UAMS Journal Club Summary April 2018
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Ultrasound Use during Resuscitation of Cardiac Arrest

Clinical Bottom Line

During our April Journal club, we reviewed four papers examining Point of Care Ultrasound (POCUS) during cardiac arrest. Our conversations centered on how POCUS could provide critical information and improve patient care, as well as consideration of possible harms. As POCUS has become ubiquitous in resuscitation, these discussions will continue to be important, so that guidelines at our own institution, and hopefully within AHA ACLS protocol, will help create improved resuscitation and patient care. Inspiration for our closer evaluation of POCUS during cardiac arrest at UAMS came from review of the Gaspari REASON trial with the more recent papers noted below.

PICO question

P - Adults presenting to an academic emergency department in cardiac arrest
I - Direct visualization of cardiac function, as well as other POCUS exams
C - Standard resuscitation
O - Prolonged pauses during ACLS

Our main takeaways from the exchange were:

1. Not every pulse check needs cardiac visualization. The first and last pulse check are the most important for differentiation of standstill vs function.

2. Ultrasound's most beneficial for evaluation of "H's and T's".

3. CPR is the most important part of resuscitation, so it needs to take precedence over scanning.

4. When using the ultrasound, limit visualization to a single 6-second clip.

5. When possible, attempt to separate roles of lead resuscitationist and ultrasonographer.

6. The most experienced ultrasonographer should assume the role of cardiac visualization.

7. Though further research is needed, compressions over the left ventricle likely benefit cardiac output.

Trial #1

Huis in't Veld, MA. et al. Ultrasound use during cardiopulmonary resuscitation is associated with delays in chest compressions. Resuscitation. 2017; 119: 95-98

Validity rating: Low risk of bias

The Basics: Prospective trial examining ultrasound use in patient's resuscitation after presenting in cardiac arrest at a single academic medical center during a one-year time frame. Duration of pauses in chest compressions with and without ultrasound were compared

Outcomes: Ultrasound use was associated with prolonged pulse checks and increased pulse check duration in this study by an average of 8 seconds

Exclusions:

1. Age less than 18
2. No documented pulse check
3. Resuscitation occurred in room without video recording equipment

Strengths:

1. Clinical relevance
2. Strong association

3. Low risk for bias

Limitations:

1. Single academic center
2. Small sample size
3. Low survival rate for follow up
4. Did not differentiate repeat measurements in the same patient

Trial #2

Clattenburg, E.J., et al. (2018). Point-of-care ultrasound use in patients with cardiac arrest is associated prolonged cardiopulmonary resuscitation pauses: A prospective cohort study. *Resuscitation, 122,* 65-68.

Validity rating: Low risk of bias

The Basics: Prospective trial examining ultrasound use in patient's resuscitation after presenting in cardiac arrest at a single urban medical center during a 7-month time frame. Duration of pauses in chest compressions with and without ultrasound were compared

Outcomes: Ultrasound use was associated with prolonged pulse checks and increased pulse check duration in this study by an average of 6 seconds

Exclusions:

1. Traumatic arrest
2. Patients with ROSC prior to ED arrival
3. Fewer than 2 CPR pauses
4. Video not recorded

Strengths:

1. Clinical relevance
2. Strong association
3. Low risk for bias

Limitations:

1. Single academic center – may not apply to community setting
2. Small sample size
3. Low survival rate for follow up
4. Did not differentiate repeat measurements in the same patient

Trial #3

Hu, Kevin, et al. (2018). Variability in Interpretation of Cardiac Standstill Among Physician Sonographers. ***Annals of Emergency Medicine, 71(2),*** **193-198.**

Validity rating: Low risk of bias

The Basics: Survey given to physicians at 6 conferences over a 9 month period comparing responses of standstill vs. cardiac activity to 15 different ultrasound images.

Outcomes: There was a high degree of variability in physician response.

Exclusions: excluded participants who could not make a decision (standstill vs. cardiac activity) in 20 seconds

Strengths:

1. Convenience sample is similar to our academic composition (74% specialized in Emergency Medicine and 63% were residents)
2. Ultrasound clips that were used in the study are available online

Limitations:

1. Cross sectional convenience sample

2. Majority of the participants only had basic ultrasonography training
3. Clips may not represent all clips that one may see in cardiac arrest

Trial #4

Anderson, KL et al. (2017). Left Ventricular Compressions Improve Hemodynamics in a Swine Model of Out-of-Hospital Cardiac Arrest. ***Prehospital Emergency Care, 21(2),*** **272-280.**

Validity rating: Low risk of bias

The Basics: Prospective, Randomized comparative investigation to compare CPP, ROSC in swine models of cardiac arrest.

Outcomes: Statistically significant improvement in CPP and success of ROSC in experimental group with modified positioning of compressions over LV.

Exclusions: n/a

Strengths:

1. Single variable studied between control and experimental group
2. Appears that all other variables and swine demographics controlled

Limitations:

1. When applying PICO question, population may be different as our current pre hospital system supports ACLS compression site. Could re attempt study w/ standard positioning initially followed by modified at "arrival to hospital" time vs continued standard.
2. Swine population.
3. Our cardiac arrest patients have a wide differential when compared to the "induced" arrest studied here.