

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

Worksheet author(s)

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THIS WS HAS BEEN UPDATED BASED ON ORLANDO 2009 TF DISCUSSION AND AGREED TF CoSTR

Clinical question.

In lay providers requiring BLS training, does focusing training on high risk populations compared with no such targeting increase outcomes (e.g. bystander CPR, survival etc.)?

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

State if this is a proposed new topic or revision of existing worksheet: New

Conflict of interest specific to this question

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

Search strategy (including electronic databases searched).

Pub Med "Cardiopulmonary Resuscitation/education"[MAJR] AND "Survival Analysis"[MeSH Terms]; heart arrest and family and training; heart arrest and casino and training; heart arrest and airline and training; "Cardiopulmonary Resuscitation education" AND Heart Arrest Therapy ; MM "Cardiopulmonary Resuscitation education" AND Heart Arrest Therapy AND Heart Arrest Mortality; "Cardiopulmonary resuscitation training" AND "Cardiac Rehabilitation"

CINAHL: "Bystander CPR" AND education AND outcome

Google Scholar: layperson BLS training high risk population target; layperson CPR training high risk population target

Cochrane database: Heart Arrest AND Training; AHA Endnote Master Library: Heart Arrest AND Training, AHA ECC Education Subcommittee Education Endnote Library: Heart Arrest AND training AND family, EBSCO host "related articles", review of references from articles, forward searching in Google Scholar

• State inclusion and exclusion criteria

Studies related to healthcare professionals and others with a duty to act, CPR in the schools, were excluded.

Studies which only reported on effectiveness of defibrillation were excluded.

Studies that only evaluated skills using manikins were excluded.

Editorials, commentaries, animal studies, abstract only studies, and reviews were excluded.

Studies related to family, friends, workers without a duty to act (e.g. airline employees, casino employees) were included.

All age groups were included.

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

16 studies met criteria for further review. Eight LOE 1; 3 LOE 1, 1 LOE3, 2 LOE 4, 2 LOE 5

Summary of evidence

Evidence Supporting Clinical Question

Good	Ingram & Maher (2006, 89) E-2	Kliegel & Scheinecker et al (2000, 147) E-4 Sigsbee & Geden (1990, 662) E-1			Groeneveld & Owens (2005, 58) E-3 Swor & Compton (2004, 420) E-3
Fair	Dracup & Moser et al (1994, 116) E-4 Dracup & Moser et al (2000, 3289) E1- Moser, Dracup & Doering (1999, 326) E-1,		Higgins, Hardy & Higashino (1989, 1102) A	Messmer & Meehan et al (1993, 217) E-5	

	E-4 Moser & Dracup (2000, 270) E-1, E-2				
Poor					
	1	2	3	4	5
Level of evidence					

A = Return of spontaneous circulation
 B = Survival of event
 E-1= Reduced anxiety
 E-4 = Willingness to perform

C = Survival to hospital discharge
 D = Intact neurological survival
 E-2 = Perception of control
 E-5 = Self-esteem

E = Other endpoint
Italics = Animal studies
 E-3 = Cost-effectiveness

Evidence Neutral to Clinical question

Good	Ingram & Maher (2006, 89) E2	Cheng & Hu, et al (1997, 273)		McLauchlan, et al. (1992,7) E1	
Fair	Dracup & Moser et al (1997, 1434) E1				
Poor					
	1	2	3	4	5
Level of evidence					

A = Return of spontaneous circulation
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Evidence Opposing Clinical Question

Good					Swor & Fahoome et al (2005, 7) B
Fair	Dracup & Guzy et al (1986, 1757) E-1				
Poor					
	1	2	3	4	5
Level of evidence					

A = Return of spontaneous circulation
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REVIEWER'S FINAL COMMENTS AND ASSESSMENT OF BENEFIT / RISK:

DISCUSSION: Although there is a great deal in the literature recommending the targeting of CPR training to family members of those with cardiac disease and older women; studies evaluating their ability to do CPR, their attitude towards doing CPR, and whether or not family bystanders actually do CPR, there have been no studies that measure the effectiveness of targeted training in CPR. There are studies that report that CPR training can be effective in reducing patient and family member stress, and assisting in social and emotional adjustment. In addition, studies indicate that targeted CPR training may be more cost-effective than mass training, though the numbers required to make a change may be unobtainable. A few studies indicate that family members indicate an increased willingness to perform but, other than a very small study done in 1989, (Higgins) they do not report actual rates of CPR use or effectiveness. Studies exist outlining targeting training to particular groups such as casino security guards and airline personnel, but they focus on the effectiveness of early defibrillation using AEDs rather than CPR. It may be worthwhile to look at results of training that combine CPR and AED if not being answered in another worksheet.

- Swor & Fahoomer et al (2005, 7) used computer modeling to estimate the probability of survival from cardiac arrest with targeted training which increased the percentage of bystanders of private-residence cardiac arrest who do CPR. Probability functions of important cardiac arrest characteristics/events such as victim/bystander age, bystander CPR training likelihood, bystander CPR provision likelihood, cardiac rhythm and defibrillation within 8 minutes of 911 call were assigned and data was taken from published/publicly available sources. Data was from one community so probability assumptions may not be transferable to other communities. Their computer model indicated that targeted training would have to result in 75% of private-residence bystanders performing CPR (compared to the baseline of 25.7%) to result in a significant improvement in survival (5.02% compared to the baseline of 4.81%). Control was standard EMS
- Dracup & Moser have published numerous articles reporting on the effects of targeted CPR training for family members of both adult and pediatric patients. Because their control groups were other high risk family members, rather than the general public, they don't directly address the question at hand. Their results primarily indicate that in these high risk groups, CPR training may reduce anxiety, enhance perception of control and improve perceived willingness to perform. In one study, the training increased anxiety and in another it did so in those patients who were not part of a support group. They do not related frequency of CPR or survival.
- Groeneveld & Owens (2005, 58) used computer modeling to demonstrate that targeted CPR training is more cost-effective than other interventions such as purchasing home AEDs
- Ingram and Maher et al (2006, 89) looked at targeting CPR training to cardiac patients during cardiac rehab, rather than families. They demonstrated a significant improvement in perception of level of control and a reduction in anxiety for those who had the training compared to those who did not.
- McLauchlan et al (1992, 7) targeted training to patients with recurrent ventricular tachycardia and their families. They demonstrated reduced anxiety for both patients and family members after the training in only one of the three assessment tools they used. They also documented three emergency incidents which, although BLS was either not required or not able to be delivered, family members responded well and followed the appropriate protocol for contacting the ambulance.

KNOWLEDGE GAPS: Further research that targeted the following questions would be valuable:

1. How likely are targeted groups to actually do CPR if they've had the training?
2. What are the outcomes of CPR done by individuals after targeted training?
3. What would the effects be for teaching chest compression only CPR to family members?
4. Do the effects of reduced stress and improved psychosocial adjustment last over time?

Acknowledgements:

Nil

Citation List

Cheng Y-C, Hu S-C, et al. Targeted mass CPR training for families of cardiac patients – experience in Taipei City. *Tzu Chi Med J* (1997) 9: 273-278.

LOE 2 Neutral Study. This study looked at the stated willingness to perform CPR differences between participants of a mass CPR training program who had high-risk family members of adult patients and those who didn't. There were no significant differences found .

Dracup K, Guzy PM, et al Cardiopulmonary resuscitation (CPR) training. Consequences for family members of high-risk cardiac patients. *Arch Intern Med* (1986) Sep;146(9):1757-61.

LOE1 Neutral Study. Although an RCT and high LOE, it doesn't actually answer the question since it doesn't compare the effects of CPR training between high-risk and low-risk populations. The control group comes from high-risk family members also. The main findings of this study were: no significant differences in anxiety or depression in family members of adult patients after CPR training. There was a trend, however, to increased anxiety & depression over time after CPR training, and decreased anxiety & depression over time in family members

who did not receive CPR training. In addition, the family members who received CPR training demonstrated higher scores than the control group on CPR knowledge portion of AHA HeartSaver Quiz.

Dracup K, Moser DK, et al Is cardiopulmonary resuscitation training deleterious for family members of cardiac patients? *Am J Pub Health* (1994) Jan;84(1):116-8.

LOE1 Neutral Study. Although an RCT and high LOE, it doesn't actually answer the question since it doesn't compare the effects of CPR training between high-risk and low-risk populations. The control group comes from high-risk family members also. The only reported comparison done between treatment and control groups is 6 month test scores, which shows that family members who did not practice CPR in the 6 months following the course performed at the same level as the control group, who received no CPR training at all. The study also showed a positive effect that CPR training of family members of adult patients had on potential willingness to perform CPR in the future

Dracup, K., D. K. Moser, et al. The psychological consequences of cardiopulmonary resuscitation training for family members of patients at risk for sudden death. *Am J Public Health* 1997; 87(9): 1434-1439.

Level 1 supporting study. Although an RCT and high LOE, it doesn't actually answer the question since it doesn't compare the effects of CPR training between high-risk and low-risk populations. The control group comes from high-risk family members also. Evidence supports question with softer endpoint of reduced anxiety rather than improve survival or increased incidence of bystander CPR. Reports research that indicates targeted CPR training combined with support for family members of adult patients can reduce anxiety and increase social adjustment and feelings of empowerment.

Dracup, K., D. K. Moser, et al. A controlled trial of cardiopulmonary resuscitation training for ethnically diverse parents of infants at high risk for cardiopulmonary arrest. *Crit Care Med* 2000; 28(9): 3289-3295.

Level 1 study, supporting. Although an RCT and high LOE, it doesn't actually answer the question since it doesn't compare the effects of CPR training between high-risk and low-risk populations. The control group comes from high-risk family members also. Evidence supports question with softer endpoint of reduced anxiety rather than improve survival or increased incidence of bystander CPR. Reports research that indicates targeted CPR training for family members of infants can reduce anxiety and increase social adjustment and feelings of empowerment.

Groeneveld PW, Owens DK. Cost-effectiveness of training unselected laypersons in cardiopulmonary resuscitation and defibrillation. *Am J Med* (2005) Jan;118(1):58-67.

LOE5 Supporting Study. This is a computer model-driven cost-effectiveness study looking at various strategies at increasing the efficiency of CPR (and AED) training on laypeople. It determined that one of the most cost-effective strategies was to target the CPR providers to people who have a higher risk of encountering a patient requiring CPR., including family members of high risk adult patients. Overall, it demonstrated that mass CPR training programs are not very efficient, but that improving the effectiveness of bystander CPR would have a large effect on the outcome, more so than other variables that were tested (for example purchasing of home Aid's).

Higgins SS, Hardy CE, Higashino SM. Should parents of children with congenital heart disease and life-threatening dysrhythmias be taught cardiopulmonary resuscitation? *Pediatrics* (1989) Dec;84(6):1102-4.

LOE3 Supporting Study. This study was a retrospective study looking at pediatric cardiology centers' rates of teaching/recommending CPR training to parents of children with cardiac disease. The numbers are very small (only complete data from 20 centers, 12 which taught CPR and 8 which did not). Comparison of the survival rate from cardiac arrests at home between 2 groups revealed significant improvement in survival rate (and rate of CPR attempt during the event) from centers where parents were taught CPR. In fact, from the centers where CPR wasn't taught, there were no attempts at CPR and none survived.

Ingram, S., V. Maher, et al. The effect of cardiopulmonary resuscitation training on psychological variables of cardiac rehabilitation patients. *Resuscitation* 2006; 71(1): 89-96.

Level 1, supporting study. Evidence supporting question with softer endpoint of improved perception of control than improve survival or increased incidence of bystander CPR) Reports research that indicates targeted CPR training for family members adult cardiac patients can reduce anxiety and increase social perception of control.

Kliegel A, Scheinecker W, et al. The attitudes of cardiac arrest survivors and their family members towards CPR courses. *Resuscitation* (2000) Oct;47(2):147-54.

LOE2 Supporting Study. This study compared attitudes of high-risk (previous cardiac arrest survivors) and low-risk (general visitors to hospital) participants in a CPR training course. The study found that, before participating in the CPR course, high-risk participants are more

willing to perform CPR on someone than low-risk participants. After taking the course, the willingness to perform CPR was similar in both groups, except on a family member, where family members of high-risk participants adult patients indicated that they would be more willing to help.

McLauchlan CA, Ward A, et al. Resuscitation training for cardiac patients and their relatives — its effect on anxiety. Resuscitation 1992;24:7-11.

Level4, supporting study. Evidence supporting question with softer endpoint of improved perception of control than improve survival or increased incidence of bystander CPR) Reports research that indicates targeted CPR training for adult cardiac patients can reduce anxiety.

Messmer P, Meehan R, et al. Teaching infant CPR to mothers of cocaine-positive infants. J Contin Educ Nurs (1993) Sep-Oct;24(5):217-20.

LOE4 Supporting Study. This is a study comparing 2 methods of CPR instruction in mothers of cocaine positive infants. There is no comparison with mothers of low-risk infants or any other control group. This doesn't answer the question since no comparison is made with mothers of low-risk infants. The study demonstrated an increase in self-esteem for mothers of high risk infants who received CPR training.

Moser DK, Dracup K, Doering LV. Effect of cardiopulmonary resuscitation training for parents of high-risk neonates on perceived anxiety, control, and burden. Heart Lung (1999) Sep-Oct;28(5):326-33.

LOE1 Supporting Study. Although an RCT and high LOE, it doesn't actually answer the question since it doesn't compare the effects of CPR training between high-risk and low-risk populations. The control group comes from high-risk family members also. The main findings were that there was an improvement in CPR Attitudes Scale scores in all subjects over time. In addition, significantly fewer family members who had not received CPR training would be willing to perform CPR on their infant if necessary. Finally, levels of anxiety about performing CPR decreased over time in subjects who had received CPR training but did not decrease in those subjects who did not.

Moser DK, Dracup K. Impact of cardiopulmonary resuscitation training on perceived control in spouses of recovering cardiac patients. Res Nurs Health (2000) Aug;23(4):270-8.

LOE1 Supporting Study. This is a substudy of Dracup (1997). Although an RCT and high LOE, it doesn't actually answer the question since it doesn't compare the effects of CPR training between high-risk and low-risk populations. The control group comes from high-risk family members also. The main findings are that levels of anxiety, depression and hostility are correlated with levels of perceived control, i.e. subjects have lower levels of these 3 variables if have higher levels of perceived control. It was also found that having received CPR training significantly improved levels of perceived control in family members of adult cardiac patients.

Sigsbee M, Geden EA. Effects of anxiety on family members of patients with cardiac disease learning cardiopulmonary resuscitation. Heart Lung (1990) Nov;19(6):662-5.

LOE2 Supporting Study. This study compared effects on anxiety and performance between high-risk (family members of adult cardiac patients) and low-risk (individuals attending a HeartSaver program who did not have relatives with cardiac disease) participants in the AHA HeartSaver program. It revealed that anxiety levels were significantly higher before participation in high-risk participants, and that the levels of anxiety decreased significantly in this group after participation. The low-risk participants did not demonstrate any change in level of anxiety after taking the course. However, the levels of performance on the MCQ test and CPR skill demonstration were not significantly different between high-and low-risk participants, which would make this study neutral to the question, in this respect.

Swor R, Compton S. Estimating cost-effectiveness of mass cardiopulmonary resuscitation training strategies to improve survival from cardiac arrest in private locations. Prehosp Emerg Care (2004) Oct-Dec;8(4):420-3.

LOE5 Supporting Study. This is a computer model-driven cost-effectiveness study which estimated the number of people who would need to be CPR trained in order to save a life. In an untargeted approach, it would take over 25 000 people to take CPR training in order to save 1 life. If a targeted approach were used (where people over the age of 50 were trained in higher proportions than in the general population) then that number drops significantly.

Swor, R., G. Fahoome, et al. Potential impact of a targeted cardiopulmonary resuscitation program for older adults on survival from private-residence cardiac arrest. Acad Emerg Med 2005; 12(1): 7-12.

Level 5 (computer model), negative study. Computer modeling using public/published data indicated that targeted training would have to result in 75% of family bystanders initiating CPR to make a significant difference. If modeling is correct, would require nearly triple the current number of family bystanders who initiate CPR to make a difference of only 0.2% increase in survival.

Vaillancourt, C. Stiell, I.G. Wells, G.A. Understanding and improving low bystander CPR rates: a systematic review of the literature. CJEM Canadian Journal of Emergency Medical Care: 10(1):51-65.

Level 1, supporting study. Evidence supporting question with softer endpoint of improved perception of control than improve survival or increased incidence of bystander CPR) Reports research that indicates targeted CPR training for cardiac patients can reduce anxiety and increase social perception of control..