WORKSHEET for Evidence-Based Review of Science for Veterinary CPCR

1. Basic Demographics

Worksheet author(s)

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[redacted]

2. Clinical question:

In dogs and cats with cardiac arrest (P) does standardized training of veterinarians and technicians in pulseless arrest algorithms (I) compared to ad-hoc training (C), improve ROSC (O)?

3. Conflict of interest specific to this question:

I do not have any conflict of interest disclosures relevant to this worksheet.

4. Search strategy (including electronic databases searched):

4a. Databases

-MEDLINE via PUBMED (1950 - present) (performed on April 5th 2011)

1.standardized training
2.ah-hoc training
3.cardiac arrest
4.CPR
5.ROSC
6.dogs
7.cats
8.pulseless arrest algorithm
9.outcome

1 and 3: 6 relevant hints out of 58 total hits
1 and 4: 9 additional relevant hints out of 68 total hits
1 and 3 and 5: 0 additional relevant hints out of 1 total hit
1 and 4 and 5: 0 additional relevant hints out of 1 total hit
1 and 3 and 9: 0 additional relevant hints out of 17 total hits
1 and 4 and 9: 0 additional relevant hints out of 14 total hits
1 and 6: 0 total hit
1 and 7: 0 total hit
1 and 8: 0 additional relevant hints out of 1 total hit
2 and 3: 0 additional relevant hints out of 1 total hit
2 and 3 and 5: 0 total hit
2 and 4 and 5: 0 total hit
2 and 3 and 9: 0 additional relevant hints out of 1total hit
2 and 4 and 9: 0 additional relevant hints out of 1total hit
2 and 4: 0 additional relevant hints out of 1total hit
2 and 6: 0 total hit
2 and 7: 0 total hit
2 and 8: 0 total hit

-CAB (1910 - present) (performed on April 10th 2011)
Report as for Medline: no additional hits were found

4b. Other sources

-GOOGLE SCHOLAR (performed on April 10th 2011)
Report as for Medline: no additional hits were found

-All references of the following relevant article were checked:
1. *Bhanji F, Mancini ME et al. (2010) "Part 16: Education, Implementation, and Teams: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care" Circulation. 2000; 102(8 Suppl):I343-57.*
2. *S.J. Plunkett, M. McMichael, (2008) "Cardiopulmonary Resuscitation in Small Animal Medicine: An Update" Jan-Feb;22(1):9-25.*

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

Inclusion criteria
Human medicine articles. Veterinary medicine articles

Exclusion criteria
Abstracts only. Editorials. Articles not in English. Out of hospital arrest. Community/not medical education

4d. Number of articles/sources meeting criteria for further review: 15
-After detailed review, six relevant studies were identified (Camp et al 1997; Chair et al 2010; Cimrin et al 2005; Hofmeister et al 2008; Howard S et al 1999; Sven Kuess 2009,)

5. Summary of evidence

Evidence Supporting Clinical Question

Good			Hofmeister 2008 (E)			*Howard 1999 (E)* *Chair 2010 (E)*
Fair						*Cimrin 2005 (E)*
Poor						*Sven Kuess 2009 (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 Neutral to 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 Opposing Clinical Question

Good						
Fair						
Poor						*Camp (1997) C*
	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 AND ASSESSMENT OF BENEFIT / RISK:

Training in cardiopulmonary resuscitation (CPR) has been recommended for healthcare professionals for more then 3 decades. The ultimate goal of the education process is to improve survival from cardac arrest.

Sanders and coworkers looked at the effect of advanced life support training (ACLS) on the outcome in a rural hospital during a 13-months period before and after the training. In the pre-ACLS period, none of the patients that had ventricular fibrillation/tachycardia as the initial rhythm of their cardiac arrest, were resuscitated. In contrast, 40% of patients with cardiac arrest from ventricular fibrillation/tachycardia in the post-ACLS period were resuscitated successfully. This represented a significant improvement in successful resuscitation for patients in ventricular fibrillation/tachycardia, support the concept that ACLS training should be provided to all health care personnel treating patients in cardiac arrest. However, Camp et al. in 1997 did not found a significantly improvement on the outcome after CPR in a rural hospital during a 2-year period following a ACLS training. Although resuscitation success rates did not improve, their results show clinically and statistically significant increases in intervention attempts and death events reversed.

Cimrin et, in 2005, al have shown that after a training session, composed of 1hour of theoretical training coupled with 4 hours of practical basic life support training, the performance of the participants was improved, however it was not uniform. Whereas in a study conduct by Schwid et al in 1999, has been shown how, computer aided advanced life support courses, can be more useful than textbook aided because the first seems to encourages more people to study.

Several different types of training have been described in humane medicine (with textbook, simulator, interactive multimedia, cased based) with better success for those that used a high grade of fidelity but no studies comparing standardized training versus ad-hoc training were found.

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Also, Howard et al, suggest that to retain ACLS knowledge at acceptable levels, review should be performed every 6 months, but a prospective study done in 2006 (Brown et al) revealed that although accurate knowledge of guidelines is associated with increased odds of correct performance of some aspect of CPR, overall performance remains poor.

In veterinary medicine Hofmeister et al. in 2008, found that trained individuals reported both higher success rates and greater feelings of competence, suggesting that training is important. Formal training similar to that available in human medicine (advanced cardiac life support training) is not available in veterinary medicine. However, veterinarians usually receive training from either a didactic, practical, or apprenticeship approach, or a combination of these methods.

7. Conclusion

CONSENSUS OF SCIENCE:

Evidence from 4 human medicine studies (LOE 6) documents an improvement in CPR skills after basic or advanced cardiac life support training, especially if the training had a high grade of fidelity (use of manikin and/or virtual reality) with frequent refreshing courses (every 6 months).
One good veterinary medicine survey (LOE 3) also found that trained veterinarian had higher success rates compared to untrained individuals.
One poor retrospective review (LOE 6) did not found improvement in CPR-outcome after ACLS training, however the attempts CPR increases in intervention attempts and death events reversed.

TREATMENT RECCOMANDATION:
As a recommendation, training course for veterinarian and veterinary technicians should include both theoretical and practice sessions with the use of manikin and refreshing courses should be done every 6months in order to retain the level of knowledge to acceptable levels.

8. Acknowledgement

None

9. Citation list

1. Brown TB, Dias JA et al (2006) "Relationship between knowledge of cardiopulmonary resuscitation guidelines and performance" Resuscitation; 69: 253-261
OBJECTIVE: Despite widespread training with CPR guidelines, CPR is often poorly performed. We explore relationships between knowledge of CPR guidelines and performance (compression rate, compression depth, compression to ventilation ratio, and ventilation volume).
METHODS: Sixty professional EMTs were sampled at 26 randomly ordered EMS response stations from an urban system of 31 stations. A recording manikin and video model were used to assess performance in a standardized scenario, and a survey was used to assess guideline knowledge. Survey and performance outcomes were categorized prospectively as correct or incorrect based on the International CPR Guidelines from 2000. Relationships were modeled with logistic regression. Covariates included years of work experience, frequency of CPR performance, and ALS versus BLS EMT level.
RESULTS: Compression rate was between 80 and 120 min(-1) in 56% (33/59) of trials. Compression depth was 1.5-2 in. in 39% (23/59), compression to ventilation ratio approximated to 15:2 in 42% (25/59), and ventilation volume was 800-1,200 cm(3) in 13% (8/60). Accurate knowledge of the CPR guidelines was associated with betterperformance of chest compression rate and compression to ventilation ratio. Adjusted OR (95% CI) were 4.6 (1.2-18.1) for compression rate, 1.7 (0.4-6.5) for compression depth, 4.5 (1.1-18.5) for compression to ventilation ratio, and 9.0 (0.2-351) for ventilation volume.
CONCLUSIONS: Although accurate knowledge of guidelines is associated with increased odds of correct performance of some aspects of CPR, overall performance remains poor.
LOE 6; fair neutral to the question

2. Camp, B. N., Parish, D. C., & Andrews, R. H. (1997) "Effect of advanced cardiac life support training on resuscitation efforts and survival in a rural hospital" Annals of emergency medicine, 29(4), 529–533.
STUDY OBJECTIVE:To determine the impact of an Advanced Cardiac Life Support (ACLS) training program on resuscitation and survival in a rural hospital.
METHODS:Retrospective review of arrests in a 119-bed rural community hospital before, during, and after organization of an ACLS teaching program. ICU logs, death logs, and code review sheets were used to determine resuscitation efforts and outcomes; these were cross-checked with medical and administrative records. From 1980 through 1984, resuscitation attempts were conducted only in the ICU. By 1985, after the training program was instituted, resuscitation efforts were conducted throughout the hospital. Data are presented on resuscitations in the ICU only and on total hospital

resuscitations. To assess effort, resuscitation attempts and successes were compared with total death events (ie, total number of hospital deaths plus total number surviving a resuscitation effort).
RESULTS:From 1980 through 1984, before ACLS training was instituted, 42 patients were resuscitated and 15 (36%) survived to discharge. From 1985 through 1987, 113 ICU patients were resuscitated and 29 (26%) survived. From 1988 through 1990, after ACLS protocol and code review procedures were established, 81 ICU patients were resuscitated and 23 (28%) survived. The number of attempted resuscitations throughout the hospital increased from 42 in the early period to 179 in the final period, with 15 (36%) and 52 (29%) survivors, respectively. Rates of ICU or hospital-wide resuscitation success were not significantly different over time (P > .3). There were 893 total death events in the early period and 485 in the final period. The percentage of death events with an intervention rose from 5% to 37% (P < .001), and the percentage reversed by intervention increased from 2% to 11% (P < .001).
CONCLUSION:After widespread ACLS training and code team organization, there was a significant increase in resuscitation efforts and reversal of death events despite a slight decline in the percentage of patients surviving resuscitation attempts. An ACLS training program in a rural hospital can contribute to increased overall survival.
LOE=6; poor, opposing to the question

3. Cimrin AH, Topacoglu H, et al. (2005) "A model of standardized training in basic life support skills of emergency medicine residents" Adv Ther;22(1):10-8.

This intervention study was designed to determine the current level of basic life support knowledge and skills of residents in a university-based emergency medicine residency program, and to investigate the potential benefit derived by these residents from a standardized theoretical and practical training session. All residents underwent tests before and after the training session. The residents were asked to perform basic life support on a recording cardiopulmonary resuscitation mannequin. Assessments were made using a 10-item checklist, with the highest score being 17. Each step performed by the resident was scored by an emergency physician for accuracy and effectiveness. Twenty-eight residents participated in the study. According to the modified Berden scale, the pretest and posttest scores were 11.2 +/- 2.9 and 15.6 +/- 1.0, respectively, and the mean difference was 4.36 +/- 2.9 (t test, P<.001). Only 11 residents (39.3%) were rated as "good" or "very good" in the pretest, whereas the corresponding figure in the posttest was 27 (96.4%) (P<.001). Skills, such as checking the airway patency (P<.001), checking breathing (P<.001), appropriate compression rate (P<.003), and delivering 2 effective breaths (P<.001), improved significantly. Depth of chest compression (P<.023) was improved significantly only in residents with fewer than 2 years of experience. The training process should comprise standardized courses to facilitate acquisition of the desired skills.
LOE=6; fair supportive to the question

4. Hofmeister EH, Thompson BT et al (2008) "Survey of academic veterinarians' clinical practice in cardiopulmonary-cerebral resuscitation" J Vet Emerg and Crit Care; 18(2): 142–152

Objective: To document the clinical practice of cardiopulmonary–cerebral resuscitation (CPCR) among academic veterinarians.
Design: Survey.
Setting: Eight colleges of veterinary medicine in the United States.
Subjects: Two hundred and one academic veterinarians.
Interventions: The survey was distributed by hand by the authors into the mailboxes of small animal faculty, residents, and interns. Demographic variables, questions regarding number of cardiopulmonary arrests (CPA) supervised and number successful, do not attempt resuscitation discussions, and Likert-style questions about client presence during CPCR, appropriateness of CPCR, and CPCR decision-making were included. Multiple linear regression models were constructed to determine the effect of multiple questions on different target variables of interest.
Measurements and main results: Numerous differences were noted based on institution, gender, specialty, and position. Most institutions did not have a standard resuscitation consent form. Most respondents believed the client, house officer, and senior clinician should determine whether to perform resuscitation or not. Quality of life was the most significant determinant of whether to resuscitate or not, followed by long-term prognosis, then short-term prognosis.
Conclusions: Veterinarians differ in many aspects of their approach to CPA and resuscitation. Creating consensus within the veterinary profession would benefit client service and patient care.
LOE=3; fair supportive to the question

5. Schwid HA, Rooke GA, et al. (1999) "Use of a computerized advanced cardiac life support simulator improves retention of advanced cardiac life support guidelines better than a textbook review" Crit Care Med; 27(4): 821-4.

OBJECTIVE: To determine whether an advanced cardiac life support (ACLS) computer simulation program improves retention of ACLS guidelines more effectively than textbook review.

DESIGN: Randomized, controlled trial.

SETTING: Academic medical center.

PARTICIPANTS: Forty-five anesthesia residents and faculty tested 10 to 11 months after ACLS provider course training.

INTERVENTION: Participants were randomized and asked to prepare for a mock resuscitation (Mega Code) with either textbooks or a computerized ACLS simulation program.

MAIN OUTCOME MEASURE: Performance on a standardized Mega Code examination that required application of supraventricular tachycardia, ventricular fibrillation, and second-degree Type II atrioventricular block algorithms. Mega Code sessions were administered by an instructor who was blinded as to the subject group. The sessions were videotaped and scored by two evaluators who also were blinded as to the subject group.

RESULTS: Participants who used the ACLS simulation program scored significantly higher (mean 34.9 +/- 5.0 [SD] of 47 possible points) than participants who reviewed using a textbook (29.2 +/- 4.9); $p < .001$. Pass-fail rates for the algorithms were also higher for the group that reviewed with the simulator (mean 2.5 +/- 0.5 of 3 possible passes) than the group that used the textbook (1.6 +/- 1.0); $p = .001$.

CONCLUSIONS: Use of a computerized ACLS simulation program improves retention of ACLS guidelines better than textbook review.

LOE=6; good supportive to the question

6. Sanders AB, Berg RA et al (2004) "The efficacy of an ACLS training program for resuscitation from cardiac arrest in a rural community" Ann Emerg Med; 23(1): 56-59

STUDY OBJECTIVE:To determine whether an advanced cardiac life support (ACLS) course in a rural hospital will improve resuscitation success from cardiac arrest.

DESIGN:A retrospective case review of all patients in cardiac arrest during a 13-month period before and after the institution of an ACLS training program.

SETTING:Emergency department of a 42-bed rural, community hospital in a community with no prehospital advanced life support or early defibrillation.

PARTICIPANTS:All patients in cardiac arrest were entered into the data base. Twenty-nine patients were included in the pre-ACLS period and 35 in the post-ACLS period. There were no significant differences in age, gender, initial rhythm, comorbid diseases, witnessed versus unwitnessed arrest, or total arrest time in the patients in the pre-ACLS period compared with those in the post-ACLS period.

INTERVENTION:ACLS provider training.

MAIN RESULTS:Patients in cardiac arrest who had ventricular fibrillation/tachycardia as their initial rhythm had significant improvement in resuscitation success compared with patients in ventricular fibrillation/tachycardia in the pre-ACLS period (six of 15 versus none of nine, $P < .05$). Out-of-hospital cardiac arrest resuscitation was more successful in the post-ACLS period than in the pre-ACLS period (five of 30 versus none of 25, $P < .05$). Overall, seven of 35 patients (20%) were resuscitated successfully in the post-ACLS period, with two patients surviving to hospital discharge. This was not significantly different than the two of 29 patients (7%) resuscitated in the pre-ACLS period, with one patient surviving to discharge.

CONCLUSION:The institution of an ACLS-provider course in a rural community hospital was associated with improvement in initial resuscitation for patients with ventricular fibrillation/tachycardia and out-of-hospital arrest.

LOE=6; poor supportive to the question