

UNIVERSITY OF LOUISIANA AT LAFAYETTE

STEP Committee

Technology Fee Application

**Improving Quality of Chest Compressions
via Interaction with an Advanced Training
Mannequin**

Title

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Aimee Mattox, MS, ATC, LAT**

Name of Submitter
(Faculty or Staff Only)

School of Kinesiology

Organization

Title: Improving Quality of Chest Compressions via Interaction with an Advanced Training Mannequin Date: 07/12/2016
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ABSTRACT (250 words or less):

In 2014, approximately 424,000 individuals experienced sudden cardiac arrest (SCA). These out-of-hospital events relied on bystanders to react to this emergency situation. While bystander intervention did improve the chances of individual's longevity, the survival rate for SCA was approximately 15%. Globally, the incidence of out-of-hospital SCA ranges from 20-140 per 100,000 individuals; survival ranges from 2-11%. One reason for this low survival percentage is due to bystanders unwillingness or not knowing how to perform high quality cardiopulmonary resuscitation (CPR). Poor compression depth and rate are the main contributing factors to ineffective CPR. Brayden Illuminating CPR mannequins (Innosonian, Republic of Korea) will address this problem. These mannequins give students real time feedback, and enhance student knowledge of their own CPR performance. The purpose of this grant is to advance the quality of teaching and assessing CPR while improving student performed CPR. This quality enhancement has the potential to save the lives of those who suffer from SCA while in the presence of these qualified future clinicians. These mannequins will be able to improve the effectiveness of teaching, and performing and assessing CPR skills due to the real time visual feedback feature. Teachers, as well as students, will be able to see if quality compressions are being performed. By giving immediate visual feedback, the mannequin allows the instructor to better assess the student's compression quality. In addition, students will be able to immediately modify their compressions, making them better quality emergency responder clinicians.

1. Purpose of grant and impact to student body as a whole.
 - a. In 2014, approximately 424,000 individuals experienced sudden cardiac arrest (SCA). These out-of-hospital events relied on bystanders to react to this emergency situation. While bystander intervention did improve the chances of individual's longevity, the survival rate for SCA was approximately 15%. Globally, the incidence of out-of-hospital SCA ranges from 20-140 per 100,000 individuals; survival ranges from 2-11%. One reason for this low survival percentage is due to the lack of bystanders knowing how to perform high quality CPR. Poor compression depth and rate are the main contributing factors to poor quality CPR. As the majority of cardiac arrests occur at home or in the community, bystander CPR is a life-saving skill. In an effort to increase the number of competent bystanders proficient in this skill, the latest American Heart Association Consensus Statement recommends eliminating ventilations breaths and using only chest compressions. Studies have shown that people are more prone to act when they have to perform chest compressions only. Performing chest compressions on an unresponsive cardiac victim allows the blood to be manually pumped to the brain. With the brain receiving blood, the victim has a decreased chance of becoming brain dead. Conversely, every minute without oxygen decreases their chance of survival by 10%. This life-saving skill has become so important that states are now creating laws that require high school students to learn CPR prior to graduation. Starting with the 2014-2015 school year, Louisiana was the 17th state to pass this high school CPR graduation law.
 - b. While the state of Louisiana requires high school students to learn CPR, not all students that enter UL know this life-saving skill. Students who enroll in basic Health courses are taught these skills. In addition, students who are certified in CPR must continue to re-certify their license. During these Health courses, students are taught CPR techniques but it is difficult for them to understand the importance of the skill. Brayden Illuminating CPR mannequins will address this problem. These mannequins give the students real time feedback on their CPR performance. This feedback can enhance student knowledge and skill set. The purpose of this grant is to advance the quality of teaching and assessing CPR while improving student-performed CPR. This quality enhancement has the potential to save the lives of those who suffer from cardiac arrests while in the presence of this qualified future clinician.
 - c. Approximately 95% of SCA victims die before reaching the hospital, and SCA is the leading cause of death in young athletes. We have paired these two facts together due to the large number of high school athletes that participate in south Louisiana under the direct medical supervision of an athletic trainer. The Athletic Training program at UL is the majority provider of graduates to the secondary schools and health care facilities in South Louisiana that hire athletic trainers. The impact the Brayden device will have goes far beyond our campus and into the rural communities where quality CPR is a must when emergency response times can exceed 20 minutes or more.
2. Projected lifetime of enhancement
 - a. These mannequins will be able to improve the effectiveness of teaching, performing and assessing CPR skills due to the real time visual feedback feature. Teachers, as well as students, will be able to see if quality CPR is being performed. Brayden mannequins have LED lights inserted into them. As a student demonstrates appropriate chest compressions, these LEDs light up to simulate blood circulating from the heart to the brain. If chest

compressions are not the correct depth and/or speed, the lights will show that blood is not being circulated from the heart to the brain. This immediate visual feedback will allow the instructor to better assess the student's compression quality. In addition, students will be able to immediately modify their compressions, making them better quality emergency responder clinicians.

- b. These mannequins will directly impact students who are becoming CPR certified in basic Health courses, as well as students in the Athletic Training and Health Promotion and Wellness programs. The Brayden mannequins will allow teachers in these programs to better integrate three health care core competencies into their curricula: provide better patient-centered care, employ evidence-based practice into skill sets, and apply quality improvement.
 - c. Indirectly, these educational tools will be used to recertify the Recreational Sports staff in proper CPR training, teach CPR to the community via student volunteer service, and become incorporated into research studies. The Athletic Training and Health Promotion and Wellness programs both complete voluntary service outreach to the local community. These mannequins can assist the students in teaching the community about proper CPR training and its importance. Due to its visual feedback system, these mannequins can also be used in research projects testing the effectiveness of CPR instruction and quality of student care outcomes.
3. Person(s) responsible for
- a. *Implementation:* The persons responsible for this teaching implementation would be Athletic Training and Health Promotions and Wellness program faculty. The Program Directors will integrate this into related kinesiology and health courses and train qualified faculty members.
 - b. *Installation:* These mannequins will be used in HLTH 100 and 101 (First Aid and CPR) as well as athletic training courses that discuss emergency management techniques. These courses would include KNES 201 (Introduction to Athletic Training), 230 (Care and Prevention of Athletic Injuries), 237 (Clinical Experiences in Athletic Training I) and 437 (Clinical Experiences in Athletic Training IV). In addition, these mannequins will be used for CPR re-certification for both programs as well as bi-yearly athletic training student in-services.
 - c. *Maintenance:* Maintenance of these mannequins will be performed by the KNES Equipment and Laboratory Manager Gina Buquet.
 - d. *Operation:* All faculty members that teach the previously mentioned courses will utilize these mannequins. These faculty members are all certified to teach First Aid and CPR and are trained in emergency response and management.
 - e. *Training (with qualifications):* Faculty members who are trained in teaching First Aid and CPR are already qualified to teach with these mannequins. In order for them to feel comfortable teaching using these mannequins, the Program Directors will meet with them prior to the first week of classes. At this time, the qualified teachers can practice with the new equipment.
4. The narrative of the proposal must include the purpose and justification for each of the items listed in the Budget Proposal.

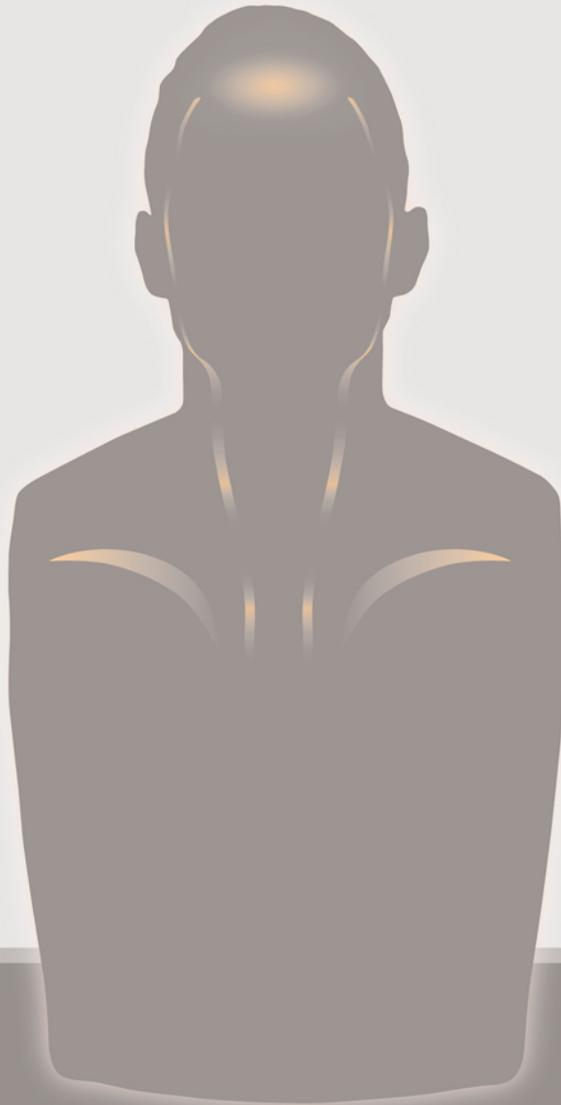
- a. *Line 1 Equipment:* While one Brayden mannequin would be useful for teacher demonstration purposes and CPR pair assessments, the number would need to increase for successful student practice. Five mannequins would allow for a 1:4 student interaction in the above mentioned courses. This would allow more hands-on student practice which would increase quality of care.
 - b. *Line 4 Maintenance:* Face shields are used in all CPR training. These shields are needed to teach students about proper bloodborne pathogens requirements. Bloodborne pathogens requirements are needed for the protection of the student as it prevents disease transmission. Batteries are also included in this maintenance plan as a secondary power source for the visual feedback mechanism. These will be used when the AC adaptors cannot power the mannequins.
5. Additional information relevant to the application.
- a. Appendix A is a PDF handout describing the Brayden Illuminating CPR mannequin. Appendix B in this STEP proposal is a quote from Nasco (Fort Atkinson, WI). Included in the quote are 5 Brayden mannequins and 100 face shields.
6. Discuss all previous funded STEP projects (if any).
- a. Dr. Aldret and Mrs. Mattox have no previous STEP projects.

References

- American Heart Association. (n.d.). *CPR facts and statistics*. Retrieved from http://www.zoll.com/uploadedFiles/Public_Site/Core_Technologies/Real_CPR_Help/CPR-fakten.pdf.
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- Tivener and Gloe. (2015). The effects of high-fidelity CPR on athletic training student knowledge, confidence, emotions and experiences. *Athletic Training Education Journal*, (10)2, 103-112.
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CPR Training Manikin "BRAYDEN"

BRAYDEN



The ultimate purpose of CPR is to maintain a flow of oxygenated blood to the brain during cardiac arrest to prevent serious brain damage.

“BRAYDEN” is the first CPR Manikin ever to display the virtual flow of blood from the heart to the brain during the CPR.

Furthermore, with the aid of the “BRAYDEN” CPR Manikin, trainees will not only learn with ease how to execute CPR correctly in time of need, the skills learned using the “BRAYDEN” CPR Manikin will be remembered for life due to the positive feedback innovations built into “BRAYDEN”

BRAYDEN

CPR Quality Indicating Lamps

These lamps are only light when the compression depth and the speed coincide correctly with the given default value. When either one of the two i.e. the compression depth or the speed is not correct then the lamps will fail to light.

The state of the art technology integrated into “BRAYDEN” makes it possible to train all levels of trainee, making it simple and easy to learn the correct way to perform CPR effectively. The trainee can learn simply by focusing attentively on the indicating lamps and how they respond to their CPR performance.

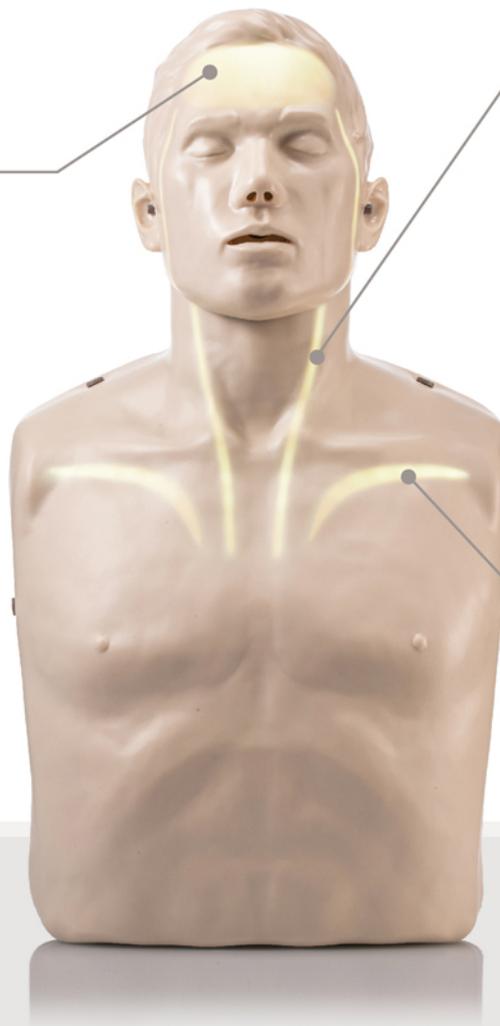
Blood Circulation Indicating Lamps

These lamps provide visualisation of the blood flow from the heart to the brain which trainees can easily observe while performing CPR. The lamps will illuminate in direct proportion to the depth and speed of the trainees compressions providing feedback throughout their CPR practice sessions

Compression Indicating Lamps

These lamps directly relate to depth and speed of compressions. In other words, these compression indicating lamps across the chest light up in direct proportion with the compressions depth and speed as with the Blood Circulation Indicating Lamps.

For example, when the CPR is correctly performed all the lamps across the chest are fully lit, however the lamps will only light up in proportion with the quality of CPR.



Size : 32 x 59 x 21 cm
Weight : 3.1 kg (Including batteries)
Power : Battery, AC Power (Option)

BASIC FUNCTIONS

The “BRAYDEN” CPR Manikin has the following functions for Basic Life Support

- ▶ Realistic head tilt and chin lift for opening airway
- ▶ Chest rise with correct ventilation
- ▶ Audible feedback (“click”) with correct compression depth



Highly realistic chest movement with correct ventilations



Head tilt and chin lift for opening airway



Oral and nasal passages which allow realistic nose pinch



Anatomical landmarks (sternum, ribcage, sternal notch and xiphisternum)



Harmless skin (RoHS, REACH) and materials



Quick and easy clean-up



Audible feedback reinforces correct compression depth (Clicker ON/OFF)



Label for record of management information



Two way of power supply (Battery, AC power)

▶ Disposable airway and reusable face (removable)



Remove skins, then lift chin



Insert the artificial lung into the slot

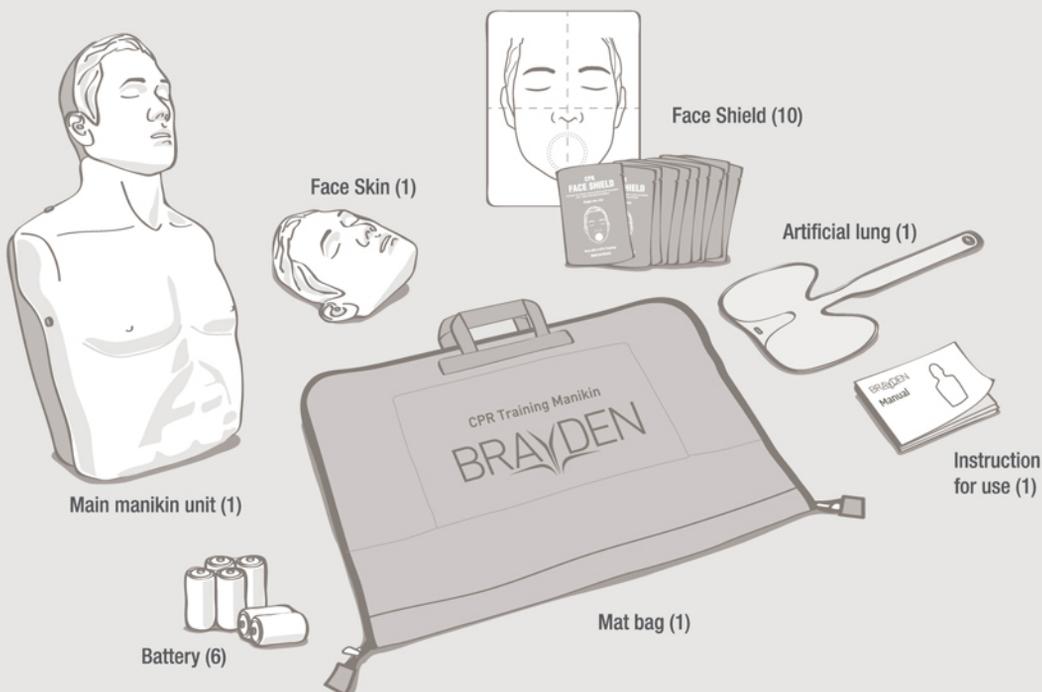


Insert the hall of artificial lung into the guide

CPR Training Manikin "BRAYDEN"

BRAYDEN

CONTENTS



PRODUCT INQUIRIES

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 WEBSITE www.eNasco.com

PLEASE REFERENCE
Nasco QUOTE#
 22693

FED I.D. NO. 06-1165854

*****QUOTATION*****

CUSTOMER RFQ#:

DATES VALID 7/08/16 thru 9/08/16

Bill To Account: 40337500
 UNIV OF LOUISIANA AT LAFAYETTE
 BUSINESS AFFAIRS/PURCH
 BOX 40400
 LAFAYETTE LA 70504-0400
 ATTN: JUNIOR24@ME.COM

Terms Minimum Order: 50.00
 NET 30 DAYS
 DELIVERY APPROX 7-21 DAYS ARO
 FREE SHIPPING

Quantity	U/M	Catalog#	Description	Unit Price	Extended
5	EA	SB50941U	MANIKIN CPR BRAYDEN	436.10	2,180.50
1	PK	SB34966U	MANIKIN FACE SHIELD PK100	37.00	37.00

SUB TOTAL: \$2,217.50
 SHIPPING/HANDLING: **FREE**
 NET TOTAL: \$2,217.50



DAVE JOHNSON, MANAGER OF CONTRACT SALES