

# JCEMS

Spring/Summer 2018

Volume 1, Issue 2

[CollegeEMS.com](http://CollegeEMS.com)

The Journal of Collegiate Emergency Medical Services

## Mass Gathering Medicine

*EMS Utilization at Campus Events*



### *Also Inside*

The JCEMS Research Mentorship Program

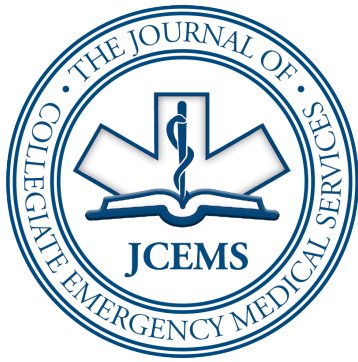
Benzodiazepine & Alcohol Co-Ingestion

Stop the Bleed at Johns Hopkins University



*The Official Peer-Reviewed Journal of the  
National Collegiate Emergency Medical Services Foundation*





*The Journal of*  
**COLLEGIATE EMERGENCY MEDICAL SERVICES**

# TABLE OF CONTENTS

*The Official Journal of the National Collegiate Emergency Medical Services Foundation*

## Editorial

### 4 JCEMS Research Mentorship Program: Objectives & Opportunities

*Nicholas M.G. Friedman, BA, EMT; Brittany J. Dingler, BA, PA-S*

## News & Commentary

### 8 Interview with Oren Cohn: 2018 Collegiate EMS Provider of the Year

*Oren Cohn; Brittany J. Dingler, BA, PA-S*

## Advice & Practices

### 11 Implementation of Stop the Bleed on an Undergraduate College Campus:

The Johns Hopkins Experience

*Christopher Wend, BS, NRP; Rajiv C. Ayyagari; Leyla Herbst, EMT; Scott Spangler, NRP, FP-C; Elliott R. Haut, MD, PhD, FACS; Matthew J. Levy DO, MSc, FAEMS, FACEP, NRP*

## Clinical Review

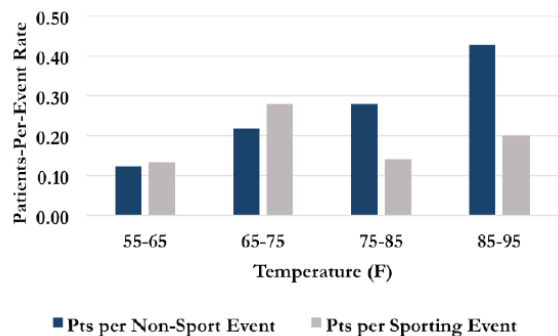
### 19 Benzodiazepine & Alcohol Co-Ingestion: Implications for Collegiate-Based Emergency Medical Services

*David Goroff, MS, NRP; Alexander Farinelli, BS, NRP*

## Original Research

### 24 EMS Resource Utilization at College Campus Mass Gathering Events

*Emma C. Ordway, BS; Neil Sarna, BS, NREMT; Lindsey M. DeGeorge, MD; Ali M. Baird, NREMT; Miranda J. Reid, NREMT; Jose V. Nable, MD, MS, NRP*



## SUPPLEMENTAL

### 31 25<sup>th</sup> Annual Conference of the National Collegiate EMS Foundation: Academic Poster Session Abstracts

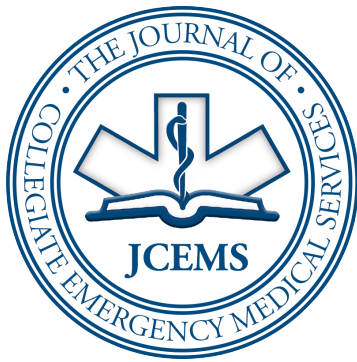
## Cover Images

### Front Cover:

Muhlenberg College EMS Quick Response Vehicle  
*Photo Credit: Muhlenberg College EMS*

### Back Cover:

Pittsburgh Skyline  
*Photo Credit: Sean Pavone ©123RF.com*



# *The Journal of* **COLLEGIATE EMERGENCY MEDICAL SERVICES**

## **Editor-in-Chief**

**Nicholas M.G. Friedman, BA, EMT**

## **Executive Editor**

**Brittany J. Dingler, BA, PA-S**

## **Editorial Board**

**Jose Victor L. Nable, MD, MS, NRP**

Georgetown University School of Medicine, Washington, DC

**Matthew J. Levy, DO, MS, FACEP**

The Johns Hopkins University School of Medicine, Baltimore, MD

**Benjamin J. Lawner, DO, MS, EMT-P, FACEP**

Temple University School of Medicine, Philadelphia, PA

**David Goroff, MS, NRP**

New Castle County EMS, New Castle, DE

**Albert Jagoda, MD**

Skidmore College, Saratoga Springs, NY

**Brent Campbell, BA, AEMT-CC**

Ambulance Service of Fulton County, Gloversville, NY

**Patricia Bosen, MSN, FNP-C**

Skidmore College, Saratoga Springs, NY

**Joseph M. Grover, MD**

University of North Carolina School of Medicine, Chapel Hill, NC

**Lauren N. Gorstein, BA, EMT-B**

Skidmore College, Saratoga Springs, NY

**Michael W. Dailey, MD, FACEP, FAEMS**

Albany Medical College, Albany, NY

**Jeffrey S. Lubin, MD, MPH, FACEP, FAEMS**

Penn State College of Medicine, Hershey, PA

## **Publishing & Management**

**Antonio Carl Del Vecchio** • Managing Editor

**Kiran Syed** • News Editor

**Nicholas Malizia** • Copy Editor

**Gregory Kantor** • Copy Editor

**Sandra Dingler** • Design Consultant

**Ketan Yerneni** • Associate Manager of Marketing and Sales

## **Reviewers**

JCEMS employs a double-blind peer review process for Original Research, Case Reports, and Reviews. The clinical and scientific quality of this publication relies on the vigorous and diligent reviews provided by independent reviewers with subject-matter expertise. JCEMS is grateful for all anonymous independent reviewers who dedicated their time and expertise to contribute to the collegiate EMS community.

## **General Information**

The Journal of Collegiate Emergency Medical Services (JCEMS) [ISSN 2576-3687] is the official scholarly, peer-reviewed journal of the National Collegiate Emergency Medical Services Foundation. JCEMS is published by the National Collegiate Emergency Medical Services Foundation.

**Annual Subscription:** Visit <https://www.collegeems.com> for information on purchasing institutional and personal annual subscriptions.

**Reprints:** Visit <https://www.collegeems.com> for information on purchasing reprints and single issues.

**Correspondence (Editorial):** Address mail to The Journal of Collegiate Emergency Medical Services, 117 N 15<sup>th</sup> St., Philadelphia, PA 19102.  
Email: [JCEMS@CollegeEMS.com](mailto:JCEMS@CollegeEMS.com)

**Correspondence (Business):** Address mail to The Journal of Collegiate Emergency Medical Services, 117 N 15<sup>th</sup> St., Philadelphia, PA 19102.  
Email: [JCEMS@CollegeEMS.com](mailto:JCEMS@CollegeEMS.com)

**Correspondence (NCEMSf):** Address mail to National Collegiate Emergency Medical Services Foundation, PO Box 93, West Sand Lake, NY 12196.  
Email: [info@ncemsf.org](mailto:info@ncemsf.org)

**Copyright:** The Journal of Collegiate Emergency Medical Services is an open access publication. Individual authors retain copyright over their own articles. Articles are distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>. All other content in the journal is copyrighted by the National Collegiate Emergency Medical Services Foundation. All rights reserved.

**Online availability:** All articles published in print issues of JCEMS are available open access at <https://www.collegeems.com>. Additional content – not available in print issues – is also published on-line.

**Disclaimers:** The statements and opinions in articles or other content contained in JCEMS are solely those of the individual authors, contributors, advertisers, and sponsors, and do not represent those of JCEMS, the National Collegiate Emergency Medical Services Foundation, or any representatives, agents, or licensors. The appearance of advertisements does not represent a warranty, endorsement, or approval of the products or services advertised. JCEMS, the National Collegiate Emergency Medical Services Foundation, or any representatives, agents, or licensors make no warranties, representations, or other claims as to the accuracy or completeness of any articles or other content contained in JCEMS. JCEMS and NCEMSf disclaim responsibility for any injury to persons or property resulting from ideas, products, or other content referred to in articles or other content in JCEMS. EMS providers should always consult medical direction and local EMS protocols.

**Instructions for Authors:** Instructions for authors may be found in the JCEMS Guide for Authors at <https://www.collegeems.com>. Authors are required to abide by the latest guidelines available on-line at the time of submission.

# The JCEMS Research Mentorship Program: Objectives and Opportunities

*JCEMS developed a Research Mentorship Program to build research capacity in the collegiate EMS community.*

Nicholas M.G. Friedman, BA, EMT & Brittany J. Dingler, BA, PA-S

In the inaugural issue of JCEMS, we described the limited evidence base supporting prehospital emergency care and the distinct lack of published research focused on collegiate-based EMS (CBEMS).<sup>1</sup> As key barriers to the production of EMS research and scholarship, we identified a lack of education and mentorship. The design, implementation, and publication of quality research projects require the contributions of experienced and knowledgeable investigators with domain-specific expertise. However, CBEMS providers rarely receive targeted education on conducting or publishing EMS research. Moreover, CBEMS providers may find it challenging to identify and forge productive relationships with mentors who are experienced in EMS research and scholarship. This challenge is even greater for providers of CBEMS organizations that are unaffiliated with academic medical institutions.

Since its recent establishment, JCEMS has vigorously promoted research education and mentorship in the CBEMS community. In collaboration with the National Collegiate EMS Foundation (NCEMSF), JCEMS created an open access journal, annual academic poster

## Key Points

**Problem:** A lack of mentorship has been identified as a barrier to EMS research and scholarship.

**Objectives:** The JCEMS Research Mentorship Program aims to facilitate productive, scholarly relationships between collegiate EMS providers and established investigators, scholars, and clinicians.

**Opportunities:** Collegiate EMS providers are eligible to apply for enrollment in the program. Faculty, graduate students, and other individuals with demonstrated research expertise may serve as senior or junior mentors.

session, and annual research design workshop. In addition, the JCEMS Editorial Board has been informally connecting CBEMS providers with established, professional mentors. The success of these initiatives has been made apparent by the quality of our published manuscripts and abstracts.

Notwithstanding JCEMS' and NCEMSF's contributions to the promotion of CBEMS research, there remain significant opportunities to pair the motivation and dedication of CBEMS providers with the experience and knowledge of established investigators. The JCEMS Research Mentorship Program – carefully designed over the last year – represents a collaborative effort between

**Nicholas M.G. Friedman**, BA, EMT is the Editor-in-Chief of JCEMS and the former Director of Skidmore College EMS. **Brittany J. Dingler**, BA, PA-S is the Executive Editor of JCEMS and a student in the Physician Assistant program at Drexel University.



academic emergency medicine physicians, college health professionals, prehospital professionals, graduate students, and CBEMS providers.

## Objectives

The primary objective of the JCEMS Research Mentorship Program is to facilitate productive scholarly relationships between CBEMS providers and established EMS researchers. It is expected that students who participate in the program will develop competency in conducting research, setting the stage for their continued development as research leaders in EMS and other fields. It is also anticipated that the projects fostered by the program will result in scholarly publications and presentations that impact clinical, operational, and administrative developments within the CBEMS community.

## Program Overview

At the core of the program is the relationship between mentors and CBEMS providers. As described in this editorial JCEMS will systematically facilitate productive, scholarly relationships. Figure 1 presents a schematic map of progression through the mentorship program; additional options may be feasible depending on the specific aims of mentors and students.

### Applications

As highlighted in the Application Information Box, all CBEMS providers may apply to enroll in the program. Students will be accepted on the basis of clearly articulated motivations and intent. Strong research experience will enhance the competitiveness of an application, but is not strictly required. Multiple students may apply as a team. Accepted students will be designated as JCEMS Research-Scholars.

Residents, medical students, and graduate students with strong preparation in research and mentorship may apply to serve as Junior Mentors; faculty and clinicians with demonstrated expertise in EMS research (or a relevant field) and extensive experience in teaching or mentorship may elect to serve as Senior Mentors.

### Matching

JCEMS will match selected students with a Senior Mentor and, potentially, one or more Junior Mentors. Match-

### Application Information

**Collegiate EMS Providers:** To apply to become a JCEMS Research-Scholar, please submit an application, available to download on the JCEMS website: <https://www.collegeems.com/research-mentorship-program/>.

**Residents/Medical Students/Graduate Students:** To elect to serve as a Junior Research Mentor, please submit a brief letter of intent and CV. Submissions may be sent via email to [JCEMS@CollegeEMS.com](mailto:JCEMS@CollegeEMS.com).

**Faculty/Clinicians:** To elect to serve as a Senior Research Mentor, please submit a brief letter of intent and CV. Submissions may be sent to [JCEMS@CollegeEMS.com](mailto:JCEMS@CollegeEMS.com).

### Deadline for First Enrollment Period

**October 1, 2018**

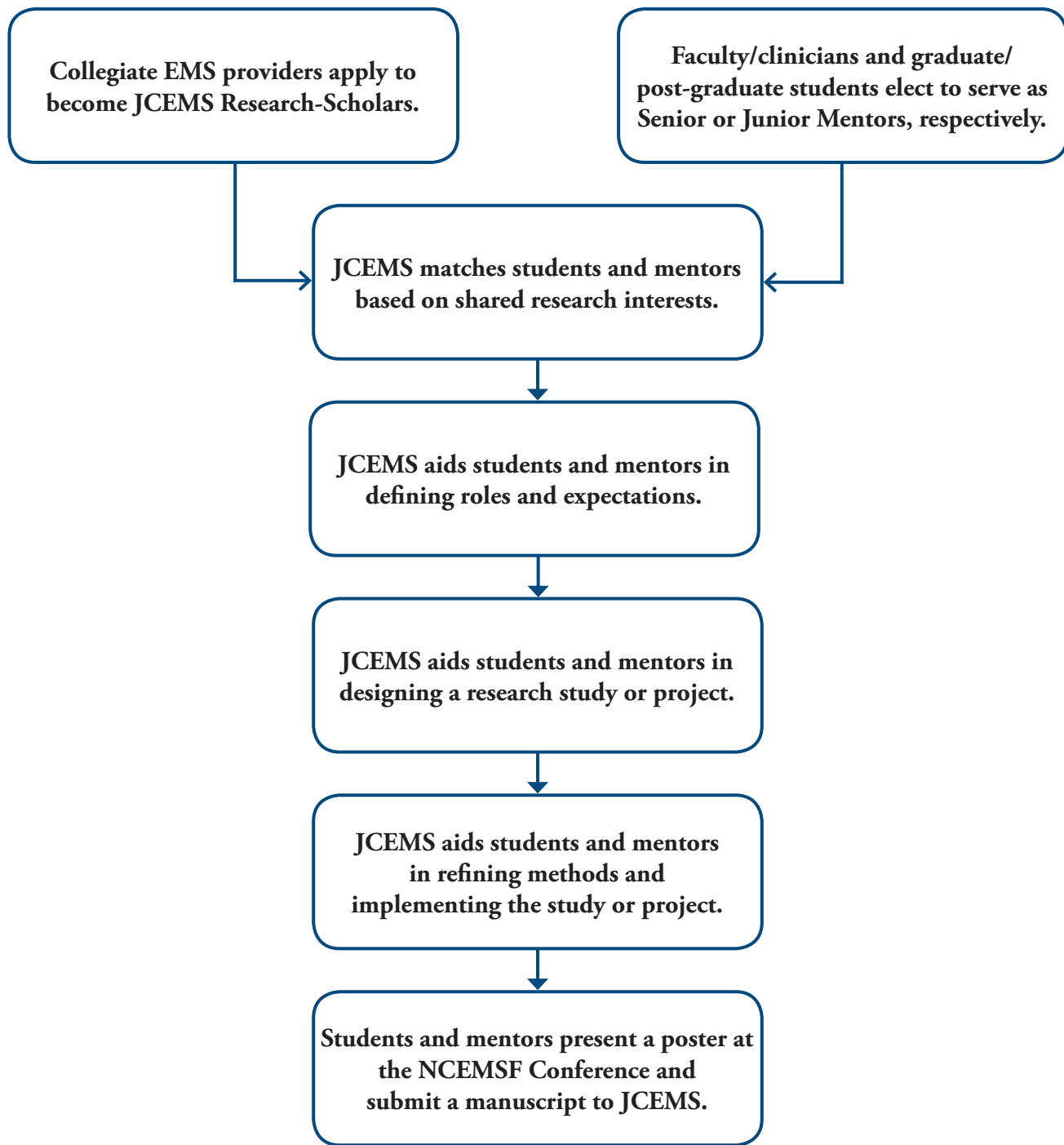
es will be made on the basis of shared research interests, and students may elect to identify a desired mentor in their application if they have an established relationship (eg, the student's medical director). When appropriate, students with similar research interests may be grouped into research teams. Mentors and students may be located remotely from each other.

### Roles & Expectations

After matching students and mentors, JCEMS will facilitate the creation of a written agreement between the students and the mentors, detailing the expected timeframe, time commitment, roles of students and mentors, and expected outcomes from their project. It is anticipated that the students will lead a semester to year-long project with continuous guidance and assistance from their mentors; however, the research team members may define their respective roles and commitments as they choose, and roles may be refined over time.

### Project Design

Mentors will help the students to design a research project, including identifying any additional student or faculty collaborators and obtaining Institutional Review



**Figure 1. Schematic map of the JCEMS Research Mentorship Program.**

Board (IRB) approval. A broad range of research projects are acceptable including, but not limited to, an innovative pilot or quality improvement project, epidemiological survey, simulation-based training study, review article, or case report.

Research teams may submit a description or proposal of their projects to JCEMS before initiating their projects. JCEMS will identify reviewers with subject-matter expertise to provide comments and feedback in order to refine and strengthen projects.



### Project Implementation

Throughout the project implementation process, JCEMS will help the research teams as needed to refine project goals and methods, identify additional collaborators/consultants, seek funding, and potentially help students seek academic credit. Each month, JCEMS Research-Scholars will submit a brief report detailing their progress and plans.

### Presentation & Publication

Research teams are strongly encouraged to submit an abstract for a poster presentation at the Annual Conference of the National Collegiate EMS Foundation. Upon completion of the project, research teams are strongly encouraged to submit a manuscript for peer review in JCEMS.

### Program Evaluation and Growth

The program will be continuously evaluated and iteratively improved. Feedback will be systematically collected from the Research-Scholars and Mentors to identify opportunities for program improvement.

Initially, only five students or student-teams will be eligible for simultaneous enrollment in the program. Limiting the number of actively enrolled Research-Scholars will ensure that JCEMS is able to offer extensive support to each research team. As the program develops, a greater number of Research-Scholars may be simultaneously enrolled.

It is anticipated that the projects initially facilitated will be short-term, single-institution research studies or pilot projects. JCEMS will actively seek to promote the development of long-term, multi-site studies and projects with the potential for high impact in the collegiate EMS environment and beyond.

### Acknowledgments

We thank Dr. George J. Koenig (President of the National Collegiate EMS Foundation) and the JCEMS Editorial Board for their contributions to the development of the JCEMS Research Mentorship Program.

### References

1. Friedman NMG, Dingler BJ, Nable JV, Koenig GJ. Research and Scholarship in Collegiate Emergency Medical Services: Current State and Opportunities for Progress. *J Coll Emerg*

*Med Serv.* 2018; 1(1): 5-12. <https://doi.org/10.30542/JCEMS.2018.01.01.01>

**Author Affiliations:** From *The Journal of Collegiate Emergency Medical Services*, Philadelphia, PA, USA (N.M.G.F, B.J.D.); Physician Assistant Program, Drexel University College of Nursing and Health Professions, Philadelphia, PA, USA (B.J.D.).

**Address for Correspondence:** Nicholas M.G. Friedman, BA, EMT. *The Journal of Collegiate Emergency Medical Services*, 117 N 15<sup>th</sup> St., Philadelphia, PA 19102, USA. E-mail: [JCEMS@CollegeEMS.com](mailto:JCEMS@CollegeEMS.com)

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. N.M.G.F and B.J.D. serve in uncompensated editorial roles for JCEMS. All authors declared that they have no others conflicts of interest. All authors declared that they did not receive funding to conduct the research and/or writing associated with this work.

**Authorship Criteria:** By the JCEMS Submission Declaration Form, all authors are required to attest to meeting the four ICMJE.org authorship criteria: (1) Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND (2) Drafting the work or revising it critically for important intellectual content; AND (3) Final approval of the version to be published; AND (4) Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

**Submission History:** Received August 5, 2018; accepted for publication August 5, 2018.

**Published Online:** August 10, 2018

**Published in Print:** August 13 2018 (Volume 1: Issue 2)

**Reviewer Information:** In accordance with JCEMS editorial policy, Editorial manuscripts are reviewed by the JCEMS Editorial Board and published by the Editor-in-Chief or designee. JCEMS thanks the Editorial Board members who contributed to the review of this work.

**Copyright:** © 2018 Friedman & Dingler. This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.02.01>

## Interview with Oren Cohn: 2018 Collegiate EMS Provider of the Year

*JCEMS Executive Editor Brittany J. Dingler offers an exclusive interview with Rochester Institute of Technology (RIT) Ambulance's visionary student-leader.*

### Why did you decide to pursue EMS? Was EMS a factor in choosing which college to attend?

My dad was very involved as a volunteer firefighter and EMT when I was a little kid; a few faint memories of calls I tagged along on have always kept me interested in the field. When I was 15, I joined my local fire department as a junior corps member. The fire house ran a BLS ambulance and, although junior corps members weren't allowed on the ambulance, I still learned a lot of EMS knowledge. I knew I wanted to keep volunteering in college, which factored into my decision to attend Rochester Institute of Technology (RIT). I'm really glad I went to a school with an EMS agency – it turned into the central point of my collegiate experience.

### What strategies or incentives do you use to motivate your agency?

One of the most effective ways to motivate an agency is to create self-motivation among members by showing them they belong and have a specific purpose in the agency. As a chief, I listen to everyone's ideas and do my best to give members leadership opportunities, both on-call and in the agency administration. These opportunities also shape them into future leaders in other settings.

Additionally, EMS agencies are experiencing a lack of volunteerism around the country, so it is important for EMS leaders to boost and maintain recruitment and retention rates. Part of retaining members is preventing provider burnout. The biggest culprit for burnout in RIT Ambulance was the weekend overnight shifts and event standbys, both of which were typically covered by only a handful of people. To combat this problem, we created a weekend shift rotation which not only reduced

### 2018 Collegiate EMS Provider of the Year

**Oren Cohn** was honored by the National Collegiate EMS Foundation as the 2018 Collegiate EMS Provider of the Year. As the Chief of Operations of Rochester Institute of Technology (RIT) Ambulance, Chief Cohn was cited for his exceptional leadership and dedication to emergency management and disaster preparedness.

provider burnout but helped ensure shift coverage. One of my main goals as chief was to increase our call coverage in order to better serve our campus and local communities. Greater coverage was partly achieved by strengthening membership participation through shift rotations.

An additional change I made was utilizing a new response application for member cell phones to help coordinate day-time response: a time without scheduled shifts when most calls were traditionally not covered. Lastly, small incentives are very effective in ensuring that everyone is able to enjoy their time spent with the agency.

**“I listen to everyone's ideas and do my best to give members leadership opportunities, both on-call and in the agency administration.”**

We started providing meals to any member that worked standbys and gave the most active members priority in picking which standbys to work. Standbys started utilizing Incident Command Structure (ICS), which allowed members to become more familiar with the system and what to expect at large incidents. These initiatives resulted in standbys becoming more popular and easier for our agency to staff.





Oren Cohn receives the 2018 Collegiate EMS Provider of the Year Award from Dr. George J. Koenig, President of the National Collegiate EMS Foundation (Philadelphia, PA).

### What is the most impactful program you and your agency created?

As chief of RIT Ambulance I had the opportunity to work with other local chiefs, county representatives, and RIT administrators. I brought large-scale training to our campus to teach the members new skills, and to have them work alongside their public safety counterparts. We hosted MCI and vehicle extrication drills, and were able to participate in Hazmat and structure fire drills. Working with other departments increased familiarity with RIT Ambulance, after which we saw an increase in mutual aid requests for RIT Ambulance to respond and assist other agencies. Hosting drills also facilitated the familiarity of our members with RIT Public Safety officers as well as local firefighters and paramedics, ultimately leading to increased efficiency on scenes.

These trainings became critical during three Hazmat calls and one structure fire on campus over the last academic year; these instances required multiple agencies to work together in order to quickly and effectively manage the complex scenes. The successful management of these incidents increased our positive reputation within the university community and the county.

Therefore, as a result of the original trainings, RIT Ambulance has become a huge asset to the community and has provided members with more motivation to grow as leaders within the agency and in their own lives.

### What are your future career goals? How has your collegiate EMS experience prepared you?

I'm currently pursuing a career in Emergency Management, in which I'm currently doing an internship. This field allows me to combine my passion for fire and EMS with leadership. Being a chief of a collegiate EMS agency gave me the opportunity to work with public safety

professionals in my local county. As a college student at large incidents, for example, I was able to contribute to important conversations and make key decisions. I took leadership classes like ICS-300, which forced me to learn and increase my versatility at the command post. This learning opportunity enabled me to grow as a leader by offering critical lessons in resource management, and revealing how many people and agencies are involved in emergency management. I will use these lessons not only in my career but in my life. Working with people is an important skill – if you can do it well under pressure or in an emergency while managing EMS crews, you can do it in day-to-day operations.

### How do you balance academics, EMS, and personal well-being?

It's important for collegiate EMS leadership to stress that their agency members must always prioritize academics. We are all students first, and our main goal is to graduate. As a leader in RIT Ambulance, I always tried to demonstrate that if I could get good grades as the chief, everyone should be able to get good grades, because that's



what the chiefs before me did. I made it clear that it was not acceptable to skip class for calls or any agency-related business. I also held that standard for myself by never picking up shifts or calls the night before big tests. Most importantly to me, I got involved with an intramural athletic team, which helped me stay in shape and clear my mind of both EMS and classes. On top of all that, I always tried to get at least 6 hours of sleep nightly and consistently eat healthy meals. Overall, I was able to balance academic work, agency work, and personal well-being by setting time aside for each of those things everyday.

**Author Affiliations:** From Rochester Institute of Technology Ambulance, Rochester, NY, USA (O.C.); *The Journal of Collegiate Emergency Medical Services*, Philadelphia, PA, USA (B.J.D.); Physician Assistant Program, Drexel University College of Nursing and Health Professions, Philadelphia, PA, USA (B.J.D.).

**Address for Correspondence:** [Interviewer] Brittany J. Dinger, BA, PA-S, *The Journal of Collegiate Emergency Medical Services*, 117 N 15<sup>th</sup> St., Philadelphia, PA 19102, USA.  
E-mail: [JCEMS@CollegeEMS.com](mailto:JCEMS@CollegeEMS.com)

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. B.J.D. serves in an uncom-

pensated editorial role for JCEMS. All authors declared that they have no others conflicts of interest. All authors declared that they did not receive funding to conduct the research and/or writing associated with this work.

**Submission History:** This interview was solicited by the JCEMS Editorial Board. Interview responses received July 7, 2018; accepted for publication July 7, 2018.

**Published Online:** August 7, 2018

**Published in Print:** August 13, 2018 (Volume 1: Issue 2)

**Reviewer Information:** In accordance with JCEMS editorial policy, interview responses are reviewed by the JCEMS Editorial Board. Interviews are published as submitted – save for copy-editing.

**Copyright:** © 2018 Cohn & Dinger. This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.02.02>



# JOIN THE JCEMS TEAM

Now seeking motivated, passionate volunteers to join the JCEMS team. Available positions in the [design](#), [outreach](#), [editing](#), and [business management](#) departments.

Excellent opportunity for current students and young alumni to [gain professional experience in an innovative start-up publication](#).

**For current opportunities, please email:**

[JCEMS@CollegeEMS.com](mailto:JCEMS@CollegeEMS.com)



# Implementation of Stop the Bleed on an Undergraduate College Campus:

## The Johns Hopkins Experience

*Johns Hopkins Emergency Response Organization (HERO) implemented a training, preparedness, and public access equipment program to stop the bleed on their campus.*

**Christopher Wend**, BS, NRP; **Rajiv C. Ayyagari**; **Leyla Herbst**, EMT; **Scott Spangler**, NRP, FP-C; **Elliott R. Haut**, MD, PhD, FACS; **Matthew J. Levy DO**, MSc, FAEMS, FACEP, NRP

Accidental injury is the greatest cause of death among college students.<sup>1</sup> Many types of injuries occur on college campuses, including motor vehicle collisions, construction and lab mishaps, and sports-related injuries. Moreover, campuses have been the scene of natural disasters, such as tornadoes, and human-made disasters, including active shooters and mass casualty events. Heightened awareness and vigilance regarding the risk of intentional attacks at colleges and uni-

---

**Christopher Wend**, BS, NRP is a paramedic and EMS Systems Intern with the Johns Hopkins Lifeline Critical Care Transport Team as well as the Stop the Bleed Coordinator for the Johns Hopkins Emergency Response Organization (HERO). **Rajiv C. Ayyagari** is a student of Public Health Studies in the School of Arts and Sciences at the Johns Hopkins University (JHU). **Leyla Herbst**, EMT is Public Health student at JHU and current Captain of HERO. **Scott Spangler**, NRP, FP-C is an Advanced Life Support Operations Supervisor with the Johns Hopkins Lifeline Critical Care Transport Team and oversees HERO operations. **Elliot R. Haut**, MD, PhD, FACS is the Vice Chair of Quality, Safety & Service in the Department of Surgery and Associate Professor of Surgery, Anesthesiology / Critical Care Medicine (ACCM) and Emergency Medicine in the JHU School of Medicine, as well as an Associate Professor of Health Policy & Management at the JHU Bloomberg School of Public Health. **Matthew J. Levy DO**, MSc, FAEMS, FACEP, NRP is the Senior Medical Officer in the Division of Special Operation and Associate Professor of Emergency Medicine at JHU School of Medicine, as well as the Chair of the Stop the Bleeding Coalition.

versities is not new. Following the events of September 11<sup>th</sup>, 2001, the director of the Federal Bureau of Investigation referred to colleges as vulnerable and “soft” targets of terrorism.<sup>2</sup> While intentional mass casualty events garner large attention from the media, the occurrence of everyday injuries occupies a larger sector of the spectrum of traumatic injury. Worldwide, injury is the leading cause of death in people ages 1-46, and hemorrhage accounts for greater than 35% of all prehospital deaths.<sup>3,4</sup>

The importance of early hemorrhage control to save lives in severely bleeding patients has evolved into a cornerstone of Tactical Combat Casualty Care (TCCC).<sup>5,6</sup> This knowledge has been further adapted by civilian groups such as the Committee for Tactical Emergency Casualty Care (C-TECC), and is becoming standard practice for civilian law enforcement, as well as tactical and emergency medical services teams worldwide.<sup>7</sup> Control of severe bleeding with tourniquet placement has been associated with a 6-fold increase in survival among civilian trauma patients.<sup>8</sup> The Hartford Consensus, convened by the American College of Surgeons to enhance survival in mass casualty and active shooter events, recommends that emergency responders and bystanders alike have both the knowledge and access to essential equipment to stop severe bleeding, similar to CPR and Automated External Defibrillators (AEDs) for sudden cardiac arrest.<sup>9,10</sup> The Hartford Consensus recognizes and emphasizes the essential role of those present

in the immediate aftermath of a traumatic injury event, highlighting that these “immediate responders” can initiate life-saving care prior to the arrival of trained personnel.<sup>11</sup>

The Stop the Bleed initiative calls for public access to bleeding control kits and training for the lay public on how to recognize and control severe bleeding. Since its inception in October 2015 (under President Barack Obama’s policy directive for national preparedness), training curricula have been developed and programs have placed bleeding control kits in various locations to include schools, airports, and communities nationwide.<sup>11,12</sup> Calls to action have encouraged the continued development and broader universal implementation of bleeding control programs.<sup>13</sup> For example, many states (including Maryland) require high school students to be trained in CPR to graduate from high school.<sup>14</sup> Suggestions now exist for similar programs designing bleeding control education for high school students, or younger.<sup>15</sup>

The fundamental principles associated with calls to action for Stop the Bleed programs have broad applicability. These calls to action also coincide with an increase in intentional mass casualty events on schools and academic campuses, which have yielded wounds previously exclusive to the battlefield. The associated timeline of these events dates back nearly two decades starting with the 1999 Columbine High School Shooting (15 deceased, 24 injured); the Virginia Tech massacre (33 deceased, 23 injured); the 2012 Sandy Hook Elementary Shooting (28 deceased, 2 injured); the 2015 Umpqua Community College Shooting (10 deceased, 15 injured); 2018 Santa Fe High School Shooting (10 deceased, 14 injured) and the 2018 Marjorie Stoneman Douglas High School Shooting (17 deceased, 17 injured).<sup>16</sup> Beyond those events that have occurred in or around academic campuses, other events have also occurred in venues where people congregate, such as night clubs (Pulse Night Club; Orlando, Florida: 49 deceased, >50 injured), houses of worship (First Baptist Church; Sutherland Springs, Texas: 26 deceased, 20 injured) and concerts (Mandalay Bay Resort and Casino; Las Vegas, Nevada: 58 deceased, ~500 injured). These events have served as a catalyst for a heightened focus on community awareness and civilian immediate-response capabilities.

Organizations such as the Scouts include tourniquets as a key point in their wilderness first aid curricu-

lum.<sup>17</sup> Furthermore, the story of Virginia Tech massacre survivor, Kevin Sterne, highlighted the importance of widespread knowledge of bleeding control. After being shot in his femoral artery, Sterne employed skills he had learned years before to make a makeshift tourniquet out of an electrical cord.<sup>18</sup> Following the 2015 Paris Terror Attacks, the need for tourniquets was so great that the mobile teams had to improvise them with their belts after exhausting their own resources.<sup>19</sup> During the 2017 Las Vegas mass shooting, bystanders used belts as makeshift tourniquets in the immediate aftermath of the event. Although the quick-thinking and skills of these heroes were paramount in saving lives, there is still more to be said and done. Studies have shown improvised tourniquets, such as belts, cravats, or wire, are likely to be “futile” due to insufficient force generated.<sup>20</sup> Through bringing Stop the Bleed to the Johns Hopkins University (JHU) Homewood Campus, we hope to heighten awareness about the importance of rapid recognition and intervention of life threatening hemorrhage, provide training in how to control severe bleeding, and to improve access to bleeding control kits. We also hope that this program can serve as a model for others to follow.

The JHU Homewood Campus is located in urban Baltimore City, Maryland. In the fall term of 2017, the campus was home to 14,203 students (8,247 full-time and 5,956 part-time).<sup>21</sup> The JHU campus emergency medical service, known as the Hopkins Emergency Response Organization (HERO), is a BLS, non-transporting unit that is in service 24/7 during the academic year and currently comprised of 66 EMS providers (64 EMTs, 1 EMT-I, and 1 Paramedic). HERO receives operational oversight along with medical direction from the Johns Hopkins Lifeline, the critical care transportation service for Johns Hopkins Hospital. HERO responds to medical emergencies with a minimum of one Field Training Officer (who responds via foot) and a Line Officer (who responds via response vehicle). In 2017, HERO had a 4-minute average response time for 314 calls. HERO works collaboratively with the Baltimore City Fire Department, which provides Advanced Life Support and transport capabilities.

In early 2017, HERO began a collaboration with faculty from the JHU School of Medicine’s Department of Emergency Medicine (ML, ERH) and the Department of Surgery, Division of Acute Care (ERH) to de-

velop a strategy to introduce the Stop the Bleed Program to the Homewood undergraduate Campus of JHU. We have outlined the program design and implementation below.

## **1. Establish a Project Team & Outline A Plan**

We first established the project's goal of "Bringing Stop the Bleed to JHU undergraduate campus." As we assembled a project team, the workgroup met by email, telephone and in-person to refine the plan for program implementation. From the beginning, specific objectives were created to prioritize and guide our focus and resources. These goals included training members of HERO in Stop the Bleed, acquiring bleeding control equipment for HERO responders, placing equipment in public access locations, and establishing the foreground for Stop the Bleed training to the entire JHU undergraduate community.

## **2. Create Short and Long-Term Training Goals**

The first goal was to train all members of HERO; all active members received training in the American College of Surgeons Bleeding Control (BCon) course. Per the course guidelines, EMS providers with a BCon course certificate are able to register as instructors.<sup>22</sup> The early training of HERO personnel in Stop the Bleed helped to motivate members and prepare them to teach BCon courses. We accomplished this goal while having concurrent, ongoing discussions with campus leadership regarding the training of other campus groups (eg, campus police officers). Future training goals included training students, faculty, and other staff members.

## **3. Perform a Needs Assessment to Guide Kit Placement**

As part of our needs assessment, we used a campus map to identify locations for strategic placement of the Stop the Bleed kits based on predicted chance of use; we chose large lecture halls and the campus library because of their high occupancies. The recreation center was chosen due to the risk of major musculoskeletal injury and because of its high occupancy during sporting events and concerts. The results of this assessment helped inform the develop-

ment of a plan for a layered approach to equipping the campus, which included the placement of small bleeding control kits in all campus Automated External Defibrillator (AED) cases (except the Homewood Museum due to its limited business hours), as well as the placement of large multi-casualty kits in HERO response vehicles and Campus Safety and Security vehicles. We believe this approach will provide the most effective means to rapidly deploy a large number of supplies to the scene of an incident, while also having supplies available for immediate use by those already on scene. Students have been made aware of the presence of these kits via our social media campaign.

## **4. Select Bleeding Control Kits and Composition**

We chose simple, standard kit designs based on the scope of practice of the user. The public access kits contain components covered in the BCon course to retain initial responder familiarity. Kits for use by Campus Safety and Security and HERO responders contain additional items that reflect their role in a response, such as disposable patient litters, which can be used to move patients in the event of a mass casualty incident. These litters will be used during training of Campus Safety and Security, which is a supplement to the defined curriculum of the BCon course. Kits for use by HERO providers are supplemented with chest seals and triage tags. The design and contents of these kits, as well as the precise quantity required to outfit the campus, were determined by the needs assessment and served as the basis for the implementation budget.

## **5. Develop a Budget, Gain Stakeholder Buy-In, Obtain Program Approval**

The budget and introductory documentation were distributed to program stakeholders, which include HERO leadership, Johns Hopkins Stop the Bleed Program Faculty Advisors, and the Office of the Dean of Student Life. After this information was distributed, the implementation team met with stakeholders, giving program leadership the opportunity to explain and outline the goals of the program in-person. Following a series of internal meetings, the University administration made a decision to allow the training of HERO personnel and



campus police officers and to fund kit placement around the University, in Campus Safety and Security Vehicles, and in HERO vehicles. Funding for all bleeding control kits was received through the Dean of Student Life's office. Grant funding for training supplies was receiving from the JHU Alumni Association, which funded two bleeding control wound packing trainers and 25 Combat Application Tourniquets for use during training. Total equipment costs were under \$9,500.

### 6. Deployment and Dissemination of Bleeding Control Kits

Once we obtained the bleeding control kits, the kits were disseminated into AED cases around campus and placed in the HERO duty officer vehicle. The Stop the Bleed Program officially launched on the JHU undergraduate campus on March 31, 2018, on National Stop the Bleed Day. Through a series of pictures and videos, the workgroup recorded social media outreach messaging regarding the Stop the Bleed Program that was distributed across the Homewood campus and the wider Hopkins community via Facebook and Twitter.

### 7. Program Metrics and Performance Indicators

As of April 2018, all HERO EMTs (n=66) have completed the BCon course. Within the first four months of the program's existence, HERO instructors participated in several regional Stop the Bleed training events and helped train over 500 additional people (Howard County 9th Grade High School Students, first-year JHU School of Medicine Students, local houses of worship attendees, and many Baltimore County Private School Nurses).

HERO purchased 46 bleeding control kits. Of the 32 public access kits purchased (Figure 1, Table 1), 23 kits were placed in Automatic External Defibrillator Cases (Figure 2), 3 in HERO crew bags, and 6 were reserved for demonstrations and restocking. Of the 7 HERO "mass-casualty" kits purchased (Figure 3, Table 2), 4 were placed in the HERO duty officer vehicle, 2 in the HERO Ambulance (not yet in service), and 1 was reserved for restocking and replacement. Of the 7 Campus Safety and Security mass-casualty kits purchased (Figure 4, Table 3), we will place 5 in Campus Safety and Security Cars after the training of campus police officers; 2 of



**Figure 1. Image of Small (Public Access) Stop the Bleed Kit Contents**

**Table 1. Contents of Small (Public Access) Stop the Bleed Kits**

2 Combat Application Tourniquets (CAT)
2 Packages of QuikClot® Combat Gauze
1 Permanent Marker
1 Pair of Trauma Shears
3 Pairs of Gloves
3 Pressure Dressings

the Campus Safety and Security mass-casualty kits will be reserved for replacement/training.

### Implementation Lessons Learned and Future Steps

The design and implementation of the Stop the Bleed Program at the JHU's undergraduate Homewood Campus yielded many lessons, which we hope will help others as they seek to implement similar programs.

The first lesson learned was the benefit of training all campus EMS providers in the BCon course early on. The course program allows any EMS Provider who



**Figure 2.** Image of Small (Public Access) Stop the Bleed Kit in Library AED Case

takes this course to become an instructor simply by signing up at [www.bleedingcontrol.org](http://www.bleedingcontrol.org). This approach created a large pool of instructors for use in future trainings – many instructors have already assisted with community training efforts. We also found it beneficial to instruct this class so that HERO providers would know how to train a public audience; providers were prompted to emphasize specific areas of the program and were given advice for presenting to an audience of lay people. This approach has proven useful for many “train the trainers courses,” taught by early adopters nationwide.

The second lesson learned was the importance of involving campus administration early with a solidified plan and budget. Stakeholders were presented with a budget and proposal outlining the Situation, Background, Assessment, and Recommendation for the project (Appendix S1). This proposal was focused and simple and clearly outlined the Stop the Bleed project. The proposal was extremely effective and administrators voiced that it immediately clarified some of their concerns.

An open dialogue was established with stakeholders, which allowed for the realization of key challenges



**Figure 3.** Image of HERO Mass-Casualty Stop the Bleed Kit Contents

**Table 2.** Contents of HERO Mass-Casualty Stop the Bleed Kits

10 Maryland Triage Tags
4 Combat Application Tourniquets (CAT)
3 Packages of QuikClot® Combat Gauze
1 Permanent Marker
2 Pair of Trauma Shears
4 Pairs of Gloves
4 Pressure Dressings
4 Chest Seals
1 Disposable Patient Litter

such as (1) obtaining approval to train students and staff and (2) procuring funding for kits and training supplies. As a relatively new concept for the campus administration, concerns were raised regarding the increased liability on JHU. However, these concerns were adequately addressed through a series of informative meetings that included the involvement of emergency medicine (ML) and trauma surgery faculty (ERH) from the School of August 2018 · Issue 2 · Volume 1 · JCEMS 15





**Figure 4.** Image of Campus Safety and Security Mass-Casualty Stop the Bleed Kit

**Table 3.** Contents of Campus Safety and Security Mass-Casualty Stop the Bleed Kits

4 Combat Application Tourniquets (CAT)
3 Packages of QuikClot® Combat Gauze
1 Permanent Marker
2 Pair of Trauma Shears
4 Pairs of Gloves
4 Pressure Dressings
1 Disposable Patient Litter

Medicine. This involvement was the most important step in the approval process, as it addressed challenges and gave the administration an opportunity to have questions answered by national experts in the field supporting a student-driven initiative.

A formal presentation was delivered by Stop the Bleed leadership to stakeholders during which the details of the proposed project implementation were described. After the presentation, the administrators brought the proposal to additional administrators and University Risk Management. They agreed that this project had

merit and that lives could be saved by having trained responders around campus. They also supported funding kits for the AED cases, HERO vehicles, and Campus Safety and Security Vehicles. The training of members of the general student body and staff was deferred to expedite initial program rollout.

Once the scope of the project was established, the final lesson learned was to ensure the sustainability of the program by incorporating the Stop the Bleed program into training requirements for campus police officers and HERO personnel and to engrain the position of a Stop the Bleed Coordinator in HERO. The 2018 HERO EMT class, and all subsequent classes, will incorporate BCon as a mandatory module, which is also required for promotion to Field Training Officer. For Campus Safety and Security, plans are underway to make BCon a required class, as is CPR/First aid training. In December 2017, a Stop the Bleed Coordinator position was created in HERO, requiring that this position be filled at all times. These steps were taken to ensure the longevity and sustainability of the program.

### Limitations

The lessons learned from this program may not be applicable to all colleges and universities. Campus leaders interested in starting a Stop the Bleed program should be sure to address their campus’s specific needs.

### Future Endeavors

Moving forward, the program will continue to train community members and to work with JHU to solidify a plan to offer trainings to students and staff. Once approved to train students and other staff, we hope that public BCon courses will be advertised and offered at no cost. Additional possibilities include the training of students in other bystander intervention programs such as combining CPR with Stop the Bleed. Future investigation surrounding Stop the Bleed at JHU could include researching the maintenance of skills taught in the BCon course and surveying the knowledge of undergraduate students about the program. The program also is interested in observing the public health impact of such a program on a college campus.

## Conclusions

The Stop the Bleed initiative aims to empower everyday people to perform lifesaving interventions in the case of life-threatening bleeding. We brought this program to the JHU undergraduate campus through Stop the Bleed trainings and the strategic placement of bleeding control kits, with the hopes that no person would die from life threatening external hemorrhage on campus. In this process, we found success through attaining leadership buy-in, receiving support from stakeholders, and showing our desire to grow the program for the betterment of our community.

## References

1. Turner JC, Leno EV, Keller A. Causes of Mortality Among American College Students: A Pilot Study. *J College Stud Psychother.* 2013;27(1):31-42. <https://doi.org/10.1080/87568225.2013.739022>
2. Boynton AT. Securing college campuses in the face of terrorism. *Campus Law Enforcement Journal.* 2003; 33(5):15–17.
3. National Trauma Institute. Trauma Statistics and Facts. <https://www.nattrauma.org/what-is-trauma/trauma-statistics-facts/>. Accessed April 20, 2018.
4. Kauvar DS, Holcomb JB, Norris GC, Hess JR. Fresh whole blood transfusion: a controversial military practice. *J Trauma.* 2006;61(1):181-184. <https://doi.org/10.1097/01.ta.0000222671.84335.64>
5. Kragh JF, Jr., Walters TJ, Baer DG, et al. Survival with emergency tourniquet use to stop bleeding in major limb trauma. *Ann Surg.* 2009;249(1):1-7. <https://doi.org/10.1097/SLA.0b013e31818842ba>
6. National Association of Emergency Medical Technicians. Tactical Combat Casualty Care for Medical Personnel Guidelines and Curriculum. [https://www.naemt.org/education/TCCC/guidelines\\_curriculum](https://www.naemt.org/education/TCCC/guidelines_curriculum). Accessed April 19, 2017.
7. Committee for Tactical Emergency Care (C-TECC). Guidelines. <http://www.c-tecc.org/guidelines>. Accessed April 19, 2017.
8. Teixeira PGR, Brown CVR, Emigh B, et al. Civilian Prehospital Tourniquet Use Is Associated with Improved Survival in Patients with Peripheral Vascular Injury. *J Am Coll Surg.* 2018;226(5):769-776.e1. <https://doi.org/10.1016/j.jamcollsurg.2018.01.047>
9. Jacobs LM, Mcswain NE, Rotondo MF, et al. Improving survival from active shooter events: the Hartford Consensus. *J Trauma Acute Care Surg.* 2013;74(6):1399-400. <https://doi.org/10.1097/TA.0b013e318296b237>
10. Levy MJ. Intentional mass casualty events: Implications for prehospital emergency medical services systems. *Bull Am Coll Surg.* 2015;100(1 Suppl):72-4.
11. Jacobs LM. The Hartford Consensus III: Implementation of Bleeding Control--If you see something do something. *Bull Am Coll Surg.* 2015;100(7):20-6.
12. American College of Surgeons and the Hartford Consensus. About BleedingControl.org. <https://www.bleedingcontrol.org/about-bc>. Accessed June 29, 2018.
13. Levy MJ, Jacobs LM. A Call to Action to Develop Programs for Bystanders to Control Severe Bleeding. *JAMA Surg.* 2016;151(12):1103-1104. <https://doi.org/10.1001/jamasurg.2016.2789>
14. Brown LE, Lynes C, Carroll T, Halperin H. CPR Instruction in U.S. High Schools: What Is the State in the Nation?. *J Am Coll Cardiol.* 2017;70(21):2688-2695. <https://doi.org/10.1016/j.jacc.2017.09.1101>
15. Haider AH, Haut ER, Velmahos GC. Converting Bystanders to Immediate Responders: We Need to Start in High School or Before. *JAMA Surg.* 2017;152(10):909-910. <https://doi.org/10.1001/jamasurg.2017.2231>
16. Deadliest Mass Shootings in Modern US History Fast Facts. *CNN.* May 23, 2018. <https://www.cnn.com/2013/09/16/us/20-deadliest-mass-shootings-in-u-s-history-fast-facts/index.html>. Accessed July 3, 2018.
17. Boy Scouts of America. Wilderness First Aid Curriculum and Doctrine Guidelines (2017 Edition). <https://filestore.scouting.org/filestore/pdf/680-008.pdf>. Accessed April 19, 2018.
18. Virginia Tech: Rescue and Recovery. *The Washington Post.* April 13, 2017. [https://www.washingtonpost.com/graphics/local/virginia-tech-five-years-later/?noredirect=on&utm\\_term=.c5e20337a235](https://www.washingtonpost.com/graphics/local/virginia-tech-five-years-later/?noredirect=on&utm_term=.c5e20337a235). Accessed June 27, 2018.
19. Hirsch M, Carli P, Nizard R, et al. The medical response to multisite terrorist attacks in Paris. *Lancet.* 2015; 386(10012): 2535-2538. [https://doi.org/10.1016/S0140-6736\(15\)01063-6](https://doi.org/10.1016/S0140-6736(15)01063-6)



20. King DR, Larentzakis A, Ramly EP. Tourniquet use at the Boston Marathon bombing: Lost in translation. *J Trauma Acute Care Surg.* 2015;78(3):594–599. <https://doi.org/10.1097/TA.0000000000000561>
21. Homewood Student Affairs, Johns Hopkins University. Headcount by time, status, and gender. <https://studentaffairs.jhu.edu/registrar/academic-term-2017-18/>. Accessed June 27, 2018.
22. American College of Surgeons and the Hartford Consensus. Bleeding Control Basic (BCon) Course V. 1.0 Instructor Information. <https://www.bleedingcontrol.org/~media/bleedingcontrol/files/private/bleeding%20control%20basic%20instructor%20guide.pdf>. Accessed April 19, 2017.

### Supplementary Materials

**Appendix S1:** Situation, Background, Assessment, and Recommendation Proposal Document (available on-line).

---

**Author Affiliations:** From Krieger School of Arts and Sciences, Johns Hopkins University (C.W., R.C.A, L.H.); Johns Hopkins Emergency Response Organization, Johns Hopkins University (C.W., L.H., S.S.); Johns Hopkins Hospital Lifeline (C.W., S.S.); Division of Acute Care Surgery, Department of Surgery, Johns Hopkins University School of Medicine (E.R.H.); Department of Emergency Medicine; Johns Hopkins University School of Medicine (M.J.L.); all in Baltimore, MD, USA.

**Address for Correspondence:** Matthew J. Levy, DO, MSc, FAEMS, FACEP, NRP, Department of Emergency Medicine, Johns Hopkins University School of Medicine, 5801 Smith Ave, Davis Building Suite 200, Baltimore, MD 21209, USA

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. M.J.L. serves on the Editorial Board for JCEMS in an uncompensated role and is also Chair of the Non-Profit Stop the Bleeding Coalition. E.R.H. is/ was primary investigator of contracts from PCORI entitled “Preventing Venous Thromboembolism: Empowering Patients and Enabling Patient-Centered Care via Health Information Technology” (CE-12-11-4489) and “Preventing Venous Thromboembolism (VTE): Engaging Patients to Reduce Preventable Harm from Missed/Refused Doses of VTE Prophylaxis” (DI-1603-34596). E.R.H. is a primary investigator of a grant from the AHRQ (1R01HS024547) entitled “Individualized Performance Feedback on Venous Thromboembolism Prevention Practice,” and is a co-investigator on a grant from the NIH/NHLBI (R21HL129028) entitled “Analysis of the Impact of Missed Doses of Venous Thromboembolism Prophylaxis.” E.R.H. is supported by a contract from The Patient-Centered Outcomes Research Institute (PCORI), “A Randomized Pragmatic Trial

Comparing the Complications and Safety of Blood Clot Prevention Medicines Used in Orthopedic Trauma Patients” (PCS-1511-32745). E.R.H. is a paid consultant and speaker for the “Preventing Avoidable Venous Thromboembolism— Every Patient, Every Time” VHA/Vizient IMPERATIV<sup>®</sup> Advantage Performance Improvement Collaborative. E.R.H. receives royalties from Lippincott, Williams, Wilkins for a book, “Avoiding Common ICU Errors.” E.R.H. was the paid author of a paper commissioned by the National Academies of Medicine titled “Military Trauma Care’s Learning Health System: The Importance of Data Driven Decision Making,” which was used to support the report titled “A National Trauma Care System: Integrating Military and Civilian Trauma Systems to Achieve Zero Preventable Deaths After Injury.” The other authors have no other conflicts of interest to disclose. All authors declared that they did not receive funding to conduct the research and/or writing associated with this work. Funding for program development is described in the manuscript.

**Authorship Criteria:** By the JCEMS Submission Declaration Form, all authors are required to attest to meeting the four ICMJE.org authorship criteria: (1) Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND (2) Drafting the work or revising it critically for important intellectual content; AND (3) Final approval of the version to be published; AND (4) Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

**Submission History:** Received May 1, 2018; accepted for publication August 3, 2018.

**Published Online:** August 8, 2018

**Published in Print:** August 13, 2018 (Volume 1: Issue 2)

**Reviewer Information:** In accordance with JCEMS editorial policy, Advice and Practice manuscripts are reviewed by the JCEMS Editorial Board and, as needed, independent reviewers. JCEMS thanks the Editorial Board members and independent reviewers who contributed to the review of this work.

**Copyright:** © 2018 Wend, Ayyagari, Herbst, Spangler, Haut, & Levy. This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>.

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.02.03>

# Benzodiazepine & Alcohol Co-Ingestion:

## Implications for Collegiate-Based Emergency Medical Services

David Goroff, MS, NRP & Alexander Farinelli, BS, NRP

### ABSTRACT

The co-ingestion of benzodiazepines and alcohol presents a unique challenge to collegiate EMS providers, due to the pharmacological interaction of the two substances and the variable patient presentations. Given the likelihood that collegiate EMS providers will be called to treat a patient who has co-ingested benzodiazepines and alcohol, this review discusses the relevant pharmacology, clinical presentation, and treatment of these co-ingestion patients.

**KEYWORDS:** alcohol, benzodiazepines, collegiate-based emergency medical services, toxicology

**Corresponding Author and Author Affiliations:** Listed at the end of this article.

Collegiate-based emergency medical services (EMS) providers at both the basic life support (BLS) and advanced life support (ALS) levels may treat a higher incidence of alcohol and substance abuse related patients than providers working with traditional community EMS populations. Among the most complex of these patients are those that have ingested alcohol as well as an illicit substance and/or prescription medication. When ingested with alcohol, benzodiazepines in particular present a unique challenge to collegiate EMS providers.

**David Goroff**, MS, NRP is a paramedic working for a county-wide ALS chase service in northern Delaware. Previously, he worked as an Associate Emergency Medical Services Administrator for the State of Maryland, coordinating a multi-county system of emergency medical services. An alumnus of Skidmore College, he was the Founder and first Executive Director of Skidmore College EMS, and has a Masters degree in emergency management from George Washington University. David Goroff is also a member of the JCEMS editorial board.

**Alexander Farinelli**, BS, NRP is a paramedic in Delaware and Maryland. He has worked as both an ALS and BLS provider following his undergraduate studies at the University of South Carolina. Alexander Farinelli also provides medical services to service members in the Army National Guard.

Excessive alcohol misuse and abuse in the college population has been discussed in both the popular media and scientific literature. In 2016, an annual nationwide survey found that 38.4% of college-aged Americans engage in binge alcohol use, and 10.1% engage in heavy alcohol use.<sup>1</sup> The rate of benzodiazepine use, though significantly lower than alcohol use, is still significant, as approximately 2.6% of the college-aged population is legally prescribed a benzodiazepine.<sup>2</sup> Through national epidemiological studies, surveillance reports, and various studies on college populations, abuse and misuse of benzodiazepines appear to be on the rise.<sup>3-5</sup> The 2013 Analgesic, Anesthetic, and Addiction Clinical Trial Translations, Innovations, Opportunities, and Networks (ACTTION) organization defines abuse and misuse of medications as “any intentional, non-therapeutic use of a drug product or substance, even once, for the purpose of achieving a desirable psychological or physiological effect” and “any intentional therapeutic use of a drug product in an inappropriate way,” respectively.<sup>6</sup>

There is limited data pertaining to the incidence of misuse and abuse of benzodiazepines in regards to alcohol co-ingestion, specifically. In a 2001 study, 4.5% of college students reported that they had ingested or con-



## Learning Objectives

**Understand** the pharmacology of benzodiazepines and alcohol co-ingestion.

**Recognize** the varied clinical presentations.

**Discuss** treatment guidelines for campus EMS providers.

**Identify** strategies for the prevention of substance abuse.

sumed a benzodiazepine recreationally, but the study did not examine alcohol co-ingestion.<sup>7</sup> There is also a limited body of literature investigating the co-ingestion of benzodiazepines and alcohol in college students specifically. One study indicated 22.6% of adult patients admitted to emergency departments in the United States in 2008 for benzodiazepine abuse reported co-ingestion of alcohol.<sup>8</sup> Another study, which reviewed the CDC Drug Abuse Warning Network (DAWN) system, found that 27% of US adults presenting to emergency departments for benzodiazepine use had also used or misused alcohol.<sup>9</sup> While this lack of specific research is limiting, there are well-established rates of abuse for both substances. As a result, EMS providers should be aware of, and prepared to manage, these polypharmacological presentations.

## Key Points

**Co-ingestion of benzodiazepines and alcohol** results in significant depression of the central nervous system.

**Hallmark clinical manifestations** include decreased mental status and severe respiratory depression, as well as additional signs and symptoms.

**Collegiate-based EMS providers** should maintain a high index of suspicion and utilize the general principles for EMS management of polysubstance overdoses.

## Benzodiazepines: Overview

Benzodiazepines are a class of medications commonly prescribed for a variety of out-patient conditions such

as anxiety, insomnia, and seizure disorders. They are also utilized for seizure control in the Emergency Department (ED) and in the prehospital setting by ALS, as well as for anesthesia in surgical procedures. Common benzodiazepines are listed in Table 1. When taken as prescribed and under the general supervision of a physician, benzodiazepines are considered safe, even in pediatric patients.<sup>10</sup> However, when abused or misused, benzodiazepines can be dangerous or fatal, as discussed further in this article.

**Table 1. Common benzodiazepines**

General Name	Brand Name
midazolam	Versed
triazolam	Rilamir
alprazolam	Xanax
lorazepam	Ativan
clonazepam	Klonopin
diazepam	Valium
flunitrazepam	Rohypnol
chlordiazepoxide	Librium

## Pharmacology

Benzodiazepines act on gamma aminobutyric acid (GABA) receptors in the central nervous system (CNS). By increasing the effectiveness of GABA, the primary inhibitory neurotransmitter in the CNS, benzodiazepines have the overall effect of decreasing neuronal activity, which further inhibits the CNS. This inhibitory activity allows benzodiazepines to have therapeutic effects in proper doses but potentially lethal effects when used in combination with other CNS depressants.

Ethanol, which also agonizes GABA, is one of the most commonly used CNS depressants. The combination of benzodiazepines and alcohol results in significant toxicological interactions.<sup>11</sup>

While alcohol is typically only ingested in a liquid form, there are many routes of administration for

benzodiazepines – injection, ingestion, insertion of a rectal suppository, or inhalation – which widely affect their onset and efficacy. As with all medications, other factors play a role including the type and quantity of benzodiazepines and alcohol consumed, patient weight, and overall patient sensitivity to the substances involved.

## Clinical Manifestations

Patients who have consumed an overdose of benzodiazepines and alcohol concomitantly will most likely present to collegiate EMS providers in a similar manner as severely intoxicated patients. Hallmark clinical manifestations include decreased mental status, severe respiratory depression, as well as the additional signs and symptoms (Table 2). The time of onset of these symptoms will vary widely depending on the type and quantity of both the benzodiazepine and alcohol consumed. Some longer-lasting benzodiazepines, such as Valium, have a rapid onset and can remain active in the body for 20 to 80 hours.<sup>12</sup> An important note for EMS providers is that patients who have consumed both alcohol and benzodiazepines may become critically ill much faster than a patient who have consumed either substance alone. As such, co-ingestion patients need to be closely monitored and may require a swifter course of prehospital management.

**Table 2. Typical signs and symptoms of benzodiazepine and alcohol overdose.**

Altered Mental Status/Unresponsive
Confusion/Combativeness
Respiratory Depression
Hypotension
Bradycardia
Ataxia
Slurred Speech

The clinical manifestations of a pure alcohol ingestion versus a co-ingestion of alcohol with benzodiazepines are similar given that they both agonize the same neurotrans-

mitter (GABA), and as such distinguishing between the two patient presentations can be difficult. When permissible and safe to do so, an extensive interview of the patient and/or bystanders, as well as a cursory examination of the scene, is essential. However, as these substances affect patients in different ways, caution must be taken when attempting to make a field diagnosis.

## Guidelines for Treatment

The unpredictability of both the onset and severity of symptoms makes the management of alcohol and benzodiazepines difficult for EMS providers. Patients can present with varying degrees of intoxication, and many patients encountered by EMS may already be unconscious and may require comprehensive, supportive management under close observation. Particular attention should be given to assertive airway management in the face of the compounding respiratory depression and risk for aspiration. Though benzodiazepine and alcohol overdoses are challenging, the general principles for EMS management of polysubstance overdoses should be utilized.

### *BLS Providers*

For BLS providers, proper positioning with bag-valve mask (BVM) management, oxygen titrated per local protocol, and airway adjuncts as tolerated may be indicated. Airway suctioning may also be needed and should be readily available. In an attempt to determine the type and quantity of all substances consumed, a thorough interview of bystanders and an investigation of the scene may also help. The BLS provider should also have a high index of suspicion for both head trauma and opioid co-ingestion, the latter of which can be managed with naloxone, according to local protocols. Early notification of ALS and a thorough report of initial findings can be essential in managing these patients.

### *ALS Providers*

ALS providers should perform a complete physical assessment with a similar emphasis on airway management. Depending on local protocols, endotracheal intubation or rapid sequence intubation may be indicated to control the patient's airway. After advanced airway placement, suctioning may help treat aspiration, maintain a patent airway, ensure better oxygenation, and prevent the clog-

ging of monitoring equipment such as end-tidal CO<sub>2</sub> (EtCO<sub>2</sub>). Vascular access should be established and fluid therapy should be initiated if hypotension is present. Though unusual, hypotension may be severe enough to warrant the use of a vasopressor if permitted by local protocol. An electrocardiogram (EKG) should be performed as hypoxia can result from associated cardiac ischemia and instability.

### *Self-Harm & Scene Safety*

Both ALS and BLS providers should have a high index of suspicion for a polysubstance overdose, and the potential that the overdose was intentional. Scene safety best practices should be adhered to per local protocol and agency policy, and the possibility of a self-harm attempt should be explored in depth at patient turn-over to ensure that emergency department personnel request the appropriate mental health evaluation and treatment prior to patient discharge.

### *Flumazenil (Romazicon)*

Flumazenil (Romazicon) has been used to treat benzodiazepine overdose by ALS in the prehospital setting and by practitioners in the emergency department. Flumazenil is a selective GABA receptor antagonist that reverses the effects of benzodiazepines. Though some prehospital services still carry the medication, it has significant contraindications and its use can often be problematic.<sup>13</sup> Flumazenil can cause cardiac dysrhythmias and seizures, which in turn will become more difficult to treat given that the treatment for seizures in the prehospital setting is a benzodiazepine. By reversing the sedative effects of the benzodiazepines, a patient may be at a higher risk of aspiration upon rapid awakening and require rapid extubation. Because there is competing literature on the safety of flumazenil, it may be more appropriate to provide supportive treatment in the emergency department or intensive care unit (ICU) while benzodiazepines are metabolized by the body.<sup>14</sup> If flumazenil is administered, it should be utilized carefully per local protocol and in doses titrated for effect.

## §

Collegiate-based EMS providers should familiarize themselves with their local protocols regarding polypharmacological overdoses, the equipment and resources re-

quired and available to them, and the efficacy of medication-based treatments in their patients.

---

## Prevention

---

Collegiate-based prehospital providers should work closely with their student health and wellness services to provide screening opportunities and risk reduction education. A common and effective screening tool aimed to help recognize and stop alcohol and illicit drug use is SBIRT (Screening, Brief Intervention, and Referral to Treatment).<sup>15</sup> Additionally, many college campuses utilize the educational harm-reduction program BASICS (Brief Alcohol Screening and Intervention), which is designed for college students at risk for alcohol abuse.<sup>16</sup>

Additionally, because many colleges have their own law enforcement departments, college EMS organizations should work closely with these officers to gain a better understanding of what substances are being utilized on their campus, with a larger goal of better anticipating patient care needs.

### References

1. Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. Results from the 2016 National Survey on Drug Use and Health: Detailed Tables. <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.pdf>. Published September 7, 2017. Accessed April 30, 2018.
2. Olfson M, King M, Schoenbaum M. Benzodiazepine Use in the United States. *JAMA Psychiatry*. 2015;72(2):136–142. <https://doi.org/10.1001/jamapsychiatry.2014.1763>
3. Johnston LD, O'Malley PM, Bachman JG. National Institute on Drug Abuse, National Institute of Health. Monitoring the Future: National Survey Results On Drug Use, 1975–2002. Volume II: College Students and Adults Ages 19–40. [http://monitoringthefuture.org/pubs/monographs/vol2\\_2002.pdf](http://monitoringthefuture.org/pubs/monographs/vol2_2002.pdf). Published September 2003. Accessed April 30, 2018.
4. Mohler-Kuo M, Lee JE, Wechsler H. Trends in marijuana and other illicit drug use among college students: results from 4 Harvard School of Public Health College Alcohol Study surveys: 1993-2001. *J Am Coll Health*. 2003;52(1):17-24. <https://doi.org/10.1080/07448480309595719>
5. Office of Applied Studies, Substance Abuse and Mental Health Services Administration. Results from the 2001



National Household Survey on Drug Abuse: Volume I. Summary of National Findings. <https://archive.samhsa.gov/data/nhsda/2k1nhsda/pdf/cover.pdf>. Published August 2002. Accessed April 30, 2018.

6. Smith SM, Dart RC, Katz NP, et al. Classification and definition of misuse, abuse, and related events in clinical trials: ACTION systematic review and recommendations. *Pain*. 2013;154(11):2287-2296. <https://doi.org/10.1016/j.pain.2013.05.053>
7. McCabe SE. Correlates of nonmedical use of prescription benzodiazepine anxiolytics: results from a national survey of U.S. college students. *Drug Alcohol Depend*. 2005;79(1):53-62. <https://doi.org/10.1016/j.drugaldep.2004.12.006>
8. Cai R, Crane E, Poneleit K, Paulozzi L. Emergency department visits involving nonmedical use of selected prescription drugs -- United States, 2004-2008. *J Pain Palliat Care Pharmacother*. 2010;59(23):705-709. <https://doi.org/10.3109/15360288.2010.503730>
9. Ogbu UC, Lotfipour S, Chakravarthy B. Polysubstance Abuse: Alcohol, Opioids and Benzodiazepines Require Coordinated Engagement by Society, Patients, and Physicians. *West J Emerg Med*. 2015;16(1):76-79. <https://doi.org/10.5811/westjem.2014.11.24720>
10. Lorman W . "Pharmacology Update: Benzodiazepines." *J Addict Nurs*. 2017; 28(2):96-97. <https://doi.org/10.1097/JAN.0000000000000148>
11. Linnoila MI. Benzodiazepines and alcohol. *J Psychiatr Res*. 1990;24(Suppl 2):121-127. [https://doi.org/10.1016/0022-3956\(90\)90043-P](https://doi.org/10.1016/0022-3956(90)90043-P)
12. Griffin CE, Kaye AM, Bueno FR, Kaye AD. Benzodiazepine Pharmacology and Central Nervous System-Mediated Effects. *Ochsner J*. 2013;13(2):214-223. <http://www.ochsnerjournal.org/doi/pdf/10.1043/1524-5012-13.2.214>. Accessed April 30, 2018.
13. Thomson JS, Donald C, Lewin K. Use of Flumazenil in Benzodiazepine overdose. *Emerg Med J*. 2006;23(2):162. <https://emj.bmj.com/content/23/2/162.2>. Accessed April 30, 2018.
14. Sivilotti MLA. Flumazenil, naloxone and the "coma cocktail." *Br J Clin Pharmacol*. 2016;81(3):428-436. <https://doi.org/10.1111/bcp.12731>
15. Substance Abuse and Mental Health Services Administration.

SBIRT: Screening, Brief Intervention, and Referral to Treatment. <https://www.integration.samhsa.gov/clinical-practice/sbirt>. Accessed June 9, 2018.

16. Blueprints for Healthy Youth Development. Brief Alcohol Screening and Intervention for College Students (BASICS). <https://www.blueprintsprograms.org/factsheet/brief-alcohol-screening-and-intervention-for-college-students-basics>. Accessed June 9, 2018.

**Author Affiliations:** From New Castle County Emergency Medical Services, New Castle, DE, USA (D.G., A.F.).

**Address for Correspondence:** David Goroff, MS, NRP.  
E-mail: davidgoroff@gmail.com

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. D.G. serves on the Editorial Board of JCEMS in an uncompensated role. All authors declared that they have no other conflicts of interest. All authors declared that they did not receive funding to conduct the research and/or writing associated with this work.

**Authorship Criteria:** By the JCEMS Submission Declaration Form, all authors are required to attest to meeting the four ICMJE.org authorship criteria: (1) Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND (2) Drafting the work or revising it critically for important intellectual content; AND (3) Final approval of the version to be published; AND (4) Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

**Submission History:** Received May 1, 2018; accepted for publication August 3, 2018.

**Published Online:** August 8, 2018

**Published in Print:** August 13, 2018 (Volume 1: Issue 2)

**Reviewer Information:** In accordance with JCEMS editorial policy, Clinical Review manuscripts undergo double-blind peer-review by at least two independent reviewers. JCEMS thanks the anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 Goroff & Farinelli. This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.02.04>

# EMS Resource Utilization at College Campus Mass Gathering Events

Emma C. Ordway, BS; Neil Sarna, BS, NREMT; Lindsey M. DeGeorge, MD; Ali M. Baird, NREMT; Miranda J. Reid, NREMT; Jose V. Nable, MD, MS, NRP

## ABSTRACT

**Background:** Predicting emergency medical services (EMS) resource utilization at mass gathering events (MGEs) is challenging. **Objectives:** This study aimed to examine EMS utilization during MGEs at an urban university with a collegiate-based EMS (CBEMS) agency, and how such utilization may be associated with specific attributes of these events. **Methods:** This retrospective study was conducted by analyzing the dispatch logs of Georgetown Emergency Response Medical Service (GERMS) for events with a medical standby detail. Environmental factors for each MGE were also analyzed, including: event type, location, event size, the presence of alcohol, and outdoor temperature. **Results:** Over approximately 5 years (2011-2016), GERMS staffed 406 MGEs and a total of 87 patients were treated. Events with fewer than 500 attendees had no reported medical events, while events with more than 1,000 attendees averaged 0.39 patients-per-event (PPE). Alcohol-free events had 0.05 PPE, while events at which alcohol was consumed had 0.49 PPE ( $p=0.028$ ). In the subset of outdoor non-sporting events with a minimum of 1,000 attendees, there was a statistically-significant increasing PPE associated with rising temperatures (Pearson's Correlation Coefficient 0.983;  $p=0.017$ ). **Conclusions:** These findings suggest that college event planners can potentially utilize event and weather features to predict EMS resource utilization.

**KEYWORDS:** collegiate-based emergency medical services; mass-gathering medical care; prehospital; resource utilization

**Corresponding Author and Author Affiliations:** Listed at the end of this article.

A mass gathering event (MGE), typically defined as an event drawing at least 1,000 persons to a specific location, can pose significant challenges for event organizers and emergency medical services

**Emma C. Ordway**, BS is a physician assistant student at Lock Haven University of Pennsylvania. **Neil Sarna**, BS, NREMT is a medical student at Georgetown University School of Medicine and former captain of Georgetown Emergency Response Medical Service (GERMS). **Lindsey M. DeGeorge**, MD is a chief resident at the MedStar Georgetown / Washington Hospital Center Emergency Medicine Residency Program and assistant medical director for GERMS. **Ali M. Baird**, NREMT and **Miranda J. Reid**, NREMT are both crew chiefs of GERMS. Ali is also the current captain of GERMS. **Jose V. Nable**, MD, MS, NRP is an assistant professor of emergency medicine at Georgetown University School of Medicine and MedStar Georgetown University Hospital, in addition to serving as medical director for GERMS.

(EMS) agencies.<sup>1</sup> While medical emergencies can reasonably be expected to occur during MGEs, accurately predicting the number of emergencies and transports can be elusive.<sup>2</sup> It remains essential, however, for event planners to ensure that appropriate medical resources are available for the event to respond to participants experiencing acute medical issues.<sup>3</sup>

Several suggested variables potentially predict the need for EMS at events, including the number of persons attending, weather conditions, and the presence of alcohol.<sup>2,4</sup> At least two prediction algorithms have been described, considering these factors.<sup>3,5</sup> However, there is little guidance in the literature on how to best anticipate EMS utilization specifically at mid-sized, collegiate settings. The university setting is often different than other mass gathering locations in that colleges are often built as

open and inviting places. The college environment also uniquely experiences high-risk behaviors with regards to alcohol by combining high rates of underage consumption<sup>6,7</sup> with a hesitation to report acute medical issues due to fear of disciplinary action.<sup>8</sup>

Universities with college-based EMS (CBEMS) agencies benefit from having timely access to emergency medical care, averaging a response time of 2.6 minutes.<sup>9</sup> CBEMS agencies often provide standby coverage for on-campus MGEs. Predicting EMS utilization at these events, however, poses a challenge to CBEMS programs when planning appropriate staffing and resources. Understaffing an event can increase risk to attendees due to delays in accessing emergency medical care. Consistently over-staffing events, however, can become unsustainably expensive for sponsoring institutions.

---

## Objectives

---

This study aimed to examine EMS resource utilization during MGEs at Georgetown University, a mid-sized urban university with a collegiate-based EMS transport agency with basic life support (BLS) providers (GERMS), and how such utilization may be associated with specific attributes of these events. The investigators hypothesized that temperature, presence of alcohol, and event size would be predictive of EMS utilization.

---

## Methods

---

In this retrospective chart review, the investigators analyzed the dispatch logs of GERMS during on-campus MGEs. The study setting, Georgetown University, is an urban collegiate EMS system that responds to approximately 900 calls for medical service annually and is the primary provider of medical standby services for the university. GERMS is composed of approximately 100 undergraduate student volunteers. Georgetown University has an undergraduate enrollment of approximately 7,500 students with a campus size of 104 acres. The study period was defined as September 1, 2011 through October 1, 2016. For this study, acute medical issues were defined as any event in which a patient (or bystander) requested medical assistance directly from on-site EMS providers or requested assistance via the GERMS dispatch center

(by phone). Electronic records of all patient encounters by GERMS (defined as a patient requesting, or being referred for, assessment due to a stated or obvious medical complaint) are maintained in the GERMS dispatch logs. Patient contacts without assessments (such as an attendee requesting help up a wheelchair ramp) are not included in this study. Multiple calls for the same patient are counted as only one encounter.

To determine potential associations between environmental factors and resource utilization, the investigators also reviewed the agency's historical standby detail staffing logs. Environmental factors considered included: event type, location, event size, the presence of alcohol, and outdoor temperature. Retrospective temperature from each event was collected from the Old Farmer's Almanac.<sup>10</sup>

Linear regression, logistic regression and bivariate correlations were used to determine potential correlational relationships between environmental factors and patient presentation rates to EMS at MGEs using the SPSS Statistics platform (IBM, Armonk, NY). Unpaired t-tests were utilized to examine for statistical significance. This study's methodology was reviewed and approved by the Georgetown University Institutional Review Board.

---

## Results

---

There were 406 unique MGEs during the study period for which GERMS provided medical standby coverage. Estimated crowd size was grouped into three categories (small: less than 500 attendees; medium: 500-1,000 attendees; and large: over 1,000 attendees). The number of MGEs, total number of patients, and patients-per-event (PPE) rate are categorized by event type in Table 1 and categorized by event size in Table 2. The PPE rate is the mean number of patient encounters at each event.<sup>3</sup> No acute medical events were reported for MGEs with fewer than 500 attendees. Concerts and graduation activities were associated with the highest PPE rates (1.44 and 0.59 respectively).

The presence of alcohol was also evaluated (Table 3). Events were classified as involving no alcohol consumption, alcohol consumed by attendees (where attendees were likely to have consumed alcohol not provided by event organizers at, or immediately prior to, the event), or alcohol provided by event organizers. Sporting events



**Table 1. Patients-Per-Event rates at MGEs covered by GERMS, grouped by event type.**

Event Type	# Events	# Patients	Patients-Per-Event Rate
Concert	9	13	1.44
Graduation Activities	46	27	0.59
Football Game	27	10	0.37
Religion Event	12	3	0.25
Party/Festival/Picnic	54	13	0.24
Basketball Game	49	6	0.12
Soccer Match	102	11	0.11
Racing Event	28	2	0.07
Other/Unknown	17	1	0.06
Lacrosse Match	62	1	0.02
<b>All events</b>	<b>406</b>	<b>87</b>	<b>0.21</b>

were considered a separate category due to the wide variability of alcohol availability and consumption.

Alcohol-free events had the lowest EMS utilization, with 0.05 PPE. Events with alcohol consumption had significantly greater EMS utilization as compared to alcohol-free events (alcohol consumed PPE=0.49; mean difference=0.044;  $p=0.028$ ). Events in which alcohol was provided had a higher EMS utilization as compared to alcohol-free events but this difference was not statistically significant (alcohol provided PPE=0.27; mean difference=0.22;  $p=0.165$ ).

Outdoor events with a minimum of 1,000 attendees were classified as sporting versus non-sporting

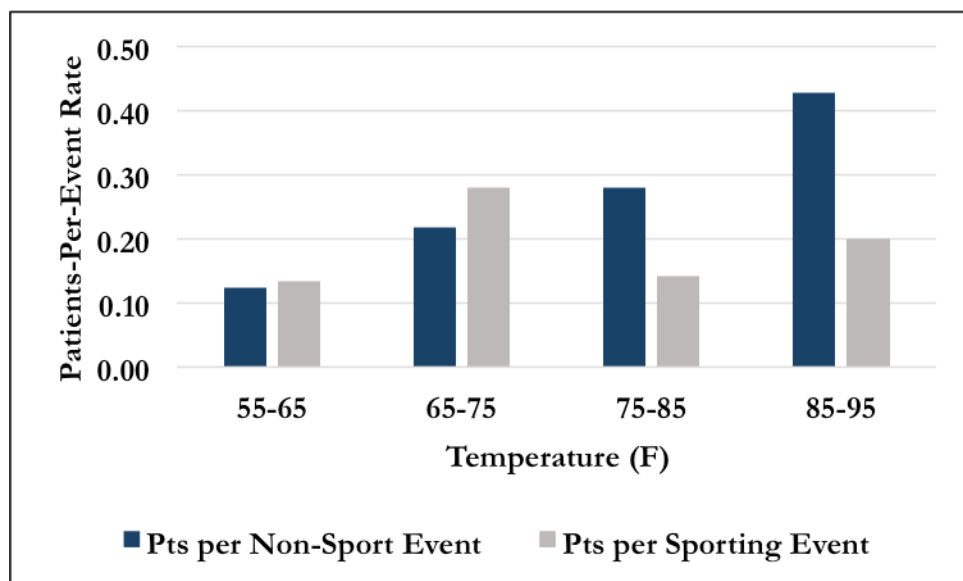
(eg, concert, graduation) events, with the patients-per-event rate calculated and outdoor temperatures identified (Figure 1). In the subset of outdoor non-sporting events, there was a statistically-significant increasing PPE associated with rising temperatures (Pearson's Correlation Coefficient 0.983;  $p=0.017$ ). No linear correlation between patients-per-event and temperature was found for outdoor sporting events.

## Discussion

This study demonstrates several identifiable patterns for EMS resource utilization for MGEs at an urban, medi-

**Table 2. Patients-Per-Event rates at MGEs, grouped by estimated crowd size.**

Estimated Crowd Size	# Events	# Patients	Patients-Per-Event Rate
< 500 (Small)	8	0	0.00
500-1000 (Medium)	214	15	0.07
>1000 (Large)	184	72	0.39



**Figure 1.** Patients-Per-Event rates at outdoor events with at least 1,000 attendees, grouped by temperature and event type (sport vs. non-sporting).

um-sized university setting. First, while GERMS provided a significant amount of standby resources at small- or medium-sized events, relatively few of these events had acute medical issues requiring EMS resources. Except for concerts, all types of events on average had less than 1 patient-per-event.

The investigators could not reliably distinguish even larger events (such as 1,000 versus 5,000 attendees). However, because of the size of Georgetown University, and limited areas for mass gatherings on campus, it is unlikely that events with significantly more attendees occurred; the largest on-campus venue only seats 2,500 attendees. Outdoor non-sporting events with higher temperatures were associated with more patients

per event. Previous studies have demonstrated a similar impact of hotter weather.<sup>3,5</sup> Concerts and graduation activities, both outdoor non-sporting events, had the highest numbers of patients-per-event of any MGE group. Given the typically higher temperatures, the authors speculate that graduations are associated with a higher PPE due to a greater incidence of heat-related emergencies. Additionally, the audience present at graduations is likely to be older and have a higher prevalence of pre-existing health conditions that may place them at greater risk of requiring EMS services, when compared to the younger and (likely healthier) students that comprise most other on-campus MGEs. Temperature is

an easily obtainable data point in advance of the event and can serve as a valuable tool to aid collegiate event planners in determining appropriate EMS resource allocation.

Outdoor sporting events did not demonstrate this near-linear correlation between temperature and PPE at large MGEs. This weaker relationship may be due to the presence of athletic participants who are better able to withstand adverse heat conditions. The length of the event may have also been a confounding factor as the sporting events were generally shorter in duration than events like concerts and graduations. The investigators were not able to reliably classify alcohol availability at athletic MGEs and thus alcohol could

**Table 3.** Patients-Per-Event rates at MGEs, grouped by alcohol availability.

Alcohol Availability	# Events	# Patients	Patients-Per-Event Rate
No Alcohol	38	2	0.05
Alcohol Consumed	99	49	0.49
Alcohol Provided	30	8	0.27
Sporting Event	239	28	0.12

not be used to determine the PPE rate for outdoor sporting events.

Events where attendees consumed alcohol showed a significant increase in the PPE when compared to alcohol-free events. Prior studies have found alcohol-use to be a significant factor in the rate of patient presentations.<sup>3,5</sup> Additionally, the drinking-related behaviors in the under-21 population are more impulsive and risky than in older age groups.<sup>9</sup> However, events in which alcohol was provided by the event sponsor were not more likely to have acute medical events. This may be due to higher regulation of alcohol consumption by dispensing event staff, or older attendee age. Events in which alcohol was provided on-site were planned for senior students or adult attendees and required age-registration and identification verification in advance of the event.

The findings of this study are consistent with others in the literature. Hartman et al<sup>3</sup>, for example, found that a heat index of greater than 90°F for outdoor events was significantly predictive for a greater number of patient encounters at MGE's. Hartman et al also found that events with an older crowd age (>21) required more EMS services, which may explain why the current authors found more patient encounters at graduation activities (which often bring an older age cohort to campus), as compared to racing events (with a relatively younger age cohort).<sup>3</sup> Arbon et al similarly found that weather (specifically higher humidity, whereas the current authors investigated temperature alone) can affect the number of patient presentations.<sup>5</sup>

It is crucial to adequately plan for the medical needs of an MGE to meet the needs of both the attendees and the hosting institution. While understaffing poses a risk of significant delays in emergency care at the event, consistently overstaffing can create a strain on the EMS system. Overstaffing can also become expensive for the host organization if they need to contract with outside EMS to arrange standby services.

This study found that no events with fewer than 500 attendees (albeit, a limited number covered by GERMS) were associated with acute medical issues requiring EMS intervention. In resource-limited settings, this finding suggests that such events may not require any EMS standby personnel coverage. The results also suggest that events in which alcohol is known to be consumed (during or immediately before) require a height-

ened awareness by event planners of the potential need for EMS coverage.

Appropriately staffing MGEs is especially critical for colleges and universities because they host a wide range of unique events with a specific patient population. In addition, university planners are often less experienced in MGE planning than their counterparts in other large institutions, as many planners are students. The high turnover of university student-organizers compounds the need for a guideline that is accessible and user-friendly to increase standardization and accuracy of event staffing.

---

### Limitations

---

This study is limited by its retrospective design and relatively small sample size. Over a 5-year period, only 406 MGEs were available for analysis. Only events where organizers had requested GERMS standby services were included in this analysis of MGEs. MGEs that took place on campus but did not request standby EMS services could have been under-represented in this dataset. GERMS also has overlap in its response boundaries with the Georgetown Fire and EMS Department. Any calls resulting from campus MGEs that were dispatched via 911 to Georgetown University would also not be represented in this dataset, potentially underrepresenting the true patients-per-event rate. However, this likely occurred infrequently, as requesting an ambulance via 911 at the studied jurisdiction results in a bill to the patient, while transport by GERMS is free. Moreover, the local Georgetown Fire and EMS department does not provide standby coverage to Georgetown University, further reducing the potential for patients to be transported via 911.

Another potential limitation is the classification of events with alcohol. The distinction between events in which alcohol was likely to be consumed and events in which alcohol was not permitted is not precise.

---

### Conclusions

---

MGEs continue to pose a challenge to both event organizers and EMS agencies with regards to predicting EMS utilization. Optimization in matching estimated



EMS needs with actual medical dispatches enhances the timeliness and quality of care patients experience, while concurrently conserving scarce medical resources. This study highlights the potential for specific features of the event to be identified ahead of time and used to predict EMS resource utilization. In particular, increased medical calls occurred at large, outdoor, non-sporting events with higher temperatures, large crowds, and alcohol consumption, especially if in an unregulated fashion. University administrators, event organizers, and EMS agencies can therefore prepare medical plans for MGEs by determining forecasted temperatures, the event size, and whether alcohol is expected to be consumed.

### Acknowledgments

The authors acknowledge Vincent WinklerPrins, MD, assistant vice president for student health at Georgetown University, along with the dedicated members of the Georgetown Emergency Response Medical Service.

### References

- DeLorenzo RA. Mass gathering medicine: a review. *Prehosp Disaster Med.* 1997;12(1):68-72. <https://doi.org/10.1017/S1049023X00037250>
- Milsten AM, Maguire BJ, Bissell RA, Seaman KG. Mass-gathering medical care: a review of the literature. *Prehosp Disaster Med.* 2002;17(3):151-162. <https://doi.org/10.1017/S1049023X00000388>
- Hartman N, Williamson A, Sojka B, et al. Predicting resource use at mass gatherings using a simplified stratification scoring model. *Am J Emerg Med.* 2009;27(3):337-43. <https://doi.org/10.1016/j.ajem.2008.03.042>
- Moore R, Williamson K, Sochor M, et al. Large-event medicine-event characteristics impacting medical need. *Am J Emerg Med.* 2011;29(9):1217-1221. <https://doi.org/10.1016/j.ajem.2010.07.018>
- Arbon P, Bridgewater F, Smith C, et al. Mass gathering medicine: a predictive model for patient presentation and transport rates. *Prehosp Disaster Med.* 2001;16(3): 150-158. <https://doi.org/10.1017/S1049023X00025905>
- White A, Hingson R. The burden of alcohol use: excessive alcohol consumption and related consequences among college students. *Alcohol Res.* 2013;35(2):201-18. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3908712/>. Accessed March 14, 2018.
- Fisher J, Ray A, Savett SC, et al. Collegiate-based emergency medical services (EMS): a survey of EMS systems on college campuses. *Prehosp Disaster Med.* 2005;21:91-96. <https://doi.org/10.1017/S1049023X00003411>
- Lewis DK, Marchell TC. Safety first: A medical amnesty approach to alcohol poisoning at a U.S. university. *Int J Drug Policy.* 2006;17(4):329-338. <https://doi.org/10.1016/j.drugpo.2006.02.007>
- Wechsler H, Davenport A, Dowdall G, Moeykens B, et al. Health and Behavioral Consequences of Binge Drinking in College. *JAMA.* 1994;272(21):1672-1677. <https://doi.org/10.1001/jama.1994.03520210056032>
- Stillman J, Hale JD, Burnett J, et al. Old Farmer's Almanac. <http://www.almanac.com>. Accessed March 14, 2018.

**Author Affiliations:** From Physician Assistant Program, Lock Haven University of Pennsylvania, Lock Haven, PA, USA (E.C.O); Georgetown University School of Medicine, Washington, DC, USA (N.S., J.V.N); MedStar Georgetown / Washington Hospital Center Emergency Medicine Residency Program, Washington, DC, USA (L.M.G.); Georgetown Emergency Response Medical Service, Georgetown University, Washington, DC, USA (L.M.G., A.M.B., M.J.R., J.V.N); Department of Emergency Medicine, MedStar Georgetown University Hospital, Washington, DC, USA (J.V.N).

**Address for Correspondence:** Jose V. Nable, MD, MS, NRP, Department of Emergency Medicine, MedStar Georgetown University Hospital, 3900 Reservoir Road, NW Washington DC 20057, USA. Email: Jose.Nable@georgetown.edu.

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. J.V.N. serves on the Editorial Board of JCEMS in an uncompensated role. All authors declared that they have no other conflicts of interest. All authors declared that they did not receive funding to conduct the research and/or writing associated with this work.

**Authorship Criteria:** By the JCEMS Submission Declaration Form, all authors are required to attest to meeting the four ICMJE.org authorship criteria: (1) Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND (2) Drafting the work or revising it critically for important intellectual content; AND (3) Final approval of the version to be published; AND (4) Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

**Prior Presentation:** Preliminary data from this study was published as an abstract in *Prehospital Emergency Care*, 2018;22(1), and pre-

## Original Research

---

sented in abstract form at the Annual Meeting of the National Association of EMS Physicians in January 2018 (San Diego, CA, USA).

**Submission History:** Received May 1, 2018; accepted for publication August 5, 2018.

**Published Online:** August 8, 2018

**Published in Print:** August 13, 2018 (Volume 1: Issue 2)

**Reviewer Information:** In accordance with JCEMS editorial policy, Original Research manuscripts undergo double-blind peer-review by at least two independent reviewers. JCEMS thanks the

anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 Ordway, Sarna, DeGeorge, Baird, Reid, & Nable. This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.02.05>



# CONTRIBUTE TO JCEMS

Seeking original content for JCEMS: the official **scholarly, peer-reviewed journal** of the National Collegiate Emergency Medical Services Foundation. Our mission is to promote leadership, clinical excellence, and original research.

### Original submissions welcome on collegiate EMS:

- Prehospital patient care
- Operations, communications, and equipment
- Training and education
- Administration and agency development
- Campus public health and safety

**Original research is prioritized. Case reports, reviews, and articles featuring perspectives and commentary are also invited.**

### Research Mentorship

We are committed to mentoring researchers and authors. If you might be interested in conducting a study or writing an article, please contact [JCEMS@CollegeEMS.com](mailto:JCEMS@CollegeEMS.com).

### Important Information (Third Issue)

Deadline  
September 10<sup>th</sup>, 2018

Send submissions to:  
[JCEMS@CollegeEMS.com](mailto:JCEMS@CollegeEMS.com)





## Upstream of EMS Overutilization: The Tufts First Aid Kit Project

Justin Zaslavsky, EMT; Carly Eiduson, EMT; Isaiah Smolar, AEMT;  
Andrew Pettit, EMT

### POSTER PRESENTATION ABSTRACT

**Introduction:** In 2016, EMTs from Tufts Emergency Medical Services (TEMS) noticed an under-preparedness amongst first-year students to handle minor illness and injury. The EMTs observed that first-year students often sought expensive and resource-intensive EMS and ED care for minor conditions that could be managed by either a general practitioner or themselves, demonstrating a limited understanding of the differences between emergency and non-emergency resources available to the Tufts community while putting an unnecessary - and potentially dangerous - strain on both university and municipal services. Multiple instances were also seen of first-year students' requesting an ambulance for medical supplies (eg, thermometers or ice packs) with no intention of seeking definitive care, demonstrating students' not having sufficient equipment for self-treatment. **Program Development & Implementation:** TEMS—alongside Tufts Health Promotion and Prevention—funded, created, and distributed first aid kits to all first-year students, which included personalized informational packets to address these two problematic observations. The project has since expanded to involve more of the first-year experience, including the implementation of an informational video that was developed and shown in Fall 2017 during first-year orientation. **Program Evaluation:** A survey was distributed to students of all class years, which demonstrated differences between students who did and did not receive a first aid kit surrounding attitudes toward the various medical services offered at Tufts. The survey also indicated differences in student's reported help-seeking behavior. Additionally, a chart review was completed, demonstrating that a smaller portion of first-year students refused transport after evaluation compared to second-year students (13.7% vs. 25%,  $p < .05$ ), possibly indicating a higher threshold for requesting EMS. **Discussion/Conclusion:** By providing first aid kits and information, collegiate EMS agencies are able to take a public health role within the communities they serve. TEMS hopes to continue this project by obtaining secure funding and constantly evaluating to ensure that students receive necessary supplies in the most cost and energy efficient way.

**Author Affiliations:** Emergency Medical Services, Tufts University, Medford, MA, USA

**Address for Correspondence:** Justin Zaslavsky, EMT. E-mail: Justin.Zaslavsky@tufts.edu

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. The authors declared that they have no conflicts of interest. The authors declared that they received funding from Tufts University Emergency Medical Services, Tufts University Health Promotion and Prevention, and Tufts University Health Services for the program and/or research described in this abstract.

**Ethical Compliance:** The authors attest that the research associated with this abstract was conducted in accordance with the JCEMS Ethics Guidelines.

**Submission History:** Received January 15, 2018; accepted for presentation and publication February 22, 2018.

**Poster Presentation:** This abstract was presented as a poster at the Academic Poster Session of the 25<sup>th</sup> Annual Conference of the National Collegiate

Emergency Medical Services Foundation; February 24, 2018; Philadelphia, PA, USA. The authors received the First Place Award for the Best Poster Presentation Competition. The poster is available for download on the JCEMS website.

**Published Online:** April 24, 2018

**Published in Print:** August 13, 2018 (Volume 1: Supplemental 1)

**Reviewer Information:** In accordance with JCEMS editorial policy, poster presentation abstracts undergo double-blind peer-review by at least two reviewers (JCEMS Editorial Board members and/or independent reviewers) prior to acceptance for presentation and publication. JCEMS thanks the anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 Zaslavsky, Eiduson, Smolar, & Pettit. This is an open access abstract distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.S1.01>





## Piloting an Online New Member Orientation Program

Elizabeth V. Woodburn, WEMT

---

### POSTER PRESENTATION ABSTRACT

---

**Introduction:** Within Illini EMS (IEMS) at the University of Illinois at Urbana-Champaign, entry-level membership as an EMS Aide requires only BLS certification. Aides are paired with a licensed EMT during operational events, but have historically arrived for their first volunteer shift knowing little more than basic CPR. Though hands-on training nights are held regularly, there is no requirement for Aides to attend. **Program Development & Implementation:** After identifying a need for formalized free training to prepare Aides to function within their team in a more comprehensive role, an online Orientation course was created and implemented. Using a combination of original and adapted videos followed by a quiz, this self-paced program teaches and assesses the basics of topics including bleeding control, organizational structure, team dynamics, and First Responder mental health in under an hour. **Program Evaluation:** After completing Orientation, Aides are required to complete a knowledge-based quiz and perception-based survey. Survey data confirms that, while not certifying them in any new skills, Orientation prepares them to integrate more effectively into the organization and understand the actions of their EMT teammates. 100% of respondents stated that Orientation improved their understanding of organizational structure, glove removal, and bleeding control. **Discussion/Conclusion:** As a collegiate EMS agency that sets its own membership requirements, this program allows us to forgo the formality and expense of relying on first aid certification for Aide training while streamlining our year-round onboarding of over 150 annual new members. Though hands-on training will continue to be an important part of onboarding, this tool will increase the quality of care that IEMS is able to provide without significantly raising the barrier to organizational entry. After this initial pilot of Aide-specific content, we hope to expand with separate modules to familiarize new EMTs with regional and organizational protocols. Future evaluations have been proposed to determine how well Aides retain this knowledge over time, and whether it translates to improved performance.

---

**Author Affiliations:** Illini Emergency Medical Services, Illini Fire Service Institute, University of Illinois at Urbana-Champaign, Urbana, IL, USA

**Address for Correspondence:** Elizabeth V. Woodburn, WEMT. E-mail: woodbrn2@illinois.edu

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. The author declared that they have no conflicts of interest. The author declared that they did not receive funding to conduct the program or research associated with this work.

**Ethical Compliance:** The authors attest that the research associated with this abstract was conducted in accordance with the JCEMS Ethics Guidelines.

**Submission History:** Received February 5, 2018; accepted for presentation and publication February 21, 2018.

**Poster Presentation:** This abstract was presented as a poster at the Academic Poster Session of the 25<sup>th</sup> Annual Conference of the National Collegiate Emergency Medical Services Foundation; February 24, 2018; Philadelphia,

PA, USA. The authors received the Second Place Award for the Best Poster Presentation Competition. The poster is available for download on the JCEMS website.

**Published Online:** April 24, 2018

**Published in Print:** August 13, 2018 (Volume 1: Supplemental 1)

**Reviewer Information:** In accordance with JCEMS editorial policy, poster presentation abstracts undergo double-blind peer-review by at least two reviewers (JCEMS Editorial Board members and/or independent reviewers) prior to acceptance for presentation and publication. JCEMS thanks the anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 Woodburn. This is an open access abstract distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.S1.02>



## Feasibility of Asynchronous Learning in Collegiate EMS: Impact of a Novel Training Program on Self-Reported Measures of Confidence

**Katherine R. Luchette**, AEMT-Cardiac; **James Dorroh**, AAS, NRP; **Gita Pensa**, MD; **Megan L. Ranney**, MD, MPH, FACEP; **Thomas J. Martin**, AEMT-Cardiac

### POSTER PRESENTATION ABSTRACT

**Introduction:** Brown University EMS (BEMS) provides 24/7 emergency medical coverage using one non-transport SUV and one ambulance equipped at the BLS and ALS/BLS levels, respectively. Each vehicle must be attended by an ALS staff or BLS student supervisor per standard operating guidelines. While this dual-supervisor model allowed BEMS to capture 25% more calls in 2016, its maintenance requires a robust staff of qualified student supervisors. Though progression models for becoming a “supervisor” or “crew chief” vary by institution, the loss of experienced personnel following graduation is a ubiquitous challenge. **Program Development & Implementation:** A novel BLS Supervisor Training Program (STP) was implemented during Fall 2017. Using asynchronous learning, we sought to optimize training time by promoting self-learning off-shift and outside of traditional didactic models. Concurrent with 48 hours/month of precepted field training, students participated in 16 weekly sessions, alternating between two hours of small-group, problem-based learning and online modules accessed through our internal website. Online content was developed internally using original exercises and augmented by Free Open Access Medical Education resources, including selected podcasts from EmCrit and Emergency Medicine Cases. **Program Evaluation:** As part of internal QI efforts, questionnaires assessing students’ goals and progress were routinely included during STP. Students (N=7) rated their confidence at supervising BLS calls on a 0-10 scale ranging from “Not at all Confident” to “Absolutely Confident” with 100% response rates. Mean [95% CI] scores of 5.4 [3.9, 6.9] and 8.6 [8.0, 9.2] were collected pre- and post-STP, respectively, and there was significant improvement within individual scores (Paired t-test: p=0.004, 95% CI [1.4, 4.9]). **Discussion/Conclusion:** Student training and development within collegiate EMS may be limited by call volume, time-demands, and personnel turnover. We propose asynchronous learning as a feasible method to optimize training time in collegiate EMS through accommodating undergraduates’ time constraints. Similar education models may increase operational efficiency, patient safety, and quality care.

**Author Affiliations:** From Emergency Medical Services, Brown University, Providence, RI, USA (K.R.L., J.D., T.J.M.); Program in Emergency Digital Health Innovation, Department of Emergency Medicine, The Warren Alpert Medical School of Brown University, Providence, RI, USA (G.P., M.L.R., T.J.M.).

**Address for Correspondence:** Thomas J. Martin, AEMT-Cardiac, The Warren Alpert Medical School of Brown University, 69 Brown St., Box 2784, Providence, RI, USA. E-mail: thomas\_martin@brown.edu

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. The authors declared that they have no conflicts of interest. The authors declared that they did not receive funding to conduct the program or research associated with this work.

**Ethical Compliance:** The authors attest that the research associated with this abstract was conducted in accordance with the JCEMS Ethics Guidelines.

**Submission History:** Received January 14, 2018; accepted for presentation and publication February 21, 2018.

**Poster Presentation:** This abstract was presented as a poster at the Academ-

ic Poster Session of the 25<sup>th</sup> Annual Conference of the National Collegiate Emergency Medical Services Foundation; February 24, 2018; Philadelphia, PA, USA. The authors received the Third Place Award for the Best Poster Presentation Competition. The poster is available for download on the JCEMS website.

**Published Online:** May 1, 2018

**Published in Print:** August 13, 2018 (Volume 1: Supplemental 1)

**Reviewer Information:** In accordance with JCEMS editorial policy, poster presentation abstracts undergo double-blind peer-review by at least two reviewers (JCEMS Editorial Board members and/or independent reviewers) prior to acceptance for presentation and publication. JCEMS thanks the anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 Luchette, Dorroh, Pensa, Ranney, & Martin. This is an open access abstract distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.S1.03>

## Cardiac Health and Stroke Awareness Month (CHASAM)

Anjali Misra, EMT; Adedoyin Olateru-Olagbegi, EMT

---

### POSTER PRESENTATION ABSTRACT

---

**Introduction:** Project HeartSafe is a subgroup of Massachusetts Institute of Technology (MIT) EMS dedicated to enhancing emergency response to cardiac arrest. Since 2014, Project HeartSafe has trained 2,000+ individuals in life-saving skills. Currently, the initiative is led by 19 EMTs who are certified as CPR instructors, and several dozen additional members of MIT EMS. Because teaching opportunities for EMTs without instructor certifications are limited, they are an underutilized source of training potential. **Program Development & Implementation:** To involve these members and to increase our breadth of training, we designed a non-certification learning opportunity for students who have not previously sought out CPR training. MIT EMS's creation of an annual Cardiac Health and Stroke Awareness Month (CHASAM), piloted at MIT in 2016 and repeated in 2017, substantially increased the number of trained bystanders from a diverse selection of residential communities. **Program Evaluation:** In 2016, walk-in hands-only CPR and stroke symptom recognition trainings with a 1:1 student to instructor ratio were conducted in all 11 undergraduate dorms, with 190 participants over five weeks. In 2017, 45-minute group sessions with an average 1:4 student to instructor ratio, including individual practice and feedback, were held at three graduate residences, with 39 participants over three weeks. Of Project HeartSafe's 762 trainees in the 2016-2017 academic year, 24.9% participated in CHASAM. Analogous data for 2017-2018 is pending, and will indicate how effectively we reach students who may not otherwise receive training. Additional evaluation will involve surveys to assess participants' perceived barriers to learning CPR through traditional means. **Discussion/Conclusion:** CHASAM was designed to minimize course cost, inconvenience of traveling to receive training, and lack of awareness of the skills' lifesaving potential. We are interested in assessing whether these are the true reasons students are not frequently trained, and whether CHASAM effectively addressed these challenges. Hosting CHASAM events in student residences is a short-term, high-impact method of reaching a diverse population, and will likely transfer well to other colleges.

**Author Affiliations:** Emergency Medical Services, Massachusetts Institute of Technology, Cambridge, MA, USA

**Address for Correspondence:** Anjali Misra, EMT. E-mail: heartsafe@ems.mit.edu

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. The authors declared that they have no conflicts of interest. The authors declared that they received funding from Massachusetts Institute of Technology (MIT) Student Life Grants, MIT PKG Public Service Center, and MIT Undergraduate Association for the program and/or research described in this abstract.

**Ethical Compliance:** The authors attest that the research associated with this abstract was conducted in accordance with the JCEMS Ethics Guidelines.

**Submission History:** Received January 18, 2018; accepted for presentation and publication February 16, 2018.

**Poster Presentation:** This abstract was presented as a poster at the Academ-

ic Poster Session of the 25<sup>th</sup> Annual Conference of the National Collegiate Emergency Medical Services Foundation; February 24, 2018; Philadelphia, PA, USA. The poster is available for download on the JCEMS website.

**Published Online:** May 1, 2018

**Published in Print:** August 13, 2018 (Volume 1: Supplemental 1)

**Reviewer Information:** In accordance with JCEMS editorial policy, poster presentation abstracts undergo double-blind peer-review by at least two reviewers (JCEMS Editorial Board members and/or independent reviewers) prior to acceptance for presentation and publication. JCEMS thanks the anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 Misra & Olateru-Olagbegi. This is an open access abstract distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.S1.04>



# Utilizing a Scramble Crew Approach to Achieve 24-Hour Coverage

Gregory Kantor, EMT-B

---

## POSTER PRESENTATION ABSTRACT

---

**Introduction:** Muhlenberg College is a small liberal arts school with a campus population of approximately 3,000. Muhlenberg College EMS (MCEMS) is a quick response service, with about 30 student volunteers and an approximate call volume of 200 emergency response calls per academic year. For 10 years, MCEMS was in service 24 hours a day; however, in 2009, MCEMS began only responding to calls from 5 p.m. until 8 a.m. during the week and 24 hours throughout the weekend, leaving the daytime unaddressed Monday through Friday. In 2016, MCEMS reinstated daytime response, incorporating Active 911, a digital messaging system, and an all-call, scramble crew model. To our knowledge, there are no reports in the literature of collegiate-based EMS agencies incorporating this approach. **Program Development & Implementation:** In daytime response during the week, MCEMS is dispatched by Muhlenberg's Department of Campus Safety through Active 911 – all members receive a notification and can indicate their availability to respond to the scene. Additionally, MCEMS crew chiefs unable to respond can indicate their availability to provide remote assistance over the phone. **Program Evaluation:** Since the new response plan began in March of 2016, MCEMS has responded to 47 calls that may have otherwise been ignored, at a response time shorter than that of normal duty crew responses. As part of the initiative, MCEMS has strengthened its relationship with Campus Safety through training dispatchers and adding medical supplies in all of their vehicles. **Discussion/Conclusion:** Combining the scramble-crew approach with regular duty crews has both provided MCEMS' members with flexibility and, more importantly, reassured the Muhlenberg community that emergency medical services are always available on campus. Recurring training of MCEMS members and Campus Safety employees will be crucial to ensuring the model's long-term viability. MCEMS believes that this model can be beneficial to collegiate EMS agencies who wish to provide or improve daytime coverage.

---

**Author Affiliations:** Emergency Medical Services, Muhlenberg College, Allentown, PA, USA

**Address for Correspondence:** Gregory Kantor, EMT-B. E-mail: gk249480@muhlenberg.edu

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. The author (G.K.) declares that they serve as a volunteer Copy Editor for JCEMS. The author declared that they have no other conflicts of interest. The authors declared that Muhlenberg College EMS received funding from Muhlenberg College's Student Activity Fee for the program described in this abstract.

**Ethical Compliance:** The authors attest that the research associated with this abstract was conducted in accordance with the JCEMS Ethics Guidelines.

**Submission History:** Received January 19, 2018; accepted for presentation and publication February 14, 2018.

**Poster Presentation:** This abstract was presented as a poster at the Academ-

ic Poster Session of the 25<sup>th</sup> Annual Conference of the National Collegiate Emergency Medical Services Foundation; February 24, 2018; Philadelphia, PA, USA. The poster is available for download on the JCEMS website.

**Published Online:** August 10, 2018

**Published in Print:** August 13, 2018 (Volume 1: Supplemental 1)

**Reviewer Information:** In accordance with JCEMS editorial policy, poster presentation abstracts undergo double-blind peer-review by at least two reviewers (JCEMS Editorial Board members and/or independent reviewers) prior to acceptance for presentation and publication. JCEMS thanks the anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 Kantor. This is an open access abstract distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.S1.05>

# Expanding Collegiate EMS Agencies: Challenges, Opportunities and the Value of Infrastructure

August Allocco\*, EMT; Tianna Zhou\*, EMT; Melanie McCloskey, DNP, NE-BC;  
Paul Genecin, MD

\*Contributed equally to this work.

## POSTER PRESENTATION ABSTRACT

**Introduction:** Expanding EMS agencies face many challenges pertaining to on-scene operations, administrative oversight, and sustainability. Specific challenges that prompted change within our agency include a critical shortage of EMTs, a \$5000 budget deficit, inconsistent training of probationary members, and a high incidence of equipment deficiencies, delayed response times, and unsafe scene conditions. **Program Development & Implementation:** Our agency has addressed these concerns using a three-pronged approach tackling Operations, Administration, and Sustainability challenges. Specific operational changes include the implementation of pre-shift checklists, site-specific SOPs, and radio integration with the Yale Police network. New administrative practices were adopted to facilitate communication. The organizational structure of the student executive board was codified in revised organizational charts and bylaws. Both measures served to delineate the responsibilities of each position and the chain-of-command relationship between them. Communication was further heightened by establishing a regular meeting schedule with campus administrators. Sustainability practices, including the creation of formal uniform/equipment requisition procedures and organized recruitment drives, were also implemented for the first time. **Program Evaluation:** YEMS witnessed a significant decrease in the number of post-shift reports noting equipment deficiencies, scene safety concerns, or delayed ambulance response times after implementing new policies. Probationary members reported increased satisfaction with the quality of their training in interviews conducted at the end of the probationary period, and new recruitment/training policies resulted in a threefold increase in cleared membership (from 3 to 9). The organization eliminated the budget deficit and was empowered to focus on other institutional goals. **Discussion/Conclusion:** All student organizations experience growing pains, but EMS is unique in that growing pains can lead to serious consequences for patients and the organization. Standardized operations, improved communication, and increased sustainability are crucial tools for expanding collegiate EMS agencies to tackle unexpected challenges.

**Author Affiliations:** From Emergency Medical Services, Yale College, New Haven, CT, USA (A.A., T.Z.); Yale Health, Yale University, New Haven, CT, USA (M.M., P.G.).

**Address for Correspondence:** August Allocco, EMT. E-mail: [august.allocco@yale.edu](mailto:august.allocco@yale.edu); Tianna Zhou, EMT. E-mail: [tianna.zhou@yale.edu](mailto:tianna.zhou@yale.edu)

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. The authors declared that they have no conflicts of interest. The authors declared that they received funding from a Yale Undergraduate Organizations Council Administrative Grant.

**Ethical Compliance:** The authors attest that the research associated with this abstract was conducted in accordance with the JCEMS Ethics Guidelines.

**Submission History:** Received January 19, 2018; accepted for presentation and publication February 19, 2018.

**Poster Presentation:** This abstract was presented as a poster at the Academic Poster Session of the 25<sup>th</sup> Annual Conference of the National Collegiate

Emergency Medical Services Foundation; February 24, 2018; Philadelphia, PA, USA. The poster is available for download on the JCEMS website.

**Published Online:** April 24, 2018

**Published in Print:** August 13, 2018 (Volume 1: Supplemental 1)

**Reviewer Information:** In accordance with JCEMS editorial policy, poster presentation abstracts undergo double-blind peer-review by at least two reviewers (JCEMS Editorial Board members and/or independent reviewers) prior to acceptance for presentation and publication. JCEMS thanks the anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 Allocco, Zhou, McCloskey, Genecin. This is an open access abstract distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.S1.06>

## Implementing Stop the Bleed at Skidmore College

**Katie Pelham**, EMT-B; **Veronica Mierzejewski**, EMT-B; **Emily O'Connor**, EMT-B; **Mégane Ackermans**, EMT-B; **Alicja Madloch**, EMT-B; **Jesse A. Epstein**, EMT-B

---

### POSTER PRESENTATION ABSTRACT

---

**Introduction:** Stop the Bleed is a national initiative to increase bystander awareness on how to control a life-threatening hemorrhage, a skill that is becoming more imperative with the increase in mass casualty incidents. Inspired by the Binghamton University presentation at the 2017 NCEMSF conference, Skidmore College Emergency Medical Services (SCEMS) brought Stop to Bleed to Skidmore College, an upstate New York liberal arts college of 2,500 students. **Program Development & Implementation:** In celebration of National Collegiate EMS Week in November 2017, our team organized 20 free bleeding control trainings on direct pressure, tourniquet usage and improvisation, and wound packing. To make bleeding control equipment more accessible, we petitioned for kits that include tourniquets, gauze, gloves, shears, and an instructional booklet. These kits will be placed next to AEDs in academic buildings, dining halls, and student centers. A total of \$5,000 was incorporated into the Skidmore Campus Safety 2018 budget proposal through collaboration between SCEMS leadership and Skidmore administrators. A Community Education Division within SCEMS was established to continue Stop the Bleed trainings. **Program Evaluation:** During National Collegiate EMS Week, over 60 members of our Skidmore community, which includes Skidmore students, professors, faculty, and local high school students, became bleeding control certified as per guidelines established by the American College of Surgeons. An additional 10 faculty members were certified after we led a requested training at our on-campus child care center. **Discussion/Conclusion:** Future division goals for the program include designing courses specifically for Skidmore professors and faculty members, certifying all of the Skidmore College sports teams, and holding trainings at local high schools in the Saratoga county region.

---

**Author Affiliations:** Emergency Medical Services, Skidmore College, Saratoga Springs, NY, USA

**Address for Correspondence:** Katie Pelham, EMT-B. E-mail: [kpelham@skidmore.edu](mailto:kpelham@skidmore.edu)

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. The authors declared that they have no conflicts of interest. The authors declared that they received funding from Skidmore College and private anonymous donors for the program and/or research described in this abstract.

**Ethical Compliance:** The authors attest that the research associated with this abstract was conducted in accordance with the JCEMS Ethics Guidelines.

**Submission History:** Received February 4, 2018; accepted for presentation and publication February 22, 2018.

**Poster Presentation:** This abstract was presented as a poster at the Academic Poster Session of the 25<sup>th</sup> Annual Conference of the National Collegiate

Emergency Medical Services Foundation; February 24, 2018; Philadelphia, PA, USA. The poster is available for download on the JCEMS website.

**Published Online:** May 15, 2018

**Published in Print:** August 13, 2018 (Volume 1: Supplemental 1)

**Reviewer Information:** In accordance with JCEMS editorial policy, poster presentation abstracts undergo double-blind peer-review by at least two reviewers (JCEMS Editorial Board members and/or independent reviewers) prior to acceptance for presentation and publication. JCEMS thanks the anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 Pelham, Mierzejewski, O'Connor, Ackermans, Madloch, & Epstein. This is an open access abstract distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.S1.07>



## MCI Training Program: Evaluation & Current Directions

Gabrielle Ramirez, EMT; Abhishek Rao, BA, EMT; Brett Bell, BA, EMT; David Gordon, EMT

---

### POSTER PRESENTATION ABSTRACT

---

**Introduction:** In 2010, the University of Pennsylvania Medical Emergency Response Team (MERT) initiated the Mass Casualty Incident (MCI) training program. An MCI Field Training Exercise allows MERT to rehearse and improve the MCI protocol execution in a half-day-long drill that includes responses with UPennAlert and the Penn MCI trailer, participation from MERT's interagency partners, and approximately 40 simulated patients. Past MCI exercises have simulated active shooter incidents, boiler explosions, bus crashes, chemical spills, and bomb detonations. However, areas for improvement include communication between designated officers, allocation of resources, and hindered extrication. Often, decisions made by the commanding officers do not necessarily reflect the changing environment of an MCI scene. **Program Development & Implementation:** To better prepare student-EMTs to respond and manage a disaster scene, MERT is implementing a tabletop exercise module to ensure that MERT members are fluent in the Incident Command System (ICS), familiar with the MERT MCI operating guidelines, and able to size-up a scene appropriately. Unlike the fast-paced MCI drill, the tabletop exercise is an environment for members to ask clarifying questions, learn the ICS thought process, and make mistakes at their own pace. The tabletop scenario presents a potential MCI scenario to a small group overseen by a facilitator and evaluator. The facilitator presents information to the group and questions members' decision-making. **Program Evaluation:** Concurrently, the evaluator tracks progress using a rubric MERT adapted from FEMA and NIMS standards. This tabletop rubric parallels the rubric used for the MCI drill. Both highlight often-forgotten MERT operating guidelines and parts of the incident command structure (e.g. prioritizing areas of the scene). After the exercise is completed, all of those involved debrief and complete feedback forms. **Discussion/Conclusion:** Our hope is that members will apply what they have learned during the tabletop to an MCI drill and, thus, show improvement in the fluidity of the simulated response.

**Author Affiliations:** Medical Emergency Response Team, University of Pennsylvania, Philadelphia, PA, USA

**Address for Correspondence:** Gabrielle Ramirez, EMT. Email: drt@pennmert.org

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. The authors declared that they have no conflicts of interest. The authors declared that they received funding from the University of Pennsylvania Division of Public Safety, University of Pennsylvania Division of the Vice Provost for University Life, and University of Pennsylvania Robert A. Fox Leadership Program for the program and/or research described in this abstract.

**Ethical Compliance:** The authors attest that the research associated with this abstract was conducted in accordance with the JCEMS Ethics Guidelines.

**Submission History:** Received January 19, 2018; accepted for presentation and publication February 16, 2018.

**Poster Presentation:** This abstract was presented as a poster at the Academ-

ic Poster Session of the 25<sup>th</sup> Annual Conference of the National Collegiate Emergency Medical Services Foundation; February 24, 2018; Philadelphia, PA, USA. The poster is available for download on the JCEMS website.

**Published Online:** May 16, 2018

**Published in Print:** August 13, 2018 (Volume 1: Supplemental 1)

**Reviewer Information:** In accordance with JCEMS editorial policy, poster presentation abstracts undergo double-blind peer-review by at least two reviewers (JCEMS Editorial Board members and/or independent reviewers) prior to acceptance for presentation and publication. JCEMS thanks the anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 Ramirez, Rao, Bell, & Gordon. This is an open access abstract distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.S1.08>

# Optimizing Collegiate EMS Resources During Major Events

Katherine R. Luchette\*, AEMT-Cardiac; Oliver G. Isik\*, EMT; Heather Rybasack-Smith, MD, MPH; Nicholas Asselin, DO, MS; Thomas J. Martin, AEMT-Cardiac

\*Contributed equally to this work.

## POSTER PRESENTATION ABSTRACT

**Introduction:** Each year, Brown University holds Spring Weekend (SWE), an outdoor concert drawing 6,000 attendees per day. Mass gatherings are prone to developing into mass casualty incidents (MCIs) due to unplanned events and attacks. Though campus venues face comparable risks, collegiate resources are more commonly and predictably overwhelmed by medical surge from trauma and/or toxicological emergencies. These ‘planned MCIs’ offer unique training opportunities and inform disaster planning. Brown EMS (BEMS) provides primary medical coverage for SWE and develops annual response plans using data-driven evaluation. **Program Development & Implementation:** BEMS establishes EMS Operations during major events using a modified ICS structure. Whereas our ALS/BLS-licensed ambulance and non-transport SUV are routinely in-service, venue resources are augmented by dedicated apparatuses and pairs of EMTs assigned to ground details. By increasing its resources, BEMS aims to increase venue capacity, optimize response, and limit mutual-aid requirements. The number and proportion of transports by external agencies consistently increased over 2014–2016: 25.0% (3/12), 31.3% (5/16), and 45.0% (9/20) during the six-hour Friday concert, respectively. For SWE 2017, we hypothesized that renting and staffing an additional ALS ambulance with BEMS personnel would decrease mutual-aid utilization. **Program Evaluation:** To control for annual variations, we compared mutual-aid utilization in 2017 against aggregate utilization during the three prior years and observed no significant difference: 20.8% (5/24) vs. 35.4%(17/48) (p=0.21). This suggests that in response planning, the temporal density of patient presentations during surge conditions may better predict mutual-aid requirements than historical call volume. **Discussion/Conclusion:** Though mutual-aid is a cornerstone of MCI management, collegiate systems may face unique pressures to decrease its utilization if students are exposed to additional billing. Expanding our transport sector in 2017 did not significantly decrease the proportion of patients requiring mutual-aid transport. To optimize incident response, collegiate services may instead consider establishing on-site triage/treatment areas and concurrently transporting low-acuity patients.

**Author Affiliations:** From Emergency Medical Services, Brown University, Providence, RI, USA (O.G.I., K.R.L., T.J.M.); Division of Emergency Medical Services, Department of Emergency Medicine, The Warren Alpert Medical School of Brown University, Providence, RI, USA (H.R., N.A.); Program in Emergency Digital Health Innovation, Department of Emergency Medicine, The Warren Alpert Medical School of Brown University, Providence, RI, USA (T.J.M.).

**Address for Correspondence:** Thomas J. Martin, AEMT-Cardiac, The Warren Alpert Medical School of Brown University, 69 Brown St., Box 2784, Providence, RI, USA. E-mail: thomas\_martin@brown.edu

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. The authors declared that they have no conflicts of interest. The authors declared that they did not receive funding to conduct the program or research associated with this work.

**Ethical Compliance:** The authors attest that the research associated with this abstract was conducted in accordance with the JCEMS Ethics Guidelines.

**Submission History:** Received January 14, 2018; accepted for presentation

and publication February 21, 2018.

**Poster Presentation:** This abstract was presented as a poster at the Academic Poster Session of the 25<sup>th</sup> Annual Conference of the National Collegiate Emergency Medical Services Foundation; February 24, 2018; Philadelphia, PA, USA. The poster is available for download on the JCEMS website.

**Published Online:** May 13, 2018

**Published in Print:** August 13, 2018 (Volume 1: Supplemental 1)

**Reviewer Information:** In accordance with JCEMS editorial policy, poster presentation abstracts undergo double-blind peer-review by at least two reviewers (JCEMS Editorial Board members and/or independent reviewers) prior to acceptance for presentation and publication. JCEMS thanks the anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 Isik, Luchette, Rybasack-Smith, Asselin, & Martin. This is an open access abstract distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.S1.09>

## A Low-Cost Ambulance Idle Reduction System

Kevin S. Kung, PhD, EMT-B; Harrison J. Kaplan, EMT-B; Kyle J. Kotowick, EMT-B; Charles S. Montgomery, SB, EMT-B

---

### POSTER PRESENTATION ABSTRACT

---

**Introduction:** As per standard ambulance protocol, when the ambient temperature is below a certain threshold, it is necessary to keep the ambulance engine running while outside (i.e. “idling”) because of the need to keep the cabin warm using the engine-heated heating system. This tends to be expensive in terms of fuel consumption and operating costs, and can also wear down the engine. While existing idle reduction technologies exist, they are often adapted from other applications such as fire apparatuses or police vehicles, which can have somewhat different functional requirements than ambulances. Such systems tend to be expensive and/or require intensive battery storage and monitoring. **Program Development & Implementation:** By studying the non-emergent operations of a collegiate ambulance service (MIT EMS), we realized that in this particular case, most idling intervals are short (less than 30 minutes) relative to the timescale of heat loss from the patient compartment, and that the need for idling is mainly driven by temperature management rather than power management. This has enabled us to propose a simple, automated system design that constantly monitors the temperature in the patient compartment, and only starts the vehicle engine and heating system temporarily when the temperature falls below a preset threshold in the cabin. **Program Evaluation:** The simplest embodiment of this design, consisting of a remote starter operating in cold start mode and a modified temperature sensor, costs approximately one-sixth (~\$750) compared to currently commercially available systems to install. A preliminary prototype system was installed on the MIT EMS ambulance (gas engine), and from the initial testing data, we estimate that our system can reduce the vehicle’s idling fuel consumption and engine run time by about 85%. **Discussion/Conclusion:** Future work includes studying the system’s compatibility with diesel engine, adding dynamic control for engine run time and heater setting, and exploring the needs and requirements of other ambulance services.

---

**Author Affiliations:** Emergency Medical Services, Massachusetts Institute of Technology, Cambridge, MA, USA

**Address for Correspondence:** Kevin Kung, PhD, EMT-B E-mail: anti-idling@mit.edu

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. The authors declared that they have no conflicts of interest. The authors declared that they received funding from Massachusetts Institute of Technology (MIT) Earth Day Sustainability Fund and MIT Emergency Medical Services for the program and/or research described in this abstract.

**Ethical Compliance:** The authors attest that the research associated with this abstract was conducted in accordance with the JCEMS Ethics Guidelines.

**Submission History:** Received January 18, 2018; accepted for presentation and publication February 22, 2018.

**Poster Presentation:** This abstract was presented as a poster at the Academ-

ic Poster Session of the 25<sup>th</sup> Annual Conference of the National Collegiate Emergency Medical Services Foundation; February 24, 2018; Philadelphia, PA, USA. The poster is available for download on the JCEMS website.

**Published Online:** May 15, 2018

**Published in Print:** August 13, 2018 (Volume 1: Supplemental 1)

**Reviewer Information:** In accordance with JCEMS editorial policy, poster presentation abstracts undergo double-blind peer-review by at least two reviewers (JCEMS Editorial Board members and/or independent reviewers) prior to acceptance for presentation and publication. JCEMS thanks the anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 Kung, Kaplan, Kotowick, & Montgomery. This is an open access abstract distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.S1.10>



# “Continuing Care” with EC-ERT: Innovative Prehospital Care

Abigail D. McKelvy, EMT; Katarzyna S. Nowacki, EMT

## POSTER PRESENTATION ABSTRACT

**Introduction:** The Eckerd College Emergency Response Team (EC-ERT) often receives more than four calls within one hour. With one BLS team on call at a time, non-emergent calls were previously transferred to county ALS for transport so that EC-ERT responders could be available for additional calls. EC-ERT leadership looked to reduce unwarranted ALS transports and to provide better care to the Eckerd Community. **Program Development & Implementation:** EC-ERT created a program called “Continued Care” (CC) to provide a prehospital care resource for patients who required additional time to monitor their condition until care could be terminated. EC-ERT utilizes the Pinellas County EMS Cognitive Evaluation and Glasgow Coma Scale to assess the patient’s mental status before and during CC. The EC-ERT office is equipped with a designated CC area, complete with a hospital bed and response gear, and has a capacity of one patient. On weekend nights, an additional team of at least two EMTs are assigned to be the CC Team, ensuring an additional team is available for response on busy nights. Protocols were implemented for utilizing CC, including when an individual can be released, what to do if a patient begins to trend downward, and how to terminate care. **Program Evaluation:** CC was first utilized in 2015, with 9 instances using the CC program as an extended care resource. As the number of calls received by EC-ERT has increased since the team’s founding, the number of CC instances has also increased. As a whole, the number of ALS transports decreased since CC was implemented. CC can also be utilized, if necessary, as a secondary team, with busier weekend nights bringing in as many as 22 calls within 4 hours. **Discussion/Conclusion:** CC allows EC-ERT responders to take more time with non-emergent patients by offering additional responders, specific protocols and resources to monitor patients for extended periods of time. Through its design and implementation, CC reduces non-emergent ALS transports, thus reducing strain on the county EMS system and local emergencies rooms. Many students also benefit from not having to pay for extensive hospital and transport fees if they are able to leave CC with improved GCS, vitals, and cognitive evaluation scores. Moving forward, EC-ERT hopes to track specific CC trends over time.

**Author Affiliations:** Emergency Response Team, Eckerd College, Petersburg, FL, USA

**Address for Correspondence:** Katarzyna S. Nowacki, EMT. E-mail: nowackks@eckerd.edu

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. The authors declared that they have no conflicts of interest. The authors declared that they received funding from Eckerd College (EC) Organization of Students, EC Campus Safety, and EC Dean of Students.

**Ethical Compliance:** The authors attest that the research associated with this abstract was conducted in accordance with the JCEMS Ethics Guidelines.

**Submission History:** Received January 19, 2018; accepted for presentation and publication February 21, 2018.

**Poster Presentation:** This abstract was presented as a poster at the Academic Poster Session of the 25<sup>th</sup> Annual Conference of the National Collegiate

Emergency Medical Services Foundation; February 24, 2018; Philadelphia, PA, USA. The poster is available for download on the JCEMS website.

**Published Online:** May 16, 2018

**Published in Print:** August 13, 2018 (Volume 1: Supplemental 1)

**Reviewer Information:** In accordance with JCEMS editorial policy, poster presentation abstracts undergo double-blind peer-review by at least two reviewers (JCEMS Editorial Board members and/or independent reviewers) prior to acceptance for presentation and publication. JCEMS thanks the anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 McKelvy & Nowacki. This is an open access abstract distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.S1.11>

## Designing Safety into Ambulances

Mark Forgues, MEd, NRP

---

### POSTER PRESENTATION ABSTRACT

---

**Introduction:** The National Highway Traffic Safety Administration's Office of EMS (NHTSA EMS) estimates that there will be about 4,500 ambulance crashes this year. NHTSA EMS has also determined that 84% of EMS providers were not restrained in the patient compartment during transport. So why don't providers wear seat belts? A small portion of this is attitude, but we believe that a much greater reason is that the design of present-day ambulances does not allow providers to render care and remain seated and secure. **Program Development & Implementation:** This poster will review the present-day situation and utilize pictures of an actual (fatal) ambulance crash as well as crash-test video stills. We will show hazards/injury areas and efforts that can be made to reduce them now. It will conclude with an attempt to reduce these hazards by introducing a new ambulance design from the Massachusetts Institute of Technology EMS. We have removed most cabinets and replaced them with drawers reducing strike zones. We have eliminated "squad" and "CPR" benches and replaced them with three captain's chairs with 5 and 6-point harnesses. **Program Evaluation:** The design incorporates the following recommendations from the Ambulance Patient Compartment Human Factors Design Guidebook: "Forward- or rear-facing seats better protect the Emergency Medical Service Provider (EMSP) in the event of an accident or evasive maneuver than side-facing seat. Each working position needs to be equipped with its own restraint system that meets all other restraint guidelines to ensure that all ... are restrained while the ambulance is in motion."<sup>1</sup> **Discussion/Conclusion:** This new ambulance was built by Braun Ambulance in a cooperative effort and incorporates many design recommendations that have been recommended for years.

**References:** 1. Avery L, Jacobs A, Moore J, Boone C, Malone T. (Prepared for U.S. Department of Homeland Security Science and Technology Directorate First Responders Group.) Ambulance Patient Compartment Human Factors Design Guidebook. <https://www.dhs.gov/publication/ambulance-patient-guidebook>. Published January 13, 2015. Accessed December 31, 2017.

---

**Author Affiliations:** Emergency Medical Services, Massachusetts Institute of Technology, Cambridge, MA, USA

**Address for Correspondence:** Mark Forgues, MEd, NRP.

E-mail: [markforgues@verizon.net](mailto:markforgues@verizon.net)

**Conflicts of Interest/Funding Sources:** By the JCEMS Submission Declaration Form, all authors are required to disclose all potential conflicts of interest and funding sources. The authors declared that they have no conflicts of interest. The author declared that they received funding from Massachusetts Institute of Technology (MIT) Medical and MIT EMS.

**Ethical Compliance:** The author attest that the research associated with this abstract was conducted in accordance with the JCEMS Ethics Guidelines.

**Prior Publication:** Content included in this abstract and associated poster was previously published in: Forgues M. How We Built a Better Ambulance. *EMS World*. 2014;43(4):37-38.

**Submission History:** Received December 31, 2017; accepted for presentation and publication February 18, 2018.

**Poster Presentation:** This abstract was presented as a poster at the Academ-

ic Poster Session of the 25<sup>th</sup> Annual Conference of the National Collegiate Emergency Medical Services Foundation; February 24, 2018; Philadelphia, PA, USA.

**Published Online:** August 10, 2018

**Published in Print:** August 13, 2018 (Volume 1: Supplemental 1)

**Reviewer Information:** In accordance with JCEMS editorial policy, poster presentation abstracts undergo double-blind peer-review by at least two reviewers (JCEMS Editorial Board members and/or independent reviewers) prior to acceptance for presentation and publication. JCEMS thanks the anonymous reviewers who contributed to the review of this work.

**Copyright:** © 2018 Forgues This is an open access abstract distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The full license is available at: <https://creativecommons.org/licenses/by/4.0/>

**Electronic Link:** <https://doi.org/10.30542/JCEMS.2018.01.S1.12>





# CALL FOR POSTER ABSTRACTS

**26<sup>th</sup> Annual NCEMSF Conference (Pittsburgh, PA)  
February 22-24, 2019**

*The Journal of Collegiate Emergency Medical Services* (JCEMS) and the National Collegiate EMS Foundation (NCEMSF) are proud to host the **Academic Poster Session** at the 26<sup>th</sup> Annual Conference.

**Abstracts for poster presentations are encouraged from students and professionals on (1) original research or (2) the development and evaluation of novel initiatives and programs. Topics include:**

- Prehospital patient care
- Operations, communications, and equipment
- Training and education
- Administration and agency development
- Career and alumni resources
- Campus public health and safety

**Authors of accepted abstracts will present posters at a 1-hour academic poster session.**

**All accepted abstracts will be published in JCEMS.**

**Questions:** Email [JCEMS@CollegeEMS.com](mailto:JCEMS@CollegeEMS.com)

## Submission Guidelines

Deadline:  
**December 1, 2018**

Submit abstracts at:  
**[NCEMSF.org/conference/  
2019-conference](http://NCEMSF.org/conference/2019-conference)**

Please review the Poster Abstract  
Submission Guide at:  
**[CollegeEMS.com/academic-poster-  
session/](http://CollegeEMS.com/academic-poster-session/)**

## Review and Selection

Abstracts are reviewed and selected  
by the JCEMS Editorial Board  
and at least two blinded,  
independent reviewers with  
subject-matter expertise.

## Conference Details

Details available at:  
**[NCEMSF.org/conference/  
2019-conference](http://NCEMSF.org/conference/2019-conference)**



**National Collegiate Emergency Medical Services Foundation  
26<sup>th</sup> Annual Conference  
February 22-24, 2019  
Pittsburgh, PA**

**Leadership**

**Clinical Excellence**

**Original Research**

