WORKSHEET for Evidence-Based Review of Science for Veterinary CPCR

1. Basic Demographics

Worksheet author(s)

Steven Mensack	**Date Submitted for review:** 04/11/2011

[redacted]

2. Clinical question:

In veterinary CPR providers (P) does training with realistic techniques (e.g. high fidelity manikins equipped with pulse, chest movement, etc.; in-situ training) (I) compared with non-realistic techniques (low-fidelity manikins; class-room training) (C), improve outcome (eg. skill acquisition, skill retention, confidence, ROSC, survival) (O)?

3. Conflict of interest specific to this question:

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

4. Search strategy (including electronic databases searched):

4a. Databases

-MEDLINE via PUBMED (1950 to current) (performed on April 10, 2011)
1. CPR training – 519 total hits
2. mannequin
3. high fidelity
4. low fidelity
5. veterinary
6. animal
7. canine
8. feline
9. outcome
10. survival
11. return of spontaneous circulation
12. cardio-pulmonary resuscitation training: 491 hits
14. Resusci Anne (and derivations)
15. Resusci Rover (and derivations)
16. Manikin
17. Voice activated mannequin

1 and 12: 491 hits (same as 12 only)
1 and 2: 17 relevant hits out of 308 total hits
1,2 and 3: 13 total hits, no new relevant hits
1,2 and 4: 2 total hits, no new relevant hits
1 and 5: no hits
1 and 6: 51 total hits, 2 new relevant hits
1 and 7: 13 total hits, no new relevant hits
1 and 8: no hits
1 and 9: 440 total hits, 5 new relevant hits
1,2 and 6: 4 total hits, no relevant hits
1,2 and 7: no hits
1,2 and 9: 42 total hits, no new relevant
1 and 10: 573 total hits
1, 2 and 10: 26 total hits, 1 new relevant hit
1,2 and 11: 3 total hits, no relevant hits

1,6 and 11: 3 total hits, no relevant hits
1, 6 and 10: 14 total hits, no relevant hits
14 only: 54 total hits, 1 additional relevant cite
15 only: no hits
1 and 16: 350 total hits, 1 new relevant cite
1 and 17: 6 hits, no new relevant hits

-CAB (1910 to present)
Submitted to domain chair for search

4b. Other sources

-GOOGLE SCHOLAR (performed on April 11, 2011)
Report as for Medline

Additional citation:
Lee KHK, Grantham H, and Boyd R: Comparison of high- and low-fidelity mannequins for clinical performance assessment. Emergency Medicine Australasia 20(6) pp 508-514, Dec 2008.

4c. State inclusion and exclusion criteria for choosing studies and list number of studies excluded per criterion

Inclusion criteria

CPR training
Medline, Nursing Journals
Human studies, animal studies
Clinical trials, meta-analyses, randomized controlled trials, reviews
Veterinary Science

Exclusion criteria

Telephone training, AED (only), Dispatcher Assisted (only), Video training (only), Computer simulation (only)
Editorials, Letters to the editor, practice guidelines, not in English

4d. Number of articles/sources meeting criteria for further review: 28

-22 relevant human (mechanistic) studies were identified:
- 2 relevant human literature reviews were identified: Yeung, 2009; Hamilton, 2005
- 1 relevant laboratory study on a porcine model was identified: Milander, 1995

-No relevant animal studies were identified:

5. Summary of evidence

Evidence Supporting Clinical Question

Good						*Kardon-Edrgren, 2010, E* *Starr, 2010, E* *Handley 2003, E* *Willliamson, 2005, E* *Wik,, 2005, E* *Spooner, 2007, E* *Lynch, 2008, E* *Sutton, 2007, E*

						Donoghue, 2009, E
Fair						*Wik, 2001, E* *Hostler, 2005, E* *Yeung, 2009, E* *Milander, 1995, E* *Peberdy, 2009, E* *Perkins, 2005, E* *Boyle, 2002, E* *Hamilton, 2005, E* *Krasteva, 2011, E*
Poor						
	1	**2**	**3**	**4**	**5**	**6**
Level of evidence (P)						

A = Return of spontaneous circulation
B = Survival of event
C = Survival to hospital discharge
D = Intact neurological survival
E = Other endpoint
Italics = Non-target species studies

Evidence Neutral to Clinical question

Good						*Noordergraaf, 1997, E* *Wik, 2002, E* *Mpotos, 2011, E*
Fair						
Poor						
	1	**2**	**3**	**4**	**5**	**6**
Level of evidence (P)						

A = Return of spontaneous circulation
B = Survival of event
C = Survival to hospital discharge
D = Intact neurological survival
E = Other endpoint
Italics = Non-target species studies

Evidence Opposing Clinical Question

Good						*Silfvast, 2002, E* *Isbye, 2008, E*

Fair						*Hoadley, 2009, E* *Lee, 2008, E*
Poor						
	1	**2**	**3**	**4**	**5**	**6**
Level of evidence (P)						

A = Return of spontaneous circulation
B = Survival of event
C = Survival to hospital discharge
D = Intact neurological survival
E = Other endpoint
Italics = Non-target species studies

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

In veterinary CPR providers (P) does training with realistic techniques (e.g. high fidelity manikins equipped with pulse, chest movement, etc.; in-situ training) (I) compared with non-realistic techniques (low-fidelity manikins; class-room training) (C), improve outcome (eg. skill acquisition, skill retention, confidence, ROSC, survival) (O)?

The AHA CPR Guidelines of 2005 and 2010 have stressed the provision of "high quality" CPR as part of their recommendations in an attempt to improve the victims chance of survival. High quality CPR involves both the cognitive performance of resuscitation (performing the steps of CPR in an orderly and rapid fashion) as well as the psychomotor skills associated with CPR. The psychomotor skills associated with high quality CPR consists of providing chest compressions with proper hand position, chest compressions of adequate rate, providing chest compressions of adequate depth, allowing complete chest recoil after each compression, minimizing interruptions in compressions, and avoiding excessive ventilation in both rate and volume (during 2+ rescuer CPR). Overall, the learning of the psychomotor skills associated with basic (ABC's) and advanced (defibrillation) CPR is poor. Many studies have documented that performance of the skills of compression rate, compression depth, complete release of compression, hand position during compression, ventilation rate, and ventilation volume are poorly performed during basic and advanced CPR in the field. Multiple training methods have been assessed in an effort to improve the performance of these psychomotor skills associated with CPR both in the classroom and in the field in lay people, para-professional staff, and professional medical staff.

The development of immediate feedback devices, both auditory and visual, have, in general, shown improved initial learning of some of the skills involved in high-quality basic and advanced CPR but no single study has shown improvement in all of the psychomotor skills involved in high quality basic or advanced CPR. These immediate feedback devices include metronomic sounds to time compressions, audio and visual heart rhythms, and programmable audio feedback devices that will provide negative reinforcement if any psychomotor skill is performed outside of pre-set parameters and positive reinforcement if the programmed skills are performed within the pre-set parameters. These pre-programmed devices are being developed within the manikin itself, as devices that are placed between the rescuer and victim (CPREzy), and as modules on automated electronic defibrillators (AEDs). These automated devises provide more consistent and correct feedback compared to instructor provided feedback during the compressive psychomotor skill training but may not provide benefit over instructor feedback in ventilation skills (Lynch, 2008, Isbye, 2008). In fact, in some of the studies evaluated, some of the psychomotor skills were performed with decreased competency when practiced on a high-fidelity manikin vs. low fidelity manikin with instructor feedback. The one psychomotor skill that manikins (both high- and low-fidelity type) cannot properly teach is proper hand position for most effective chest compressions.

In the single non-manikin study found (Milander, 1995) with a pig-model of CPR compressions that evaluated rate of compression only, audio guidance regarding rate improved rate to within acceptable range. This lead to an increase in ETCO2, which has been associated with a higher rate of ROSC.

Student satisfaction was mixed regarding immediate feedback devices. When the devices were incorporated into the manikin, course satisfaction was significantly higher for studies with crossover design but with studies that used control groups, student satisfaction was not statistically different between the instructor-led low-fidelity course and the high fidelity training. However, in studies using the CPREzy device, student satisfaction was decreased with the use of the device due to the design of the device. This hard device caused discomfort on the rescuer's hands and increased fatigue.

There were no studies found that evaluated whether either high fidelity or low fidelity training translated to improved rates of success (improved psychomotor skills, ROSC, survival) in actual CPR for laypersons, para-professionals, medical students, or medical professionals.

Note that all of the studies found were based on AHA Guidelines prior to the 2010 revision and/or

7. Conclusion

It appears that high fidelity manikins and feedback devices, those that provide immediate consistent feedback to the student/rescuer, have some benefit in the initial learning of some of the psychomotor skills involved in BLS over low fidelity manikins. These manikins and devices have been shown to prevent the decay in quality of CPR performed during prolonged periods of compressions and ventilations (times greater than 3 minutes). However, retention of these skills start to deteriorate within weeks of learning and deteriorate at the same rate whether the student learned on a high fidelity or low fidelity manikin, such that by 1-2 years after training, the student's psychomotor skill set returns to pre-training levels. This is lessened if the follow-up training is also performed with immediate feedback (high-fidelity). It does appear that over-training (continued brief practice sessions after the initial training) helps to prolong the retention period of psychomotor skills, especially on the high-definition manikin.

At the same time, the cognitive skills associated with CPR (identify that CPR indicated, activate emergency response system, initiate CPR in accordance with guidelines and personnel present) require some version of training outside of psychomotor skill training. Classroom teaching by a certified instructor, self paced audio-video or computer based learning modules have been developed to accomplish this goal.

The development of veterinary specific high-fidelity manikins for learning the psychomotor skills along with a consistent veterinary-specific didactic method of teaching the cognitive skills of CPR needs to be evaluated to ensure that this model of training is most effective for teaching high quality CPR for animals to veterinarians, veterinary staff, and lay persons. If proven effective, then studies need to be performed to determine if the training received translates to improved outcomes of field and in-hospital basic CPR and in-hospital advanced CPR.

8. Acknowledgement

None

9. Citation list

All manuscripts evaluated were LOE 6 performed on human-type manikins

Boyle AJ, Wilson AM, Connelly K, McGuigan L, Wilson J, Whitbourn R.
Resuscitation. 2002 Jul;54(1):63-7.
Improvement in timing and effectiveness of external cardiac compressions with a new non-invasive device: the CPR-Ezy.
Source
Department of Cardiology, Cardiac Investigation Unit, St. Vincent's Hospital, Princes St., Fitzroy 3065, Melbourne, Australia. boylea@svhm.org.au
Supportive, fair

Abstract

Prompt and effective cardiopulmonary resuscitation (CPR) is the first link in the chain of survival following cardiac arrest. We assessed a new device, the CPR-Ezy (Medteq Innovations Pty Ltd., Brisbane, Australia), to aid timing and effectiveness of external cardiac compressions (ECC), by 32 subjects who had prior community-based training in CPR. ECC was performed on a manikin for 4 min by all subjects without and with the device. There was a statistically significant improvement in timing of ECC. Effectiveness of compressions was also improved over the whole time period, especially so in the last minute. We conclude that the CPR-Ezy can improve timing and effectiveness of ECC, and reduce the effects of resuscitator fatigue, in community-trained subjects.

PMID:
12104110
[PubMed - indexed for MEDLINE]

Donoghue AJ, Durbin DR, Nadel FM, Stryjewski GR, Kost SI, Nadkarni VM.
Pediatr Emerg Care. 2009 Mar;25(3):139-44.
Effect of high-fidelity simulation on Pediatric Advanced Life Support training in pediatric house staff: a randomized trial.
Source
Division of Emergency Medicine, The Children's Hospital of Philadelphia, Philadelphia, PA 19104, USA. donoghue@email.chop.edu
Supportive, good

Abstract

OBJECTIVES:

To assess the effect of high-fidelity simulation (SIM) on cognitive performance after a training session involving several mock resuscitations designed to teach and reinforce Pediatric Advanced Life Support (PALS) algorithms.

METHODS:

Pediatric residents were randomized to high-fidelity simulation (SIM) or standard mannequin (MAN) groups. Each subject completed 3 study phases: (1) mock code exercises (asystole, tachydysrhythmia, respiratory arrest, and shock) to assess baseline performance (PRE phase), (2) a didactic session reviewing PALS algorithms, and (3) repeated mock code exercises requiring identical cognitive skills in a different clinical context to assess change in performance (POST phase). SIM subjects completed all 3 phases using a high-fidelity simulator (SimBaby, Laerdal Medical, Stavanger, Norway), and MAN subjects used SimBaby without simulated physical findings (ie, as a standard mannequin). Performance in PRE and POST was measured by a scoring instrument designed to measure cognitive performance; scores were scaled to a range of 0 to 100 points. Improvement in performance from PRE to POST phases was evaluated by mixed modeling using a random intercept to account for within subject variability.

RESULTS:

Fifty-one subjects (SIM, 25; MAN, 26) completed all phases. The PRE performance was similar between groups. Both groups demonstrated improvement in POST performance. The improvement in scores between PRE and POST phases was significantly better in the SIM group (mean [SD], 11.1 [4.8] vs. 4.8 [1.7], P = 0.007).

CONCLUSIONS:

The use of high-fidelity simulation in a PALS training session resulted in improved cognitive performance by pediatric house staff. Future studies should address skill and knowledge decays and team dynamics, and clearly defined and reproducible outcome measures should be sought.

PMID:
19262421
[PubMed - indexed for MEDLINE]

Hamilton R.
J Adv Nurs. 2005 Aug;51(3):288-97.
Nurses' knowledge and skill retention following cardiopulmonary resuscitation training: a review of the literature.
Source
Newham University Hospital NHS Trust, Newham University Hospital, London, UK. rozy.hamilton@newhamhealth.nhs.uk
Supportive, fair

Abstract

AIM:

This paper reports a literature review examining factors that enhance retention of knowledge and skills during and after resuscitation training, in order to identify educational strategies that will optimize survival for victims of cardiopulmonary arrest.

BACKGROUND:

Poor knowledge and skill retention following cardiopulmonary resuscitation training for nursing and medical staff has been documented over the past 20 years. Cardiopulmonary resuscitation training is mandatory for nursing staff and is important as nurses often discover the victims of in-hospital cardiac arrest. Many different methods of improving this retention have been devised and evaluated. However, the content and style of this training lack standardization.

METHOD:

A literature review was undertaken using the Cumulative Index to Nursing and Allied Health Literature, MEDLINE and British Nursing Index databases and the keywords 'cardiopulmonary resuscitation', 'basic life support', 'advanced life support' and 'training'. Papers published between 1992 and 2002 were obtained and their reference lists scrutinized to identify secondary references, of these the ones published within the same 10-year period were also included. Those published in the English language that identified strategies to enhance the acquisition or retention of Cardiopulmonary resuscitation skills and knowledge were included in the review.

RESULTS:

One hundred and five primary and 157 secondary references were identified. Of these, 24 met the criteria and were included in the final literature sample. Four studies were found pertaining to cardiac arrest simulation, three to peer tuition, four to video self-instruction, three to the use of different resuscitation guidelines, three to computer-based learning programmes, two to voice-activated manikins, two to automated external defibrillators, one to self-instruction, one to gaming and the one to the use of action cards.

CONCLUSIONS:

Resuscitation training should be based on in-hospital scenarios and current evidence-based guidelines, including recognition of sick patients, and should be taught using simulations of a variety of cardiac arrest scenarios. This will ensure that the training reflects the potential situations that nurses may face in practice. Nurses in clinical areas, who rarely see cardiac arrests, should receive automated external defibrillation training and have access to defibrillators to prevent delays in resuscitation. Staff should be formally assessed using a manikin with a feedback mechanism or an expert instructor to ensure that chest compressions and ventilations are adequate at the time of training. Remedial training must be provided as often as required. Resuscitation training equipment should be made available at ward/unit level to allow self-study and practice to prevent deterioration between updates. Video self-instruction has been shown to improve competence in resuscitation. An in-hospital scenario-based video should be devised and tested to assess the efficacy of this medium in resuscitation training for nurses.

PMID:
16033596
[PubMed - indexed for MEDLINE]

Handley AJ, Handley SA.
Resuscitation. 2003 Apr;57(1):57-62.
Improving CPR performance using an audible feedback system suitable for incorporation into an automated external defibrillator.
Source
Department of Cardiology, Colchester General Hospital, Turner Road, CO4 5JL, Colchester, UK. tony.handley@btinternet.com
Supportive, good

Abstract

BACKGROUND:

It has been shown that a computer-based audible feedback system can improve acquisition and retention of basic life support (BLS) skills. This system is being developed to work in association with an automated external defibrillator (AED).

AIM:

To determine if such a feedback system is likely to improve the quality of CPR performed by trained nurses whilst using an AED.

METHOD:

Thirty-six general nurses performed 3 min of BLS on a manikin connected to a laptop computer running an experimental software program. After initial testing they were randomly allocated to control or 'feedback' groups. Both groups then performed a further 3 min of BLS, but those in the feedback group received audible corrective instructions from the computer when errors of technique were detected.

RESULTS:

The group receiving feedback were significantly better than the control group at performing inflations (P=0.004) and achieving the correct depth of chest compression (P<0.0005).

CONCLUSIONS:

The results suggest that if the feedback system were to be incorporated into an AED, it could lead to better performance of CPR during a resuscitation attempt.

PMID:
12668300
[PubMed - indexed for MEDLINE]

Hoadley TA.
Nurs Educ Perspect. 2009 Mar-Apr;30(2):91-5.
Learning advanced cardiac life support: a comparison study of the effects of low- and high-fidelity simulation.
Source
OSF Saint Frances Medical Center College of Nursing, Peoria, IL, USA. Theresa.hoadley@osfhealthcare.org
Opposing, fair

Abstract

To increase cardiopulmonary arrest survival, the American Heart Association developed basic and advanced cardiac life support (ACLS) courses that expose participants to realistic learning situations. This experimental study compared results of two ACLS classes on measures of knowledge (content exam) and resuscitation skills (performance exam). Both the control and experimental groups consisted of physicians, nurses, emergency medical technicians, respiratory therapists, and advanced health care providers. The control group used low-fidelity simulation (LFS); the experimental group was exposed to enhanced realism via high-fidelity simulation (HFS). The findings showed a positive correlation between enhanced practice and learning but no significant correlation between posttest and skills test scores for the LFS and HFS groups. The HFS group did score higher on both cognitive and behavioral tests, but the difference was not statistically significant. Participants from both groups indicated satisfaction with their forms of simulation experience and course design. In addition, participants' self-confidence to care for a victim of cardiopulmonary arrest was increased after completing their course; profession and work experience had no effect on responses. The largest difference noted was in verbal responses to course satisfaction. The experimental group stated that learning using HFS was enjoyable and adamantly recommended that ACLS should only be taught using HFS. Further study is required to assess if practicing beyond the course enhances short- and long-term retention of ACLS techniques.

PMID:
19476072
[PubMed - indexed for MEDLINE]

Hostler D, Wang H, Parrish K, Platt TE, Guimond G.
Prehosp Emerg Care. 2005 Jan-Mar;9(1):53-60.
The effect of a voice assist manikin (VAM) system on CPR quality among prehospital providers.
Source
Department of Emergency Medicine, Affiliated Emergency Medicine Residency, University of Pittsburgh, Pittsburgh, Pennsylvania 15213, USA.
hostlerdp@upmc.edu
Supportive, fair

Abstract

Numerous studies have documented poor cardiopulmonary resuscitation (CPR) performance among prehospital providers during both simulated and actual resuscitations. Previous studies have shown that a real-time, voice assist manikin (VAM) system may improve CPR performance.

OBJECTIVE:

To determine whether VAM prompting would improve CPR performance by prehospital providers during simulated resuscitation.

METHODS:

In this prospective, randomized, crossover design, 114 prehospital providers performed two 3-minute sessions of one-rescuer CPR on a VAM-resuscitation manikin: one round with the VAM feature turned on and one with the feature turned off. The primary outcomes were measured at 15-second intervals and included the fraction of correct compressions, the mean compression depth, the fraction of correct ventilations, and the mean ventilation tidal volume. Generalized estimating equations were used to analyze the repeated measures.

RESULTS:

The VAM prompting was not directly associated with correct compressions during one-rescuer CPR in a cohort of subjects naïve to the system. However, the general decay in correct compressions seen over 3 minutes was attenuated with VAM prompting. Neither the compression depth nor the decay in compression depth over time was affected by VAM prompting. In contrast, VAM prompting did affect the fraction of correct ventilations and attenuated the time-dependent decline in correct ventilations in tidal volume.

CONCLUSIONS:

Use of VAM did not directly improve compression or ventilation rate or quality in this cohort of prehospital providers. However, use of VAM did prevent decay of compression and ventilation performance over time.

PMID:
16036829
[PubMed - indexed for MEDLINE]

Isbye DL, Hoiby P, Rasmussen MB, Sommer J, Lippert FK, Ringsted C, Rasmussen LS.
Resuscitation. 2008 Oct;79(1):73-81. Epub 2008 Aug 6.
Voice advisory manikin versus instructor facilitated training in cardiopulmonary resuscitation.
Source
Department of Anaesthesia, Centre of Head and Orthopaedics, Copenhagen University Hospital, Rigshospitalet, Copenhagen, Denmark.
dan.lou.isbye@rh.regionh.dk
Opposing, good

Abstract

BACKGROUND:

Training of healthcare staff in cardiopulmonary resuscitation (CPR) is time-consuming and costly. It has been suggested to replace instructor facilitated (IF) training with an automated voice advisory manikin (VAM), which increases skill level by continuous verbal feedback during individual training.

AIMS:

To compare a VAM (ResusciAnne CPR skills station, Laerdal Medical A/S, Norway) with IF training in CPR using a bag-valve-mask (BVM) in terms of skills retention after 3 months.

METHODS:

Forty-three second year medical students were included and CPR performance (ERC Guidelines for Resuscitation 2005) was assessed in a 2 min test before randomisation to either IF training in groups of 8 or individual VAM training. Immediately after training and after 3 months, CPR performance was assessed in identical 2 min tests. Laerdal PC Skill Reporting System 2.0 was used to collect data. To quantify CPR performance a scoring system based on the Cardiff test was used. Groups were compared with a Mann Whitney rank sum test.

RESULTS:

There was no statistically significant difference between the two groups when considering change in overall CPR performance score from before training to 3 months after training (P=0.12). However, the IF group performed significantly better than the VAM group in the total score, both immediately after (P=0.0008) and 3 months after training (P=0.02). This difference was primarily related to the BVM skills.

CONCLUSION:

Skill retention in CPR using a bag-valve-mask was better after 3 months when training with an instructor than with an automated voice advisory manikin.

PMID:
18687512
[PubMed - indexed for MEDLINE]

Kardong-Edgren SE, Oermann MH, Odom-Maryon T, Ha Y.
Resuscitation. 2010 Aug;81(8):1019-24. Epub 2010 Jun 2.
Comparison of two instructional modalities for nursing student CPR skill acquisition.
SourceWashington State University, College of Nursing, Box 1495, Spokane, Washington 99210, United States.
Supportive, good

Abstract

AIMS:

The purpose of the study was to compare performance based measures of CPR skills (compressions, ventilations with bag-valve-mask (BVM), and single rescuer CPR) from two types of CPR courses: a computer-based course (HeartCode BLS) with voice advisory manikin (VAM) feedback and instructor-led (IL) training with traditional manikins.

METHODS:

604 nursing students from 10 schools of nursing throughout the United States were randomized by school to course type. After successful course completion, students performed 3min each of compressions; ventilations with BVM; and single rescuer CPR on a Laerdal Resusci Anne SkillReporter manikin. The primary outcome measures were: (1) compression rate, (2) percentage of compressions performed with adequate depth, (3) percentage of compressions performed with correct hand placement, (4) number of ventilations/min, and (5) percentage of ventilations with adequate volume.

RESULTS:

There were no differences in compression rates between the two courses. However, students with HeartCode BLS with VAM training performed more compressions with adequate depth and correct hand placement and had more ventilations with adequate volume than students who had IL courses particularly when learning on hard molded manikins. During single rescuer CPR, students who had HeartCode BLS with VAM training had more compressions with adequate depth and ventilations with adequate volume than students with IL training.

CONCLUSION:

Students who trained using HeartCode BLS and practiced with VAMs performed more compressions with adequate depth and ventilations with adequate volume than students who had IL courses. Results of this study provide evidence to support use of HeartCode BLS with VAM for training nursing students in CPR.

PMID:
20566391
[PubMed - indexed for MEDLINE]

Krasteva V, Jekova I, Didon JP.
Physiol Meas. 2011 Jun;32(6):687-99. Epub 2011 May 23.

An audiovisual feedback device for compression depth, rate and complete chest recoil can improve the CPR performance of lay persons during self-training on a manikin.

Source
Institute of Biophysics and Biomedical Engineering, Bulgarian Academy of Sciences, Acad. G. Bonchev Str. Bl 105, 1113 Sofia, Bulgaria.
Supportive, fair

Abstract

This study aims to contribute to the scarce data available about the abilities of untrained lay persons to perform hands-only cardio-pulmonary resuscitation (CPR) on a manikin and the improvement of their skills during training with an autonomous CPR feedback device. The study focuses on the following questions: (i) Is there a need for such a CPR training device? (ii) How adequate are the embedded visual feedback and audio guidance for training of lay persons who learn and correct themselves in real time without instructor guidance? (iii) What is the achieved effect of only 3 min of training? This is a prospective study in which 63 lay persons (volunteers) received a debriefing to basic life support and then performed two consecutive 3 min trials of hands-only CPR on a manikin. The pre-training skills of the lay persons were tested in trial 1. The training process with audio guidance and visual feedback from a cardio compression control device (CC-Device) was recorded in trial 2. After initial debriefing for correct chest compressions (CC) with rate 85-115 min(-1), depth 3.8-5.4 cm and complete recoil, in trial 1 the lay persons were able to perform CC without feedback at mean rate 95.9 ± 18.9 min(-1), mean depth 4.13 ± 1.5 cm, with low proportions of 'correct depth', 'correct rate' and 'correct recoil' at 33%, 43%, 87%, resulting in the scarce proportion of 14% for compressions, which simultaneously fulfill the three quality criteria ('correct all'). In trial 2, the training process by the CC-Device was established by the significant improvement of the CC skills until the 60th second of training, when 'correct depth', 'correct rate' and 'correct recoil' attained the plateau of the highest quality at 82%, 90%, 96%, respectively, resulting in 73% 'correct all' compressions within 3 min of training. The training was associated with reduced variance of the mean rate 102.4 ± 4.7 min(-1) and mean depth 4.3 ± 0.4 cm, indicating a steady CC performance achieved among all trained participants. Multivariable linear regression showed that the compression depth, rate and complete chest recoil did not strongly depend on lay person age, gender, height, weight in pre-training and training stage (correlation coefficient below 0.54). The study confirmed the need for developing CPR abilities in untrained lay persons via training by real-time feedback from the instructor or CC-Device. The CC-Device embedded feedback was shown to be comprehensible and easy to be followed and interpreted. The high quality of the CC-Device-assisted training process of lay persons was confirmed. Thus learning or refresher courses in basic life support could be organized for more people trained at the same time with fewer instructors needed only for the initial debriefing and presentation of the CC-Device.

PMID:
21606561
[PubMed - in process]

Lee KHK, Grantham H, and Boyd R: Comparison of high- and low-fidelity mannequins for clinical performance assessment. Emergency Medicine Australasia 20(6) pp 508-514, Dec 2008.
Opposing, fair

Lynch B, Einspruch EL, Nichol G, Aufderheide TP.
Resuscitation. 2008 Feb;76(2):233-43. Epub 2007 Sep 12.
Assessment of BLS skills: optimizing use of instructor and manikin measures.

Source
University of Dundee School of Medicine, Dundee, Tayside Centre for General Practice, Mackenzie Building, Kirsty Semple Way, Dundee DD2 4BF, United Kingdom. b.lynch@chs.dundee.ac.uk
Supportive, good

Abstract

BACKGROUND:

The primary objective of layperson CPR training is to ensure that learners achieve minimal competence to provide aid that improves the odds of survival of victims of out-of-hospital sudden cardiac arrest. During CPR courses, pronouncement of a learner's competence typically depends entirely on judgments made by an instructor; yet previous research strongly suggests that these judgments - particularly of chest compressions - are not sufficiently precise or accurate to ensure valid assessments. Comparisons of instructors' subjective assessments with objective data from recording manikins provide one means of understanding the magnitude and type of instructor errors in assessment.

METHOD:

Eight hundred and twenty-six laypersons between 40 and 70 years old participated in CPR training. Performance of five discrete skills was tested in a scenario format immediately afterward: assessing responsiveness, calling the emergency telephone number 911, delivering ventilations of adequate volume, demonstrating correct hand placement for compressions, and delivering compressions with adequate depth. Thirteen AHA-certified instructors assessed these five skills and rendered a global performance rating; sensored Resusci Anne manikins with SkillReporting software recorded ventilation and compression data.

RESULTS:

Instructors' ratings of the ventilation skills were highly accurate; ratings of compressions were correct about 83% of the time; yet inadequate compression depth was rated adequate 55% of the time, and incorrect hand placement was rated adequate 49% of the time.

CONCLUSION:

Instructors' judgments alone are not sufficient to determine learners' competence in performing compressions. Assessment, technology, and guidelines must be better aligned so that learners can receive accurate feedback.

PMID:
17854972
[PubMed - indexed for MEDLINE]

Milander MM, Hiscok PS, Sanders AB, Kern KB, Berg RA, Ewy GA.
Acad Emerg Med. 1995 Aug;2(8):708-13.
Chest compression and ventilation rates during cardiopulmonary resuscitation: the effects of audible tone guidance.
Source
University Heart Center, University of Arizona Colege of Medicine, Tucson 85724, USA.
Supportive, fair

Abstract

OBJECTIVES:

To determine: 1) whether chest compressions during CPR are being performed according to American Heart Association (AHA) guidelines during cardiac arrest; and 2) the effect of an audio prompt to guide chest compressions on compliance with AHA guidelines and hemodynamic parameters associated with successful resuscitation.

METHODS:

An observational clinical report and laboratory study was conducted. A research observer responded to a convenience sample of cardiac arrests within a 300-bed hospital and counted the rate of chest compressions and ventilations during CPR. To evaluate the effect of an audio prompt on CPR, health care providers performed chest compression without guidance using a porcine cardiac arrest model for 1 minute, followed by a second minute in which audio guidance was added. Chest compression rates, arterial and venous blood pressures, end-tidal CO2 (ETCO2) levels, and coronary perfusion pressures were measured and compared for the two periods.

RESULTS:

Twelve in-hospital cardiac arrests were observed in the clinical part of the study. Only two of 12 patients had chest compressions performed within AHA guidelines. No patient had respirations performed within AHA guidelines. In the laboratory, 41 volunteers were tested, with 66% performing chest compressions outside the AHA standards for compression rate without audible tone guidance. With guided chest compressions, the mean (+/- SD) chest compression rate increased from 74 +/- 22 to 100 +/- 3/min ($p < 0.01$). End-tidal CO2 levels increased from 15 +/- 7 to 17 +/- 7 torr ($p < 0.01$). Coronary perfusion pressure increased minimally with audible tone-guided chest compressions.

CONCLUSIONS:

The majority of Basic Cardiac Life Support--certified health care professionals did not perform CPR according to AHA-recommended guidelines. The use of audible tones to guide chest compression resulted in significantly higher chest compression rates and ETCO2 levels.

PMID:
7584749
[PubMed - indexed for MEDLINE]

Mpotos N, Lemoyne S, Calle PA, Deschepper E, Valcke M, Monsieurs KG.
Resuscitation. 2011 Mar 26. [Epub ahead of print]
Combining video instruction followed by voice feedback in a self-learning station for acquisition of Basic Life Support skills: A randomised non-inferiority trial.
Source
Emergency Department, Ghent University Hospital, De Pintelaan 185, B-9000 Ghent, Belgium.
Neutral, good

Abstract

INTRODUCTION:

Current computerised self-learning (SL) stations for Basic Life Support (BLS) are an alternative to instructor-led (IL) refresher training but are not intended for initial skill acquisition. We developed a SL station for initial skill acquisition and evaluated its efficacy.

METHODS:

In a non-inferiority trial, 120 pharmacy students were randomised to IL small group training or individual training in a SL station. In the IL group, instructors demonstrated the skills and provided feedback. In the SL group a shortened Mini Anne™ video, to acquire the skills, was followed by Resusci Anne Skills Station™ software (both Laerdal, Norway) with voice feedback for further refinement. Testing was performed individually, respecting a seven week interval after training for every student.

RESULTS:

One hundred and seventeen participants were assessed (three drop-outs). The proportion of students achieving a mean compression depth 40-50mm was 24/56 (43%) IL vs. 31/61 (51%) SL and 39/56 (70%) IL vs. 48/61 (79%) SL for a mean compression depth ≥40mm. Compression rate 80-120/min was achieved in 49/56 (88%) IL vs. 57/61 (93%) SL and any incomplete release (≥5mm) was observed in 31/56 (55%) IL and 35/61 (57%) SL. Adequate mean ventilation volume (400-1000ml) was achieved in 29/56 (52%) IL vs. 36/61 (59%) SL. Non-inferiority was confirmed for depth and although inconclusive, other areas came close to demonstrate it.

CONCLUSIONS:

Compression skills acquired in a SL station combining video-instruction with training using voice feedback were not inferior to IL training.

PMID:
21444145
[PubMed - as supplied by publisher]

Noordergraaf GJ, Van Gelder JM, Van Kesteren RG, Diets RF, Savelkoul TJ.
Eur J Emerg Med. 1997 Dec;4(4):204-9.
Learning cardiopulmonary resuscitation skills: does the type of mannequin make a difference?
Source
Department of Intensive Care and Clinical Toxicology, University Hospital Utrecht, The Netherlands.
Neutral, good

Abstract

Resuscitation (CPR) courses stress acquisition of psychomotor skills. The number of mannequins may limit the 'hands-on' time available for each trainee to practise CPR and impede acquisition of skill. This may occur because expensive, sophisticated mannequins are favoured over individual, simple mannequins. In a blind, prospective, controlled study we compared one-rescuer CPR skills of 165 trainees in two cohorts using their own individual light-weight torso mannequins (Actar 911 and Laerdal Little Anne) and a control cohort with four to five trainees sharing a sophisticated mannequin (Laerdal Recording Resusci Anne). No major significant differences ($p = 0.18$) were found when using the 'Berden scoring system'. Both the Actar 911 and the Little Anne were compatible with the Recording Resusci Anne. Trainees preferred the individual mannequins. We conclude that the results indicate that the use of individual mannequins in conjunction with a sophisticated mannequin neither results in trainees learning incorrect skills nor in significant improvement. Further analysis of the actual training in lay person CPR training courses and evaluation of course didactics to optimize training time appear indicated.

Notes: All mannequins had depth indicators

PMID:
9444504
[PubMed - indexed for MEDLINE]

Peberdy MA, Silver A, Ornato JP.
Resuscitation. 2009 Oct;80(10):1169-74. Epub 2009 Aug 11.
Effect of caregiver gender, age, and feedback prompts on chest compression rate and depth.
Source
Virginia Commonwealth University, Richmond, VA 23298, United States. mpeberdy@aol.com
Supportive, fair

Abstract

BACKGROUND:

Quality of chest compressions (CC) is an important determinant of resuscitation outcome for cardiac arrest patients.

PURPOSE:

To characterize the quality of CC performed by hospital personnel, evaluate for predictors of CC performance, and determine the effects of audiovisual feedback on CC performance.

METHODS:

Seven hundred and fifty four individuals participated in a CPR quality improvement challenge at 30 US hospitals. Participants performed 2min of CC on a manikin with an accelerometer-based system for measuring both rate (CC/min) and depth (in.) of CC (AED Plus:ZOLL Medical). Real-time audiovisual feedback was disabled. A subset of participants performed a second trial of CC with the audiovisual feedback prompts activated.

RESULTS:

Mean depth of CC was below AHA minimum guidelines (<1.5in.) for 34% (1.30+/-0.14in.) and above maximum guidelines (>2.0in.) for 12% of participants (2.20+/-0.22in.). Depth of CC was greater for male vs. female (p<0.001) and younger vs. older (p=0.009) but did not differ between ACLS, BCLS, and non-certified participants (p=0.6). Predictors of CC depth included CC rate (r(part)=-0.34, p<0.0001), gender (r(part)=0.13, p=0.001), and age (r(part)=-0.09, p=0.02). Mean depth of CC increased, mean rate decreased, and variance in CC depth and rate declined when feedback was used (p< or =0.0001 vs. without feedback). The percentage of CC performed within AHA guidelines (1.5-2in.) improved from 15 to 78% with feedback.

CONCLUSIONS:

The quality of CC performed by personnel at US hospitals as judged by their performance on a manikin is often suboptimal. Quality of CC can be improved with use of CPR feedback technologies.

PMID:
19674826
[PubMed - indexed for MEDLINE]

Perkins GD, Augré C, Rogers H, Allan M, Thickett DR.
Resuscitation. 2005 Jan;64(1):103-8.
CPREzy: an evaluation during simulated cardiac arrest on a hospital bed.
Source
Division of Medical Sciences, University of Birmingham, Birmingham B152TT, UK. gavin.perkins@virgin.net
Supportive, fair

Abstract

CPREzy is a new adjunct designed to improve the application of manual external chest compressions (ECC) during cardiopulmonary resuscitation (CPR). The aim of this study was to determine the effect of using the CPREzy device compared to standard CPR during the simulated resuscitation of a patient on a hospital bed. Twenty medical student volunteers were randomised using a cross over trial design to perform 3 min of continuous ECC using CPREzy and standard CPR. There was a significant improvement in ECC depth with CPREzy compared to standard CPR 42.9 (4.4) mm versus 34.2 (7.6): mm, P = 0.001; 95% CI d.f. 4.4-12.9 mm. This translated to a reduction in the percentage of shallow compressions (<38 mm) with CPREzy 16 (23)% compared to standard CPR 59 (44)%, P = 0.003. There was a small increase in the percentage of compression regarded excessive (>51 mm): CPREzy 6.5 (19)% versus standard CPR 0 (0.1)%. P = 0.012). There was no difference in compression rate or duty cycle between techniques. Equal numbers of participants (40% in each group) performed one of more incorrectly placed chest compression. However the total number of incorrect compressions was higher for the CPREzy group (26% versus 3.9% standard CPR, P < 0.001). This was due to a higher number of low compressions (26% of total compressions for CPREzy versus 1% for standard CPR, P < 0.001). In conclusion, CPREzy was associated with significant improvements in ECC performance. Further animal and clinical studies are required to validate this finding in vivo and to see if it translates to an improvement in outcome in human victims of cardiac arrest.

PMID:
15629562
[PubMed - indexed for MEDLINE]

Silfvast T, Paakkonen H, Gorski J.
Resuscitation. 2002 Oct;55(1):25-9.
The effect of seeing the rhythm display on performance of cardiopulmonary resuscitation.
Source
Department of Anaesthesiology and Intensive Care Medicine, Helsinki University Central Hospital, P.O. Box 340, Finland. tom.silfvast@hus.fi
Opposing, good

Abstract

Semiautomated external defibrillators are widely used by prehospital emergency personnel. Some of the devices have a rhythm display and some show only text commands on the screen. To evaluate the effects on cardiopulmonary resuscitation (CPR) performance of seeing the rhythm during resuscitation, 60 fire-fighter students were randomly divided in two groups and trained to use either a defibrillator with a rhythm display or one without a display. The students in both groups formed teams of two rescuers, and their performance of CPR on a manikin was tested using a predefined rhythm

sequence in a simulated cardiac arrest situation. The teams using a defibrillator with a rhythm display more often interrupted CPR for pulse checks than those who did not see the rhythm (P=0.003). The duration of CPR between rhythm analyses was shorter in the group who saw the rhythm on the screen (P=0.002). Our data suggest that seeing an organised rhythm on a monitor during CPR interferes with adherence to CPR algorithms which may have a negative influence on the performance of CPR.

PMID:
12297350
[PubMed - indexed for MEDLINE]

Spooner BB, Fallaha JF, Kocierz L, Smith CM, Smith SC, Perkins GD.
Resuscitation. 2007 Jun;73(3):417-24. Epub 2007 Feb 1.
An evaluation of objective feedback in basic life support (BLS) training.
Source
Warwick Medical School, University of Warwick, Coventry CV4 7AL, UK.
Supportive, good

Abstract

BACKGROUND:

Studies show that acquisition and retention of BLS skills is poor, and this may contribute to low survival from cardiac arrest. Feedback from instructors during BLS training is often lacking. This study investigates the effects of continuous feedback from a manikin on chest compression and ventilation techniques during training compared to instructor feedback alone.

MATERIALS AND METHODS:

A prospective randomised controlled trial. First-year healthcare students at the University of Birmingham were randomised to receive training in standard or feedback groups. The standard group were taught by an instructor using a conventional manikin. The feedback group used a 'Skillreporter' manikin, which provides continuous feedback on ventilation volume and chest compression depth and rate in addition to instructor feedback. Skill acquisition was tested immediately after training and 6 weeks later.

RESULTS:

Ninety-eight participants were recruited (conventional n=49; Skillreporter n=49) and were tested after training. Sixty-six students returned (Skillreporter n=34; conventional n=32) for testing 6 weeks later. The Skillreporter group achieved better compression depth (39.96mm versus 36.71mm, P<0.05), and more correct compressions (58.0% versus 40.4%, P<0.05) at initial testing. The Skillreporter group also achieved more correct compressions at week 6 (43.1% versus 26.5%, P<0.05).

CONCLUSIONS:

This study demonstrated that objective feedback during training improves the performance of BLS skills significantly when tested immediately after training and at re-testing 6 weeks later. However, CPR performance declined substantially over time in both groups.

PMID:
17275158
[PubMed - indexed for MEDLINE]

Starr LM.
Occup Health Saf. 1997 Apr;66(4):30-7.
Electronic voice boosts CPR responses.
Source
Department of Psychology, Villanova University, Pa., USA. lstarr@sostech.com
Supportive, good

PMID:
9127959
[PubMed - indexed for MEDLINE]

Sutton RM, Donoghue A, Myklebust H, Srikantan S, Byrne A, Priest M, Zoltani Z, Helfaer MA, Nadkarni V.
Resuscitation. 2007 Oct;75(1):161-8. Epub 2007 Apr 25.
The voice advisory manikin (VAM): an innovative approach to pediatric lay provider basic life support skill education.
Source
The Children's Hospital of Philadelphia, Department of Anesthesiology and Critical Care Medicine, 7th Floor: Central Wing, 34th Street and Civic Center Boulevard, Philadelphia, PA 19104, USA. suttonr@email.chop.edu

Supportive, good

Abstract

AIM:

To determine the efficacy of immediate, standardized, corrective audio feedback training as supplied by the voice advisory manikin (VAM) compared to high quality standardized instructor feedback training for the initial acquisition of 1-rescuer lay provider pediatric BLS skills.

MATERIALS AND METHODS:

Lay care providers of hospitalized children 8-18 years were randomized to VAM (n=23) or standardized human instruction (SHI, n=27) training in one-rescuer pediatric BLS. After an identical video/instructor introduction to CPR and 20 min of training in their respective group, quantitative CPR psychomotor skill data was recorded during 3-min CPR testing epochs. All manikins used in training and testing sessions were identical in outside appearance and feel of doing CPR. The primary outcome measure was CPR psychomotor skill success defined prospectively as 70% correct chest compressions (CC) and ventilations (V). Subjects not attaining these success goals retrained for 5 min in their respective training group and were retested. Data analysis using student t-test and chi2-tests as appropriate.

RESULTS:

VAM trainees delivered more total CC/min (58.7+/-7.9 versus 47.6+/-10.5, p<0.001), correct CC/min (47.9+/-15.7 versus 31.2+/-16.0, p<0.001), total V/min (7.8+/-1.2 versus 6.4+/-1.4, p<0.001), and correct V/min (5.4+/-1.9 versus 3.1+/-1.6, p<0.001). Overall error rates per individual were lower in VAM trainees for chest compressions (18.1+/-23.2% versus 34.9+/-28.8%, p<0.03) and ventilations (32.0+/-19.7% versus 50.7+/-24.1%, p<0.005). More VAM (12/23, 52%) than SHI (1/26, 4%) trainees passed the initial skill tests (p<or=0.0001). After remediation and retesting, the difference in rate of attaining success goals remained significant: VAM 15/23, 65% versus SHI 7/26, 27% (p=0.008).

CONCLUSION:

Immediate, standardized, corrective audio feedback training as supplied by the voice advisory manikin (VAM) can improve initial pediatric basic life support skill acquisition for lay providers even when compared to one-on-one, standardized instructor-led training.

PMID:
17459561
[PubMed - indexed for MEDLINE]

Wik L, Thowsen J, Steen PA.
Resuscitation. 2001 Aug;50(2):167-72.
An automated voice advisory manikin system for training in basic life support without an instructor. A novel approach to CPR training.
Source
Department of Emergency Medical Services, Division of Surgery, Ulleval University Hospital, N-0407 Oslo, Norway. lars@nakos.org
Supportive, fair

Abstract

Twenty-four paramedic students with previous basic life support training were randomised, performing cardiopulmonary resuscitation (CPR) on a manikin for 3 min without any feedback followed by 3 min of CPR with audio feedback from the manikin after a 2-min break, or vice versa. A computer recorded information on timing, ventilation flow rates and volumes and all movements of the sternum of the manikin. The software allowed acceptable limits to be set for all ventilation and compression/release variables giving appropriate on-line audio feedback according to these settings from among approximately 40 pre-recorded messages. Students who started without feedback significantly improved after feedback in terms of the median percentage of correct inflations (from 2 to 64%), with most inflations being rapid before feedback (94%), compressions of correct depth (from 32 to 92%), and the duration of compressions in the duty cycle (from 41 to 44%). There were no problems with the median compression rate, sternal release during decompressions, or the hand position, even before feedback. There were no significant differences in any variables with and without feedback for the students who started with feedback, or between the audio feedback periods of the two groups. It is concluded that this automated voice advisory manikin system, a novel approach to basic CPR training, caused an immediate improvement in the skills performance of paramedic students.

PMID:
11719144
[PubMed - indexed for MEDLINE]

Wik L, Myklebust H, Auestad BH, Steen PA.
Resuscitation. 2002 Mar;52(3):273-9.\
Retention of basic life support skills 6 months after training with an automated voice advisory manikin system without instructor involvement.
Source
National Centre of Competence in Emergency Medicine, Ulleval University Hospital, Kirkevn 166, N-0407, Oslo, Norway. lars@nakos.org

Neutral, good

Abstract

AIM:

To evaluate the retention of skills 6 months after training in ventilation and chest compressions (CPR) on a manikin with computer based on-line voice advisory feedback and the possible effects of initial overtraining.

METHODS:

Thirty five volunteers had 20 min provisional CPR training on a manikin with computer based voice advisory feedback but without an instructor. The appropriate feedback was taken from a pre-recorded list depending on performance measured by the manikin--computer system versus set limits for ventilation and compression variables. One group in addition was randomised to receive 10 similar 3 min training sessions during 1 week in the following month (overtrained group). All ventilation and compression variables were measured without feedback before and after the initial training session, with feedback immediately thereafter, and both without and with feedback 6 months after the initial training session.

RESULTS:

The initial training improved all variables. Compressions with correct depth increased from a mean of 33 to 77%, and correct inflations from a mean of 9 to 58%. After 6 months, the results for the controls were not significantly different from pre-training, except for a higher of correct inflations (18%), while the overtrained group had better retention of skills including the correct compression depth (mean 61%) and inflations (mean 42%). When verbal feedback was added both the compressions and ventilations immediately improved both when tested immediately and 6 months after the initial training session.

CONCLUSIONS:

The computer-based voice advisory manikin (VAM) feedback system can improve immediate performance of basic life support (BLS) skills, with better long-term retention with overtraining.

PMID:
11886733
[PubMed - indexed for MEDLINE]

Wik L, Myklebust H, Auestad BH, Steen PA.
Resuscitation. 2005 Jul;66(1):27-30.
Twelve-month retention of CPR skills with automatic correcting verbal feedback.
Source
National Center of Competence in Emergency Medicine, Division of Prehospital Emergency Medicine, Ulleval University Hospital, N-0407 Oslo, Norway. lars.wik@ioks.uio.no
Supportive, good

Abstract

AIM:

To evaluate the retention of CPR skills 12 months after initial training, using a manikin equipped with a computer-based voice advisory feedback system.

METHODS:

Thirty-five volunteers had individual 20 min training sessions without an instructor on a manikin with computer-based voice advisory feedback. The feedback depended on the performance as measured by the manikin computer system versus set limits for ventilation and compression variables. Twelve of the volunteers received additional ten 3-min self-training sessions during the following month making a total of 50 min training. All ventilation and compression variables when the volunteers were tested before, immediately after and 6 months after training have previously been reported. The volunteers were now tested 12 months after the initial training session with activated feedback.

RESULTS:

There were virtually no changes in CPR skills when tested with active feedback 12 months after initial training versus immediately or 6 months post-training. The only exception was a slightly lower number of compressions per minute at 12 months versus immediate post-training in the subgroup with 20 min of initial training, 47+/-4 versus 52+/-4, p = 0.008. There were no differences between the 20 and 50 min training subgroups at 12 months.

CONCLUSIONS:

Computer-based voice advisory feedback can improve the performance of basic life support skills on a manikin with no deterioration in feedback supported performance after 12 months.

PMID:
15993726
[PubMed - indexed for MEDLINE]

Williamson LJ, Larsen PD, Tzeng YC, Galletly DC.
Emerg Med J. 2005 Feb;22(2):140-3.
Effect of automatic external defibrillator audio prompts on cardiopulmonary resuscitation performance.
Source
Section of Anaesthesia and Resuscitation, Wellington School of Medicine, PO Box 7343, Wellington, New Zealand.
Supportive, good

Abstract

OBJECTIVES:

To determine the effectiveness of the cardiopulmonary resuscitation (CPR) audio prompts in an automatic external defibrillator in 24 lay subjects, before and after CPR training.

METHODS:

Untrained subjects were asked to perform CPR on a manikin with and without the assistance of audio prompts. All subjects were then trained in CPR, and retested them eight weeks later.

RESULTS:

Untrained subjects who performed CPR first without audio prompts performed poorly, with only (mean (SD)) 24.5% (32%) of compressions at the correct site and depth, a mean compression rate of 52 (31) per minute, and with 15% (32%) of ventilatory attempts adequate. Repeat performance by this group with audio prompts resulted in significant improvements in compression rate (91(12), p = 0.0002, paired t test), and percentage of correct ventilations (47% (40%), p = 0.01 paired t test), but not in the percentage correct compressions (23% (29%)). Those who performed CPR first with audio prompts performed significantly better in compression rate (87 (19), p = 003, unpaired t test), and the percentage of correct ventilations (51 (34), p = 0.003 unpaired t test), but not in the percentage of correct compressions (18 (27)) than those without audio prompts. After training, CPR performance was significantly better than before training, but there was no difference in performance with or without audio prompts, although 73% of subjects commented that they felt more comfortable performing CPR with audio prompts.

CONCLUSIONS:

For untrained subjects, the quality of CPR may be improved by using this device, while for trained subjects the willingness to perform CPR may be increased.

PMID:
15662072
[PubMed - indexed for MEDLINE]
PMCID: PMC1726677

Yeung J, Meeks R, Edelson D, Gao F, Soar J, Perkins GD.
Resuscitation. 2009 Jul;80(7):743-51. Epub 2009 May 28.
The use of CPR feedback/prompt devices during training and CPR performance: A systematic review.
Source
University of Warwick, UK.
Supportive, fair

Abstract

OBJECTIVES:

In lay persons and health care providers performing cardiopulmonary resuscitation (CPR), does the use of CPR feedback/prompt devices when compared to no device improve CPR skill acquisition, retention, and real life performance?

METHODS:

The Cochrane database of systematic reviews; Medline (1950-Dec 2008); EmBASE (1988-Dec 2008) and Psychinfo (1988-Dec 2008) were searched using ("Prompt$" or "Feedback" as text words) AND ("Cardiopulmonary Resuscitation" [Mesh] OR "Heart Arrest" [Mesh]). Inclusion criteria were articles describing the effect of audio or visual feedback/prompts on CPR skill acquisition, retention or performance.

RESULTS:

509 papers were identified of which 33 were relevant. There were no randomised controlled studies in humans (LOE 1). Two non-randomised cross-over studies (LOE 2) and four with retrospective controls (LOE 3) in humans and 20 animal/manikin (LOE 5) studies contained data supporting the use of feedback/prompt devices. Two LOE 5 studies were neutral. Six LOE 5 manikin studies provided opposing evidence.

CONCLUSIONS:

There is good evidence supporting the use of CPR feedback/prompt devices during CPR training to improve CPR skill acquisition and retention. Their use in clinical practice as part of an overall strategy to improve the quality of CPR may be beneficial. The accuracy of devices to measure compression depth should be calibrated to take account of the stiffness of the support surface upon which CPR is being performed (e.g. floor/mattress). Further studies are needed to determine if these devices improve patient outcomes.

PMID:
19477574
[PubMed - indexed for MEDLINE]