

## Physicians and EMS Who Responded to Mass Shootings Develop Consensus Recommendations for Improving Care

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**A**mid recurring mass shootings in the US, health care responders have helped develop consensus recommendations for improving care during these incidents. The guidance, recently published in the *Journal of the American College of Surgeons*, is based on the experiences of emergency medical services (EMS) professionals, emergency medicine physicians, and surgeons who responded to 6 US mass shootings in which 15 or more people were injured or killed.

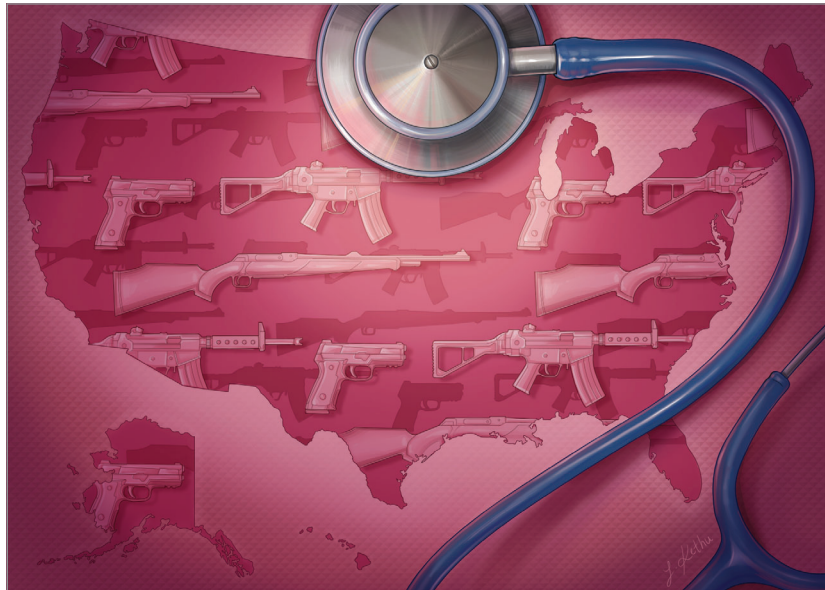
### Why It's Important

The number of mass shootings in the US in which at least 4 people were shot or killed increased from 417 incidents in 2019 to 691 incidents in 2021, according to the non-profit [Gun Violence Archive](#). Last year, 705 people died and 2833 others were injured in US mass shootings.

"Mass shootings are unique incidents that combine penetrating injuries with a large number of victims, widespread psychological trauma, and specific medical response considerations," the authors of the recommendations wrote. They noted that fatality rates can be high and that the often-substantial distance to the nearest trauma center can delay critical treatment.

In an interview with *JAMA*, Craig Goolsby, MD, MEd, MHCD, an emergency physician and the recommendations' senior author, said he and then colleagues at the Uniformed Services University's National Center for Disaster Medicine and Public Health wondered how to [improve the health care response](#) to these events. To try to answer this, they convened a group of medical professionals with firsthand knowledge.

"The article is an attempt to establish best practices based on real-life experience of EMS personnel, ER physicians, and trauma surgeons who were on duty and responded to mass shootings," explained coauthor Deborah Kuhls, MD, a trauma and critical care surgeon at the Kirk Kerkorian School of Medi-



cine and the University Medical Center of Southern Nevada. Kuhls was among the responders who treated people injured during the October 1, 2017, Las Vegas shooting in which a gunman killed 58 people and wounded 800 more, according to a [2018 Las Vegas Metropolitan Police](#) report.

### The Design

A committee of federal government clinicians from the Departments of Defense, Homeland Security, Transportation, and Health and Human Services invited a group of health care responders to complete an online survey and then join a 2-day virtual workshop in September 2021 where they shared their experiences with some of the largest US mass shootings in recent years. In addition to the 2017 Las Vegas concert shooting, responders were present from the 2016 Orlando, Florida, Pulse nightclub shooting; the 2017 Sutherland Springs, Texas, church shooting; the 2018 Parkland, Florida, school shooting; the 2019 El Paso, Texas, Walmart shooting; and the 2019 Dayton, Ohio, bar shooting.

Kuhls and 14 other participants, who were divided into 3 groups by specialty, developed consensus recommendations

after a series of presentations and discussions. Eight of the recommendations were substantially similar across all 3 groups and an additional 11 were similar between 2 of the groups.

In an interview, Nathan Charlton, MD, an emergency physician and professor at the University of Virginia in Charlottesville, who was not involved with the effort, said a strength of the work was that the participants shared their experiences as a group and then agreed on consensus recommendations, rather than simply publishing individual case reports.

### The Recommendations

The 8 recommendations all 3 groups of participants suggested were

- Regular interdisciplinary training for mass shooting incidents that includes hospitals, EMS, law enforcement and fire departments, and 911 dispatch
- Prior public education or real-time direction from mobile apps or alerts to transport patients to the appropriate hospital
- A staged triage process at the scene and at hospitals to prioritize patients for operating rooms



Visitors placed flowers at a memorial to the people killed and injured during the July 4, 2022, mass shooting in Highland Park, Illinois.

Nam Y. Huh/AP Images

- Effective communication between personnel at the scene and at hospitals
- A system to track patients from point of injury throughout their care, such as with a QR code
- Alternative methods to document and input patient details
- Rapidly established and well-communicated family reunification sites
- Mental health services for all responders tailored to their needs

Additional recommendations from the emergency medicine and surgery groups included trauma training for clinicians who don't care for trauma patients, [Stop the Bleed](#) education for communities, modern systems to reach and recall staff, a plan for hospitals to rapidly increase capacity, and staffing plans for all categories of hospital leaders and employees.

### Triage and Tourniquets

Most of the discussion at the conference focused on improving system-wide responses. One important takeaway: better triage and tracking of patients, including rapidly directing them to the correct hospital, may save lives after mass shootings, according to Goolsby, who is now professor and chair in the department of emergency medicine at Harbor-UCLA Medical Center.

"When it comes to a mass shooting, the threat to life from bleeding is going to be greater," Kuhls added in an interview, "so we need to be able to triage or sort patients who urgently need blood or an operation."

One of the new recommendations is to simplify triage based on gunshot location or

potential for death. Kuhls said this type of triage, as well as an all-hands-on-deck effort from hospital residents and staff and military personnel from Nellis Air Force Base, improved the health care response in the Las Vegas shooting.

To avoid overwhelming trauma centers, patients whose injuries are not life threatening should receive care at other hospitals. Real-time notifications and mobile phone maps, as well as 911 dispatchers, could help direct patients and responders to appropriate hospitals, according to the recommendations. Effective communication between those at the scene and at hospitals is another critical step in triage and response during mass shootings.

Goolsby said several conference participants noted that individuals injured in mass shootings arrived at their hospitals with potentially lifesaving tourniquets in place. He emphasized the importance of this type of first aid training, such as the [Stop the Bleed](#) initiative, for community preparedness.

### What Responders Need

All 3 expertise groups spoke passionately about the need for mental health services for responders, according to Goolsby. He said this could be relatively easy for hospitals to implement by creating mental health "after action" plans that designate counselors, psychiatrists, or support programs to be made available immediately following a mass shooting incident.

"At a time when burnout is at an all-time high for providers, it was good to see that one of the main recommendations was

providing emotional support," Charlton said. "Response to these incidents certainly takes an emotional toll."

University Medical Center of Southern Nevada, where Kuhls works, received 104 patients from the Las Vegas shooting. Speaking about the aftermath, she said: "It was really challenging. It was a combination of the sheer number of people, and just having so much pain and suffering, and realizing that it was intentional."

### Future Areas of Research

"In general, this is a really difficult topic to research, and I think that's true across the board with disaster medicine," Goolsby said. "We don't really have a way to conduct controlled trials like we do if we're testing a new medication." In the future, convening experts and gathering experience on mass shootings in a conference setting, including patient outcomes, will help refine recommendations and make them more effective, he said.

Kuhls added that although the recommendations can be applied for all people injured in mass shootings, "there will need to be some additional planning for particularly small children, even just in the equipment we use." Having smaller chest tubes and intubation equipment on hand might be necessary, she said.

### The Takeaway

The guidance gives clinicians and hospital and community leaders steps they can take to better prepare for and handle a mass shooting.

"This article provides recommendations that can be used in more rural areas that might not have a trauma center or [may not] be used to dealing with mass casualty incidents," Charlton wrote in an email.

"Many of us see these events on TV or read about them in the news in some capacity, and we feel helpless," Goolsby said. "These are some things that might increase our chances of saving lives when it happens." ■

**Conflict of Interest Disclosures:** Dr Goolsby reported receiving grants from the US Department of Homeland Security and Department of Defense and a provisional patent pending for a limb tourniquet. Dr Kuhls reported receiving grants for research related to traffic safety, disaster preparedness, and firearm injury prevention. No other disclosures were reported.

**Note:** Source references are available through embedded hyperlinks in the article text online.