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

Worksheet author(s)

Masami Ishikawa, Keiichi Tada, Tetsuo Hatanaka

Date Submitted for review: 30 September 2009

Clinical question.

Does the use of induced hypothermia (I) improve survival (O) in patients after cardiac arrest (P)?)

In bystanders (lay or HCP) (P), are there any specific factors (I) compared with standard interventions (C) that increase outcomes (eg. willingness to provide or the actual performance of CPR (standard or chest compression only) on adult or pediatric patients with cardiac arrest (prehospital [OHCA]) (O)?

Is this question addressing an intervention/therapy, prognosis or diagnosis? Intervention/therapy
State if this is a proposed new topic or revision of existing worksheet: Revision of existing worksheet (W184A_Young.doc, W184B_Dennet.doc, W191A_Young.doc, W191B_Celenza.doc)

Conflict of interest specific to this question

I have no real or potential conflict of interest regarding this question.

Search strategy (including electronic databases searched).

MEDLINE at PubMed search using “heart arrest” or “cardiopulmonary resuscitation” as MESH. In addition, using “willingness” or “willing” or “attitude”, and “perform” or “performance” as text words in any field.
The Cochrane databases search using “heart arrest” or “cardiopulmonary resuscitation” in all text. In addition, using “willingness” or “willing” or “attitude”, and “perform” or “performance” in all text.
ECC EndNote Master Library for systematic reviews including these findings.

- State inclusion and exclusion criteria

The following studies were included: Willingness to provide CPR, education and training in CPR course and method.
The following studies were excluded: Reviews, the clinical outcome for patients, studies that were not compared with standard interventions, studies about ACLS and non English language studies.

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

115 studies were found and 24 studies met the criteria. Of these, 2 reviews were excluded in this worksheet but referred to. 22 studies met the criteria for further review: one LOE 2 (prospective control), one LOE 3, nineteen LOE 4 and one LOE5.

Summary of evidence

Evidence Supporting Clinical Question

Good				**Axelsson, 2000, p27 E1, E2 Axelsson, 2006, p90 E1 Hubble, 2003, p219 E3 Omi, 2008, p340 E3 Parnell, 2006, p899 E1, E3 Riegel, 2006, p98 E1, E3 Swor, 2003, p171 E1 Swor, 2006, p596 E1**	
Fair		**Moser, 1999, p326 E1**		**Culley, 1991, p362 E2 Donohoe, 2006,p70 E1, E3 Jelinek, 2001,p239 E1, E3 Johnston, 2003,p67 E1 Kuramoto, 2008, p475 E1 Lam, 2007,p325 E3 Locke, 1995,p938 E3 Shibata 2000,p187 E3 Taniguchi 2007,p82 E3**	
Poor				**Caves, 2006, p93 E3 Lerner, 2008, p51 E3**	
	1	**2**	**3**	**4**	**5**
Level of evidence					

A = Return of spontaneous circulation

B = Survival of event

C = Survival to hospital discharge

D = Intact neurological survival

E =willingness to provide bystander CPR.
E1 = Recent training,
E2 = Telephone CPR instructions,
E3 = Compression only CPR

Italics = Animal studies

Evidence Neutral to Clinical question

Good					**Swor R, 2003, p177 E3**
Fair					
Poor			**Isbye, 2007, p1380 E1**		
	1	**2**	**3**	**4**	**5**
Level of evidence					

A = Return of spontaneous circulation
C = Survival to hospital discharge
E =willingness to provide bystander CPR.
E1 = Recent training,
E2 = Telephone CPR instructions,
E3 = Compression only CPR
B = Survival of event
D = Intact neurological survival
Italics = Animal studies

Evidence Opposing Clinical Question

Good					
Fair					
Poor					
	1	**2**	**3**	**4**	**5**
Level of evidence					

A = Return of spontaneous circulation
C = Survival to hospital discharge
E =willingness to provide bystander CPR.
E1 = Recent training,
E2 = Telephone CPR instructions,
E3 = Compression only CPR
B = Survival of event
D = Intact neurological survival
Italics = Animal studies

REVIEWER'S FINAL COMMENTS AND ASSESSMENT OF BENEFIT / RISK:

DISCUSSION: The terms "bystander", "out of hospital" and "prehospital" were not searched, because some papers were not included in the search results when using these words. EIT-008 is a very broad question, so the focus was on "willingness to provide CPR". This is an important factor to increase the successful outcome of patients with OHCA. In this worksheet, outcome improvement refers to the willingness to perform CPR by various bystanders, but does not relate it to the clinical outcome for patients. The bystander CPR rate for both laypersons and Health Care Providers remains low. The major reason for this is a reduced willingness to perform CPR. There are some supporting studies that were one LOE 2, Fair and nineteen non-control studies, LOE 4, regarding the improvement of willingness to perform CPR.

1. CPR on adult strangers

Regarding CPR on adult strangers with OHCA, the common reasons for unwillingness by laypersons to perform CPR are anxiety and panic, lack of knowledge and confidence of performing CPR, and the fear of injuring victims (Hubble 2003 p219; Omi 2008 p340; Shibata 2000 p187; Swor 2006 p596; Taniguchi 2007 p82). Even with dispatch assisted telephone instruction given to bystanders, emotional factors remain a major reason for inability to perform CPR (Lerner 2008 p51).

Summary of Hubble 2003 p219

- High school students indicated they would be willing to perform mouth-to-mouth resuscitation 1,768 times (43%) and Chest compression 2,249 times (55%).
- More respondents were willing to intervene on behalf of a child or family member.
- Fear of infection, legal consequences, and fear of harming the patient were the most frequently reasons for not performing CPR.

Summary of Omi 2008 p340

- Japanese high school students are reluctant to perform full CPR.
- Reasons for the unwillingness to perform full CPR were poor knowledge and the fear of incomplete performance of CPR.
- Repeating training improved willingness to perform CPR.
- Japanese high school students prefer to perform CPR for pediatrics and relatives.

Summary of Shibata 2000 p187

- Both layperson and HCP were more unlikely to provide CPR with mouth to mouth ventilation than chest compression only CPR.
- Common reasons that the lay bystanders cited for not performing MMV were the fear of inadequate knowledge and poor performance.
- HCP bystanders feared disease transmission.

Summary of Swor 2006 p596

- Common reasons that the CPR-trained bystanders cited for not performing CPR; panic and anxiety (37.5%). perception that they would not be able to do CPR correctly (9.1%), and fear that they would hurt the patient (1.1%).
- Only 1.1% objected to performing mouth-to-mouth resuscitation.

Summary of Taniguchi 2007 p82

- The reasons for the unwillingness among laypeople to perform CC plus MMV were inadequate knowledge and/or doubt regarding whether they could perform the techniques effectively
- For HCP it was a fear of disease transmission.

Summary of Lerner 2008 p51

- Common reasons that the lay bystander CPR with telephone instruction were not performing CPR were caller's refusal (18%) and the emotional state of the caller (14%)

In order to improve the willingness to perform CPR by laypersons and HCP, it might be important to modify the potential for anxiety and fear, and improve their confidence in performing CPR. One study showed that the stress experienced by laypersons in a medical emergency was low, and practical issues were more important than emotions (Riegel 2006 p98). Even if emotion is a major reason for non-willingness of laypersons or not, a simplified sequence would improve the lack of knowledge and ability of performing CPR. Compression only CPR would improve the willingness to perform CPR for laypersons. One randomized simulation study using manikin showed that the chest-compression only CPR training for elder resulted in equivalent skill retention rates as compared with traditional CPR training, but did not impact the willingness to provide CPR.(Swor 2003 p177).

Summary of Riegel 2006 p98

- A low level of stress was reported by lay responders to a medical emergency overall.
- Practical issues were more important than emotions.

Summary of Swor 2003 p177

- Chest-compression only CPR training resulted in equivalent skill retention rates as compared with traditional CPR training (51.7 vs. 44.4%; P=0.586), but did not impact the willingness to provide CPR.

In Sweden, unawareness of the course schedule and location of training courses is the major reason for not being CPR trained (Axelsson 2006 p90). Widely disseminating training courses using a simple CPR sequence, such as a video self-training course or having courses in primary or secondary school curriculum would greatly increase the number of trained lay people. Two studies had conflicting results regarding the effect of CPR courses in schools (Omi 2008 p340; Parnell 2006 p899). One non-randomized, retrospective controlled study showed that the bystander CPR rate did not increase despite of distributing personal manikins among school children (Isbye 2007 p1380).

Summary of Axelsson 2006 p90

- The most common reason for not being trained in CPR was that the respondent was not aware of such courses or that they did not know where to go for training.

Summary of Parnell 2006 p899

- Willingness to perform CPR among high students in New Zealand was higher than in Japan.
- Willingness to perform CPR on family members was higher than on a stranger, which was most remarkable in non-willing students.
- Previous CPR training enhanced willingness.

Summary of Isbye 2007 p1380

- The bystander CPR rate after mass training with distributing personal manikins among school children did not increase significantly compared with the previous year (25.0% versus 27.9%)

Twelve studies showed the importance of recent CPR training and emergency dispatchers provide telephone CPR instructions in order to improve the willingness to perform CPR by laypersons. (Axelsson, 2000, p. 27; Culley 1991 p362; Donohoe, 2006, p.70; Jelinek, 2001, p.239; Johnston, 2003, p. 67; and Kuramoto, 2008, p.475; Swor, 2003, p. 171; Swor, 2006, p. 596)

Summary of Axelsson 2000 p27

- Recent trained CPR rescuers were highly willing to perform CPR.
- Telephone-guided CPR by dispatchers might encourage bystanders to perform CPR.

Summary of Culley 1991 p362

- Dispatcher-assisted telephone CPR program was associated with an increase in bystander CPR.

Summary of Donohoe 2006 p70

- Persons more recently trained were more likely to perform CPR, and persons with CPR training were more likely to perform chest-compression only CPR.

Summary of Jelinek 2001 p239

- Greater frequency of refresher courses and public education on the risks of CPR to improve rates of bystander CPR.

Summary of Kuramoto 2008 p475

- Experience of CPR training closely associated with willingness to perform CPR.

Summary of Swor 2003 p171

- Recent and frequent CPR training might increase bystander willingness to perform CPR.

The fear of disease is not a critical reason for the un-willingness of laypersons in countries such as Japan (Omi 2008 p340; Shibata 2000 p187; Taniguchi 2007 p82). In contrast, it is a major reason for un-willingness to perform CPR, especially mouth to mouth ventilation, in other localities, such as Hong Kong, the U.S.A and Australia (Caves 2006 p93; Hubble 2003 p219; Johnston 2003 p67; Lam 2007 p325; Locke 1995 p 938). For HCPs the fear of disease transmission is a cause for reluctance in performing CPR in OHCA (Swor 2006 p596; Taniguchi 2007 p82). One non-randomized study after an outbreak of SARS showed that willingness to provide compression only CPR was higher than traditional CPR (Lam 2007 p325) and one LOE 4 study showed that medical students are not likely to perform mouth to mouth ventilation on strangers due to fear of disease transmission; however, they were likely to perform chest compression only for both strangers and family members in spite of the SARS outbreak (Caves 2006 p93). Compression only CPR would improve the willingness to perform CPR for both laypersons fearing disease and HCPs without a CPR device.

Summary of Caves 2006 p93

- Medical students are not likely to perform mouth to mouth ventilation on strangers due to fear of disease.
- They are likely to perform mouth to mouth ventilation for family members, and chest compression only CPR for both strangers and family members in spite of a SARS outbreak.

Summary of Johnston 2003 p67

- In Queensland, Australia the most common barrier to performing CPR was a fear of disease transmission.

Summary of Lam 2007 p325

- After SARS, more respondents were unwilling to perform standard CPR ($p < 0.001$) and compression-only CPR ($p < 0.001$) on strangers.
- After SARS, more respondents were unwilling to perform SCPR on a family member ($p = 0.039$), but there was no difference in the preference to perform CCPR ($p = 1.000$).

Summary of Locke 1995 p 938

- Mouth-to-mouth ventilation appears to create substantial barriers to performance of bystander CPR.

2. CPR on a family member

In CPR on family members with OHCA, bystanders do not hesitate to perform mouth to mouth ventilation; however, because of anxiety and panic the bystander commonly becomes confused and as such CPR is frequently not performed (Caves 2006 p93; Hubble 2003 p219; Omi 2008 p340; Parnell 2006 p899). The authors conclude that simple sequence CPR, such as compression only CPR would improve the willingness to perform CPR on family members, however no study has been published that directly shows evidence to support this hypothesis.

3. CPR on pediatric patients

In CPR on pediatric patients with OHCA, ventilation is occasionally necessary and bystanders are likely to perform mouth to mouth ventilation (Hubble 2003 p219; Omi 2008 p340). One LOE 2 study showed that CPR training enhanced the willingness among parents of high-risk neonates to perform CPR (Moser 1999 p326**).** No study shows that any new factors improved the outcome in pediatric OHCA.

Summary of Moser 1999 p326

- The major reason for reluctance among parents of high-risk neonates to perform CPR was a fear of hurting their infant.
- CPR training enhanced willingness to perform CPR.

Acknowledgements:
Nil

Citation List

Axelsson, A., A. Thoren, et al. (2000). "Attitudes of trained Swedish lay rescuers toward CPR performance in an emergency: a survey of 1012 recently trained CPR rescuers." Resuscitation 44(1): 27-36.

Level 4. Good. Supporting Evidence. Evaluation of the willingness to perform CPR in Swedish trained lay rescuers. Recent trained CPR rescuers were highly willing to perform CPR. Telephone-guided CPR by dispatchers might encourage bystanders to perform CPR.

Axelsson, A. B., J. Herlitz, et al. (2006). "A nationwide survey of CPR training in Sweden: foreign born and unemployed are not reached by training programmes." Resuscitation 70(1): 90-7.

Level 4, Good, Supporting. Non-controlled study. Evaluation of the willingness to attend a CPR course.
The most common reason for not being trained in CPR was that the respondent was not know such courses existed or that they did not know where to go for training.

Caves, N. D. and M. G. Irwin (2006). "Attitudes to basic life support among medical students following the 2003 SARS outbreak in Hong Kong." Resuscitation 68(1): 93-100.

Level 4, poor, Supporting. Non-controlled study. Small study size. Evaluation of the willingness to perform CPR among medical students after an outbreak of SARS.
Medical students are not likely to perform mouth to mouth ventilation on strangers due to fear of disease. They are likely to perform mouth to mouth ventilation for family members, and chest compression only CPR for both strangers and family members in spite of a SARS outbreak.

Culley, L. L., J. J. Clark, et al. (1991). "Dispatcher-assisted telephone CPR: common delays and time standards for delivery." Ann Emerg Med 20(4): 362-366.

Level 4. Fair. Supporting Evidence. Evaluation of the dispatcher-assisted telephone CPR. Dispatcher-assisted telephone CPR program was associated with an increase in bystander CPR.

Donohoe, R. T., K. Haefeli, et al. (2006). "Public perceptions and experiences of myocardial infarction, cardiac arrest and CPR in London." Resuscitation 71(1): 70-9.

Level 4 Fair. Supporting Evidence. Persons more recently trained were more likely to perform CPR, and persons with CPR training were more likely to perform chest-compression only CPR.

Hubble, M. W., M. Bachman, et al. (2003). "Willingness of high school students to perform cardiopulmonary resuscitation and automated external defibrillation." Prehosp Emerg Care 7(2): 219-24.

Level 4, Good, Supporting. Non-controlled study. Evaluation of the willingness to perform CPR among high school students.
The respondents indicated they would be willing to perform mouth-to-mouth resuscitation 1,768 times (43%) and chest compressions 2,249 times (55%). More respondents were willing to intervene on behalf of a child or family member. Fear of infection, legal consequences, and fear of harming the patient were the most frequently reasons for not performing CPR.

Isbye, D. L., L. S. Rasmussen, et al. (2007). "Disseminating cardiopulmonary resuscitation training by distributing 35,000 personal manikins among school children." Circulation 116(12): 1380-5.

Level 3, Poor, Neutral. Non-randomized, non-blinded, prospective study with retrospective control. Both groups were not similar. Evaluated the bystander CPR rate after mass training and distribution of personal manikins among school children.
Bystander CPR rates in the months after training did not significantly increase compared with the previous year (25.0% versus 27.9%)

Jelinek, G. A., H. Gennat, et al. (2001). "Community attitudes towards performing cardiopulmonary resuscitation in Western Australia." Resuscitation 51(3): 239-246.

Level 4. Fair. Supporting Evidence. Evaluation of the willingness of laypersons to perform CPR. in Western Australia. Greater frequency of refresher courses and public education on the risks of CPR to improve rates of bystander CPR.

Johnston, T. C., M. J. Clark, et al. (2003). "Factors influencing Queenslanders' willingness to perform bystander cardiopulmonary resuscitation." Resuscitation 56(1): 67-75.

Level 4, Fair, Supporting. Non-controlled study. Evaluation of the willingness of laypersons to perform CPR.
In Queensland, Australia, the most common barriers to performing CPR was a fear of disease transmission.

Kuramoto, N., T. Morimoto, et al. (2008). "Public perception of and willingness to perform bystander CPR in Japan." Resuscitation. 79(3): 475-81

Level 4. Fair. Supporting Evidence. Evaluation of the willingness of laypersons to perform bystander CPR in Japan. Experience of CPR training closely associated with willingness to perform CPR.

Lam, K. K., F. L. Lau, et al. (2007). "Effect of severe acute respiratory syndrome on bystander willingness to perform cardiopulmonary resuscitation (CPR)--is compression-only preferred to standard CPR?" Prehosp Disaster Med 22(4): 325-9.

Level 4, Fair, supporting. Non-randomized, non-blinded, prospective study. Evaluation of the laypersons willingness to perform CPR after an outbreak SARS in Hong Kong.
After SARS, more respondents were unwilling to perform standard CPR ($p < 0.001$) and compression-only CPR ($p < 0.001$) on strangers. After SARS, more respondents were unwilling to perform SCPR on a family member ($p = 0.039$), but there was no difference in the preference to perform CCPR ($p = 1.000$).

Lerner, E. B., M. R. Sayre, et al. (2008). "Cardiac arrest patients rarely receive chest compressions before ambulance arrival despite the availability of pre-arrival CPR instructions." Resuscitation 77(1): 51-6.

Level 4, poor, Supporting. Non-controlled、retrospective case series. Evaluation of the willingness to perform lay bystander CPR with telephone instruction.
Common reasons that the lay bystander CPR with telephone instruction were not performing CPR were caller's refusal (18%) and emotional state of the caller (14%)

Locke, C. J., R. A. Berg, et al. (1995). "Bystander cardiopulmonary resuscitation. Concerns about mouth-to-mouth contact." Arch Intern Med 155(9): 938-943.

Level 4. Fair. Supporting Evidence. Evaluation of the willingness to perform lay bystander CPR with mouth-to-mouth contact. Mouth-to-mouth ventilation appears to create substantial barriers to performance of bystander CPR.

Moser, D. K., K. Dracup, et al. (1999). "Effect of cardiopulmonary resuscitation training for parents of high-risk neonates on perceived anxiety, control, and burden." Heart Lung 28(5): 326-33.

Level 2, supportive, Fair. Pseudo-randomized, not blinded, controlled study. Other treatment not same, baseline was similar. Evaluation of willingness to perform CPR for parents of high-risk neonates after CPR training.
Major reason for reluctance to perform CPR was a fear of hurting their infant. CPR training enhances willingness to perform CPR.

Omi, W., T. Taniguchi, et al. (2008). "The attitudes of Japanese high school students toward cardiopulmonary resuscitation." Resuscitation 78(3): 340-5.

Level 4, Good, Supporting. Non-controlled study. Evaluation of the willingness to perform bystander CPR in Japanese high school students.
Japanese high school students are reluctant to perform full CPR. Reasons for the unwillingness to perform full CPR were poor knowledge and the fear of incomplete performance of CPR. Repeating training improved willingness to perform CPR. Japanese high school students prefer to perform CPR for pediatrics and relatives.

Parnell, M. M., J. Pearson, et al. (2006). "Knowledge of and attitudes towards resuscitation in New Zealand high-school students." Emerg Med J 23(12): 899-902.

Level 4, Good, Supporting. Non-controlled study. Evaluation of the willingness to perform bystander CPR in New Zealand high school students.
Willingness to perform CPR was higher in New Zealand high school students compared to Japanese high school students.Willingness to perform CPR on family members was higher than on strangers, being most remarkable in non-willing students. Previous CPR training improved the willingness to perform CPR.

Riegel, B., V. N. Mosesso, et al. (2006). "Stress reactions and perceived difficulties of lay responders to a medical emergency." Resuscitation 70(1): 98-106.

Level 4, Good, Supporting. Non-controlled study. Evaluation of the stress experienced by lay responders to a medical emergency and the barriers that may have impeded their response to the event.
Stress levels were low overall. Practical issues were more important than emotional issues.

Shibata, K., T. Taniguchi, et al. (2000). "Obstacles to bystander cardiopulmonary resuscitation in Japan." Resuscitation 44(3): 187-193.

Level 4, Fair, Supporting. Non-controlled study. Evaluation of the willingness to perform bystander CPR.
Both layperson and HCP were more unlikely to provide CPR with mouth to mouth ventilation than chest compression only CPR. Common reasons that the lay bystanders cited for not performing MMV were the fear of inadequate knowledge and poor performance. HCP bystanders feared disease transmission.

Swor, R. A., R. E. Jackson, et al. (2003). "Cardiac arrest in private locations: different strategies are needed to improve outcome." Resuscitation 58(2): 171-176.

Level 4. Good. Supporting Evidence. A prospective, observational study. Recent and frequent CPR training might increase bystander willingness to perform CPR.

Swor R, et al. (2003). "A randomized controlled trial of chest compression only CPR for older adults-a pilot study." Resuscitation. 2003 Aug;58(2):177-85.

Level 5, Good, Neutral. Randomized simulation study using manikin, small study size. Evaluation of the chest-compression only CPR for elder.
Chest-compression only CPR training resulted in equivalent skill retention rates as compared with traditional CPR training (51.7 vs. 44.4%; P=0.586), but did not impact the willingness to provide CPR.

Swor, R., I. Khan, et al. (2006). "CPR training and CPR performance: do CPR-trained bystanders perform CPR?" Acad Emerg Med 13(6): 596-601.

Level 4, Good, Supporting. Non-controlled study. Evaluation of the willingness of layperson bystanders to perform CPR. Common reasons that the CPR-trained bystanders cited for not performing CPR; panic and anxiety (37.5%). perception that they would not be able to do CPR correctly (9.1%), and fear that they would hurt the patient (1.1%). Only 1.1% objected to performing mouth-to-mouth resuscitation.

Taniguchi, T., W. Omi, et al. (2007). "Attitudes toward the performance of bystander cardiopulmonary resuscitation in Japan." Resuscitation 75(1): 82-7.

Level 4, Fair, Supporting. Non-controlled study. Evaluation of the willingness of layperson and HCP bystanders to perform CPR. The reasons for unwillingness among laypeople to perform CC plus MMV were inadequate knowledge and/or doubt regarding whether they could perform the techniques effectively. For HCP it was a fear of disease transmission.