**WORKSHEET for Evidence-Based Review of Science for Emergency Cardiac Care**

**Worksheet author(s)**
Andrew Travers MD MSc FRCPC, HSFC

**Date Submitted for review:** May 19 2008, November 14 2009

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**Clinical question.**

BLS-047B In adult patients suffering from a cardiac arrest (P) does the provision of chest compressions (without ventilation) from bystanders, both trained and untrained, (I) compared with chest compressions plus mouth-to-mouth breathing (C) improve survival to hospital discharge (O)?

**Is this question addressing an intervention/therapy, prognosis or diagnosis?**

Intervention

**State if this is a proposed new topic or revision of existing worksheet:**
Revision of Existing Worksheet

**Conflict of interest specific to this question**

Do any of the authors listed above have conflict of interest disclosures relevant to this worksheet?

There are no reported academic or financial conflict(s) of interest(s).

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**Search strategy (including electronic databases searched).**

The last formal electronic search of the various electronic databases was conducted on November 14 2009.

Interventional trials will be identified in the Cochrane Controlled Trials Register (CCTR), PUBMED, EMBASE, CINAHL, Current Contents, AHA Endnote database using the following initial search strategy: (chest compression*) AND (randomized controlled trial[Publication Type] OR (randomized[Title/Abstract] AND controlled[Title/Abstract] AND trial[Title/Abstract])). Text Word Headings were also searched using combinations of 'cardiac arrest', 'chest compression', 'continuous chest compression', and 'ventilation'.

Reference lists of all available primary studies and review articles were reviewed to identify potential relevant citations. Trials were not excluded on the basis of language.

Inquiries regarding other published or unpublished studies known and/or supported by the authors of the primary studies will be made so that these results could be included in this review. Several pathways will be used to locate authors including letters to an address presented in the article, Internet 'People and Hospital Searches', electronic author searches in library databases for the address on the most recent article published by the author, and contact with other reviewers in the where feasible. Personal contact with colleagues, collaborators and other researchers working in the field of resuscitation was made to identify potentially relevant studies.

Papers were reviewed for relevance based on available title and abstract. Papers were reviewed for inclusion based on full article review. There was single author review for relevance and inclusion.

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**State inclusion and exclusion criteria**


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**Number of articles/sources meeting criteria for further review:**

36 studies met criteria for further review, including: one LOE 1, ten LOE 2, 16 LOE 5 (animal models), and 9 LOE (educational/mathematical models).
## Summary of evidence

### Evidence Supporting Clinical Question

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
</table>
| **Mathematical or Educational Models** | Dias 2007E  
Woollard 2003E  
Babbs 2002E  
Turner 2002E | Animal Model  
Ewy 2007E  
Kern 2002E  
Sanders 2002E  
Berg 2001E | |
| **Animal Model** | Kern 2002C  
Berg 1997E  
Berg 1995E  
Noc 1995E  
Chandra 1994E  
Berg 1993E | Mathematical or Educational Models  
Odegaard 2006E  
Dorph 2003E  
Swor 2003E  
Williams 2006E | |

### Evidence Neutral to Clinical question

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
</table>
| **Animal Model** | Kern 1998E | Mathematical or Educational Models  
Odegaard 2006E  
Dorph 2003E  
Swor 2003E  
Williams 2006E | |
| **Mathematical or Educational Models** | Odegaard 2006E  
Dorph 2003E  
Swor 2003E  
Williams 2006E | | |
| **No Descriptor Type/Training** | Hallstrom 2000C  
Nagao 2007D  
Waalewijn 2001C  
Iwami 2007D  
Bohm 2007C  
Ong 2008C | | |

A = Return of spontaneous circulation  
B = Survival of event  
C = Survival to hospital discharge  
D = Intact neurological survival  
E = Other endpoint  
*Italics = Animal studies*
# Evidence Opposing Clinical Question

<table>
<thead>
<tr>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
</table>

**Animal Model**
- Dorph 2004E
- Kawamae 2001E
- Berg 2000E
- Berg 1999E

**Animal Model**
- Idris 1994E

**Reports**
- Bystander Type
  - Homberg 2001
  - Wik 1994C
  - Van Hoeyweghen 1993B
  - Bossaert 1989C

**No Descriptor Type/Training**
- Gallagher 1995C

### Level of evidence

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

**A** = Return of spontaneous circulation  **C** = Survival to hospital discharge  **E** = Other endpoint  
**B** = Survival of event  **D** = Intact neurological survival  
*Italics = Animal studies*
The body of evidence was systematically searched and compiled using contemporary evidence-based medicine strategies. The original clinical question being evaluated was, “In adult patients suffering from a cardiac arrest (P) does calling of EMS and the provision of chest compressions (without ventilation) by untrained laypersons (I) compared with calling EMS and starting chest compressions plus mouth-to-mouth breathing (C) improve survival to hospital discharge (O)?”, however this was modified to include the following: In adult patients suffering from a cardiac arrest (P) does the provision of chest compressions (without ventilation) from bystanders, both trained and untrained, (I) compared with chest compressions plus mouth-to-mouth breathing (C) improve survival to hospital discharge (O)?

**Mathematical/Educational model**

Regarding compression only CPR in the mathematical/educational model, there is reasonably good evidence supporting chest compression only CPR over chest compression and ventilation (4 studies). There is also reasonably good evidence from five LOE 5 citations that there is no difference between the two forms of CPR.

**Animal Model**

Regarding compression only CPR in the animal model, there are four studies favoring compression only CPR over compression/ventilation CPR (all fair quality), seven papers with neutral evidence (1 good, six fair quality), and five papers (4 good, 1 fair quality) favoring compression/ventilation CPR over compression only CPR. The majority (14/16) of these citations utilize a porcine model, with one canine and one rodent model, with inherent methodological limitations. For the porcine model of arrest, it is important to note that pigs will frequently gasp during effective CPR, and more importantly are able to maintain a patent airway during unresponsiveness. Evidence has demonstrated that based on human anatomy, pulseless patients with a head in the neutral position will have an obstructed airway (Ruben Anes 1961 22 271-279, Safar JAMA 1961 176 574-76, Steen CIRC 2007 116:2514-16,) in contrast to animal models which are purported to maintain a patent airway. For all of the studies with supporting, or neutral findings, there was an endotracheal tube inserted into the airway of the animal that remained patent throughout the resuscitation sequence. For those studies supporting compression/ventilation CPR over compression only CPR, these animals were either paralyzed (Idris et al), or had an endotracheal tube that was clamped mimicking the airway obstruction that would be presumed present in humans during compression only CPR.

The Ewy et al paper was the only contemporary paper that evaluated the 30:2 compression rate that is currently recommended by CoSTR/ILCOR, and it was demonstrated that compression only CPR was superior to compression/ventilation CPR (Ewy 2007 p2525). However, the same methodological limitations apply here with an unobstructed ETI and a model associated with spontaneous gasping during CPR.

**Human Studies**

The evidence spanning this question encompasses over 5 years of educational/mathematical models, 15 years for animal studies, and 25 years for human studies. Over this period there have been substantive changes to what is described as standard CPR including an evolution of compression:ventilation ratios from 5:1, to 15:2, to 30:2. There is a paucity of data comparing what is currently defined as ‘standard’ layperson CPR (ie 30:2) versus compression only CPR, and this is reflected in one single porcine model (Ewy 2007 p2525).

There have been 12 clinical studies evaluating layperson compression only CPR compared to compression/ventilation CPR in out-of-hospital cardiac arrest patients all of which have evaluated patients prior to 2005 and the current guidelines of 30:2 compression:ventilation. The ability of a clinical trial to determine the percentage of formally trained vs untrained laypeople is very difficult to ascertain for many reasons, and should be a uniformly reported variable. Moreover, the definition of standard CPR has gone through several iterations over the 25 year course of the evidence period.

Two of the twelve (17%) studies (Nagao, Waalewijn) reported both the type of responder (layperson vs professional) and layperson training (present or absent). 50% (5/12: Bohm, Holmberg, Iwani, Wik, Van Hoeyweghen, Bossaert) report bystander type but not layperson training. 33% (4/11: Hallstrom, Gallagher, Olasveengen, Ong) report no description of the bystander subtype or layperson training.
### Key ‘Human’ Studies

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Country</th>
<th>Standard of Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Olasveengen</td>
<td>2008</td>
<td>Norway</td>
<td>2003-2006</td>
</tr>
<tr>
<td>Ong</td>
<td>2008</td>
<td>Singapore</td>
<td>2001-2004</td>
</tr>
<tr>
<td>Nagao</td>
<td>2007</td>
<td>Japan</td>
<td>2002-2003</td>
</tr>
<tr>
<td>Bohm</td>
<td>2007</td>
<td>Sweden</td>
<td>1990-2005</td>
</tr>
<tr>
<td>Hallstrom</td>
<td>2000</td>
<td>United States</td>
<td>1998</td>
</tr>
<tr>
<td>Gallagher</td>
<td>1995</td>
<td>United States</td>
<td>6 month period unknown</td>
</tr>
<tr>
<td>Wik</td>
<td>1994</td>
<td>Norway</td>
<td>1985-1989</td>
</tr>
<tr>
<td>Van Hoeyweghen</td>
<td>1993</td>
<td>Belgium</td>
<td>1983-1989</td>
</tr>
<tr>
<td>Bossaert</td>
<td>1989</td>
<td>Belgium</td>
<td>1983-1987</td>
</tr>
</tbody>
</table>

### Key Studies

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>#</th>
<th>Arm</th>
<th>All</th>
<th>Shockable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bohm</td>
<td>2007</td>
<td>11275</td>
<td>CCC</td>
<td>6.70%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CPR</td>
<td>8209</td>
<td>7.20%</td>
</tr>
<tr>
<td>Kanto</td>
<td>2007</td>
<td>9592</td>
<td>CCC</td>
<td>6%</td>
<td>19%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CPR</td>
<td>712</td>
<td>4%</td>
</tr>
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<td></td>
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<td></td>
<td>No CPR</td>
<td>2917</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CPR</td>
<td>2917</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No CPR</td>
<td>2917</td>
<td>8%</td>
</tr>
<tr>
<td>Iwami</td>
<td>2007</td>
<td>24,436</td>
<td>CCC</td>
<td>3.50%</td>
<td>11.50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CPR</td>
<td>783</td>
<td>3.60%</td>
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<td>3550</td>
<td>2.10%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CPR</td>
<td>3550</td>
<td>8.20%</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>No CPR</td>
<td>3550</td>
<td></td>
</tr>
<tr>
<td>Ong</td>
<td>2008</td>
<td>2428</td>
<td>CCC</td>
<td>2.60%</td>
<td>5.90%</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>CPR</td>
<td>287</td>
<td>2.80%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No CPR</td>
<td>1695</td>
<td>0.50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CPR</td>
<td>1695</td>
<td>4.00%</td>
</tr>
<tr>
<td>Olasveengen</td>
<td>2008</td>
<td>1650</td>
<td>CCC</td>
<td>10%</td>
<td>28%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CPR</td>
<td>281</td>
<td>13%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No CPR</td>
<td>269</td>
<td>9%</td>
</tr>
</tbody>
</table>

Studies Reporting Both Responder Type and Level of Training.

Nagao et al demonstrated no significant difference in 30 day survival (with favorable neurological outcome) for adult patients with witnessed OOHCA from both cardiac and noncardiac causes between compression only and compression/ventilation bystander CPR. Nagao did demonstrate a subgroup of ‘lay person with dispatcher assisted resuscitation’ and ‘lay person with no training and no assisted resuscitation’ rates of bystander CPR.
Waalewijn et al, also reported similar findings of no statistically significant difference between the two groups in question. Moreover, in this study the authors found that survival when basic CPR performers were untrained and had no previous experience, was similar to that when no CPR was done at all. In each of these studies, compression only CPR was associated with statistically improved outcomes compared to no bystander CPR.

**Studies Reporting Responder Type, but not Level of Training (Trained vs Untrained)**

Two observational prospective cohort studies conducted between 1990 and 2005, demonstrated no statistical significant differences in survival between compression only CPR and compression:ventilation CPR. Iwami et al, also reported no difference in one year neurologically intact survival between cardiac etiology OOHCA patients who received compression only versus compression/ventilation bystander CPR. Bohm et al, also found no statistically significant difference between OOHCA patients who received compression only versus compression/ventilation bystander CPR.

Interestingly, four observational studies which oppose the study question at hand. Bossaert et al reported the following survival rates: no bystander CPR: longterm survival was 6%, normal CPR had survival of 12% (p<0.001) and ECC (external cardiac compression) had survival of 9% (p=0.05). Wik et al demonstrated a survival to discharge rate after compression/ventilation CPR of 23%, ’no good CPR’ of 1% (p<0.0005) and no BCPR of 6% (p<0.0005). Van Hoeyweghen et al, demonstrated a long-term survival of 16% in patients with compression:ventilation CPR, 10% in compression only CPR, and 7% in no bystander CPR. Regarding good quality studies opposing the concept of compression only CPR, Holmberg et al demonstrated that survival to 1 month was 8.2% among patients who received bystander cardiopulmonary resuscitation vs 2.5% among patients who did not receive it (odds ratio 3.5, 95% confidence interval 2.9-4.3). The effect of bystander cardiopulmonary resuscitation on survival was related to: (1) the interval between collapse and the start of bystander cardiopulmonary resuscitation (effect more marked in patients who experienced a short delay); (2) the quality of bystander cardiopulmonary resuscitation (effect more marked if both chest compressions and ventilation were performed than if either of them was performed alone); (3) the category of bystander (effect more marked if bystander cardiopulmonary resuscitation was performed by a non-layperson); (4) interval between collapse and arrival of the ambulance (effect more marked if this interval was prolonged); (5) age (effect more marked in bystander cardiopulmonary resuscitation among the elderly); and (6) the location of the arrest (effect more marked if the arrest took place outside the home).

**Studies Not Reporting Responder Type of Level of Training**

Olasveengen et al demonstrated in a large cohort of patients (n=695) in Norway during the period 2003-2006 that patients receiving CCC from bystanders did not have a worse outcome than patients receiving standard CPR. Furthermore, Ong et al demonstrated in a large cohort of patients in Singapore (n=2428) during the period 2001-2004 that patients were more likely to survive with any form of bystander CPR than without even with a tendency towards a higher distribution of known negative predictive feature.

One randomised clinical trial (Hallstrom 2000) conducted between 1992 and 1998 demonstrated no statistical difference in survival to discharge in patients who received compression only CPR or compression:ventilation CPR instructions through ‘prearrival instructions’ given by their EMS operator during the 911 call.

Gallagher et al demonstrated survival to discharge rate of 4.6% in patients with compression/ventilation CPR, 2% survival in compression CPR (with ineffective ventilation), and 0% survival in ineffective compression. No exact stats are reported for this, except for survival of 4.6% for effective CPR and 1.4% for ineffective CPR (which is most frequently adequate compression and inadequate ventilations).

As any EBM practitioner is aware, it is extremely important to note that these are observational studies, and the lack of evidence to demonstrate a difference, does not translate to say that there is evidence of a lack of difference between the two studies.
<table>
<thead>
<tr>
<th>Layperson</th>
<th>EMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untrained</td>
<td>Trained</td>
</tr>
<tr>
<td>Unwilling</td>
<td>Willing</td>
</tr>
<tr>
<td>Unable</td>
<td>Able</td>
</tr>
<tr>
<td>Inexperienced</td>
<td>Experienced</td>
</tr>
<tr>
<td>CC only</td>
<td>CC only</td>
</tr>
<tr>
<td>Effective CC:V (30:2)</td>
<td>Effective CC:V 30:2 with emphasis on achieving chest compressions BEFORE other CPR processes of care</td>
</tr>
<tr>
<td></td>
<td>Effective CC:V 30:2 with emphasis on maintaining chest compressions CONCURRENT with other CPR processes of care</td>
</tr>
</tbody>
</table>

Acknowledgements:
Nil
REFERENCES


LOE: 5
QUALITY: good
DIRECTION OF SUPPORT: neutral
COMMENTS: mathematical model, no evidence industry sponsorship, shows progressive rise in oxygen flow then drop off


LOE: 5
QUALITY: fair
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship, animals that were intubated limits quality


LOE: 5
QUALITY: fair
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship, animals that were intubated limits quality


LOE: 5
QUALITY: fair
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship, used ischemic etiology for the cardiac arrest, animals that were intubated limits quality


LOE: 5
QUALITY: fair
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship, in contrast to the above citation this was induced without ischemic etiology, there was no occlusion of the coronary artery, animals that were intubated limits quality


LOE: 5
QUALITY: good
DIRECTION OF SUPPORT: opposing
COMMENTS: no report of industry sponsorship, asphyxia-precipitated etiology for the arrest, this applies to drowning, trauma, airway obstruction, acute respiratory distress, apnea +/- drugs, and prolonged cardiac arrest, ETI were actually clamped


LOE: 5
QUALITY: good
DIRECTION OF SUPPORT: opposing
COMMENTS: no report of industry sponsorship, no report of industry sponsorship, asphyxia-precipitated etiology for the arrest, this applies to drowning, trauma, airway obstruction, acute respiratory distress, apnea +/- drugs, and prolonged cardiac arrest


LOE: 5
QUALITY: fair
DIRECTION OF SUPPORT: supporting
COMMENTS: no report of industry sponsorship, demonstrated reduced CPP and left median ventricular blood flow, and no difference in oxygen delivery, or neuro intact survival, all animals are intubated, and this may limit application to the bystander who is providing CCC without an open airway


LOE: 3
QUALITY: good
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship, could not assess or control for the quality of bystander CPR, did not use the 30:2 or 2:30 guidelines, study ran from 1990-2005 (study ran 72 months)


LOE: 2
QUALITY: fair
DIRECTION OF SUPPORT: opposing
COMMENTS: sister article to the other Bossaert paper below. POOR QUALITY CPR DID NOT INCREASE SURVIVAL COMPARED WITH NO CPR.


LOE: 2
QUALITY: fair
DIRECTION OF SUPPORT: opposing
COMMENTS: no bystander CPR: longterm survival was 6%, normal CPR had survival of 12% (p<0.001) and ECC (external cardiac compression) had survival of 9% (p=0.05), enrolled people between 1983 and 1987, with 3083 OOHCA, with 998 with bystander CPR (2055 without) in Belgium, sister article for the other Bossaert paper, this included healthcare workers or trained people, POOR QUALITY CPR DID NOT INCREASE SURVIVAL COMPARED WITH NO CPR.


LOE: 5
QUALITY: fair
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship, animals that were intubated limits quality


LOE: 5
QUALITY: good
DIRECTION OF SUPPORT: supporting
COMMENTS: no report of industry sponsorship


LOE: 5

LOE: 5
QUALITY: good
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship


LOE: 5
QUALITY: fair
DIRECTION OF SUPPORT: supporting
COMMENTS: no report of industry sponsorship, animals that were intubated limits quality


LOE: 2
QUALITY: fair
DIRECTION OF SUPPORT: opposing
COMMENTS: 32% bystander rate, if effective CPR then survival of 4.6%, if effective chest compressions (but ineffective vent) then survival was 2% (p1923), 2071 cardiac arrests in New York City over a six month period (undefined) POOR QUALITY CPR DID NOT INCREASE SURVIVAL COMPARED WITH NO CPR.


LOE: 1
QUALITY: good
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship, perhaps more of the clinical answer regarding dispatch instructions, telephone CPR should be limited to CCC only, study ran from January 1992 to August 30 1998 (study ran 80 months)


LOE: 3
QUALITY: fair
DIRECTION OF SUPPORT: opposing
COMMENTS: no obvious industry support


LOE: 5
QUALITY: fair
DIRECTION OF SUPPORT: opposing
COMMENTS: no report of industry sponsorship, animals that were intubated limits quality


LOE: 2

LOE: 5
QUALITY: good
DIRECTION OF SUPPORT: opposing
COMMENTS: no report of industry sponsorship, asphyxia model of arrest, first arm had no airway management at all


LOE: 5
QUALITY: good
DIRECTION OF SUPPORT: supporting
COMMENTS: no report of industry sponsorship


LOE: 5
QUALITY: good
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship, study suggests limits to the time that the arrest can be without ventilation – this turns out to be around six minutes, fairly short period of down time, actually went as far to occlude the airway


LOE: 5
QUALITY: fair
DIRECTION OF SUPPORT: supporting
COMMENTS: no report of industry sponsorship, simulated the delays when present as a single rescuer where there are 16 second pauses to administer the 2 breaths, in this study there was a 15:2 ratio, in the Ewy 2007 paper there was 30:2 ratio, animals that were intubated limits quality


LOE: 2
QUALITY: good
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship, study period ran from Sept 1 2002 to Dec 31 2003 (16 months total)


LOE: 5
QUALITY: fair
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship, partially it demonstrates that there is some airflow during CCC, but there was an ETI in situ, animals that were intubated limits quality


LOE: 5
QUALITY: good
DIRECTION OF SUPPORT: neutral

LOE: 3
QUALITY: poor
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship


LOE: 2
QUALITY: poor
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship


LOE: 5
QUALITY: fair
DIRECTION OF SUPPORT: supporting
COMMENTS: no report of industry sponsorship, fair study as animals are intubated


LOE: 5
QUALITY: good
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship


LOE: 5
QUALITY: good
DIRECTION OF SUPPORT: supporting
COMMENTS: no report of industry sponsorship, mathematical model, supportive for CCC in first four minutes, and then CCC is inferior after 4 minutes


LOE: 3
QUALITY: fair
DIRECTION OF SUPPORT: opposing
COMMENTS: no report of industry sponsorship


LOE: 2
QUALITY: fair
DIRECTION OF SUPPORT: neutral
COMMENTS: no report of industry sponsorship, study ran from June 1st 1995 to August 1 1997

LOE: 2
QUALITY: fair
DIRECTION OF SUPPORT: opposing
COMMENTS: ’good’ CPR lead to a survival rate of 23%, bad CPR resulted in 1% survival, and no CPR resulted in 6%, collected over 48 months between 1985 and 1989. POOR QUALITY CPR DID NOT INCREASE SURVIVAL COMPARED WITH NO CPR.


LOE: 5
QUALITY: good
DIRECTION OF SUPPORT: supporting
COMMENTS: no report of industry sponsorship


LOE: 5
QUALITY: good
DIRECTION OF SUPPORT: supporting
COMMENTS: no report of industry sponsorship