Colorado Science and Engineering Fair

2024 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Tourniquets: Using Medical Instructions to Prepare for School Shootings

Finalist's Name: Garrett Rymer

School and City: Cherry Creek High School, Greenwood Village

Sponsor's Name: Ethan Dusto

Category: Biomedical Sciences (BMED)

Division: Senior (9th - 12th grades)

Abstract (250 words or less):

With the continued rise of firearm-related homicides in American schools, many institutions are searching for methods of improving preparedness for school shootings. One solution implemented in Colorado's Cherry Creek School District (CCSD) is to make emergency supplies accessible in every classroom, including a windlass combat tourniquet. However, few students or faculty members are aware of these resources, and even fewer are medically trained to apply a windlass tourniquet. Previous research has determined that prehospital tourniquets greatly improve the survival rate of patients who experience massive hemorrhage in the arms or legs. Furthermore, victims of extremity gunshot wounds have been found to be strong candidates for tourniquet application. The purpose of this study was to determine if providing medical instructions would enable participants to apply a more effective tourniquet to a simulated bleed. Participants were randomly sorted into three groups, the first receiving no instructions and the second and third groups receiving video and paper instructions, respectively. Upon receiving a windlass tourniquet and instructions, if applicable, participants were asked to apply the tourniquet to a bleeding simulator and were assessed for both the time and quality of their application. Participants provided with paper instructions were found to have the lowest mean application time of 90 seconds. This value was substantially lower than the mean for participants supplied with no and video instructions, which was found to be 135 and 107 seconds, respectively. However, high variation within each group precluded both t-test and ANOVA analyses from finding statistical significance. While this study was unable to identify an ideal format of instructions for tourniquet efficacy, the findings indicate that providing untrained good samaritans with paper instructions is highly unlikely to decrease the efficacy of their application, and may assist those who are unfamiliar with tourniquets. As a result, progress is underway for CCSD to implement an instructional pamphlet among the emergency supplies in each classroom.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature: Date:

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES o all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.