Retention of basic life support knowledge, self-efficacy and chest compression performance in Thai undergraduate nursing students

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ABSTRACT

This study explored the retention of basic life support knowledge, self-efficacy, and chest compression performance among Thai nursing students at a university in Thailand. A one-group, pre-test and post-test design time series was used. Participants were 30 nursing students undertaking basic life support training as a care provider. Repeated measure analysis of variance was used to test the retention of knowledge and self-efficacy between pre-test, immediate post-test, and re-test after 3 months. A Wilcoxon signed-rank test was used to compare the difference in chest compression performance two times. Basic life support knowledge was measured using the *Basic Life Support Standard Test for Cognitive Knowledge*. Self-efficacy was measured using the *Basic Life Support Self-Efficacy Questionnaire*. Chest compression performance was evaluated using a data printout from Resusci® Anne and Laerdal skillmeter within two cycles. The training had an immediate significant effect on the knowledge, self-efficacy, and skill of chest compression; however, the knowledge and self-efficacy significantly declined after post-training for 3 months. Chest compression performance after training for 3 months was positively retaining compared to the first post-test but was not significant. Therefore, a retraining program to maintain knowledge and self-efficacy for a longer period of time should be established after post-training for 3 months.

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Introduction

Effective cardiopulmonary resuscitation (CPR) in first few minutes can better the chance of survival of cardiac arrest victims (Berg et al., 2010). During hospital cardiac arrest, the triggers of CPR activation are usually detected and managed by nurses (Kardong-Edgren et al., 2010; Roh et al., 2014). Similarly, nursing students regularly practice in clinical settings and have to provide care for patients at risk of cardiac arrest. However, lack of resuscitation competencies has been reported among nursing students (Madden, 2006; Oermann et al., 2011), as it has been for other healthcare professions (Oermann et al., 2010). This issue may be related to evidence suggesting that resuscitation knowledge and skills rapidly deteriorate over time, even with recent optimal training (Ackermann, 2009; Hamilton, 2005).

Background

The incidence of cardiac arrest in the US in 2013 cardiac arrest statistics reported by American Heart Association (AHA), was estimated at 209,000 cases in hospitals (Go et al., 2013). The survival rate to hospital discharge of adult victims was 23.9% (Go et al., 2013). The survival rate from cardiac arrest can be improved with high-quality CPR (Abella et al., 2005; Meaney et al., 2013).

Nurses' competence in basic life support (BLS) is a key factor determining the survival of cardiac arrest patients (Hemming et al., 2003; Madden, 2006) because nurses are regularly the first responders to deal with in-hospital cardiac arrest (Kardong-Edgren et al., 2010; Roh et al., 2014; Xanthos et al., 2012).

BLS performance involves a spectrum of cognitive knowledge and psychomotor retention skills (Broomfield, 1996). CPR knowledge in relation to standard care is fundamental in effective resuscitation performance. However, the existing literature has shown that the quality of CPR among nurses and nursing students is inferior to the standards of care (Madden, 2006; Mäkinen et al., 2010; Oermann et al., 2011; Roh and Issenberg, 2013). In the 2010 AHA guidelines for CPR, emphasis was placed on high-quality CPR,

particularly with regard to the following: "Push hard, push fast," "allow the chest to completely recoil each time there is a chest compression", and "*minimal interruption of chest compression*" (Berg et al., 2010). In Thailand, CPR training is affiliated with The Heart Foundation of Thailand and follows guidelines recommended by the AHA. Tests on CPR knowledge are one of the criteria for being certified in the resuscitation training for care providers.

Self-efficacy is one of the predictors of resuscitation skill competence (Turner et al., 2009). Self-efficacy can be described as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura, 1994, p 71). Perceived self-efficacy in relation to BLS in this study was defined as the judgment of the nurses' ability to save a victim's life through BLS. A recent study analyzed self-efficacy as an outcome of BLS training programs for nursing students using case simulation (Akhu-Zaheya et al., 2013). It was found that nursing students had better scores on their BLS knowledge and self-efficacy perception after the training. Further, the nursing students that performed correct chest compression reported higher self-efficacy (Roh and Issenberg, 2013). In this study, self-efficacy in BLS was also evaluated for its retention after training.

Typically, the retention of CPR knowledge and skills is an issue. CPR knowledge and skills decline rapidly after training (Ackermann, 2009; Hamilton, 2005; Moser and Coleman, 1992; Oermann et al., 2010). The appropriate time frame, according to Hamilton, for sustainable BLS knowledge and skills is three to six months (Hamilton, 2005). Further, CPR psychomotor skills deteriorate even more quickly than knowledge (Hamilton, 2005). Practice in these skills is significant in terms of maintaining competency; although nursing students and registered nurses seem to be certified in BLS every two years (Oermann et al., 2010) they may not deal with cardiac arrest victims during this time frame, and this lack of practice after training can bring about CPR psychomotor skill declination (Oermann et al., 2011).

In Thailand, BLS training for undergraduate nursing students is essential because they may have to deal with cardiac arrest situations. The author's school of nursing for example has incorporated modified BLS training in the 4th year of the undergraduate students' training for many years, and they must be certified in BLS for care providers. The criteria for certification include achievement on the written examination of more than eighty percent, and passing the BLS skill performance evaluation using the guidelines recommended by the AHA. However, the nursing students are only evaluated for their knowledge and performance at one point in time immediately after the training. To date, there is no regulatory mandate for re-certification in BLS courses for Thai nurses during a certain period of time. In the Thai context, there is relatively limited empirical evidence that indicates the effectiveness of the BLS programs or the lasting effects of those programs on knowledge, self-efficacy, and skill performance. This study would be beneficial for establishing a guideline for a BLS retraining course.

Study purpose

The purpose of this study was to examine the retention of BLS knowledge, self-efficacy, and chest compression performance of Thai undergraduate nursing students completing a BLS course at three stages, pre-test, immediately post-test, and re-test at 3 months after training.

Research design

Design

This study employed a one-group, pre-test and post-test design time series.

Participants

Random sampling using a computer program was used to select 30 participants from 180 senior nursing students at the undergraduate level undertaking a modified basic life support course at the Ramathibodi School of Nursing, Mahidol University, Bangkok, in 2012. Students were required to take a one-hour lecture on the theoretical knowledge of BLS in the subject of emergency nursing and practice BLS in the subject of community health nursing. These were required courses for 3rd year nursing students approximately one year before attending the modified BLS course.

Calculation of optimal sample size was based on the effect size (0.86) from Madden's (2006) study of the retention of CPR cognitive knowledge among Irish nursing students. Regarding the adequate sample size needed for power at 0.80 in a single group repeated measures, $\alpha = 0.05$, medium correlation, medium effect size (0.35), and 3 times measurement, should be 30 cases per group (Stevens, 2002).

Participants were contacted via mobile phone, and they were asked to join in this study. They received a full explanation of the purpose of the study and the data-collection process, and all were willing to join the study.

Program intervention

The Modified Basic Life Support Course (MBLSC) is one-day program involving theoretical knowledge and a practical session. Parts of advanced cardiovascular life support (ACLS), including post cardiac arrest care and drug management, and nursing roles for advanced airway management and defibrillation, were added to the MBLSC.

This program was conducted by the Cardiopulmonary Resuscitation (CPR) Training Center, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, which is affiliated with The Heart Association of Thailand under the Royal Patronage of His Majesty the King. The course instructors comprised doctors and nurses, specialists in CPR and certified in BLS, and ACLS instructors. The core content of the program was consistent with the 2010 BLS guideline recommended by the AHA (Berg et al., 2010). The course consisted of the following:

a. watching a one-hour video on guided BLS practice;
b. twenty minutes of practice rotating across four stations, including CPR for 1−2 adult rescuers, CPR for infants and children, relief of choking, and automated electrical defibrillator (AED); and
c. a thirty-minute practice rotating in four stations, including post-cardiac care and drug management, airway management, electrical therapy, and simulated case scenario (megacode and team concept).

The training course was conducted in a quiet classroom.

Data collection

The three instruments are described below:

1. *Basic Life Support Standard Test for Cognitive Knowledge* (*BLSCK*) is a 25-item multiple-choice test with four choices each. This instrument was a Thai version of the standard test for care providers developed by The Heart Association of Thailand using the 2010 BLS guidelines recommended by the AHA (Berg et al., 2010). Examples of items are: (1) "If you were asked to help a Thai male 60 years old with no breathing and loss of conscious, but that had no history of an accident, what should you do first