Length of Chest Compression Pauses is Reduced with Cardiac Rhythm Analysis and Charging During Chest Compressions

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Background
• Prolonged chest compression interruptions before and after a defibrillation shock:
  – Lower chance of shock success
  – Reduce patient survival
Background

• Chest compressions introduce artifact in cardiac waveform

Hypothesis

• Compression pauses can be shortened with use of Analysis During Compressions with Fast Reconfirmation (ADC-FR) compared with standard AED operation.

ADC-FR Technology

• Analysis During Compressions with Fast Reconfirmation (ADC-FR)
  – Low pass subtraction filtering
  – Automated rhythm analysis
  – Automated Defibrillator Charging
  – Brief reconfirmation analysis
• Occurs while compressions are on-going
ADC-FR Technology

Standard AED Mode
- Start CPR
- CPR interval
- ECG analysis and charging
- Pause CPR
- Ready to shock
- Press Charge and Ready to Shock

ACD-FR Mode
- Start CPR
- CPR interval
- ECG analysis
- Automated rhythm analysis
- Pause CPR
- Ready to shock

Methods
• ADC-FR Accuracy
  – Tested retrospectively using database of ECG rhythms
• ADC-FR in Simulated Cardiac Arrest Resuscitations
  – Prospective randomized crossover design

Methods
• 32 basic life support (BLS) certified providers worked in pairs
• Performed two trials of simulated cardiac resuscitation with a chest compression sensing defibrillator
• Each participant pair was randomized to perform a trial of 8 two-minute compression intervals
  – One trial in AED mode
  – One trial in ADC-FR mode
Methods

- A cardiac rhythm generator randomly assigned 4 shockable and 4 non-shockable rhythms for analysis during each compression interval.
- Subjects were advised to follow the defibrillator prompts, to defibrillate the rhythm if a “shock advised” was issued by the defibrillator, and to switch compressors every 2 intervals.
- Compression timing and quality data were reviewed using RescueNet Code Review (ZOLL Medical).
- Data were analyzed using descriptive statistics and paired t-tests.

Results

- ADC-FR Algorithm Accuracy
  - 629 records reviewed
  - 2059 ADC-FR advisories

<table>
<thead>
<tr>
<th>Rhythm</th>
<th>Sample size</th>
<th>Advising shockable</th>
<th>Advising non-shockable</th>
<th>Algorithm accuracy</th>
<th>Performance (CAD)</th>
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</table>
Results

• Simulated Resuscitation

End of interval compression interruptions were significantly reduced with ADC-FR mode.

Limitations

• Performed in a simulated setting

• Clinical studies needed to confirm findings
Conclusions
ADC-FR technology in AED’s
- Accurate
- Reduces chest compression interruptions by 30% compared with standard AED
- Reduces interruptions during pre-shock period by almost 5 seconds

Questions?