

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

Worksheet author(s)

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Clinical question.

EIT-008A – In bystanders (lay or HCP) (P), are there any specific factors (I) compared with standard interventions (C) that increase outcomes (e.g. 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 the 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.

Conflict of interest specific to this question

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

I have no conflicts of interest specific to this topic, or any relevant philosophical, religious, or cultural beliefs or longstanding disagreements with an individual that could be interpreted as conflict of interest.

Search strategy (including electronic databases searched).

The following databases were searched using keywords “bystander CPR” “willingness to perform CPR”, “reluctance to perform CPR”, “hands-only CPR”, and “bystander apathy”:

Medline (OVID and PubMed) – keywords, MeSH headings and text words

Cochrane database for systematic review – keywords, MeSH headings and text words

AHA EndNote Master Library – keywords and text words

Social Psychology Internet search for key words “bystander apathy” and “bystander response to emergencies”

Forward Search using Google Scholar

• State inclusion and exclusion criteria

Only human studies were included. Animal studies were excluded. There were no limits to group size/number. The review included experimental and observational studies and meta-analysis of these studies; targeted, random, and convenience sample surveys; prospective observational studies, prospective cohort studies, retrospective cohort studies, retrospective observational cohort studies, case studies, systematic reviews and descriptive studies. Case studies that involved only one patient or one bystander were excluded. Only completed articles were included, no abstracts were included. No non-English language papers were found, (or they had been previously translated). Only research articles were included; letters, editorials, or review articles were excluded. The search included articles written from 1991 to 2009.

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

The refined search resulted in 210 articles. Further targeting of the search criteria resulted in 37 articles that met the criteria for final review.

Level 1 = 1 study; a randomized control study, fair quality

Level 2 = 1 study, a randomized concurrent control intervention, fair quality

Level 3 = 0 studies

Level 4 = 34 studies; surveys, secondary data analyses, prospective observational studies, probabilistic simulation model, systematic reviews and descriptive studies; (8 studies were of good quality, and 26 were fair quality.)

Level 5 = 1 studies, (1 RCT of good quality)

Summary of evidence

Evidence Supporting Clinical Question

Good				Axelsson, 2000 P Bobrow 2008 CEP Casper, 2003 EP Mitchell, 2009 P Swor, 2003 EP Swor, 2006 P Vaillancourt, 2008 EP	
Fair	Perkins, 2006 EP			Becker, 1999 P Boucek, 2009 P Coons, 2009 P Culley, 1991 P Donohoe, 2006 EP Dwyer, 2008 P Hamasu, S., 2009 Jelinek, 2001 EP Johnston, 2003 P Kuramoto, 2008 P Lam, 2007 P Locke, 1995 P Nolan, 1999 P Omi, 2008 P Shibata, 2000 EP Taniguchi, 2007 EP	
Poor					
	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 = Other endpoint

P = CPR Performance or willingness to perform

Italics = Animal studies

Evidence Neutral to Clinical question

Good				Jackson, 1997 P	Dias, 2007 E
Fair				Axelsson, 1998 P Fong, 2001 EP Platz, 2000 P Riegel, 2006 EP Skora, 2001 P Swor, 2005 EP Vadeboncoeur, 2008 P Vaillancourt & Lui, 2008 P	
Poor					
	1	2	3	4	5
Level of evidence					

A = Return of spontaneous circulation D = Intact neurological survival *Italics = Animal studies*
 B = Survival of event E = Other endpoint-
 C = Survival to hospital discharge P = CPR Performance or willingness to perform

Evidence Opposing Clinical Question

Good					
Fair		Eisenberg, 1995 P		Hauff, 2003 P Isbye, 2007 EP	
Poor					
	1	2	3	4	5
Level of evidence					

A = Return of spontaneous circulation D = Intact neurological survival *Italics = Animal studies*
 B = Survival of event E = Other endpoint-
 C = Survival to hospital discharge P = CPR Performance or willingness to perform

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

Using keywords “bystander CPR”, “willingness to perform CPR”, “reluctance to perform CPR”, “hands only CPR”, and “bystander apathy”, greater than 500 articles were initially identified. First review eliminated all but 210 of these articles. Continued review resulted in 89 articles. Of these 37 met the criteria for final review. The following articles were considered key to the worksheet question:

- 1) Axelsson, A., A. Thoren, et. al. (2000), page 27-36. This survey sample of 1012 participants analyzed rescuer attitudes and willingness to perform CPR. Results of the survey indicated that 72% of the respondents would like to have CPR refresher training annually; and that 75% of the respondents said emergency dispatch assistance would make them more likely to perform CPR. This study also revealed that respondents were more likely to perform CPR on a friend or family member than a stranger, and there would be hesitancy to perform CPR on an “unkempt” person.
- 2) Bobrow B.J et al. (2008), page 2550-2554. This retrospective analysis of the records of 1218 patients with out-of-hospital cardiac arrest, revealed that of the 113 patients with response by the Phoenix Fire Department, 44 (39%) had gasping. 1218 patient records from the Arizona EMS were analyzed to determine prevalence of gasping, relationship between gasping and time of EMS response, and survival to hospital discharge. Survival to hospital discharge occurred in 54 of 191 patients (28%) who gasped and in 80 of 1027 (8%) who did not (adjusted odds ratio, 3.4; 95% confidence interval, 2.2 to 5.2). Results of the study indicate that gasping or abnormal breathing is common after arrest but decreases rapidly with time. Gasping is associated with increased survival. The results suggest that the recognition and importance of gasping should be taught to bystanders and emergency medical dispatchers to increase likelihood of CPR performance and ultimately survival to hospital discharge.
- 3) Donohoe, R.T., K. Haefeli, et. al. (2006), page 70-79. This quantitative interview survey of 1011 subjects revealed that of 299 (30%) who had been trained in CPR, 50% of those had been trained greater than 10 years earlier. Only 22 % of those had received refresher training. Sixty one percent (61%) of this trained group reported they would feel confident performing CPR in an emergency. Seventy-nine percent (79%) of total surveyed indicated they would do mouth to mouth ventilations if trained, and 84% said they would do compression-only CPR. When interviewed in focus groups, those who had not been recently trained (training was greater than 12 months), related reluctance to perform CPR because of a fear of “doing more harm than good”, and of the potential of being sued if they performed the procedure incorrectly.
- 4) Jelinek, G.A., H. Gennat, et. al. (2001), page 239-246. This telephone survey of 803 randomly selected sample of people from suburban Perth and rural Western Australia, revealed that the majority (90.7%) definitely would give mouth to mouth ventilation to a friend or relative, but less than half (47.2%) would provide this to a stranger. The reluctance was mostly (56%) because of health and safety concerns, particularly related to HIV infection. People were more likely to give mouth-to-mouth ventilations and cardiac massage if they had been trained in cardiopulmonary resuscitation (CPR), trained several times, trained recently, and used their CPR skills in real life.
- 5) Lam, K.K., F.L. Lau, et. al. (2007), page 325-329. This descriptive study was conducted through telephone interviews of 305 persons who attended a CPR course from January 2000 – February 2003. Results showed that concerns about SARS adversely affected the willingness of respondents to perform standard CPR or compression-only CPR on strangers and to perform standard CPR on family members. Compression-only CPR was preferred to standard CPR to resuscitate strangers experiencing cardiac arrest after the emergence of SARS.
- 6) Perkins, G.D., G. Walker, et. al. (2006), page 432-437. This single blind, randomized control trial was conducted to determine if knowledge and recognition of agonal respirations would increase incidences of bystander CPR. Though the sample groups were small, the findings demonstrated increased accuracy in checking for signs of circulation, with resultant increase in performance of CPR in cardiac arrest victims. The prevalence of agonal respirations in cardiac arrest is about 33%, suggesting significant increases in bystander CPR when bystanders can identify these signs of cardiac arrest.
- 7) Shibata, K., T. Taniguchi, et. al. (2000), page 187-193. The survey questionnaire of 1302 subjects included high school students, teachers, emergency medical technicians, medical nurses, and medical students. About 2% of high school students, 3% of teachers, 26% of emergency medical technicians, 3% of medical nurses and 16% of medical students claimed they would 'definitely' perform mouth to mouth ventilations (MMV) plus chest compressions (CC) on a stranger. However, 21-72% claimed they would prefer the alternative of performing CC alone. Respondents claimed their unwillingness to perform MMV was not due to the fear of contracting a communicable disease, but the lack of confidence in their ability to perform CPR properly.
- 8) Vaillancourt, C., I. G. Stiell, et al. (2008), page 51-65. This systematic review of the literature summarized findings from 252 papers that focused on the determinants of CPR, and factors associated with successful training. Based on the results of the systematic review, Vaillancourt made 22 recommendations, those with the highest scores being: 1) 911 dispatch-assisted CPR instructions; 2) teaching CPR to family members of cardiac patients; 3) Braslow's self-training video; 4) maximizing time spent using manikins and 5) teaching the concepts of ambiguity and diffusion of responsibility.

Review of the 37 articles selected resulted in the following general summary of findings:

- 1) Frequent/regular CPR training may result in greater likelihood of performance of CPR.
- 2) Dispatch telephone-assisted CPR may result in an increase incidence of bystander CPR.
- 3) Survival rates are higher for both children and adults when the SCA occurs outside the home, rather than in the home.
- 4) Bystanders relate more willingness to perform CPR on family and friends than on strangers.

- 5) Bystanders taught to identify agonal respirations had increased accuracy in identifying signs of circulation, with resultant increase in performance of CPR.
- 6) Patients with out-of-hospital cardiac arrests who had gasping, had increased rates of survival to hospital discharge.
- 7) Public service announcements (PSA) may increase willingness of bystanders to perform CPR.
- 8) Bystanders who previously used CPR skills on a victim, are more likely to perform CPR again.
- 9) Bystanders are more likely to perform chest compressions only than mouth to mouth ventilations.
- 10) Willingness to perform CPR on a friend or family member increased with bystanders' level of education.
- 11) CPR classes should focus on increased manikin time.
- 12) Bystanders who perform CPR should be offered critical incident psychological debriefing.

Acknowledgements:

I have no conflicts of interest.

Citation List n=37

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.

Comments: *Level 4. Good. Supporting Evidence. Survey with large sample, (n=1012), which analyzed rescuers' attitudes and beliefs in terms of CPR. The study revealed a variety of reasons for unwillingness to perform CPR, including hesitancy to perform CPR on an "unkempt" man, a young drug addict, and an unknown person. This data is in conflict with a few studies regarding willingness to perform CPR on known victims. In this case, "known" victim is a factor that would increase outcome. One supporting factor for increasing the willingness to perform CPR was, interestingly, being from a rural environment, compared to an urban environment. Seventy-five percent of the respondents said emergency dispatch assistance would make them more likely to perform CPR; 73% said they believed there was little chance of disease transmission; and 72% percent of respondents would like to have CPR refresher training annually.*

Axelsson, A., J. Herlitz, et al. (1998). "Factors surrounding cardiopulmonary resuscitation influencing bystanders' psychological reactions." Resuscitation **37**(1): 13-20.

Comments: *Level 4. Fair. Neutral Evidence. This study does not address this reviewer's worksheet question; however, the data revealing the bystander's need for debriefing following CPR can be extrapolated into the current study question. If the bystander received appropriate debriefing/counseling after the event, and considered the event as positive, he/she is more likely to perform CPR again.*

Becker, L., J. Vath, et al. (1999). "The impact of television public service announcements on the rate of bystander CPR." Prehosp Emerg Care **3**(4): 353-356.

Comments: *Level 4. Fair. Supporting Evidence. The researchers presented a CPR public service announcement (PSA) to one community, and compared the follow up rates of bystander CPR with those of a community that didn't receive the PSA. Though the numbers of cardiac arrest following the PSA were significantly smaller than the numbers identified prior to the PSA, there is indication that bystander CPR increased.*

Bobrow B.J. et al. (2008). "Gasping during cardiac arrest in humans is frequent and associated with improved survival." Circulation Dec 9; 118:2550.

Comments: Level 4. . Good. Supporting Evidence. This study supported the findings of the Perkins, 2006, LOE 1 study. This study was a retrospective analysis of out of hospital cardiac arrests, which used survival to hospital discharge as the outcome measure. The researchers examined records to determine the presence of gasping in relation to time of cardiac arrest and initiation of CPR, and the rates of survival to hospital discharge. The findings suggest inclusion of recognition of gasping in CPR courses.

Boucek, C.D., et.al. (2009). "Willingness to Perform Mouth-to-Mouth Ventilation by Health Care Providers: A Survey." Resuscitation. Aug;80(8):849-53. Epub 2009 May 29.

Comments: Level 4. Fair. Supporting Evidence. This study is a questionnaire survey of 560 participants, revealing reasons for not performing mouth-to-mouth ventilations. Interesting findings included age and level of experience tend to reduce the propensity to engage in mouth-to-mouth. The study differs from others in this paper, in that the participants were all health care workers.

Casper, K, G. Murphy, et al. (2003). "A comparison of cardiopulmonary resuscitation rates of strangers versus known bystanders." Prehosp Emerg Care 7(3): 299-302.

Comments: Level 4. Good. Supporting Evidence. This is a retrospective observational study of 415 cardiac arrests, which compared bystander CPR response to unknown and known arrest victims. The study measured performance of and attitudes toward CPR. Results revealed that bystanders were more willing to perform CPR on a stranger, than on a known victim.

Coons, S.J., M.C. Guy (2009). "Performing Bystander CPR for Sudden Cardiac Arrest: Behavioral Intentions Among the General Adult Population in Arizona." Resuscitation, Mar;80(3):334-40. Epub 2009 Jan 20.

Comments: Level 4. Fair. Supporting Evidence. This is a questionnaire survey, thus measures participants anticipated willingness to perform CPR. Findings reveal reasons for not performing CPR, which support those provided in several other studies.

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.

Comments: Level 4. Fair. Supporting Evidence. Though this study was conducted using data that is now approximately 20 years old, the findings have been supported in more recent studies, some included in this review. Dispatch-offered CPR instructions may be a factor in increasing bystander willingness to perform CPR.

Dias, J. A., T. B. Brown, et al. (2007). "Simplified dispatch-assisted CPR instructions outperform standard protocol." Resuscitation 72(1): 108-114.

Comments: Level 5, Good. Neutral Evidence. Study revealed that dispatch provided, compression only CPR was better than the standard protocol of dispatch CPR. The study was an RCT; however, it didn't measure the effect of the training on willingness to perform. It measured the quality of CPR, thus a LOE of 5.

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.

Comments: Level 4 Fair. Supporting Evidence. This study involves a quantitative survey of 1011 randomly selected people in London and a series of focus groups. The finds revealed that persons more recently trained were more likely to perform CPR, and persons with CPR training were more likely to perform chest-compression only CPR. Respondents suggested that employers should make CPR training available to employees.

Dwyer, T. (2008). "Psychological Factors Inhibit Family Members' Confidence to Initiate CPR." Prehospital Emergency Care, Apr-Jun: **12**(2):157-61.

Comments: Level 4, Fair. Supporting Evidence. This is a telephone survey, and measures participants stated willingness to perform CPR. The findings support other studies that suggest fear of failing is a reason bystanders may give for not performing CPR.

Eisenberg, M., S. Damon, et al. (1995). "CPR instruction by videotape: results of a community project." Ann Emerg Med **25**(2): 198-202.

Comments: Level 2. Fair. Opposing Evidence. This is a well-carried out study, though the results were negative in increasing bystander CPR.

Fong, Y. T., V. Anantharaman, et al. (2001). "Mass cardiopulmonary resuscitation 99--survey results of a multi-organisational effort in public education in cardiopulmonary resuscitation." Resuscitation **49**(2): 201-205.

Comments: Level 4. Fair. Neutral Evidence. Survey research, an observational cross-section study, conducted during mass CPR training session in Singapore. Study measured participant attitudes regarding the CPR training and their concerns and perceptions in performing CPR. Study found that 52% of survey respondents had witnessed a collapse, and only 8.5% had initiated CPR in those collapses. Respondents rated "lack of confidence" (39.5%) and "technique of CPR" (39.9%) as the greatest concerns in performing CPR.

Hamasu, S., et al. (2009). "Effects of BLS training on factors associated with attitude toward CPR in college students." Resuscitation **80**(3):359-64. Epub 2009 Jan 31.

Comments: Level 4, Fair. Supporting Evidence. This study utilized questionnaires before and after BLS training. Analysis of the questionnaires revealed likely reasons participants would not perform CPR prior to the training and an increase in willingness to perform CPR after the training.

Hauff, S. R., T. D. Rea, et al. (2003). "Factors impeding dispatcher-assisted telephone cardiopulmonary resuscitation." Ann Emerg Med **42**(6): 731-737.

Comments: Level 4. Fair. Opposing Evidence. This retrospective, non-random study examined factors that impede dispatcher-assisted telephone CPR. The reviewer extrapolated information from results that demonstrated reasons for bystander's unwillingness to perform CPR when assisted by 911 dispatchers. Reasons given by bystanders for their unwillingness to perform 911-dispatch assisted CPR were quite similar to reasons given by bystanders who were CPR-trained in the traditional classroom settings. This study revealed factors that decrease the willingness to perform 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.

Comments: Level 4, Fair. Opposing. This study did show 2.5 persons trained per each student with CPR kit; however the incidence of bystander CPR did not increase over the previous year before the CPR kits were distributed.

Jackson, R. E. and R. A. Swor (1997). "Who gets bystander cardiopulmonary resuscitation in a witnessed arrest?" Acad Emerg Med **4**(6): 540-4.

Comments: Level 4. Good. Neutral Evidence. The data obtained from this study in 1997 indicates that bystander CPR is more likely outside the home. Recent studies have shown this continues to be the case. This study is neutral as it doesn't provide opposing evidence to the study question; however it does suggest that interventions to increase CPR in the home may increase bystander performance of CPR.

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

Comments: *Level 4. Fair. Supporting Evidence. This survey research of attitudes toward performance of CPR, suggests that family/friend victims are a factor that increases this review outcome, in contrast with strangers which decreases outcome. Another important identified factor leading to an increase in outcomes, is frequency and/or recentness in CPR training. Lastly, a third factor increasing outcome is previous use of CPR skills. Those who had performed CPR previously were more likely to do so again. In contrast to some other studies, there was no difference in responses from urban and rural participants. In other studies, rural bystanders are more inclined to perform CPR than urban.*

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

Comments: *Level 4. Fair. Supporting Evidence. Survey research of large sample (n=4480). This study supported much of the findings in the Jelinek article, and reported additional factors that increase likelihood of performing CPR. Respondents most likely to perform bystander CPR were more likely male, had higher education, were under the age of 59, were employed, interestingly were smokers, and had recently received training in CPR.*

Kuramoto, N., T. Morimoto, et al. (2008). "Public perception of and willingness to perform bystander CPR in Japan." Resuscitation **79**(3): 475-481.

Comments: *Level 4. Fair. Supporting Evidence. This article is in press at this time, and was available only online, so no page number has been assigned at the time of this writing. This is a questionnaire survey that identified respondents' willingness to provide CPR. Factors that increased willingness to perform CPR included experience of CPR training. Awareness of an AED in a public place might call attention to CPR training, and develop a willingness to attempt CPR. The study showed that willingness to attempt CPR on a friend or family member, increased with increased education, and with friends and family who had cardiac disease.*

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.

Comments: *Level 4. F. Supporting Evidence. This descriptive study reviewed bystander willingness to perform CPR prior to and after the outbreak of severe acute respiratory syndrome (SARS). This data suggest compression-only CPR will increase bystander willingness to perform CPR.*

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.

Comments: *Level 4. Fair. Supporting Evidence. This is a survey study using a convenience sample from a University Hospital Heart Center mailing list. It is a relatively large sample including 80% laypersons and 20% health professionals. Sixty-two percent of the survey respondents had CPR training. The family/friend victim is again noted as a factor increasing willingness to perform CPR in 75% of the respondents. Respondents were more likely to perform chest compression only resuscitation.*

Mitchell, M.J., Stubbs B.A., Eisenberg, M.S. (2009). "Socioeconomic Status is Associated with Provision of Bystander Cardiopulmonary Resuscitation." Prehospital Emergency Care, Oct-Dec:**13**(4):478-86.

Comments: *Level 4, Good. Supporting Evidence. This retrospective cohort study of 2618 cardiac arrest victims suggests that socioeconomic status may be a factor in a bystander's willingness to perform CPR. This has been suggested in other studies.*

Nolan, R., E. Wilson, et al. (1999). "Readiness to perform cardiopulmonary resuscitation: an emerging strategy against sudden cardiac death." Psychosom Med. **61**(4): 546-51.

Comments: *Level 4. Fair. Supporting Evidence. A telephone survey of 786 individuals to examine motivational factors for performing CPR. The study revealed that greater motivation, greater confidence in abilities to perform CPR, increase willingness to perform CPR. This study supports a theory that appropriate, targeted training will increase willingness to perform CPR. The study measure attitudes and willingness to perform.*

Omi, W.; Taniguchi, T., et al. (2008) "The Attitudes of Japanese High School Students Toward Cardiopulmonary Resuscitation." Resuscitation Sep;**78**(3):340-5. Epub 2008 Jul 17.

Comments: *Level 4. Fair. Supporting Evidence. This questionnaire study of 3316 high school students revealed that only 27% of respondents were willing to perform chest compressions plus mouth-to-mouth ventilations; and 31% reported willingness to perform chest compressions alone. Most respondents who reported that they would not perform CPR stated poor knowledge, and/or fear of incomplete performance as deciding factors.*

Perkins, G. D., G. Walker, et al. (2006). "Teaching recognition of agonal breathing improves accuracy of diagnosing cardiac arrest." Resuscitation **70**(3): 432-7.

Comments: *Level 1. Fair. Supporting Evidence. This single blinded, randomized control trial was conducted to determine if knowledge and recognition of agonal respirations would increase incidences of bystander CPR. Though the sample groups are small, the findings demonstrated increased accuracy in checking for signs of circulation, with resultant increase in performance of CPR in cardiac arrest victims. The prevalence of agonal respirations in cardiac arrest is about 33%, suggesting significant increases in bystander CPR when bystander can identify these signs of cardiac arrest.*

Platz, E., M. D. Scheatzle, et al. (2000). "Attitudes towards CPR training and performance in family members of patients with heart disease." Resuscitation **47**(3): 273-80.

Comments: *Level 4. Fair. Neutral Evidence. Survey of 100 family members to determine willingness to perform CPR. The study measured attitudes rather than performance, and revealed that family members of cardiac patients were unwilling to maintain CPR skills. The main reason for unwillingness to perform CPR was fear of harming the patient or lack of knowledge and skill to help.*

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.

Comments: *Level 4, Fair. Neutral Evidence. This study is a mixed methodology, in which both quantitative and qualitative data were analyzed. The outcome studied was response to medical emergency, and not just CPR, though the scenarios appeared to be cardiac arrest in nature. The study did reveal interesting results.*

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

Comments: *Level 4. Fair. Supporting Evidence. Survey of 1355 citizens in Japan to measure willingness to perform bystander CPR. Of those who were unwilling to perform mouth-to-mouth resuscitation, most reported fear of not performing the skill correctly, rather than fear of infection. Respondents did indicate they were more willing to perform chest-compression only resuscitation, than mouth-to-mouth. This indicates that a factor to increase willingness to perform CPR is the option to provide chest compressions only.*

Skora, J. and B. Riegel (2001). "Thoughts, feelings, and motivations of bystanders who attempt to resuscitate a stranger: a pilot study." Am J Crit Care **Nov**(10(6)): 408-16.

Comments: Level 4. Fair. Neutral Evidence. Survey of small sample (n=12) of laypersons who had actually performed CPR. The study revealed feelings and attitudes the laypersons experienced after having performed CPR on arrest victims, extrapolated as factors that would increase the likelihood of performing CPR.

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.

Comments: Level 4. Good. Supporting Evidence. A survey of patients transported via the 911 system and the bystander's who initiated the 911 call. The study looks at the cardiac arrest event outcomes for those patients who arrested in public places versus those who arrested at home. The researchers discovered that that the bystanders in private homes are less likely to be trained and less likely to perform CPR than those in public places. . Bystanders in public locations were younger, more often trained in CPR and more frequently trained within 5 years of the event. For the subgroup that received training within 5 years, those in a public location more often initiated CPR. As other studies have suggested, recentness and frequency of training seems to be a positive factor in performance of CPR.

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

Comments: Level 4. Fair. Neutral Evidence. This is a study of targeted CPR training. Evidence indicates that bystander CPR is less likely to occur in the home, where more cardiac arrests occur. Though the conclusions of the study are that to meet the needs of the community, mass training of significant numbers of bystanders would have to be conducted, which may not be beneficial; there still remains the finding that increased bystander CPR in the home could be a target of CPR training.

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.

Comments: Level 4. Good. Supporting evidence. This excellent, prospective, observational study, spanning 5 years, gathered a great deal of data regarding willingness to perform CPR. These data add to the body of data indicating that frequency and recentness of CPR training are factors in bystander willingness to perform CPR.

Taniguchi, Takumi, Wataru Omi, Hideo Inaba, Attitudes toward the performance of bystander cardiopulmonary resuscitation in Japan , 11 April 2007, Resuscitation October 2007 (Vol. 75, Issue 1, Pages 82-87)

Comments: Level 4. Fair. Supporting Evidence. This survey study of bystander attitudes toward CPR suggests that chest compression only CPR may be a factor that increases bystander CPR.

Vadeboncoeur, T. F., P. B. Richman, et al. (2008). "Bystander cardiopulmonary resuscitation for out-of-hospital cardiac arrest in the Hispanic vs the non-Hispanic populations." Am J Emerg Med **26**(6): 655-60.

Comments: Level 5. Fair. Neutral Evidence. This study revealed that bystander CPR was less likely to occur in Hispanics in a specified region. Reasons for this disparity of bystander are not indicated.

Vaillancourt, C., I. G. Stiell, et al. (2008). "Understanding and improving low bystander CPR rates: a systematic review of the literature." CJEM **10**(1): 51-65.

Comment: Level 4. Good. Supporting Evidence. This study is an exhaustive literature review. However, because of the differences in study designs of the articles reviewed, the authors indicate it is not a meta-analysis. This study targets the question that this reviewer's worksheet is asking. Most of the articles reviewed by this reviewer, were included in the extensive review of Vaillancourt et al.

Vaillancourt, C., A. Lui, et al. (2008). "Socioeconomic status influences bystander CPR and survival rates for out-of-hospital cardiac arrest victims." Resuscitation.

Comments: Level 4. Fair. Neutral Evidence. This study suggested that higher socioeconomic households had higher levels of bystander CPR; however, had lower levels of survival than lower socioeconomic households. Multiple variables were considered, e.g., higher economic status may mean great access to CPR training. Researches did find that the higher the economic level, the greater the age of the cardiac arrest victims. This then could explain that the bystander CPR was provided by the partner, possible also of advanced age.