ARC SAC Advisory Pulse Check for Cardiac Arrest

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**Overall Recommendation:**
One good quality study (LOE 4) supports omitting a pulse check after defibrillation for patients in cardiac arrest.

One fair quality study (LOE 4) opposes the performance of simultaneous as opposed to sequential pulse and breathing check to determine cardiac arrest.

There is insufficient evidence to support a recommendation on the preferred method for the initial determination of cardiac arrest.

CPR courses should specifically teach the recognition of agonal breathing and the understanding that agonal breathing is not normal breathing and that it indicates the need for CPR.

**Recommendations and Strength (using table below):**

**Standards:** None.

**Guidelines:** Rescuers may omit a pulse check after defibrillation for people in cardiac arrest.

**Options:** Rescuers performing a pulse and breathing check may consider performing a sequential pulse and breathing check when checking for cardiac arrest.

The literature does not support any recommendations regarding a pulse check for determining if a person needs CPR.

**Questions to be addressed:**
In adults in cardiac arrest (P), does omitting a pulse check (I) compared with including a pulse check (C), change outcomes of resuscitation (O)?

**Introduction/Overview:**
Checking the carotid pulse is currently a disputed step in basic cardiac life support (BCLS) during cardiopulmonary resuscitation (CPR). Although the 2005 American Heart Association’s and the European Resuscitation Council’s guidelines recently abolished the carotid pulse check for lay rescuers, they still recommend it for health care providers. The 2005 guidelines for CPR and ECC strongly emphasize evidence as the basis for all new clinical recommendations. They have recommended several protocol changes aimed at reducing hands-off pauses in chest compressions, including elimination of stacked defibrillation shocks and post-shock pulse and rhythm checks.
Summary of Scientific Foundation:
Recent evidence demonstrates the significant impact that excellent chest compressions have on improving outcome after cardiac arrest. We agree with the interpretation of that evidence – better chest compressions with less interruption leads to improved survival. In an attempt to reduce the compression-free interval from collapse to the start of CPR for people with a cardiac arrest, some have recommended eliminating the pulse check during basic life support. Such recommendations guide potential rescuers to use only a check for responsiveness and breathing as the ‘test’ to diagnose the ‘disease’ of cardiac arrest.

We created a standard P-I-C-O (what Population, what Intervention, what Comparison, and what Outcome) evidence-based question. This gave us our specific question to be addressed: “In adults in cardiac arrest (the population we wanted to know about), does omitting a pulse check (the intervention), compared with including a pulse check (the comparison), change outcomes (e.g., survival) of resuscitation (the outcome)?” We searched three large databases to find peer-reviewed articles that helped to answer our question. Our initial search resulted in 100 articles. We carefully reviewed these results and eliminated articles that did not meet our strict inclusion and exclusion criteria. We included articles that had a comparison group and a defined outcome. We excluded articles that described research using devices, technology or equipment that was not generally available to the lay public or that used advanced cardiac life support. This step resulted in 24 articles that we obtained and reviewed in detail, and again applied the same inclusion and exclusion criteria.

Based on the review of the full articles, our final review included thirteen publications. We evaluated each article on several factors. One was to determine the level of evidence that it offered. Level 1 evidence was the highest level, based on the highest and most reliable types of human research. Level 4 was the lowest level, and involved research on animals or manikins. We also evaluated the quality of the research, and gave each article a grade of good, fair or poor, based on strict evaluation criteria. We determined if an article supported our research question, was neutral to our question, or opposed it. As the types of intervention varied slightly between the articles we considered a publication to support the research question if it supported the most recent change in CPR guidelines.

The articles that we reviewed reported on three different types of interventions. These included whether or not to use pulse checks, whether or not to use breathing checks, and whether it is better to do simultaneous or sequential breathing and pulse checks. Our articles also reported on several different outcomes, including interval to determine pulse, correct diagnosis (cardiac arrest or not), interval to CPR after shock, interval to third shock, and four-hour survival after ventricular fibrillation.

We determined that one of the thirteen articles offered good quality, level four evidence that supported the clinical question that one should eliminate pulse checks before starting CPR after a defibrillation. We also found one article that offered fair quality, level four evidence opposing concurrent, rather than sequential, breathing and pulse checks. Two fair quality and one poor quality studies provided level two evidence along with eight other articles that were all neutral to the clinical question.

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We used standard methods to evaluate the performance of pulse checks as a diagnostic test for people in cardiac arrest. Sensitivity tells us how often the test will be positive in people who have the disease. When we determine the sensitivity of a pulse check we ask the question, “for all people with cardiac arrest, how often will the conclusion from a pulse check be ‘no pulse’?” Perfect sensitivity would be 1. This would mean that every time a patient in cardiac arrest has a pulse check performed, the rescuer would determine that the victim was no pulse. A sensitivity of 0.5 would mean that if a series of rescues were analyzed, and we knew that all of the victims were actually in cardiac arrest, only half of the time would the rescuers determine that the victim does not have a pulse. This means half the time the rescuer would be wrong, and, would presumably withhold CPR even though it is actually needed.

Given that any test is usually not perfect, we thought it was reasonable to ask how well we can expect breathing checks alone to perform when our goal is to determine who needs CPR. Two of the articles that we reviewed reported the sensitivity of breathing checks alone for the diagnosis of cardiac arrest. The sensitivity of these two studies was .42 and .65. Taken together, the weighted sensitivity was 0.52. This means that these studies show that for all patients in cardiac arrest 52% of the time rescuers will make the right diagnosis when using breathing checks alone to diagnose cardiac arrest. Conversely, the data suggest that when using breathing checks alone to diagnose cardiac arrest, rescuers will make the wrong decision and withhold CPR from people who need it in 48%, or 12 out of every 25 rescues.

Studies that advocate eliminating pulse checks describe how difficult it can be for a rescuer to determine if a pulse is present. Four of the articles we reviewed reported sensitivity of pulse checks to diagnose cardiac arrest. These studies reported sensitivity that varied from 0.44 – 0.91. We pooled the data and found the resultant sensitivity of 0.77. This means that, based on the published evidence, when pulse checks alone are used to diagnose cardiac arrest 77% of the time the assessment results in the correct diagnosis. Conversely, the data suggest that when using pulse checks alone to diagnose cardiac arrest, rescuers will make the wrong decision and withhold CPR from people who need it in 23 out of every 100 rescues. Thus, we can see that, based on the articles we reviewed, pulse checks alone are 48% more sensitive than breathing checks alone to determine the need for CPR.

The most significant conclusion to be drawn from this scientific review is that there is very little evidence to guide a decision as to whether or not one should eliminate a pulse or breathing check as part of the BLS sequence. Nevertheless, of the two options, eliminating the pulse or the breathing checks, one should note that the decision to incorrectly withhold CPR would be reached more often in the use of breathing checks in place of pulse checks for the determination of cardiac arrest.