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Part 8: Interdisciplinary topics

International Liaison Committee on Resuscitation

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 (e.g. 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 randomised studies using models from the motor skills literature (LOE 6)[2—28] and one randomised 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 two 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 7[38]) showed improved rates of survival from out-of-hospital cardiac arrest when CPR plus automated external defibrillation training (traditional 4-h course) was made widely available to lay first responders. The prospective randomised 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 5[39]; 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

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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 randomised 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 randomised 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 randomised 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 (e.g. ''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 randomised controlled trials (RCTs) using manikins (LOE 6)[67,69,82–85] evaluated hand positioning in detail. One trial[82] compared a simplified message (''place hands in the centre of the chest'') versus the standard method (anatomical landmarks) for teaching correct hand placement. Three of the six 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 centre of the chest.

In four 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 minimising 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] one 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 randomised 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 four 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 seven 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 pre-

sentation 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 1[102]; LOE 3[107,110,114]; LOE 4[105]) 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 are 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] one prospective controlled cohort study (LOE 3),[116] two 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 seven studies with good written test scores (LOE 6 manikin studies), four studies were associated with good CPR skills[146–149] and three studies with poor CPR skills.[150–152] In two manikin studies (LOE 6)[68,153] mediocre written test scores correlated with mediocre or borderline CPR performance. In six manikin studies (LOE 6),[72,147,153–156] poor written test performance was associated with poor CPR capability. In five 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 standardised 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, five 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 are 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 six nonrandomised 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 two 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: ''Paediatric 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 (i.e. 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 emphasise the enrolment of laypeople with the highest probability of encoun-

tering cardiac arrest. Other potentially more cost-effective methods of training should be considered (see previous sections).

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at 10.1016/j.resuscitation.2005.09.021.

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