


## CONCEPTS

## Education

# An emergency medicine based model for community-engaged learning

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**Abstract**

Community-engaged learning (CEL) integrates community service with structured learning to strengthen the knowledge and skills of future physicians while still in medical school. A national model for CEL during medical school does not currently exist. Emergency physicians have the opportunity to play a vital role in medical student education using CEL as a platform. This article elucidates the structure of a bystander cardiopulmonary resuscitation (B-CPR) CEL program developed by emergency physicians that could serve as a national model for community engagement. As B-CPR is a well-known evidence-based community intervention that can be taught by students and implemented by the community, it represents an ideal CEL that can also have a measurable impact on local B-CPR rates. The development and structure of a B-CPR CEL program, lessons learned, and impact on B-CPR in a local area are reported.

**KEYWORDS**

Bystander CPR, community-engaged learning, undergraduate medical education

## 1 | INTRODUCTION

Community-engaged learning (CEL) integrates community service with structured learning to strengthen the knowledge and skills of future physicians while still in medical school. In accordance with a mission to train new physicians who provide optimal patient-centered care that also addresses social determinants of health, there has been a growing emphasis on the incorporation of CEL into under-

graduate medical education (UME) curricula. CEL has been linked to the development of attributes of altruism and dutifulness, along with more favorable academic outcomes in medical students.<sup>1</sup> The Liaison Committee on Medical Education (LCME) enumerates this educational objective as one of the standards for accreditation for medical education programs by ensuring medical schools provide sufficient opportunities for, encourage, and support medical student participation in service-learning and community service activities.<sup>2</sup> Despite this guidance, substantial gaps currently exist in the adoption of CEL initiatives.

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**TABLE 1** Ideal characteristics of a community engaged learning project

1. Easily accessible to students.
2. Educates students on community-oriented health topics.
3. Promotes an underserved medical need within the community.
4. Evidence-based in its clinical intervention.
5. Can exist as a national model with applicability in a wide range of communities.

The need for program development is demonstrated by data from the American Association of Medical Colleges 2014–2015 Curriculum Inventory, which showed that only 29 of the 135 respondent US medical schools reported teaching CEL.<sup>3</sup> Universities desiring to showcase their community engagement benchmarks and gauge themselves against other programs lack universal language, making it difficult for institutions to show their imprint.<sup>4</sup> CEL introduces medical students to educational experiences within the community and aims at addressing unique community-identified needs, often well within the scope of the practice of emergency medicine. Emergency physicians have the opportunity and distinct skill set to play a key role in the development of CEL experiences. The aim of this article is to elucidate the development and structure of a specific CEL program, developed and directed by emergency physicians, that could serve as a national model for community engagement while advancing health care within communities.

## 2 | EDUCATIONAL STRATEGY

An ideal model for UME CEL includes the following characteristics: (1) easily accessible to students, (2) educates students on community-oriented health topics, (3) promotes an underserved medical need within the community, (4) reproducible, and (5) evidence based in its intervention (Table 1). Unfortunately, no national model for CEL currently exists, primarily because of the difficulty in meeting these ideal characteristics.

Our goal, as academic emergency physicians, was to design a CEL program based on an evidence-based medical intervention that is known to advance community health. One of the best studied community-based medical interventions involves performing bystander cardiopulmonary resuscitation (B-CPR) on cardiac arrest victims. Recent estimates suggest that approximately 395,000 cases of out-of-hospital cardiac arrest (OHCA) occur in the United States every year among patients of all ages, only 5.5% of whom survive to hospital discharge.<sup>5</sup> The medical literature is clear that early B-CPR and the use of an automated external defibrillation (AED) device are the most effective interventions to improve OHCA survival.<sup>6</sup>

B-CPR community education and training meet all of the “ideal” characteristics of a CEL initiative. The implementation of the outlined B-CPR CEL project, including student education, community engagement modalities, research initiatives, and assessment of community impact, are further discussed.

## 3 | IMPLEMENTATION

CEL initiatives at our institution are overseen by CEL directors, in both implementation and design. The current lack of a national model for CEL design provides several opportunities for emergency physicians, who have a unique understanding of medical needs within the community. Most often physicians, CEL directors are paired with initiatives that align with their field of expertise. Examples of other CEL programs at our institution include a student-run free health clinic, community stroke awareness, medical Spanish for clinicians, and Stop the Bleed.

Although CEL is designed as an elective offering at most institutions, it is a required component of the medical curricula at Eastern Virginia Medical School (EVMS). Each fall, incoming students submit a list of their preferred CEL initiatives based on interests that align with their career aspirations; 95% of students match to 1 of their top 2 CEL choices. The B-CPR CEL initiative accepts a maximum of 30 students each academic year and typically attracts those interested in emergency medicine, internal medicine, and other specialties rooted in acute care. Students are required to participate longitudinally over all 4 years of medical school, though the bulk of contact time occurs during the first 2 years. During the pre-clerkship phase (first and second year), CEL students are expected to have 15 contact hours per year with their CEL initiative. Contact time is accomplished by participating in activities that are both asynchronous (literature reviews, protocol development, planning) and synchronous (group meetings, CPR training, teaching, study data collection). During the third and fourth years, there are no minimum contact hour requirements.

The B-CPR CEL was designed, and is currently directed, by 2 faculty physicians with academic appointments in the Department of Emergency Medicine at EVMS. Though alignment with emergency medicine trained physicians is clearly beneficial, it is not an absolute prerequisite for directing this type of CEL program. The B-CPR directors provide guidance to B-CPR students around (1) funding use, (2) curricular education, (3) community teaching, and (4) research opportunities, specifically those focused on assessing community impact. Though compensation for the CEL directors’ time and efforts is not mandatory, it does help to formalize the commitment and deliverables from both parties. At EVMS, the B-CPR directors’ time commitment is offset by compensation at 10% of a physician full-time equivalent.

CEL has been described as direct community service with a focus on joint education, contemplation of experiences, and the coordination between community members.<sup>7</sup> B-CPR CEL students participate in required didactics that include topics such as pathophysiology of cardiac arrest, epidemiology of cardiovascular disease, and the role of B-CPR. The incorporation of didactic learning into the B-CPR CEL model is an important element in the structure of our CEL. Learners expand on these didactic sessions through student presentations and critical appraisal of the cardiac arrest literature. Interwoven into the development of B-CPR are intrinsic educational components centered on the American Heart Association (AHA) cardiac arrest guidelines.

The educational content of our community-facing B-CPR initiative closely follows AHA guidelines and emphasizes compression-only CPR. Current AHA guidelines recommend lay rescuers provide chest compression-only CPR for adults in OHCA. The elimination of the mouth-to-mouth breathing step during cardiac arrest was significant and had a profound impact nationally on simplifying CPR education—without a negative effect on patient mortality.<sup>6</sup> CPR training today is easily taught and can be accomplished in about 20 minutes (30 minutes when combined with AED training), as opposed to the full-day certification courses that were standard 10 years ago. The streamlining of AHA interventions allows students to quickly learn, and subsequently teach, B-CPR.

Our initial CPR and First Aid Anywhere kits were purchased through the AHA and included an interactive DVD that structured course content and allowed pauses for class participants to practice skills. These kits contained 10 inflatable mannequins and cost \$649 each. A DVD-capable projector and screen were purchased separately from the AHA materials and were an excellent way to initially grab the learner's attention. During the skills portion, students proctored course participants to ensure adequate CPR technique. Educational content for compression-only CPR and teaching materials are available through the AHA and can be viewed at <https://cpr.heart.org/en/cpr-courses-and-kits/hands-only-cpr/hands-only-cpr-resources>.

Program oversight by emergency medicine faculty has an additional benefit in that it leverages preexisting professional relationships between community partners. This is most evident with emergency medical services (EMS) and police who have a similar mission to promote community health and well-being. In many communities, parallel efforts to improve B-CPR performance (and AED use) are often unrecognized. Our partnership with both Norfolk Fire Rescue (NFR) and Norfolk Police Department resulted in collaborative efforts that allowed us to achieve more than we could alone. Throughout its development, the CEL group benefited from shared equipment, supervision, and the visibility of uniformed prehospital providers to help attract community participation. As an added component to promote community engagement, B-CPR CEL students were required to complete a 4-hour ride-along with NFR EMS units, further enhancing their community experience.

The acquisition of training manikins was a prerequisite for a B-CPR CEL program. Although various purchase options exist from several manufacturers, programs should first make an effort to reach out to local EMS training programs, as equipment sharing occurs regularly for training efforts. We recommend purchasing durable equipment that can be used repeatedly. Although we initially believed that inflatable manikins were an excellent training model, after repeated use, they quickly developed tears at their seams. Foam-based manikins, although lacking some of the realistic feel of a chest compression, proved more durable, making them superior for repeated use. The quantity of manikins depends on the number of instructors and anticipated students. During community training sessions, we assigned 2 learners to each manikin, allowing the class size to double. An initial purchase of 10 to 20 manikins, at an anticipated cost of \$500 to \$1000, should be sufficient.

The B-CPR CEL group initially concentrated CPR teaching sessions at locations with greater public density, such as fitness centers, shopping malls, and local public areas. The challenge with this approach was the randomness of the encounter. The participation of the general public was dependent on their availability and motivation to set aside 30 minutes to learn B-CPR and AED use. Training events usually consisted of 5 to 10 medical students and 1 CEL director. A B-CPR CEL team this size could train a group of 30 to 40 participants on B-CPR and AED use in about 30 minutes..

In an effort to attract public interest, we often staged an ambulance or fire engine, with lights on, in front of the venue. We also developed signage with our school's logo advertising both the event and the medical school. Though compression-only CPR training does not come with a traditional course-based CPR certification card, we did distributed wallet-sized cards that indicated participation in our training session. These cards also included a reminder of basic B-CPR techniques. It became clear over time that these training cards were valued by course participants.

As the program matured, CEL designers also found that high schools represented a high-value target for our group. In the Commonwealth of Virginia, high schools are required, by law, to train students in performing CPR before graduation. It has been our observation that high school students are typically motivated to learn and are a captive audience. It is also relatively easy to train several hundred students over a 2- to 3-hour time frame using 10 to 15 medical students as trainers.

#### 4 | EFFECTIVENESS OF THE CURRICULUM

The B-CPR CEL project has made significant impacts on our community. Over the last 6 years, our CEL group has trained over 4,000 learners and has promoted B-CPR and AED use through community education efforts, billboards, and other public service announcements. During the early stages of the B-CPR CEL initiative, our community (Norfolk, VA; pop. 242,803) was identified as having one of the lowest rates of B-CPR in the country. In 2013 NFR performance improvement data indicated only 12% of patients in Norfolk received B-CPR during an OHCA event, compared to the national norms, which approached 40% during the same time period. Since the inception of B-CPR in 2014, rates of B-CPR in Norfolk during an OCHA event increased in 2019 to 26%.

This improvement is especially significant in the context of addressing local health care disparities. As Sasson et al reported in their 2012 study, the odds of receiving B-CPR were 51% lower if the cardiac arrest occurred in a low-income black neighborhood when compared with a high-income white neighborhood.<sup>8</sup> As Norfolk has a diverse population with a high percentage of African American residents, many of whom live significantly below the poverty level,<sup>9</sup> these factors are suspected to have contributed to our community's initially low B-CPR rates. The National Institutes of Health, through the Clinical and Translational Science Awards (CTSAs), and the Centers for Disease Prevention and Control have emerging interest in CEL as a critical approach to "resolving health disparities and improving the health of communities across

**TABLE 2** Community survey questions and answers

	% Yes	Total surveys completed
I would know if someone needs CPR	80	843
It is important to perform CPR on a person who is unconscious and not breathing	85	841
I have to do "mouth to mouth" breathing when performing CPR	47	772
CPR can be delayed until ambulance arrives		776
I can catch a disease when performing CPR	29	840
I am interesting in learning how to perform CPR	69	841
I am physically unable to perform CPR	9	848
I am afraid of performing CPR on someone in case I do something wrong	28	845
I am worried that I can be sued/legal trouble for performing CPR	26	841
If I knew CPR, I would be willing to teach others	80	842
Have you ever been trained to perform CPR?	71	845
Have you ever been trained to perform "hands only" CPR?	44	841

Abbreviation: CPR, cardiopulmonary resuscitation

the country."<sup>10</sup> As the B-CPR program continues to mature, our focus will continue to address local inequalities based on race and socioeconomic status through targeted B-CPR awareness and education efforts within poorer areas of our community.

Student organized research has also been effective in implementing important community changes while meeting the educational standards of the LCME.<sup>2</sup> Students within the B-CPR CEL group developed an institutional review board (IRB)-approved community survey to better understand the unique barriers in our community that limit performance of B-CPR by the general public. This anonymous survey consisted of questions aimed at (1) assessing a subject's knowledge of current B-CPR AHA recommendations, (2) willingness to perform CPR, and (3) barriers that might prevent the performance of B-CPR. Data collection was summative over several years of B-CPR CEL groups (2015–2019) and in sum, resulted in 1019 surveyed subjects.

The B-CPR CEL community survey identified multiple barriers that contributed to the low B-CPR rates, unique to our community (Table 2), and revealed 2 major themes: (1) only 44% ( $n = 334$ ) of the surveyed population had been trained in compression-only CPR, and (2) nearly half of the population surveyed (47% [ $n = 350$ ]) still thought "mouth-to-mouth" was a required component of B-CPR. Further, 29% ( $n = 218$ ) of survey participants believed they could catch a disease when performing CPR, 28% ( $n = 204$ ) were fearful of doing something wrong while performing CPR, and 26% ( $n = 188$ ) reported concerns about legal consequences. As communities throughout the country have unique and unidentified barriers for performing B-CPR, our research survey is reproducible and has applicability in communities of different size and socioeconomic makeup. The invaluable insights gleaned from our survey allowed for adjustments in our B-CPR education program, to proactively address community concerns, and to dispel myth. This survey could be used as a national model to advance community health and engage students in academic research.

## 5 | LESSONS LEARNED

The development of any CEL project requires medical expertise in the area of community engagement. The B-CPR CEL project met both academic and community engagement requirements on many levels. Though straightforward in concept, there were many lessons learned during program maturation.

Over the course of the initiative, changes have been made to the overall curriculum. For instance, in the programs initial years, B-CPR students were required to complete the AHA Heartsaver Instructor course. It quickly became apparent, however, that the time commitment for the Heartsaver course was prohibitive for busy medical students. At the same time, we found that student supervision by B-CPR directors was a sufficient, and the preferred method of oversight. As a result, the AHA Heartsaver Instructor course requirement was removed. Changes were also made to the curriculum to ensure better understanding and engagement around key topic areas. When the first group of students joined the B-CPR initiative, we quickly realized that students were lacking the necessary understanding of cardiac arrest pathophysiology. We began to incorporate didactics and student presentations early in the B-CPR experience to ensure that students had the appropriate foundational knowledge prior executing B-CPR in the community.

Creating an initiative that relied on community partners allowed for many learning opportunities and recommendations for others looking to replicate this program. First, engagement with prehospital community partners is a priority. Not only can these partners serve as teaching resources, but they can expand your equipment supply and connect you with others in the community. Other key stakeholders may include city offices, recreation centers, and local high schools, as they often provide a high volume of engaged students and have consistent teaching opportunities. When considering where to offer B-CPR

training, it is important to map and target areas of the community that are underserved medically and those with higher numbers of cardiac arrest.

Other, more administrative-oriented, learned lessons include tracking all data, including pre-and post-program bystander CPR performance rates, the development and administration of a community survey to determine the unique understanding of barriers to performing CPR in the local area, and best practices when purchasing materials. For example, after some trial and error, we found that the foam-based CPR manikins were more durable than the air-inflated ones.

## 6 | LIMITATIONS

Despite the overwhelming benefits, CEL development is often slowed due to lack of awareness of medical school leadership and emergency physicians. Often, these key stakeholders overlook the excellent community engagement opportunity that exists when developing a B-CPR program. Although program costs must be considered, they can often be reduced or offset through community and teaching partnerships.

Lastly, as experienced in all of education, the COVID-19 pandemic greatly disrupted our CEL initiatives, most notably our teaching opportunities within the community. Although our students were able to pivot during the pandemic and provide community support through different means, B-CPR community engagement was slowed considerably. As we enter a post-pandemic period, CEL directors are optimistic that initiatives and community education efforts will once again be available.

## 7 | CONCLUSION

The B-CPR CEL initiative provides a model for how UME CEL can benefit from partnerships with emergency physicians. Emergency physicians can play a valuable role in both the advancement of community health and medical student education. This program highlights the leadership role emergency physicians can take both in the academic and out-of-hospital health care environments.

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## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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