City of San Diego
2017 Medical Director Update

History

Per bystander pt. was riding motorcycle collided into the back of parked truck; wearing a helmet with full riding gear

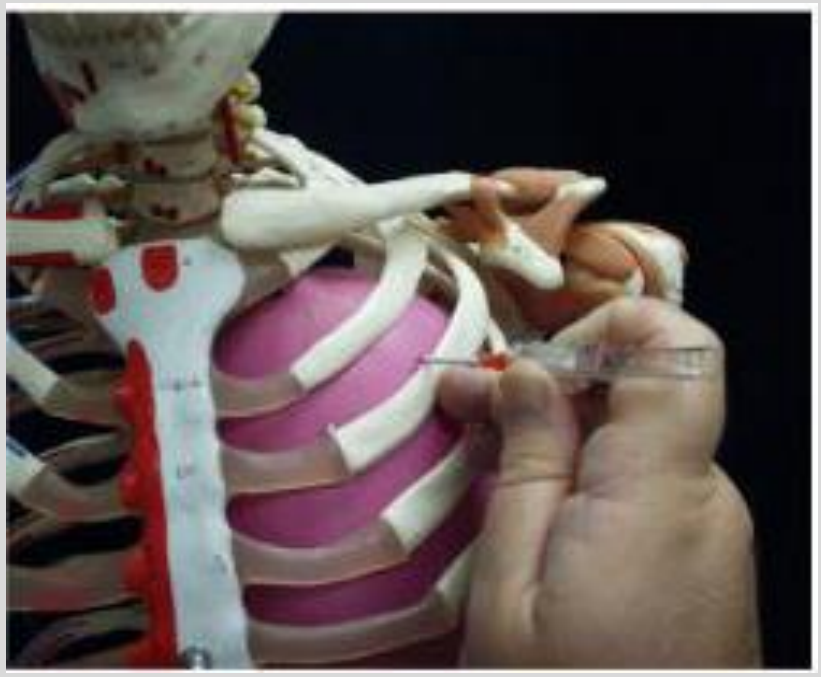
Initially patient alert but not oriented asking repetitive questions. No LOC, no thinners; not verbalizing pain.

BP 88 P74 R14 O2 sat 78% RA

Abrasions R arm
Breath sounds R clear, L absent
Chest: flail segment, crepitus over ribs
Opened eyes, MAE x 4

Scene care

- High flow O2
- Spine stabilization
- Needle thoracentesis, 14g
  - bright red blood
- At scene 22:20:46
- Depart scene 22:25:30

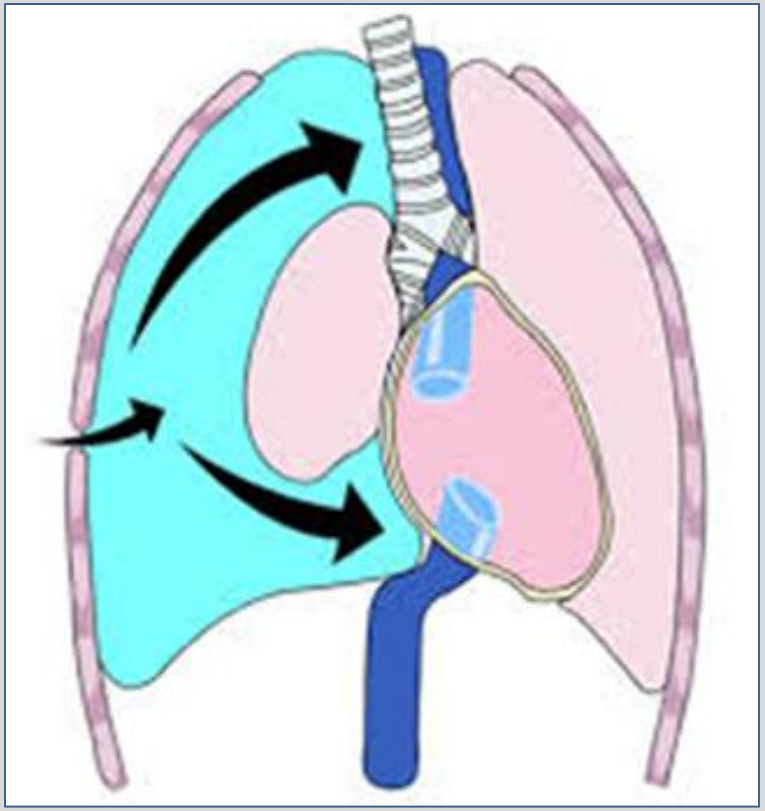


Course

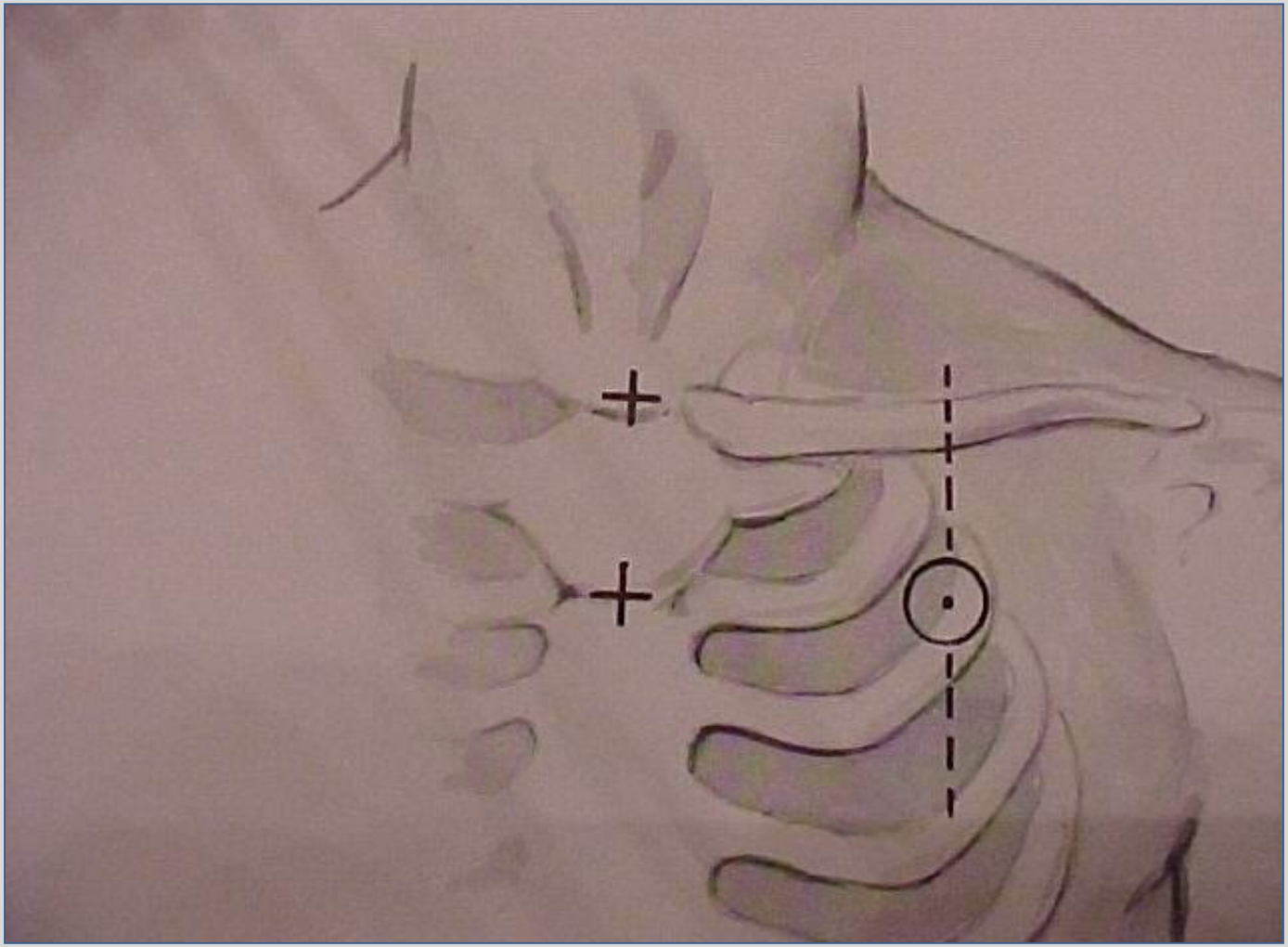
Patient Vitals									
Time	B / P	HR	T°	RR	Effort	Left Lung	Right Lung	SpO2 / Qualifier	EtCO2
22:25	88 /	74	36.7	14	Shallow	Absent	Clear	78 / At Room Air	
22:30	88 /	57	36.7	14	Mechanically Assisted (BVM, CPAP, etc.)	Diminished	Clear	85 / High Concentration O2 (10-25 LPM)	14
22:35	120 / 90	52	36.7	14	Mechanically Assisted (BVM, CPAP, etc.)	Diminished	Clear	92 / High Concentration O2 (10-25 LPM)	24
22:40	84 / 60	41	36.7	14	Mechanically Assisted (BVM, CPAP, etc.)	Diminished	Clear	97 / High Concentration O2 (10-25 LPM)	12

- Lost consciousness
- Lost pulses
- CPR
- Transferred to ED

Tension pneumothorax

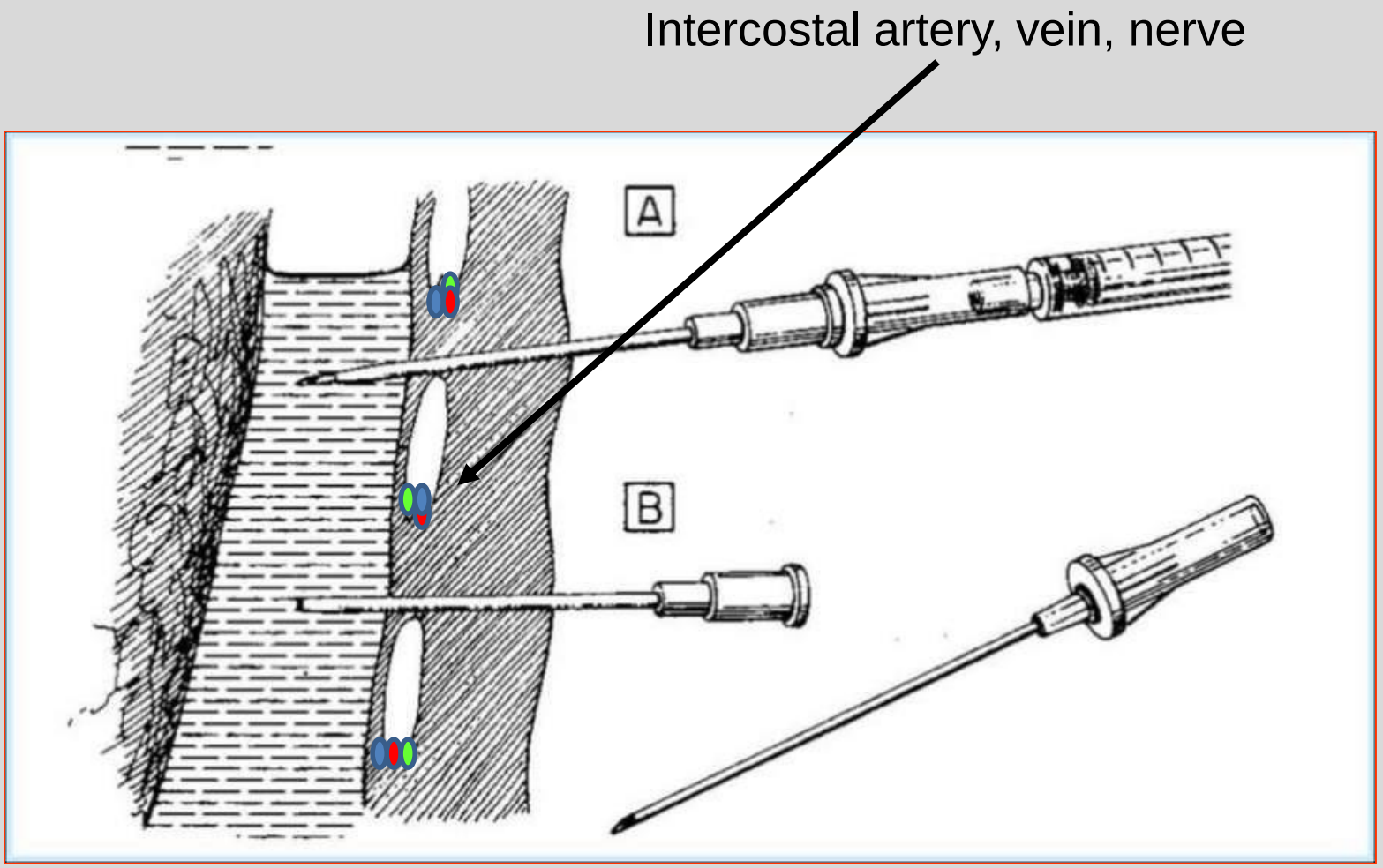


2nd interspace



http://www.naemt.org/education/TCCC/tccc.aspx

Over top of 3rd rib



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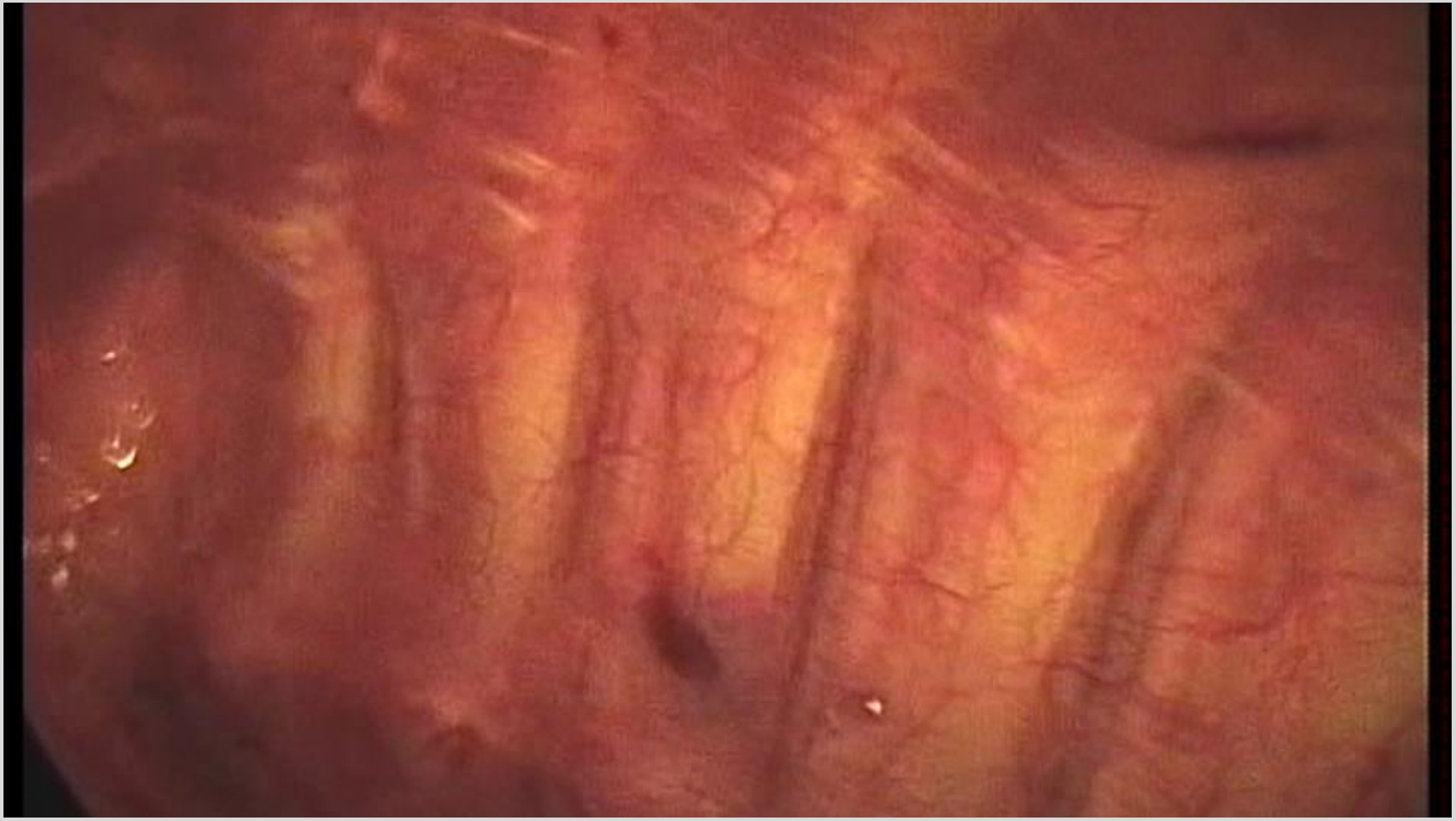
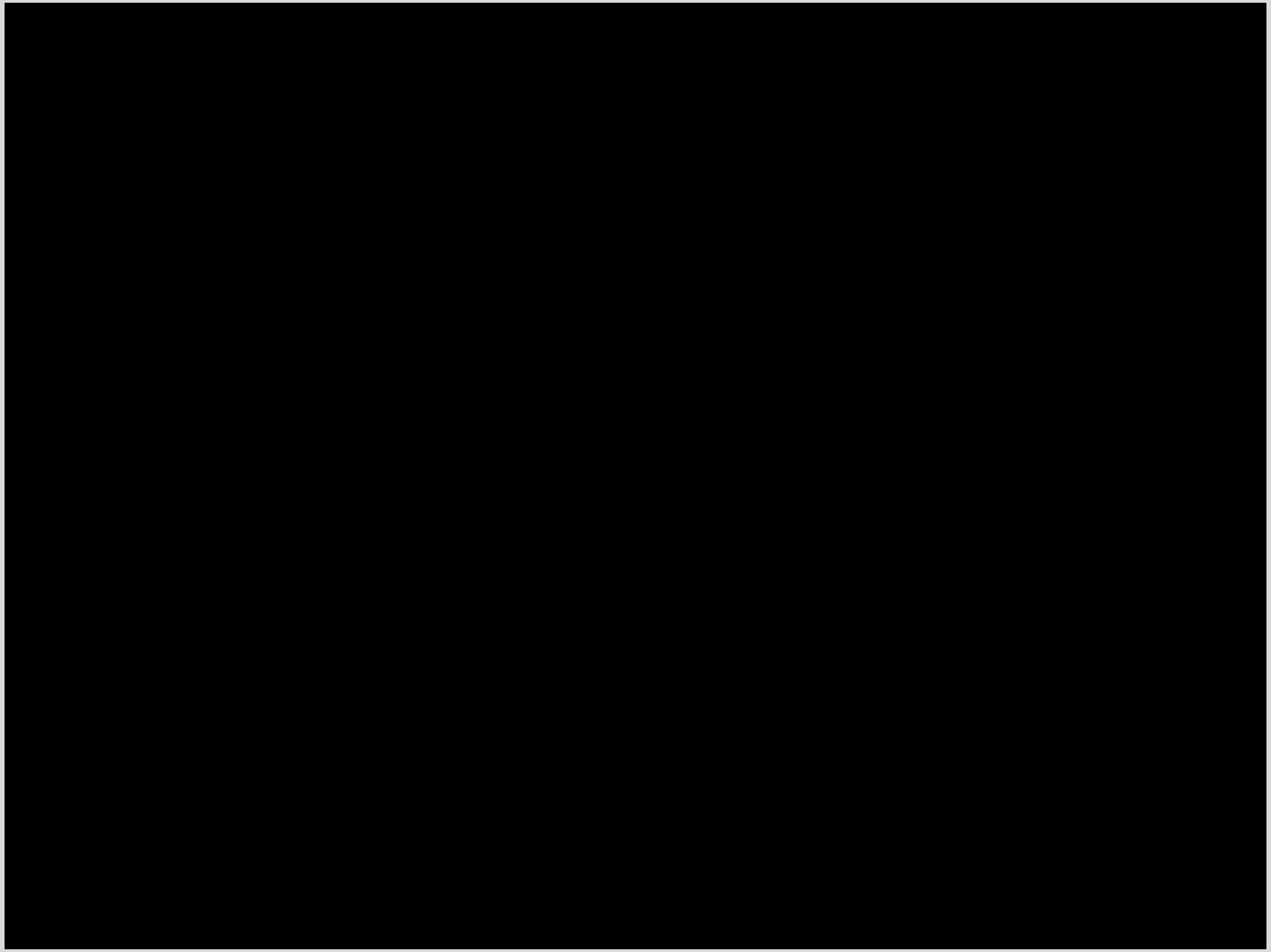


GSW victim Kyle Kraska (2015)

- E37 and M37
- Scene time 4 min
- Needled tension PTX

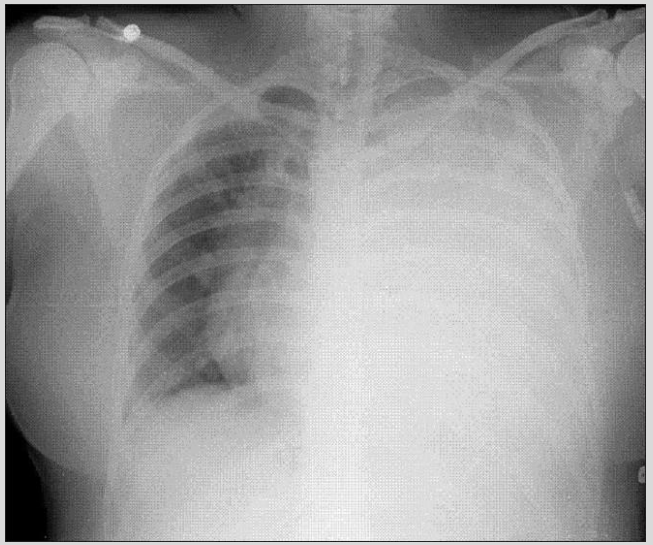


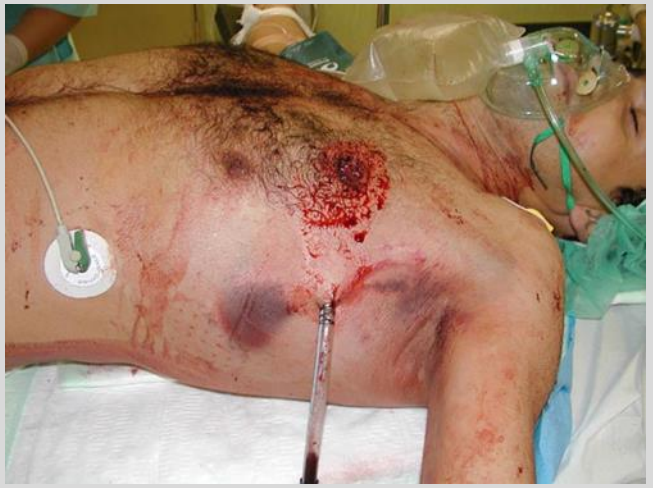
http://www.naemt.org/education/TCCC/tccc.aspx

Vented chest seal

Massive hemothorax

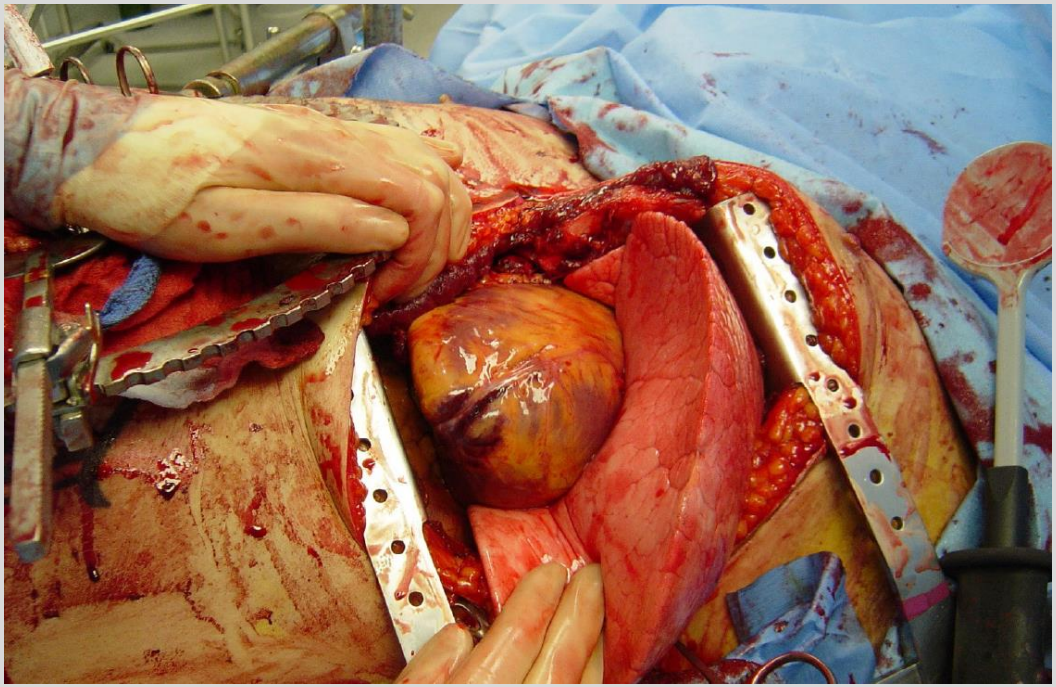
- Disruption of major vessel
- Shock
- Flat neck veins
- Dyspnea
- Unilateral absent BS
- > 1500 mL initial output from chest tube





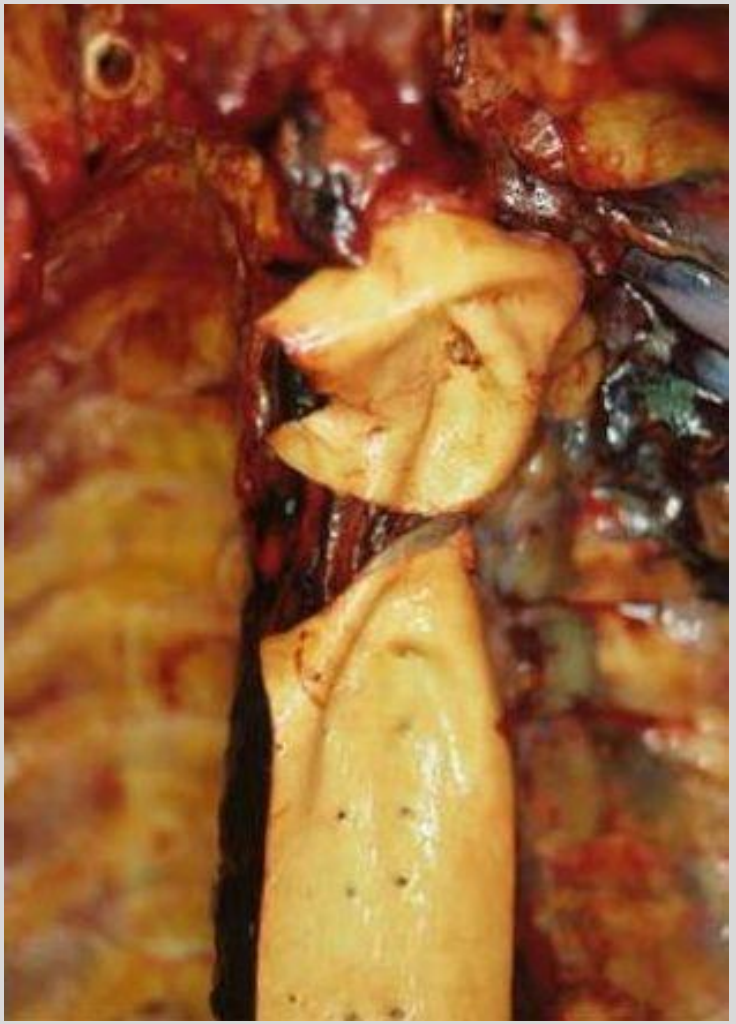
Indications for thoracotomy

- Uncommon
  - <10% blunt trauma
  - 15-30% penetrating
- > 1500 mL initial
- Continued bleeding
  - 200 ml/h x 2-4 h
- Repeat transfusions to maintain BP

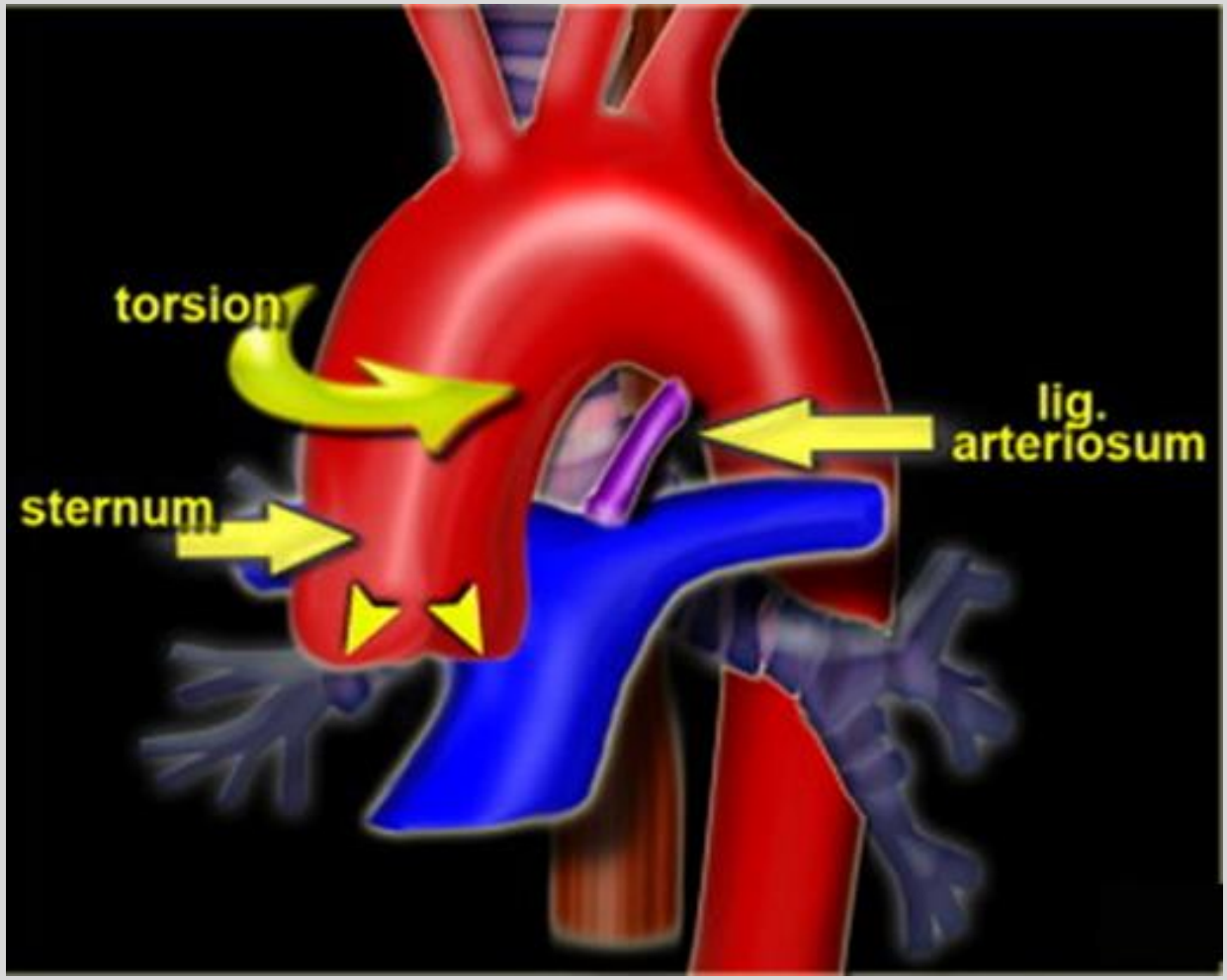


Blunt traumatic aortic injury

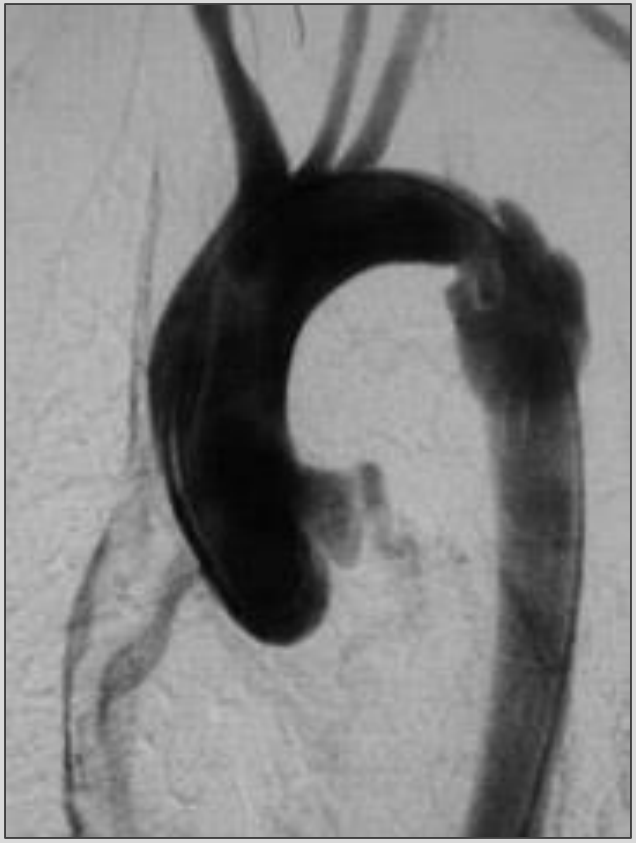
- 15% of MVA deaths
  - Transection
- Deceleration forces
  - MVA
  - falls

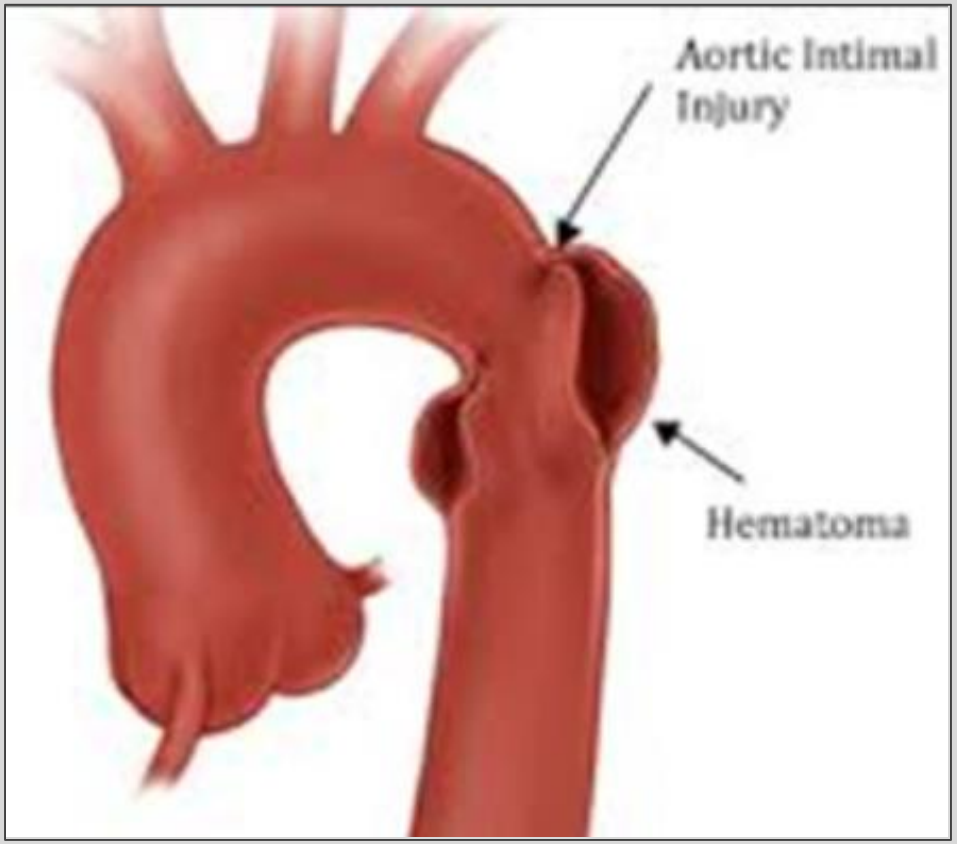


Blunt traumatic aortic injury



Blunt traumatic aortic injury





Why bradycardia?

Patient Vitals									
Time	**B / P**	**HR**	**T°**	**RR**	**Effort**	**Left Lung**	**Right Lung**	**SpO2 / Qualifier**	**EtCO2**
22:25	88 /	74	36.7	14	Shallow	Absent	Clear	78 / At Room Air	
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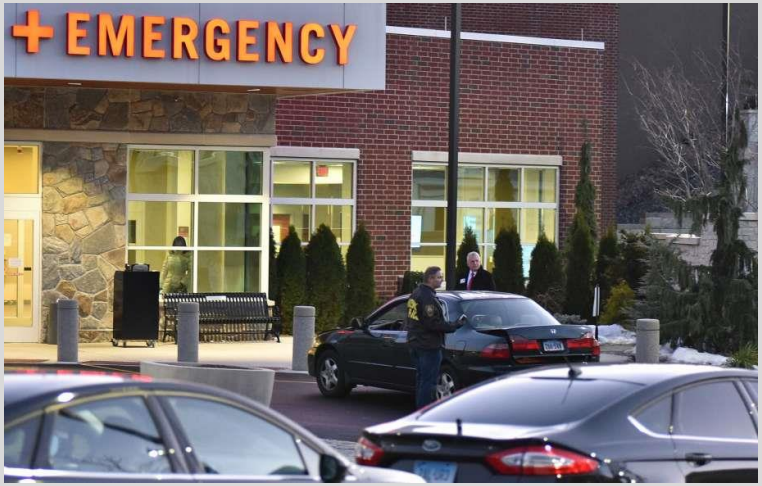
22:40	84 / 60	41	36.7	14	Mechanically Assisted (BVM, CPAP, etc.)	Diminished	Clear	97 / High Concentration O2 (10-25 LPM)	12

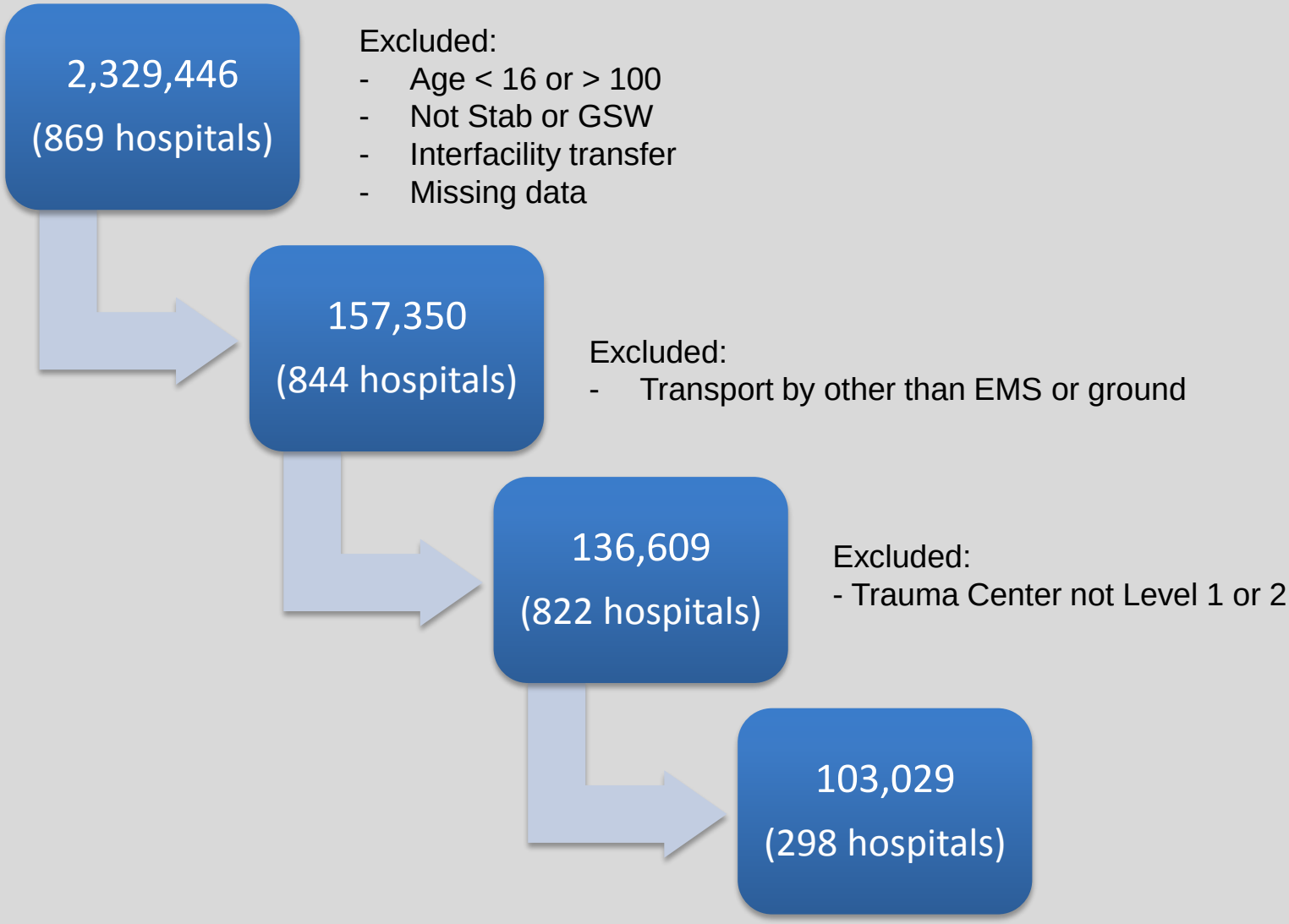
Paradoxical bradycardia in hemorrhagic shock

	Definition	Incidence of bradycardia
Hren T. (2002) 107 prehospital trauma px	BP <90 and P < 60 BP < 70 and P <60	28% 8.4%
Demetriades (1998) 750 hypotensive trauma px	BP <90 and P < 90	29%
Barriot and Riou (1987) 273 trauma/nontrauma px	BP < 70 and P < 60	8.4%
Snyder (1990) 750 major trauma px	BP < 90 and P < 90	29%
Thompson (1990) Major trauma	BP <100 and P < 100	35%
Hick (2001) Ruptured ectopic w hemoperitoneum	BP < 90 and P < 100	37%

What is the association between the means of transport for GSW and Stab wounds and survival?



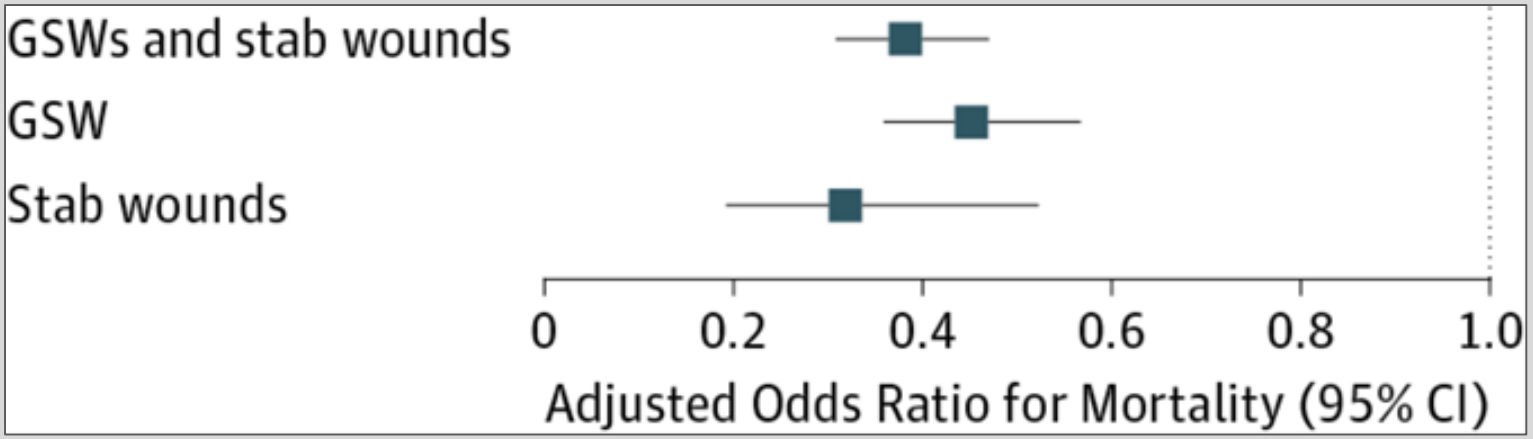
Wandling MW. Association of Prehospital Mode of Transport With Mortality in Penetrating Trauma. A Trauma System–Level Assessment of Private Vehicle Transportation vs Ground Emergency Medical Services. JAMA Surg. Published online September 20, 2017.



Wandling MW. Association of Prehospital Mode of Transport With Mortality in Penetrating Trauma. A Trauma System–Level Assessment of Private Vehicle Transportation vs Ground Emergency Medical Services. JAMA Surg. Published online September 20, 2017.

Conclusion

Favors private transport

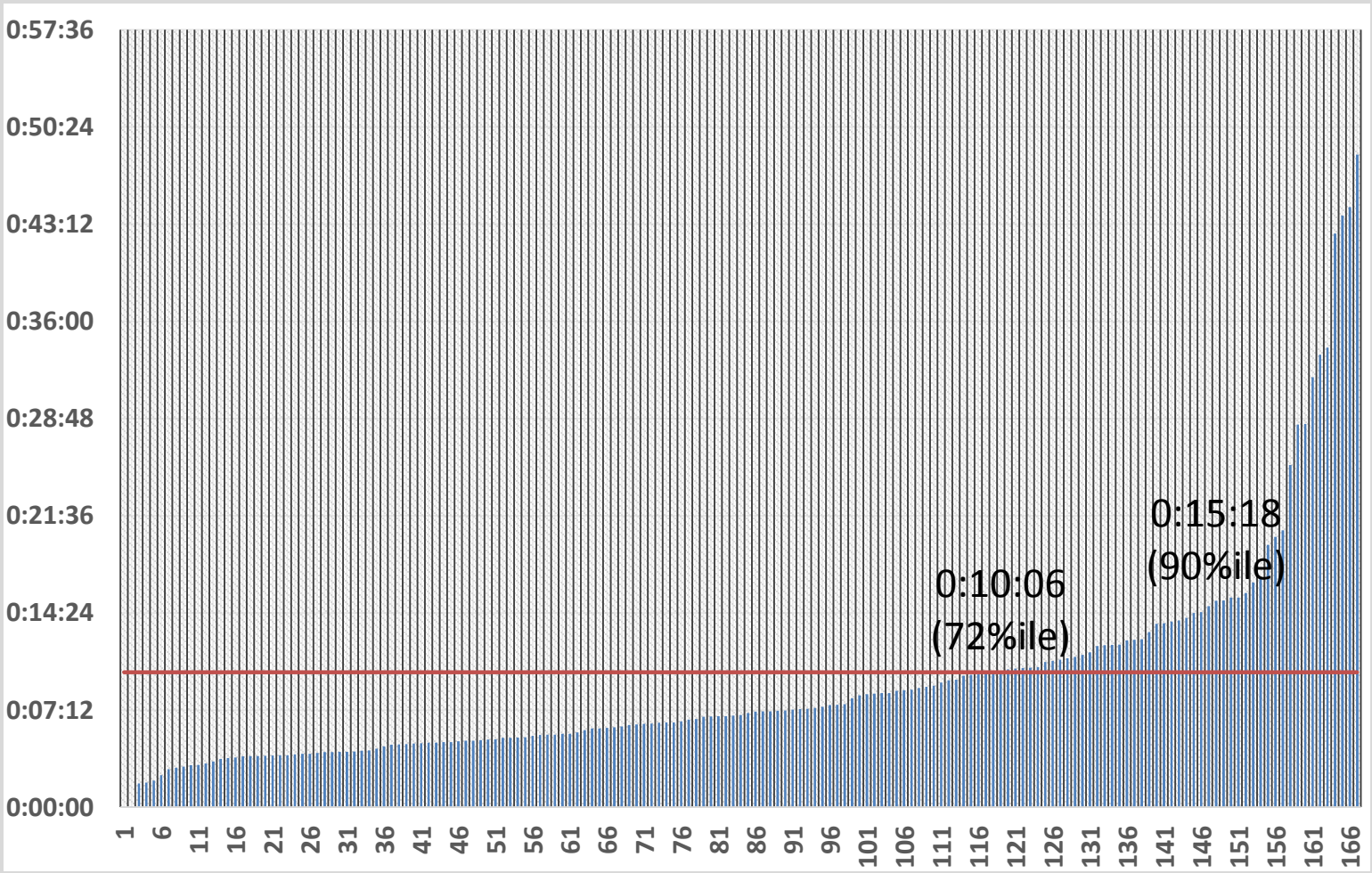


Wandling MW. Association of Prehospital Mode of Transport With Mortality in Penetrating Trauma. A Trauma System–Level Assessment of Private Vehicle Transportation vs Ground Emergency Medical Services. JAMA Surg. Published online September 20, 2017.

San Diego ambulance scene time

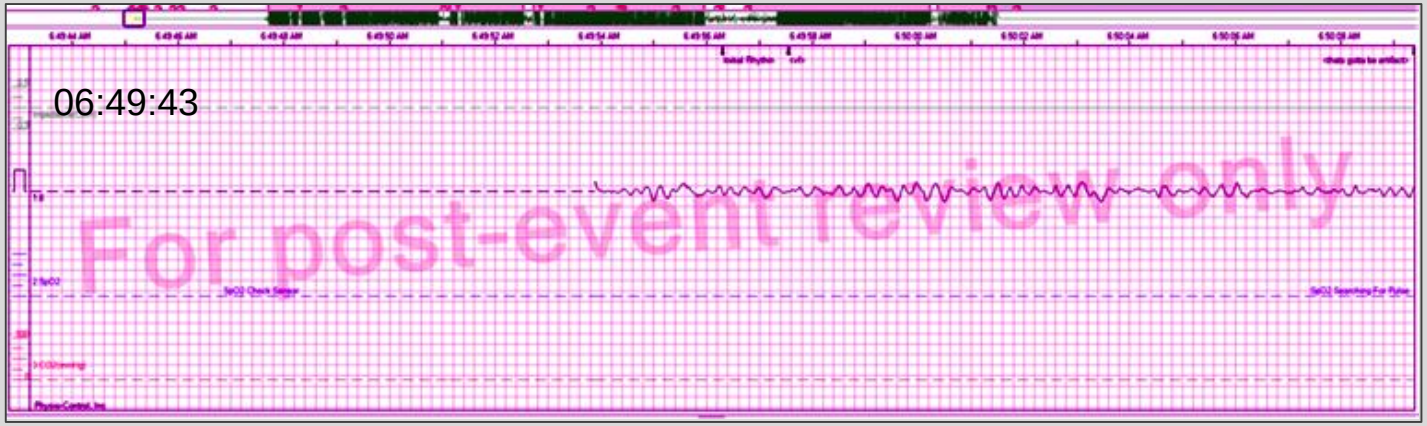
GSW / Stab Wounds transported red-lights-and-sirens

July 1, 2016 – June 30, 2017



- 47M witnessed by roommate
  - seized in bed
  - history of seizures
- Dispatcher verifies “not conscious and not breathing”
  - 09E01 CARDIAC ARREST
- Dispatcher assisted CPR


06:46:43
For post-event review only
06:47:43
For post-event review only
06:48:43
For post-event review only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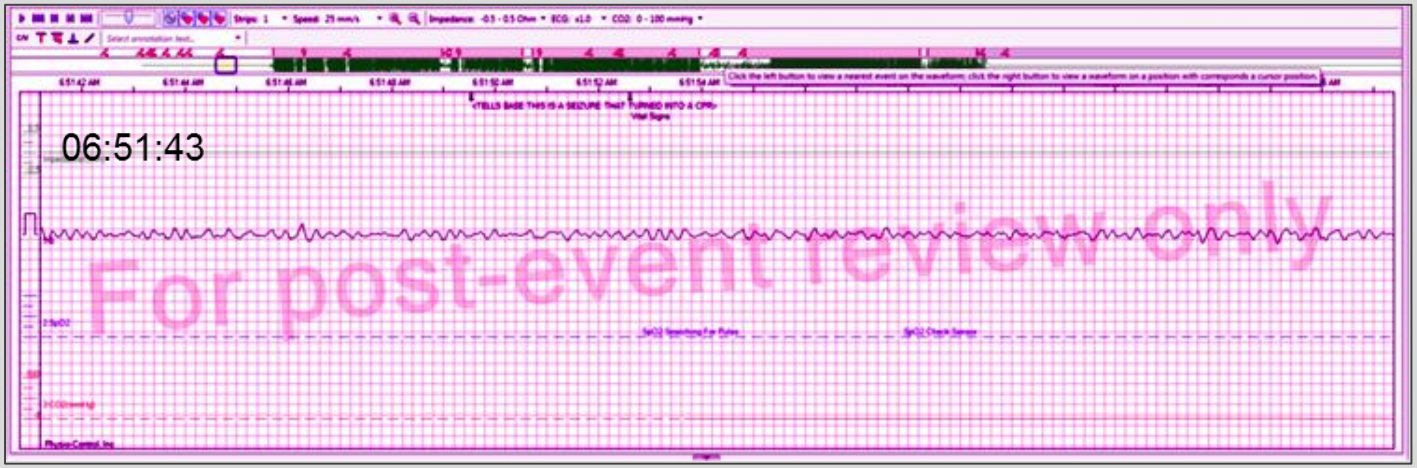
For post-event review only


06:50:43
For post-event review only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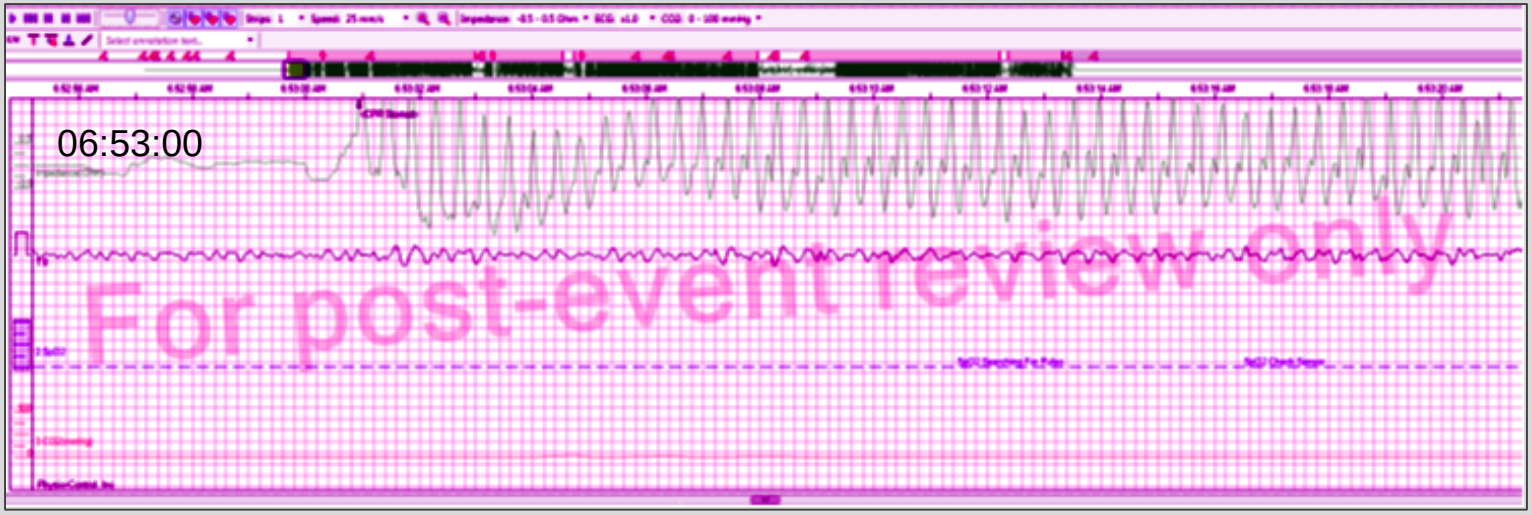
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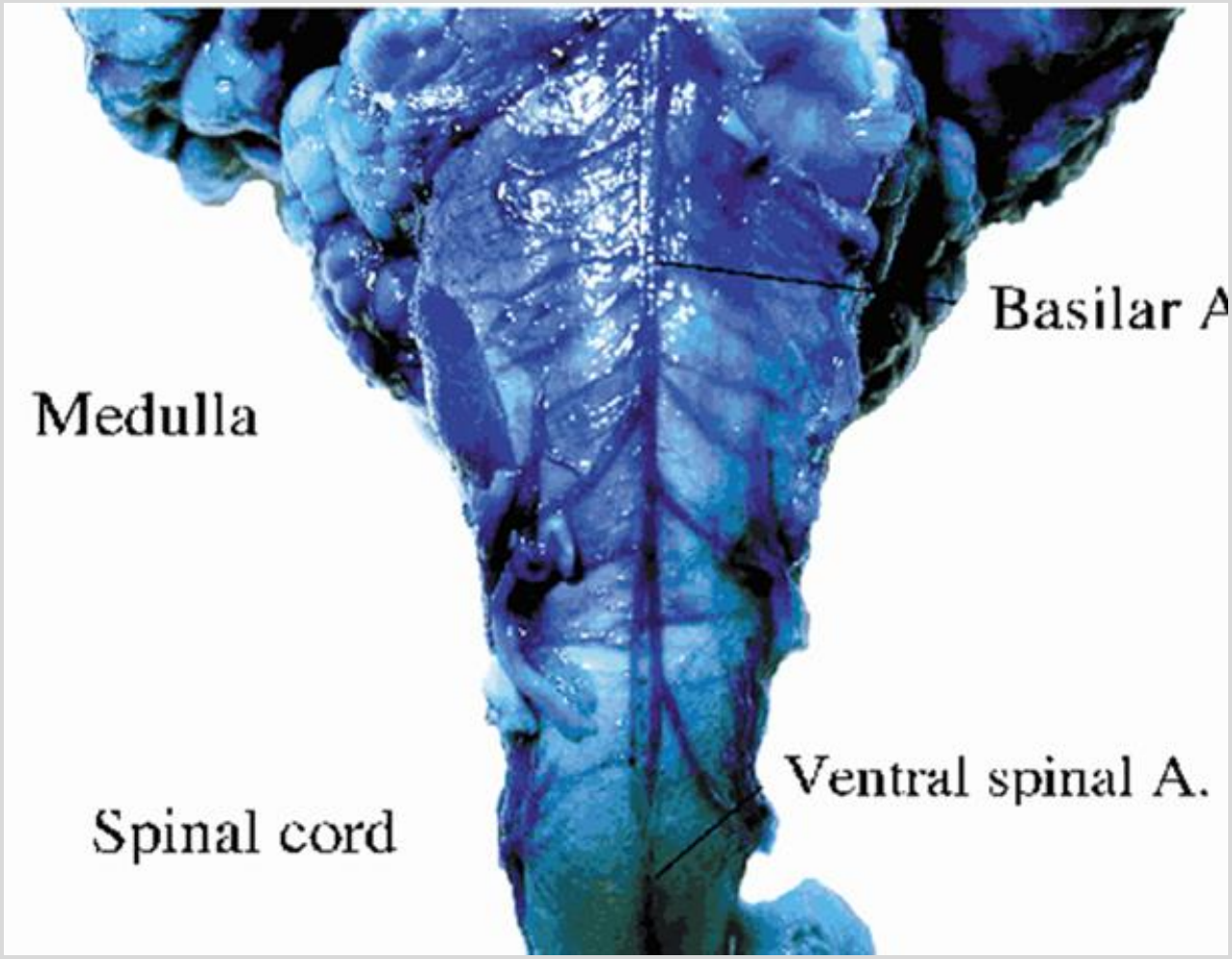
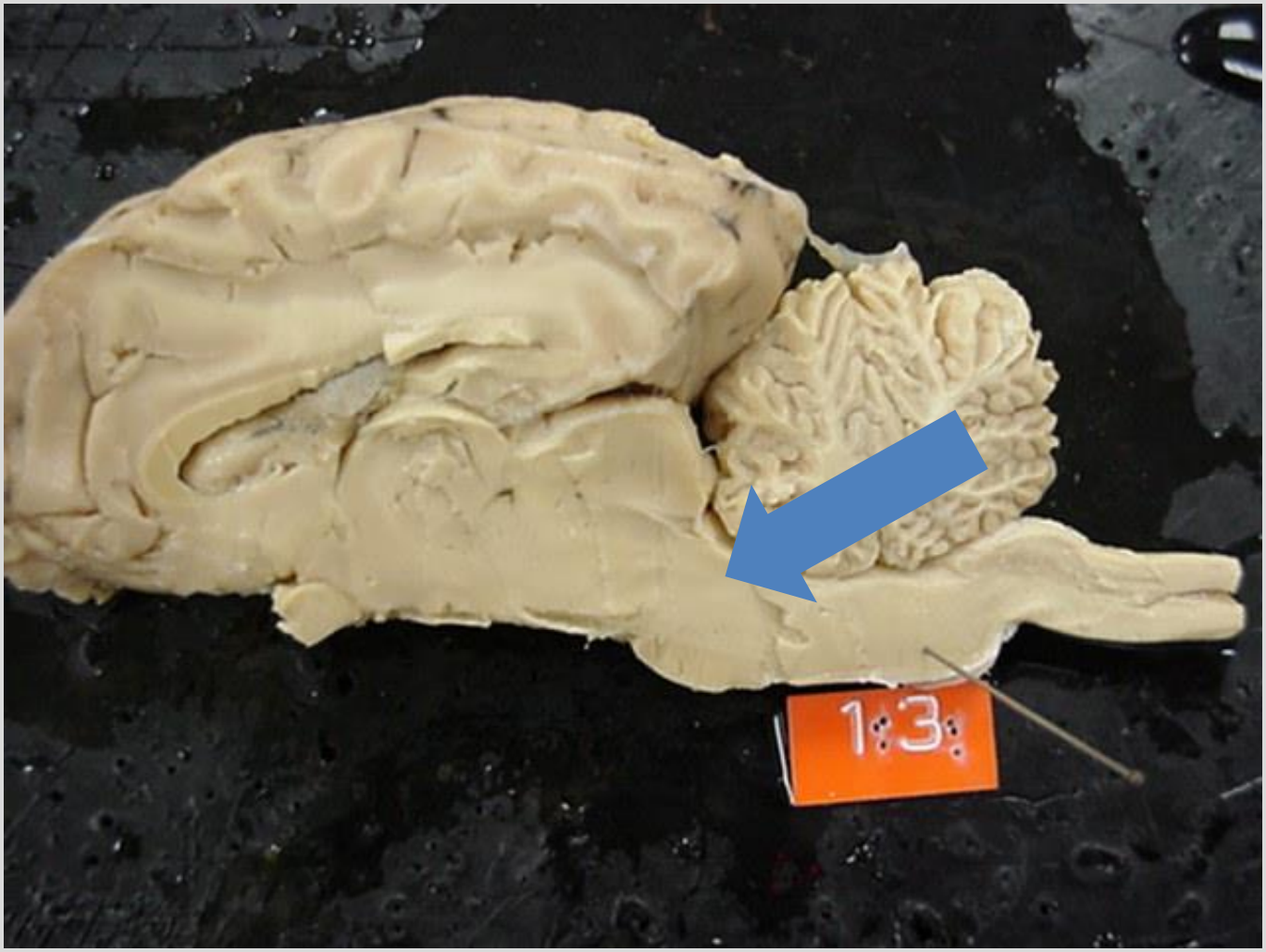
For post-event review only

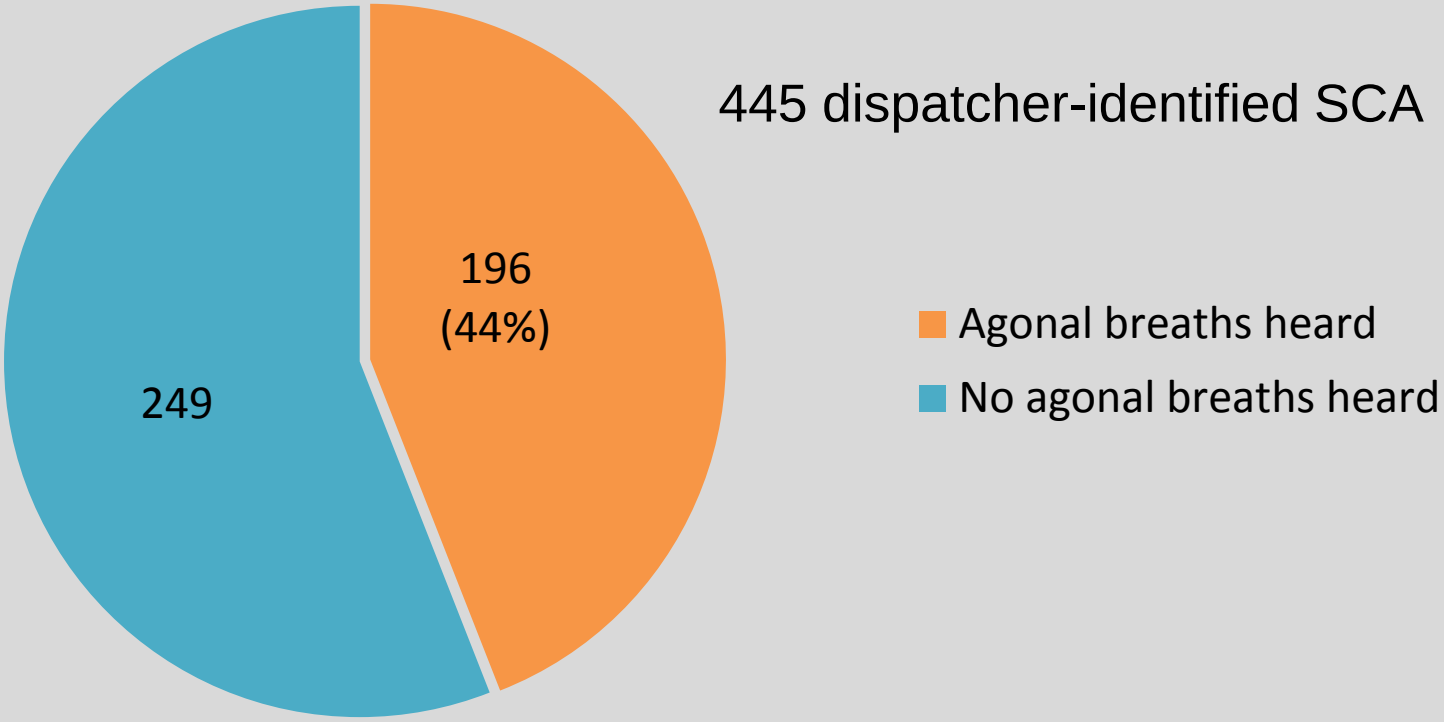

06:53:45
For post-event review only


Basilar A
Medulla
Ventral spinal A.
Spinal cord

Respiratory center

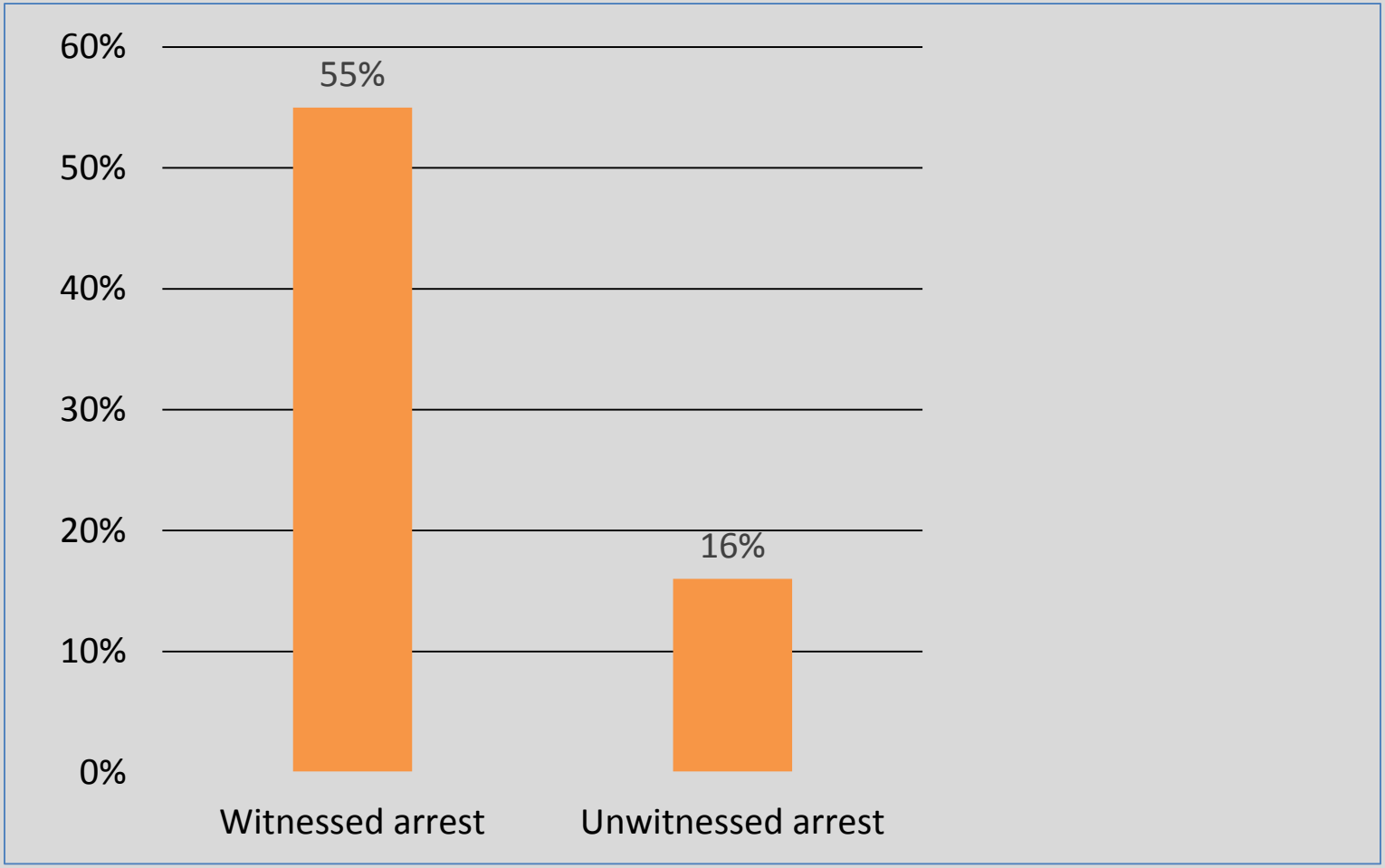


Agonal breathing is common



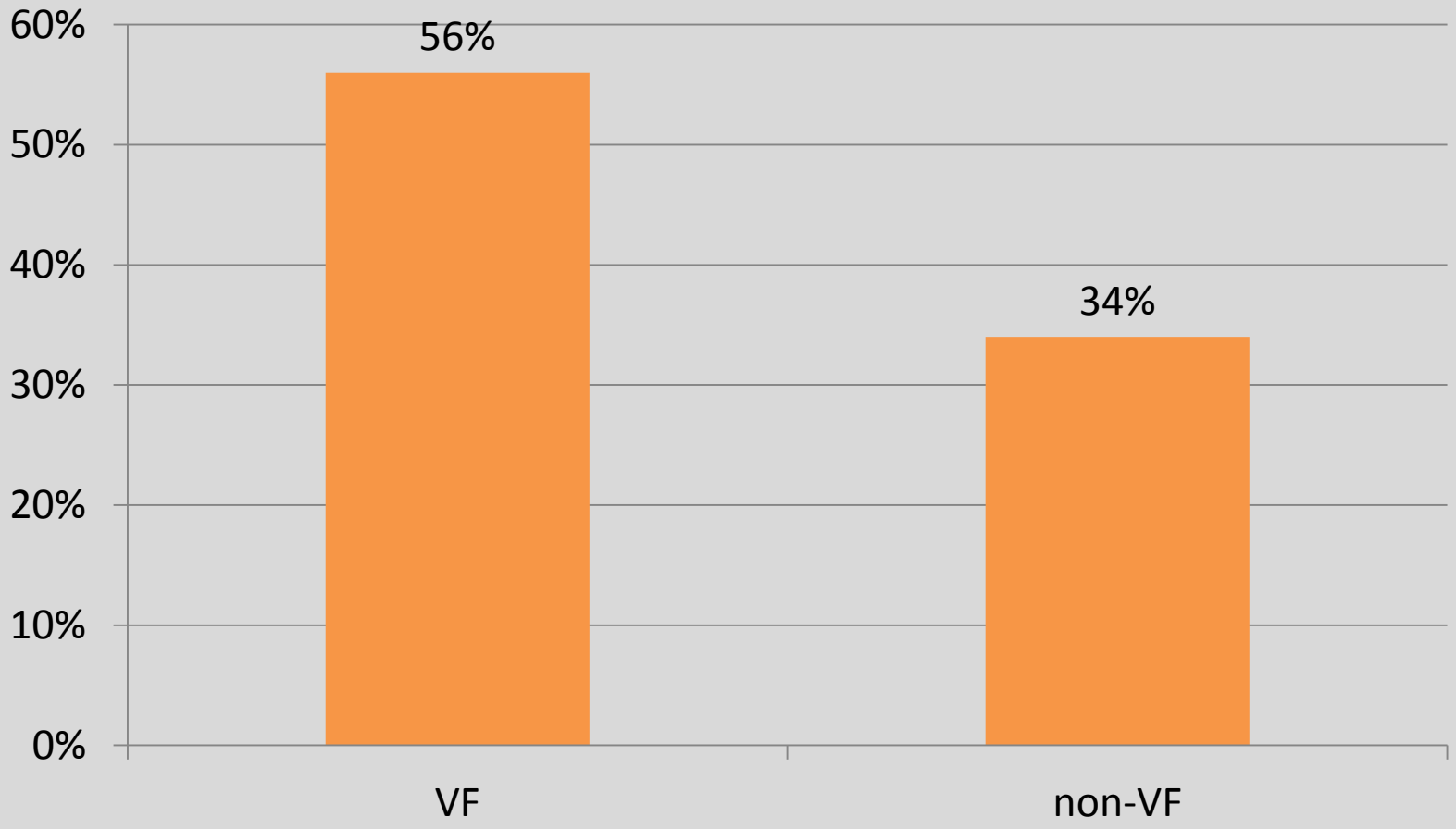
Clark JJ. Incidence of agonal respirations in sudden cardiac arrest. Ann Emerg Med 1992;21: 1464-1467

Agonal breathing is especially common in witnessed arrests



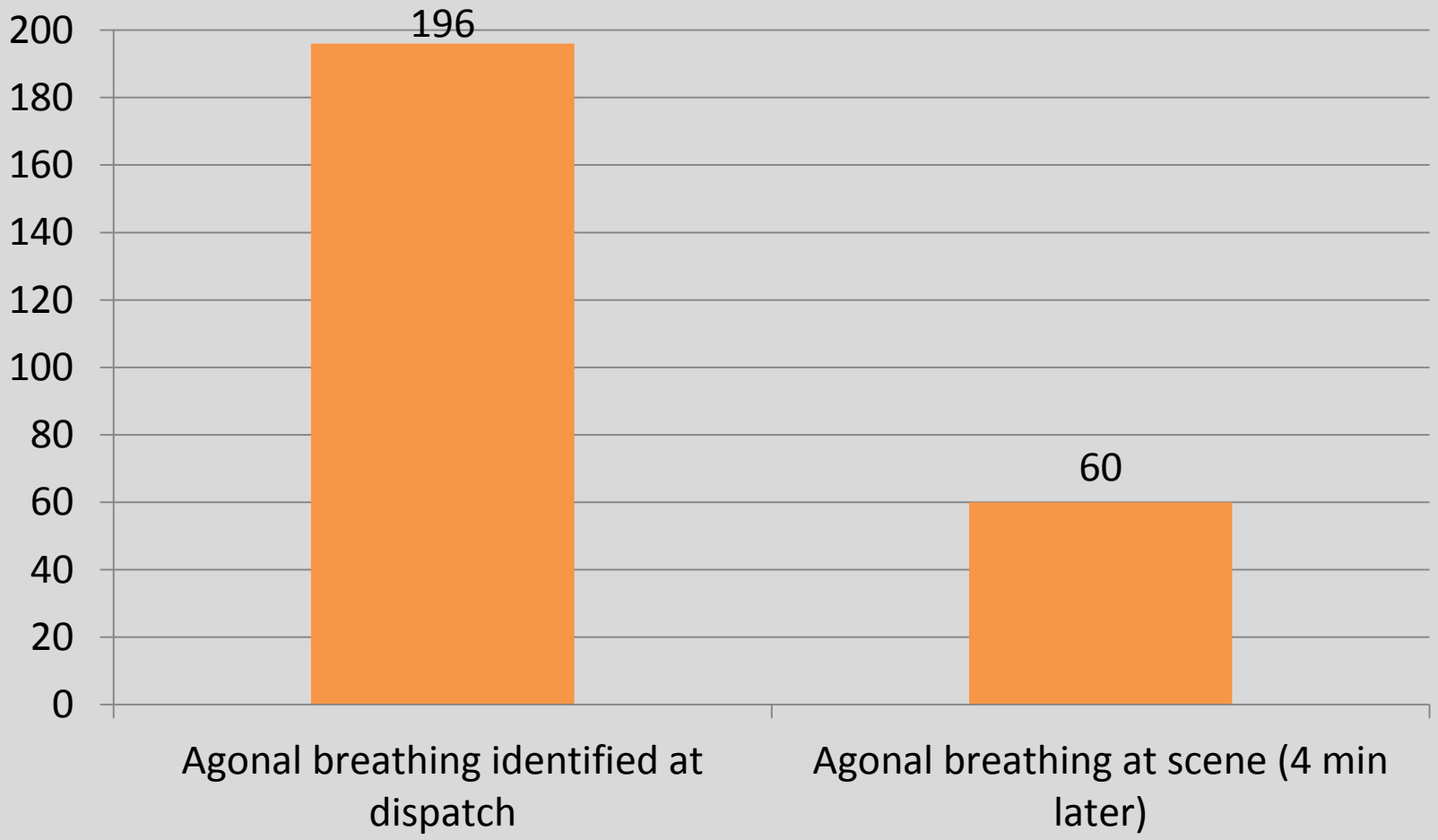
Clark JJ. Incidence of agonal respirations in sudden cardiac arrest. Ann Emerg Med 1992;21: 1464-1467

Agonal breathing is especially common in VF arrests



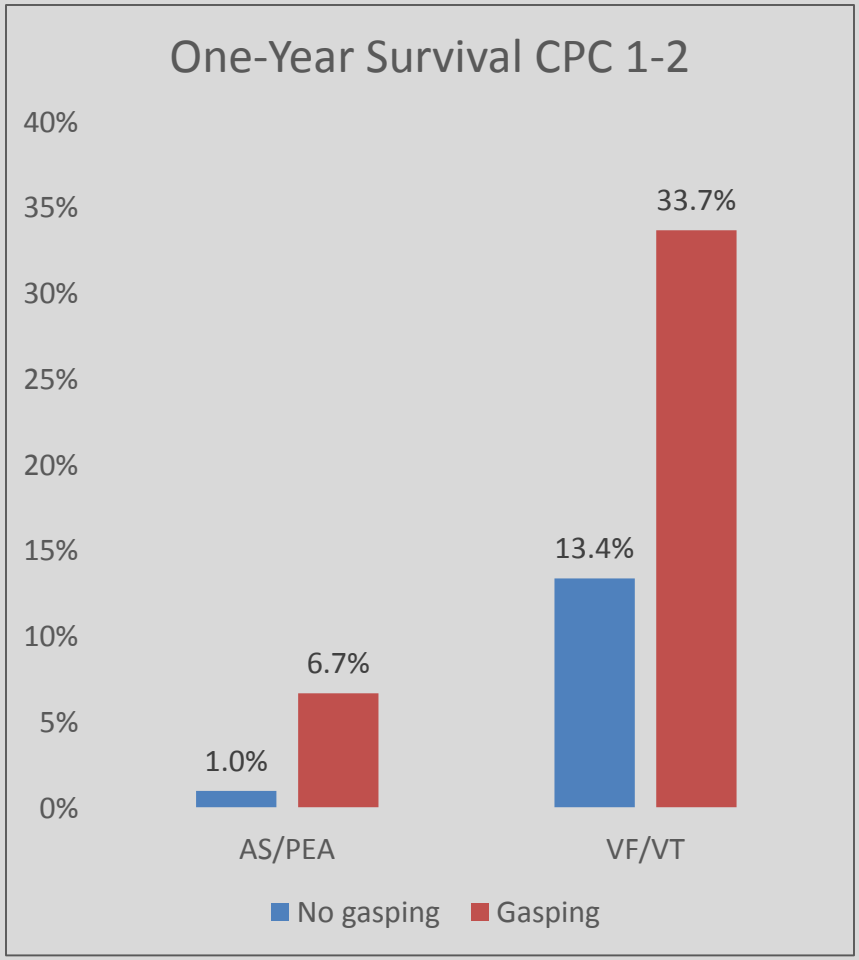
Clark JJ. Incidence of agonal respirations in sudden cardiac arrest. Ann Emerg Med 1992;21: 1464-1467

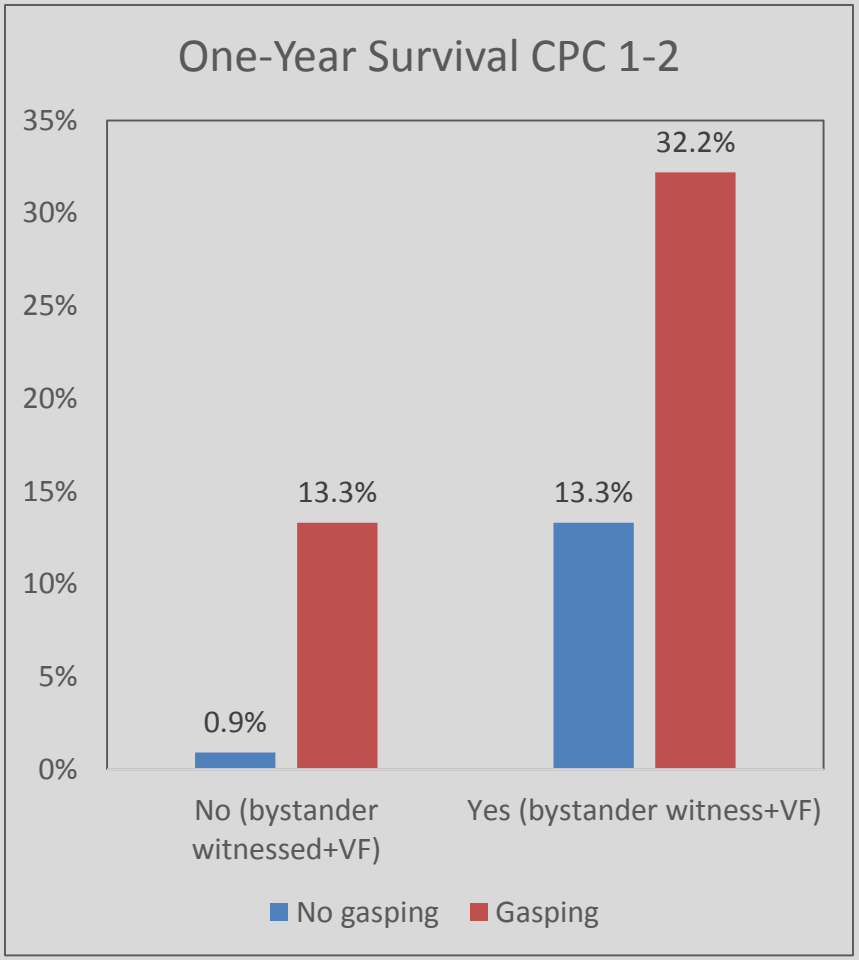
Agonal breathing can last more than 4 minutes



Clark JJ. Incidence of agonal respirations in sudden cardiac arrest. Ann Emerg Med 1992;21: 1464-1467

Gasping is associated with better neurologic outcome





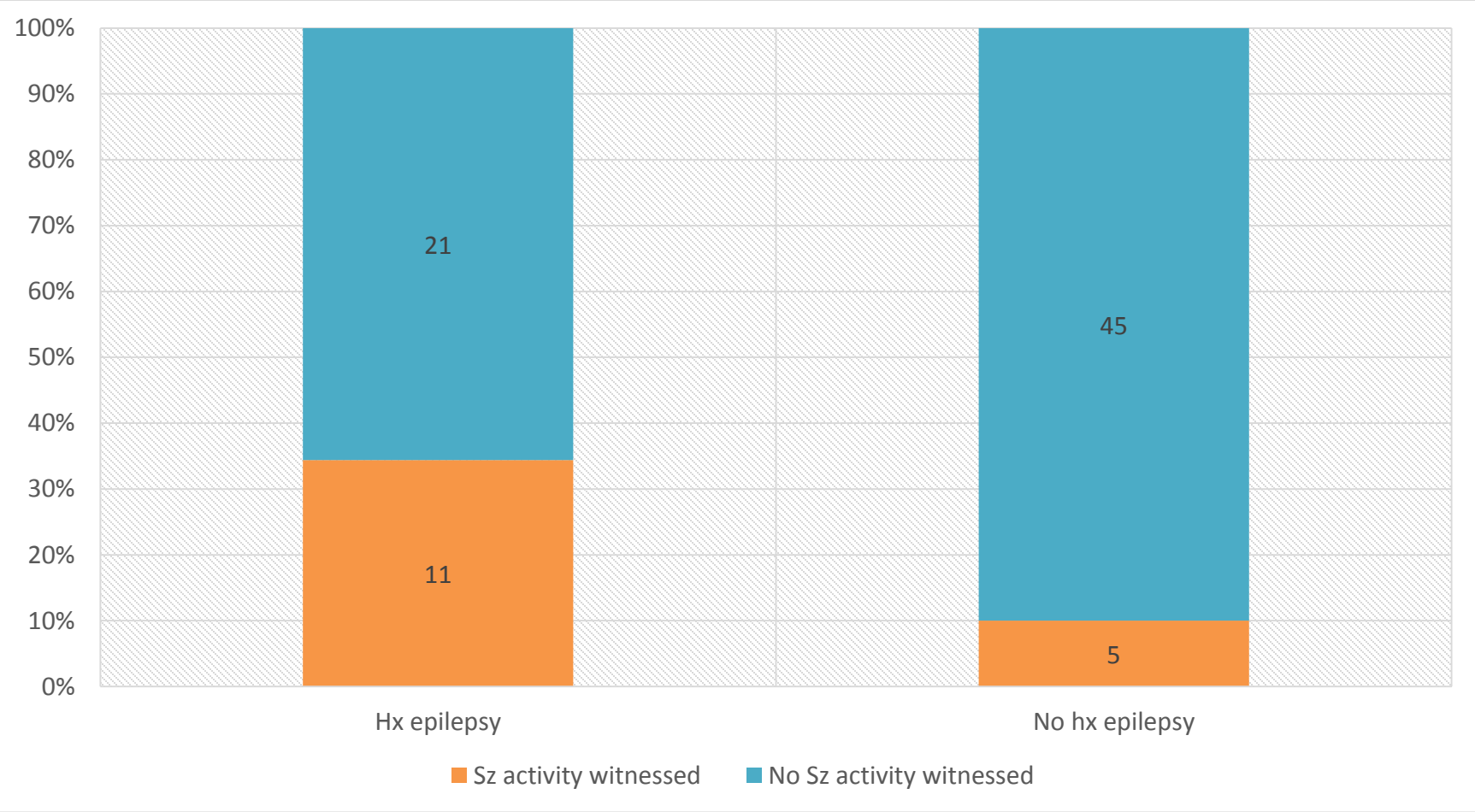
Debaty G, et al. J Am Coll Cardiol. 2017;70(12):1467-76

Sudden cardiac arrest and epilepsy

- Patients with epilepsy have a 3-fold higher incidence of sudden cardiac arrest
- Why?

Stecker, EC. Relationship between seizure episode and sudden cardiac arrest in patients with epilepsy. Circulation: Arrhythmia and Electrophysiology. 2013;6:912-916

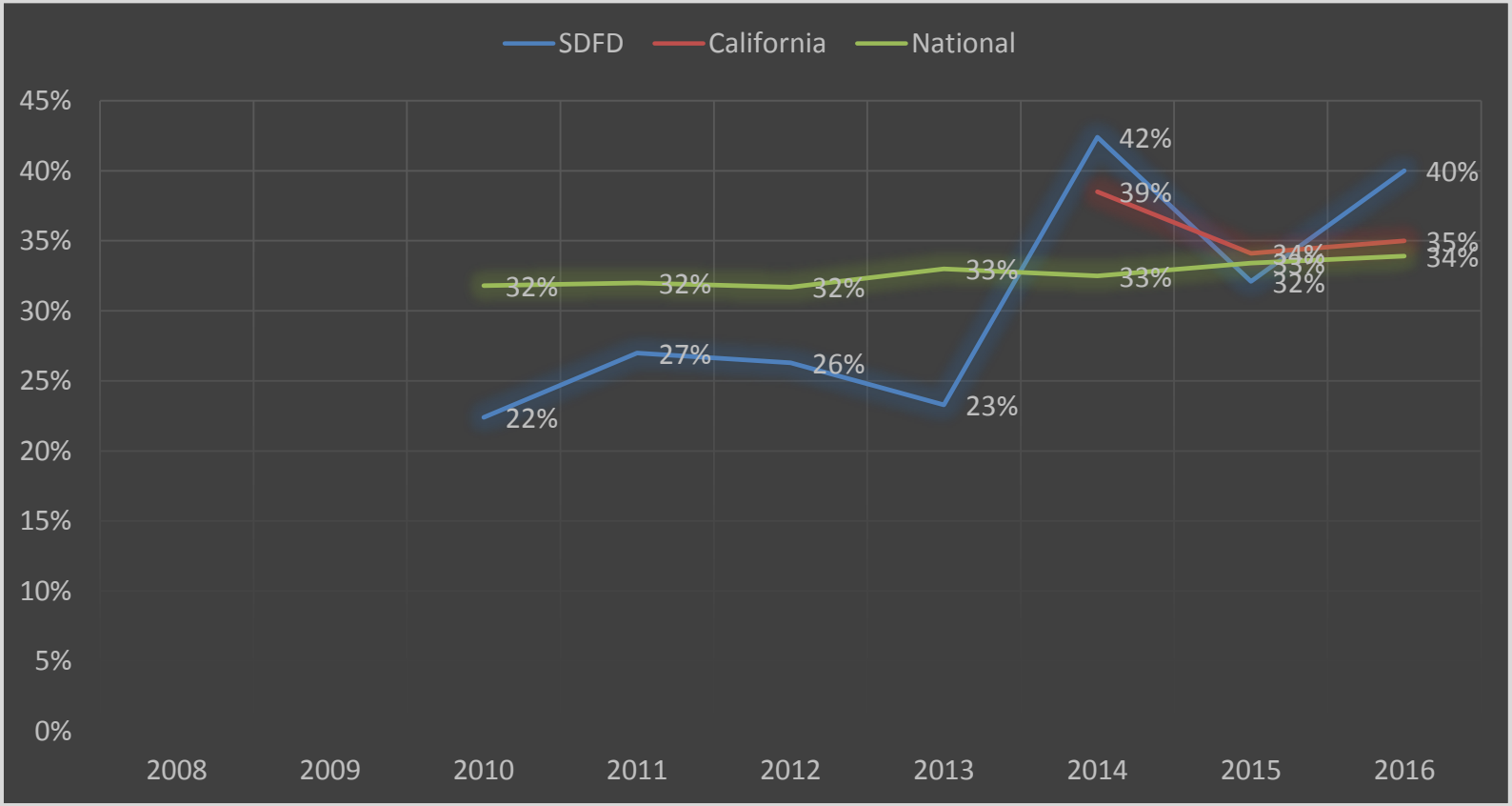
Incidence of seizure activity prior to arrest



Stecker, EC. Relationship between seizure episode and sudden cardiac arrest in patients with epilepsy. Circulation: Arrhythmia and Electrophysiology. 2013;6:912-916

SCA survival

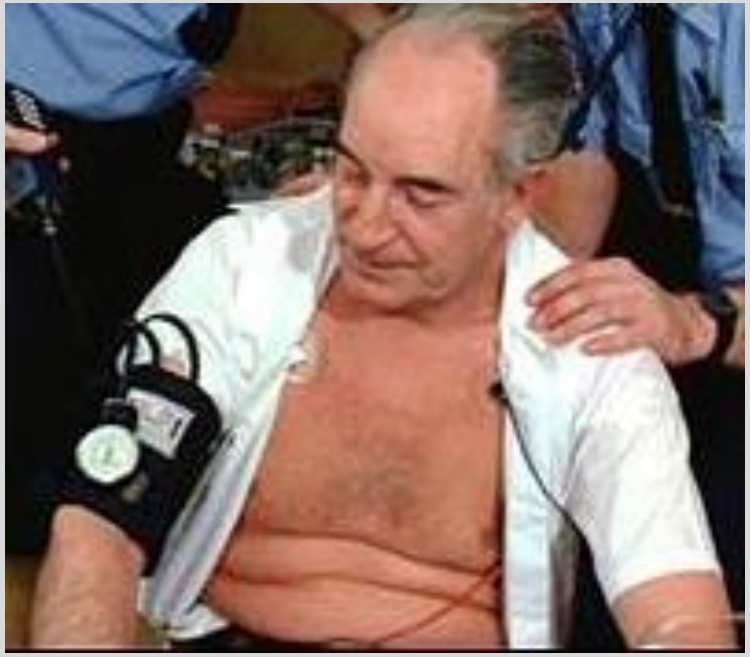
Bystander witnessed + found in VF/pVT

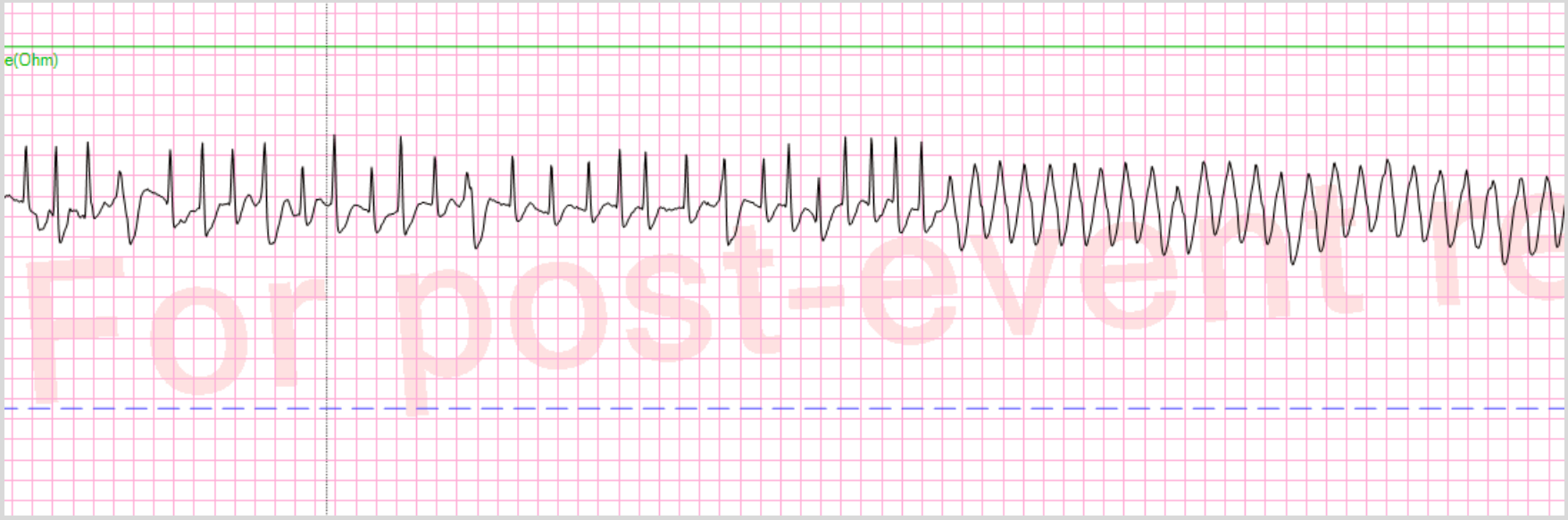


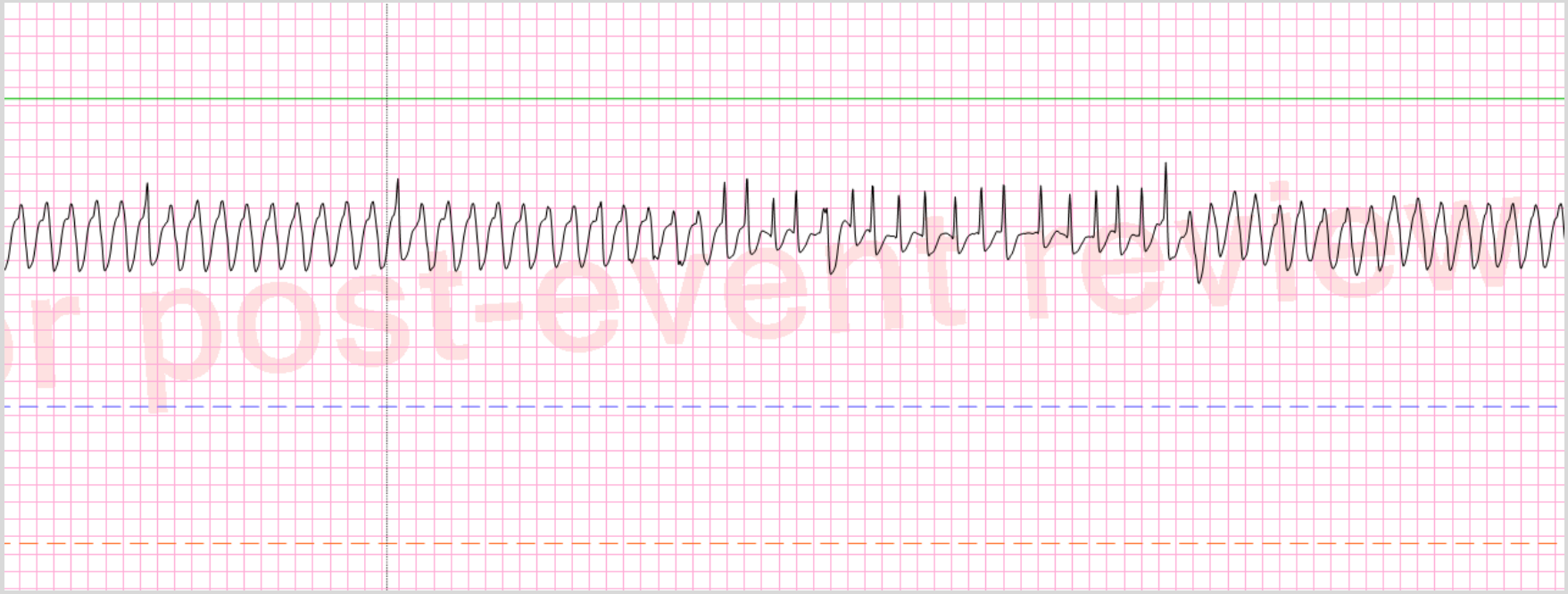
Cardiac Arrest Registry to Enhance Survival (CARES)

July 2017

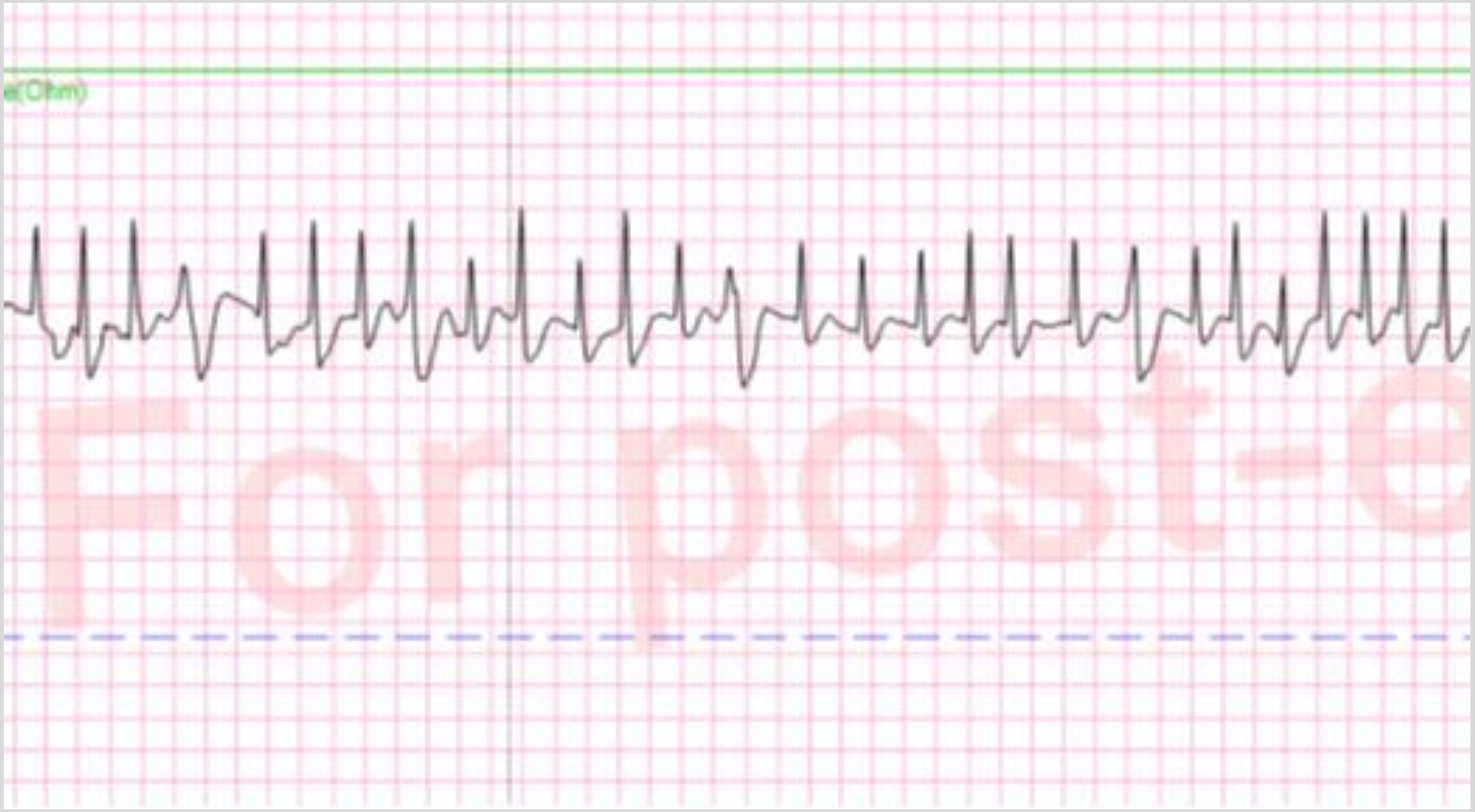
- 64M #200 c/o sudden, intermittent palpitations/dizziness
- Past history
  - Atrial fibrillation
  - 2 ablations
  - Multiple cardioversions
  - AICD
- Awake, alert, sitting on couch
- 110/79, O2 sat 100%



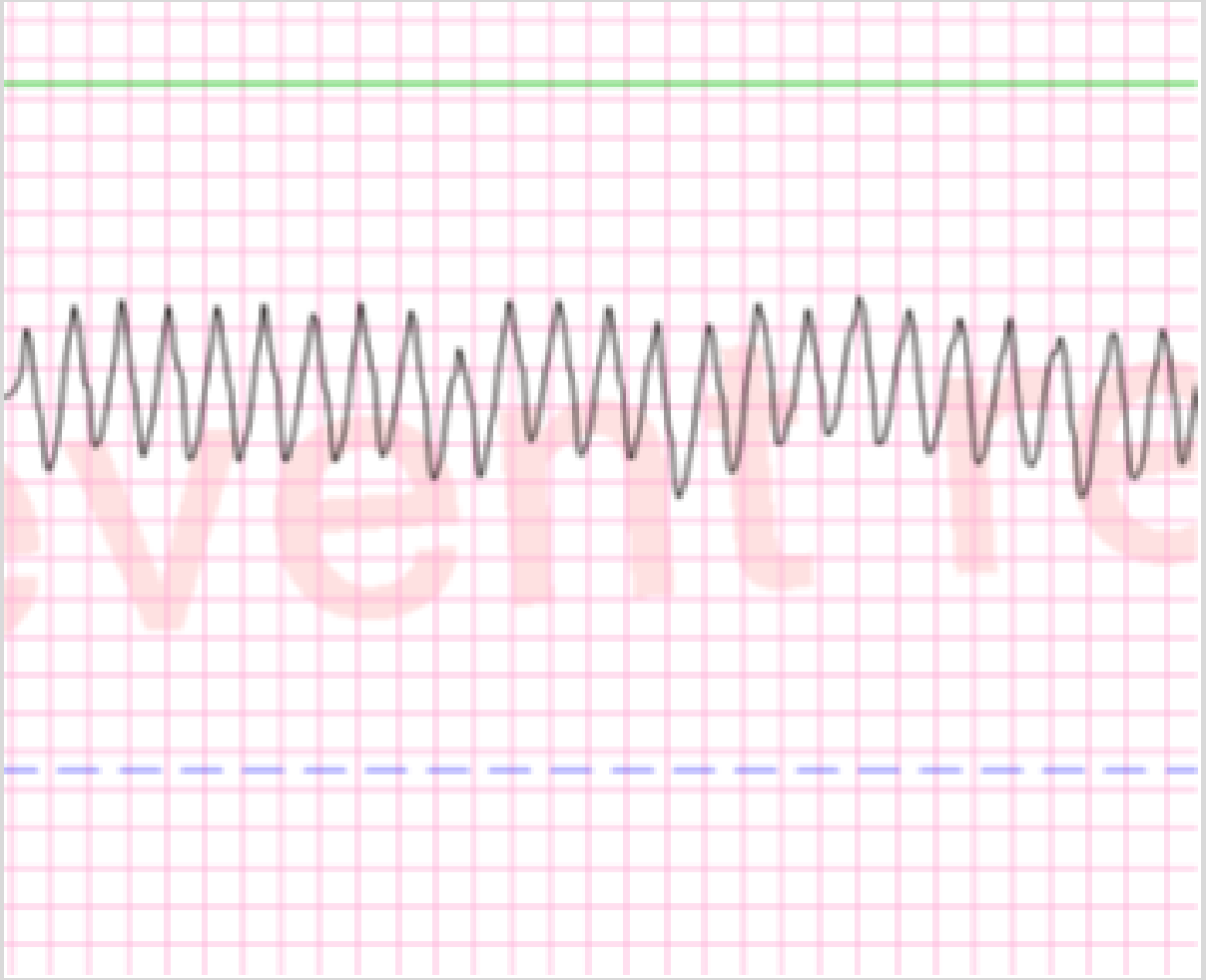

e(Ohm)

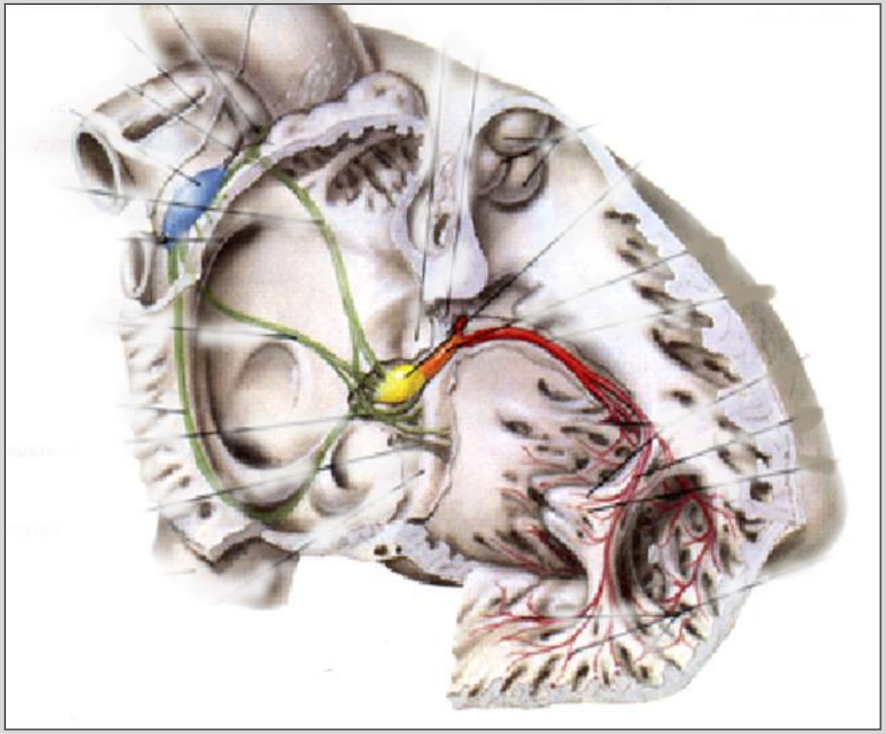


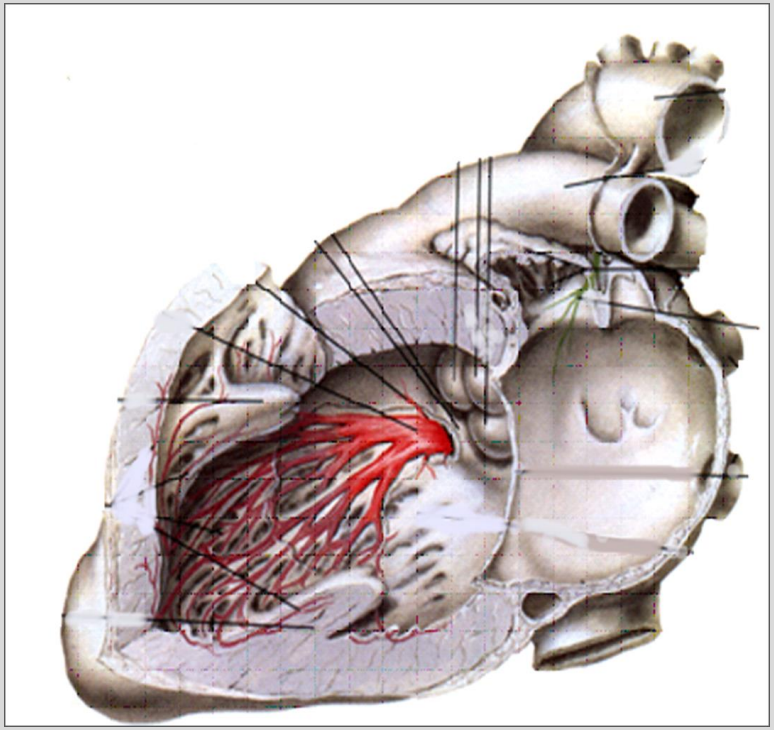
What is the rhythm?



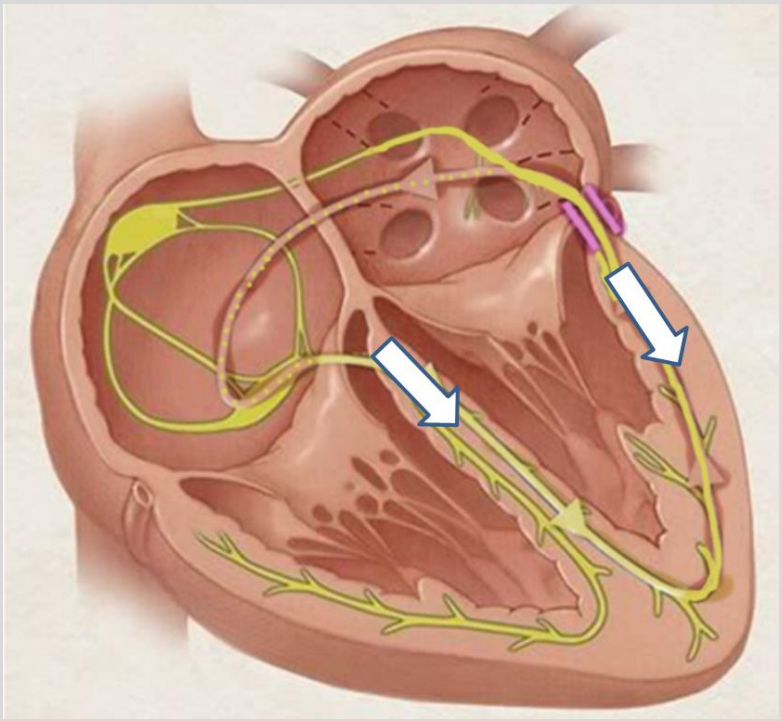
What is the rhythm now?

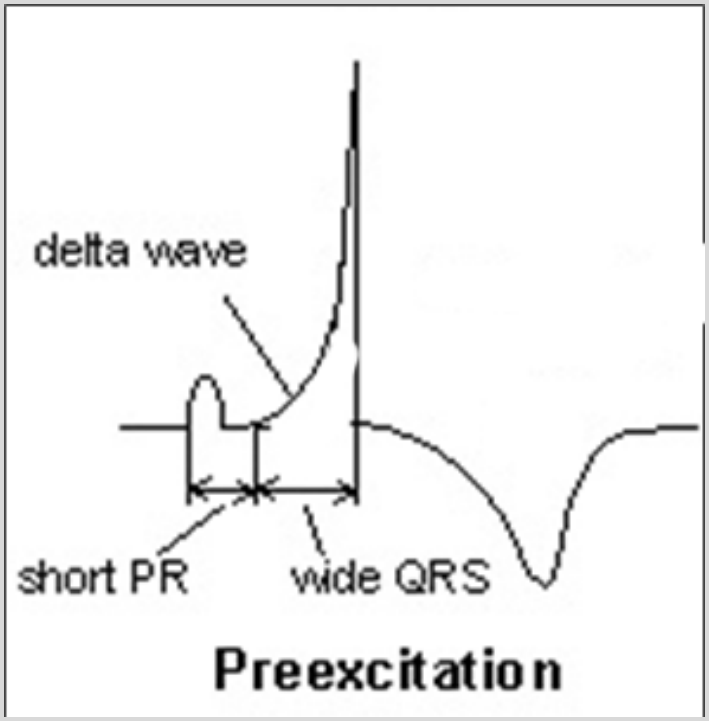


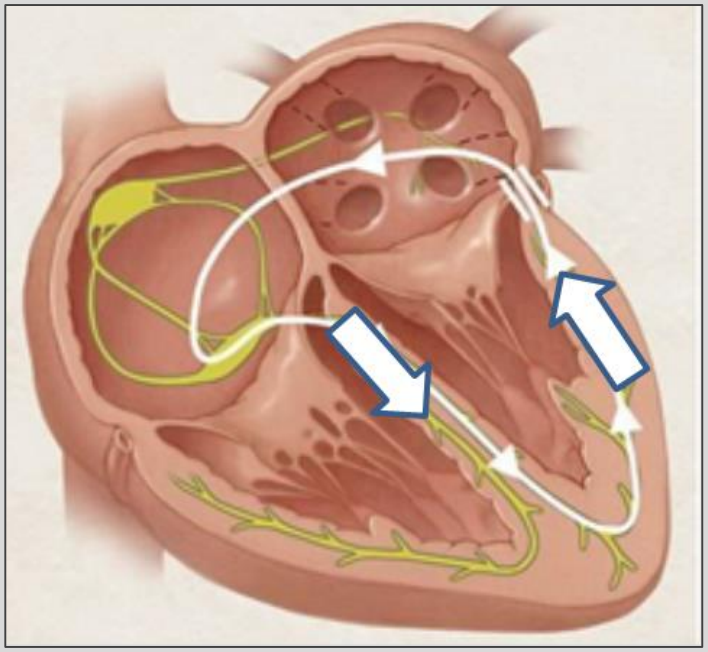


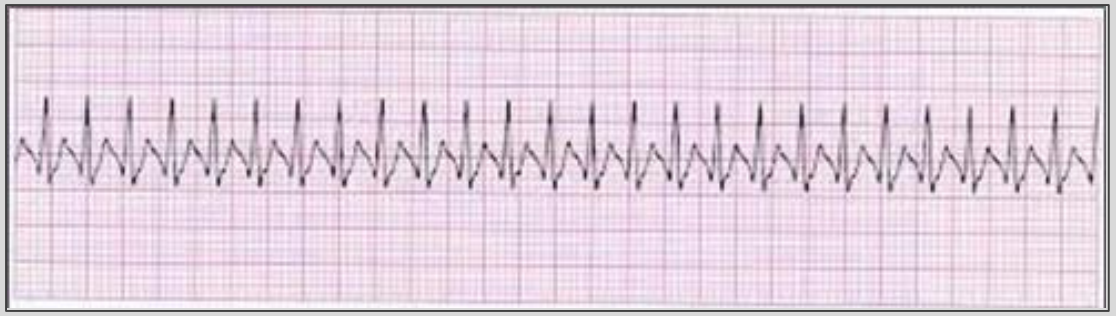


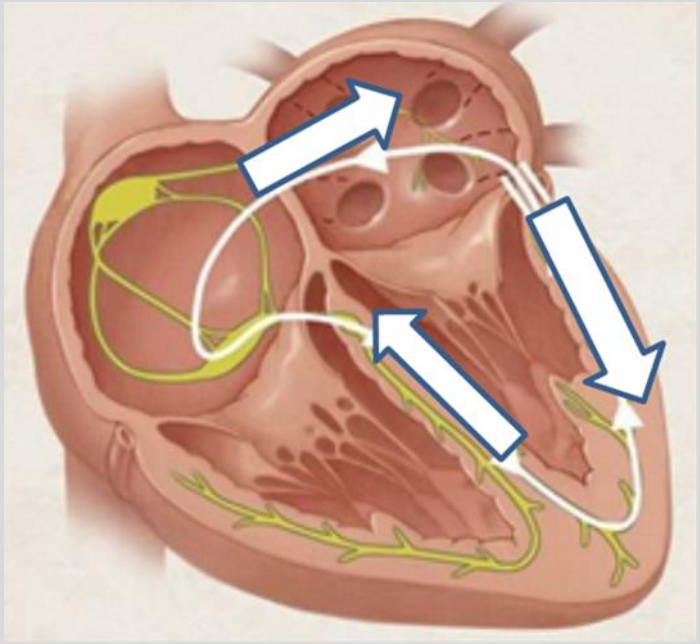
Bypass tract: WPW

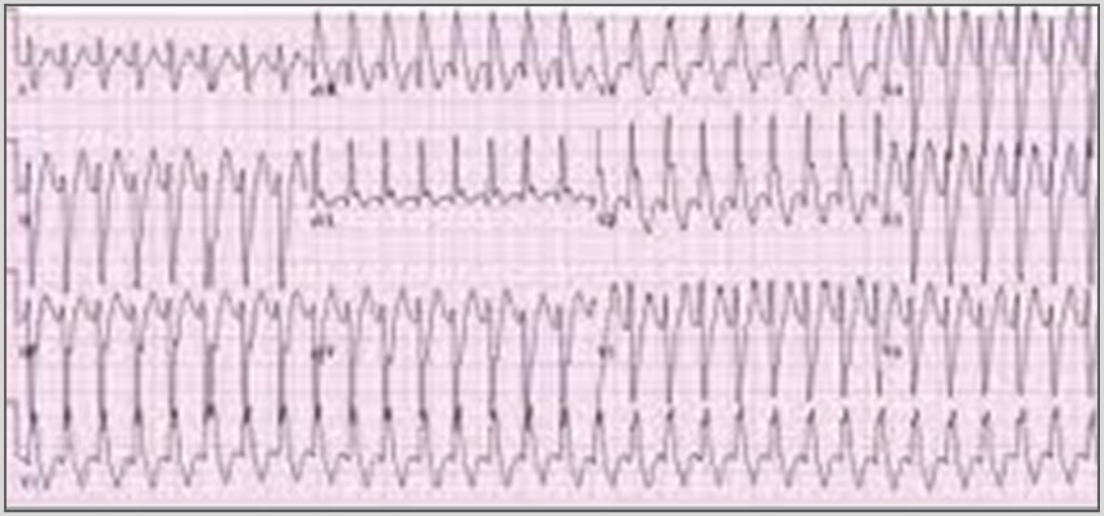






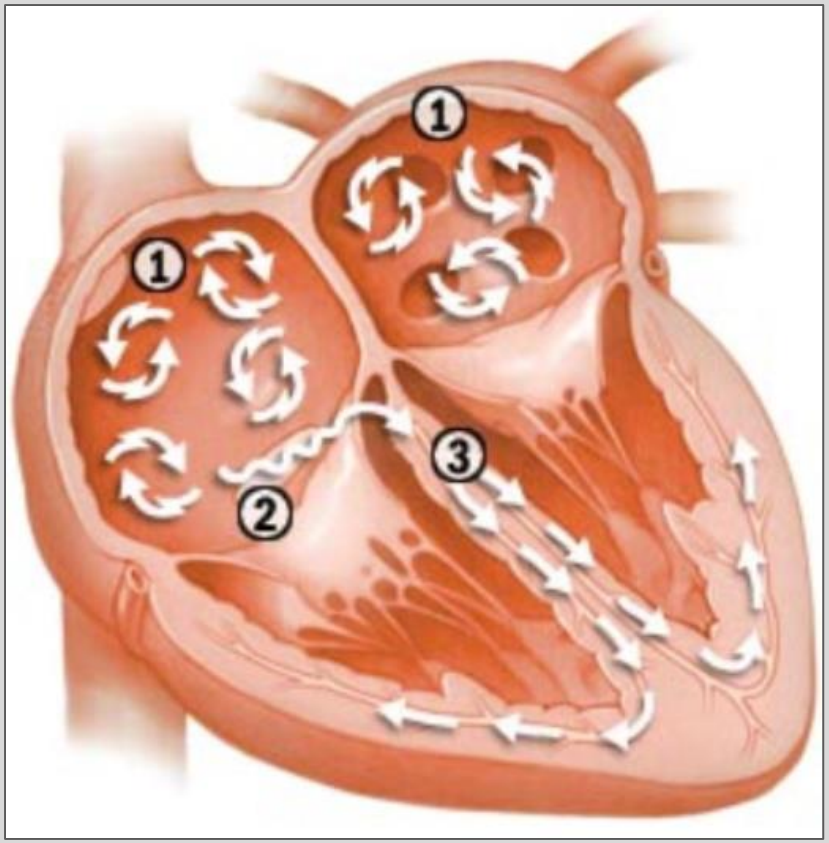




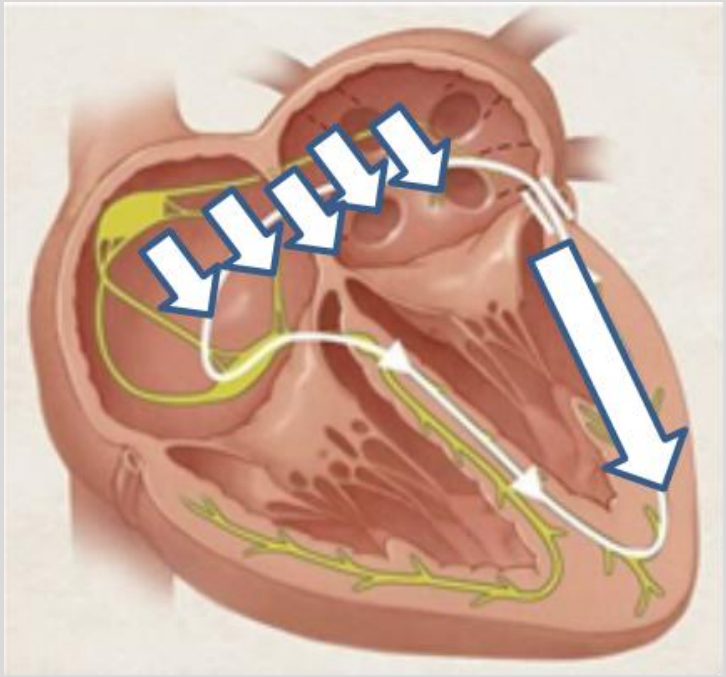


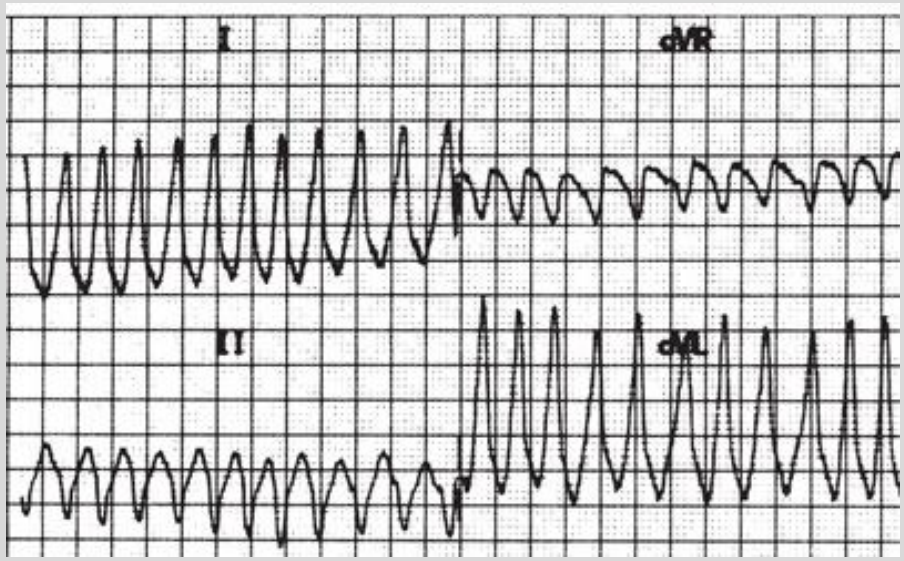
Atrial fibrillation

- Chaotic atrial impulses at 600-800/minute
- AVN is gatekeeper



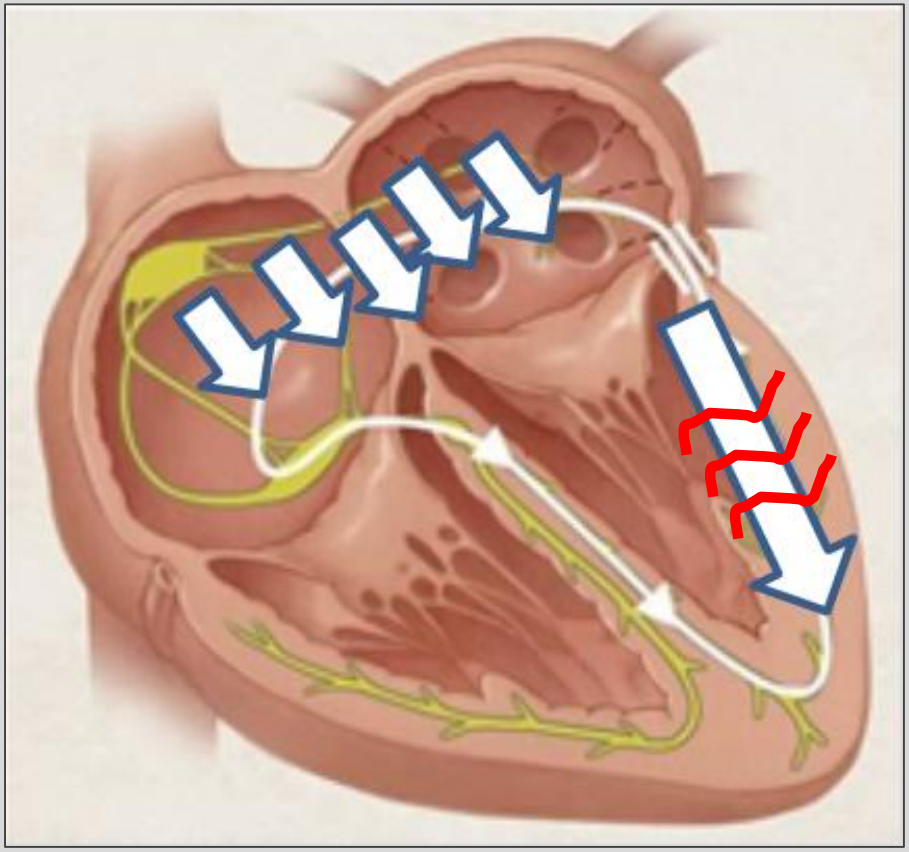
Rapid AF (or flutter) + bypass tract = DANGEROUS!



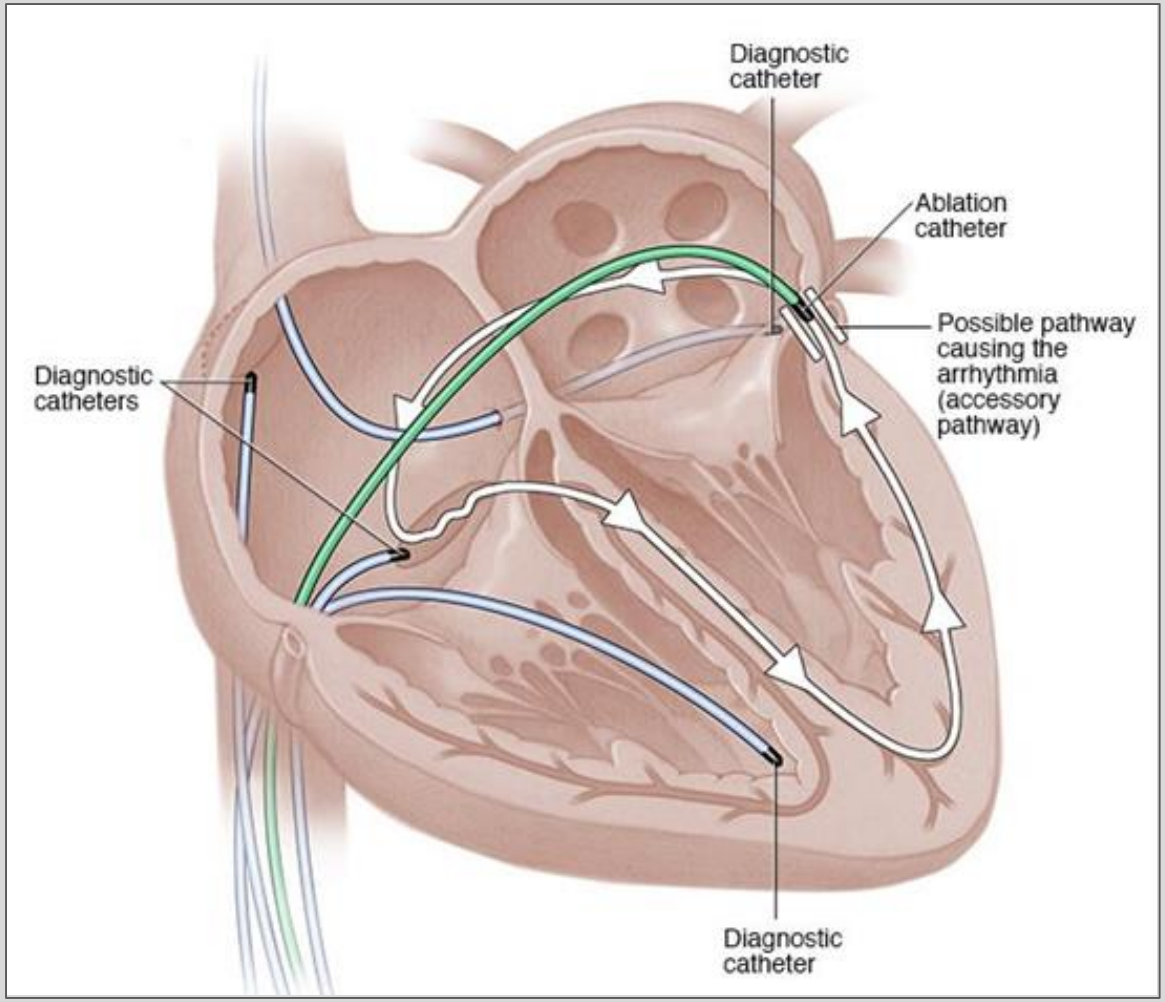


Amiodarone slows conduction in bypass tract

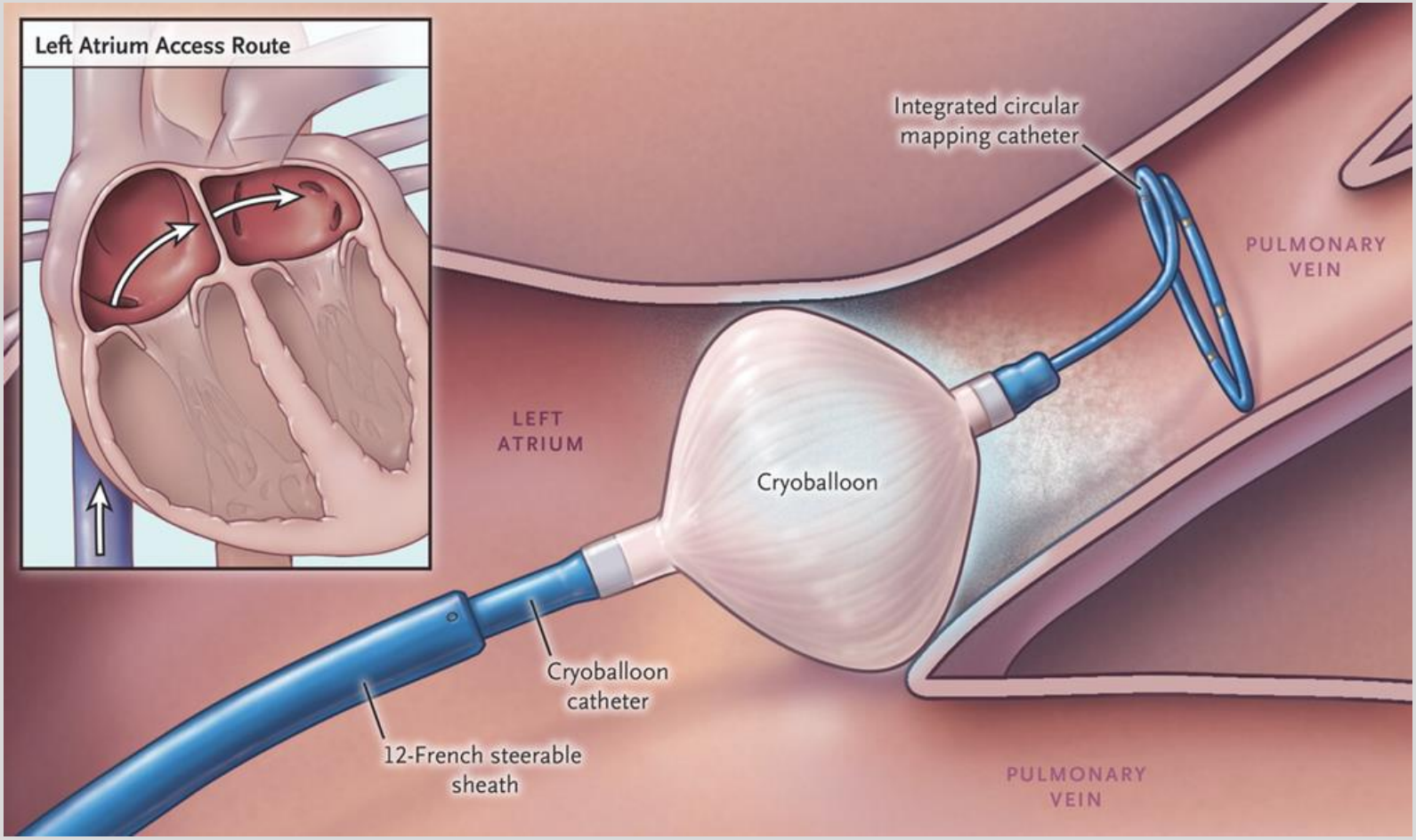
- Amiodarone 150mg IV over 10 minutes



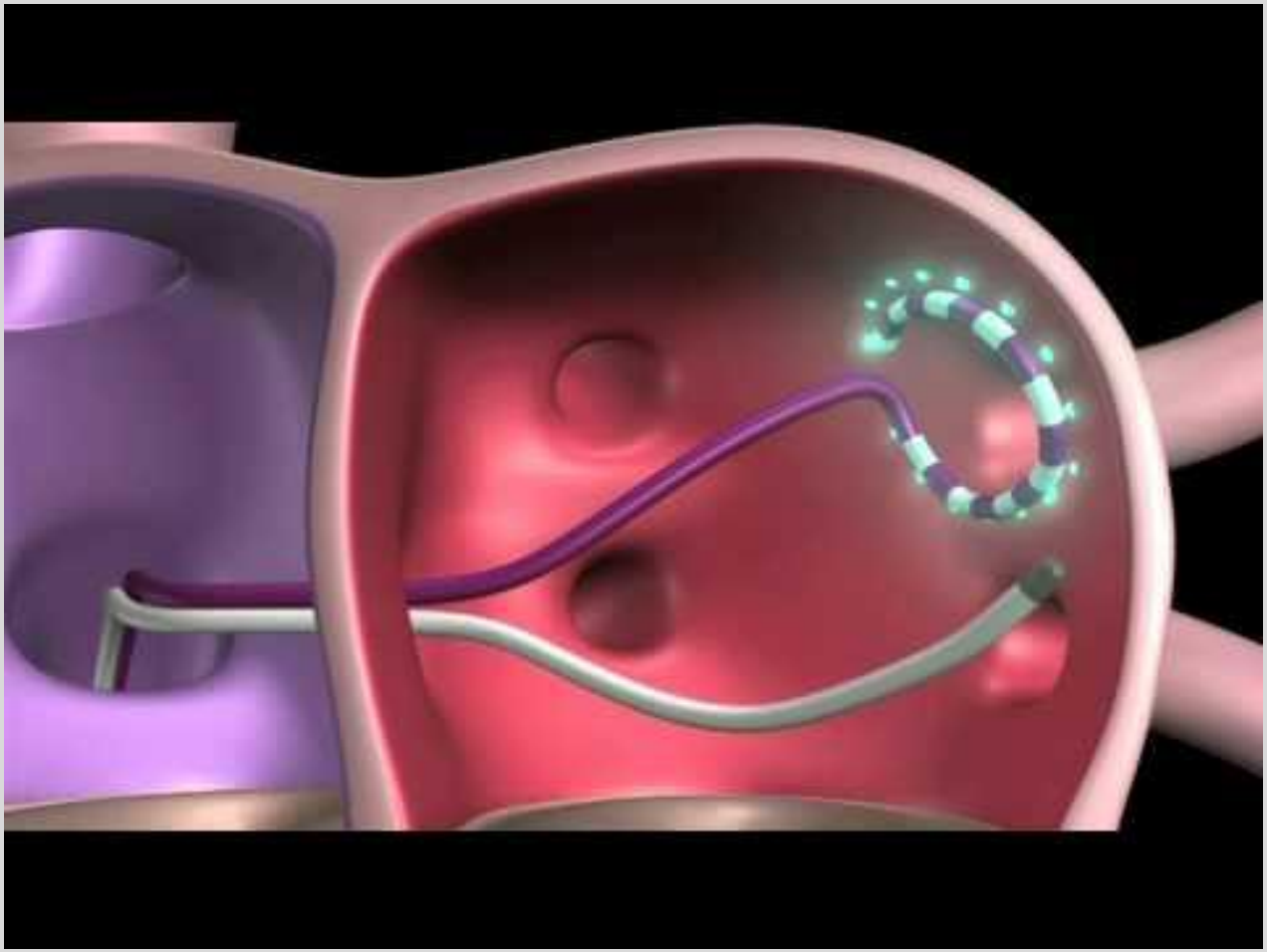
Ablation destroys bypass tracts



Ablation to prevent AF



Ablation for AF

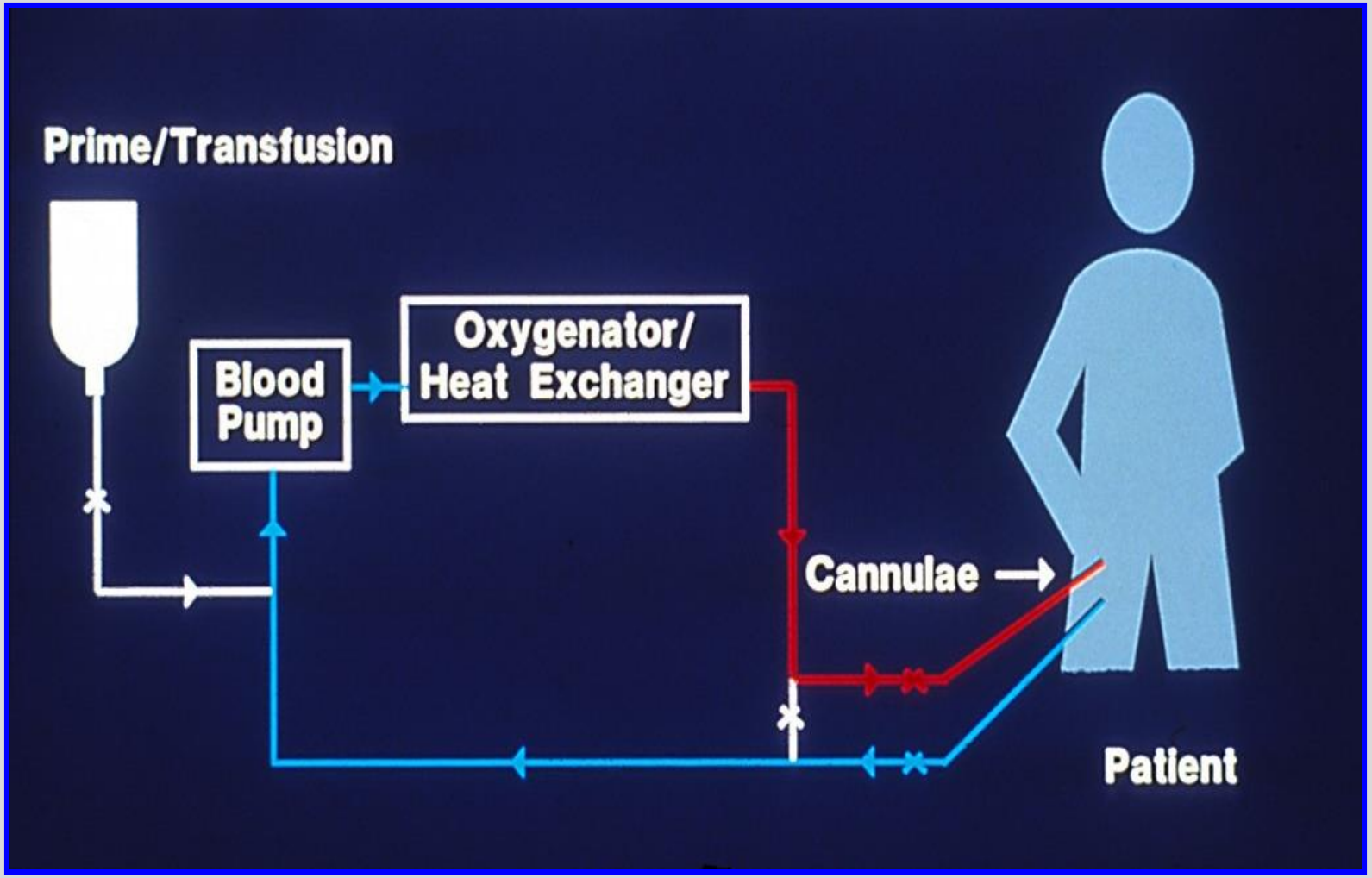


Mechanical CPR

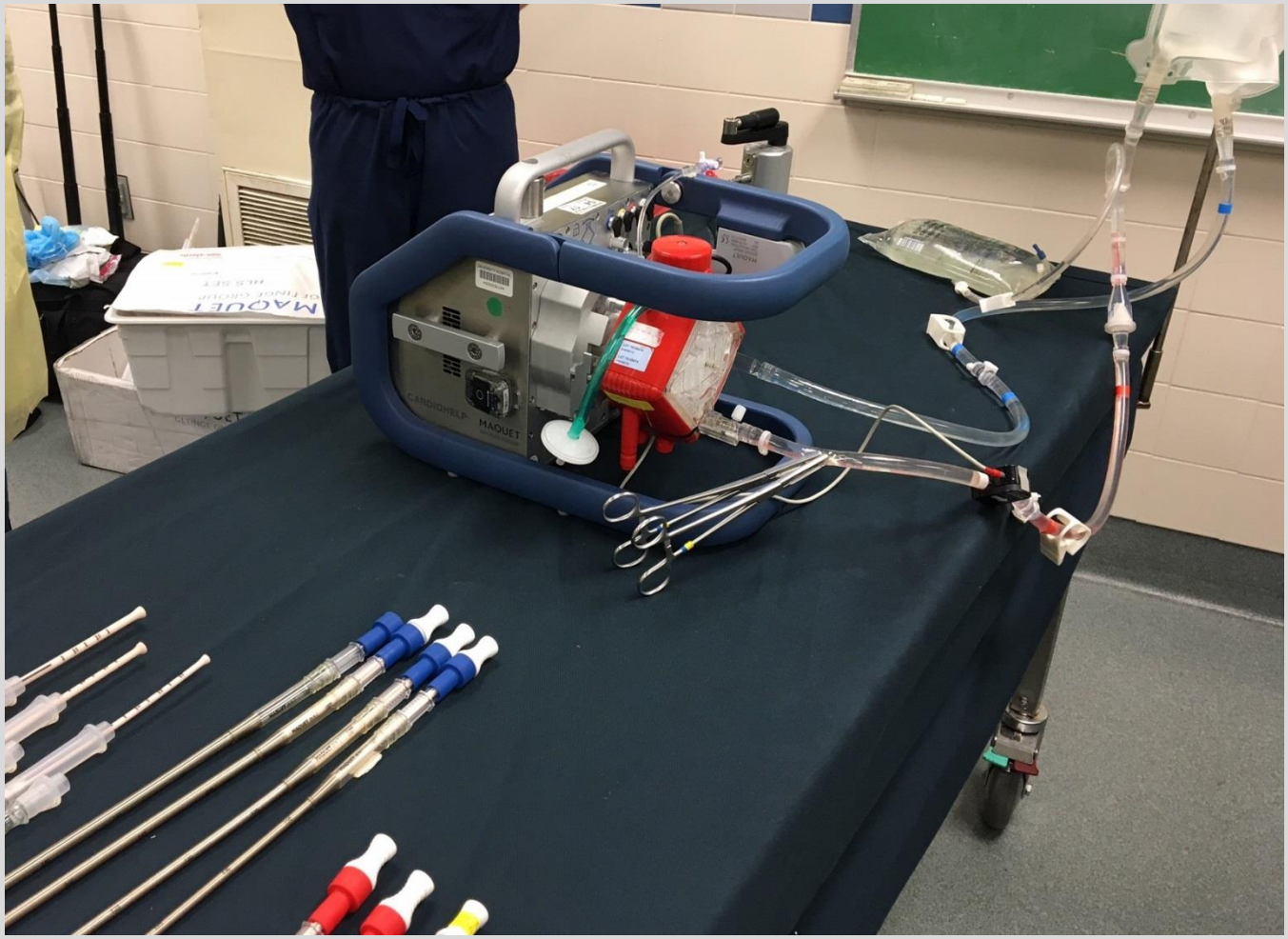
Lucas Device

Autopulse

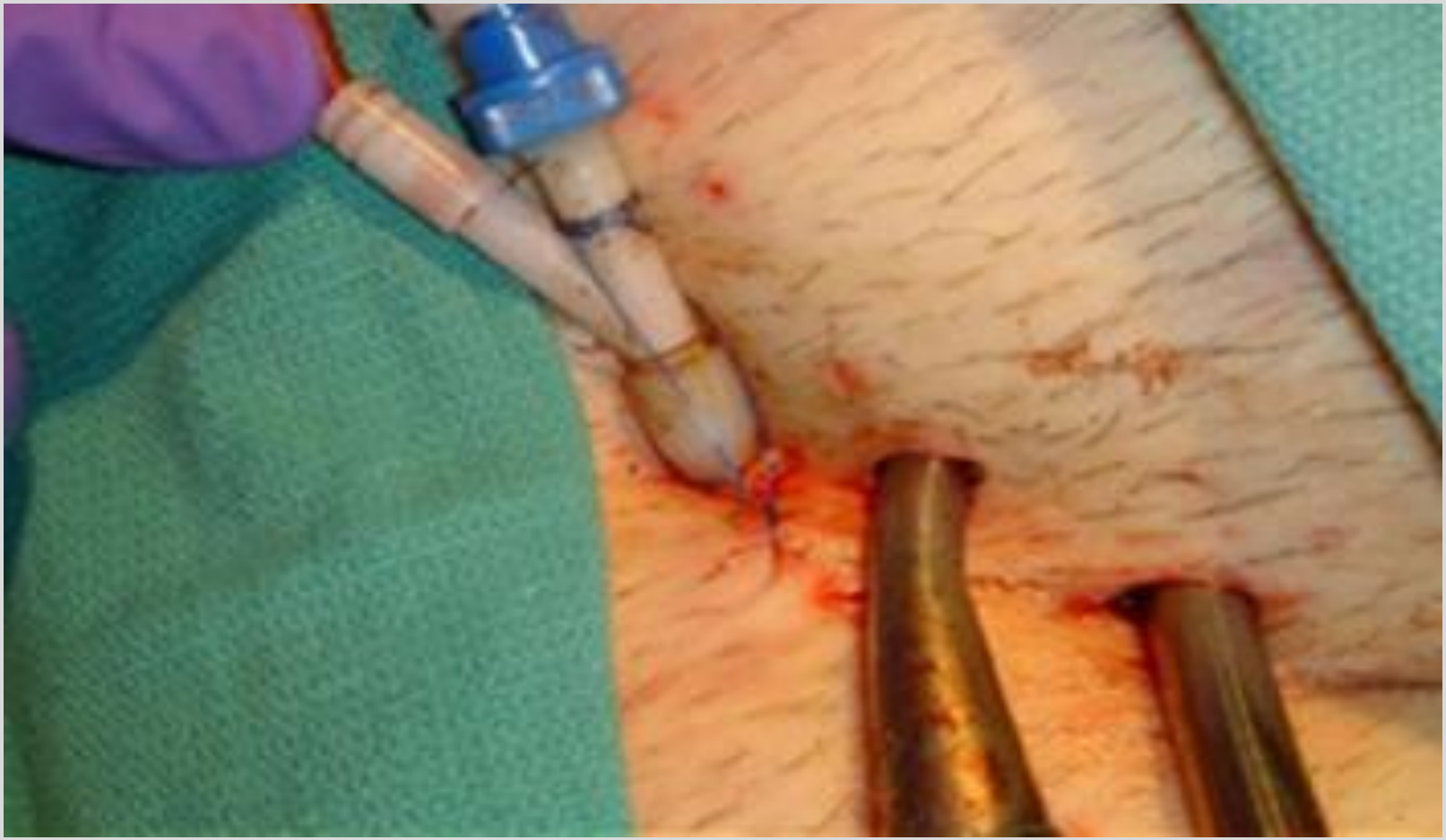
Extracorporeal CPR (ECPR)



Extracorporeal CPR (ECPR)



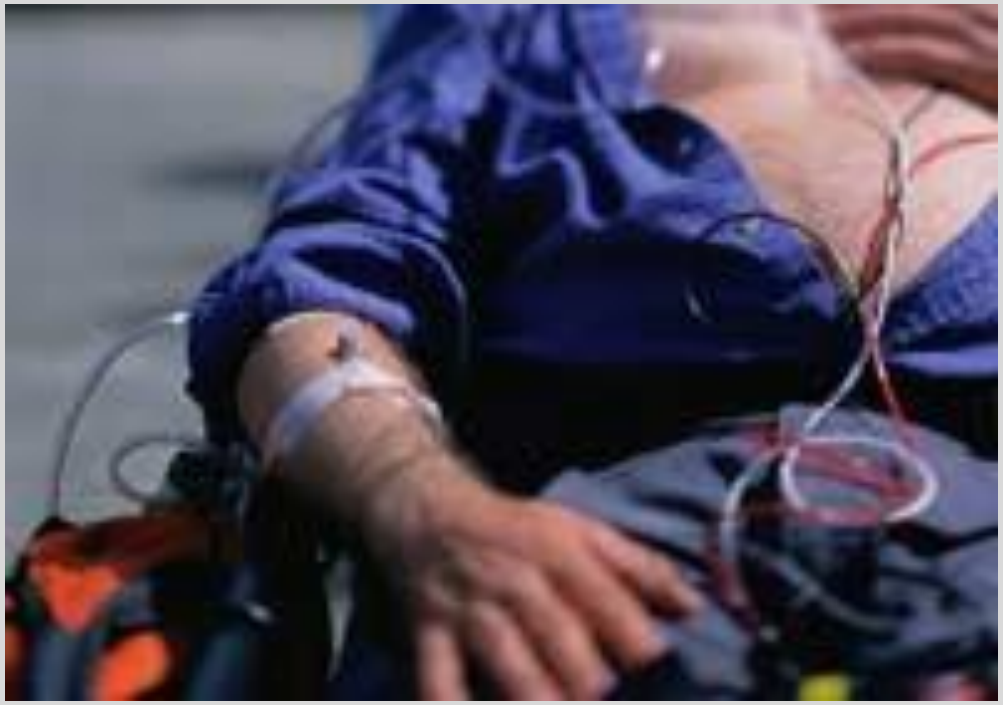
Extracorporeal CPR (ECPR) Cannulation

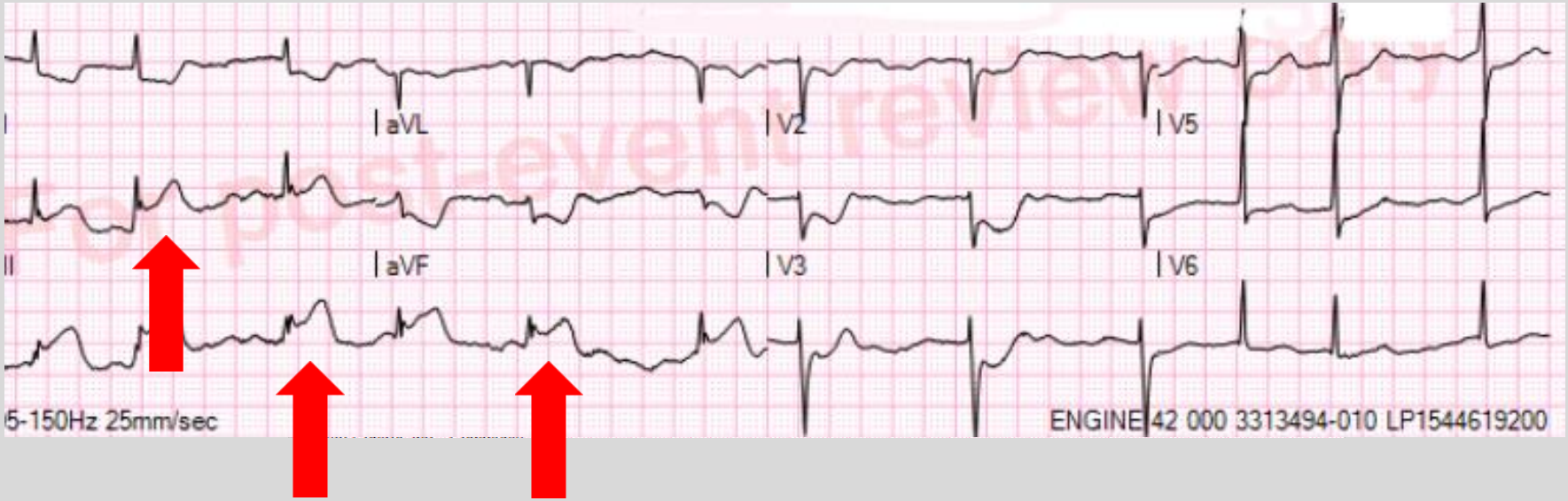


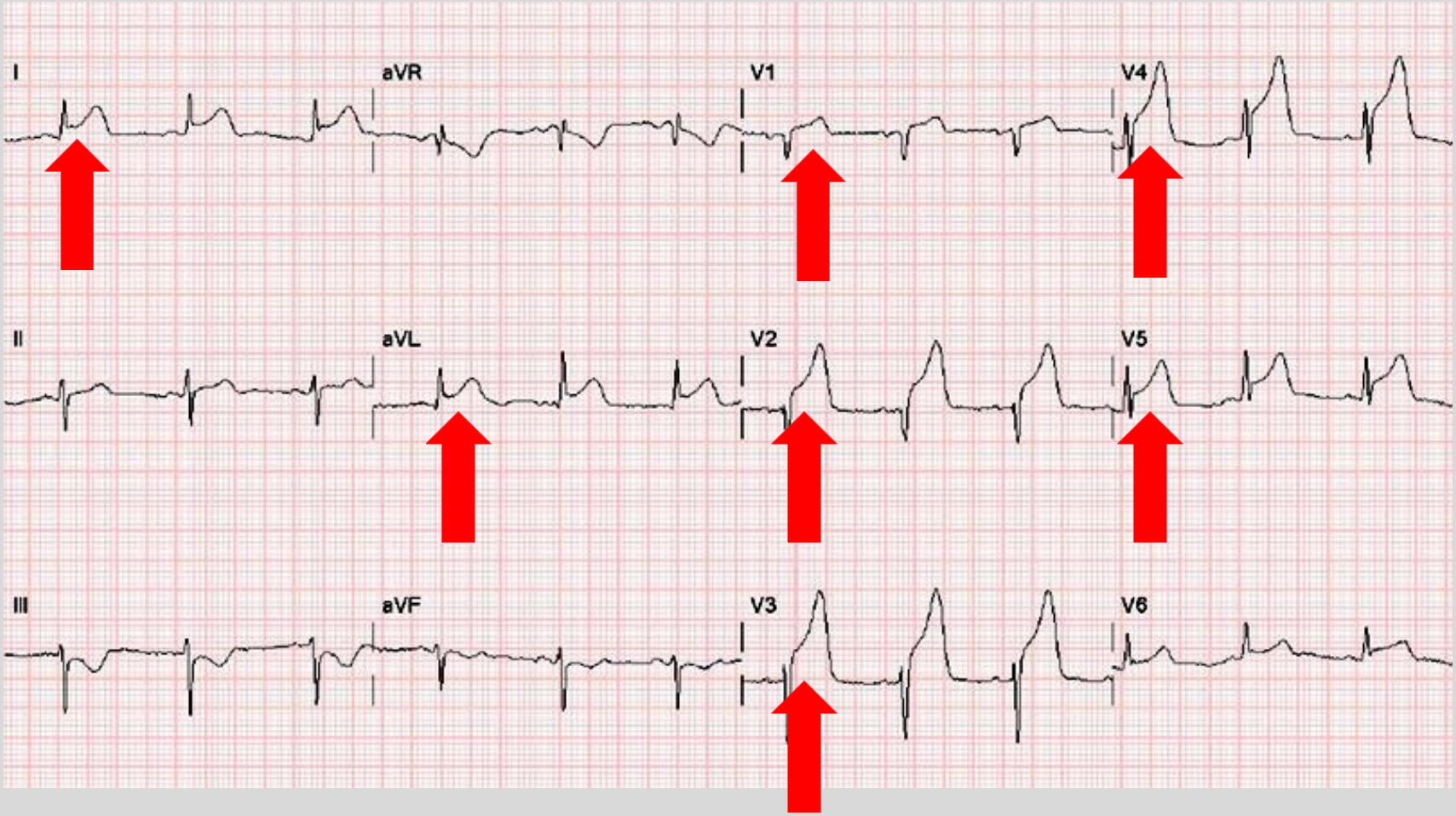
University of Minnesota

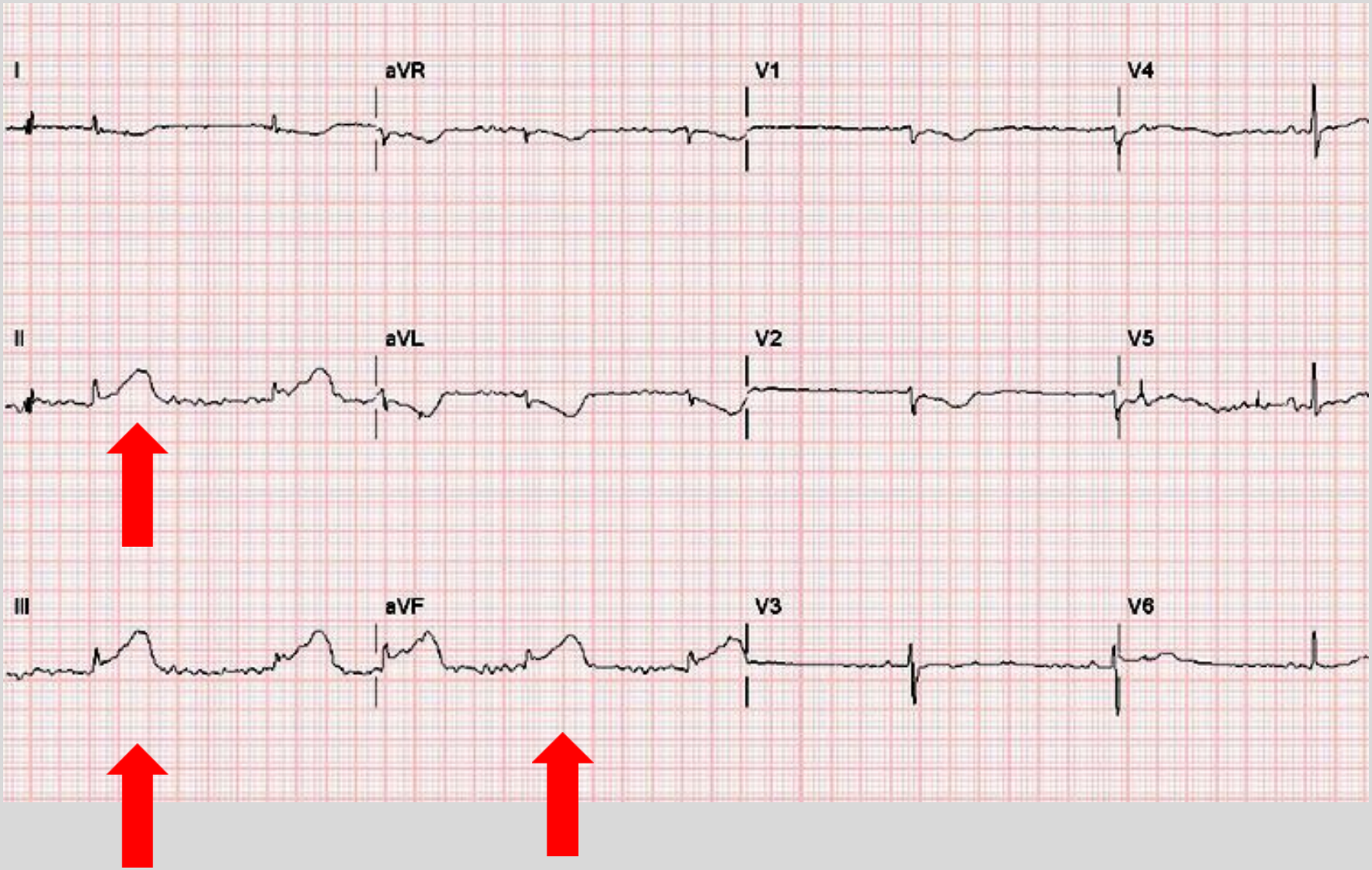
- Inclusion criteria
  - Witnessed VF/VT
  - <30 min transport
  - 18-75 yo
  - no terminal illness
- Process
  - 3 defib + Epi/Amio on scene
  - Transport with Lucas
- Outcome
  - 50% neuro intact survivors

- Convention Center
- 9/10, crushing CP
- HBP, Type 2 DM
- Meds
  - Metformin
  - ASA
  - Lipitor
  - Lotensin
  - Sildenafil

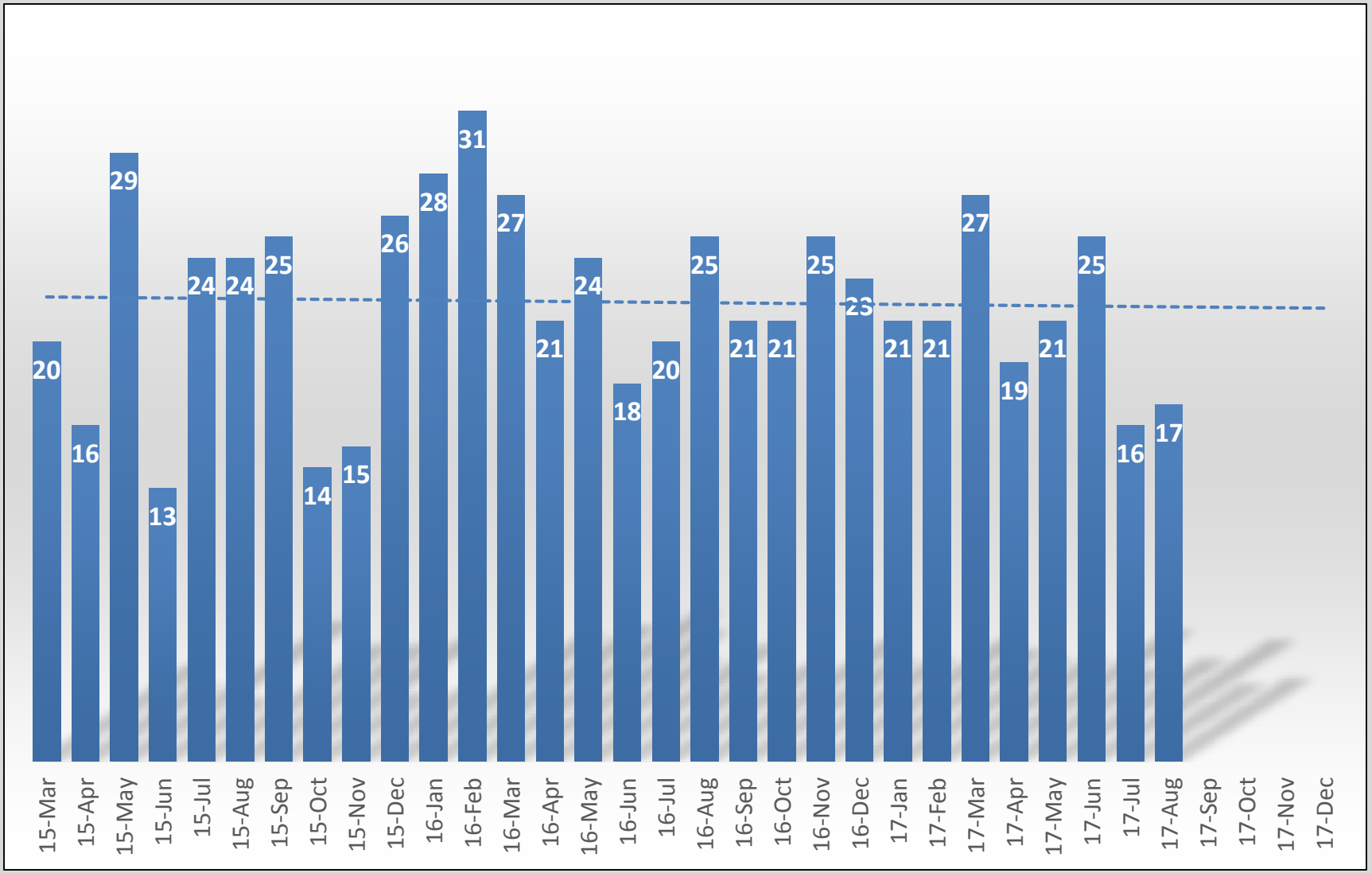



aVL
V2
V5
aVF
V3
V6
5-150Hz 25mm/sec
ENGINE 42 000 3313494-010 LP1544619200

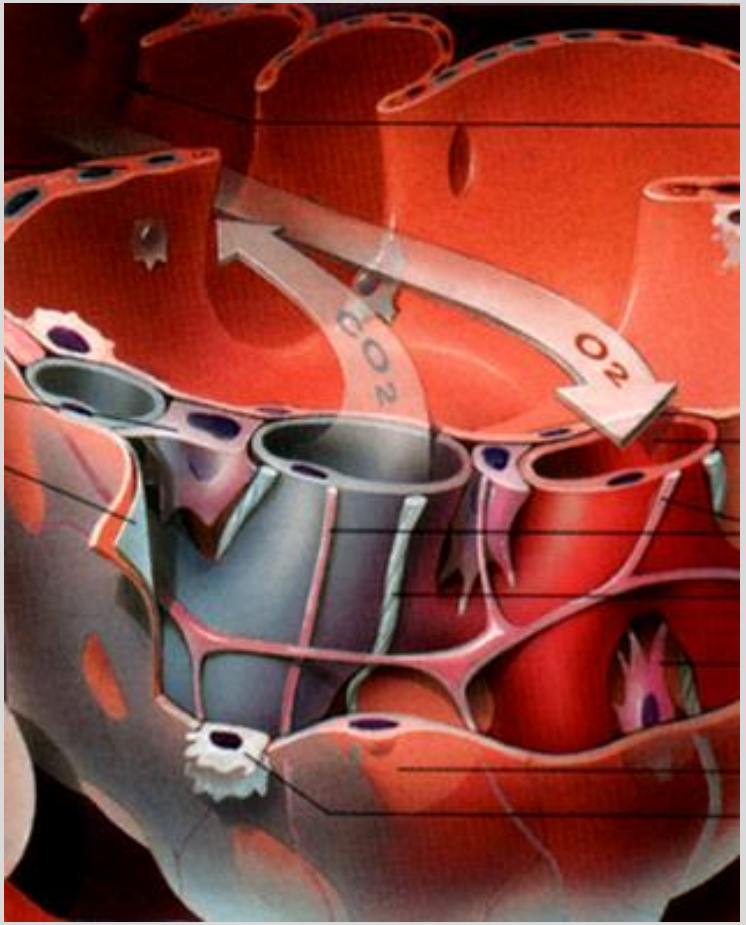

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6

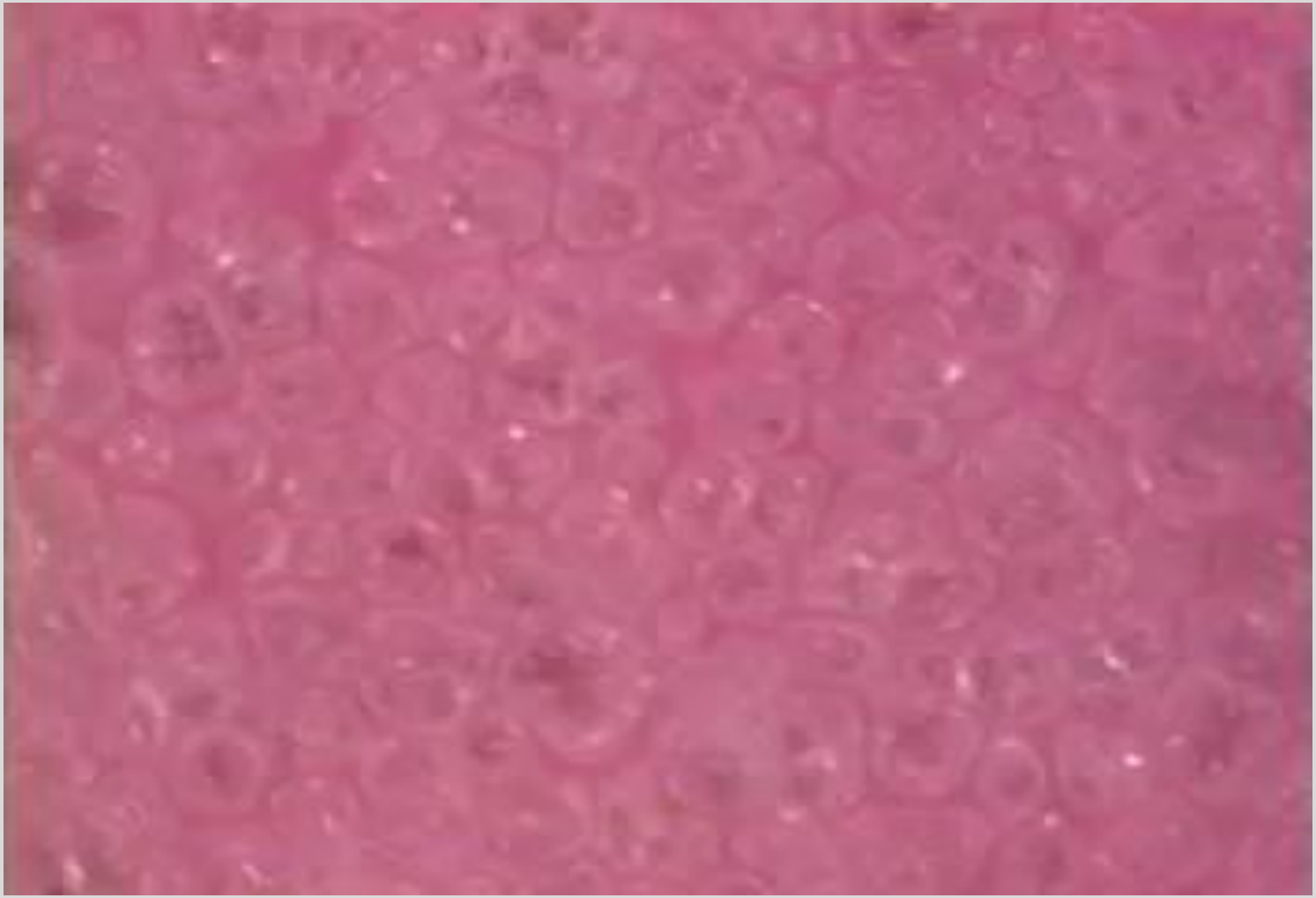
Monthly incidence of STEMI



- 78F acutely SOB x 2h
- Meds (ran out 4d ago)
  - Lisinopril, HCTZ, Diltiazem
- 220/135, ST 125, RR 36
- O2 sat (RA) 78%
- Skin cool, damp
- Wheezing, distant BS

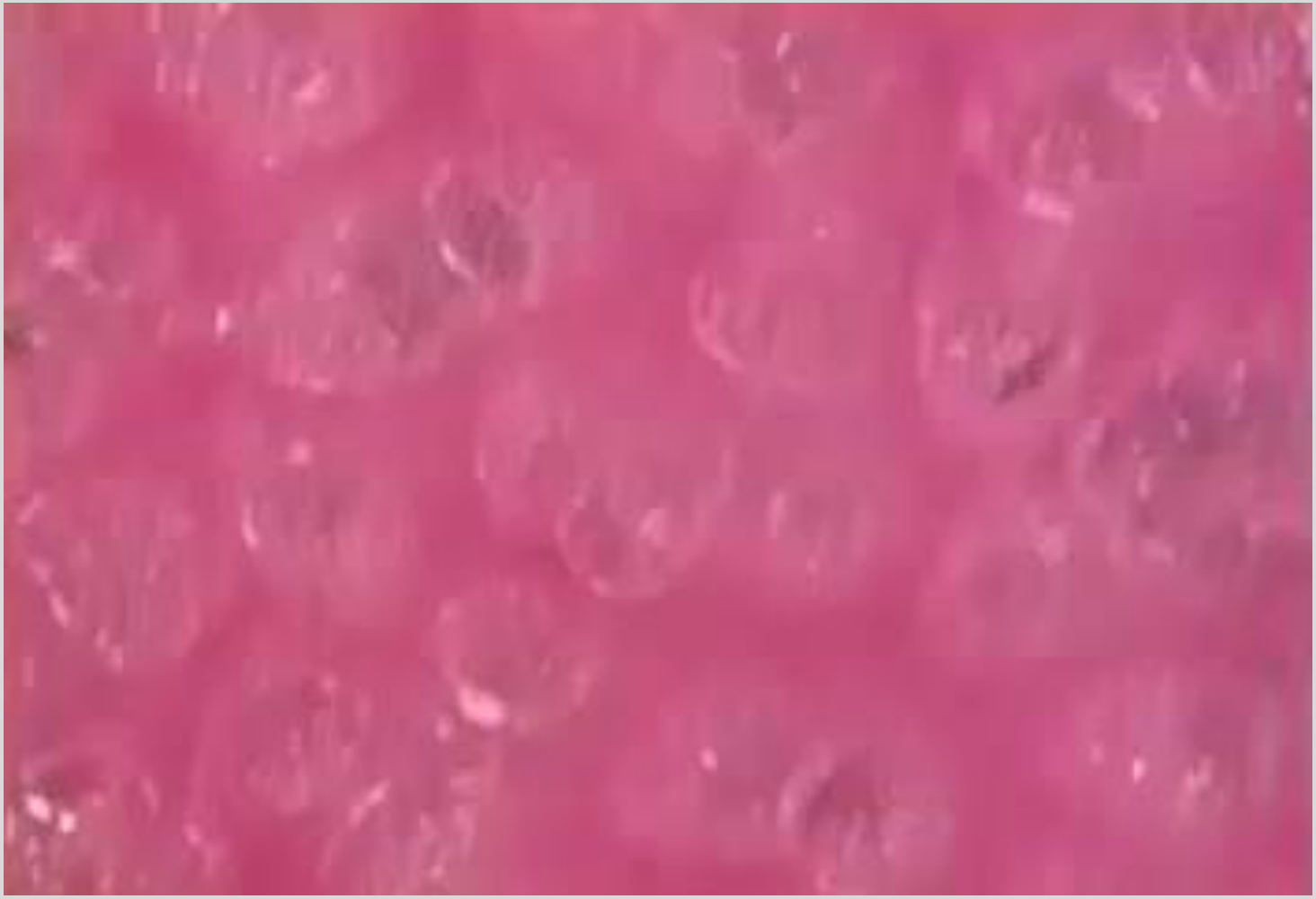

CO2
O2

Normal alveoli



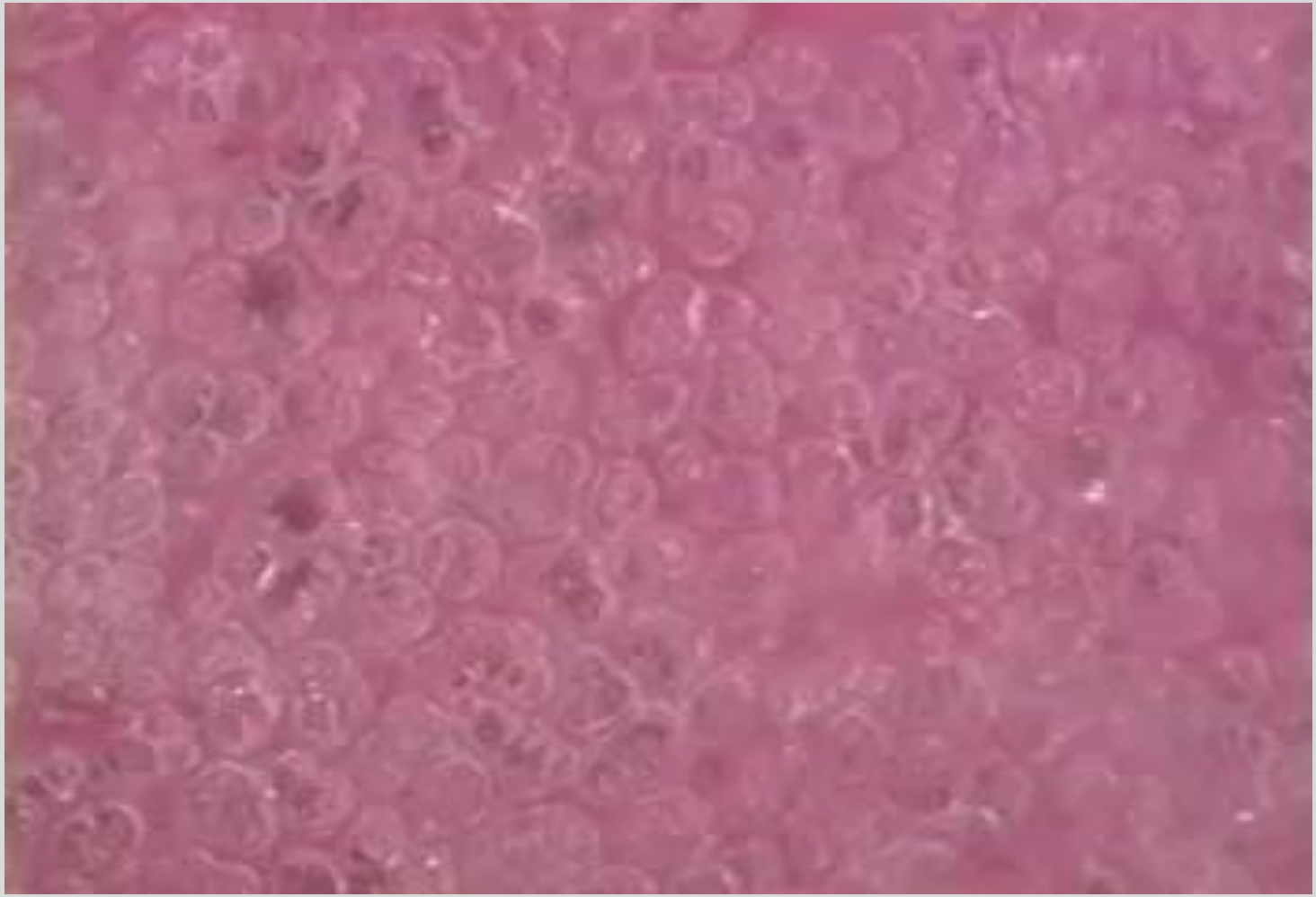
Pavone *et al. Critical Care* 2007 **11**:R104

Injured alveoli



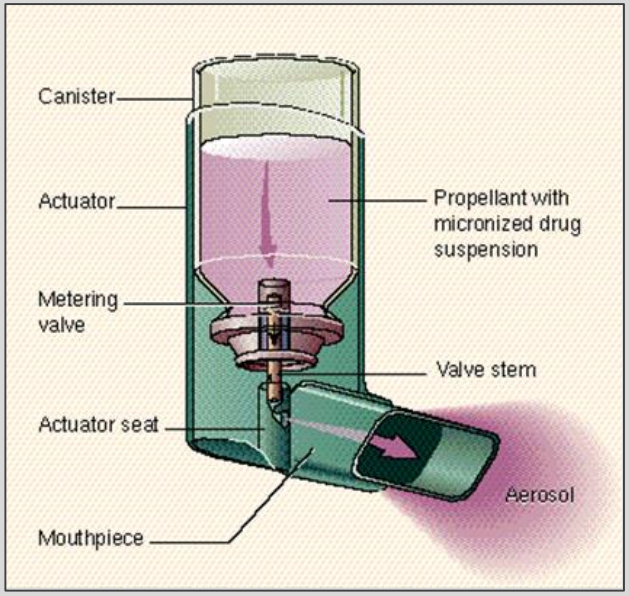
Pavone *et al. Critical Care* 2007 **11**:R104

Injured alveoli with CPAP

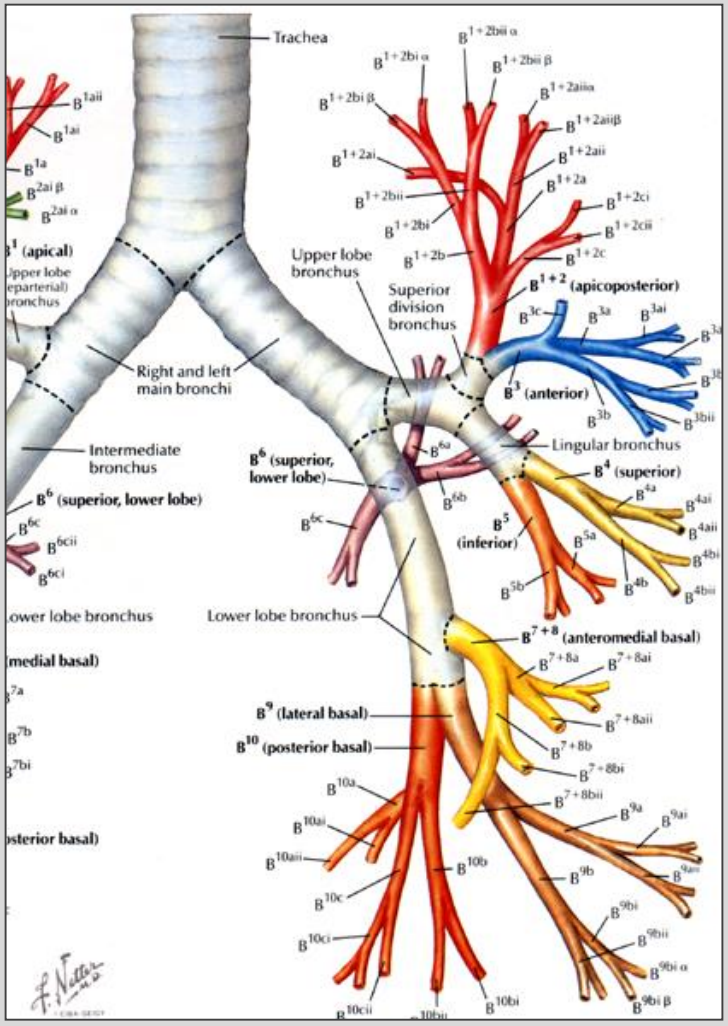


Pavone *et al. Critical Care* 2007 **11**:R104

Metered dose inhaler (MDI)



Beta receptors deep in lung



Spacer improves 2-5 micron particle delivery to beta receptors

RAP

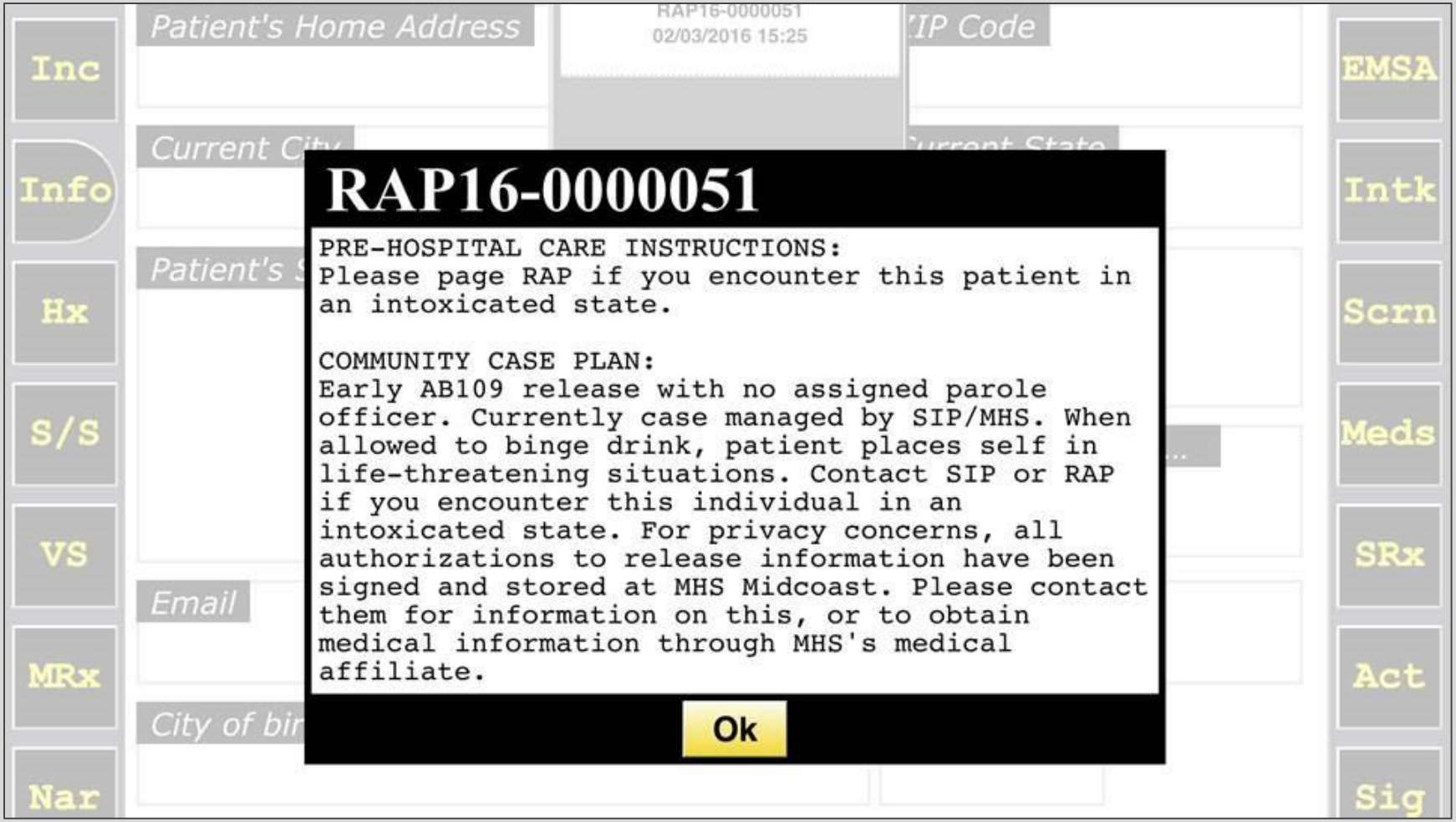
Community Paramedic Pilot Project

Avg. monthly savings

Monthly average	Alameda	San Diego
Enrolled	9	26
Transports and ED visits avoided	6	33
Cost of transports avoided	$603	$923
Cost of ED visits avoided	$749	$749
Savings from ED transport avoided	$3618	$30,305
Savings from ED visit avoided	$4496	$24,602
Total savings per mo.	**$8114**	**$54,907**

Coffmann JM, et al. Evaluation of California's Community Paramedic Pilot Project. January 23, 2017

RAP screen shot



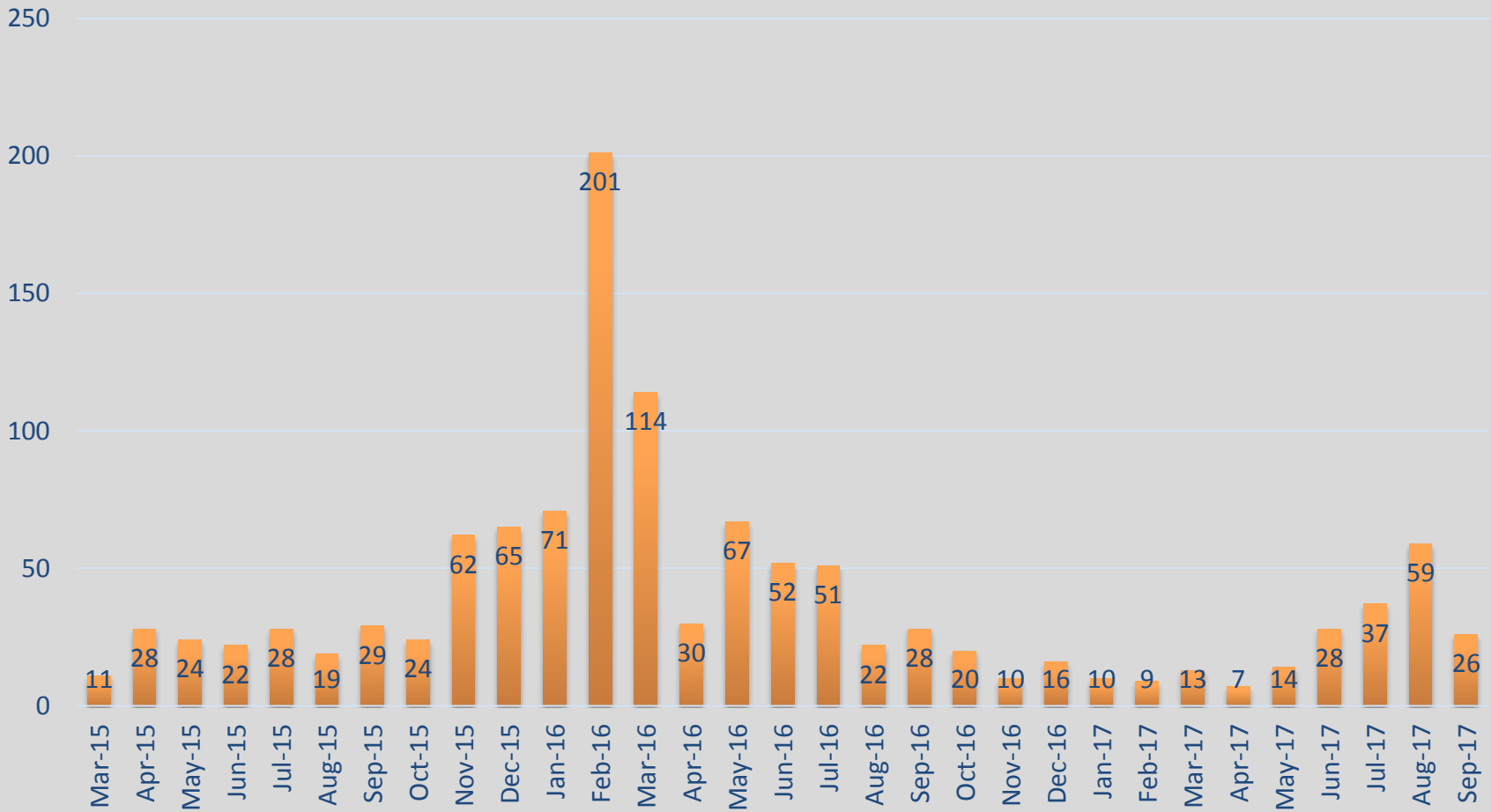
+EMS GRANT

SAN DIEGO HEALTH CONNECT
Better Information • Better Care™

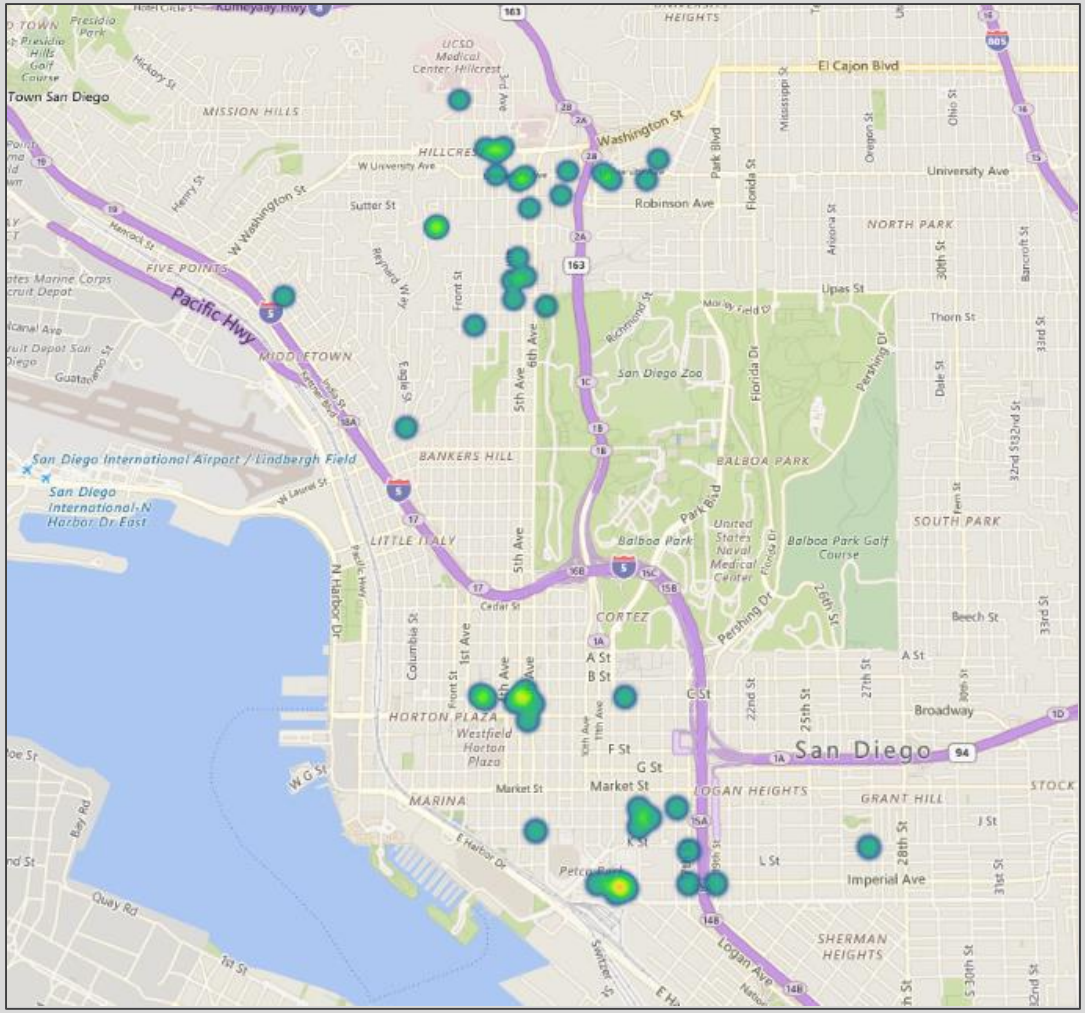
EMS referral to 211 healthcare navigators

- ✓ Food
- ✓ Childcare
- ✓ Utility
- ✓ Finance
- ✓ Housing/shelter
- ✓ Mental health

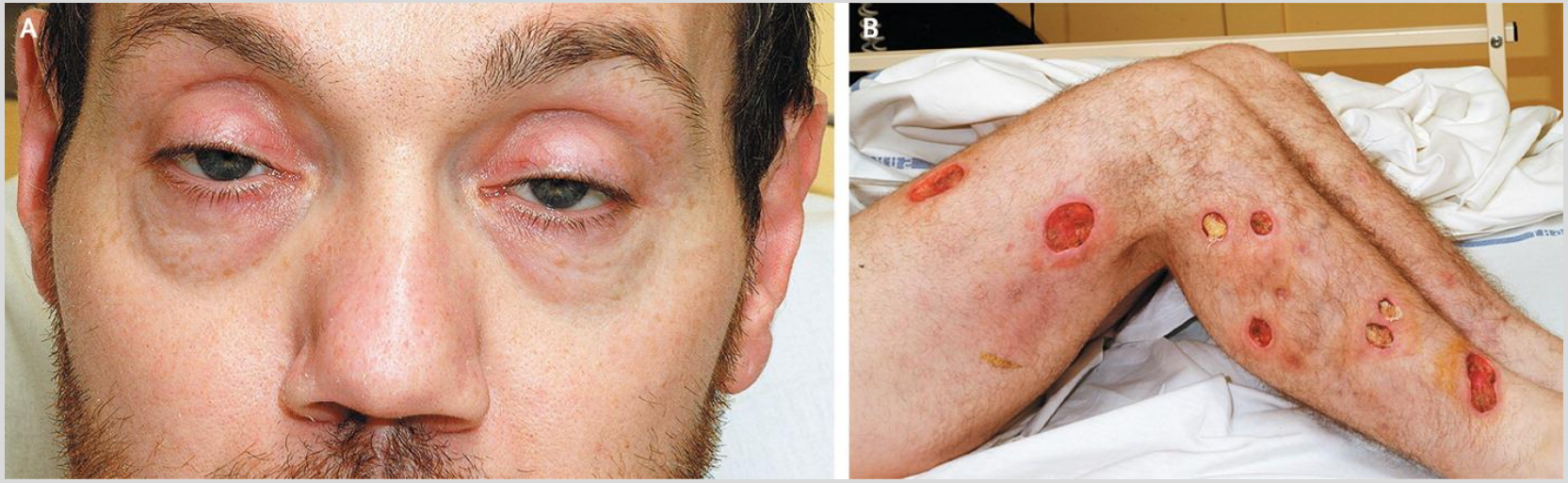
Spice incidents



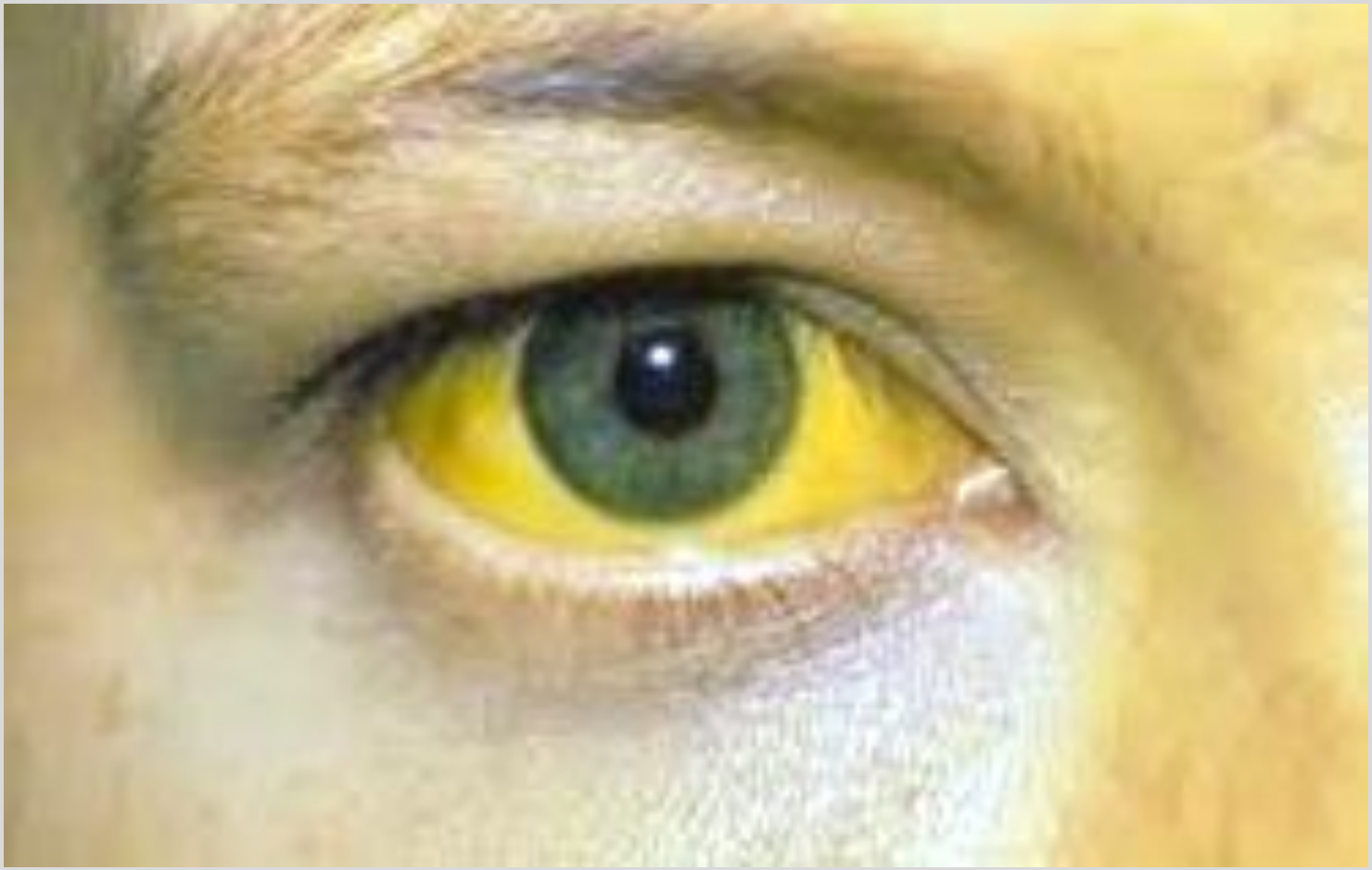
Spice hotspotting




Tide
PODS



Sam AH, Beynon HL. N Engl J Med 2010;363:2444-2444.



Next Gen City EMS Medical Directors

Chris Kahn, MD
EMS Medical Director

Joelle Donofrio, DO
Associate EMS Medical Director

Pending/unresolved issues

- Fentanyl, carfentanil, etc.
- Psychiatric care
- Wellness
  - Burnout
  - Crew safety
- EMS of the Future
  - Resource assignment
  - Response times
  - Payment reform
  - Community PM-MIHC
- Ketamine
- TXA
- Pediatric airway
- Anaphylaxis