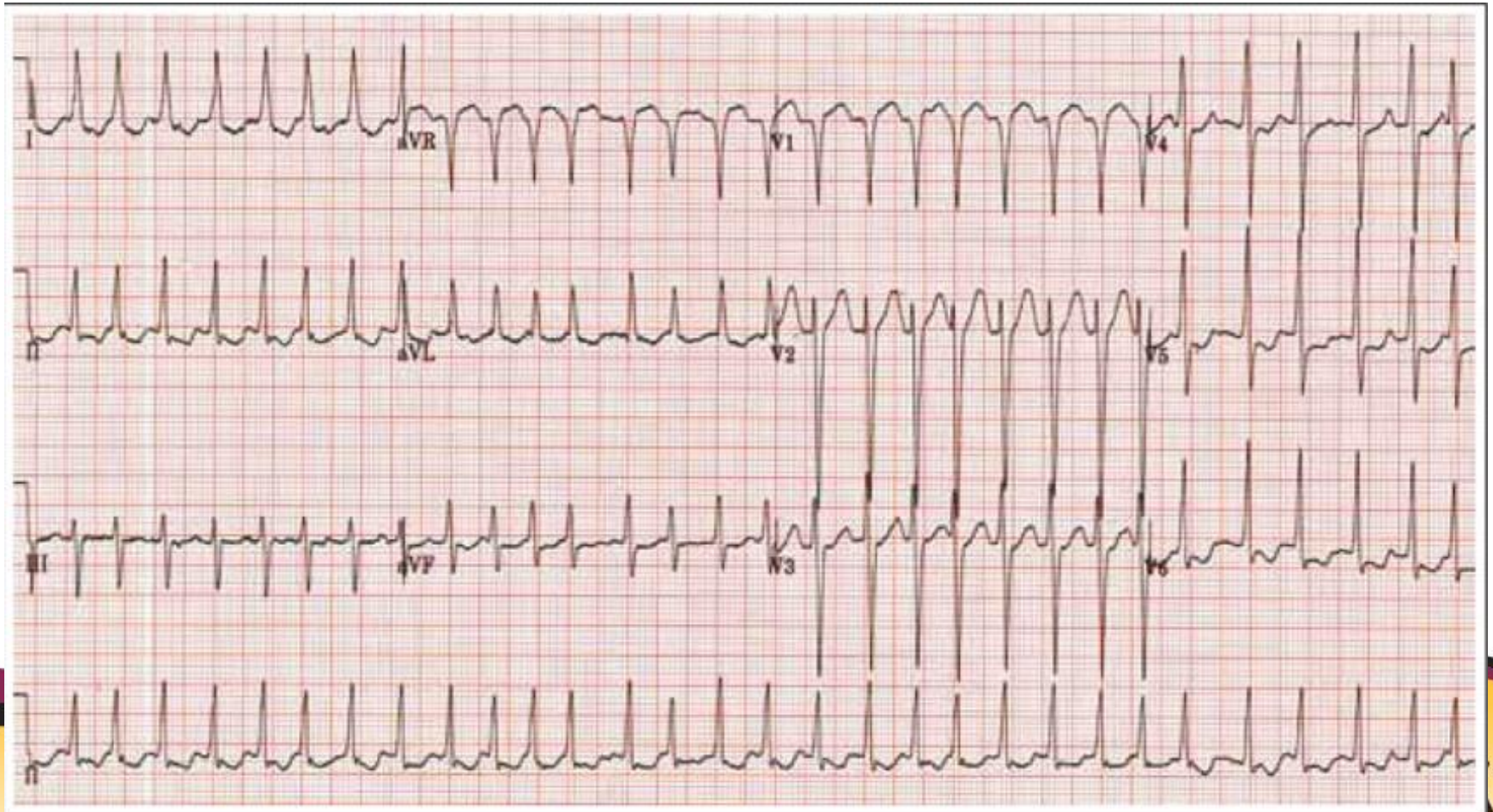


Tachycardia with a Pulse – Signs/Symptoms

- Heart rate > 150
- ECG: QRS duration (wide or narrow)
- Lightheadedness
- Chest pain
- Dyspnea



Narrow complex tachycardia



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Tachycardia with a pulse

- Patient is stable, QRS is narrow
 - Vagal maneuvers
 - Adenosine 6mg IV push FAST, may repeat with 12mg
 - May show underlying Afib/Flutter waves
 - May convert rhythm to normal sinus
 - Diltiazem 20mg IV push

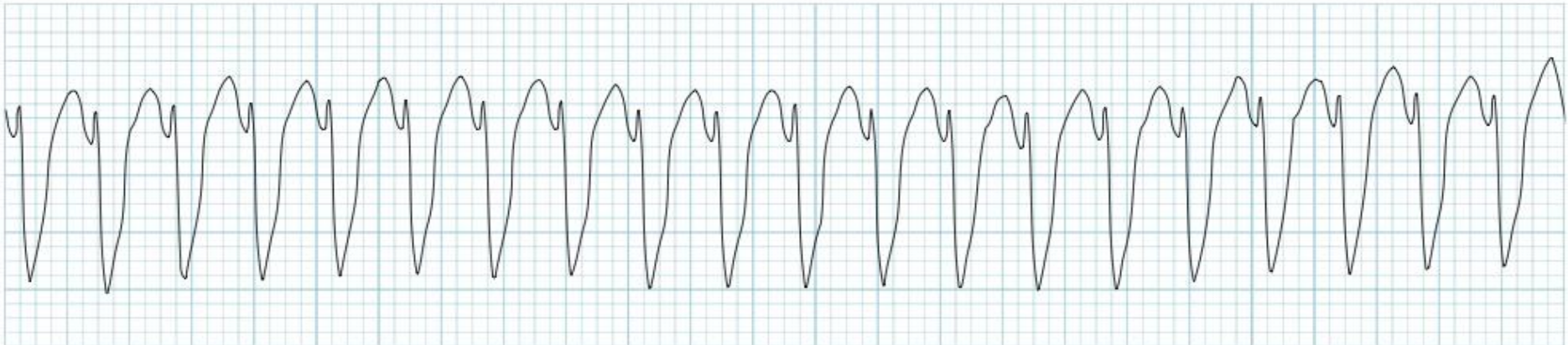


BEWARE! WPW with Afib



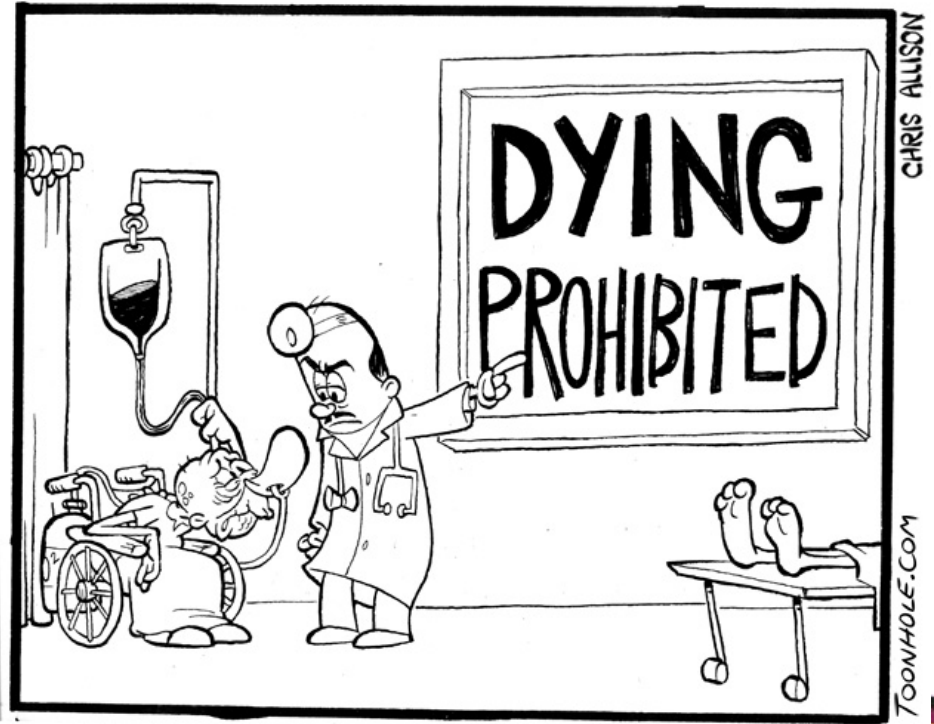
Tachycardia with a Pulse

- Stable patient with wide QRS
 - Amiodarone 150mg IV
- Patient is becoming unstable (low BP, altered, ect)
 - Consider paralytic / sedation (?)
 - Synchronized cardioversion
 - Amiodarone 150mg IV



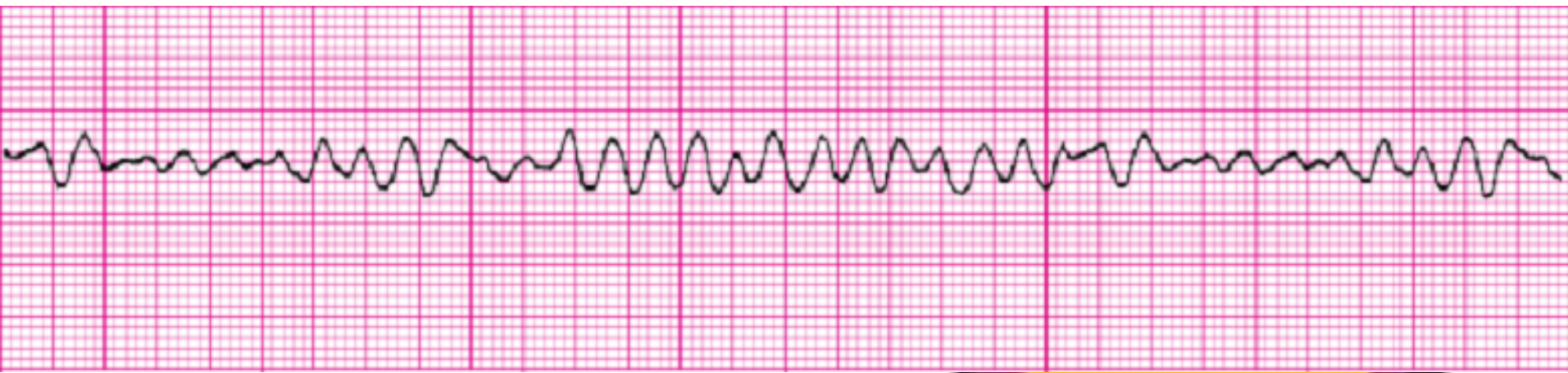
Vtach / Vfib - History

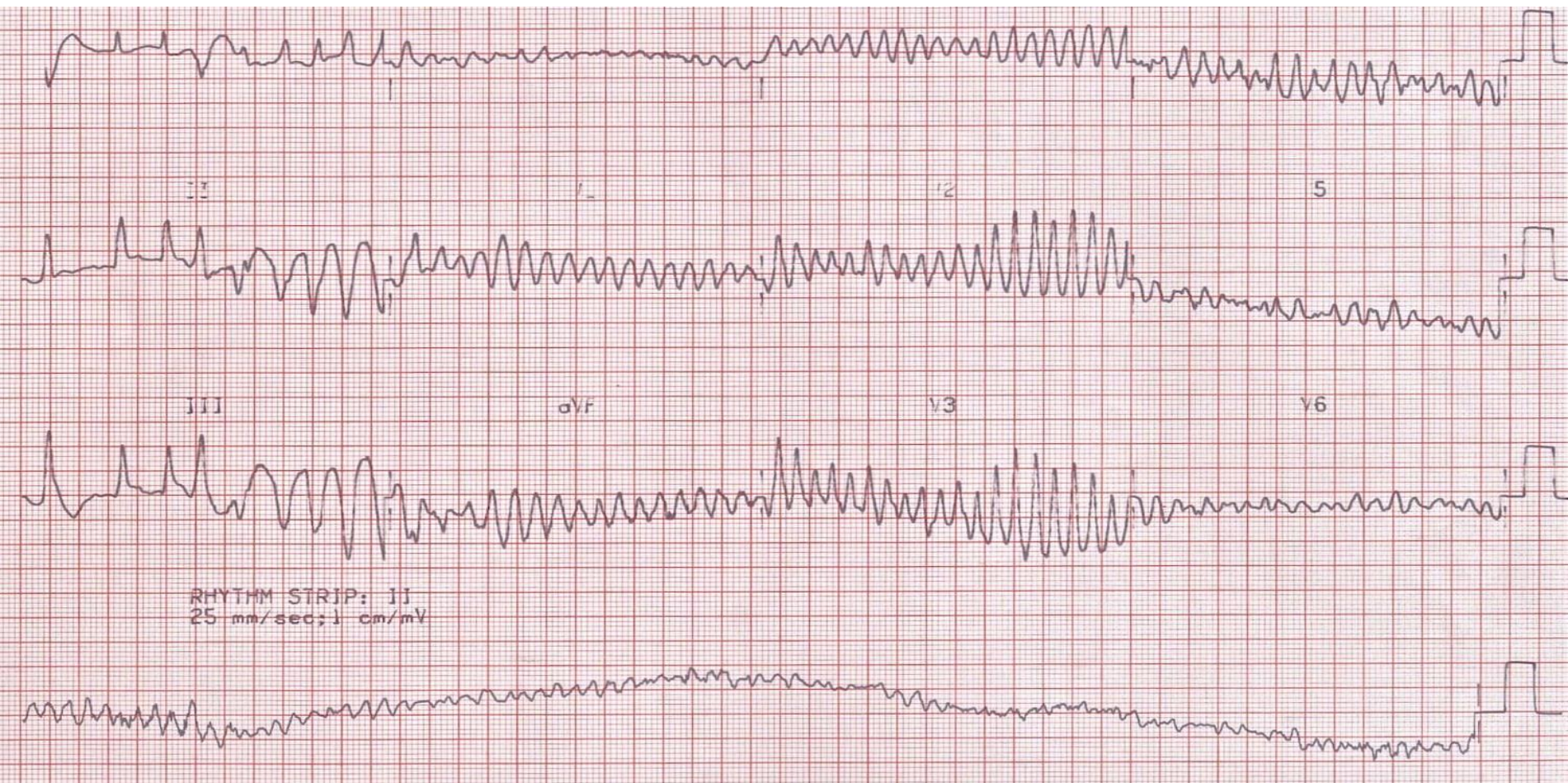
- History of cardiac disease
- Time of arrest
- medications
- Foreign body in airway
- Hypothermia
- Electrocutation
- Near drowning
- DNR



Vtach / Vfib Unstable – Signs/Symptoms

- The unresponsive patient with this strip...
- Apneic
- pulseless





Vtach / Vfib - Treatment

- Chest compressions
- 12 – lead ECG
- Defibrillation as soon as possible
- Resume CPR immediately for 2 minutes
- Consider epi 1mg IV/IO, repeat 3-5 minutes
- Shockable rhythm again?
- Resume CPR for 2 minutes
- Amiodarone 300mg IV/IO, may repeat 150mg IV
- Lidocaine 1.5mg/kg IV, may repeat 1 x q 5 minutes



Asystole and PEA - History

- Age
- Past medical history
- Medications
- Events leading to arrest
- End stage renal disease
- Estimated downtime
- Suspected hypothermia
- Suspected Overdose
- DNR or POST form



Asystole and PEA – History Cont

- Differential
 - Trauma
 - Hypoxia
 - Potassium (hypo or hyper)
 - Drug overdose
 - Acidosis
 - Hypothermia
 - Device error
 - Death



Asystole and PEA

- Pulseless
- Apneic
- ECG rhythm (electrical activity or asystole)
- No auscultated heart tones



Asystole and PEA - Treatment

- Chest compressions
- Epinephrine (1mg IV/IO, repeat q 3-5 minutes)
- Vasopressin 40 units IV/IO may replace 1st or 2nd dose of epi
- Levophed 1-10mcg/min IV
- Normal saline or LR (IL IV bolus)
- Sodium bicarb (50mEq)
- Calcium chloride 1gram
- Chest compressions



Chest Pain (STEMI) - History

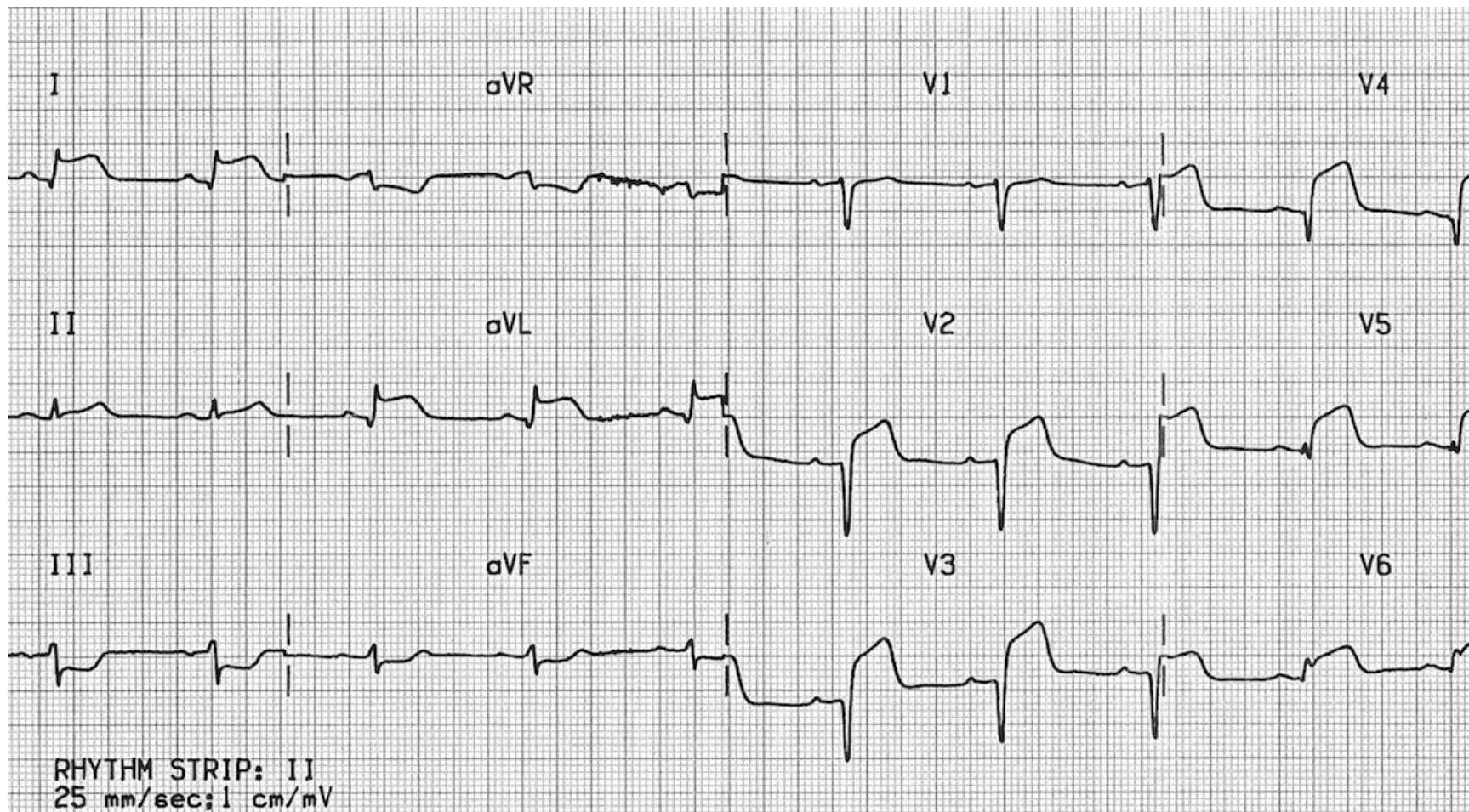
- Age
- History of cardiac disease
- Quality of pain (dull, radiating, constant, not reproducible with palpation, non pleuritic)
- Severity
- Exacerbated by physical exertion
- Time of onset, duration, frequency
- Diabetic may have atypical pain



Chest Pain (STEMI) - Treatment

- 12 lead ECG
- O2
- ASA 325mg - chewable
- NTG (if SBP > 90)
 - Careful of Inferior STEMI and bradycardia
 - Contraindicated if use of Viagra in past 24 hours or Cialis in past 36 hours
- Morphine
- AED / defibrillator pads





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Hypothermia protocol

- Return of spontaneous circulation with STABLE RHYTHM! Not IN SHOCK!
- NOT following commands
 - Secure airway
 - Maintain BP (NS/LR, dobutamine, epi, levophed)
 - Begin hypothermia protocol by placing ice bags in arm pits and groins or infusing cold IV normal saline



Cardiac Hypotension/Shock – Signs/Symptoms

- Altered mental status
- Weak, rapid pulse
- Cool, clammy skin (not just hands/feet)
- Delayed capillary refill
- Declining blood pressure



Cardiac Hypotension/Shock - Treatment

- Treat underlying cause (STEMI, Vtach, ect)
- Secure airway
- IV access
- Normal Saline / LR bolus
- Dopamine 5-20 mcg/kg/min IV
- Epinephrine 2-10 mcg/min IV



IOM Report, How Can We Do Better?

- Institute of Medicine 2015 report declares that 8 out of 10 out of hospital cardiac arrest occur at home
- 46% of in home cardiac arrests are witnessed
 - Only 40% of the witnesses will begin CPR
- 90% of these people will die before getting medical care.
- Only 6% -15% will survive hospital discharge.



Recognize and Initiate CPR Early!

- Need more engagement of initial bystander recognition and treatment
 - Recognize need for CPR, Call 911, start CPR, get AED
 - Decrease time between initial event and beginning CPR
 - Likelihood of survival decreases by 10% for every passing minute.
 - < 3% of population receives CPR training

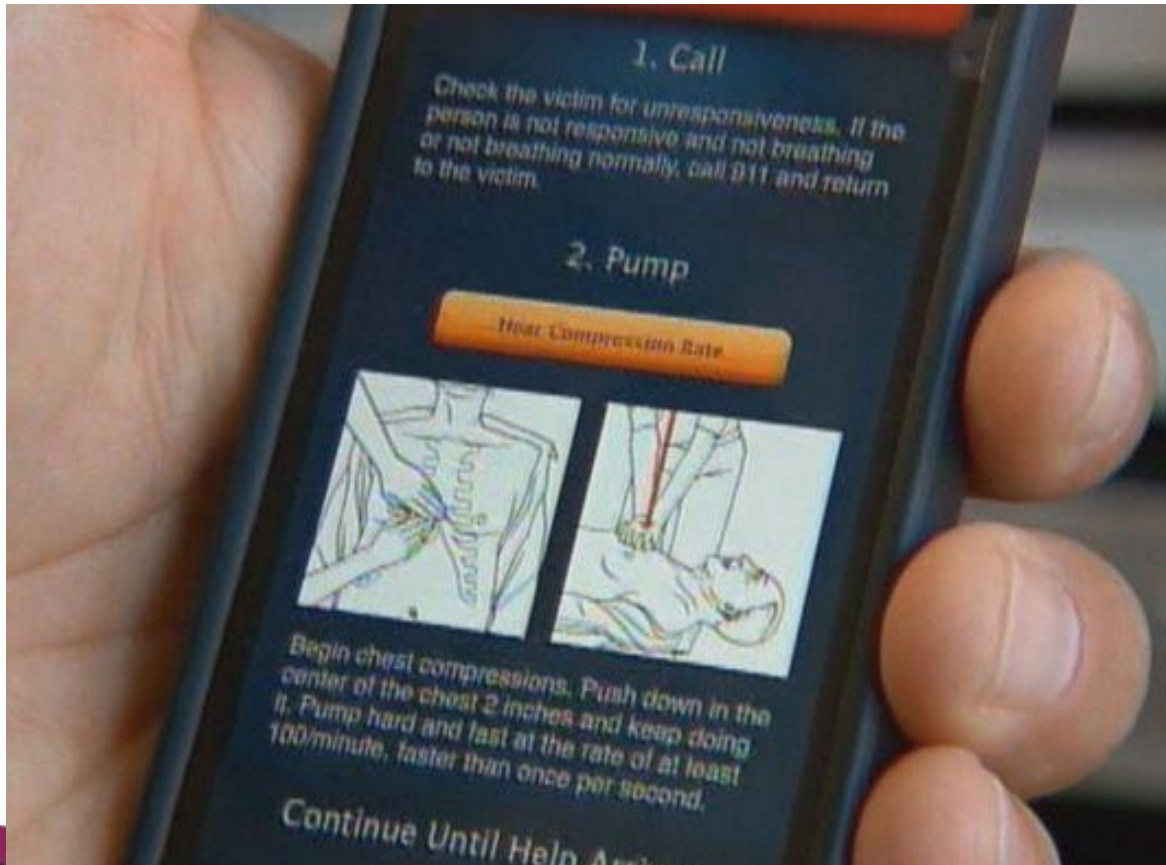


Initiatives

- Educate the public
 - Teach CPR and proper use of AED in middle school and high school
 - Encourage dispatcher assisted high quality CPR



There's an app for that!



Thinking outside the box

- Animation assisted CPR vs dispatcher assisted CPR
 - More accurate hand placement
 - Better depth and speed of CPR
- Video directed dispatcher assisted for CPR and/or AED use
 - More accurate, more confidence in provider, earlier CPR/AED
 - Needs more than 1 person, technical delays
- Map apps for AED locations
 - Identify quicker where a AED is located
- Mobile responders
 - Reached patient faster than EMS in 72% of the simulated events



Mobile CPR-Trained Bystanders

- Mobile CPR-trained bystanders
 - Regular people trained in CPR and agree to receive mobile alerts and location of emergency
- 667 OHCA and randomized to alert or not to alert the mobile trained non EMS personal
 - 62% in intervention group vs 48% in control group

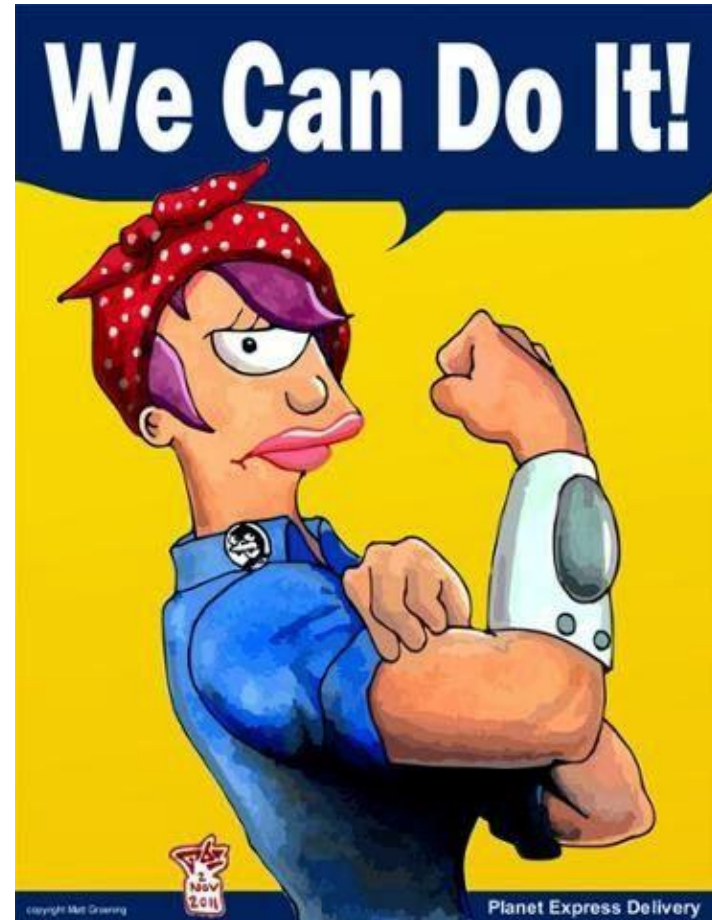


Bystanders...

- Only 20-30% of CPR trained bystanders will use it
- CPR quality deteriorates within months after training
- Smart phone apps do not meet BLS standard guidelines and may do more harm than good.



- Increased rate of survival in 30 days post arrest if bystander CPR was initiated, a world wide trend



Thank you

- <https://www.youtube.com/watch?v=Bw5dN7hcu5s>

