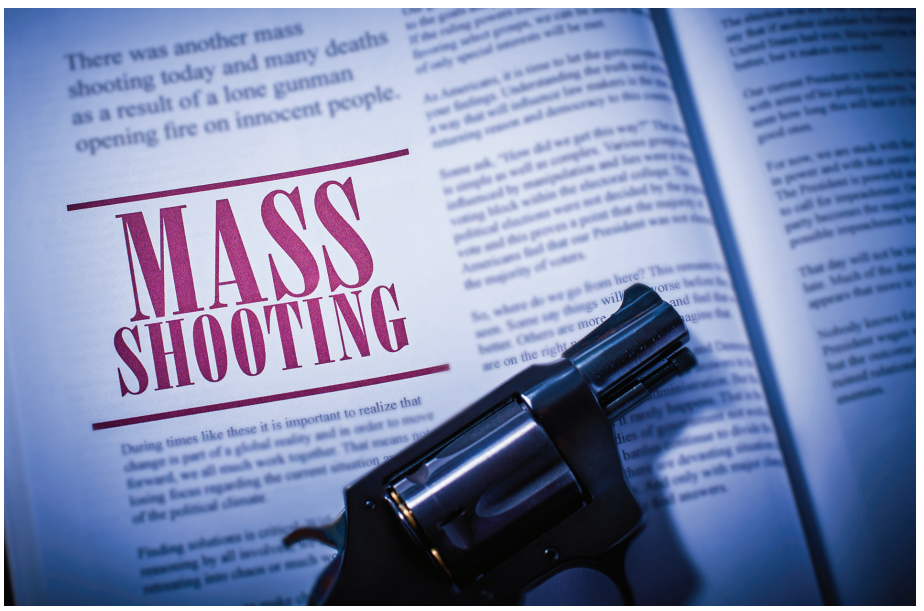
The Pulse

Preparing Public Health Responses to Mass Shooting Incidents

Amy Gallagher

Editor's Note: Gun violence, including mass shootings, is increasingly being referred to as a public health crisis. From 2015 onward, the number of mass shooting events and people injured in these events has increased annually, with a peak of 686 incidents in 2021 (asamonitor.pub/41qQhpE). At the time of publication, there have been almost 200 mass shootings so far in 2023 (asamonitor.pub/3UGMBxG).



Behind the scenes of mass shooting incidents (MSIs) in the United States stand many dedicated frontline trauma surgeons, anesthesiologists, emergency medicine physicians, nursing teams, and other health care professionals who are advocating for a public health education strategy to reduce firearm-related violence.

Brenda Gentz, MD, Chair of the Department of Anesthesiology at Valleywise Health/District Medical Group in Phoenix, and Stephanie Davidson, DO, FASA, of Sunrise Hospital/Sunrise Children's Hospital/U.S. Anesthesia Partners (USAP) in Las Vegas, recently participated in a first-of-its-kind collaboration on mass shooting incidents organized by the Uniformed Services University's National Center for Disaster Medicine and Public Health. At this conference, 15 medical professionals representing three groups – emergency medical services (EMS) clinicians, emergency medicine (EM) physicians, and surgeons – shared common practices in responding to large-scale MSIs resulting in 15 or more victims.

Participants explored public health care responses to six U.S. MSIs: Orlando, FL (2016), Las Vegas, NV (2017), Sutherland Springs, TX (2017), Parkland, FL (2018), El Paso, TX (2019), and Dayton, OH (2019), and developed eight consensus recommendations (see sidebar).

Building on 'Stop the Bleed' success

Trauma centers throughout the U.S. have become epicenters of community outreach for "Stop the Bleed" training led by the American College of Surgeons (ACS) Committee on Trauma. Significant progress has been made, training more than 2.6 million people worldwide to keep blood in the body through measures like using belts as tourniquets.

"I carry a tourniquet in my car, and in my purse, wherever I go," said Dr. Gentz. "Because of my unusual work hours, I have come across numerous trauma victims who have needed assistance."

Dr. Gentz also suggested downloading and laminating the Ryder Cognitive Aid Checklist for Trauma Anesthesia for a quick visual aid.

Anesthesiologists are trained in Advanced Trauma Life Support (ATLS), which provides education on wound packing, use of tourniquets, airway techniques, and use of whole blood. Dr. Gentz emphasizes the importance of establishing practices, processes, and protocols ahead of time. This training stresses the importance of critical thinking and being willing to deviate from the original plan. For anesthesiologists with intensive care training, this may mean working on the trauma response to MSIs.

Dr. Davidson recalled the 2017 Las Vegas shooting at an outdoor concert that left 61 people dead: "Sunrise Hospital/Sunrise Children's Hospital had over 200 patients during the first five hours. As an anesthesiologist, our daily training prepares us for the unplanned events – the unknown or known surgical complications, such as cardiac arrhythmia."

Staged and iterated triage

Participants at the Uniformed Services University's National Center for Disaster Medicine and Public Health conference emphasized that staging triage could save time and, more importantly, lives.

There were also significant concerns about bystanders who may transport patients to hospitals that are not trauma centers. This results in an uneven and inappropriate distribution of victims. New mapping technology or other programs could instruct the public on identifying local trauma centers, eliminating the need for injured patients to self-transport. Self-transporting was an issue during the Las Vegas concert, which had more than 20,000 attendees. Dr. Davidson said the first response from the crowd – understandably – was to run away. Victims were transported to three or four different hospitals, without knowing the right location of the trauma center.

Participants at the Uniformed Services University conference recommended that the first triage occur at the MSI locations, with serial triage for those who do not need immediate care (such as the minimally injured). This avoids the bottleneck created when the same patients are triaged a second time. From the first triage site, patients should be taken to the ED for re-triage by an ED physician. The third triage involves the surgeon who determines patients appropriate for the OR.

Although some questioned the effectiveness of widely used triage protocols, such as SALT (sort, assess, life-saving interventions, treatment/transport) or START (simple triage and rapid treatment), Dr. Gentz called SALT a good starting point. She noted, though, that health care professionals are not always surveying the entire body to look for the location of wounds (*Disaster Med Public Health Prep* 2008;2:245-6).

"Once the patient arrives in the hospital, ATLS protocol is activated and the entire body is surveyed to look for additional wounds," said Dr. Gentz. "For example, a gunshot wound to the back of the head can be missed if the patient has a lot of hair. It's especially important to remove all the clothing to assess the entire body for wounds."

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Staged and Iterated Triage Process

At a recent conference on mass shooting incidents organized by the Uniformed Services University's National Center for Disaster Medicine and Public Health, a 15-person multidisciplinary group recommended "staged and iteratied triage" for efficiently organizing the heavy flow of patients during an MSI. As a dynamic and recurrent process, the consensus group agreed the starting location of triage should be the MSI and then recur in serial process as noted in the following:

1. Upon arrival to the hospital (at or before the emergency department entrance, if possible).
2. Later in the emergency department by more experienced clinicians, if initial triage is performed by less-trained providers. A surgeon should determine OR priority and order.
3. Potentially triaging patients away from trauma centers to balance the health system's load of patients.

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Patient tracking: identifying victims

Identifying the anatomic location of the injury can not only determine the severity and potential lethality of the injury but can lead to more efficient patient tracking. All conference participants agreed that the standard protocol of patient documentation during an MSI is a widespread problem. More specifically, due to the slower than standard emergency response technological system, electronic health records were noted as significant impediments during MSIs.

Current systems may require multiple and different patient identifications across prehospital, hospital, and interhospital transfers, which further complicates patient tracking, while technology must keep pace with the increasing surge of patients during MSIs. The entire system can become overwhelmed, potentially impacting medical records, patient tracking, family reunification, dispensing of medication, communication between medical teams, and documentation.

"Medical records and documentation represent a problem during MSIs when computer systems are too slow, including the Pyrex machines that dispense drugs," Dr. Gentz noted. "The pharmacy and the pharmacists need to be available to dispense drugs faster."

When technology wasn't available, paper became the norm. Teams must secure paper tags, tools and templates, and even paper applications when there isn't time or the technology is too slow to download the forms. Low-tech alternatives, such as paper charts, were often utilized during the abnormal MSI environment. At Sunrise Hospital/Sunrise Children's Hospital, Dr. Davidson used a Sharpie as a tool to document patient tracking amidst a patient surge.

"To identify patients for family reunification, we used physical descriptions such as 'facial hair,' 'piercings,' and 'muscular with tattoos,' while also taking a picture of the tattoos," said Dr. Davidson. "Ultimately, this helped the families identify their loved ones."

Patient tracking is critical during an MSI, and every step of the triage process depends on locating the patient.

"The anatomical site of the wound affects triage, and the location of the triage affects patient tracking," said Dr. Gentz. "We need to ensure the scene is secured and the location of where the patient was sent."

Improving community communications and care

Participants said they often bypassed formal communication channels by using cell phones to communicate directly between physicians in the hospital and medics at the scene.

Dr. Davidson proactively initiated a phone tree that branched out to physicians after the MSI in Las Vegas. She and the other Sunrise Hospital/Sunrise Children's Hospital providers used a walkie talkie as well as mobile intrahospital cellular by texting back and forth. The group further recommended communication and transportation considerations, including:

1. Designating a mass gathering area, such as a convention center near the incident site, as a family assistance site
2. Establishing a help line with key phone numbers and a reunification center address
3. Widespread messaging through social and mass media.

Simultaneously activating all staff members, housekeeping, transportation, pharmacy, radiology, and blood banking personnel during triage is important as well.

"Hospitals and system phone tree activations and drills should be in place ahead of time, but you don't want everyone to come in right away," Dr. Gentz said.

The consensus conference concluded with multiple common recommendations to fulfill the preparedness gap for all medical personnel in health care facilities impacted by an MSI. With the increasing MSIs in the U.S., there is an opportunity to improve care and strengthen the functionality of the entire community's emergency response system. ■

Recommendations from the Uniformed Services University National Center for Disaster Medicine and Public Health Conference

The following statements identified across all three subgroups recommended:

1. Regular, multidomain training activities that mirror the actual events to ensure readiness of the entire community system.
2. Previous public education or immediate direction from web-based mapping programs about the appropriate hospitals to which victims of MSIs are brought for care.
3. A staged and iterative triage process at the scene and emergency department. Prioritization of operative care is important.
4. Effective communication between prehospital personnel at the scene and hospitals.

Point-of-Injury Patient Tracking System

1. A patient-tracking system that functions from point-of-injury through all subsequent health care.
2. Rehearsal with and rapid availability of alternative methods of patient care documentation and order entry (such as paper forms).
3. Rapid implementation of organized, well-communicated family reunification and assistance services.
4. Tailored after-action mental health services for responding professionals.

Statements Across Two Subgroups

1. Trauma and/or other response training for clinicians who do not routinely care for trauma patients.
2. Stop the Bleed education as an important part of community preparation.
3. A mass shooting triage protocol that uses injury pattern and anatomic considerations to prioritize patient care.
4. Surgeon participation in emergency department triage, particularly to identify appropriate patients for the operating room.
5. Regionwide, coordinated hospital communications and capacity awareness.
6. Immediate, redundant, and modern systems to reach and recall staff.
7. Hospitals to increase capacity rapidly, including moving patients internally, rapid emergency department and in-house discharges, and opening, flexing, or repurposing spaces.
8. Staffing plans for MSIs that include all categories of staff, from hospital leadership to support services, not just clinical staff.

Housekeeping

1. Establish military-civilian health care collaborations that may facilitate rapid incorporation of military clinical resources in an MSI response.
2. Improved education and current treatment protocols for hemorrhage control and blood transfusion.
3. Family reunification centers to be located near the incident site.