Performance Accuracy of Cardiopulmonary Resuscitation Techniques during Simulated Cardiac Arrest

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Context: Sudden cardiac death is an extraordinary scenario for the healthcare practitioner. Timely engagement is essential when performing potentially life-saving cardiopulmonary resuscitation (CPR). For the Certified Athletic Trainer (ATC), the addition of protective football equipment (i.e., helmet/facemask and chest protector/shoulder pads) presents a unique challenge. Objective: The purpose of this study was to investigate CPR accuracy during simulated cardiac arrest of a football player. A second objective was to investigate if protective football equipment impedes the performance measures consistent with effective CPR techniques. Design: Randomized crossover study. Setting: A clinical simulation laboratory at a medical school located in the northeastern United States was used for data collection. Subjects performed CPR sequences on a Laerdal SimMan® 3G interactive manikin simulator. Participants: This exploratory study included 10 BOC® certified athletic trainers (6 male, 4 female) with an average of 4.8 years of experience (SD=1.54). The average age of the participants was 23.6 years (SD=2.91; range 22-31). Evidence of professional level rescuer CPR training within six months prior to data collection was required. This study received institutional review board approval and all subjects provided their consent to participate. Interventions: Each subject was given a standardized rescuer scenario and asked to perform three sequences of CPR for two minute cycles under various test conditions. Baseline data was captured on each subject during a 2-minute repeated cycle CPR sequence. The experimental conditions were randomized and included 2-minute sequences of CPR performed both over protective football shoulder pads and under the unlaced pads, respectively. Subjects were required to adhere to the 2010 American Heart Association guidelines for performing CPR (initiation of thirty chest compressions at a rate of 100/minute to a 51 millimeter [2-inch] depth). Main Outcome Measures: The dependent variables included average compression depth (mm), average compression rate (per minute), percentage of time chest wall appropriately recoiled and percentage for hands-on contact during cardiac compressions. Results: The following means were reported: 37.99 mm (SD=7.81) compression depth achieved; 114.8 compressions per minute (SD=12.68) performed; 97.63% (SD=7.35) of time appropriate chest recoil was attained; and 99.16% (SD=1.62) of time on-chest contact was made throughout compression sequence. Conclusions: These findings revealed that the participants allowed for proper chest recoil while maintaining appropriate hand position throughout each trial sequence. Subjects did not achieve the recommended depth (51mm) for adequate chest compressions and were observed to perform such compressions at a rate faster than the prescribed guidelines. Even though adequate chest recoil was accomplished, shallow compression depths would have a negative effect on cardiac output. Research suggests significant CPR skill degradation is inevitable. Alternate CPR training
methods utilizing various instructional modalities could improve skill retention for out-of-hospital providers performing such lifesaving techniques.  Word Count: 442.