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Review article

Comparing the effect of self-instruction with that of traditional instruction in basic life support courses—A systematic review☆

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ABSTRACT

Aim: The efficacy of learning basic life support (BLS) through self-instruction is not clearly understood. The aim of our review was to compare the effect of self-instruction with that of traditional instruction on learners taking BLS courses.

Methods: We searched the Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, CINAHL, PsycInfo and SCI-EXPANDED databases for randomized control trials (RCTs) or randomized cluster-controlled trials published from January 1, 1966 to April 25, 2015 which compared self-instruction with traditional instruction in BLS courses. Characteristics, participants, design and outcomes of included studies were extracted.

Results: The search yielded 2119 unique articles, of which 19 RCTs and 3 randomized cluster-controlled trials were included. The learners were different across studies, including laypersons, parents and caretakers of children, university or high school students, medical, pharmacy and nursing students, and practicing nurses. Self-instructional material included DVD, videotapes, on-line learning or interactive computer programs accompanied with synchronous or asynchronous hands-on practice. There were no studies comparing clinical outcomes between the different instructional methods. In evaluating skill performance, there was variability among studies in the skill assessment tools utilized and time of assessment. Nevertheless, the most frequent conclusion of these studies was that self-instruction had similar performance compared with traditional courses. Four studies which measured cognitive knowledge outcomes all demonstrated similar outcomes between the two methods.

Conclusion: Although it remains inconclusive about which is superior between the two methods, considering the potential to train many more rescuers and to reduce resource utilization, well-designed self-instruction with hands-on practice may be an alternative to traditional BLS courses.

Introduction

The survival rate of patients receiving bystander cardiopulmonary resuscitation (CPR) immediately after cardiac arrest is 2–4 times higher than that of patients who do not receive bystander CPR.[1] Nevertheless, in most areas, only a minority of out of hospital cardiac arrest victims receive bystander CPR.[2,3] To improve survival of victims with cardiac arrest, it is important to increase rates of bystander CPR in the community. In addition, high-quality CPR performed by healthcare providers is essential to improve outcomes.[4] Therefore, it is also needed to enable the rescuers to perform high-quality CPR when resuscitation starts. The International Liaison Committee on Resuscitation (ILCOR) proposed the concept of the formula for survival and suggested educational efficiency was one of three multiplicands which would affect the survival (Fig. 1).[5,6] Teaching more potential rescuers CPR and giving them the ability to perform high-quality CPR through more efficient edu-

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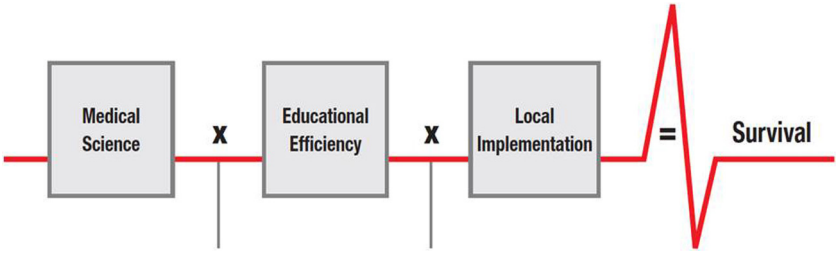

Fig. 1. The Utstein formula for survival, suggesting 3 essential components which affect the survival. Redrawn from Ref. [6], with permission from Elsevier, www.resuscitationjournal.com.

cational methods may ultimately improve the rates and the quality of bystander CPR, and help save more lives.[7]

Instructor-led basic life support (BLS) courses are delivered to increase the number of individuals who know how to perform CPR thereby increasing rates of bystander CPR. Such traditional BLS courses have many disadvantages. The training capacity of traditional courses is limited by the availability of instructors and other logistical/financial considerations. One study found that inconvenience was one of the main reasons that students did not take BLS courses.[8] During the courses, the learners may also have psychological barriers and distractions to learning in a classroom environment, such as learning and performance anxiety in an unfamiliar setting. The limited time for manikin-based practice leave trainees unfamiliar with the psychomotor CPR skills.[9] In addition, inconsistency of instruction in traditional courses was also found,[10] and may be a concern for future performance of CPR when required. It was noted that some instructors did not teach according to the defined curricula and failed to correct errors accurately and consistently when learners were practicing CPR. The above disadvantages could limit the number of the trained individuals, as well as the retention and competency of CPR skills. Therefore, novel approaches to CPR instruction that are consistent, effective and convenient may help train more potential rescuers with adequate skills.

To overcome the disadvantages of traditional CPR courses, self-instruction courses were developed. Such self-instruction courses usually include a short video, or a game program on a website, and a manikin with or without automated feedback for learners to perform hands-on practice. The self-instruction courses did not require instructors and some could allow learners to learn CPR at home. Such teaching methods have the potential to improve training capacity and theoretically enable mass training. Nevertheless, before replacing traditional courses with self-instruction, a greater understanding of the literature around one critical question may be important: is the learning from CPR self-instruction equivalent to that of a traditional instructor-led method? Thus, the aim of our systematic review was to evaluate all randomized control trials (RCTs) or randomized cluster-controlled trials that compared the effect of self-instruction with that of traditional instruction on learners who were taking BLS courses in an educational setting.

Material and methods

Selection criteria and searching strategy

We conducted a systematic review in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) guidelines,[11] using a predetermined protocol. We only included RCTs or cluster-randomized controlled trials to compare the effect of self-instruction with that of traditional instruction on learners in BLS courses. We excluded studies involving advanced life support (ALS) courses whether they related to adults, children, neonates or trauma patients. Studies without a concurrent comparator group, and studies in which hands-on practice was not performed in the self-instruction group were also excluded. Hands-on practice allowed learners to develop their psychomotor skills of CPR and was also the essential component of the traditional BLS courses. Therefore, to make the two different instruction methods more comparable, we only included studies in which self-instruction had hands-on practice. The outcomes included clinical outcomes of victims with cardiac arrest, including the rate of return of spontaneous circulation (ROSC), skill performance in actual resuscitations, pass rate on a skills test, scores on a cognitive knowledge test, and individual performance of CPR skills, including compression depth, compression rate, complete release, hand position and ventilation volume, both at course conclusion or on a retention test.

We used the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, CINAHL, PsycInfo and SCI-EXPANDED to search for studies with the terms associated with CPR, BLS, education and self-instruction. The American Heart Association (AHA) published the first guidelines of CPR in 1966,[12] and thus we limited the search to papers published after 1966. The detailed search strategy is shown in Appendix A in Supplementary materials. The final search was conducted on April 25, 2015. There was no language or publication restriction. We also reviewed the references of included articles to identify other potentially relevant studies. After removing duplicates, two authors (MJH and MHM) independently screened the title, abstract and keywords of every record to determine which articles were required for full-text assessment. The article would receive full-text assessment if any author determined that it was needed. After the articles were determined to be included after full-text assessment, data in these articles was extracted by two authors independently, including details of study subjects, country, publication year, training status of the learners, training methods, evaluation methods, outcomes and funding sources using a standard data extraction form specifically adapted for this review.

Quality assessment

The two authors independently assessed each included study using the "Cochrane Collaboration's tool for assessing risk of bias" and the "Medical Education Research Study Quality Instrument (MERSQI)".[13,14] The MERSQI is numeric scale designed for educational studies, ranging from 5 to 18. The authors of the MERSQI scale did not define a cut-off value to differ methodically "good" studies from "less good studies". If there were differences in opinion between the two authors, a discussion was held to achieve consensus.

Results

From the initial search strategy a total of 3271 records were retrieved across the databases. We removed 1155 duplicates and excluded 2027 irrelevant articles after reviewing the titles and