

UAMS Journal Club Summary
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Manual Pulse Checks vs Ultrasound Pulse Checks in Cardiac Arrest

Clinical Bottom Line

These two publications below reached different conclusions, lacking consensus when it comes length of time of manual pulse checks vs US. The studies also had severe limitations which call into question their conclusions. Trial 1 found longer time to pulse check using US. Trial 2 showed non-inferiority of manual and US pulse checks in a simulated setting. There is not enough information in these studies to reach a definitive conclusion on the issue and more research is warranted in this area.

PICO

P - Patient is in cardiac arrest
I - adjunctive ultrasound
C - manual pulse checks
O - pulse check duration

Background

Utilization of point of care ultrasound as an adjunct to cardiac arrest or as a means of detecting pulse during cardiac arrest may allow for improvements in resuscitation. The current gold standard for pulse detection during cardiac arrest is manual pulse checks. Ultrasound may provide a more rapid and objective way to detect pulse and additionally ultrasound can be used to detect cardiac activity during pulse checks. However, there are multiple concerns about point of care ultrasound utilization during resuscitation. Increased duration of pulse check during cardiac arrest resuscitation and ability to detect an adequate pulse are two such concerns.

Trial 1

Huis In 't Veld MA, Allison MG, Bostick DS, Fisher KR, Goloubeva OG, Witting MD, Winters ME. Ultrasound use during cardiopulmonary resuscitation is associated with delays in chest compressions. *Resuscitation*. 2017 Oct;119:95-98. doi: 10.1016/j.resuscitation.2017.07.021. Epub 2017 Jul 25. PMID: 28754527.

PubMed link: <https://pubmed.ncbi.nlm.nih.gov/28754527/>

Validity Rating: Underpowered and poorly generalizable

The Basics:

This prospective cohort study was performed at the University of Maryland Medical Center Emergency Department and examined pulse check durations during cardiac arrest resuscitations with and without point of care ultrasound.

Inclusion Criteria:

Patients were included if they were over the age of 18 and presented in cardiac arrest or experienced cardiac arrest while in the emergency department.

Exclusion Criteria:

Patients were excluded from the study if they were younger than 18, did not have documentation of a pulse check, were not placed in one of the emergency room's 3 resuscitation bays that video recording capability, or if the video quality was too poor to accurately interpret.

Primary Outcomes:

Measurement of duration of pulse checks with and without ultrasound

Secondary Outcomes:

None

Results:

In this single center perspective 23 patients and 123 pulse checks in total were assessed and the mean duration of seconds for pulse checks with and without point of care ultrasound was recorded. This studies' results demonstrated that pulse checks with the utilization of point of care ultrasound had a mean duration of 21 seconds while pulse checks without point of care ultrasound were noted to have a mean duration of 13 seconds (95% CI, 6.7-10.0 ($p < 0.0001$)).

Limitation/Bias:

This study evaluated only 23 patients and seems to be severely under powered. Additionally, this study does not note what type of ultrasound was performed during each pulse check and the proficient see of the ultrasound technician is not noted either. Furthermore, the study is poorly generalizable as 74% were males and the median age was 54 with the majority having a BMI greater than 30. This study was also performed at only 1 center.

Badra K, Coutin A, Simard R, Pinto R, Lee JS, Chenkin J. The POCUS pulse check: A randomized controlled crossover study comparing pulse detection by palpation versus by point-of-care ultrasound. *Resuscitation*. 2019 Jun;139:17-23. doi: 10.1016/j.resuscitation.2019.03.009. Epub 2019 Mar 20. PMID: 30902687.

PubMed link: <https://pubmed.ncbi.nlm.nih.gov/30902687/>

The Basics: This trial compared US versus manual pulse checks in a prospective randomized controlled crossover non-inferiority trial.

Methods: Providers attended a 15-minute focused US workshop on identification of the carotid pulse. Both pulse check methods were timed for each participant on two different subjects in random order.

Primary Outcome:

Time to carotid pulse detection in seconds.

Secondary Outcomes:

Confidence levels of pulse detection measured on a 100 mm visual analog scale and rates of prolonged pulse checks (> 5 s or >10 s).

Results:

Mean pulse detection times were 4.22 s (SD 3.26) by US compared to 4.71 s (SD 6.45) by MP with a mean difference in times of 0.49 s. There were no significant differences between US and MP in the rates of prolonged pulse checks of greater than 5 s or 10 s. First attempt at detection of pulse checks was more successful in the US group. Prior to training, participants reported higher confidence using MP compared to US. Following the study, participants reported higher confidence levels using US than MP.

Limitation/Bias:

The largest limitation was not using actual patients which limits the conclusions that can be drawn to actual cardiac arrest patients. Also, participants were unable to be blinded.