

Commentary

Retention, retention, retention: targeting the young in CPR skills training!

Lynn P Roppolo¹ and Paul E Pepe^{1,2}

¹Departments of Surgery/Emergency Medicine, University of Texas Southwestern Medical Center, 5323 Harry Hines Boulevard, Dallas, TX 75390-8579, USA

²City of Dallas Office of the City Manager and Office of Medical Emergency Services for Public Safety, Public Health and Homeland Security, Dallas, USA, 1500 Marilla Street, Dallas, TX 75201, USA

Corresponding author: Lynn P Roppolo, Lynn.Roppolo@UTSouthwestern.edu

Published: 9 September 2009

This article is online at <http://ccforum.com/content/13/5/185>

© 2009 BioMed Central Ltd

Critical Care 2009, **13**:185 (doi:10.1186/cc7997)

See related research by Fleischhackl *et al.*, <http://ccforum.com/content/13/4/R127>

Abstract

The usefulness of basic cardiopulmonary resuscitation (CPR) training in school systems has been questioned, considering that young students may not have the physical or cognitive skills required to perform complex tasks correctly. In the study conducted by Fleischhackl and coworkers, students as young as 9 years were able to successfully and effectively learn basic CPR skills, including automated external defibrillator deployment, correct recovery position, and emergency calling. As in adults, physical strength may limit the depth of chest compressions and ventilation volumes given by younger individuals with low body mass index; however, skill retention is good. Training all persons across an entire community in CPR may have a logarithmic improvement in survival rates for out-of-hospital cardiac arrest because bystanders, usually family members, are more likely to know CPR and can perform it immediately, when it is physiologically most effective. Training captured audiences of trainees, such as the entire workforce of the community or the local school system, are excellent mechanisms to help achieve that goal. In addition to better retention with new half hour training kits, a multiplier effect can be achieved through school children. In addition, early training not only sets the stage for subsequent training and better retention, but it also reinforces the concept of a social obligation to help others.

The prospective investigation conducted by Fleischhackl and coworkers [1], reported in the previous issue of *Critical Care*, sets out to determine whether young students have the physical and cognitive skills to implement cardiopulmonary resuscitation (CPR). In this investigation, the average time from the last class of CPR instruction to the evaluation session was 120 days. It is not clear whether such a large gap in time between initial instruction and skills testing may have affected testing performance, except that good performance could indicate good retention. Students tested also included those with special learning needs, which may skew the examination results in an unfavorable direction. Never-

theless, the outcomes were generally very good. As the investigators demonstrated, students as young as 9 years are able to effectively learn CPR skills, including automated external defibrillator deployment, correct recovery position, and emergency calling. As in adults, physical strength may have limited the depth of chest compressions and ventilation volumes, but perhaps the key finding was that skills retention was good.

These findings are consistent with other studies in which none of the students aged 9 to 10 years could compress the chest to the depth recommend by the guidelines, but 45% of students aged 13 to 14 years old could [2]. Studies also have found that with retraining, CPR performance can improve in school-aged children [3]. Although the study by Fleischhackl and coworkers [1] did not specifically address this retraining, it would have been interesting to know how well these students would have retained their learned skills several months later, because it is well known that CPR skills rapidly deteriorate after initial training [4].

Prompt initiation of CPR undoubtedly saves lives [5]. Intuitively, the higher the number of persons trained in CPR skills in a given community, the more frequently it is performed. For example, in Los Angeles, where the relative percentage of citizens trained in CPR is estimated to be relatively low, only a small percentage of bystanders performed CPR and just 1.4% of out-of-hospital cardiac arrest victims survived [6]. However, 10-fold improvements in survival rates (>15%) have been reported in Seattle, where the frequency of bystander-performed CPR is one of the highest in the nation [7]. Basic CPR is most effective when started immediately. Survival rates fall 7% to 10% for each

CPR = cardiopulmonary resuscitation.

minute without CPR [8]. In essence, one of the most effective means of improving surviving for out-of-hospital cardiac arrest is to attempt to train all individuals across a given community, and experience has shown that having captive audiences for training, such as in school systems, is a major component. When closely examining such numbers, the survival improvements are not linear but may actually be logarithmic.

Young children between the ages of 10 and 14 years only account for approximately 15% of the population in the USA [9], and they are not in the main target age group for CPR except for perhaps drowning incidents. However, there are multiple benefits from teaching school-aged children CPR beside the concept of capturing entire generations of CPR-trained citizens. Children older than 10 years of age are teachable and capable of abstract thought, and most have the coordination and physical strength to perform CPR. Moreover, strategies to teach CPR skills have now been simplified. The CPR kits that are currently being promoted by the American Heart Association are designed to train individuals who are as young as 8 years old in less than a half hour. It has been demonstrated that using such a kit that contains a self-instructional video and an inflatable manikin not only promotes retention but also has a multiplier effect. One study found that distributing CPR training kits to students aged 12 to 14 years resulted in another 2.5 persons trained per student [10]. Furthermore, early training can lay the foundation for a sense of social obligation and reinforce CPR knowledge and follow-up training, so that by the time a student graduates from high school CPR skills are well engrained and can easily be called upon in an emergency situation. If government agencies enforced mandatory age-appropriate CPR and first aid training in schools, similar to how schools practice evacuation and fire drills, then one could only imagine the impact this could have on the number of individuals capable of intervening in out-of-hospital cardiac arrest and, in turn, the number of lives saved.

Competing interests

The authors declare that they have no competing interests.

References

1. Fleischhackl R, Nuernberger A, Sterz F, Schoenberg C, Urso T, Habart T, Mittlboeck M, Chandra-Strobos N: **School children sufficiently apply life supporting first aid: a prospective investigation.** *Crit Care* 2009, **13**:R127.
2. Jones I, Whitfield R, Colquhoun M, Chamberlain D, Vetter N, Newcombe R: **At what age can schoolchildren provide effective chest compressions? An observational study from the Heartstart UK schools training programme.** *BMJ* 2007, **334**: 1201.
3. Van Kerschaver E, Delooz HH, Moens GF: **The effectiveness of repeated cardiopulmonary resuscitation training in a school population.** *Resuscitation* 1989, **17**:211-222.
4. Wilson E, Brooks B, Tweed WA: **CPR skills retention of lay basic rescuers.** *Ann Emerg Med* 1983, **12**:482-484.
5. Abella BS, Aufderheide TP, Eigel B, Hickey RW, Longstreth WT Jr, Nadkarni V, Nichol G, Sayre MR, Som margren CE, Hazinski MF: **Reducing barriers for implementation of bystander-initiated cardiopulmonary resuscitation: a scientific statement from the American Heart Association for healthcare providers, policymakers, and community leaders regarding the effectiveness of cardiopulmonary resuscitation.** *Circulation* 2008, **117**:704-709.
6. Eckstein M, Stratton SJ, Chan LS: **Cardiac Arrest Resuscitation Evaluation in Los Angeles: CARE-LA.** *Ann Emerg Med* 2005, **45**:504-509.
7. Rea TD, Eisenberg MS, Culley LL, Becker L: **Dispatcher-assisted cardiopulmonary resuscitation and survival in cardiac arrest.** *Circulation* 2001, **104**:2513-2516.
8. Valenzuela TD, Roe DJ, Cretin S, Spaite DW, Larsen MP: **Estimating effectiveness of cardiac arrest interventions: a logistic regression survival model.** *Circulation* 2001, **96**:3308-3313.
9. US Census Bureau, PD: **Annual estimates of the resident population by sex and five-year age groups for the United States: April 1, 2000 to July 1, 2008.** [<http://www.census.gov/popest/national/asrh/NC-EST2008-sa.html>]
10. Isbye DL, Rasmussen LS, Ringsted C, Lippert FK: **Disseminating cardiopulmonary resuscitation training by distributing 35,000 personal manikins among school children.** *Circulation* 2007, **116**:1380-1385.