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INCORPORATION OF CIVILIAN CARE IN EMERGENCY MEDICINE:  
RETAINMENT OF TRAINING AND FAMILIARIZATION OF RESOURCES AT THE  
UNIVERSITY OF MAINE

by

Courtney J. Jurson

A Thesis Submitted in Partial Fulfillment  
of the Requirements for a Degree with Honors  
(Kinesiology)

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University of Maine

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## ABSTRACT

According to statistics by the American Heart Association, there are 475,000 deaths from cardiac arrest every year with more than 350,000 of them happening outside of the hospital. The only chance of a victim of sudden cardiac arrest to survive is a bystander rapidly starting cardiopulmonary resuscitation (CPR), contacting emergency services for assistance, and acquiring an automated external defibrillator (AED).

This research recruited participants affiliated with the University of Maine campus and divided them into two groups: those who are required to have CPR/AED training for their affiliation and those who were not required these trainings. All participants then took a survey to look at their confidence and familiarization with CPR/AED and their knowledge of AEDs on campus.

It is hoped this study will result in an increased amount of individuals on the University of Maine in Orono campus becoming CPR and AED certified as well as opportunities for current certification holders to expand their confidence in their CPR/AED abilities. In addition, steps will hopefully be taken to provide information of AED locations to more people on campus via course, maps, and dispatch-assisted AED locationing.

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## INTRODUCTION

Even with the use of light-and-siren responses, it takes time for emergency medical personnel to respond to an incident. Nationally, the response time to an incident is, on average, seven minutes (Bogle et al., 2013). This reason alone points to the importance of laypersons needing training in providing necessary care until medical personnel arrive. One of the two most important tasks laypersons can provide while waiting for emergency services to arrive is immediate cardiopulmonary resuscitation (CPR) on a victim of cardiac arrest. The second lifesaving step a layperson can complete is locating and performing early defibrillation using a nearby automated external defibrillator (AED). Additionally, if an incident involves severe bleeding, civilians can stop massive external hemorrhage on a extremity wound via the use of a tourniquet. These three critical components of CPR, AED usage, and placement of a tourniquet by laypersons have been shown to increase survival rates and lead to better patient outcomes (Kabaroff et al., 2013; Geri et al., 2017; Park et al., 2017; Weisfeldt et al., 2010).

The 2017 American Heart Association CPR & AED Guideline defines cardiac arrest as “the abrupt loss of heart function in a person who may or may not have diagnosed heart disease.” This sudden arrest is caused by failure of the electrical processes of an individual’s heart. When the heart fails in this manner, an abnormal heart rhythm known as an arrhythmia occurs. People who have a history of myocardial infarctions due to the scarring or enlargement of the heart that occur are more prone to cardiac arrest. Also, individuals with high blood pressure, heart failure, or cardiomyopathy (which is thickening of the heart muscle) have a higher risk of cardiac

arrest. Heart medications can also adversely cause hemostatic changes within the body leading to an arrhythmia. Despite common belief, cardiac arrest affects individuals throughout the lifespan. This is due to known or unknown congenital blood vessel or electrical abnormalities. Recreational drug use can cause sudden cardiac arrest as well (American Heart Association. <http://www.heart.org>).

Every year, 350,000 out-of-hospital cardiac arrests (OHCA) occur in the United States with over 90% leading to death. However, research (Park et al., 2017; Geri et al., 2017; Van Hoeyweghan et al., 1993; Viereck et al., 2017) points to rapid initiation of bystander CPR and early defibrillation as factors in increasing survival to hospital, survival to hospital discharge, and survival with good neurological outcomes by double or triple the amount. This is due in part by the chance of survival decreasing 10% for every minute defibrillation is not initiated.

Tourniquets used to be considered last resort devices for massive external hemorrhage. However, the beneficial properties of tourniquets have recently been proven through research and their usage on the battlefields in Iraq and Afghanistan for bullet wounds. The previous understanding was placement tourniquets resulted in significant nerve and muscle tissue damage requiring the victim's limb to be amputated. Now, as discussed by Doyle and Taillac in their 2008 article on expanding tourniquet use prehospitally, tourniquets are advantageous by "reducing blood loss and thereby preserving vital oxygen-carry capacity will lessen complications, such as adult respiratory distress syndrome and multisystem organ failure" (p. 248). Approximately, 5 million deaths in the United States every year are the result of exsanguination, which is blood loss significant enough to cause death. Therefore, if more laypersons were trained

in the basic procedure of tourniquet placement, it is estimated that 16% or 800,000 deaths of the 5 million could be prevented in result of effective hemorrhage control (Kabaroff, 2013).

Nonetheless, research (Swor et al., 2006) shows a majority of laypersons are not trained or have lost the ability to perform CPR. Reasons for this inability include retention issues or the length of time since their last training. A study done by Bogel et al. in 2013 found that “a large percentage of university students were able to identify CPR and an AED from images and that a large portion of participants had been trained in CPR or AED but comfort with AEDs or CPR was relatively low” (p. 840). Furthermore, due to its past reputation as a last resort device and recent change to a life-saving device prehospitally, a low number of laypersons have the knowledge of placing and/or have access to a tourniquet.

In conclusion, all of the skills for CPR, AED usage, and tourniquet placement can be taught in classes and are required for some places of employment or participation. Therefore, the primary focus of this research project questions if the University of Maine requires affiliated individuals who have higher risk of needing CPR/AED training to take these classes. The secondary questions include, if they are being appropriately trained, is the information provided being retained, as well as do these individuals know the location of important resources on campus.

## LITERATURE REVIEW

### Review On CPR

Cardiopulmonary resuscitation, or CPR, is a means of keeping someone's heart pumping and thus keeping oxygenated blood flowing through vital organs within the body. Research and practices of resuscitation began with mouth-to-mouth breathing in the mid-1700s on drowning victims. However, it was not until the 1900s when chest compressions, as we know of them today, were used for human resuscitation. From this point on, CPR research has continued to grow and CPR performance has been altered with a goal of increasing a victim's chance of survival. Initially, cardiopulmonary resuscitation was only taught to physicians until the late 1900s when standardized training for bystanders and non-healthcare professional was created (American Heart Association). This review will discuss CPR research and the different components which are discussed including the benefits of bystander CPR versus no bystander CPR, continuous versus interrupted chest compression, and the level of retention of CPR trainings.

Every year, 350,000 out-of-hospital cardiac arrests (OHCA) occur in the United States with over 90% leading to death (Benjamin et. al, 2017). When people go into cardiac arrest outside the hospital, there are not the resources and personnel immediately trained to start interventions like there are in hospitals. The only people who can help in an OHCA are those effectively trained and comfortable in their abilities of performing CPR. With early and effectual bystander CPR, research shows survival rates increase, which shows the importance of people being trained in CPR (Park et al., 2017; Brown et

al., 2015; Geri et al., 2017; Van Hoeyweghen, et al., 1993). Bystander CPR research also compares the survival rates of individuals who received bystander CPR and those who waited for EMS arrival for CPR to be initiated. In addition, studies have compared the differences between bystanders being trained in traditional CPR (with both compressions and breaths) to compressions-only CPR.

### Benefits of Bystander CPR

In the 2013 article by Bogle et al. in the *Emergency Medicine Journal*, it is noted that “CPR is only performed by bystanders in 32% of OHCA cases” (p. 837). There are many reasons behind bystander CPR not being initiated including the cardiac arrest being unwitnessed, a bystander with no CPR training witnessing the event, or a bystander with knowledge of CPR but not either knowing it is the appropriate time to begin CPR or not feeling comfortable doing CPR. In a study Geri et al. completed in 2017, it was shown bystander CPR increases “survival to hospital admission by 16%, survival to hospital discharge by 26%, and five-year survival to 30%” (p. 133). The study by Park et al. (2017) found similar increases in survival, as well as good neurological outcomes being about 5% higher in patients after bystander CPR. In addition, multiple sources (Brown et al., 2014; Odegaard et al., 2006; Souchtchenko et al., 2012) point to bystander CPR as beneficial in preserving both adequate cardiac perfusion as well as extending shockable cardiac rhythms, including ventricular fibrillation. This provides the time for a layperson to locate an automated external defibrillator (AED) or EMS providers to arrive with one.

## Continuous vs Interrupted Chest Compression

Over time, the recommended ratio of compressions to ventilations has changed from 15:2 to 30:2 (American Heart Association). Recent studies have also pointed to continuous chest compression and no ventilations during bystander CPR (Brown et al., 2015; Odegaard et al., 2006; Souchtchenko et al., 2013). The justification for continuous chest compressions is multifaceted. First, continuous chest compression (CCC) also known as Hands-Only CPR can easily be taught to untrained layperson quickly. Bystanders do not need to remember a ratio during a stressful situation and only to “push hard and fast in the center of the victim’s chest” (American Heart Association).

Another rationale for CCC is its ability to sustain cardiac perfusion pressure (CPP). CPP is the adequate pressure needed in the heart to pump blood through the coronary arteries to oxygenate the heart itself. In conventional CPR when compressions are stopped to give ventilations, the CPP drops to zero and it takes a significant amount of compression to attain a sufficient CPP again (Souchtchenko et al., 2013). A third reason found by Brown et al. (2015) was continuous chest compression as opposed to interrupted chest compression had “significantly better neurological survival” (p. 334). Finally, CCC removes the need for a barrier device, pocket mask, or bag-valve mask to ventilate the patient and removes the barrier of giving month-to-month ventilation in a CPR situation. Nonetheless, research indicates that best practice for healthcare providers is to still give full/conventional CPR, but bystanders are more successful with continuous chest compressions.

## Retention of CPR

An American Heart Association CPR certification lasts for two years before training is required to recertify. In a 1993 study by Van Hoeyweghen et al. it was determined that retention of CPR decays rapidly after 1 to 2 years. This is because CPR is a skill that needs to be used or practiced to be retained. An individual's confidence in their abilities to perform a skill decreases with time as well. Therefore, "among CPR-trained bystanders, we [study investigators] were not surprised to identify that those with recent CPR training or higher educational levels were more likely to perform CPR" (Swor et al., 2006, p. 599). Swor et al. suggests more frequent re-trainings are required in order to see an increase in the prevalence of bystander CPR.

Another study which focused on a university population found students "were able to identify CPR and an AED from images and that a large portion of participants had been trained in CPR or AED but comfort with AEDs or CPR was relatively low" (Bogle, B., 2013, p. 840). In addition, the 1993 study by Van Hoeyweghen et al. also correlated that long-term survival of OHCA victims was 12% higher (16% compared to 4%) when Bystander CPR was performed correctly. All of these studies point to the importance of recertification for bystander confidence in skills and recognition as well as an increase in survival rates of victims.

In conclusion, the overarching determination of rapid identification and initiation of bystander CPR increases the odds of survival in all stages: survival to hospital admission, survival to hospital discharge, five-year survival and good neurological outcomes. This is due to its ability to extend the timeframe of shockable rhythms and keep the cardiac perfusion pressure at an optimal level. Consequently, in order for

bystanders to initiate CPR, they have to have the knowledge and confidence in CPR skills which refers to the importance of recertification.

### Review of AEDs

Similar to the evolution of CPR, the act of defibrillation of the heart has changed throughout the years. Defibrillation formerly was only available to healthcare professionals like doctors, nurses, and emergency service personnel. This was due to defibrillators being manually operated and requiring intensive training in heart rhythm recognition. Users had to be able to recognize the difference between the “four possible electrocardiographic rhythms in cardiac arrest: ventricular fibrillation (VF), pulseless ventricular tachycardia (VT), pulseless electrical activity (PEA), and asystole” (ACLS Certification Institute). From there users had to understand that VF and VT are shockable rhythms while PEA and asystole required additional CPR and pharmacological interventions due to them being non-shockable rhythms.

Now defibrillators are commonly found in the form of an AED or Automated External Defibrillator. These devices are programmed to be easy to use and guide the rescuer through all steps of the AED process from turning on the device and placing the pads to determining when/if a shockable rhythm is present. In addition to voice-prompts, AEDs have easy to understand pictures on the device itself and pads to assist in correct usage.

### Benefits of Early Defibrillation

The study done by Sanna et. al., in 2008 states ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT) are “the presenting rhythm of OHCA in 41 - 70%” (p. 227). As mentioned above, of the four heart rhythms present during cardiac arrest, only VF and pulseless VT are shockable rhythms. Other than keeping oxygenated blood circulating through the necessary organs, bystander CPR can preserve ventricular fibrillation, according to a 2017 article by Geri et al. This is why CPR is only a holding pattern that can raise the chances of defibrillation working. CPR, however, can not restart the electrical pattern within someone’s heart, which is why a person needs defibrillation to re-initiate an organized rhythm and cause the heart to independently pump blood. Thus, if bystander CPR is paired with early defibrillation, a shockable rhythm can be maintained and then the heart rhythm will be converted to a life-sustaining rhythm effectively. The ACLS Institute (ACLS Certification Institute) states the chances of survival decreases as the delay of defibrillation in VF and pulseless VT increases. Deakin et al in a 2014 study discovered that with “every minute’s delay without resuscitation, mortality increase 7-10%” (p. 619). Overall, early defibrillation is a main factor in increasing survival to hospital, survival to hospital discharge, and survival with good neurological outcomes by double or triple the amount.

### AED Training & Retention

According to Zinckernagel et al. in a study in 2017, “while the bystander CPR rate has improved significantly from 21% in 2001 to 45% in 2010, the use of defibrillation has remained low at only 2%” (p. 2). Weisfeldt et al. in a 2010 study noted

of 13,769 individuals in cardiac arrest only 2.1% (289) had an AED applied before EMS arrival. Multiple studies have sought to figure out why AED usage is so low especially seeing how research proves "lay responders (including children) with minimal training are able to deliver at least one shock effectively in a simulated environment" (Woollard et al., 2004, p. 24). Woollard et al. tested if untrained subjects would be able to successfully use an AED. They found many subjects were able to use the pictures and voice commands from the AED successfully and some could not.

"some of the subjects who did not administer a shock before training expressed a fear of doing harm while others refused to use a device without training. Other attempted to use the AED but were unsuccessful. This was either due to an inability to plug the electrodes in the the AED or failure to stick them to the manikin chest" (p. 23).

Watanabe, K., Lopez-Colon, D., Shuster, J. J., & Philip, J. in 2017 found that "mandatory BLS [basic life support] education has national importance as, in countries where CPR is mandatory part of the school curriculum, bystander CPR is performer >40% of OHCA and survival rates have doubled or tripled" (p. 266). In addition, their study showed that in the United States "only 15% [of 41 8th graders] know what an AED was and of these, none knew its location in school" (p. 264).

### AED Availability

Deakin, C. D., Shewry, E., & Gray, H. H. in their 2014 study point to the fact that "the sudden, unpredictable, and geographically challenging nature of this emergency [cardiac arrest] makes rapid treatment difficult" (p. 619). Therefore automated external

defibrillators (AED) have been made more available through public access defibrillation (PAD) programs. This allows bystanders to deliver defibrillation prior to the arrival of emergency medical services (EMS). According to the statistics found by Weisfeldt et al. in their 2010 study, “more than 200,000 automated external defibrillators (AEDs) are sold yearly for public use in the U.S” (p. 1714). Having AEDs to place throughout commonly used areas is important but also figuring out the best locations for them in order for them to be most effective should take priority. In a study by Weisfeldt et al. in 2010, the authors proposed “placement of all AEDs may be guided by a model that considers health risk, population density, and rate of cardiac arrest in similar buildings” (p. 1719). Deakin et al. also mentioned the impracticality of PADs being in every location and suggests that only locations that have at least "1000 adults over the age of 35 years present during normal business hours" (p. 622) should have an AED available because of the incident ratio of OHCA, which is the amount of time it occurs in a set amount of years being one OHCA every five years.

The study by Deakin et al. also recommended, after proper distribution of AEDs, focusing on teaching the public "the safety, effectiveness and ease of use of AEDs" (p. 622). Their study also shows that only "44 of the 1035 cardiac arrests (4.25%), the caller was aware of an AED being available at that location" (p. 620) and then the AED was only retrieved and attached to the patients in 18 of those 44 OHCA's before arrival of EMS. Increasing public education would hopefully raise the confidence in location of AEDs and their uses. A suggestion was made by Weisfeldt et al., in their 2010 article to include an AED registration requirement with the area's EMS dispatch service of all

public access defibrillators. This would allow the dispatcher to talk the caller through starting CPR as well as direct another bystander to the closest AED.

In conclusion, these studies collectively pointed to time being a crucial factor in survival rates of OHCA. There is a necessity to increase the public's knowledge of the locations of AED within their community and workplaces. In addition, a boost in training needs to occur so learners become more confident in their abilities to use the AED effectively.

## METHODS

This research project had two components. The primary method was an anonymous twenty-four question survey which took participants approximately 10-20 minutes. All survey data collected was analyzed through the Qualtrics Survey platform. The survey questions have been attached in Appendix A and the consent form has been added in Appendix B and Appendix C. After the survey was completed, research participants of UVAC & UMPD were asked if they would be willing to demonstrate CPR and use of an AED on a mannequin. This mannequin was attached to a ZOLL Monitor and ZOLL CPR-D padz Trainer Electrodes (Zoll Medical Corporation, Chelmsford, MA) which is a training device used to record and give feedback on compressions per minute as well as depths of each compressions. This portion of the project allowed participants to exhibit and gain feedback on their knowledge in CPR and AED usage. Due to confidentiality, no audio or visual recording was made. However, notes were taken in order to gain data on the quality of the participants' chest compression and the overall efficiency of the CPR demonstrations. The form that was used collect this data can be found in Appendix D. This data sheet was modeled after the American Heart Association's Heartsaver Adult CPR/AED Skills Sheet. In order to analyze the comparison between the participant's survey answers and the pre-/post-questionnaire and notes, the participants who did the demonstration portion were given a 5-digit ID code. If participants decide to complete both sections, it took approximately 1 hour.

Participants were recruited through convenience selection. A stipulation on involvement included participants needing to be affiliated at the University of Maine in

one of the following roles: Dining staff, UMPD officer, UVAC provider, Campus Rec employee, faculty, Residence Life, Woodman Team member, a University sports and/or intramural/club coach, or Collins Center for Arts employee. Five people per population were used as participants.

The consent form was presented to the participants before they were allowed to answer any of the survey questions or participate in the demonstration portion. It appeared as the first page of the survey. Responding to the survey and/or participating in the demonstration indicates consent by the participant.

In order to ensure privacy of the participants and the confidentiality of the data, all survey responses were anonymous. The data collection program used for this thesis was Qualtrics and IP addresses were not collected. Data remained on the Qualtrics database and was referred to for analytical purposes. The notes taken as well as the record of the 5-digit ID number of each participant are in a document on the primary investigator's password locked computer. If any notes on paper during the session are taken, they were shredded immediately after being entered into the online document.

The surveys and CPR/AED demonstrations with UVAC and UMPD participants were scheduled by the primary investigator and the participants based on availability of both parties as well as CPR/AED equipment. For these research sessions, a private room was reserved in order for the participants to have a confidential and quiet place to take the survey. At the predetermined time, the participants came to the reserved room and took the survey. Afterward, upon the participant's decision to do the second portion of the research project, the CPR/AED mannequin and training monitor were already set up in the same room. Participants completed a pre-demonstration questionnaire (Appendix E).

Then, they were given a CPR scenario based on their affiliation with the University. Thus, if the participant is a UMPD officer, they were given a scenario they might encounter in their line of work. If participants were unsure of their abilities or wanted a review on CPR/AED usage, they were able to ask questions anytime throughout the scenario. After the scenario was finished, the participant did a post-demonstration questionnaire. For all other participants who were not affiliated with UVAC or UMPD and thus did not do the demonstration portion, a link to the survey was sent out with the recruitment email. Participants then had the opportunity to fill out the survey on their own time frame.

As supplementary pieces to the research, three UMPD officers were interviewed about cases where bystander or EMS CPR/AED usage allowed for ROSC (Return of Spontaneous Circulation). The questions they were asked included: did you witness the individual code, if no, was bystander CPR/CPR by EMS initiated before your arrival, did you know where the closest AED was, how confident were you in your CPR skills, how long have you had a CPR certification, and how often are you required to be recertified in CPR. In addition, telephone conversations were had with a dispatcher from the University of Maine Police Department and from the Penobscot Regional Communication Center on their roles in finding AEDs on campus if the situation arose.

## RESULTS

Forty-three individuals participated in the research portion of this project. Of the University-affiliated groups initially recruited, results ended up coming from University of Maine Police Department (UMPD), University Volunteer Ambulance Corp (UVAC), Residence Life, New Balance Recreation Center, Collins Center of the Arts (CCA), Intramural Sports, and Faculty. To form comparisons from the results, these participants were broken into two groups: requiring CPR/AED training in order to work and the ones who do not require CPR/AED training. Table #1 represents these two groups and how many participants there were from each affiliation.

<b>Table 1: Participants</b>	
<b>Requires CPR/AED Training</b>	<b>Number of Participants</b>
<b>UMPD</b>	<b>6</b>
<b>UVAC</b>	<b>5</b>
<b>New Balance Recreation Center</b>	<b>11</b>
<b>Intramural Sports</b>	<b>1</b>
<b>Does Not Require CPR/AED Training</b>	
<b>Residence Life</b>	<b>6</b>
<b>CCA</b>	<b>3</b>
<b>Faculty</b>	<b>11</b>
<b>Total Number of Participants</b>	<b>43</b>

From the twenty-four questions answered within the survey, nine questions were selected for statistical analysis. Two different statistical tests were used. For Questions 1, 3, 5, 16, 17, and 20, a t-test for two independent variables was used in order to examine the difference in knowledge and confidence level of ability of the two groups. The alpha level for all questions was set at .05. Then for Questions 12, 19, 2, the chi-square test was used to examine how the two groups compared to each other in their familiarity of CPR, AEDs usage, and resources available to them on campus.

Questions 1, 3, and 5 looked into how knowledgeable the participants judged themselves to be with a 4-choice Likert scale. The choices were: Very Familiar, Familiar, Somewhat Familiar, and Not at all Familiar. The Likert scale points were number 1 through 4 in increasing confidence. Then both groups had their points calculated, and a mean was found and their corresponding t-test scores are represented in Table #2.

Of the three questions, only Question 1 was considered statistically significant according to conventional criteria. Therefore this means that both groups were close in their knowledge of cardiopulmonary resuscitation (CPR) and an automated external defibrillator (AED) but the group that required CPR/AED training has more knowledge about sudden cardiac arrest.

<b>Table 2: Question 1, 3, 5 Response Statistics</b>			
	<b>Requires Training</b>	<b>Does not Require Training</b>	<b>T-test for sig. Diff. between groups</b>
<b>Question 1:</b> How familiar would you say you are with sudden cardiac arrest (SCA)?	2.91	2.25	<b>p=.028*</b>
<b>Question 3:</b> How familiar would you say you are with cardiopulmonary resuscitation (CPR)?	3.43	3.05	p=.126
<b>Question 5:</b> How familiar would you say you are with an automated external defibrillator (AED)?	3.17	2.75	p=.095

The second set of questions statistically tested were Questions 16, 17, and 20. These questions looked into how confident the survey participants were in their ability to take the proper actions, contact help, and get the AED closest to their place of affiliation if they witnessed someone collapse due to sudden cardiac arrest and the same t-test format was used so the average number of points were found for each group for all three questions. The mean score and t-test scores can be found below in Table #3.

For this group of questions, Question 17 was deemed not statistically significant but both Questions 16 and 20 were considered quite statistically significant according to conventional criteria. This translates to both groups being similar in their confidence levels to call the appropriate people to get help but the group requiring CPR/AED training were more confident in knowing what actions to take upon the individual collapsing and in their ability to find the closest AED in order to defibrillate the patient.

<b>Table 3: Table 2: Question 16, 17, 20 Response Statistics</b>			
	<b>Requires Training</b>	<b>Does not Require Training</b>	<b>T-test for sig. Diff. between groups</b>
<b>Question 16:</b> If I witnessed an individual on the University of Maine campus collapse due to sudden cardiac arrest, I would confidently know what action to take to help	3.48	2.85	<b>p=.0008*</b>
<b>Question 17:</b> If I witnessed an individual on the University of Maine campus collapse due to sudden cardiac arrest, I would know who to call to get help.	3.68	3.50	p=.354
<b>Question 20:</b> 39 AEDs can be found dispersed throughout campus. How confident do you feel you could find the AED closest to your place of affiliation?	3.48	2.11	<b>p&lt;.0001*</b>

The final group of questions statistically tested were Questions 12, 19, and 20. These were chosen in order to see how familiar the participants were with the components of CPR and with the available AED resources on the University of Maine campus. Because to these questions provided nominal data, the chi-square test was selected. To format the answers for the chi-square test, a point was given for each correct answer within the question and then the ratio of correct answers over total number of

possible answers was calculated. The ratios and chi-square score can be found in Table #4.

For Question 12, the individual taking the survey could have chosen 5, 15, 30, or “the rescuer should not pause between compression to administer rescue breaths”. Both 30 compressions between rescue breaths and compression-only/no rescue breaths are both correct because they either follow the American Heart Association Basic Life Support guideline for a 30/2 compression to breath ratio or Hands-Only Compression guidelines which is taught to individuals as a quick introduction to CPR. For Question 19, the only answer correct which would earn a point was “between 31 and 40” due to their being 39 AEDs on campus. So if the participant chose Less than 5, Between 5 to 10, Between 11 to 20, Between 21 to 30, Between 41 to 50, and More than 50 than they did not earn a point for this question. Finally for Question 21, surveyors had to choose the places they thought there were AEDs on campus. On the University of Maine Orono Campus, AEDs can be found in the Memorial Union, York Dining, Collins Center for the Arts, and Edward T. Bryand Global Sciences Center. These were counted as correct answers and participants earned a point if they chose any of them. No AED can be found at Little Hall, Buchanan Alumni House, Neville Hall, or Estabrooke Hall so these answers are incorrect and no point was earned if chosen.

All three of these questions were regarded as not statistically significant. Accordingly, this means both the group that requires CPR/AED training and the group that does not require training are similar in their familiarity with CPR and AEDs on campus. For Question 12, a majority of participants chose the correct answer. Question

19 showed a minority of them knew how many AEDs were on campus. Question 30 represented approximately two-thirds of individuals chose the right locations for AEDs.

<b>Table 4: Question 12, 19, 30 Significance</b>			
	<b>Require Training</b>	<b>Does not Require Training</b>	<b>Chi Squared test for significance</b>
<b>Question 12:</b> When performing CPR, how many compressions do you think someone should perform in between rescue breaths to the victim?	19/23	14/20	The chi-square statistic is 0.9529. The <i>p</i> -value is .328979.
<b>Question 19:</b> How many AEDs can be found on the University of Maine campus? (If unsure, mark your best guess).	8/23	4/20	The chi-square statistic is 1.1619. The <i>p</i> -value is .281063.
<b>Question 21:</b> From the list below, in which locations on the UMaine Campus can you find AEDs? (Select all that apply)	81/125	53/90	The chi-square statistic is 0.7786. The <i>p</i> -value is .377556.

## DISCUSSION

As a former member of the University Volunteer Ambulance Corp (UVAC) on the University of Maine, the primary investigator taught CPR/AED classes for students, employees, and the University of Maine community. Over the last 10 years, and then after a tragic incident involving a UMaine athlete in the summer of 2018, the number of AEDs in and around campus has slowly increased to 39 units. The questions became, however, if students, employees, and community members would be able to perform the CPR they were taught and if they would be able to successfully locate the closest AED to the places these people commonly go on campus, including the places they take class and their areas of employment. In addition to knowing the locations of an AED, the primary investigator wanted to investigate the confidence level of participants' knowing how to use the AED upon acquiring one.

### Explanation of Results

Questions 1, 3, and 5 asked how familiar the survey participants were with sudden cardiac arrest, CPR, and AED usage. The results from these questions determined both groups (those requiring training as part of their work and those not requiring training) judged themselves to be familiar with CPR (mean scores of 3.43 vs. 3.05 on a Likert Scale) and AEDs (mean scores of 3.17 vs. 2.75) similarly, but the group that required CPR/AED training judged themselves slightly higher in each category. The required training group judged themselves higher in their familiarization with sudden cardiac arrest (2.91 vs. 2.25).

Participants were asked the definition of sudden cardiac arrest (Question 2), CPR (Question 4), and an AED (Question 6) coincided with what they thought it was, everyone who took the survey either chose Strongly Agree or Agree for these questions. Individuals who were not required to have training judged themselves lower when asked their knowledge but consistently agreed with the definitions when provided.

In Question 10, participants were asked when was their most recent CPR/AED training. The individuals who had training greater than 2 years prior were given a follow-up question of why they did not get retraining. Of the sixteen people who did not get retraining, four did not think to get training, seven did not need it for employment anymore, three did not have time, one could not find a course nearby, and one did not provide a reason. From these results, a suggestion on boosting retraining levels would be to communicate a reminder to individuals when their certification is close to expiring, provide them with a list of courses nearby, and encourage retraining even when not required for their current employment.

Question 13 and 14 asked participants what level of training they think is required for using an AED and performing CPR. The group that required training indicated on average that AEDs required less training than the group that did not require training.

<b>Table 5: Training Perceptions, A</b>		
	<b>Requires Training</b>	<b>Does not Require Training</b>
<b>Extensive training is necessary</b>	5/23 (21.7%)	6/20 (30%)
<b>Some training is necessary</b>	13/23 (56.5%)	14/20 (70%)
<b>No training is necessary</b>	5/23 (21.7%)	0/20 (0%)
<b>Only medical professional are qualified to operate AEDs</b>	0/23 (0%)	0/20 (0%)

The group that did not require training indicated CPR required significantly more training than the group that did require training with the majority of all respondents opinion being extensive training is necessary to perform CPR.

<b>Table 6: Training Perceptions, B</b>		
<b>Table #5</b>		
	<b>Requires Training</b>	<b>Does not Require Training</b>
<b>Extensive training is necessary</b>	8/23 (34.8%)	13/20 (65%)
<b>Some training is necessary</b>	15/23 (65.2%)	7/20 (35%)
<b>No training is necessary</b>	0/23 (0%)	0/20 (0%)
<b>Only medical professional are qualified to operate AEDs</b>	0/23 (0%)	0/20 (0%)

Question 17 showed both groups were similarly confident in their abilities to contact the right people to get help (mean scores of 3.68 vs. 3.50). However, the group

requiring CPR/AED training were significantly more confident in knowing what actions need to be taken if someone collapses in sudden cardiac result (Question 16: 3.48 vs. 2.85,  $p=.0008^*$ ) and their ability find the AED closest to your place of affiliation (Question 20: 3.48 vs. 2.11,  $p<.0001^*$ ). Even though contacting the right people to get a responding EMS unit en route is important, the two components of initiating CPR and finding and retrieving an AED are what will increase a victim's chance of survival.

Question 12, 19, and 21 all showed both the group that requires CPR/AED training and the group that does not require training are similar in their familiarity with CPR and AEDs and their availability on campus. However, Question 12 showed 6/20 people who did not need the training chose the wrong ratio of 5 chest compression per each breath. Even though it was statistically significant using the chi-square test in comparison of each group, Question 19 showed a low number of participants were able to choose the correct location of AEDs on campus. 4/20 who are not required to be AED/CPR trained correctly knew how many AEDs are on campus and 8/23 who are required to be AED/CPR trained correctly knew how many AEDs are on campus.

As a supplement to the original study, UMPD Officer George Ash, UMPD Lieutenant Robert Norman, and UMPD Detective Keith Mercier were interviewed about code saves they have been a part of and their knowledge/experience with CPR/AEDs. During his interview Lieutenant Norman spoke about two of the code saves he has been on. He stated one occurred at the New Balance Campus Recreation Center in the pool area and the lifeguard was able to recognize the situation as cardiac arrest, call for emergency services, and start chest compressions. He said someone had retrieved the AED but it was not being used until he arrived to help put it on. In the second instance, Norman said

there was no bystander CPR but an AED was present. This is due to the people who had retrieved it were having difficulty using it.

Detective Keith Mercier's opinion during his interview was that CPR/AED training should be done annually for anyone for "works on the street" which on the University of Maine campus includes at minimum UVAC and UMPD. Finally, Officer George Ash mentioned the importance of the AED in the UMPD cruisers multiple times, and how this was the AED he used on two of his three code saves. Officer Ash mentioned the importance of assuring individuals that have been recently trained on AED use to just "listen to the instructions" because the AEDs are user-friendly and helpful.

#### References to Previous Research

In the 2013 study by Bogle, et al., found even though many of the university students could identify CPR and an AED from photos and were trained in CPR/AED usage, the actual comfort with AEDs or CPR was on average low. Woollard and associates' 2004 study also pointed to participants' self assessments of their competence and confidence scores and how they are most likely not indicators to the actual lower rate of these individuals being willing or able to intervene in an actual emergency. These mirrored results of this study with examples including participants indicating they Strongly Agreed/Agreed with the definitions of sudden cardiac arrest, CPR, and AED, however, they did not score themselves confidently in their abilities to take the right actions if someone collapsed with SCA (Question 16) and/or in finding an AED (Question 20).

A general conclusion of multiple studies including Bogle et al. (2013), Swor et al. (2006), and Van Hoeyweghen et al. (1993), is people become less comfortable with their abilities in CPR and AED usage in an emergency situation the longer an individual goes from training. Van Hoeyweghen et al. expressed in their study “retention of well trained CPR trainees decay rapidly after 1 - 2 years” (p. 48). Swor et al. concludes that the solution to the problem is frequent retraining. The results from these studies are comparable to this research. Five of the individuals who chose 5 chest compressions per minute in this study had not recertified their training in more than 5 years. 10 of the 14 individuals who had not recertified in more than 5 years were only somewhat confident or not confident at all in their abilities to find the closest AED whereas 23 of the 28 individuals with training in the last 1-2 years were either very confident or confident they could find an AED.

After discussions with 9-1-1 dispatchers from the University of Maine Police Department and Penobscot Regional Communication Center, the two dispatch centers who could receive a call from the University of Maine in Orono, it was noted that neither centers have the capability to locate the closest AED to the caller. The 2017 study by Viereck et al. and the 2010 study by Weisfeldt et al. describes the benefit of medical dispatchers being able to direct a bystander to the nearest available AED through an interactive map or pre-incident registration of all AEDs.

### Deduction

This research will hopefully lead to policies/practices that increase the amount of people on the University of Maine in Orono campus overall who are required or

encouraged to take a CPR/AED course. In addition, the individuals who are more likely to need the training and currently already required to have it (including University of Maine Police, University Volunteer Ambulance Corp, and New Balance Campus Recreation employees) should decrease the amount of time they have between certification courses and take a refresher/review course every other year on top of the normal 2 year recertification course.

Furthermore, increased education should be provided to everyone on campus on the locations of AEDs. This could include a large map of the AEDs' locations being placed in populated areas of campus like the Memorial Union, Fogler Library, and strategically placed in permanent locations outside. On top of this, the dispatchers from the University of Maine Police Department and Penobscot Regional Communication Center should be provided the locations of the AEDs in order to assist the caller or available bystanders in retrieving an AED.

#### Limitations and Future Directions for Research

First, the study took place solely on the University of Maine - Orono Campus, so there is a potential bias to this population. Participants were chosen by convenience selection which also might have biased the results. For example, three of the five UVAC participants available to take the survey and do the demonstration portion were also CPR Instructors. Therefore, they had more experience in CPR and AED usage than the average member of UVAC. Another limitation to this study was the limited stakeholder groups that were available to complete the survey. Multiple attempts were made to reach out to university affiliated groups including the Woodsman Team, Residence Life, and

Dining Services but the investigator was unable to arrange for large numbers of participants from these subject pools.

There are multiple areas for future study. One would be to remove the demonstration portion entirely from the beginning. This is due to this initial methodology possibly intimidating potential participants. If the demonstration portion was removed, the survey link might have generated more responses from each group. Another addition to potential studies in the future would be to broaden the sample to the entire town of Orono and look into additional groups who would benefit from having CPR/AED training. Finally, Questions 22, 23, and 24 of the survey pertained to tourniquet familiarization and confidence. The results found from these questions were not analyzed and primarily used as pilot questions. A study about tourniquets would need to be done separately.

Overall, this study showed a better method of training members of the public needs to be created. This could be done by altering the current CPR and AED training process so learners end their training course confident in their knowledge of Out of Hospital Cardiac Arrest and determination of OHCA, proper CPR, AED electrode placement, and administration of a shock. A section on the location of AEDs within the local community should be added to better prepare the course participants if they were required to use their training.

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## APPENDICES

## APPENDIX A: SURVEY QUESTIONS

1.) How familiar would you say you are with sudden cardiac arrest (SCA)?

- Very Familiar
- Familiar
- Somewhat Familiar
- Not at all Familiar

2.) Sudden cardiac arrest, or SCA, occurs when the heart's pumping chambers suddenly stop contracting effectively, and the heart loses its ability to effectively pump blood. As a result, a person experiencing sudden cardiac arrest usually has no detectable pulse. They suddenly become unresponsive, stop breathing, and could die if treatment is not received in minutes.

This definition of sudden cardiac arrest agrees with what I thought it was?

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

3.) How familiar would you say you are with cardiopulmonary resuscitation (CPR)?

- Very Familiar
- Familiar
- Somewhat Familiar
- Not at all Familiar

- 4.) Cardiopulmonary resuscitation, or CPR, is used to maintain circulation when the heart stops pumping during sudden cardiac arrest, by manually compressing the chest overlying the heart and forcing air into the lungs by providing mouth-to-mouth breaths.

This definition of cardiopulmonary resuscitation/CPR agrees with what I thought it was?

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

- 5.) How familiar would you say you are with an automated external defibrillator (AED)?

- Very Familiar
- Familiar
- Somewhat Familiar
- Not at all Familiar

- 6.) An automated external defibrillator, or AED, is a portable device used to deliver an electrical shock to the heart of a victim of sudden cardiac arrest. An AED automatically analyzes the patient's heart rhythm and advises the rescuer whether or not a shock is needed.

This definition of an automated external defibrillator/AED agrees with what I thought it was?

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

7.) Which of the following organization below are you affiliated with on the University of Maine campus?

- Dining Service
- University of Maine Police Department (UMPD)
- University Volunteer Ambulance Corps (UVAC)
- New Balance Campus Recreation
- Residence Life
- Collin Center for the Arts
- Woodman Team
- Faculty
- University Affiliated Sports
- Intramural or Club Sports

8.) Do you think Cardiopulmonary Resuscitation (CPR) performed by bystanders before EMS arrival can increase a victim's chances of survival?

- Yes, it increases the victim's chances significantly
- Yes, it increases the victim's chances slightly
- It doesn't increase or decrease the victim's chances
- No, it decreases the victim's chances slightly
- No, it decreases the victim's chances significantly

9.) Have you ever had CPR/AED training?

- Yes
- No

10.) [If checked yes] How long ago did you take CPR/AED training?

- 1 year or less
- 1 year to 2 years
- 2 - 5 years
- 5 - 10 years
- 10 year or more

11.) [If checked 2-5, 5-10, 10 year or more]

After your CPR/AED certification expired, why didn't you get retraining?

- Didn't think to
- Didn't need to for employment
- Didn't have time
- Couldn't find a course nearby
- Not comfortable performing CPR and/or using an AED
- Didn't think it was necessary to be retrained
- Other

12.) When performing CPR, how many compressions do you think someone should perform in between rescue breaths to the victim?

- 5
- 15
- 30
- The rescuer should not pause between compression to administer rescue breaths

13.) How much training do you think is necessary to be able to properly use an automated external defibrillator (AED) in a medical emergency?

- Extensive training is necessary
- Some minimal training is necessary
- No training is necessary
- Only medical professional are qualified to operate AEDs

- 14.) How much training do you think is necessary to be able to perform cardiopulmonary resuscitation (CPR) in a medical emergency?
- Extensive training is necessary
  - Some minimal training is necessary
  - No training is necessary
  - Only medical professional are qualified to perform CPR.
- 15.) I think CPR/AED training **should be** mandatory where I am currently affiliated?
- It is already mandatory
  - Strongly Agree
  - Agree
  - Disagree
  - Strongly Disagree
- 16.) If I witnessed an individual on the University of Maine campus collapse due to sudden cardiac arrest, **I would confidently know what action to take to help.**
- Strongly Agree
  - Agree
  - Disagree
  - Strongly Disagree
- 17.) If I witnessed an individual on the University of Maine campus collapse due to sudden cardiac arrest, **I would know who to call to get help.**
- Strongly Agree
  - Agree
  - Disagree
  - Strongly Disagree

- 18.) Other than 9-1-1, what is the University of Maine specific number to contact for UMPD and UVAC? (If unsure, please write "I don't know")  
[Fill-in-the-Blank]
- 19.) How many AEDs can be found on the University of Maine campus? (If unsure, mark your best guess).
- Less than 5
  - Between 5 to 10
  - Between 11 to 20
  - Between 21 to 30
  - Between 31 to 40
  - Between 41 to 50
  - More than 50
- 20.) 35 AEDs can be found dispersed throughout campus. How confident do you feel you could find the AED closest to your place of affiliation?
- Very Confident
  - Confident
  - Somewhat Confident
  - Not at all Confident
- 21.) From the list below, in which locations on the UMaine Campus can you find AEDs? (Select all that apply)
- Memorial Union
  - Little Hall
  - York Dining
  - Buchanan Alumni House
  - Collins Center for the Arts
  - Neville Hall
  - Estabrooke Hall
  - Edward T. Bryand Global Sciences Center

- 22.) How familiar are you with a tourniquet and its use?
- Very Familiar
  - Familiar
  - Somewhat Familiar
  - Not at all Familiar
- 23.) Tourniquets are used to stop major bleeding. Do you agree that you and your fellow colleagues at my place of UMaine affiliation should be required to learn how to use a tourniquet?
- Strongly Agree
  - Agree
  - Disagree
  - Strongly Disagree
- 24.) How confident are you that you would know when it is appropriate to apply a tourniquet in an emergency situation?
- Very Confident
  - Confident
  - Somewhat Confident
  - Not at all Confident

Some pieces of the survey were taken from Philips Medical Center & the American Heart Association's CPR & AED Awareness Survey.

Philips Medical Systems & the American Heart Association. (2008, January 4 to 21).

[CPR & AED Awareness].

## APPENDIX B: UVAC/UMPD INFORMED CONSENT STATEMENT

This research is for an undergraduate Honors thesis of Courtney Jurson, Kinesiology-Exercise Science/Honors College. The faculty sponsor for this research project is Christopher Nightingale, Assistant Professor of Athletic Training and Physical Education. This survey and research project is being conducted to find out if the University of Maine require its employees to take a CPR/AED class, is the information provided being retained, and do they know where to find important resources on campus. You are being asked to participate in a research project due to your involvement at University of Maine in one of the following roles including Dining staff, UMPD officer, UVAC provider, Campus Rec employee, faculty, Residence Life, a member of the Woodman team, a University sports and/or intramural/club coach, or Collin Center for Arts employee. You need to be at least 18 to participate.

**What will you be asked to do:** For this research project, you will be asked to take an anonymous twenty-four question survey which will take approximately 10-20 minutes . Upon completion of the survey, you will be asked to participate in an additional section of the project that includes physical demonstration of CPR/AED usage on a mannequin. The mannequin will have a device attached that records the compressions per minute as well as the depths of each compression. The process will include a pre- and post-session questionnaire. You will be given a scenario in order for you to exhibit your knowledge in CPR/AED usage. No audio or visual recording will be taken. Notes about the quality and efficiency of your CPR will be taken. You will given a 5-digit ID that will link the survey data with the practice session so data from both can be analyzed together. Both sections, if you decide to participate in both, should taken approximately 1 hour.

**Participation is voluntary:** You can stop the survey at any time or skip questions if you prefer not to answer. You also can withdraw from the CPR/AED demonstration portion anytime. In case of withdrawal, all your data will be deleted.

**Risks:** Risks for the participating in the survey section are minor including time, inconvenience, and possibly discomfort answering questions. However, remember any questions can be skipped and you can withdraw from the survey at anytime. Risks for participating in the demonstration portion may include physical strain and emotional stress. If a physician has recommended that you avoid strenuous activity in any way or you have a medical history that may be aggravated by participating, you should consult your physician about whether or not you should participate. Keep in mind CPR is hard work which is true for both demonstrating on a practice mannequin as well as performing CPR on a real victim in actual cardiac arrest. You can withdraw from the demonstration portion at anytime. Please speak with the primary investigator if you have any questions.

**Benefits:** There are no direct benefits to participating. The overall potential benefit of this research is to find if CPR/AED classes are being offered to the right employees and how effective the classes are on retention of the information which results in a safer campus.

**Confidentiality:** In order to ensure your privacy and the confidentiality of the data, all survey responses will be anonymous. Data from the survey, demonstration questionnaires, and notes will be kept on the Primary Investigator's password locked computer for analytical purposes and will be deleted upon completion of thesis, on or before April 30, 2019. No audio, video, or film recordings will be made. Parts of data collected will be published within the thesis but all identifying references will be removed.

**Contact Information:** Please contact any of the following people if you have any questions:

**Principal Investigator**

Courtney Jurson: courtney.jurson@maine.edu

**Faculty Sponsor**

Christopher Nightingale: christopher.nightingale@maine.edu

The Office of Research Compliance at University of Maine can also be contacted by phone at (207) 581-1498 or (207) 581-2657 as well as through email at [umric@maine.edu](mailto:umric@maine.edu), if you have questions about your rights as a research participant.

Continuing on to the first question of the survey will indicate you have read and understand the information and agree to participate.

A copy of this informed consent form can be requested to be kept in personal records

APPENDIX C: INFORMED CONSENT STATEMENT FOR  
ALL OTHER PARTICIPANTS

This research is for an undergraduate Honors thesis of Courtney Jurson, Kinesiology-Exercise Science/Honors College. The faculty sponsor for this research project is Christopher Nightingale, Assistant Professor of Athletic Training and Physical Education. This survey and research project is being conducted to find out if the University of Maine requires its employees to take a CPR/AED class, if the information provided is being retained, and if they know where to find important resources on campus. You are being asked to participate in a research project due to your involvement at the University of Maine in one of the following roles including Dining staff, UMPD officer, UVAC provider, Campus Rec employee, faculty, Residence Life, a member of the Woodman team, a University sports and/or intramural/club coach, or Collin Center for Arts employee. You need to be at least 18 to participate.

**What will you be asked to do:** For this research project, you will be asked to take an anonymous twenty-four question survey which will take approximately 10-20 minutes .

**Participation is voluntary:** You can stop the survey at any time or skip questions if you prefer not to answer. In case of withdrawal, all your data will be deleted.

**Risks:** Risks for participating in the survey section are minor including time, inconvenience, and possibly discomfort answering questions. However, remember any questions can be skipped and you can withdraw from the survey at anytime. Please speak with the primary investigator if you have any questions.

**Benefits:** There are no direct benefits to the participants. The overall potential benefit of this research is to find if CPR/AED classes are being offered to the right employees and how effective the classes are on retention of the information which results in a safer campus. All participants will be entered for a \$25 Amazon gift card raffle if name and contact information are filled in at the end of the survey.

**Confidentiality:** In order to ensure your privacy and the confidentiality of the data, all survey responses will be anonymous. Data from the survey, demonstration questionnaires, and notes will be kept on the Primary Investigator's password locked computer for analytical purposes and will be deleted upon completion of thesis, on or before April 30, 2019. No audio, video, or film recordings will be made. Parts of data collected will be published within the thesis but all identifying references will be removed.

**Contact Information:** Please contact any of the following people if you have any questions:

**Principal Investigator**

Courtney Jurson: courtney.jurson@maine.edu

**Faculty Sponsor**

Christopher Nightingale: christopher.nightingale@maine.edu

The Office of Research Compliance at University of Maine can also be contacted by phone at (207) 581-1498 or (207) 581-2657 as well as through email at umric@maine.edu, if you have questions about your rights as a research participant.

Continuing on to the first question of the survey will indicate you have read and understand the information and agree to participate.

A copy of this informed consent form can be requested to be kept in personal records

APPENDIX D: SKILLS SHEET FORM FOR UVAC/UMPD  
DEMONSTRATION SESSION

Step #	Step	Check if done correctly
1	Verbalize the scene is safe	
2	Check for responsiveness - tap and shout	
3	Yells for help	
4	Tells someone to call 911	
5	Tells someone to get an AED	
6	Checks for no breathing or only gasping	
7	Delivers first set of compressions - 30:2 with adequate rate & depth	
8	Gives 2 breaths with pocket mask (Minimizes interruption to less than 10 seconds)	
9	Does 5 sets of compressions and breaths	
10	Turns on AED	
11	Clears everyone from pt while AED analyzes	
12	Clears everyone before pressing shock button	

APPENDIX E: UVAC/UMPD DEMONSTRATION SESSION QUESTIONNAIRE

1.) Please fill in the 5 digit ID number given to you.

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2.) Please circle the following organization below that you are affiliated with on the University of Maine campus?

- Dining Service
- University of Maine Police Department (UMPD)
- University Volunteer Ambulance Corps (UVAC)
- New Balance Campus Recreation
- Residence Life
- Collin Center for the Arts
- Woodman Team
- Faculty
- University Affiliated Sports
- Intramural or Club Sports

3.) Before the demonstration portion, please circle how confident you with your understanding and abilities of CPR/AED usage?

- |                    |                      |
|--------------------|----------------------|
| Very Confident     | Confident            |
| Somewhat Confident | Not at all Confident |

4.) Now after demonstration portion, please circle how confident you with your understanding and abilities of CPR/AED usage?

- |                    |                      |
|--------------------|----------------------|
| Very Confident     | Confident            |
| Somewhat Confident | Not at all Confident |

5.) During the demonstration portion, did you learn anything about performing CPR/using an AED?

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## APPENDIX F: RECRUITMENT EMAIL SCRIPT

Hello, my name is Courtney Jurson and I am a 5th year student conducting a research project for my Honors thesis under the supervision of Dr. Christopher Nightingale. I am studying if the right people on the University of Maine campus are participating in CPR/AED classes. In addition, I am researching if the information provided in these classes is being retained well enough where these individuals could confidently respond to an emergency knowing the location of important resources on campus. This research will hopefully lead to a conversation about CPR/AED training on campus as well as to changes to policies to increase the amount of people trained and information retainment through yearly reviews. You are being asked to participate in a research project due to your involvement at University of Maine in one of the following roles including Dining staff, UMPD officer, UVAC provider, Campus Rec employee, faculty, Residence Life, a member of the Woodman team, a University sports and/or intramural/club coach, or Collin Center for Arts employee. Your email was obtained from the UMaine server. You must be at least 18 years old to participate.

If you volunteer as a participant in this study, you will be asked to take an anonymous twenty-four question survey. For the second portion, you will be asked to demonstrate CPR and use of an AED on a mannequin. This mannequin will be attached to a Zoll Monitor with a CPR training device which records and gives feedback on compressions per minute as well as depths of each compressions. will be able to withdraw from the survey at anytime. Risks for participating in the demonstration portion may include physical strain and emotional stress. If a physician has recommended that you avoid strenuous activity in any way or you have a medical history that may be aggravated

by participating, you should consult your physician about whether or not you should participate. The session should take approximately 1 hr of your time based on what portions of the study you participated in. The survey and demonstration portion will both be scheduled to be completed in one concurrent session. A predetermined time in a room in the Memorial Union will be scheduled where you will take the survey and then, if desired, complete the demonstration portion. . Risks for the participating in the survey section are minor including time, inconvenience, and possibly discomfort answering questions. However, any questions can be skipped and you

If you are interested in participating or have any question, please email me back and I will be in touch with you to determine a time that works best for each other's schedule.

**Thank you.**

APPENDIX G: LIST OF AED ON THE UNIVERSITY OF MAINE - ORONO  
CAMPUS (AS OF OCTOBER 2018)

- Alfond Hallway
- Alfond Training Room
- Alumni Hall
- CCA Lobby
- Chadbourne Hall
- Cutler Health Center
- Facilities
- Fogler Library
- Game Crew Kit 1
- Game Crew Kit 2
- Hilltop Dining
- Kessock Training 1
- Kessock Training 2
- Lengyel Hall
- Mahoney Dome
- Maine Bound
- Memorial Dome
- Rec Center 1st Floor lobby
- Rec Center Pool
- Rec Center 1st Floor
- Rec Center 2nd Floor

- UMPD Lobby
- UMPD Unit 072
- UMPD Unit 190
- UMPD Unit 946
- UMPD Unit 486
- Union Info Desk
- Union Atrium
- UVAC 50
- UVAC 51
- UVAC Car 1
- Wallace Pool
- Wells Dining
- Wells Conference
- York Dining