

Part 8: Interdisciplinary Topics

The Interdisciplinary Task Force discussed topics that applied to several task forces and in particular focused on questions about educational methods, ethics, and outcomes. Some of these topics are discussed in other sections of this document (eg, the topic of medical emergency teams is discussed in Part 4: “Advanced Life Support”).

To maintain consistency with the science statements in other sections, studies using manikins were recorded as LOE 6, irrespective of the study design.

Educational Methods

Acquisition and retention of skills are poor after conventional CPR training.¹ Evidence for and against several resuscitation training methods was reviewed, highlighting the need for further research.

Devices

CPR Prompt Devices^{W190A,W190B}

Consensus on Science

Twenty-seven randomized studies using models from the motor skills literature (LOE 6)^{2–28} and one randomized study using manikins (LOE 6)²⁹ showed that the use of audio or visual prompts during motor skills acquisition training improved student skills performance during or immediately after training. These studies and supporting theory from 2 studies (LOE 7)^{30,31} indicate that the overuse of guiding prompts during training reduced skills retention in the long term.

Treatment Recommendation

Audio and visual prompts and other forms of directive or corrective feedback that guide action sequences and timing of chest compressions and ventilations may help early learning of CPR skills. Training must include ample practice time without prompting devices to optimize skills retention for situations in which prompting devices are not available.

Instructional Methods

Effective AED Instructional Methods^{W191A,W191B}

Consensus on Science

Seven studies (LOE 4)^{32–35}; LOE 5^{36,37}; LOE 7³⁸ showed improved rates of survival from out-of-hospital cardiac arrest when CPR plus automated external defibrillation training (traditional 4-hour course) was made widely available to lay first responders. The prospective randomized trial of lay rescuer automated external defibrillation programs did not

specifically evaluate the training provided, but sites where rescuers were trained and equipped to provide CPR or CPR plus automated external defibrillator (AED) use showed higher survival rates compared with national reports (LOE 7).³⁸

Twenty studies (LOE 5³⁹; LOE 6^{40–58}) document consistent improvement in simulated AED use and skills retention using diverse training methods and durations. Three studies (LOE 6)^{59–61} show that within a simulated arrest scenario the correct and appropriate use of an AED depends on the AED user interface.

Treatment Recommendation

Community lay responder AED training is recommended. There is insufficient evidence to recommend a specific instructional method for AED training. AED manufacturers should increase the ease of AED user interface to improve efficacy.

Effective BLS Instructional Methods^{W185A,W185B,W192}

Consensus on Science

Nineteen randomized manikin studies (LOE 6)^{48,62–79} and one extrapolated study (LOE 7)⁸⁰ showed considerable variability in BLS skills acquisition and retention with the use of different instructional formats (video instruction, computer-assisted instruction, and traditional instruction). Four randomized studies using manikins (LOE 6)^{66–69} indicated that one video instruction program (a self-instructional synchronous “watch-while-you-practice” program) achieved better skills acquisition and retention than other educational formats. One randomized study of adult learners using manikins showed that a brief video self-instruction program produced CPR skills performance equivalent to or better than traditional training (LOE 6).⁸¹

Treatment Recommendation

Instruction methods should not be limited to traditional techniques; newer training methods (eg, “watch-while-you-practice” video programs) may be more effective. Training programs should be evaluated to verify that they enable effective skills acquisition and retention.

Instructional Methods for Hand Position in Chest Compressions^{W189}

Consensus on Science

Six randomized controlled trials (RCTs) using manikins (LOE 6)^{67,69,82–85} evaluated hand positioning in detail. One

From the 2005 International Consensus Conference on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations, hosted by the American Heart Association in Dallas, Texas, January 23–30, 2005.

This article has been copublished in *Resuscitation*.

(*Circulation*. 2005;112:III-100-III-108.)

© 2005 International Liaison Committee on Resuscitation, American Heart Association, and European Resuscitation Council.

This special supplement to *Circulation* is freely available at <http://www.circulationaha.org> DOI: 10.1161/CIRCULATIONAHA.105.166478

trial⁸² compared a simplified message (“place hands in the center of the chest”) versus the standard method (anatomical landmarks) for teaching correct hand placement. Three of the 6 trials^{83–85} compared a staged teaching approach with standard teaching. Two of the trials^{67,69} compared the results of video self-instruction with standard teaching on CPR performance. The likelihood of achieving an acceptable hand position was no different between those who had received detailed instruction on anatomical landmarks and those who were instructed to simply compress the center of the chest.

In 4 manikin RCTs (LOE 6)^{82–85} the use of anatomical landmarks to determine hand placement delayed delivery of the first chest compression after a ventilation; thus, fewer compressions were delivered per minute. Incorrect rescuer hand placement can injure the victim (LOE 6).^{86,87}

Treatment Recommendation

Teaching hand placement for chest compression should be simplified with less attention to anatomical landmarks and emphasis on the importance of minimizing interruption to chest compressions and performing an adequate number of chest compressions per minute.

Retraining Intervals

Retraining Intervals in Advanced and Basic Life Support ^{W186A,W86}

Consensus on Science

One prospective cohort study (LOE 3),⁸⁸ 1 survey (LOE 5),⁸⁹ and 10 manikin studies (LOE 6),^{90–99} documented decay in healthcare provider ALS skills and knowledge after ALS training and retraining from as little as 6 weeks to 2 years. Refresher courses based only on knowledge did not prevent the decay in psychomotor skills.

A single randomized manikin study (LOE 6)¹⁰⁰ concluded that retraining at either 3- or 6-month intervals resulted in similar BLS performance at 12 months and providers who were retrained performed significantly better than controls with no retraining.

Treatment Recommendation

Frequent retraining (theory and practice) is required to maintain both BLS and ALS skills. The optimal interval for retraining has *not* been established.

Media Campaigns

Media Campaigns Targeting Chest Pain ^{W193A,W193B}

Consensus on Science

One large RCT (LOE 1),¹⁰¹ a Cochrane systematic review (LOE 1),¹⁰² and 4 additional studies (LOE 3^{103,104}; LOE 4^{105,106}) evaluating the impact of mass media campaigns indicate that they do not reduce the delay to presentation at the hospital following onset of chest pain. Conversely 7 studies (LOE 3)^{107–113} did report reduced delay in the patient’s response to chest pain.

The evidence that mass media campaigns reduce patient delay from the onset of symptoms to presentation at hospital is equivocal and suggests that the impact of such campaigns,

particularly on prehospital delay times, may be greater for populations in which the baseline delay time is long.

There is evidence that mass media campaigns can increase the use of ambulance transport (LOE 1)¹⁰¹ in patients with symptoms that suggest myocardial ischemia. In several studies (LOE 1¹⁰²; LOE 3^{107,110,114}; LOE 4¹⁰⁵) the number of patients presenting to the emergency department increased in the early stages of the media campaign but soon returned to baseline.

The impact of mass media campaigns on rates of mortality from ischemic heart disease remains inconclusive (LOE 3)¹⁰⁹; however, the inference is that by reducing prehospital delay time, the mortality rate should decrease.

Treatment Recommendation

Given that the data is inconsistent, mass media campaigns should not be considered the only option for reducing patient delay but rather part of an overall system approach to reduce the interval from onset of symptoms of chest pain to hospital presentation.

Educational Evaluation

Although there is considerable literature on the evaluation of educational processes in general, there are few studies of resuscitation education.

Attitude Toward Performing CPR

Barriers to Performing CPR ^{W184A,W184B}

Consensus on Science

One RCT (LOE 2),¹¹⁵ 1 prospective controlled cohort study (LOE 3),¹¹⁶ 2 cohort and case studies (LOE 4),^{117,118} supported by 27 cohort and case studies (LOE 5^{119–138}; LOE 7^{139–145}) indicate hesitancy or unwillingness to perform CPR, particularly mouth-to-mouth ventilation, on adult patients in and out of hospital, even after CPR training.

Reasons for the hesitancy or unwillingness to perform CPR include, but are not limited to, fear of contracting a disease while performing mouth-to-mouth ventilations, fear of performing the skills incorrectly, and fear of hurting the patient.

Treatment Recommendation

CPR training programs should include discussion of the minimal risk of contracting infectious diseases while performing mouth-to-mouth ventilation. “Chest compression only” resuscitation may be considered when there is a reluctance to perform mouth-to-mouth ventilation (see Part 2: “Adult Basic Life Support”).

Written Test Scores and Skills Competence ^{W188A,W188B}

Consensus on Science

Do written test scores correlate with competence in CPR skills? None of the studies reviewed was designed specifically to answer this question. In 14 of 17 studies test scores correlated with CPR proficiency. Of the 7 studies with good written test scores (LOE 6 manikin studies), 4 studies were associated with good CPR skills^{146–149} and 3 studies with poor CPR skills.^{150–152} In 2 manikin studies (LOE 6)^{68,153} mediocre written test scores correlated with mediocre or borderline CPR performance. In 6 manikin studies (LOE

6),^{72,147,153–156} poor written test performance was associated with poor CPR capability. In 5 manikin studies (LOE 6),^{150–152,157,158} written test scores did not correlate with CPR proficiency.

Treatment Recommendation

A written test score does not always reflect BLS skills competence. Therefore, a written test or questionnaire should not be used as the sole determinant of a person's acquisition of the skills needed to perform CPR.

Ethics

The ethical issues surrounding resuscitation are dependent on local culture and law. Consideration of the patient's wishes, the family's desires, cultural issues, and local laws makes specific recommendations about ethical decisions generally inappropriate.

Impact of DNAR on Resuscitation^{W179A,W179B,W179C}

Consensus on Science

The emergency medical services (EMS) system is activated for many patients in cardiac arrest who are chronically ill, have a terminal illness, or have do-not-attempt-resuscitation (DNAR) orders (LOE 4).^{159–161} Studies from the United States and Australia indicate that Caucasians and better-educated persons are more likely to have advance directives (LOE 4)^{162–165}; (LOE 7)^{166–168}). There is evidence that out-of-hospital healthcare providers can interpret and use DNAR orders and other documents to limit treatment (LOE 3)^{169,170}; (LOE 4)¹⁷¹; (LOE 7)¹⁷²).

The most studied DNAR form is the Physician Orders for Life-Sustaining Treatment (POLST) form.^{170,171,173–175}

Treatment Recommendation

We recommend the use of standardized out-of-hospital physician orders for patients who are chronically ill or have a terminal illness. These must be easily understood by EMS personnel. Additional instructions should indicate whether EMS personnel are to initiate or continue life-sustaining interventions for patients in cardiac arrest and those in near-arrest. Because laws governing the use of DNAR forms and advance directives vary by jurisdiction, providers should be aware of local laws and regulations.¹⁷⁶

Family Member Presence During CPR^{W180A,W180B}

Consensus on Science

No studies evaluated the effect of the presence of parents during resuscitation of children. Studies on parents' opinions indicate their preference to be at the side of the child who is dying (LOE 5),¹⁷⁷ during CPR (LOE 5),¹⁷⁷ or during procedures (LOE 7).^{177–184} However, 5 studies (LOE 3)^{185–189} found that staff members were reluctant to allow parents to be present during resuscitation.

Most relatives of adult patients requiring CPR state that they would like to be offered the option of being present in the resuscitation room (LOE 5).^{190–194} A survey of adult patients indicated that many, but not all, would prefer to have certain family members present (LOE 5).¹⁹⁵ Family presence during resuscitation did not impact on self-reported stress among staff (LOE 3),¹⁹⁶ nor was it disruptive for staff (LOE

5).^{191,194} Family members considered their presence to be beneficial (LOE 5)^{191,193,194,197} and their adjustment to the death of the patient made easier by their presence during the resuscitation attempt (LOE 2)¹⁹⁸; (LOE 5)^{191,197}).

There are no data to support or refute the importance of having a dedicated staff member available to support family members during resuscitation for either adults or children, but this practice is well described (LOE 2)¹⁹⁸; (LOE 5)¹⁹¹).

Treatment Recommendation

There is no data indicating that the presence of relatives in the resuscitation room is harmful. Therefore, it is reasonable to give select family members the opportunity to be present during resuscitation unless the adult patient has raised a prior objection.

Outcomes and Cost-Effectiveness

Research about the "quality of life" for survivors of cardiac arrest is plagued by the lack of a consistent definition of quality of life and how best to measure it. Nonetheless, the increasing demand for limited healthcare resources makes it important to measure the effectiveness of CPR in terms of quality of survival and not just the number of survivors.

Outcomes

Quality of Life Outcomes After CPR^{W182A,W182B}

Consensus on Science

In 6 nonrandomized prospective cohort studies (LOE 3)^{144,199–203} and 20 additional studies (LOE 4)^{204–210}; (LOE 5)^{211–223}) of long-term survivors of in- and out-of-hospital cardiac arrest, the quality of life among the majority of adult survivors is similar to that of the general population. Cognitive deficits in survivors, such as memory loss and depression, are common. In 2 studies (LOE 4)^{224,225} neurologic outcomes were poor after cardiac arrest in children. Two studies indicate that the quality of life may not be as good in some cohorts, such as long-term care patients (LOE 5).^{226,227}

Treatment Recommendation

The quality of life for most adult survivors of cardiac arrest and CPR is good. There are few reports about longer-term quality of life in children. For more information about prognosis in adults, children, and neonates, see Part 2: "Adult Basic Life Support," Part 6: "Pediatric Basic and Advanced Life Support," and Part 7: "Neonatal Resuscitation."

Cost-Effectiveness

Cost-Effectiveness in CPR Training Programs^{W183}

Consensus on Science

In the single study (LOE 3)¹⁴⁸ that considers the cost-effectiveness of CPR training programs, traditional CPR training in an unselected population of laypeople is expensive compared with accepted cost-effectiveness thresholds. Conversely, selective training of laypeople at high risk of witnessing a cardiac arrest (ie, persons living in households with a recent survivor of myocardial infarction) is much more cost-effective.

Treatment Recommendation

It is reasonable for CPR programs to emphasize the enrollment of laypeople with the highest probability of encountering a victim of cardiac arrest. Other potentially more cost-effective methods of training should be considered (see previous sections).

References

- Chamberlain DA, Hazinski MF. Education in resuscitation: an ILCOR symposium: Utstein Abbey: Stavanger, Norway: June 22–24, 2001. *Circulation*. 2003;108:2575–2594.
- Goodwin AP. Cardiopulmonary resuscitation training revisited. *J R Soc Med*. 1992;85:452–453.
- Guadagnoli MA, Kohl RM. Knowledge of results for motor learning: relationship between error estimation and knowledge of results frequency. *J Mot Behav*. 2001;33:217–224.
- Pringle RK. Guidance hypothesis with verbal feedback in learning a palpation skill. *J Manipulative Physiol Ther*. 2004;27:36–42.
- Schmidt RA, Young DE, Swinnen S, Shapiro DC. Summary knowledge of results for skill acquisition: support for the guidance hypothesis. *J Exp Psychol*. 1989;15:352–359.
- Swinnen S. Interpolated activities during the knowledge-of-results delay and post-knowledge-of-results interval: effects on performance and learning. *J Exp Psychol*. 1990;16:692–705.
- Winstein CJ, Schmidt RA. Reduced frequency of knowledge of results enhances motor skill learning. *J Exp Psychol*. 1990;16:677–691.
- Wrisberg CA, Wulf G. Diminishing the effects of reduced frequency of knowledge of results on generalized motor program learning. *J Mot Behav*. 1997;29:17–26.
- Wulf G, Lee TD, Schmidt RA. Reducing knowledge of results about relative versus absolute timing: differential effects on learning. *J Mot Behav*. 1994;26:362–369.
- Wulf G, Schmidt RA. The learning of generalized motor programs: reducing the relative frequency of knowledge of results enhances memory. *J Exp Psychol*. 1989;15:748–757.
- Anderson DI, Magill RA, Sekiya H. A reconsideration of the trials-delay of knowledge of results paradigm in motor skill learning. *Res Q Exerc Sport*. 1994;65:286–290.
- Anderson DI, Magill RA, Sekiya H. Motor learning as a function of KR schedule and characteristics of task-intrinsic feedback. *J Mot Behav*. 2001;33:59–66.
- Butki BD, Hoffman SJ. Effects of reducing frequency of intrinsic knowledge of results on the learning of a motor skill. *Percept Mot Skills*. 2003;97:569–580.
- Croce R, Horvat M, Roswal G. Augmented feedback for enhanced skill acquisition in individuals with traumatic brain injury. *Percept Mot Skills*. 1996;82:507–514.
- Gable CD, Shea CH, Wright DL. Summary knowledge of results. *Res Q Exerc Sport*. 1991;62:285–292.
- Gillespie M. Summary versus every-trial knowledge of results for individuals with intellectual disabilities. *Adapted Physical Activity Quarterly*. 2003;20:46–56.
- Goodwin JE, Eckerson JM, Voll CA Jr. Testing specificity and guidance hypotheses by manipulating relative frequency of KR scheduling in motor skill acquisition. *Percept Mot Skills*. 2001;93:819–824.
- Guadagnoli MA, Leis B, Van Gemmert AW, Stelmach GE. The relationship between knowledge of results and motor learning in Parkinsonian patients. *Parkinsonism Relat Disord*. 2002;9:89–95.
- Guay M, Salmoni A, Lajoie Y. Summary knowledge of results and task processing load. *Res Q Exerc Sport*. 1997;68:167–171.
- Kohl RM, Guadagnoli MA. The scheduling of knowledge of results. *J Mot Behav*. 1996;28:233–240.
- Lee TD, White MA, Carnahan H. On the role of knowledge of results in motor learning: exploring the guidance hypothesis. *J Mot Behav*. 1990;22:191–208.
- Liu J, Wrisberg CA. The effect of knowledge of results delay and the subjective estimation of movement form on the acquisition and retention of a motor skill. *Res Q Exerc Sport*. 1997;68:145–151.
- Park JH, Shea CH, Wright DL. Reduced-frequency concurrent and terminal feedback: a test of the guidance hypothesis. *J Mot Behav*. 2000;32:287–296.
- Schmidt RA, Wulf G. Continuous concurrent feedback degrades skill learning: implications for training and simulation. *Hum Factors*. 1997;39:509–525.
- Weeks DL, Kordus RN. Relative frequency of knowledge of performance and motor skill learning. *Res Q Exerc Sport*. 1998;69:224–230.
- Wulf G, Schmidt RA, Deubel H. Reduced feedback frequency enhances generalized motor program learning but not parameterization learning. *J Exp Psychol*. 1993;19:1134–1150.
- Yao WX. Average-KR schedule benefits generalized motor program learning. *Percept Mot Skills*. 2003;97:185–191.
- Shewokis PA, Kennedy CZ, Marsh JL. Effects of bandwidth knowledge of results on the performance and learning of a shoulder internal rotation isokinetic strength task. *Isokinet Exerc Sci*. 2000;8:129–139.
- Wik L, Thowson J, Steen PA. An automated voice advisory manikin system for training in basic life support without an instructor: a novel approach to CPR training. *Resuscitation*. 2001;50:167–172.
- Salmoni AW, Schmidt RA, Walter CB. Knowledge of results and motor learning: a review and critical reappraisal. *Psychol Bull*. 1984;95:355–386.
- Winstein CJ. Knowledge of results and motor learning—implications for physical therapy. *Phys Ther*. 1991;71:140–149.
- Lerner EB, Hinchey PR, Billittier IV AJ. A survey of first-responder firefighters' attitudes, opinions, and concerns about their automated external defibrillator program. *Prehosp Emerg Care*. 2003;7:120–124.
- Bertrand C, Rodriguez Redington P, Lecarpentier E, Bellaiche G, Michel D, Teiger E, Morris W, Le Bourgeois JP, Barthout M. Preliminary report on AED deployment on the entire Air France commercial fleet: a joint venture with Paris XII University Training Programme. *Resuscitation*. 2004;63:175–181.
- Chadda KD, Kammerer R. Early experiences with the portable automatic external defibrillator in the home and public places. *Am J Cardiol*. 1987;60:732–733.
- Mosesso VN, Jr, Davis EA, Auble TE, Paris PM, Yealy DM. Use of automated external defibrillators by police officers for treatment of out-of-hospital cardiac arrest. *Ann Emerg Med*. 1998;32:200–207.
- Valenzuela TD, Roe DJ, Nichol G, Clark LL, Spate DW, Hardman RG. Outcomes of rapid defibrillation by security officers after cardiac arrest in casinos. *N Engl J Med*. 2000;343:1206–1209.
- Destro A, Marzaloni M, Sermasi S, Rossi F. Automatic external defibrillators in the hospital as well? *Resuscitation*. 1996;31:39–43.
- The Public Access Defibrillation Trial Investigators. Public-access defibrillation and survival after out-of-hospital cardiac arrest. *N Engl J Med*. 2004;351:637–646.
- Walters G, D'Auria D, Glucksman E. Automated external defibrillators: implications for training qualified ambulance staff. *Ann Emerg Med*. 1992;21:692–697.
- Cummins RO, Schubach JA, Litwin PE, Hearne TR. Training lay persons to use automatic external defibrillators: success of initial training and one-year retention of skills. *Am J Emerg Med*. 1989;7:143–149.
- Gundry JW, Comess KA, DeRook FA, Jorgenson D, Bardy GH. Comparison of naive sixth-grade children with trained professionals in the use of an automated external defibrillator. *Circulation*. 1999;100:1703–1707.
- Kaye W, Mancini ME, Giuliano KK, Richards N, Nagid DM, Marler CA, Sawyer-Silva S. Strengthening the in-hospital chain of survival with rapid defibrillation by first responders using automated external defibrillators: training and retention issues. *Ann Emerg Med*. 1995;25:163–168.
- Kooij FO, van Alem AP, Koster RW, de Vos R. Training of police officers as first responders with an automated external defibrillator. *Resuscitation*. 2004;63:33–41.
- Lawson L, March J. Automated external defibrillation by very young, untrained children. *Prehosp Emerg Care*. 2002;6:295–298.
- Mattei LC, McKay U, Lepper MW, Soar J. Do nurses and physiotherapists require training to use an automated external defibrillator? *Resuscitation*. 2002;53:277–280.
- McDaniel CM, Berry VA, Haines DE, DiMarco JP. Automatic external defibrillation of patients after myocardial infarction by family members: practical aspects and psychological impact of training. *Pacing Clin Electrophysiol*. 1988;11:2029–2034.
- McKee DR, Wynne G, Evans TR. Student nurses can defibrillate within 90 seconds: an evaluation of a training programme for third year student

- nurses in the use of an automatic external defibrillator. *Resuscitation*. 1994;27:35–37.
48. Meischke HW, Rea T, Eisenberg MS, Schaeffer SM, Kudenchuk P. Training seniors in the operation of an automated external defibrillator: a randomized trial comparing two training methods. *Ann Emerg Med*. 2001;38:216–222.
 49. Moore JE, Eisenberg MS, Cummins RO, Hallstrom A, Litwin P, Carter W. Lay person use of automatic external defibrillation. *Ann Emerg Med*. 1987;16:669–672.
 50. Roccia WD, Modic PE, Cuddy MA. Automated external defibrillator use among the general population. *J Dent Educ*. 2003;67:1355–1361.
 51. Sandroni C, Fenici P, Franchi ML, Cavallaro F, Menchinelli C, Antonelli M. Automated external defibrillation by untrained deaf lay rescuers. *Resuscitation*. 2004;63:43–48.
 52. Ten Eyck RP. Automated external defibrillator training and skills maintenance in Air Force emergency medical services systems. *Mil Med*. 1993;158:579–581.
 53. Usatch BR, Cone DC. Automated external defibrillator training and skill retention at a ski patrol. *Prehosp Emerg Care*. 2002;6:325–329.
 54. Warwick JP, Mackie K, Spencer I. Towards early defibrillation—a nurse training programme in the use of automated external defibrillators. *Resuscitation*. 1995;30:231–235.
 55. Wik L, Dorph E, Auestad B, Steen PA. Evaluation of a defibrillator-basic cardiopulmonary resuscitation programme for non medical personnel. *Resuscitation*. 2003;56:167–172.
 56. Woollard M, Whitfield R, Smith A, Colquhoun M, Newcombe RG, Vetteer N, Chamberlain D. Skill acquisition and retention in automated external defibrillator (AED) use and CPR by lay responders: a prospective study. *Resuscitation*. 2004;60:17–28.
 57. Zeitz CJ, Zeitz KM, Ward G, Inglis A. The acquisition and maintenance of defibrillation skills by lay first responders. *Resuscitation*. 2003;56:77–82.
 58. Walters G, Glucksman E, Evans TR. Training St John Ambulance volunteers to use an automated external defibrillator. *Resuscitation*. 1994;27:39–45.
 59. Andre AD, Jorgenson DB, Froman JA, Snyder DE, Poole JE. Automated external defibrillator use by untrained bystanders: can the public-use model work? *Prehosp Emerg Care*. 2004;8:284–291.
 60. Eames P, Larsen PD, Galletly DC. Comparison of ease of use of three automated external defibrillators by untrained lay people. *Resuscitation*. 2003;58:25–30.
 61. Fleischhackl R, Losert H, Haugk M, Eisenburger P, Sterz F, Laggner AN, Herkner H. Differing operational outcomes with six commercially available automated external defibrillators. *Resuscitation*. 2004;62:167–174.
 62. Dracup K, Moser DK, Doering LV, Guzy PM. Comparison of cardiopulmonary resuscitation training methods for parents of infants at high risk for cardiopulmonary arrest. *Ann Emerg Med*. 1998;32:170–177.
 63. Fabius DB, Grissom EL, Fuentes A. Recertification in cardiopulmonary resuscitation: a comparison of two teaching methods. *J Nurs Staff Dev*. 1994;10:262–268.
 64. Messmer P, Meehan R, Gilliam N, White S, Donaldson P. Teaching infant CPR to mothers of cocaine-positive infants. *J Contin Educ Nurs*. 1993;24:217–220.
 65. Plank CH, Steinke KR. Effect of two teaching methods on CPR retention. *J Nurs Staff Dev*. 1989;5:145–147.
 66. Braslow A, Brennan RT, Newman MM, Bircher NG, Batcheller AM, Kaye W. CPR training without an instructor: development and evaluation of a video self-instructional system for effective performance of cardiopulmonary resuscitation. *Resuscitation*. 1997;34:207–220.
 67. Todd KH, Braslow A, Brennan RT, Lowery DW, Cox RJ, Lipscomb LE, Kellermann AL. Randomized, controlled trial of video self-instruction versus traditional CPR training. *Ann Emerg Med*. 1998;31:364–369.
 68. Todd KH, Heron SL, Thompson M, Dennis R, O'Connor J, Kellermann AL. Simple CPR: a randomized, controlled trial of video self-instructional cardiopulmonary resuscitation training in an African American church congregation. *Ann Emerg Med*. 1999;34:730–737.
 69. Batcheller AM, Brennan RT, Braslow A, Urrutia A, Kaye W. Cardiopulmonary resuscitation performance of subjects over forty is better following half-hour video self-instruction compared to traditional four-hour classroom training. *Resuscitation*. 2000;43:101–110.
 70. Edwards MJ, Hannah KJ. An examination of the use of interactive videodisc cardiopulmonary resuscitation instruction for the lay community. *Comput Nurs*. 1985;3:250–252.
 71. Nelson M, Brown CG. CPR instruction: modular versus lecture course. *Ann Emerg Med*. 1984;13:118–121.
 72. Kaczorowski J, Levitt C, Hammond M, Outerbridge E, Grad R, Rothman A, Graves L. Retention of neonatal resuscitation skills and knowledge: a randomized controlled trial. *Fam Med*. 1998;30:705–711.
 73. Liberman M, Golberg N, Mulder D, Sampalis J. Teaching cardiopulmonary resuscitation to CEGEP students in Quebec—a pilot project. *Resuscitation*. 2000;47:249–257.
 74. Friesen L, Stotts NA. Retention of Basic Cardiac Life Support content: the effect of two teaching methods. *J Nurs Educ*. 1984;23:184–191.
 75. Jerin JM, Ansell BA, Larsen MP, Cummins RO. Automated external defibrillators: skill maintenance using computer-assisted learning. *Acad Emerg Med*. 1998;5:709–717.
 76. Long CA. Teaching parents infant CPR—lecture or audiovisual tape? *MCN Am J Matern Child Nurs*. 1992;17:30–32.
 77. Clark LJ, Watson J, Cobbe SM, Reeve W, Swann IJ, Macfarlane PW. CPR '98: a practical multimedia computer-based guide to cardiopulmonary resuscitation for medical students. *Resuscitation*. 2000;44:109–117.
 78. Done ML, Parr M. Teaching basic life support skills using self-directed learning, a self-instructional video, access to practice manikins and learning in pairs. *Resuscitation*. 2002;52:287–291.
 79. Umlauf MG. How to provide around-the-clock CPR certification without losing any sleep. *J Contin Educ Nurs*. 1990;21:248–251.
 80. Dracup K, Moser DK, Doering LV, Guzy PM, Juarbe T. A controlled trial of cardiopulmonary resuscitation training for ethnically diverse parents of infants at high risk for cardiopulmonary arrest. *Crit Care Med*. 2000;28:3289–3295.
 81. Lynch B, Einspruch E, Nichol G, Becker L, Aufderheide T, Idris A. Effectiveness of a 30-min CPR self-instruction program for lay responders: a controlled randomized study. *Resuscitation*. 2005;67:31–43.
 82. Handley AJ. Teaching hand placement for chest compression—a simpler technique. *Resuscitation*. 2002;53:29–36.
 83. Assar D, Chamberlain D, Colquhoun M, Donnelly P, Handley AJ, Leaves S, Kern KB. Randomised controlled trials of staged teaching for basic life support, 1: skill acquisition at bronze stage. *Resuscitation*. 2000;45:7–15.
 84. Chamberlain D, Smith A, Colquhoun M, Handley AJ, Kern KB, Woollard M. Randomised controlled trials of staged teaching for basic life support, 2: comparison of CPR performance and skill retention using either staged instruction or conventional training. *Resuscitation*. 2001;50:27–37.
 85. Smith A, Colquhoun M, Woollard M, Handley AJ, Kern KB, Chamberlain D. Trials of teaching methods in basic life support (4): comparison of simulated CPR performance at unannounced home testing after conventional or staged training. *Resuscitation*. 2004;61:41–47.
 86. Clements F, McGowan J. Finger position for chest compressions in cardiac arrest in infants. *Resuscitation*. 2000;44:43–46.
 87. Reynolds PE, Turner MM. Relative merits of ARC guidelines for ECC. *Resuscitation*. 2003;57:187–191.
 88. Makker R, Gray-Siracusa K, Evers M. Evaluation of advanced cardiac life support in a community teaching hospital by use of actual cardiac arrests. *Heart Lung*. 1995;24:116–120.
 89. Anthonypillai F. Retention of advanced cardiopulmonary resuscitation knowledge by intensive care trained nurses. *Intensive Crit Care Nurs*. 1992;8:180–184.
 90. Azcona LA, Gutierrez GE, Fernandez CJ, Natera OM, Ruiz-Speare O, Ali J. Attrition of advanced trauma life support (ATLS) skills among ATLS instructors and providers in Mexico. *J Am Coll Surg*. 2002;195:372–377.
 91. Birnbaum ML, Robinson NE, Kuska BM, Stone HL, Fryback DG, Rose JH. Effect of advanced cardiac life-support training in rural, community hospitals. *Crit Care Med*. 1994;22:741–749.
 92. Hammond F, Saba M, Simes T, Cross R. Advanced life support: retention of registered nurses' knowledge 18 months after initial training. *Aust Crit Care*. 2000;13:99–104.
 93. Kaye W, Mancini ME, Rallis SF. Advanced cardiac life support refresher course using standardized objective-based Mega Code testing. *Crit Care Med*. 1987;15:55–60.
 94. Kaye W, Wynne G, Marteau T, Dubin HG, Rallis SF, Simons RS, Evans TR. An advanced resuscitation training course for preregistration house officers. *J R Coll Physicians Lond*. 1990;24:51–54.

95. O'Steen DS, Kee CC, Minick MP. The retention of advanced cardiac life support knowledge among registered nurses. *J Nurs Staff Dev*. 1996;12:66-72.
96. Schwid HA, O'Donnell D. Anesthesiologists' management of simulated critical incidents. *Anesthesiology*. 1992;76:495-501.
97. Young R, King L. An evaluation of knowledge and skill retention following an in-house advanced life support course. *Nurs Crit Care*. 2000;5:7-14.
98. Stross JK. Maintaining competency in advanced cardiac life support skills. *JAMA*. 1983;249:3339-3341.
99. Su E, Schmidt TA, Mann NC, Zechnich AD. A randomized controlled trial to assess decay in acquired knowledge among paramedics completing a pediatric resuscitation course. *Acad Emerg Med*. 2000;7:779-786.
100. Berden HJ, Willems FF, Hendrick JM, Pijls NH, Knape JT. How frequently should basic cardiopulmonary resuscitation training be repeated to maintain adequate skills? *BMJ*. 1993;306:1576-1577.
101. Luepker RV, Raczynski JM, Osganian S, Goldberg RJ, Finnegan JR Jr, Hedges JR, Goff DC Jr, Eisenberg MS, Zapka JG, Feldman HA, Labarthe DR, McGovern PG, Cornell CE, Proschan MA, Simons-Morton DG. Effect of a community intervention on patient delay and emergency medical service use in acute coronary heart disease: the Rapid Early Action for Coronary Treatment (REACT) Trial. *JAMA*. 2000;284:60-67.
102. Grilli R, Ramsay C, Minozzi S. Mass media interventions: effects on health services utilisation. *Cochrane Database Syst Rev*. 2001;CD000389.
103. Ho MT, Eisenberg MS, Litwin PE, Schaeffer SM, Damon SK. Delay between onset of chest pain and seeking medical care: the effect of public education. *Ann Emerg Med*. 1989;18:727-731.
104. Bett N, Aroney G, Thompson P. Impact of a national educational campaign to reduce patient delay in possible heart attack. *Aust N Z J Med*. 1993;23:157-161.
105. Wright RS, Kopecky SL, Timm M, Pflaum DD, Carr C, Evers K, Bell J. Impact of community-based education on health care evaluation in patients with acute chest pain syndromes: the Wabasha Heart Attack Team (WHAT) project. *Fam Pract*. 2001;18:537-539.
106. Moses HW, Engelking N, Taylor GJ, Prabhakar C, Vallala M, Colliver JA, Silberman H, Schneider JA. Effect of a two-year public education campaign on reducing response time of patients with symptoms of acute myocardial infarction. *Am J Cardiol*. 1991;68:249-251.
107. Herlitz J, Hartford M, Karlson BV, Risenfors M, Blohm M, Luepker RV, Wennerblom B, Holmberg S. Effect of a media campaign to reduce delay times for acute myocardial infarction on the burden of chest pain patients in the emergency department. *Cardiology*. 1991;79:127-134.
108. Herlitz J, Blohm M, Hartford M, Karlson BW, Luepker R, Holmberg S, Risenfors M, Wennerblom B. Follow-up of a 1-year media campaign on delay times and ambulance use in suspected acute myocardial infarction. *Eur Heart J*. 1992;13:171-177.
109. Blohm M, Hartford M, Karlson BW, Karlsson T, Herlitz J. A media campaign aiming at reducing delay times and increasing the use of ambulance in AMI. *Am J Emerg Med*. 1994;12:315-318.
110. Gaspoz JM, Unger PF, Urban P, Chevrolet JC, Rutishauser W, Lovis C, Goldman L, Heliot C, Sechaud L, Mischler S, Waldvogel FA. Impact of a public campaign on pre-hospital delay in patients reporting chest pain. *Heart*. 1996;76:150-155.
111. Breuer HW, Eckert K. The Gortitz myocardial infarction project: An information campaign to reduce the prehospital time of acute myocardial infarctions in Eastern Saxonia. [German]. *Herz Kreislauf*. 1999;31:443-447.
112. Maeso-Madronero JL, Bergbauer M, Mensing M, Murza G, Athanasiou K, Lange S. HEUH 'Recognition of myocardial infarction and correct acting'—a project aiming at reducing the prehospital delay time in acute myocardial infarction. [German]. *Herz Kreislauf*. 2000;32:257-262.
113. Mitic WR, Perkins J. The effect of a media campaign on heart attack delay and decision times. *Can J Public Health*. 1984;75:414-418.
114. Eppler E, Eisenberg MS, Schaeffer S, Meischke H, Larson MP. 911 and emergency department use for chest pain: results of a media campaign. *Ann Emerg Med*. 1994;24:202-208.
115. 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;28:326-333.
116. Kandakai T, King K. Perceived self-efficacy in performing lifesaving skills: an assessment of the American Red Cross's Responding to Emergencies course. *J Health Educ*. 1999;30:235-241.
117. Lester CA, Donnelly PD, Assar D. Lay CPR trainees: retraining, confidence and willingness to attempt resuscitation 4 years after training. *Resuscitation*. 2000;45:77-82.
118. Pane GA, Salness KA. A survey of participants in a mass CPR training course. *Ann Emerg Med*. 1987;16:1112-1116.
119. Axelsson A, Herlitz J, Fridlund B. How bystanders perceive their cardiopulmonary resuscitation intervention: a qualitative study. *Resuscitation*. 2000;47:71-81.
120. Axelsson A, Thoren A, Holmberg S, Herlitz J. Attitudes of trained Swedish lay rescuers toward CPR performance in an emergency: a survey of 1012 recently trained CPR rescuers. *Resuscitation*. 2000;44:27-36.
121. Brenner BE, Van DC, Cheng D, Lazar EJ. Determinants of reluctance to perform CPR among residents and applicants: the impact of experience on helping behavior. *Resuscitation*. 1997;35:203-211.
122. Chu K, May C, Clark MJ, Breeze K. CPR training in households of patients with chest pain. *Prehosp Emerg Care*. 2003;7:219-224.
123. Elif AA, Zeynep K. Knowledge of basic life support: a pilot study of the Turkish population by Baskent University in Ankara. *Resuscitation*. 2003;58:187-192.
124. Gross CP, Reisman AB, Schwartz MD. The physician as ambivalent Samaritan: will internists resuscitate victims of out-of-hospital emergencies? *J Gen Intern Med*. 1998;13:491-494.
125. Holmberg M, Holmberg S, Herlitz J. Effect of bystander cardiopulmonary resuscitation in out-of-hospital cardiac arrest patients in Sweden. *Resuscitation*. 2000;47:59-70.
126. Hubble MW, Bachman M, Price R, Martin N, Huie D. Willingness of high school students to perform cardiopulmonary resuscitation and automated external defibrillation. *Prehosp Emerg Care*. 2003;7:219-224.
127. Jelinek GA, Gennat H, Celenza T, O'Brien D, Jacobs I, Lynch D. Community attitudes towards performing cardiopulmonary resuscitation in Western Australia. *Resuscitation*. 2001;51:239-246.
128. Johnston TC, Clark MJ, Dingle GA, FitzGerald G. Factors influencing Queenslanders' willingness to perform bystander cardiopulmonary resuscitation. *Resuscitation*. 2003;56:67-75.
129. Kliegel A, Scheinecker W, Sterz F, Eisenburger P, Holzer M, Laggner AN. The attitudes of cardiac arrest survivors and their family members towards CPR courses. *Resuscitation*. 2000;47:147-154.
130. Lester C, Donnelly P, Assar D. Community life support training: does it attract the right people? *Public Health*. 1997;111:293-296.
131. Locke CJ, Berg RA, Sanders AB, Davis MF, Milander MM, Kern KB, Ewy GA. Bystander cardiopulmonary resuscitation: concerns about mouth-to-mouth contact. *Arch Intern Med*. 1995;155:938-943.
132. McCormack AP, Damon SK, Eisenberg MS. Disagreeable physical characteristics affecting bystander CPR. *Ann Emerg Med*. 1989;18:283-285.
133. Nolan RP, Wilson E, Shuster M, Rowe BH, Stewart D, Zambon S. Readiness to perform cardiopulmonary resuscitation: an emerging strategy against sudden cardiac death. *Psychosom Med*. 1999;61:546-551.
134. Platz E, Scheatzle MD, Pepe PE, Dearwater SR. Attitudes towards CPR training and performance in family members of patients with heart disease. *Resuscitation*. 2000;47:273-280.
135. Ross CA, Winter MK, Mossesso VN Jr. Bystander CPR in two predominantly African American communities. *Top Emerg Med*. 2000;22:63-68.
136. Rowe BH, Shuster M, Zambon S, Wilson E, Stewart D, Nolan RP, Webster K. Preparation, attitudes and behaviour in nonhospital cardiac emergencies: evaluating a community's readiness to act. *Can J Cardiol*. 1998;14:371-377.
137. Shibata K, Taniguchi T, Yoshida M, Yamamoto K. Obstacles to bystander cardiopulmonary resuscitation in Japan. *Resuscitation*. 2000;44:187-193.
138. Waalewijn RA, Tijssen JG, Koster RW. Bystander initiated actions in out-of-hospital cardiopulmonary resuscitation: results from the Amsterdam Resuscitation Study (ARRESUST). *Resuscitation*. 2001;50:273-279.
139. Axelsson A. Bystander cardiopulmonary resuscitation: would they do it again? *J Cardiovasc Nurs*. 2001;16:15-20.
140. Brenner B, Stark B, Kauffman J. The reluctance of house staff to perform mouth-to-mouth resuscitation in the inpatient setting: what are the considerations? *Resuscitation*. 1994;28:185-193.

141. Hauff SR, Rea TD, Cully LL, Kerry F, Becker L, Eisenberg MS. Factors impeding dispatcher-assisted telephone cardiopulmonary resuscitation. *Ann Emerg Med.* 2003;42:731-737.
142. Hew P, Brenner B, Kaufman J. Reluctance of paramedics and emergency medical technicians to perform mouth-to-mouth resuscitation. *J Emerg Med.* 1997;15:279-284.
143. Horowitz BZ, Matheny L. Health care professionals' willingness to do mouth-to-mouth resuscitation. *West J Med.* 1997;167:392-397.
144. Stiell I, Nichol G, Wells G, De Maio V, Nesbitt L, Blackburn J, Spaite D; OPALS Study Group. Health-related quality of life is better for cardiac arrest survivors who received citizen CPR. *Circulation.* 2003;108:1939-1944.
145. Swor RA, Jackson RE, Compton S, Domeier R, Zalenski R, Honeycutt L, Kuhn GJ, Frederiksen S, Pascual RG. Cardiac arrest in private locations: different strategies are needed to improve outcome. *Resuscitation.* 2003;58:171-176.
146. Brennan RT. Student, instructor, and course factors predicting achievement in CPR training classes. *Am J Emerg Med.* 1991;9:220-224.
147. Broomfield R. A quasi-experimental research to investigate the retention of basic cardiopulmonary resuscitation skills and knowledge by qualified nurses following a course in professional development. *J Adv Nurs.* 1996;23:1016-1023.
148. Groeneveld PW, Owens DK. Cost-effectiveness of training unselected laypersons in cardiopulmonary resuscitation and defibrillation. *Am J Med.* 2005;118:58-67.
149. Tweed WA, Wilson E, Isfeld B. Retention of cardiopulmonary resuscitation skills after initial overtraining. *Crit Care Med.* 1980;8:651-653.
150. Carrillo Alvarez A, Lopez-Herce Cid J, Moral Torrero R, Sancho Perez L, Vigil Escribano D. [Evaluation of basic and advanced pediatric resuscitation courses]. *An Esp Pediatr.* 2000;53:125-134.
151. Tanigawa K, Tanaka K. Demographic differences in the resuscitation knowledge and skills of the Standard First Aid Class ambulance crews in Japan. *Eur J Emerg Med.* 1998;5:41-46.
152. Lewis FH, Kee CC, Minick MP. Revisiting CPR knowledge and skills among registered nurses. *J Contin Educ Nurs.* 1993;24:174-179.
153. Celenza T, Gennat HC, O'Brien D, Jacobs IG, Lynch DM, Jelinek GA. Community competence in cardiopulmonary resuscitation. *Resuscitation.* 2002;55:157-165.
154. Fossel M, Kiskaddon RT, Sternbach GL. Retention of cardiopulmonary resuscitation skills by medical students. *J Med Educ.* 1983;58:568-575.
155. Wenzel V, Lehmkühl P, Kubilis PS, Idris AH, Pichlmayr I. Poor correlation of mouth-to-mouth ventilation skills after basic life support training and 6 months later. *Resuscitation.* 1997;35:129-134.
156. West H. Basic infant life support: retention of knowledge and skill. *Paediatr Nurs.* 2000;12:34-37.
157. Nagashima K, Suzuki A, Takahata O, Sengoku K, Fujimoto K, Yokohama H, Iwasaki H. [A survey on cardio-pulmonary resuscitation knowledge of the nursing staff in the Asahikawa Medical College Hospital]. *Masui.* 2002;51:68-70.
158. Vanderschmidt H, Burnap TK, Thwaites JK. Evaluation of a cardiopulmonary resuscitation course for secondary schools. *Med Care.* 1975;13:763-774.
159. Becker LJ, Yeargin K, Rea TD, Owens M, Eisenberg MS. Resuscitation of residents with do not resuscitate orders in long-term care facilities. *Prehosp Emerg Care.* 2003;7:303-306.
160. Dull SM, Graves JR, Larsen MP, Cummins RO. Expected death and unwanted resuscitation in the prehospital setting. *Ann Emerg Med.* 1994;23:997-1002.
161. Guru V, Verbeek P, Morrison L. Response of paramedics to terminally ill patients with cardiac arrest: an ethical dilemma. *CMAJ.* 1999;161:1251-1254.
162. Braun K, Onaka A, Horiuchi B. Advance directive completion rates and end-of-life preferences in Hawaii. *J Am Geriatr Soc.* 2002;49:1708-1713.
163. Hanson LC, Rodgman E. The use of living wills at the end of life: a national study. *Arch Intern Med.* 1996;156:1018-1022.
164. Kiely D, Mitchell S, Marlow A, Murphy K, Morris J. Racial and state differences in the designation of advance directives in nursing home residents. *J Am Geriatr Soc.* 2001;49:1346-1352.
165. Suri D, Egleston B, Brody J, Rudberg M. Nursing home resident use of care directives. *J Gerontol A Biol Sci Med Sci.* 1999;54:225-229.
166. Lahn M, Friedman B, Bijur P, Haughey M, Gallagher EJ. Advance directives in skilled nursing facility residents transferred to emergency departments. *Acad Emerg Med.* 2001;8:1158-1162.
167. McAuley WJ, Travis SS. Advance care planning among residents in long-term care. *Am J Hosp Palliat Care.* 2003;20:353-359.
168. Waddell C, McNamara B. The stereotypical fallacy: a comparison of Anglo and Chinese Australians' thoughts about facing death. *Mortality.* 1997;2:149-161.
169. Naess A, Steen E, Steen P. Ethics in treatment decisions during out-of-hospital resuscitation. *Resuscitation.* 1997;35:245-256.
170. Schmidt TA, Hickman SE, Tolle SW, Brooks HS. The Physician Orders for Life-Sustaining Treatment program: Oregon emergency medical technicians' practical experiences and attitudes. *J Am Geriatr Soc.* 2004;52:1430-1434.
171. Dunn P, Schmidt T, Carley M, Donius M, Weinstein M, Dull V. A method to communicate patient preferences about medically indicated life-sustaining treatment in the out-of-hospital setting. *J Am Geriatr Soc.* 1996;44:785-791.
172. Marco C, Schears R. Prehospital resuscitation practices: a survey of prehospital providers. *J Emerg Med.* 2003;24:101-106.
173. Hickman SE, Tolle SW, Brummel-Smith K, Carley MM. Use of the Physician Orders for Life-Sustaining Treatment program in Oregon nursing facilities: beyond resuscitation status. *J Am Geriatr Soc.* 2004;52:1424-1429.
174. Lee MA, Brummel-Smith K, Meyer J, Drew N, London MR. Physician orders for life-sustaining treatment (POLST): outcomes in a PACE program. Program of All-Inclusive Care for the Elderly. *J Am Geriatr Soc.* 2000;48:1343-1344.
175. Tolle SW, Tilden VP, Nelson CA, Dunn PM. A prospective study of the efficacy of the physician order form for life-sustaining treatment. *J Am Geriatr Soc.* 1998;46:1097-1102.
176. Sabatino CP. Survey of state EMS-DNR laws and protocols. *J Law Med Ethics.* 1999;27:297-315.
177. Boie ET, Moore GP, Brummett C, Nelson DR. Do parents want to be present during invasive procedures performed on their children in the emergency department? A survey of 400 parents. *Ann Emerg Med.* 1999;34:70-74.
178. Haimi-Cohen Y, Amir J, Harel L, Straussberg R, Varsano Y. Parental presence during lumbar puncture: anxiety and attitude toward the procedure. *Clin Pediatr (Phila).* 1996;35:2-4.
179. Bauchner H, Vinci R, Waring C. Pediatric procedures: do parents want to watch? *Pediatrics.* 1989;84:907-909.
180. Bauchner H, Waring C, Vinci R. Parental presence during procedures in an emergency room: results from 50 observations. *Pediatrics.* 1991;87:544-548.
181. Bauchner H, Vinci R, Bak S, Pearson C, Corwin MJ. Parents and procedures: a randomized controlled trial. *Pediatrics.* 1996;98:861-867.
182. Merritt KA, Sargent JR, Osborn LM. Attitudes regarding parental presence during medical procedures. *Am J Dis Child.* 1990;144:270-271.
183. Sacchetti A, Lichenstein R, Carraccio CA, Harris RH. Family member presence during pediatric emergency department procedures. *Pediatr Emerg Care.* 1996;12:268-271.
184. Taylor N, Bonilla L, Silver P, Sagy M. Pediatric procedure: do parents want to be present? *Crit Care Med.* 1996;24:A131.
185. Beckman AW, Sloan BK, Moore GP, Cordell WH, Brizendine EJ, Boie ET, Knoop KJ, Goldman MJ, Geninatti MR. Should parents be present during emergency department procedures on children, and who should make that decision? A survey of emergency physician and nurse attitudes. *Acad Emerg Med.* 2002;9:154-158.
186. Helmer SD, Smith RS, Dort JM, Shapiro WM, Katan BS. Family presence during trauma resuscitation: a survey of AAST and ENA members. American Association for the Surgery of Trauma. Emergency Nurses Association. *J Trauma.* 2000;48:1015-1022; discussion 1023-1024.
187. McClenathan BM, Torrington KG, Uyehara CF. Family member presence during cardiopulmonary resuscitation: a survey of US and international critical care professionals. *Chest.* 2002;122:2204-2211.
188. O'Brien MM, Creamer KM, Hill EE, Welham J. Tolerance of family presence during pediatric cardiopulmonary resuscitation: a snapshot of military and civilian pediatricians, nurses, and residents. *Pediatr Emerg Care.* 2002;18:409-413.
189. Waseem M, Ryan M. Parental presence during invasive procedures in children: what is the physician's perspective? *South Med J.* 2003;96:884-887.
190. Barratt F, Wallis DN. Relatives in the resuscitation room: their point of view. *J Accid Emerg Med.* 1998;15:109-111.

191. Doyle CJ, Post H, Burney RE, Maino J, Keefe M, Rhee KJ. Family participation during resuscitation: an option. *Ann Emerg Med.* 1987;16:673–675.
192. Grice AS, Picton P, Deakin CD. Study examining attitudes of staff, patients and relatives to witnessed resuscitation in adult intensive care units. *Br J Anaesth.* 2003;91:820–824.
193. Meyers TA, Eichhorn DJ, Guzzetta CE. Do families want to be present during CPR? A retrospective survey. *J Emerg Nurs.* 1998;24:400–405.
194. Meyers TA, Eichhorn DJ, Guzzetta CE, Clark AP, Klein JD, Taliaferro E, Calvin A. Family presence during invasive procedures and resuscitation. *Am J Nurs.* 2000;100:32–42; quiz 43.
195. Benjamin M, Holger J, Carr M. Personal preferences regarding family member presence during resuscitation. *Acad Emerg Med.* 2004;11:750–753.
196. Boyd R, White S. Does witnessed cardiopulmonary resuscitation alter perceived stress in accident and emergency staff? *Eur J Emerg Med.* 2000;7:51–53.
197. Hanson C, Strawser D. Family presence during cardiopulmonary resuscitation: Foote Hospital emergency department's nine-year perspective. *J Emerg Nurs.* 1992;18:104–106.
198. Robinson SM, Mackenzie-Ross S, Campbell Hewson GL, Egleston CV, Prevost AT. Psychological effect of witnessed resuscitation on bereaved relatives. *Lancet.* 1998;352:614–617.
199. Nichol G, Stiell IG, Hebert P, Wells GA, Vandemheen K, Laupacis A. What is the quality of life for survivors of cardiac arrest? A prospective study. *Acad Emerg Med.* 1999;6:95–102.
200. van Alem AP, Waalewijn RA, Koster RW, de Vos R. Assessment of quality of life and cognitive function after out-of-hospital cardiac arrest with successful resuscitation. *Am J Cardiol.* 2004;93:131–135.
201. Granja C, Cabral G, Pinto AT, Costa-Pereira A. Quality of life 6-months after cardiac arrest. *Resuscitation.* 2002;55:37–44.
202. Dimopoulou I, Anthi A, Michalis A, Tzelepis GE. Functional status and quality of life in long-term survivors of cardiac arrest after cardiac surgery. *Crit Care Med.* 2001;29:1408–1411.
203. Martin-Castro C, Bravo M, Navarro-Perez P, Mellado Vergel FJ. [Survival and the quality of life in extrahospital cardiorespiratory arrest]. *Medicina Clinica.* 1999;113:121–123.
204. Bunch TJ, White RD, Gersh BJ, Meverden RA, Hodge DO, Ballman KV, Hammill SC, Shen WK, Packer DL. Long-term outcomes of out-of-hospital cardiac arrest after successful early defibrillation. *N Engl J Med.* 2003;348:2626–2633.
205. de Vos R, de Haes HC, Koster RW, de Haan RJ. Quality of survival after cardiopulmonary resuscitation. *Arch Intern Med.* 1999;159:249–254.
206. Hugo S, Borner Rodriguez E, Kummer-Bangerter A, Schuppel R, Von Planta M. Quality of life in long-term survivors of out-of-hospital cardiac arrest. *Resuscitation.* 2002;53:7–13.
207. Saner H, Borner Rodriguez E, Kummer-Bangerter A, Schuppel R, von Planta M. Quality of life in long-term survivors of out-of-hospital cardiac arrest. *Resuscitation.* 2002;53:7–13.
208. Sauve MJ. Long-term physical functioning and psychosocial adjustment in survivors of sudden cardiac death. *Heart Lung.* 1995;24:133–144.
209. Hsu JW, Madsen CD, Callahan ML. Quality-of-life and formal functional testing of survivors of out-of-hospital cardiac arrest correlates poorly with traditional neurologic outcome scales. *Ann Emerg Med.* 1996;28:597–605.
210. Bertini G, Giglioli C, Giovannini F, Bartoletti A, Cricelli F, Margheri M, Russo L, Taddei T, Taiti A. Neuropsychological outcome of survivors of out-of-hospital cardiac arrest. *J Emerg Med.* 1990;8:407–412.
211. Eisenburger P, List M, Schorkhuber W, Walker R, Sterz F, Lagner AN. Long-term cardiac arrest survivors of the Vienna emergency medical service. *Resuscitation.* 1998;38:137–143.
212. Graves JR, Herlitz J, Bang A, Axelsson A, Ekstrom L, Holmberg M, Lindqvist J, Sunnerhagen K, Holmberg S. Survivors of out of hospital cardiac arrest: their prognosis, longevity and functional status. *Resuscitation.* 1997;35:117–121.
213. Kuilman M, Bleeker JK, Hartman JA, Simoons ML. Long-term survival after out-of-hospital cardiac arrest: an 8-year follow-up. *Resuscitation.* 1999;41:25–31.
214. Polo V, Ardeleani G, Pistone G, Baltrocchi M, Mongiat R, Porro A, Macchi C. [3-year-survival and quality of life after out-of-hospital heart arrest]. *Ann Ital Med Int.* 2000;15:255–262.
215. Kamphuis HC, De Leeuw JR, Derksen R, Hauer R, Winnubst JA. A 12-month quality of life assessment of cardiac arrest survivors treated with or without an implantable cardioverter defibrillator. *Europace.* 2002;4:417–425.
216. Motzer SU, Stewart BJ. Sense of coherence as a predictor of quality of life in persons with coronary heart disease surviving cardiac arrest. *Res Nurs Health.* 1996;19:287–298.
217. Nunes B, Pais J, Garcia R, Magalhaes Z, Granja C, Silva MC. Cardiac arrest: long-term cognitive and imaging analysis. *Resuscitation.* 2003;57:287–297.
218. Paniagua D, Lopez-Jimenez F, Londono JC, Mangione CM, Fleischmann K, Lamas GA. Outcome and cost-effectiveness of cardiopulmonary resuscitation after in-hospital cardiac arrest in octogenarians. *Cardiology.* 2002;97:6–11.
219. Roewer N, Kloss T, Puschel K. [Long-term result and quality of life following preclinical cardiopulmonary resuscitation]. *Anasth Intensivther Notfallmed.* 1985;20:244–250.
220. Guerot E, Deye N, Diehl JL, Iftimovici E, Rezgui MN, Labrousse J. [Evaluation of outcome of patients hospitalized after pre-hospital cardiac arrest]. *Arch Mal Coeur Vaisc.* 2001;94:989–994.
221. Beuret P, Feihl F, Vogt P, Perret A, Romand JA, Perret C. Cardiac arrest: prognostic factors and outcome at one year. *Resuscitation.* 1993;25:171–179.
222. Earnest MP, Yarnell PR, Merrill SL, Knapp GL. Long-term survival and neurologic status after resuscitation from out-of-hospital cardiac arrest. *Neurology.* 1980;30:1298–1302.
223. Kliegel A, Scheinecker W, Eisenburger P, Sterz F, Malzer R, Kaff A, Redelsteiner C, Meixner G, Lillie P, Tikal M, Peschel H. Hurray—We are still alive! A different dimension in post-resuscitative care: the annual gathering of cardiac arrest survivors at a typical Viennese wine tavern. *Resuscitation.* 2002;52:301–304.
224. Schindler MB, Bohn D, Cox PN, McCrindle BW, Jarvis A, Edmonds J, Barker G. Outcome of out-of-hospital cardiac or respiratory arrest in children. *N Engl J Med.* 1996;335:1473–1479.
225. Ronco R, King W, Donley DK, Tilden SJ. Outcome and cost at a children's hospital following resuscitation for out-of-hospital cardiopulmonary arrest. *Arch Pediatr Adolesc Med.* 1995;149:210–214.
226. Bilsky GS, Banja JD. Outcomes following cardiopulmonary resuscitation in an acute rehabilitation hospital: clinical and ethical implications. *Am J Phys Med Rehabil.* 1992;71:232–235.
227. Mohr M, Bomelburg K, Bahr J. Attempted CPR in nursing homes—life-saving at the end of life? *Anesthesiol Intensivmed Notfallmed Schmerzther.* 2001;36:566–572.

Worksheets Cited

- W86. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC151>
- W179A. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC304>
- W179B. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC305>
- W179C. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC306>
- W180A. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC307>
- W180B. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC308>
- W182A. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC310>
- W182B. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC311>
- W183. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC312>
- W184A. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC313>
- W184B. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC314>
- W185A. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC315>
- W185B. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC316>
- W186A. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC317>
- W188A. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC320>
- W188B. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC321>

- W189. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC322>
- W190A. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC323>
- W190B. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC324>
- W191A. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC325>
- W191B. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC326>
- W192. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC327>
- W193A. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC328>
- W193B. <http://circ.ahajournals.org/cgi/content/full/CIRCULATIONAHA.105.170522/DC329>