Sudden Adult Death Syndrome

Recognizing the Undetected Disease of EMS

Neal J. Richmond, M.D., FACEP
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 EtCO2 waveform capnography
- QA personnel, processes & policy
- Wireless upload capability
- Training and education

What you see in the field

[Images of medical equipment and EKG readings]
The tools

What we see in the office

CPR Quality

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

ECG

EtCO2
What we see
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 EtCO2 – 80-85 mm Hg
- Initial O2 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

Intubation attempt

Moving & securing patient in ambulance
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

- Initiation of CPR also independently confirmed on the pads rhythm 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 vital and monitor rhythm

1:09 pm

- Non-rebreather mask placed
- EtCO2 initially not placed on the patient
4-18 minutes later

### Procedures Performed

<table>
<thead>
<tr>
<th>Time</th>
<th>Crew</th>
<th>Name</th>
<th>Location</th>
<th>Size</th>
<th>Attempts</th>
<th>Response</th>
<th>Success</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>01:13:28</td>
<td></td>
<td>IV - Extremity</td>
<td>Antecubital-Left</td>
<td>20</td>
<td>1</td>
<td></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>01:15:41</td>
<td></td>
<td>IV - Extremity</td>
<td>Forearm-Right</td>
<td>22</td>
<td>1</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>01:23:55</td>
<td>Monitor</td>
<td>- Defib Pads</td>
<td>placed</td>
<td></td>
<td></td>
<td>1</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

### Vitals

<table>
<thead>
<tr>
<th>Time</th>
<th>HR</th>
<th>RR</th>
<th>SpO2</th>
<th>ETCO</th>
<th>BP</th>
<th>MAP</th>
<th>Gluc</th>
<th>Gluc Hi</th>
<th>Gluc Lo</th>
<th>GCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>01:09:01</td>
<td>125</td>
<td>12</td>
<td>73</td>
<td>50/P</td>
<td>71</td>
<td></td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>3</td>
</tr>
<tr>
<td>01:18:02</td>
<td>93</td>
<td>12</td>
<td>50/P</td>
<td></td>
<td></td>
<td></td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>3</td>
</tr>
<tr>
<td>01:27:03</td>
<td>70</td>
<td>12</td>
<td>50/P</td>
<td></td>
<td></td>
<td></td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>3</td>
</tr>
</tbody>
</table>

- 1:27 – patient moved to ambulance & transport initiated
1-2 minutes later

Proressive 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

<table>
<thead>
<tr>
<th>Time</th>
<th>Crew</th>
<th>Name</th>
<th>Location</th>
<th>Size</th>
<th>Attempts</th>
<th>Response</th>
<th>Success</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>01:34:12</td>
<td></td>
<td>Airway-Endotracheal Intubation</td>
<td></td>
<td>7.0</td>
<td>1</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
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)