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The effects of music on the cardiac resuscitation education of nursing students

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ABSTRACT

Purpose: The purpose of this study is to examine the effects of music on the appropriate performance of the rate and depth of chest compression for nursing students.
Methods: This randomized controlled study was conducted in the School of Nursing in Turkey between November 2014 and January 2015. The study's participants were second-year nursing school students with no previous formal cardiac resuscitation training (n = 77). Participants were randomly assigned to one of two groups: an intervention group with music and a control group without music. During practical training, the intervention group performed chest compressions with music. The outcomes of this study were collected twice. The first evaluation was conducted one day after CPR education, and the second evaluation was conducted six weeks after the initial training.
Results: The first evaluation shows that the participants in the intervention group had an average rate of 107.33 ± 7.29 chest compressions per minute, whereas the rate for the control group was 121.47 ± 12.91. The second evaluation shows that the rates of chest compression for the intervention and control groups were 106.24 ± 8.72 and 100.71 ± 9.54, respectively.
Conclusion: The results of this study show that a musical piece enables students to remember the ideal rhythm for chest compression. Performing chest compression with music can easily be integrated into CPR education because it does not require additional technology and is cheap.

1. Introduction

After cardiac arrest, ischemic injuries occur in the brain and heart within the first few minutes. Survival rates after the arrest depend on the immediate and effective application of basic and advanced life support (Paal et al., 2012). Immediate and correctly performed cardiopulmonary resuscitation (CPR) prevents neurological deficits and increases the quality of life of individuals after sudden cardiac arrest (Abella et al., 2005a; Lee and Low, 2010; Paal et al., 2012; Rawlins et al., 2009). Because of this, CPR is an important life-saving technique that increases survival rates by two to three times (Hafner et al., 2012, 2015; Matlock et al., 2008), especially when chest compression is performed correctly (Abella et al., 2005a; Rawlins et al., 2009).

The American Heart Association (AHA) states that since tissue perfusion during CPR is completely tied to chest compression, such compression should be prioritized in CPR (Berg et al., 2010). The primary condition for increasing a patient's survival rate and ensuring the efficacy of CPR is to perform chest compression at a constant rate (Hafner et al., 2012, 2015; Matlock et al., 2008) and to limit the number of discontinuations as much as possible (Rawlins et al., 2009). An inadequate number of chest compressions decreases the survival rate (Woollard et al., 2012), whereas excessive chest compression results in stretching the sternum and negatively influences blood volume returning to the heart (Zhou et al., 2014). Accordingly, CPR guidelines suggest between 100 and 120 chest compressions per minute (AHA, 2015) in order to maintain blood flow after cardiac arrest (Wik et al., 2005).

1.1. Background

Existing studies on CPR reveal that it remains ineffective (Hafner et al., 2012, 2015; Naushaduddin et al., 2010; Paal et al., 2012) due to the fact that the number of chest compressions is

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lower or higher than the numbers suggested in AHA guidelines (Abella et al., 2005a; France et al., 2006; Hunt et al., 2009; Perkins et al., 2008; Wik et al., 2005; Zhou et al., 2014). Besides, the guidelines of the AHA (2010), Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) have not been transitioned into clinical practice (Hafner et al., 2012; Zhou et al., 2014). A study by Abella et al. (2005b) found that the number of chest compressions per minute for patients with cardiac arrest was below 90. On the other hand, a study by Wik et al. (2005) on paramedics and nurses found the number of chest compressions to be over 120. Therefore, educating health personnel on how to apply effective CPR is extremely important (Rawlins et al., 2009).

The CPR education of nurses who frequently encounter cardiac arrest is exceedingly important and compulsory (Hamilton, 2005). However, the skills gained during CPR education are not long lasting (Hamilton, 2005), and health personnel are not able to, or are not aware of, performing the suggested number of chest compressions (Hafner et al., 2012). Considering this, nurses should be educated with the most recent and appropriate knowledge about resuscitation and be able to put this theoretical knowledge into practice (Sullivan et al., 2015). Since lectures on CPR education are part of undergraduate programmes for nursing students, the CPR-related skills of these students have been frequently observed. However, these studies note that theoretical knowledge and skills are forgotten over time. The case is no different for graduates of nursing programs (Madden, 2006; Dal and Sarpkaya, 2013).

Performing the recommended number of chest compressions per minute during CPR training may be a hard task (France et al., 2006; Rawlins et al., 2009). In order to overcome this difficulty and to find the required rhythm, various techniques have been suggested, including music and the use of metronomes (Hafner et al., 2015; Matlock et al., 2008; Naushaduddin et al., 2010; Paal et al., 2012; Rawlins et al., 2009). For this purpose, popular songs have been used worldwide (Matlock et al., 2008) in the application of CPR. One of these songs used to apply the appropriate rhythm for CPR is entitled "Stayin' Alive", by the Bee Gees (Hafner et al., 2015; Rawlins et al., 2009; Woollard et al., 2012). Other music used widely to assist CPR rhythm includes "Nellie the Elephant" and "Macarena" (Oulego-Erroz et al., 2011; Rawlins et al., 2009). Since neither the rhythm nor emphasis changes for these songs, they create the effect of a mental metronome and can be easily remembered (Hafner et al., 2012, 2015; Matlock et al., 2008; Oulego-Erroz et al., 2011; Rawlins et al., 2009; Woollard et al., 2012).

Various studies exist on the use of music in CPR in the context of the education of medical students, paramedics, and students from non-health-related fields. Hafner et al. (2012) and Matlock et al. (2008) used "Stayin' Alive" during the CPR training of health personnel and medical students. Both studies show that music helped the participants perform the ideal chest compression rate (Hafner et al., 2012; Matlock et al., 2008). After watching a CPR education video using the music for "Stayin' Alive", Naushaduddin et al. (2010) stated that chest compression rates of emergency nurses and doctors were 117.3 per minute. Similarly, a study by Oulego-Erroz et al. (2011) on students aged 13–14 showed that music helped the students reach ideal chest compression rates. Hafner et al. (2015) found that the use of pop music such as "Stayin' Alive" to establish the appropriate chest compression rhythm was effective among university students. These studies show that music helped the participants perform the ideal chest compression rate. However, no studies on music's effect on chest compression rates has been conducted among nursing students who received CPR education for the first time. We predict that developing musical memory will be easier for participants who have learned to perform CPR for the first time. This study aims to analyze the short- and long-term impact of musical memory on the appropriate performance of the rate and depth of chest compression for nursing students who receive CPR education for the first time.

2. Methods

2.1. Study design and setting

This research was planned and conducted as a randomized controlled trial. The study was conducted in the School of Nursing in Turkey between November 2014 and January 2015. There are different nursing education systems in Turkey. An integrated education model is used in the nursing school where the study was conducted. The curriculum consists of committees. The first-year committees are interested in four basic nursing concepts (e.g., the structure and nature of the human body, society and the environment). The second and third year committees are structured according to bodily systems such as the heart and circulatory system and the digestive system. An internship programme is implemented in the fourth year of nursing education. Theoretical and applied lessons for CPR are given during the second year within the context of the heart and circulatory system. Therefore, participants in this study were second-year nursing students.

2.2. Sample size

The sample size was calculated by using the power and sample size software package (G* Power 3.1.7, Franz Faul, Kiel University). Predicting that the ideal number of chest compressions (100–120 compressions per minute) would be 80% for the intervention group and 40% for the control group, we calculated the inclusion of at least 27 nursing students for each group in order to achieve 80% power with a confidence interval of 95%. However, all voluntary students were included in the study, so none of them could be excluded.

2.3. Randomization and blinding

Block randomization was used to randomize the participants. Computer-generated numerical tables were used to randomize the students, who were divided into two categories based on their place on the class list. Because most of the academic staff evaluated the CPR during practice sessions of the CPR education, it was not possible to apply blinding among academic staff.

2.4. Participants

The participants in this study included second-year students from a university nursing school (n = 77). While 77 students agreed to participate initially, 75 continued to participate six weeks after the study had started. Thirty-nine students were included in the intervention group, whereas 38 students comprised the control group (Fig. 1).

2.5. The intervention

Prior to the start of the study an emergency service medical doctor gave the participants a theoretical two-hour lecture on CPR based on the 2010 version of the AHA guidelines (AHA, 2010). The same specialist gave an applied CPR lesson using a traditional CPR mannequin.

Following theoretical education, the students received two hours of practical training in different classes based on their groups. During this practice, the intervention group watched a video of a lecture on CPR with music, and performed chest compressions with music. This study used the song "Stayin' Alive",

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