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Equipping Public Spaces to Facilitate Rapid Point-of-Injury Hemorrhage Control After Mass Casualty

In response to increasing violent attacks, the Stop the Bleed campaign recommends that everyone have access to both personal and public bleeding-control kits. There are currently no guidelines about how many bleeding victims public sites should be equipped to treat during a mass casualty incident.

We conducted a retrospective review of intentional mass casualty incidents, including shootings, stabbings, vehicle attacks, and bombings, to determine the typical number of people who might benefit from immediate hemorrhage control by a bystander before professional medical help arrives.

On the basis of our analysis, we recommend that planners at public venues consider equipping their sites with supplies to treat a minimum of 20 bleeding victims during an intentional mass casualty incident. (*Am J Public Health*. 2019;109:236–241. doi: 10.2105/AJPH.2018.304773)

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See also Agrawal, p. 189.

Violent attacks are increasing in frequency and severity, and the injuries sustained by victims can mirror those seen on battlefields.^{1,2} Tourniquet use on the battlefield has saved an estimated 1000 to 2000 lives in Iraq and Afghanistan.³ In addition, a battlefield medical training program for nonmedics that teaches soldiers point-of-injury hemorrhage-control skills has been shown to reduce mortality from approximately 16% to 10%.⁴ Military research has also shown tourniquet use to be generally safe—causing only infrequent minor morbidity.⁵

The Hartford Consensus, an expert group convened in response to the Sandy Hook Elementary School shooting, describes the public as “immediate responders” and essential to providing point-of-injury hemorrhage control.^{6,7} The importance of this recommendation becomes obvious when one considers that victims can bleed to death before the arrival of emergency medical services.⁸ A recent study demonstrated a 4.5-fold increase in mortality from hemorrhagic shock for patients who had tourniquets placed upon hospital arrival versus those who had tourniquets placed before arrival.⁹ The national Stop the Bleed (STB) campaign is built on military experience and Hartford Consensus recommendations (Figure A,

available as a supplement to the online version of this article at <http://www.ajph.org>). Research has shown that laypeople are capable of applying tourniquets, and STB seeks to equip the public to recognize and stop life-threatening bleeding using the practices developed by military battlefield experience.^{10–15}

The STB campaign has 5 objectives, 2 of which are for the general public to have access to both personal and public bleeding-control kits. STB recommends the following contents for personal bleeding-control kits: an effective tourniquet, compressive dressing, rolled gauze, trauma shears, nitrile gloves, and a bag to hold the contents.¹² These kits typically retail for approximately \$50 to \$75. However, no formal

guidelines exist regarding the quantities of supplies that should be stocked in public places.

We provide the first, to our knowledge, published recommendations to public health professionals and emergency planners about the number of bleeding casualties to expect during an intentional mass casualty event. Planners can use this typical, or mean, number of anticipated bleeding victims when equipping their venues.

REVIEW

We reviewed databases, gray literature, and scholarly publications to generate our estimate of bleeding victims. The Global Terrorism Database lists information about 13 types of

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weapons used in terrorist attacks.¹⁶ By far, the 2 most common weapon types worldwide are explosives, bombs, or dynamite (88 123 entries) and firearms (59 932 entries).¹⁶ We elected to review bombs and firearms for our analysis, because they are the most common globally and are the most common in the United States. We also included knife attacks and intentional vehicle attacks because of their increased likelihood of causing external and extremity bleeding that might be amenable to bystander intervention. In addition, intentional vehicle attacks have seen a recent marked increase.¹⁶ We did not review the other categories of weapons used nor did we review natural disasters.

In addition to the databases, we reviewed 2 US government reports and searched PubMed for literature about mass casualty attacks. We performed this search as a convenience sample rather than as a systematic review. During the review, we captured information, when available, about number of fatalities, number of people injured, location, and type of violence. This information allowed us to determine a typical profile for mass casualty attacks. We used this information to estimate the number of people that might benefit from prompt bleeding control in a typical attack. In most cases, specific wounding patterns were neither publicly reported nor available for analysis. All of our reviews were of information available through November 14, 2017.

We reviewed the following gun violence databases: (1) the Gun Violence Archive, a not-for-profit database containing 1306 entries on US mass shootings; (2) the *Mother Jones* database, a news open-source database of US shootings containing 315 entries; and (3) the Federal

Bureau of Investigation (FBI) database, with 160 active shooter incidents (Table 1; Figure 1).^{1,18,19} Because 31% of the world's mass shootings have occurred in the United States, we chose US-focused databases.²³ We then calculated a mean number of people killed and injured per event from the Gun Violence Archive and *Mother Jones* databases (1306 and 315 incidents, respectively), as they contained more robust entry criteria than did the FBI database. The average active shooter event involves 5 to 11 victims per event, and 77% to 97% of events involve fewer than 10 people.^{18,19} The fatality rate for active shooter events ranges from 21% to 51%.^{18,19} It is rare for an active shooter event to involve more than 50 people.^{1,18,19}

To characterize intentional vehicle attacks (IVAs) we reviewed (1) a Transportation Security Administration (TSA) document on vehicle ramming attacks, (2) the Counter Extremism Project database on vehicles as weapons of terror, and (3) the Global Terrorism Database, an open-source database that includes information on terrorist events around the world (Table 1).^{16,17,21} In our review of the Counter Extremism Project database and the Global Terrorism Database, we found that they included IVAs in which no one was killed or injured by the vehicle ramming but some individuals were subsequently killed by another mechanism.^{16,17} For this reason, we used the TSA database as the source for our calculations. The TSA report documented 16 incidences of IVAs that occurred in North America, Europe, and Israel, resulting in an overall total of 130 fatalities and 692 injured.²¹ This database reported an average of approximately 8 deaths (range:

0–87) and 43 injured (range: 0–434) per IVA.²¹ This yields an average of 51 people killed or injured per IVA. We did not find readily available information suggesting how many injuries from IVAs would be amenable to external hemorrhage control. It is likely that many of the injuries would be internal hemorrhage, but it is also possible that wounds such as amputations could benefit from rapid bystander hemorrhage control.

Although there have been isolated machete attacks, we did not find evidence for mass casualty stabbing data in the US population. The Global Terrorism Database does not list “stabblings” as a weapon category; therefore, we used the scientific literature. A recent Israeli study reviewed 161 terror-related stabbing victims and found an average of 1.5 victims per attack.²⁰ Israeli studies suggest that the mortality from stab wounds ranges from 5% to 25%, depending on such factors as whether they are terror related or interpersonal and when they occurred (the period of knife violence from 1987 to 1994 had higher mortality than did the period from 2013 to 2016).^{20,24,25} Terror-related stabblings had a greater number of injuries and higher injury severity scores than did interpersonal stabblings²⁴; 58% of stabbing injuries involved the extremities.²⁴

We used a meta-analysis by Edwards et al. as our primary source to characterize blast attacks.²² Considering 58 095 attacks, the average number killed and injured per incident is 1.11 and 3.45 (nonsuicide) and 10.16 and 24.16 (suicide), respectively.²² Over a 40-year period, suicide bombings resulted in an average of 30% of victims killed, whereas nonsuicide bombing averaged 20% of victims killed.²² The combined killed or injured per event is

approximately 5 to 34 people.²² Suicide attacks, which represent approximately 5% of all attacks, cause 8.9 times more fatalities and 7 times more injuries.²² Although the numbers are variable in the literature, there is a rough pattern of approximately 60% of the total victims in terrorist attacks requiring only outpatient care, whereas up to 30% of victims are killed and 10% to 20% are admitted to a hospital.^{26–30}

We also analyzed the locations where mass casualty events occur. The most complete information is for gun violence, and the most common locations for mass shooting events are homes, neighborhoods, and public businesses. Public entertainment venues (e.g., theaters, concert halls, night clubs) had the largest numbers of total victims. The Global Terrorism Database provides location types for blasts (Figure 2).¹⁶ More than 70% of blast attacks occur in confined or semiconfined spaces.²² The majority of blasts occur in the Middle East (26.9%). Western Europe and North America are the sites of 13.2% and 2.2% of terrorist blast attacks respectively.²²

ANALYSIS

On the basis of this analysis, the typical mean number of people killed or injured in mass casualty events is 5 to 11 for active shooter situations, 51 for IVAs, 5 to 34 for blasts, and less than 2 for stabblings (Table 2). Unfortunately, the exact injuries are not well reported.

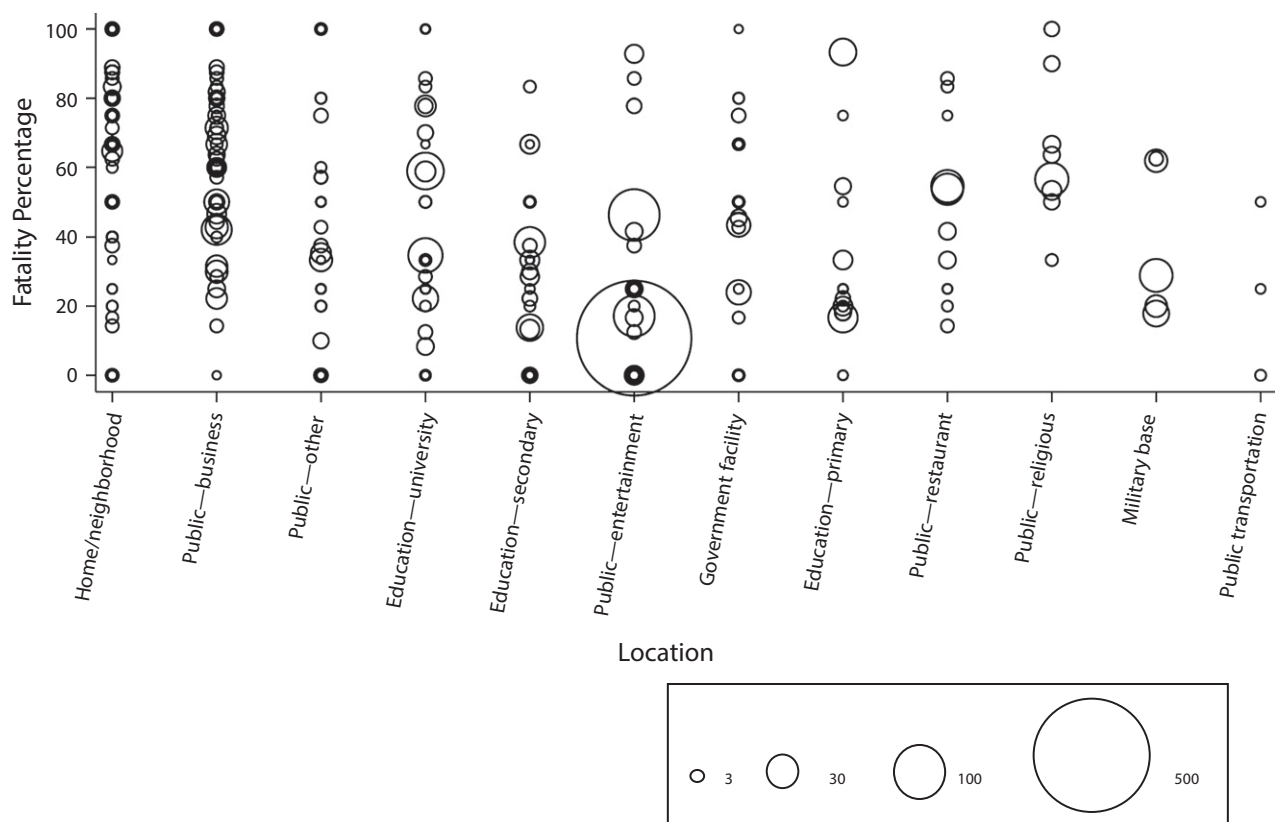
It is the authors' opinion that planners should equip public sites with bleeding-control supplies to treat a minimum of approximately 20 people. We base this recommendation on our analysis of the typical number and severity of victims during intentional mass casualty events.

TABLE 1—Summary of Databases and Gray Literature of Intentional Mass Casualty Incidents: United States, Through November 14, 2017

| Source | Source Type | Dates | Population | Variables | Limitations | Web Site | Use in This Article |
|------------------------------------------------------|-------------------------------|--------------|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Blair and Schweit ¹ | Report | 2000–2013 | 160 active shooter incidents; 486 fatalities, 557 injury victims | US active shooter incidents as reported by law enforcement agencies | Incident had to fit definition of active shooter | https://www.fbi.gov/file-repository/active-shooter-study-2000-2013-1.pdf/view | Considered for use in calculating shooting mean and median numbers; excluded because of limitations in data reported |
| Counter Extremism Project ¹⁷ | Database | 2006–present | > 1000 victims of vehicle attacks | Global vehicle attacks on pedestrians | Incident had to fit terrorism definition | https://www.counterextremism.com/vehicles-as-weapons-of-terror | Considered for use in calculating IVA mean and median numbers; excluded attributable to/because of limitations in data reported |
| Global Terrorism Database ¹⁶ | Database | 1970–2016 | > 170 000 terrorist events | Terrorist events, including biological, chemical, radiological, nuclear, firearms, explosives, fake weapons, incendiary, melee, vehicle, sabotage weapons, other, unknown | Unclassified events, variable source material, definition of terrorism | https://www.start.umd.edu/gtd | To determine the most common types of weapons used in mass casualty attacks; considered for use in calculating mean and median numbers for various attack types and excluded for limitations in reported data. Also used to create Figure 2 |
| Gun Violence Archive ¹⁸ | Database | 2014–present | > 200 000 gun-related incidents | US gun-related incidents | Limited to 2014–present | http://www.gunviolencearchive.org | To calculate mean and median shooting casualties |
| Follman et al. ¹⁹ | Database | 1982–present | > 90 mass shootings in the US (> 3 victims killed in the incident) | US mass shootings since 1982 | Mass shootings only, excluded robbery and gang violence | https://www.motherjones.com/politics/2012/12/mass-shootings-mother-jones-full-data | To calculate mean and median shooting casualties. Used to create Figure 1 |
| Merin et al. ²⁰ | Peer-reviewed journal article | 2015–2016 | 161 stabbing victims | Victims of stabbing terror attacks in Israel | Limited sample size and time window | PubMed | To report mean and median stabbing casualties |
| Transportation Security Administration ²¹ | Report | 2014–2017 | 17 vehicle ramming attacks, 173 fatalities, 667 injury victims | Global vehicle attacks on pedestrians, building, or vehicles | Limited years, incident had to fit definition of vehicle attacks | https://info.publicintelligence.net/TSA-VehicleRamming.pdf | To report mean and median IVA casualties |
| Edward et al. ²² | Peer-reviewed meta-analysis | 1970–2014 | 58 095 global terrorist explosions | Terrorist explosions | Quality of data inputs in underlying studies | PubMed | To report mean blast casualties |

Note. IVA = intentional vehicle attacks.

We made several conclusions and assumptions from our data to reach this recommendation. First, in an effort not to underestimate potential victims, we used numbers at the upper end of the typical range of victims. We recognize that many victims will not have external bleeding amenable to immediate point-of-injury control. Next, we determined that the largest number of killed or injured victims in a typical attack is the 51 victims expected during an IVA. Next, we found that approximately



Note. Bubble size indicates number of victims (range = 3–548).

FIGURE 1—Fatality Rate of 312 Mass Shooter Incidents by Location: United States, Through November 14, 2017

40% of people in terrorist blast attacks are killed or require hospitalization and that 21% to 51% of active shooter victims are killed. Blasts and active shooter attacks had the highest fatality rates of the 4 attack types we analyzed, and these fatality rates were similar. We assumed that blasts are more likely than are shootings to generate the types of injuries amenable to bystander treatment.^{31–33} Therefore, we used 40% as the percentage of victims who could potentially benefit from hemorrhage control. Finally, we multiplied the largest typical number of victims ($n = 51$) by the expected percentage of victims with possible severe bleeding (40%) to create our estimate of 20 people who might benefit from immediate hemorrhage control.

The circumstances of a particular attack or location may change this recommendation. For example, if a public site never has more than 50 people present at once, then the supplies needed might decrease. Planners at larger venues would need to distribute supplies throughout the site and likely prepare to treat 20 victims in multiple areas of the site. We noted during our analysis that the population present at an event may not affect the total number of victims. As examples, 22 people were killed in the 2017 attack at a concert arena in Manchester, United Kingdom, and 3 people were killed and 75 required hospitalization in the Boston Marathon Bombing. This is despite crowds of thousands of people at both events.^{34,35} By contrast, 49 people were killed at

the Orlando Pulse shootings, which is a much smaller venue than are either of the 2 bombings.³⁶ Therefore, we decided that reporting a total number of victims in typical mass casualty events is the best way to aid planners in the absence of more definitive information.

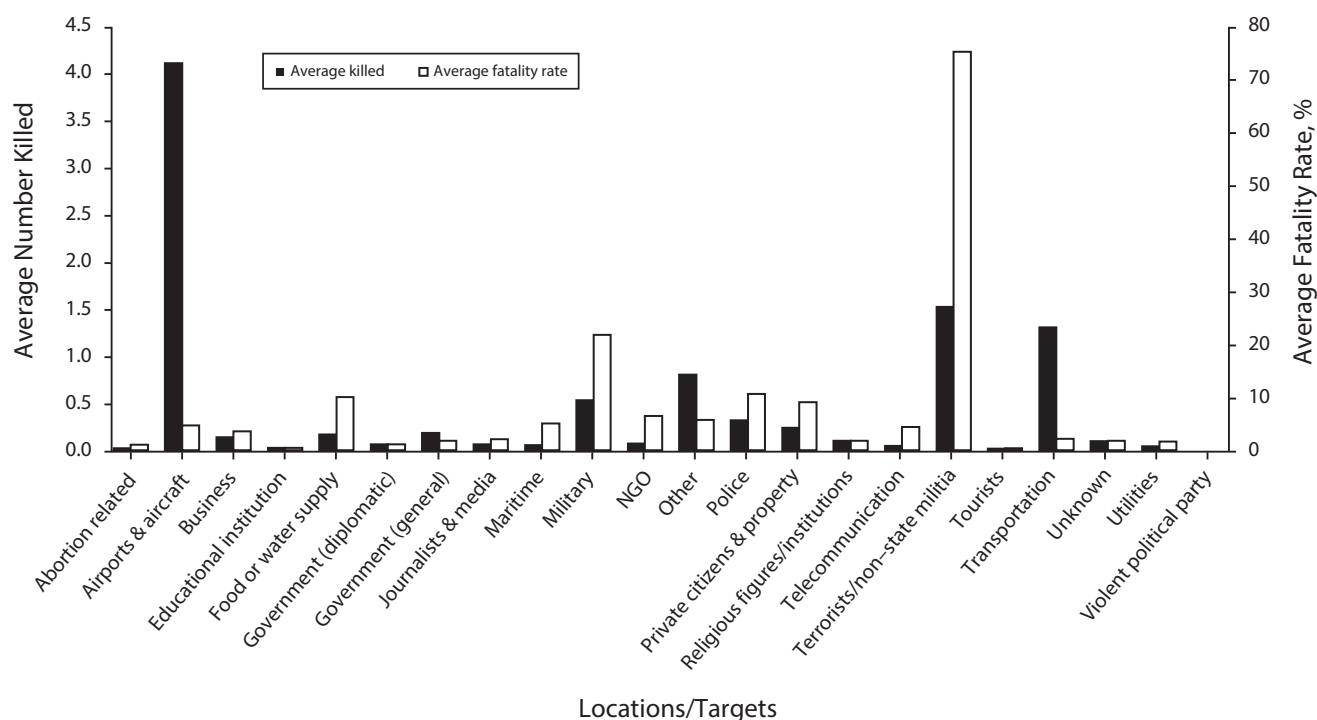
We recommend that larger venues consider worst-case scenarios, or at least how many injured people they could expect in the event of a large typical attack. For example, although most active shooter incidents involve 10 or fewer people, there have been recent attacks, including the Las Vegas shootings, that have involved more than 50 people.

Battlefield experience has shown the value of rapid point-of-injury hemorrhage control, and the STB campaign has

translated these lessons to the US public. Experts recommend placing bleeding-control kits in public locations.^{6,7} For civilian and polytrauma victims, extremity hemorrhage control with a tourniquet may offer a survivability benefit.^{9,37} The combination of an increase in violent attacks, demonstrated benefit of rapid tourniquet application, and relatively low cost of hemorrhage-control equipment suggests that planners should consider hemorrhage control when preparing for a potential mass casualty attack.

LIMITATIONS

There are several limitations to this analysis. Mass casualty attacks



Note. NGO = nongovernmental organization.

FIGURE 2—Bombing Fatalities and Fatality Rate by Location in Developed Countries: United States, Through November 14, 2017

are by nature unpredictable and often indiscriminate. Suicide bombers and shooters are able to change timing and targets on an impulse. The trends we have observed may not predict future attacks, and this initial analysis should be interpreted with the understanding that stocking bleeding-control supplies for 20 victims may not be adequate for a future event. In addition, the presence of bleeding-control supplies alone may not be lifesaving, as laypeople will need to know how to use them. Although it is beyond

the scope of this essay, there are a number of efforts under way to educate the public or provide just-in-time instruction.^{7,11,13–15}

There are many variables that could make the outcomes of a mass casualty event at any particular site dramatically different from a typical event. Blasts have the most variability of all intentional mass casualty events because of the wide variety of circumstances that affect their lethality, such as location in a confined versus open space and the type of explosive used.³⁸

The lack of data about injuries during mass casualty attacks is a significant limitation. The creation of a system to report, characterize, and analyze injuries during mass casualty events could greatly improve deliberation regarding the most cost-effective, efficient ways to prepare for response to future events. Although all these factors limit the precision of our analysis for any public site, the information we found about typical situations could still be useful for planners attempting to equip their facilities to reduce

morbidity and mortality during a mass casualty event.

CONCLUSIONS

Planners at public venues should consider equipping their sites with supplies to treat a minimum of 20 bleeding victims during a mass casualty attack. Although this is a preliminary recommendation on the basis of limited data, the demonstrated benefit of rapid hemorrhage control and the relatively low cost of supplies make this a reasonable preparedness consideration. Larger public sites should consider additional supplies as well as how to distribute the supplies effectively. **AJPH**

CONTRIBUTORS

C. Goolsby conceptualized the article and authored the first draft. C. Goolsby, K. Strauss-Riggs, M. Rozenfeld, E. Goralnick, K. Peleg, M. J. Levy, T. Davis, and

TABLE 2—Summary of Victims by Mass Casualty Type: United States, Through November 14, 2017

| Mass Casualty Type | Mean Total Victims Killed or Injured | Mean Killed (%) | Median Total Victims Killed or Injured |
|----------------------------|--------------------------------------|-----------------|----------------------------------------|
| Shooting | 5–11 | 1–6 (21–51) | 4–6 |
| Intentional vehicle attack | 51 | 8 (16) | 13 |
| Stabbing | <2 | <2 (<10) | <2 |
| Blasts | 5–34 | 1–10 (20–30) | . . . ^a |

^aCannot determine from data used.

N. Hurst edited and revised all drafts. C. Goolsby and N. Hurst analyzed data and helped create figures. K. Strauss-Riggs, E. Goralnick, M. J. Levy, and N. Hurst helped conceptualize the article. M. Rozenfeld, K. Peleg, and T. Davis provided references and subject matter expertise. N. Charlton performed critical revision of multiple drafts. N. Hurst collected data.

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CONFLICTS OF INTEREST

C. Goolsby has a patent pending for "Tourniquet & Methods of Use."

HUMAN PARTICIPANT PROTECTION

No protocol approval was necessary because no human participants were involved in this study.

REFERENCES

- Blair JP, Schweit KW. *A Study of Active Shooter Incidents, 2000–2013*. Washington, DC: Texas State University and Federal Bureau of Investigation, US Department of Justice; 2014.
- Sanger-Katz M. Is terrorism getting worse? In the West, yes. In the world, no. *New York Times*. August 16, 2016:A3.
- Blackbourne LH, Baer DG, Eastridge BJ, et al. Military medical revolution: prehospital combat casualty care. *J Trauma Acute Care Surg*. 2012;73(6, suppl 5):S372–S377.
- Kotwal RS, Montgomery HR, Kotwal BM, et al. Eliminating preventable death on the battlefield. *Arch Surg*. 2011; 146(12):1350–1358.
- Kragh JF Jr, O'Neill ML, Walters TJ, et al. Minor morbidity with emergency tourniquet use to stop bleeding in severe limb trauma: research, history, and reconciling advocates and abolitionists. *Mil Med*. 2011;176(7):817–823.
- Jacobs LM, Wade D, McSwain NE, et al. Hartford Consensus: a call to action for THREAT, a medical disaster preparedness concept. *J Am Coll Surg*. 2014; 218(3):467–475.
- Levy MJ, Jacobs LM. A call to action to develop programs for bystanders to control severe bleeding. *JAMA Surg*. 2016; 151(12):1103–1104.
- Blackwell TH, Kaufman JS. Response time effectiveness: comparison of response time and survival in an urban emergency medical services system. *Acad Emerg Med*. 2002;9(4):288–295.
- Scerbo MH, Holcomb JB, Taub E, et al. The trauma center is too late: major limb trauma without a prehospital tourniquet has increased death from hemorrhagic shock. *J Trauma Acute Care Surg*. 2017; 83(6):1165–1172.
- Rasmussen TE, Baer DG, Goolsby C. The giving back: battlefield lesson to national preparedness. *J Trauma Acute Care Surg*. 2016;80(1):166–167.
- Goolsby C, Jacobs L, Hunt RC, et al. Stop the Bleed Education Consortium: education program content and delivery recommendations. *J Trauma Acute Care Surg*. 2018;84(1):205–210.
- Journal of Emergency Medical Services Staff. What the White House's Stop the Bleed campaign means for EMS. 2016. Available at: <http://www.jems.com/articles/print/volume-41/issue-40/special-focus-gearing-up-for-active-shooter-tactical-high-threat-incidents/what-the-white-house-s-stop-the-bleed-campaign-means-for-ems.html>. Accessed December 4, 2018.
- Goolsby C, Branting A, Chen E, Mack E, Olsen C. Just-in-time to save lives: a pilot study of layperson tourniquet application. *Acad Emerg Med*. 2015;22(9): 1113–1117.
- Goolsby C, Chen E, Branting A, et al. Analysis of layperson tourniquet application using a novel color-coded device. *Disaster Med Public Health Prep*. 2016;10(2): 274–280.
- Goolsby CA, Strauss-Riggs K, Klimczak V, et al. Brief, Web-based education improves lay rescuer application of a tourniquet to control life-threatening bleeding. *AEM Educ Train*. 2018;2(2): 154–161.
- Global Terrorism Database. Global terrorism database search results. 2017. Available at: https://www.start.umd.edu/gtd/search/Results.aspx?start_yearonly=&end_yearonly=&start_year=&start_month=&start_day=&end_year=&end_month=&end_day=&asmSelect0=&asmSelect1=&weapon=10&dt2=all&success=yes&casualties_type=b&casualties_max=. Accessed January 13, 2018.
- Counter Extremism Project. Vehicles as weapons of terror. 2018. Available at: <https://www.counterextremism.com/vehicles-as-weapons-of-terror>. Accessed January 13, 2018.
- Gun Violence Archive. Mass shootings—all years. 2018. Available at: <http://www.gunviolencearchive.org/mass-shooting>. Accessed October 10, 2017.
- Follman M, Aronsen G, Pan D. US mass shootings, 1982–2017: data from *Mother Jones'* investigation. 2017. Available at: <http://www.motherjones.com/politics/2012/12/mass-shootings-mother-jones-full-data>. Accessed October 6, 2017.
- Merin O, Sonkin R, Yitzhak A, et al. Terrorist stabbings—distinctive characteristics and how to prepare for them. *J Emerg Med*. 2017;53(4):451–457.
- Transportation Security Administration. (U) *Vehicle Ramming Attacks: Threat Landscape, Indicators, and Countermeasures*. Pentagon City, VA; 2017.
- Edward DS, McMenemy L, Stapley SA, Patel HD, Clasper JC. 40 years of terrorist bombings—a meta-analysis of the casualty and injury profile. *Injury*. 2016; 47(3):646–652.
- Meindl JN, Ivy JW. Mass shootings: the role of the media in promoting generalized imitation. *Am J Public Health*. 2017;107(3):368–370.
- Rozenfeld M, Givon A, Peleg K. Violence-related versus terror-related stabbings: significant differences in injury characteristics. *Ann Surg*. 2018;267(5): 965–970.
- Leiba A, Ben Ishay O, Ossadon H, Frenkel H. Knife stabbing attacks in the West Bank: implementing a modern response chain to an ancient foe. *Emerg Med J*. 2016;33(4):301–302.
- Mallonee S, Shariat S, Stennies G, Waxweiler R, Hogan D, Jordan F. Physical injuries and fatalities resulting from the Oklahoma City bombing. *JAMA*. 1996;276(5):382–387.
- Arnold JL, Halpern P, Tsai MC, Smithline H. Mass casualty terrorist bombings: a comparison of outcomes by bombing type. *Ann Emerg Med*. 2004; 43(2):263–273.
- Frykberg ER, Tepas JJ 3rd. Terrorist bombings. Lessons learned from Belfast to Beirut. *Ann Surg*. 1988;208(5):569–576.
- Hirshberg A, Holcomb JB, Mattox KL. Hospital trauma care in multiple-casualty incidents: a critical view. *Ann Emerg Med*. 2001;37(6):647–652.
- Hirshberg A, Scott BG, Granchi T, Wall MJ Jr, Mattox KL, Stein M. How does casualty load affect trauma care in urban bombing incidents? A quantitative analysis. *J Trauma*. 2005;58(4):686–693; discussion 694–695.
- 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.
- Smith ER, Shapiro G, Sarani B. The profile of wounding in civilian public mass shooting fatalities. *J Trauma Acute Care Surg*. 2016;81(1):86–92.
- Peleg K, Aharonson-Daniel L, Stein M, et al. Gunshot and explosion injuries: characteristics, outcomes, and implications for care of terror-related injuries in Israel. *Ann Surg*. 2004;239(3):311–318.
- Horton H, Shute J. Who are the victims of the Manchester terror attack? 2017. Available at: <https://www.telegraph.co.uk/news/2017/05/23/victims-manchester-terror-attack>. Accessed December 4, 2018.
- Gates JD, Arabian S, Biddinger P, et al. The initial response to the Boston Marathon bombing: lessons learned to prepare for the next disaster. *Ann Surg*. 2014; 260(6):960–966.
- Mettler K. A year ago, 49 people died at Pulse nightclub. Today, Orlando remembers. *Washington Post*. 2017. Available at: https://www.washingtonpost.com/news/morning-mix/wp/2017/06/12/a-year-ago-49-people-died-at-pulse-nightclub-today-orlando-remembers/?utm_term=.8d6a27fbb780. Accessed January 11, 2018.
- Kragh JF Jr, Nam JJ, Berry KA, et al. Transfusion for shock in US military war casualties with and without tourniquet use. *Ann Emerg Med*. 2015;65(3):290–296.
- Rozenfeld M, Givon A, Shenhar G, Renert L, Peleg K. A new paradigm of injuries from terrorist explosions as a function of explosion setting type. *Ann Surg*. 2016;263(6):1228–1234.