

# Case Study: Transcutaneous Pacing (TCP)

- *Improving success with transcutaneous pacing*
- *Improving patient safety in TCP hospital hand-off*

## Michael Levy, MD FAEMS

Immediate Past President NAEMSP  
CMO Anchorage Areawide EMS  
Medical Director State of AK Emergency Programs

# Questions

- When is TCP likely to help?
- What are the risks of TCP?
- What are the steps in confirming successful pacing?
- Have you considered SYSTEMATICALLY the risk of disparate EMS v Hospital monitor/defib platforms?

# Efficacy of TCP for Symptomatic Bradycardia

- Limited human studies
- Latest AHA: chronotrope vs TCP
- Severe symptomatic bradycardia w shock: one 2006 systemic review (7 studies) did not find benefit vs standard ACLS





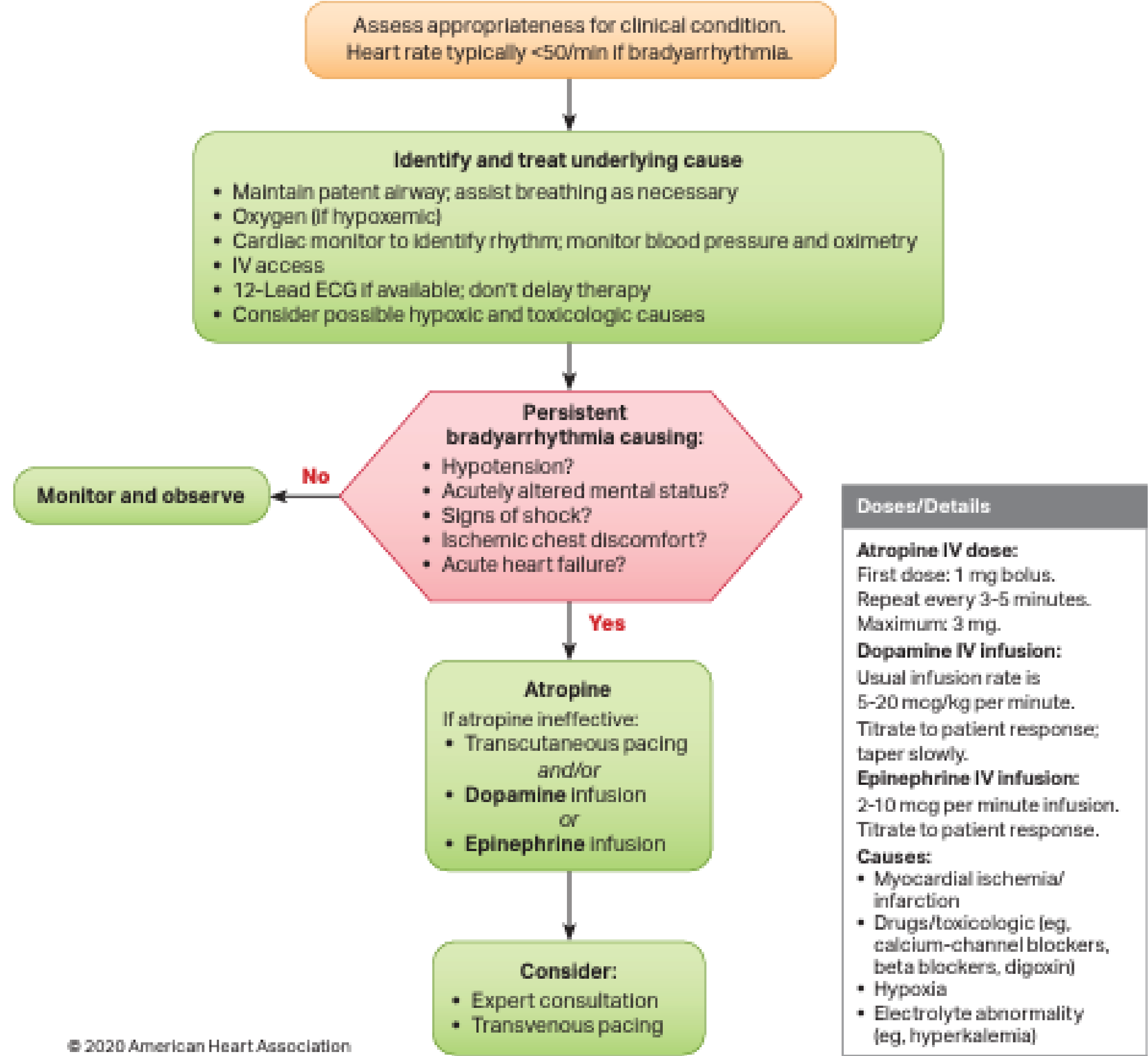
Recommendations for Initial Management of Bradycardia		
COR	LOE	Recommendations
1	C-EO	1. In patients presenting with acute symptomatic bradycardia, evaluation and treatment of reversible causes is recommended.
2a	B-NR	2. In patients with acute bradycardia associated with hemodynamic compromise, administration of atropine is reasonable to increase heart rate.
2b	C-LD	3. If bradycardia is unresponsive to atropine, IV adrenergic agonists with rate-accelerating effects (eg, epinephrine) or transcutaneous pacing may be effective while the patient is prepared for emergent transvenous temporary pacing if required.
2b	C-EO	4. Immediate pacing might be considered in unstable patients with high-degree AV block when IV/IO access is not available.

Expert Opinion

Nonrandomized

Limited data

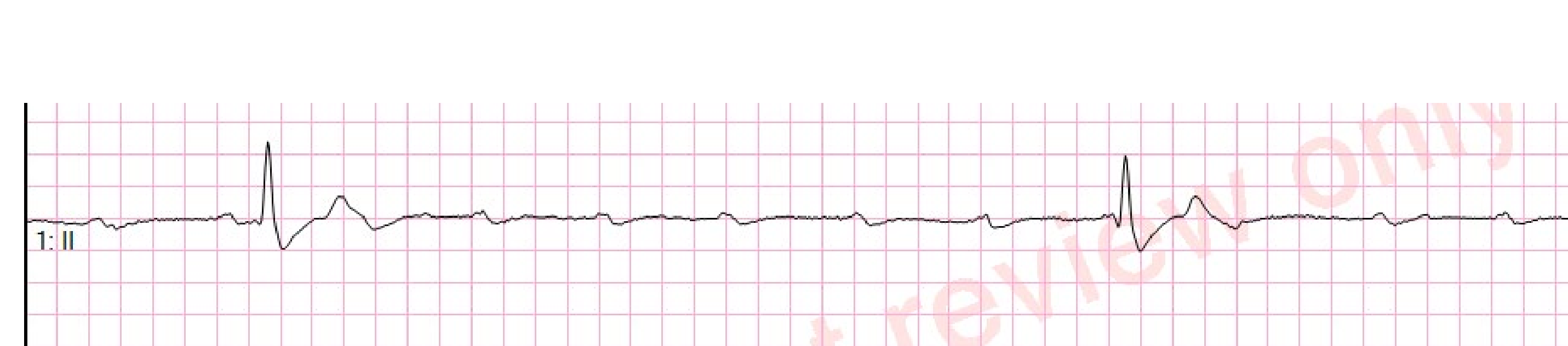
Adult Bradycardia Algorithm



© 2020 American Heart Association

# When?

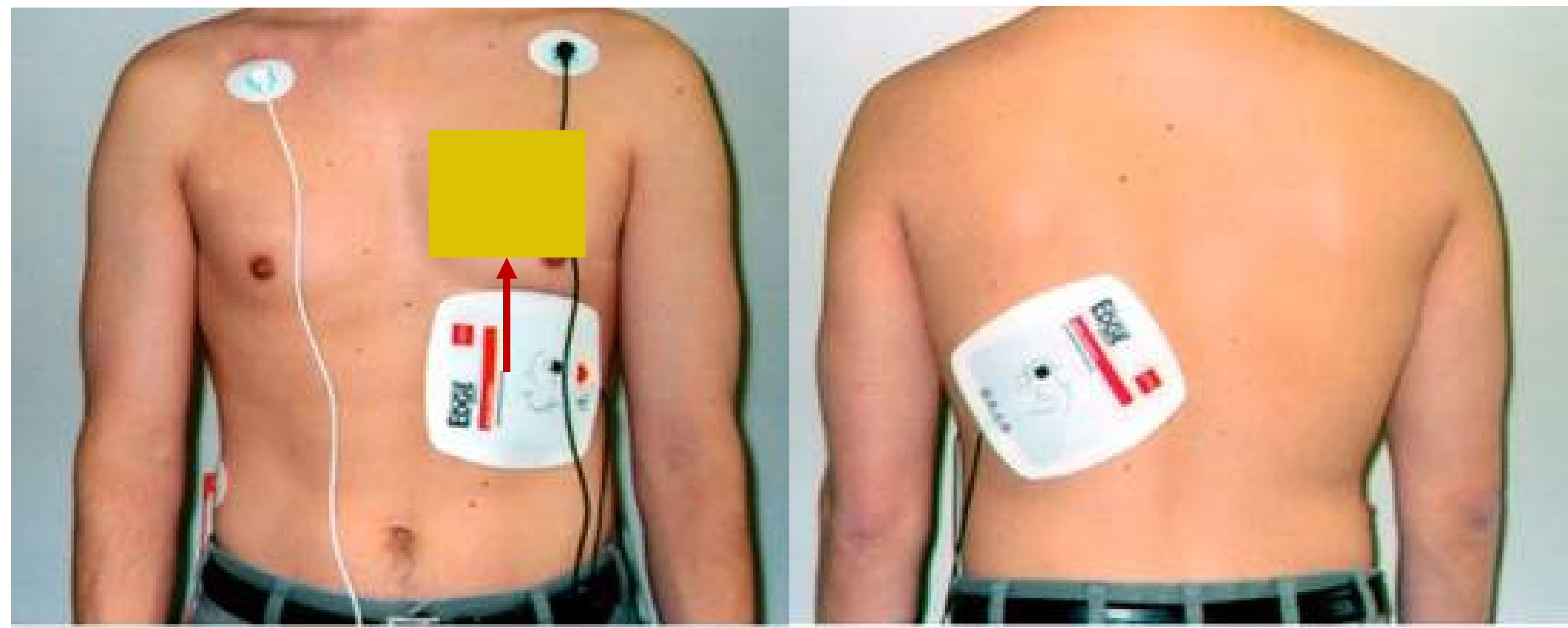
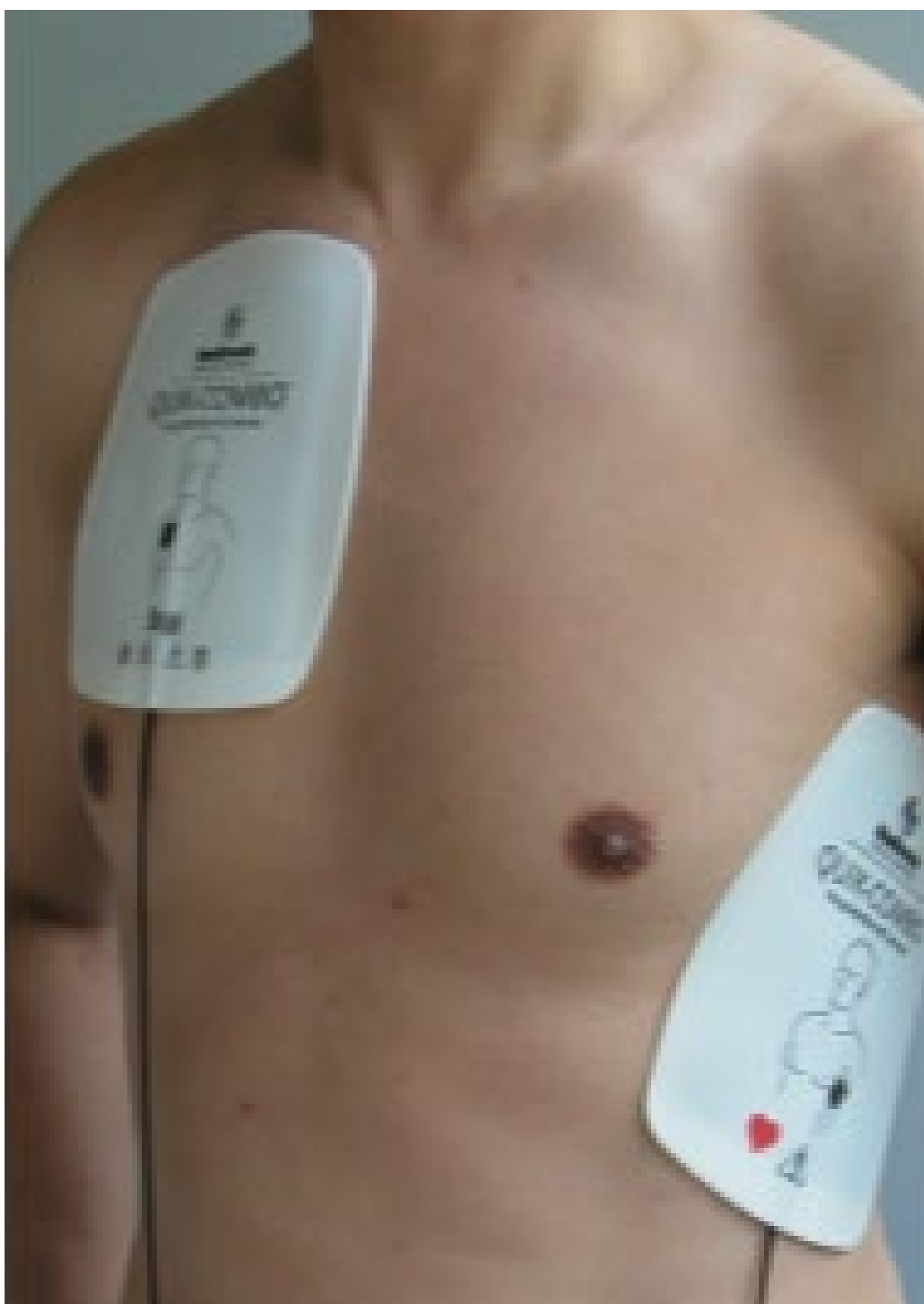
- Severe symptomatic or hemodynamically unstable bradyarrhythmia in which pharmacological therapy is not indicated or unsuccessful



# How?

- Pad placement (AP)
- 4 lead ECG monitor
- Confirm Demand or Non-demand mode
- Adjust EKG signal to appropriate sensing shown by markers ▼
- Set rate to 70, increase only if capture occurs and perfusion inadequate
- Pick current dose and press "CURRENT". Increase until electrical capture. Increase additional 5-10 mA above that threshold
- Consider alternative pad placement if not capture





Images compliments of Stryker



# What?

- **Electrical capture:** very wide QRS, distinct ST segment, broad T wave
- Distinguish from "phantom capture"
- **Mechanical capture:** proximal palpable pulses may simply be muscle contractions; improved mentation, NIBP, HR great if present but SpO2 pleth, rise in EtCO2, pedal pulses helpful
- Caution: if lead comes off, pacemaker reverts to nondemand mode at a fixed rate (LP15)



# Ouch Ouch Ouch Ouch

- Sedation/analgesic
  - Ketamine
  - Fentanyl/versed
  - Nitrous?
  - Other?





# Droperidol Reigns Supreme



# Danger Zone!

The Hospital Handoff: Transition of TCP Care



PROTOCOL: Without discontinuing or interrupting pacing being done by the LP15:

1. ED Monitor (ZOLL) is turned on and patches are placed WITHOUT removing EMS patches. Patches from the different devices MUST NOT TOUCH. Ensure that Zoll has its own limb leads.
2. ED Monitor is set to same mode, rate and mA as the LP15. If LP15 mA exceeds highest Zoll mA, notify hospital and leave patient on LP15.
4. Once Zoll is set up to equivalent setting to LP15, activate the Zoll device while simultaneously on the LP15, turning down the current to zero by pushing the mA button and using the speed dial to take the mA to zero
5. Reconfirm that the ZOLL monitor is providing electrical capture then confirm mechanical capture by the same means that confirmed successful LP15 pacing. Maximum of 5 seconds attempt if the patient becomes symptomatic. If no capture by Zoll, immediately bring the LP15 current back up to prior successful number or 5-10 above and reconfirm electrical and mechanical capture.
6. Once Zoll pacing is confirmed, the LP15 can be turned off and patient can be transferred to the hospital bed.
  - If there are issues with the hospital monitor being able to successfully pace, encourage the ED to continue using the LP15 as long as necessary including possible continuation to the cath lab.

• 1.

Reference: DOUKKY R, BARGOUT R, KELLY RF, CALVIN JE. Using transcutaneous cardiac pacing to best advantage. *J Crit Illn*. 2003;18(5):219-225.

# Transcutaneous Pacing: The Right Way

D) Dispatched Code red for Syncope.

S) 77 yo male CC: Unwitnessed syncope. E02 on location states pt. had a unwitnessed syncopal episode at church. Bystanders on location found pt. laying on the ground by the church back entrance. Bystander state they do not know how long pt was unconscious for but pt. woke up on bystanders arrival. Pt. states he is having C/P radiating into his back and does not recall the episode. Pt. states he has PMHX of HTN and enlarged prostate. Pt. denies any cardiac PMHX. Pt. LOC soon started to deteriorate and no other information could be obtained. Pt. also later was disassociated due to active TCP and could not give any further information or history.

O) Found pt. laying in back doorway of local church. Pt. in care of E02

Pt. AO x 4 and answering questions / following commands appropriate.

Pt. skin- pale / cool / dry

HEENT- atraumatic, PERRL. Pt. has clear and protected airway. Pt. has noted weak central pulses

Chest- LS- clear, SPO2- 90% but initially has poor pleth due to profound hypotension. END CO2- 25 with RR at 20-24 / min. EKG- STEMI- S. brady with 1st degree AV block. Rate initially at 45 bpm Obvious ST elevation in inferior and anterior leads with sig. reciprocal changes suspecting of a wrap around LAD STEMI. Pt. degrade to a 3rd degree HB 20-30 bpm and Pacing was started initially with out pain management.

ABD- atraumatic, soft non tender.

EXT- Pt. has no noted distal pulses, Pt. moves all EXT appropriate

BGL- 93

A) STEMI Alert, Bradycardia, Hypotension

P) Pt. assessment, Vitals initial BP was 70/p by manual , EKG, 12- lead. STEMI alert notified to Prov and transmitted EKG, Fast patches applied, IV access x 2, ASA given, Pt. degraded to a 3rd degree HB with slower rate 20-30 bpm. Pt. Paced at 70 bpm at 120 ma with good mechanical capture confirmed by femoral pulses and good pleth waveform. 35 mg Ketamine given for procedural sedation and repeated at 17.5 mg to help make pt. tolerate pacing. Obvious skin color improvement with stronger central pulses noted. SPO2 pleth much more pronounced on monitor. additional BP could not be obtained due to active pacing and transport road noise. Pt. transported red status 1 to Prov. Pt. transfer at ED went smoothly with M05 PM [REDACTED] directing transfer onto Prov. Pacer. Pacing was confirmed and electrical / mechanical capture was noted before AFD LP 15 was DC'd.

P) Pt. assessment, Vitals initial BP was 70/p by manual , EKG, 12- lead. STEMI alert notified to Prov and transmitted EKG, Fast patches applied, IV access x 2, ASA given, Pt. degraded to a 3rd degree HB with slower rate 20-30 bpm. Pt. Paced at 70 bpm at 120 ma with good mechanical capture confirmed by femoral pulses and good pleth waveform. 35 mg Ketamine given for procedural sedation and repeated at 17.5 mg to help make pt. tolerate pacing. Obvious skin color improvement with stronger central pulses noted. SPO2 pleth much more pronounced on monitor. additional BP could not be obtained due to active pacing and transport road noise. Pt. transported red status 1 to Prov. Pt. transfer at ED went smoothly with M05 PM [REDACTED] directing transfer onto Prov. Pacer. Pacing was confirmed and electrical / mechanical capture was noted before AFD LP 15 was DC'd.

# Summary

- TCP: can be a life-saving bridge to definitive rhythm management
- Infrequently used skill: practice!
- May be useful in symptomatic bradycardia, not helpful in asystolic arrest
- Anticipate risk of hospital handoff
  - Develop collaborative transition of care guideline
  - TCP: **T**rain: **C**onfirm: **P**lan to re-train. Rust never sleeps