WORKSHEET for Evidence-Based Review of Science for Veterinary CPCR

1. Basic Demographics

Worksheet author(s)

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2. Clinical question:

In dogs and cats with suspected cardiac arrest (P), is the palpation of femoral pulses (I) vs. assessment for other signs of life (e.g. pupil size, agonal breathing, thoracic auscultation) (C) a reliable tool for diagnosis of cardiac arrest?(O)

3. Conflict of interest specific to this question:

Do any of the authors listed above have conflict of interest disclosures relevant to this worksheet?
No

4. Search strategy (including electronic databases searched):

4a. Databases

Medline (via Pub-Med, searched 7-13-11)

1. “heart arrest” AND “pulse palpation”: 4 results, 3 relevant articles (search details: "heart arrest"[All Fields] AND "pulse palpation"[All Fields])
2. “heart arrest” AND “pulse check”: 23 results, 2 relevant articles (search details: "heart arrest"[All Fields] AND "pulse check"[All Fields])
3. “cardiopulmonary resuscitation” AND “pulse check”: 38 results, 7 relevant articles (search details: "cardiopulmonary resuscitation"[All Fields] AND "pulse check"[All Fields])
4. “cardiopulmonary resuscitation” AND “pulse palpation”: 2 results, 1 relevant article (search details: "cardiopulmonary resuscitation"[All Fields] AND "pulse palpation"[All Fields])

Total relevant articles found in all four searches (some overlap): 11

CAB Abstracts (searched 7-13-11)

1. “cardiac arrest” AND pulse: 12 results, 0 relevant articles (search details: ("cardiac arrest" and pulse).mp. [mp=abstract, title, original title, broad terms, heading words])
2. “cardiopulmonary resuscitation” AND pulse: 4 results, 0 relevant articles (search details: ("cardiopulmonary resuscitation" and pulse).mp. [mp=abstract, title, original title, broad terms, heading words])
3. “heart arrest” AND pulse: 1 result, 0 relevant articles (search details: ("heart arrest" and pulse).mp. [mp=abstract, title, original title, broad terms, heading words])

Total relevant articles found in all three searches: 0

4b. Other sources

Google Scholar “cited by” option:
Eberle B, Dick WF, et al. Checking the carotid pulse check: diagnostic accuracy of first responders in patients with and without a pulse. Resuscitation 1996;33(2):107-16. *Cited by 208 articles, 9 relevant articles.*

Review of references cited in veterinary CPCR reviews:

- Cole SG, Otto CM, et al. Cardiopulmonary cerebral resuscitation in small animals – a clinical practice review (Part 1). J Vet Emerg Crit Care 2002; 12(4):261-267. *47 references, 0 relevant articles.*

- Cole SG, Otto CM, et al. Cardiopulmonary cerebral resuscitation in small animals – a clinical practice review. Part II J Vet Emerg Crit Care 2003; 13(1):13-23. *48 references, 0 relevant articles.*
- Haldane S, Marks S, et al. Cardiopulmonary cerebral resuscitation: emergency drugs and postresuscitative care. Comp Contin Educ Pract Vet 2004;26(10): 791-799. *65 references, 0 relevant articles.*
- Haldane S, Marks SL. Cardiopulmonary resuscitation: techniques Comp Contin Educ Pract Vet 2004;26(10): 780-790. *54 references, 0 relevant articles.*
- Holowaychuk M, Martin L. An In-depth look: misconceptions about emergency and critical care: cardiopulmonary cerebral resuscitation, fluid therapy, shock, and trauma. Comp Contin Educ Pract Vet 2006; 420-433. *73 references, 0 relevant articles.*
- Plunkett SJ, McMichael M. Cardiopulmonary resuscitation in small animal medicine: an update. J Vet Intern Med 2008;22(1):9-25. *297 references, 0 relevant articles.*
- Travers AH, Rea TD et al. American Heart Association: Part 4: CPR Overview: 2010 Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation 2010;122:S676-684. *52 references, 3 relevant articles.*

Total relevant articles found using other searches (some overlap): 10

4c. State inclusion and exclusion criteria for choosing studies and list number of studies excluded per criterion

Inclusion criteria
- Peer reviewed journal articles
- Clinical or experimental studies
- Animal studies (any species) or human studies
- Articles pertaining to the palpation of pulses during cardiac arrest (including pulses other than femoral pulses)

Exclusion criteria
- Review articles (143 excluded)
- Clinical practice guidelines (186 excluded)
- Editorials/letters (2 excluded)
- Case reports (1 excluded)
- Abstracts/posters (1 excluded)
- Articles that do not pertain to the palpation of pulses during cardiac arrest (309 excluded)

4d. Number of articles/sources meeting criteria for further review:

11 ARTICLES

5. Summary of evidence

Evidence Supporting Clinical Question

Good						
Fair						
Poor						
	1	**2**	**3**	**4**	**5**	**6**
Level of evidence (P)						

A = Return of spontaneous circulation
B = Survival of event
C = Survival to hospital discharge
D = Intact neurological survival
E = Other endpoint
Italics = Non-target species studies

Evidence Neutral to Clinical question

Good						
Fair						*Albarran, 2006 E* *Sarti, 2006 E*
Poor						*Ochoa, 1998 E* *Graham, 2002 E*
	1	**2**	**3**	**4**	**5**	**6**
Level of evidence (P)						

A = Return of spontaneous circulation
B = Survival of event
C = Survival to hospital discharge
D = Intact neurological survival
E = Other endpoint
Italics = Non-target species studies

Evidence Opposing Clinical Question

Good						*Tibballs 2010 E* *Dick 2000 E* *Eberle 1996 E*
Fair						*Tibballs, 2009 E* *Lapostolle 2000 E* *Moule, 2000 E* *Bahr 1997 E*
Poor						
	1	**2**	**3**	**4**	**5**	**6**
Level of evidence (P)						

A = Return of spontaneous circulation
B = Survival of event
C = Survival to hospital discharge
D = Intact neurological survival
E = Other endpoint
Italics = Non-target species studies

6. Reviewer's Final Comments:

No clinical veterinary studies or experimental animal studies have been conducted to investigate the reliability of pulse palpation for diagnosis of cardiac arrest. Multiple, well designed, prospective, randomized human studies have shown both diagnostic inaccuracy and delayed diagnosis of the presence or absence of a pulse in adult and pediatric simulated cardiac arrest. Studies used mannequins, healthy volunteers, or patients on extracorporeal circulation with pulsatile or non-pulsatile flow. The sensitivity and specificity of pulse palpation varied between studies, but was generally in the region of 0.9 (sensitivity) and 0.65 (specificity). One study separately analysed the data from pulseless patients, and found that only 2% of participants correctly recognized a pulseless patient within 10 seconds (Dick, 2000), suggesting that sensitivity may be much lower in the absence of a pulse. Another study showed that the mean time required for diagnosis of cardiac arrest by pulse palpation was 30 seconds (Tibballs, 2010). Human guidelines therefore no longer recommend a pulse check prior to starting resuscitation efforts.

Human anatomy and the usual site of pulse palpation are, however, different from those in cats and dogs. Most studies investigated palpation of the carotid pulse, although the site was variable. However, one study showed that palpation of the femoral pulse was more rapid and accurate than palpation of the carotid or brachial pulses in hypotensive infants (Sarti, 2006). There are no studies investigating palpation of the femoral pulse during cardiac arrest.

Since cardiac arrest in humans often occurs in an out-of-hospital setting, the initial human studies were designed to assess the ability of a layperson or first responder to palpate the pulse (Eberle, 1996; Bahr 1997). Since then studies have evaluated the skills of doctors, nurses, medical students and other healthcare professionals. The results of these studies may be more applicable to veterinary medicine, where the majority of treated cardiac arrests occur in hospital. A recent study showed that experienced doctors and nurses working in acute care areas were able to detect a pulse more quickly and accurately than those working in non-acute areas, but confirmation of the absence of a pulse still required longer than 10 seconds (Tibballs, 2010).

Whereas there is good human evidence opposing pulse palpation for diagnosis of cardiac arrest, extrapolation to veterinary medicine should be cautious, given the differences in anatomy, site of pulse palpation, arrest setting, and the training and specialization of veterinarians.

7. Conclusion:

Consensus on science

Evidence from seven human studies (LOE 6) show that lay rescuers and healthcare professionals are often unable to accurately and swiftly determine the presence of a pulse. A further three human studies (LOE 6) investigated the accuracy and timeliness of different methods of checking the pulse, but did not specifically address the question and are therefore regarded as neutral evidence. One study (LOE 6) showed that femoral pulse palpation may be more reliable in infants, but was not investigating cardiac arrest and is therefore also regarded as neutral evidence.

Treatment recommendations

Palpation of the femoral pulse in dogs and cats is likely not a reliable diagnostic tool for cardiac arrest.

8. Acknowledgements:

Nil

9. Citation list:

Albarran JW, Moule P, Gilchrist M, Soar J. Comparison of sequential and simultaneous breathing and pulse check by healthcare professionals during simulated scenarios. Resuscitation. 2006 Feb;68(2):243-9.
Abstract: BACKGROUND: Basic life support guidelines for healthcare professionals recommend a sequential breathing and carotid pulse check allowing up to 10 s for each assessment. Life support providers are sometimes taught to do a simultaneous assessment of breathing and pulse check for up to 10 s. It is not clear whether this assessment improves diagnostic accuracy. METHODS: We recruited 119 healthcare professionals. The SIM-Man was used to develop 10

simulated cases scenarios. To assess performance, 89 participants did 10 simultaneous assessments followed by 10 sequential assessments, and 29 participants did the assessment techniques in reverse order. The primary outcome of the study was the number of correct diagnoses made with each assessment method. RESULTS: There were more correct diagnoses with a sequential assessment; 48.2% (569 out of 1180) compared to 33.5% (395 out of 1180) for the simultaneous method. Only 26.3% (n=31) had more than five accurate diagnoses with a simultaneous assessment, compared to 44.1% (n=52) for sequential assessments. Those performing sequential assessment achieved a median score of 5/10 correct diagnoses compared to a median score of 2.5/10 for the simultaneous method (Wilcoxon Z=-4.63, p<0.001). Sensitivity for the pulse check was 99% for both assessments; specificity was 48.9% for a simultaneous assessment and 61.9% for the sequential approach. For breathing check, specificity, sensitivity and accuracy were also higher with the latter method (sensitivity 99.6%, specificity 70.6% and accuracy 88%) CONCLUSION: A sequential assessment of breathing and pulse by healthcare professionals has greater diagnostic accuracy in simulated case scenarios.
LOE 6, fair quality, neutral, no comment about industry funding (Research grant from the Resuscitation Council, UK).

Bahr J, Klingler H, Panzer W, Rode H, Kettler D. Skills of lay people in checking the carotid pulse. Resuscitation. 1997 Aug;35(1):23-6.
Abstract: American Heart Association as well as European Resuscitation Council require the carotid pulse check to determine pulselessness in an unconscious victim and to decide whether or not cardiopulmonary resuscitation (CPR) should be initiated. Recent studies on the ability of health professionals to check the carotid pulse have called this diagnostic tool in question and led to discussions. To contribute to this discussion we performed a study to evaluate skills of lay people in checking the carotid pulse. A group of 449 volunteers (most had participated in a first aid course) were asked to check the carotid pulse in a young healthy, non-obese person by counting aloud the detected pulse rate. Time intervals until correct detection of the carotid pulse were registered. Overall the volunteers needed an average of 9.46 s, ranging from 1 to 70 s. Only 47.4% of the volunteers were able to detect a pulse within 5 s, and 73.7% within 10 s. A level of 95% volunteers detecting the pulse correctly was reached only after 35 s. Based on these findings we conclude that the intervals established for carotid pulse check may be too short and that perhaps the value of pulse check within in the scope of CPR needs to be reconsidered.
LOE 6, fair quality, opposing, no comment about industry funding.

Dick WF, Eberle B, Wisser G, Schneider T. The carotid pulse check revisited: what if there is no pulse? Crit Care Med. 2000 Nov;28(11 Suppl):N183-5.
Abstract: This study was undertaken to evaluate the diagnostic accuracy and time required by first responders to assess the carotid pulse in potentially pulseless patients. We conducted a prospective, randomized study of first responders (n = 206; four different training levels) and were blinded as to the patients' conditions in the cardiac operating rooms of a university hospital. Sixteen patients underwent coronary artery bypass surgery on nonpulsatile cardiopulmonary bypasses. Carotid pulse check was performed either during pulsatile (spontaneous) or during nonpulsatile (extracorporeal) circulation. Patients' hemodynamic status at the time of assessment, diagnostic accuracy of the first responders, and the time required to diagnose carotid pulsatility or pulselessness were documented. Within 10 secs, only 16.5% of the participants (34 of 206) were able to reach any decision about their patients' pulse status. Assessments that were both rapid and correct (15%, i.e., 31 of 206) occurred almost exclusively in pulsatile patients. Advanced training level shortened the delay to decision and improved its accuracy. However, merely 2% of the participants (1 of 59) correctly recognized a truly pulseless patient within 10 secs. Recognition of pulselessness of the carotid artery by rescuers with basic cardiopulmonary resuscitation training is time-consuming and highly inaccurate. Although the carotid pulse check needs to be taught, its importance in the context of layperson basic life support should be de-emphasized.
LOE 6, good quality, opposing, no comment about industry funding.

Eberle B, Dick WF, Schneider T, Wisser G, Doetsch S, Tzanova I. Checking the carotid pulse check: diagnostic accuracy of first responders in patients with and without a pulse. Resuscitation. 1996 Dec;33(2):107-16.

Abstract: International guidelines for cardiopulmonary resuscitation (CPR) in adults advocate that cardiac arrest be recognized within 5-10 s, by the absence of a pulse in the carotid arteries. However, validation of first responders' assessment of the carotid pulse has begun only recently. We aimed (1) to develop a methodology to study diagnostic accuracy in detecting the presence or absence of the carotid pulse in unresponsive patients, and (2) to evaluate diagnostic accuracy and time required by first responders to assess the carotid pulse. In 16 patients undergoing coronary artery bypass grafting, four groups of first responders (EMT-1: 107 laypersons with basic life support (BLS) training; EMT-2: 16 emergency medical technicians (EMTs) in training; PM-1: 74 paramedics in training; PM-2: 9 certified paramedics) performed, single-blinded and randomly allocated, carotid pulse assessment either during spontaneous circulation, or during non-pulsatile cardiopulmonary bypass. Time to diagnosis of carotid pulse status, concurrent haemodynamics and diagnostic accuracy were recorded. In 10% (6/59), an absent carotid pulse was not recognized as pulselessness. In 45% (66/147), a pulse was not identified despite a carotid pulse with a systolic pressure > or = 80 mmHg. Thus, although sensitivity of all participants for central pulselessness approached 90%, specificity was only 55%. Both sensitivity and, to a lesser degree, specificity improved with increasing training; blood pressure or heart rate had no significant effect. The median diagnostic delay was 24 s (minimum 3 s). When no carotid pulse was found, delays were significantly longer (30 s: minimum 13 s), than when a carotid pulse was identified (15 s; minimum 3 s) ($P < 0.0001$). Of all participants, only 15% (31/206) produced correct diagnoses within 10 s. Only 1/59 (2%) identified pulselessness correctly within 10 s. Our cardiopulmonary bypass model of carotid pulse assessment proved to be feasible and realistic. We conclude that recognition of pulselessness by rescuers with basic CPR training is time-consuming and inaccurate. Both intensive retraining of professional rescuers and reconsideration of guidelines about carotid pulse assessment are warranted.

LOE 6, good quality, opposing, no comment about industry funding.

Graham CA, Lewis NF. Evaluation of a new method for the carotid pulse check in cardiopulmonary resuscitation. Resuscitation. 2002 Apr;53(1):37-40.

Abstract: BACKGROUND: The ability to determine the presence or absence of a central pulse remains a key skill in cardiopulmonary resuscitation (CPR) for healthcare providers, despite studies showing that they perform this poorly. The aim of this study was to evaluate a modified technique for palpation of the carotid pulse. METHODS: Sixty seven undergraduate dental students were taught the standard method of carotid pulse detection during a basic life support session and were also taught a modified method. Each student was asked to palpate the carotid pulse of a volunteer in two positions (neck neutral and neck extended) with the volunteer on the floor and on a trolley. The time taken to identify the pulse was measured and the scenarios compared. RESULTS: The time to detect the carotid pulse was reduced in three of the four scenarios (floor, neck extended $P=0.0053$, trolley neck neutral $P=0.0070$, trolley neck extended $P=0.0024$). The final scenario (floor, neck neutral) showed no improvement ($P=0.36$). CONCLUSION: The new method of carotid pulse palpation results in a more rapid determination of the carotid pulse when it is present in all positions except with the neck neutral on the floor. This will only be clinically significant if trauma is suspected.

LOE 6, poor quality, neutral, no comment about industry funding.

Lapostolle F, Le Toumelin P, Agostinucci JM, Catineau J, Adnet F. Basic cardiac life support providers checking the carotid pulse: performance, degree of conviction, and influencing factors. Acad Emerg Med. 2004 Aug;11(8):878-80.

Abstract: The American Heart Association recently abolished the carotid pulse check during cardiopulmonary resuscitation for lay rescuers, but not for health care providers.OBJECTIVES: The aim of the study was to evaluate health care providers' performance, degree of conviction, and influencing factors in checking the carotid pulse. METHODS: Sixty-four health care providers were asked to check the carotid pulse for 10 or 30 seconds on a computerized mannequin simulating three levels of pulse strength (normal, weak, and absent). Health care providers were asked whether they felt a pulse and how certain were they that they felt a pulse. Performance was evaluated, as well as degree of conviction about the answer, using a visual analog scale. Data were compared by using a general linear model procedure. RESULTS: In the pulseless situations, the answers were correct in 58% and 50% when checking the pulse for 10 and 30 seconds, respectively. In the situation with a weak pulse, the answer was correct in 83% when checking the pulse for 10 seconds. In situations with a normal pulse, the answers were correct in 92%, 84%, and 84%, respectively, when checking the pulse for 10 (twice) and 30 seconds. The exactitude of the answer was correlated with the pulse strength ($p < 0.05$). The degree of conviction about the answer was correlated with the exactitude of the answer

($p < 0.01$) and the pulse strength ($p < 0.0001$). CONCLUSIONS: These results question the routine use of the carotid pulse check during cardiopulmonary resuscitation, including for health care providers.
LOE 6, fair quality, opposing, no comment about industry funding.

Moule P. Checking the carotid pulse: diagnostic accuracy in students of the healthcare professions. Resuscitation. 2000 May;44(3):195-201.
Abstract: This study evaluated the competence of students of the healthcare professions to locate the carotid pulse using a computerised manikin, within 10 s. A sample of 105 students from physiotherapy, radiography, midwifery and nursing participated in measuring diagnostic accuracy in a single attempt at pulse check using a computerised manikin, timed to an accuracy of +/-1 s. All had received basic life support instruction, and one group had advanced life support skills. The mode and median diagnostic delays were calculated for each group. Comparisons of mean rank values for the groups were determined, and comparisons of previous training and accuracy in diagnosis were calculated. Forty (38%) students were able to give an accurate diagnosis within 10 s. The results identified significant differences between the performance of the groups (χ^2 16.74, $P<0.01$), with the advanced life support course students demonstrating most competence. Previous training did not affect performance in the skill (χ^2 0.29, $P=0.58$). Carotid pulse check skills should be emphasised and tested as part of cardiopulmonary resuscitation instruction.
LOE 6, fair quality, opposing, no comment about industry funding (grant from the Resuscitation Council, UK).

Ochoa FJ, Ramalle-Gomara E, Carpintero JM, Garcia A, Saralegui I. Competence of health professionals to check the carotid pulse. Resuscitation. 1998 Jun;37(3):173-5.
Abstract: Our objective was to establish the proportion of Emergency Room and Intensive Care doctors and nurses able to locate the carotid pulse in less than 5 s, and identify the variables that influence this ability. The method followed was locating the carotid pulse in a healthy male adult volunteer with normal blood pressure in two situations (stretcher or floor) and with the neck in either a neutral or in an extended position. We recorded the gender, age, and previous training in cardiopulmonary resuscitation (CPR) of each participant and the time spent in detecting the pulse in each of the four possible positions. A model of logistic regression was constructed to determine if the patient's position had any influence on the proportion of health workers capable of finding the pulse within 5 s. The average age of the 72 subjects studied was 33.4 years ($SD = 6.6$); 80% of the participants had CPR training. Thirty-one participants (43.1%; CI 95%, 31.4-55.3%) required more than 5 s to detect the pulse, although only three (4.2%; CI 95%, 0.9-11.7%) required more than 10 s. The variable 'no CPR training' was associated with the inability to detect the pulse within 5 s. The detection of the pulse was easier with an extended neck. A significant proportion of nurses and doctors were slow to locate the carotid pulse on a healthy, young volunteer with normal blood pressure. No relation was found between gender or age of the participants. More attention should be given to carotid pulse detection in CPR training.
LOE 6, poor quality, neutral, no comment about industry funding.

Sarti A, Savron F, Ronfani L, Pelizzo G, Barbi E. Comparison of three sites to check the pulse and count heart rate in hypotensive infants. Paediatr Anaesth. 2006 Apr;16(4):394-8.
Abstract: BACKGROUND: Current international guidelines state that heart rate counted at the brachial pulse must be absent or <60 b x min(-1) to diagnose cardiac arrest. Some data suggest that this site may not be the best to check cardiac activity. Hypotension is a likely real scenario of the need for chest compressions in infants. We compared the performance of three sites of pulse palpation (brachial, carotid, and femoral) for detecting and counting heartbeat in hypotensive infants. METHODS: In an operating theater of a pediatric teaching hospital in Italy, we studied 40 anesthetized hypotensive infants just prior to surgery, checked by two doctors and two nurses by a cross-sectional, repeated-measures study design. Each examiner, blind to the monitoring data of the patient, was asked to find the infant's arterial pulse within 10 s and count heart rate for 15 s. During each examination, the order of the three sites was randomized. RESULTS: Among successful detections, femoral pulse palpation resulted as the most successful, rapid, and accurate site to detect and count heart rate in hypotensive infants. CONCLUSIONS: Femoral palpation proved to be the best site for detecting heartbeat and counting heart rate in hypotensive infants. These findings challenge the current guidelines. More data are needed, but the current standard of brachial pulse assessment is debatable.
LOE 6, fair quality, neutral, no comment about industry funding.

Tibballs J, Russell P. Reliability of pulse palpation by healthcare personnel to diagnose paediatric cardiac arrest. Resuscitation. 2009 Jan;80(1):61-4. Epub 2008 Nov 6.
Abstract: AIM: To determine the reliability of pulse palpation to diagnose paediatric cardiac arrest. MATERIALS AND METHODS: With all cardiovascular information obscured, 209 doctors and nurses (rescuers) were requested once each to determine if a pulse was present in 1 of 16 infants and children (average age 1.8 years, range 1 week-13 years) provided with non-pulsatile circulation with veno-arterial extracorporeal membrane oxygenation or left ventricular assistance for cardiac arrest or failure. Rescuers did not know the stage of recovery of the heart and did not if a true pulse was present or absent. Rescuer decisions "pulse absent" or "pulse present" were compared with concurred decisions of investigators and bedside nurse who knew cardiovascular data and had unlimited time to palpate pulses. RESULTS: Rescuer pulse palpation accuracy was 78% (95% CI 70-82), sensitivity 0.86 (95% CI 0.77-0.90) and specificity 0.64 (95% CI 0.53-0.74). When investigators diagnosed cardiac arrest pulse pressure was 6+/-5mmHg (range 0-20) compared with 9+/-8mmHg (range 0-29) with rescuers (p=0.0004). With pulse pressure zero, rescuer accuracy was 89% and sensitivity 0.89. Sixty per cent of rescuers chose a brachial pulse, 33% a femoral pulse with respective accuracies of 78% and 77%, sensitivities 0.86 and 0.85 and specificities 0.67 and 0.56. CONCLUSIONS: Pulse palpation is unreliable to diagnose paediatric cardiac arrest. Rescuers misdiagnose on 22% of occasions and which may lead them to withhold external cardiac compression on 14% of occasions when needed and on 36% to give it when not needed. Brachial palpation is slightly more reliable than femoral palpation.
LOE 6, fair quality, opposing, no comment about industry funding.

Tibballs J, Weeranatna C. The influence of time on the accuracy of healthcare personnel to diagnose paediatric cardiac arrest by pulse palpation. Resuscitation. 2010 Jun;81(6):671-5.
Abstract: AIM: To determine time and accuracy diagnosing paediatric cardiac arrest (CA) by pulse palpation. MATERIALS AND METHODS: Blinded rescuers (82 nurses, 71 doctors) palpated for a brachial pulse in 17 children (1 day-11 years) with non-pulsatile extracorporeal circulation for CA or cardiac failure. Timed rescuer decisions (pulse present/absent) were compared with non-blinded investigator decisions. RESULTS: CA on 55 occasions was diagnosed by 42 (76%) rescuers in mean (+/-SD) time 30+/-19s. Experienced rescuers diagnosed CA in 25+/-14s, inexperienced rescuers in 37+/-24s (p=0.042). CA absent on 98 occasions was confirmed by 77 (79%) rescuers in 13+/-13s. Experienced rescuers confirmed absent CA in 9+/-5s, inexperienced rescuers in 21+/-19s (p=0.0001). Diagnosis of CA compared to confirmation of absence took longer by all rescuers (p<0.0001), experienced rescuers (p<0.0001) and inexperienced rescuers (p=0.018). Twenty-eight of 33 (85%) experienced doctors diagnosed CA or confirmed absence in 13+/-9s, 49 of 61 (80%) experienced nurses in 15+/-12s, 11 of 21 (52%) inexperienced nurses in 18+/-15s and 31 of 38 (82%) inexperienced doctors in 30+/-24s. Overall accuracy was 78% (95%CI 71-84%), sensitivity 0.76 (95%CI 0.64-0.86) and specificity 0.79 (95%CI 0.69-0.86). Experienced doctors were 85% accurate, inexperienced doctors 82%, experienced nurses 80%, inexperienced nurses 52%. Rescuers diagnosing quickly (<10s) had 90% accuracy, in 11-20s 77% accuracy and in 21-30s 62.5% accuracy (p=0.015). CONCLUSIONS: Diagnosis of cardiac arrest by pulse palpation alone is unreliable. At least 30s is required but accuracy and speed are related to clinical experience.
LOE 6, good quality, opposing, no comment about industry funding.