OFFICE OF THE MEDICAL DIRECTOR
EMERGENCY PHYSICIANS ADVISORY BOARD

Sudden Adult Death Syndrome

Recognizing the Undetected Disease of EMS

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Rewind 50-years

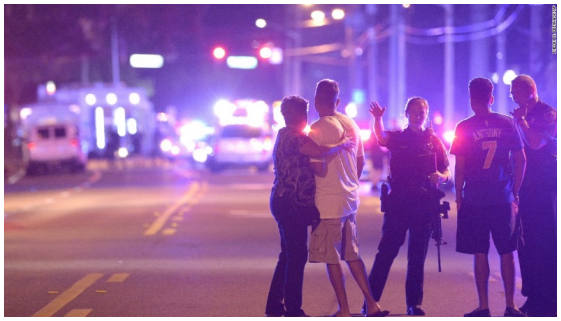
1966

- National Academy of Sciences
- Published the white paper that started it all
- *Accidental Death and Disability: The Neglected Disease of Modern Society*

Fast-forward 30-years

Shift our focus

- Over the past two decades
- Spend a great deal of our time, resources and effort
- Thinking about, planning and responding
- Variety of Mass Casualty Incidents and disaster events



What I want to talk with you about today

Everyday EMS cases like ODs, altered mental status, CHF and COPD

- Patients who are very sick when we arrive on-scene
- Typically arrest minutes later
- in the back of the ambulance or enroute to the hospital
- These cases are certainly, but there's nothing special about them
- Certainly noting that would typically trigger a sentinel event notification or QA review

If you add up all these patients in every city & EMS system

We have an MCI every day in this country

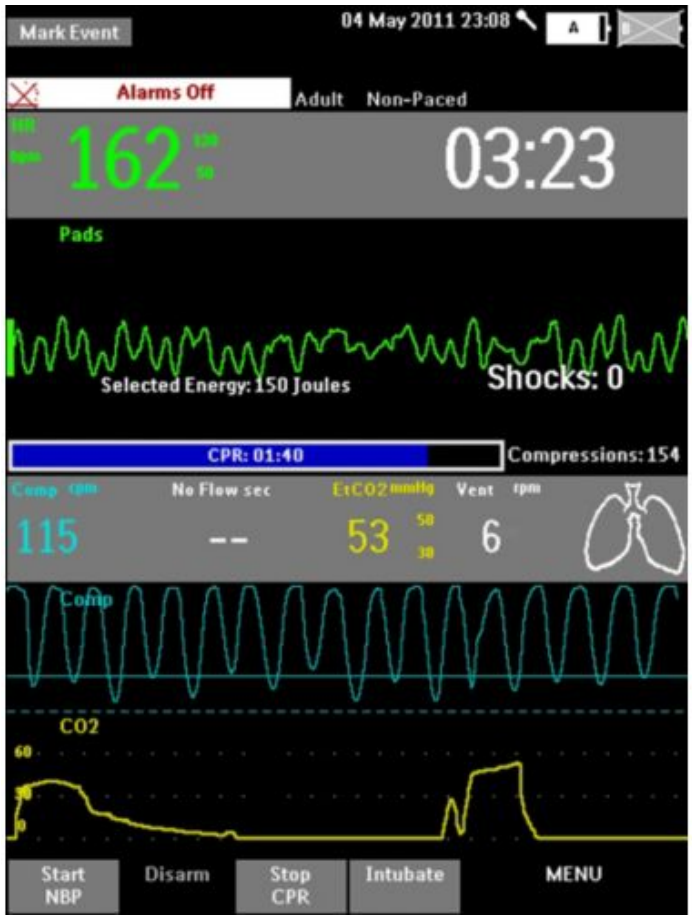
- The problem is that we just don't recognize them
- Because we don't have the tools or knowledge to detect them

Sudden Adult Death Syndrome (S.A.D.S.)

The tools

- Cardiac monitor
- Continuous $EtCO_2$ waveform capnography
- QA personnel, processes & policy
- Wireless upload capability
- Training and education

What you see in the field



EKG

Capnometry

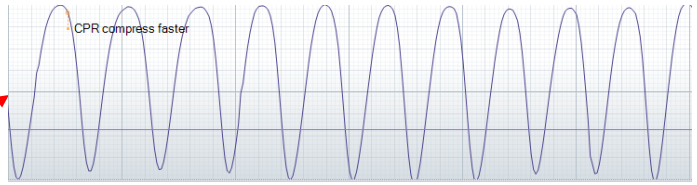
CPR Quality

Capnography

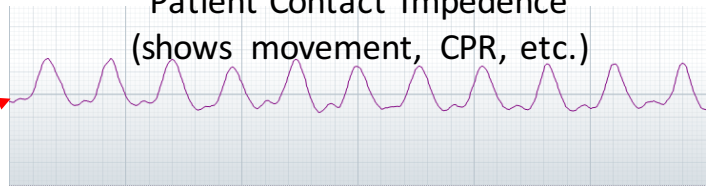
The tools

What we see in the office

CPR Quality

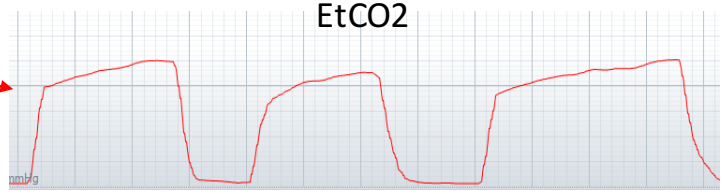


Patient Contact Impedence
(shows movement, CPR, etc.)



ECG

EtCO2



What we see


Lead II
Sample rate: 250Hz
Scale: 0.1000mV per mm
Baseline: mV
0.00
Range: mV
4.00
Center
+2.0000 mV
PVC alarm
CO2 26mmHg
SpO2 low perfusion
-2.0000 mV
Compressions
Sample rate: 50Hz
Scale: 1.7500mm per mm
Baseline: mm
-35.00
Range: mm
70.00
Center
0.0000 mm
-70.0000 mm
CO2
Sample rate: 125Hz
Scale: 1.8250mmHg per mm
Baseline:
8.72
Range: mmHg
73.00
Center
+45.2200 mmHg
-27.7800 mmHg
PCI
Sample rate: 200Hz
Scale: 7,500.0000mOhms per mn
Baseline:
439,598.8
Range: mOhms
300000.00
Center
+589,598.9000 mOhms
+289,598.8000 mOhms

Case #1

43 y/o asthmatic female, found unconscious and unresponsive

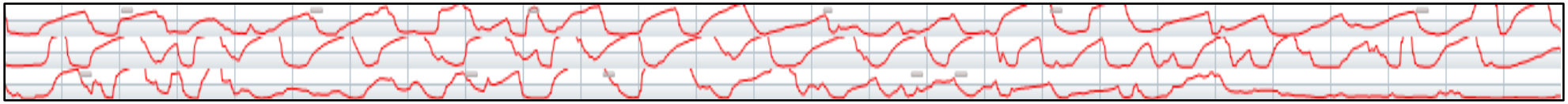
- Pulse-80's (weak); BP-unable to obtain; RR-agonal; Pupils-sluggish
- Patient subsequently arrested en route to the hospital

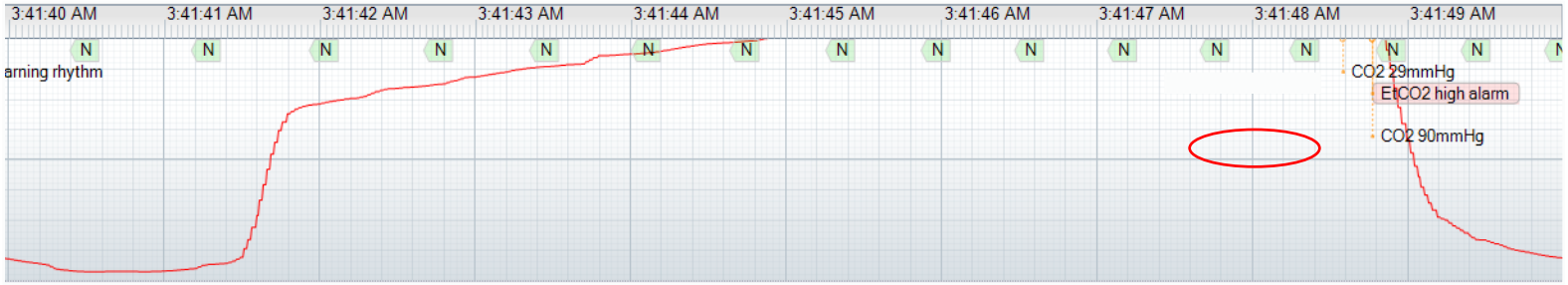
QA review (e-pcr and monitor files)

4-minutes later

03:40 – Ventilation provided via BVM

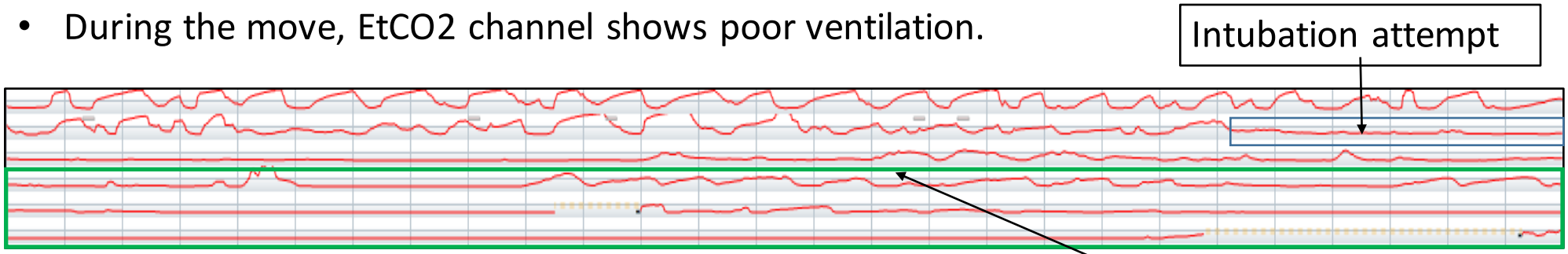
- Initial EtCO2 shows good waveform with $EtCO_2$ – 80-85 mm Hg
- Initial O_2 saturations – 55-60%



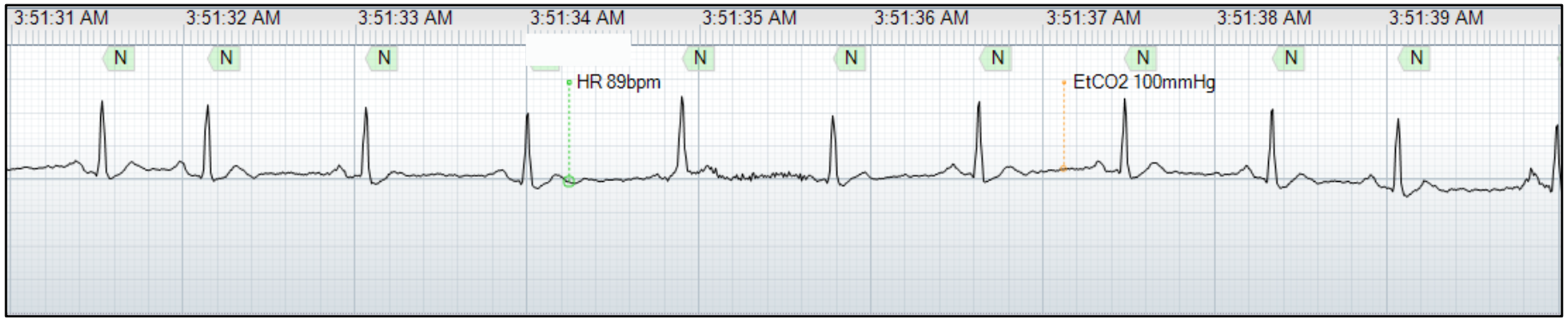


8-minutes later

- SpO2 remains low despite BVM ventilation
- 03:48 Unsuccessful intubation attempt made & patient moved to ambulance
- During the move, EtCO2 channel shows poor ventilation.



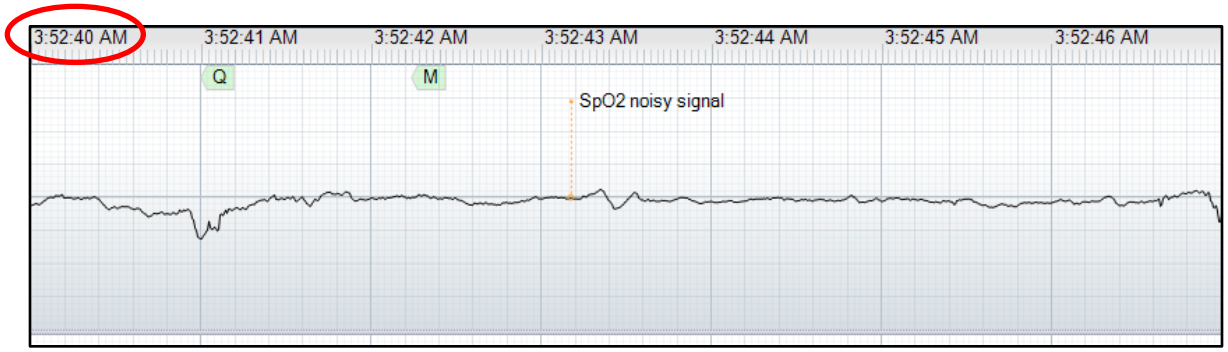
Heart rate begins to go slow



4-minutes later

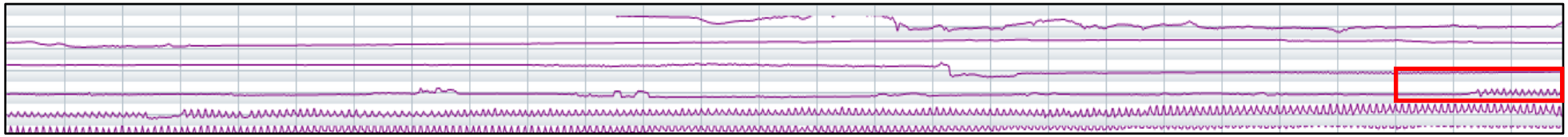
03:52 Patient becomes progressively more bradycardic

- While the crew prepares for drug-assisted intubation
  - Rhythm deteriorates to asystole

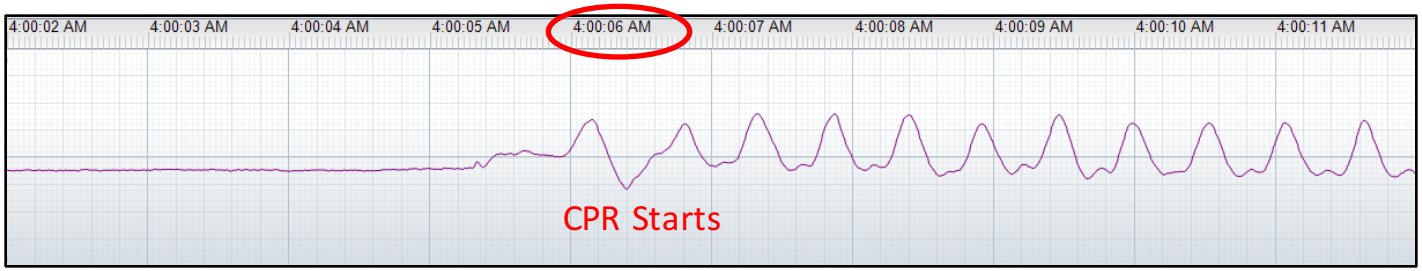


8-minutes later

04:00 PCI channel (patient contact impedance) CPR is started

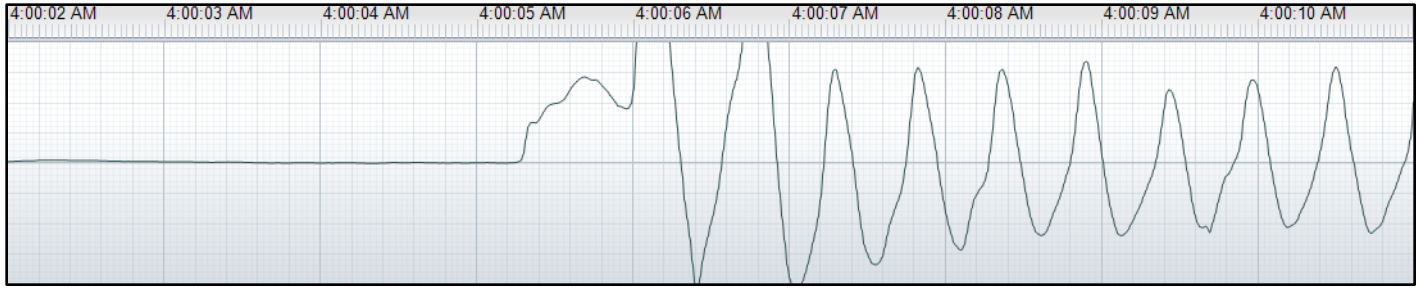


PCI Channel



- Initiation of CPR also independently confirmed on the pads rhythm channel

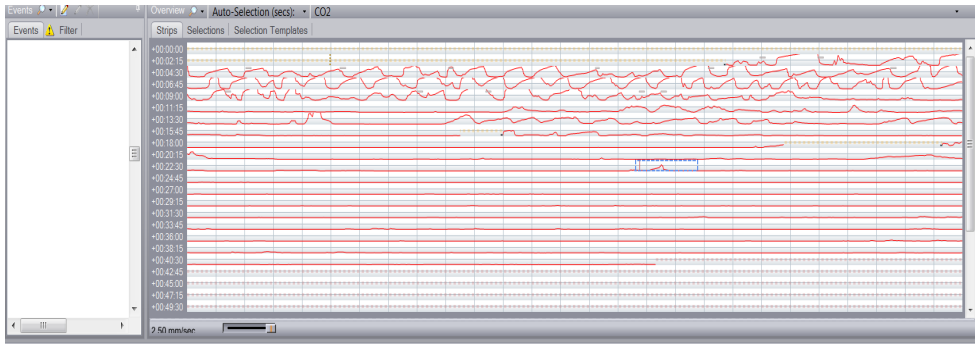
Pads Channel



The whole ‘SADS’ picture

QA summary

- Inability to initially stabilize patient’s oxygenation and ventilation status
  - O2 saturation remained in the 50-60% range prior to arrest
  - Ventilation declined to near flat-line with focus on moving the patient
- Intubation attempted with low SpO2
  - In the absence of adequate pre-oxygenation
- Cardiac arrest went unrecognized for 8-minutes
  - During preparation for drug-assisted intubation



Case #2

61 year old female found with Altered mental status at nursing home

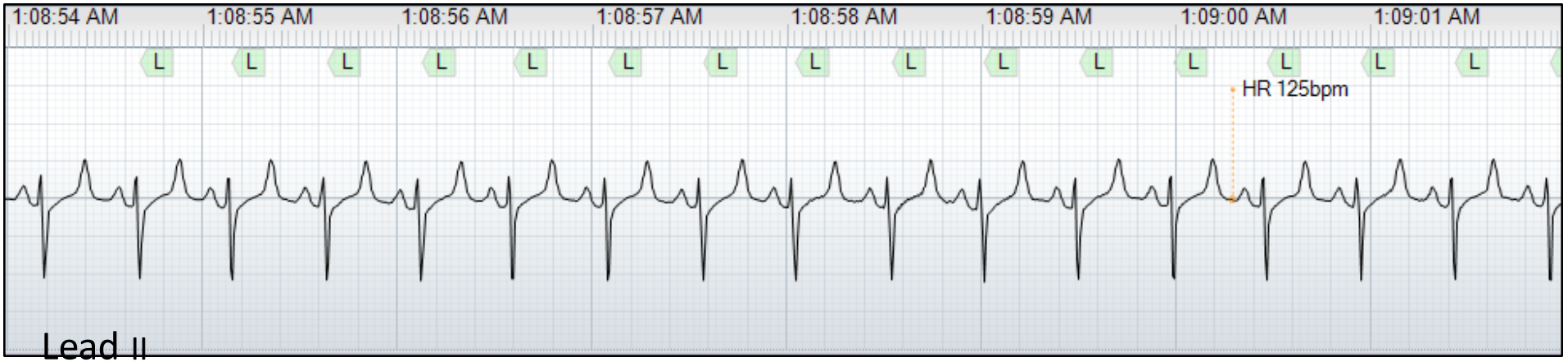
- Per staff:
  - Palpable carotid pulse
  - Unable to obtain BP
  - Downtime: “I don’t know, maybe an hour”

Onscene: 12/23/2015 01:03:04
At Patient: 12/23/2015 01:07:05

Initial vitals and monitor rhythm

1:09 pm

Time	HR	RR	SpO2	ETCO2	BP	MAP	Gluc	Gluc Hi	Gluc Lo	GCS	Pain	Temp	Art Sys	CVP	Pos	Rhythm
01:09:01	125	12	73		50/P		71	False	False	3					Semi-Fowlers	Sinus Tachycardia



- Non-rebreather mask placed
- EtCO2 initially not placed on the patient

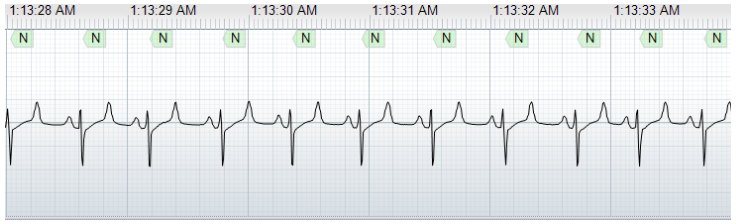
4-18 minutes later

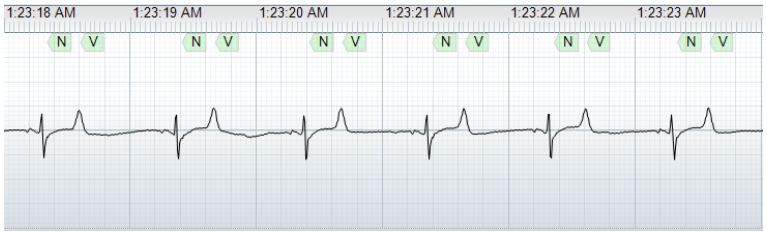
Procedures Performed

Time	Crew	Name	Location	Size	Attempts	Response	Success	Comments
01:13:28		IV - Extremity	Antecubital-Left	20		1	No	
01:15:41		IV - Extremity	Forearm-Right	22		1	Yes	
01:23:55		Monitor - Defib Pads	placed			1	Yes	

Vitals

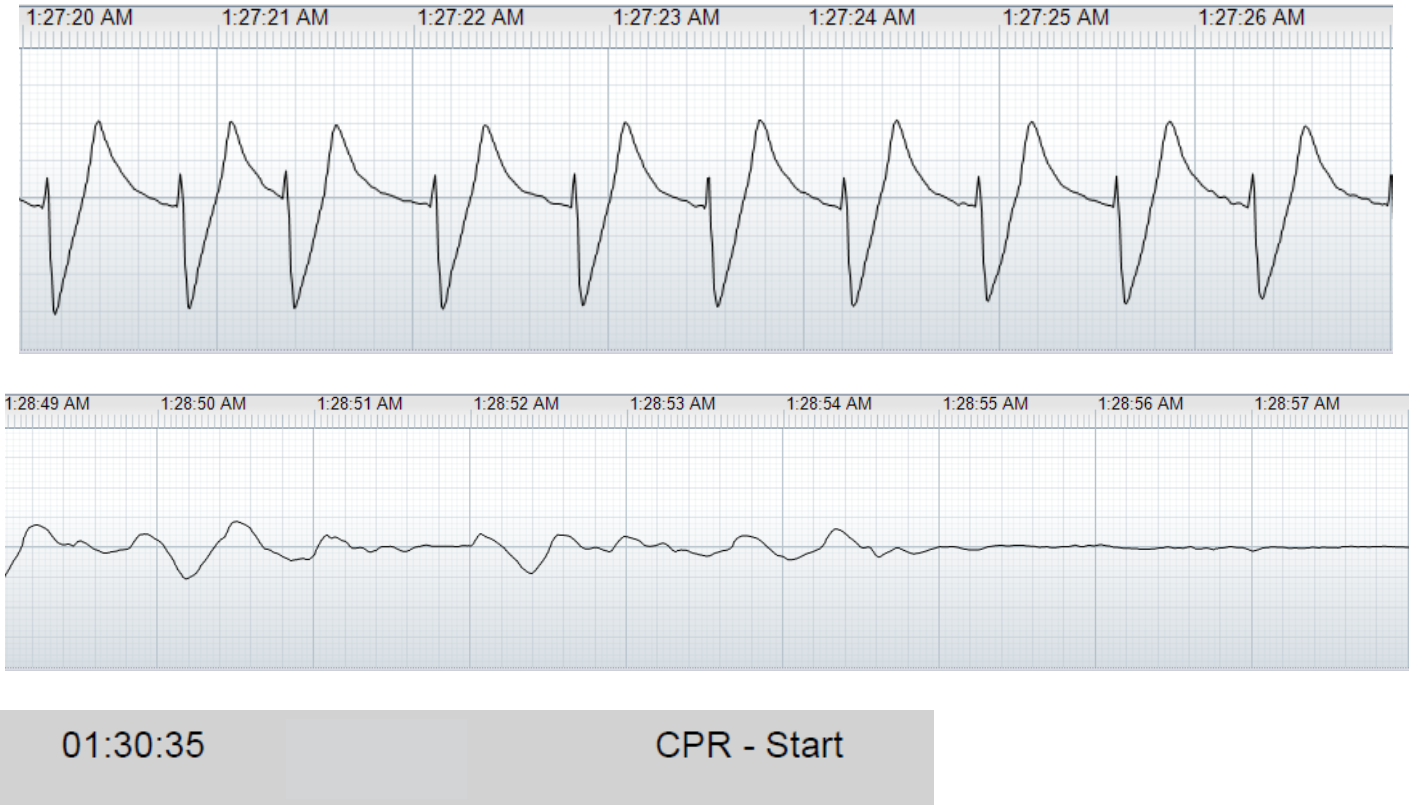
Time	HR	RR	SpO2	ETCO2	BP	MAP	Gluc	Gluc Hi	Gluc Lo	GCS
01:09:01	125	12	73		50/P		71	False	False	3
01:19:02	93	12			50/P			False	False	3
01:27:03	70	12			50/P			False	False	3





- 1:27 – patient moved to ambulance & transport initiated

1-2 minutes later



Prorogressive widening of QRS complexes

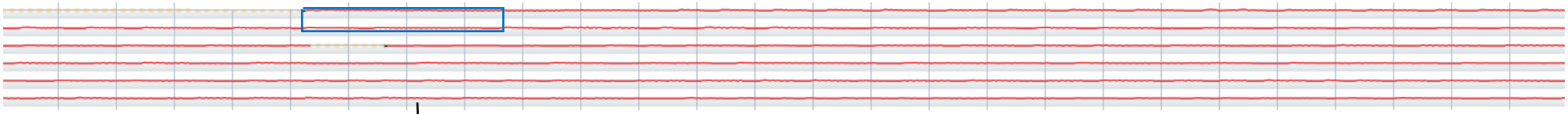
- "Assisted ventilations were about to start, but the patient went into asystole"

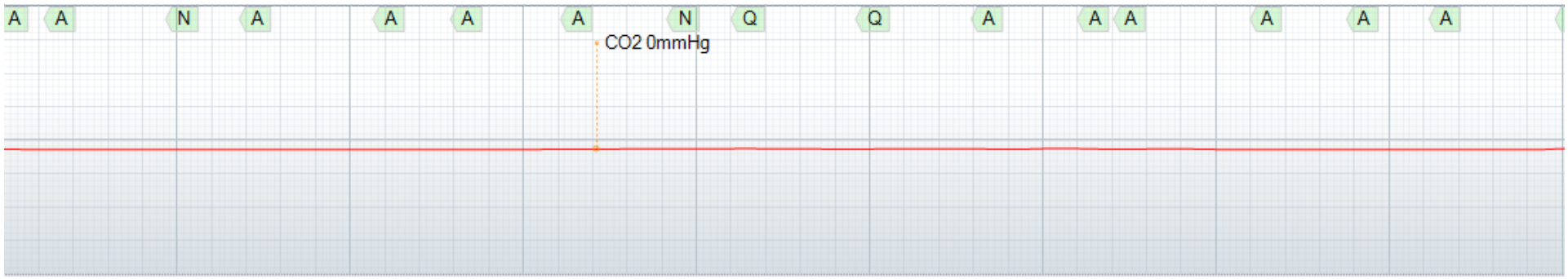
2-minutes later

Intubation attempted, tube pulled & no adequate EtCO2 subsequently established

Procedures Performed

Time	Crew	Name	Location	Size	Attempts	Response	Success	Comments
01:34:12		Airway-Endotracheal Intubation		7.0	1		Yes	





The moral of the story

If you don't want to be SADS

- Field providers have to be equipped with real time monitoring capability
- QA processes have to be developed to ensure
  - Providers know how to use them
  - The system knows how they are doing
- If you can't do that you probably shouldn't be managing
  - Airways (NRBM masks, CPAP, BVM, supralottics or ETT)
  - Critically ill patients
  - 911 EMS system
- Training has to encompass 3-things
  - Manual skills (BVM, intubation)
  - Cognitive skills (when to ventilate & when to intubate)
  - Affective skills (what happens on-scene and in the back of the truck)