

Letters

RESEARCH LETTER

Lethality of Civilian Active Shooter Incidents With and Without Semiautomatic Rifles in the United States

Semiautomatic rifles have been used in some of the largest active shooter incidents in US history.¹ The weapons were banned in 1994 under the federal assault weapons ban but were reintroduced to the public marketplace in 2004.² Currently, there are no comprehensive assessments of injuries from different types of firearms. We compared the number of persons wounded, killed, and either wounded or killed during active shooter incidents with and without semiautomatic rifles.

Methods | An active shooter incident is defined by the Federal Bureau of Investigation (FBI) as a situation in which an individual is actively engaged in killing or attempting to kill people in a confined or populated area.³ The FBI has tracked all active shooter incidents since 2000 and has the most comprehensive data set available.³ We retrieved active shooter incident characteristics from the publicly accessible FBI database through 2017 (accessed May 18, 2018).³ For each incident, we extracted shooter age, name, year, location (city and state), number of people wounded, killed, and wounded or killed, place of shooting (commerce, education, government, open space, residences, health care, and house of worship), and type of firearms present (rifle, shotgun, handgun).

The FBI reports do not distinguish whether a rifle was semiautomatic; therefore, for each incident in which the FBI reported that a rifle was present, a media content analysis was performed to identify semiautomatic rifle presence. An a priori search hierarchy was established in which the primary data sources were court and police documents or statements (44.9%; 35 of 78), and secondary data sources were news articles. At least 3 news articles from different media outlets were required to triangulate data. No discrepancies among sources were found. All incidents with the presence of a semiautomatic rifle were classified as semiautomatic rifle incidents regardless of other firearm presence. The Las Vegas, Nevada, shooting, which represented a statistical outlier, and the San Bernardino, California, shooting, which had more than 1 shooter present, were excluded. Negative binomial regression was used to estimate the association between presence of a semiautomatic rifle and the total numbers nonfatally wounded, killed, and either wounded or killed, and the percentage of persons who died if wounded at the incident, controlling for the place and year of shooting and the presence of other firearms. Significance was set at $P < .05$ (2-sided). Stata version 15.1 was used for analysis.

Results | Of the 248 active shooter incidents, 76 involved a rifle, and we identified the type in all instances. A semiautomatic rifle

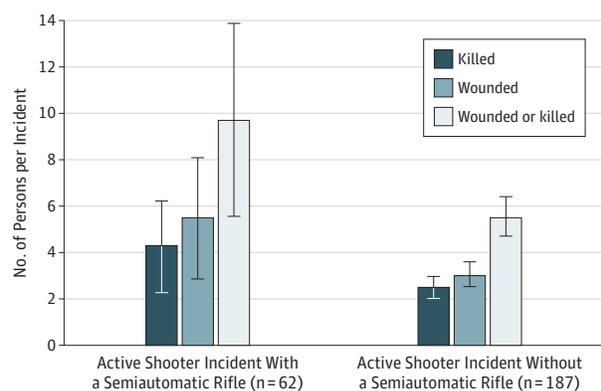
was involved in 24.6% ($n = 61$) of incidents, and 75.4% ($n = 187$) involved handguns ($n = 154$), shotguns ($n = 38$), and non-semiautomatic rifles ($n = 15$). Multiple firearm types were involved in 60.7% ($n = 37$ of 61) of semiautomatic rifle incidents and 25.1% ($n = 47$) of non-semiautomatic rifle incidents.

There were 898 persons wounded and 718 killed. Active shooter incidents with vs without the presence of a semiautomatic rifle were associated with a higher incidence of persons wounded (unadjusted mean, 5.48 vs 3.02; incidence rate ratio [IRR], 1.81 [95% CI, 1.30-2.53]), killed (mean, 4.25 vs 2.49; IRR, 1.97 [95% CI, 1.38-2.80]), and wounded or killed (mean, 9.72 vs 5.47; IRR, 1.91 [95% CI, 1.46-2.50]) (Figure). The percentage of persons who died if wounded in incidents with a semiautomatic rifle (43.7% [$n = 259$ of 593]) was similar to the percentage who died in incidents without a semiautomatic rifle (44.9% [$n = 459$ of 1023]) (IRR, 0.99 [95% CI, 0.60-1.61]).

Discussion | Although 44% of persons wounded in active shooter incidents died of their injuries, irrespective of the type of firearm used, more people were wounded and killed in incidents in which semiautomatic rifles were used compared with incidents involving other firearms. Semiautomatic rifles are designed for easy use, can accept large magazines, and fire high-velocity bullets, enabling active shooters to wound and kill more people per incident.⁴

Limitations of this study include the lack of data on specific injuries, demographics, and other details of the incidents. Incidents involving semiautomatic rifles may differ from other incidents in ways that may partially explain the association but could not be controlled (ie, intentionality of the shooter). This lack of data highlights the need for a national centralized database to inform the debate on an assault weapons ban.

Figure. Unadjusted Mean Number of Victims Injured and Killed per Active Shooter Incident With and Without Semiautomatic Rifles



The error bars indicate 95% CIs.

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COMMENT & RESPONSE

Antiplatelet Therapy After Coronary Artery Bypass Grafting

To the Editor Dr Zhao and colleagues concluded that among patients undergoing elective coronary artery bypass graft (CABG) surgery with saphenous vein grafting, ticagrelor plus aspirin significantly increased graft patency after 1 year vs aspirin alone.¹ However, based on current best evidence and standards of care, the aspirin dosage (100 mg/d) used in this study for the aspirin-alone group may have been suboptimal.²

The largest placebo-controlled trial to date in this field was the Veterans Administration Cooperative Study.³ The aspirin dosage in this trial was 325 mg/d. The 1-year graft occlusion rate in the aspirin-alone group was lower than that noted by Zhao and colleagues (15.8% vs 23.5%). Similarly, a previous meta-analysis of 5 randomized clinical trials suggested that

a medium dosage of aspirin (300-325 mg/d) more successfully reduced graft occlusion within the first year of CABG than low-dosage regimens (50-100 mg/d).⁴ In addition, pharmacokinetic studies have shown that an aspirin dose of 100 mg is sufficient to suppress thromboxane synthesis in healthy controls but ineffective at suppressing platelet thromboxane formation in the majority of post-CABG patients.^{2,5} This observation reflects the phenomenon of platelet resistance during the post-CABG period, which is believed to be due to the effects of cardiopulmonary bypass and surgical trauma.^{2,5} Therefore, current scientific guidelines prefer a higher aspirin dosage (>100 mg/d) early after CABG to improve graft patency.²

In the study by Zhao and colleagues, the dosage of aspirin administered in the aspirin alone group may have been suboptimal, which could have confounded their findings by favoring the ticagrelor plus aspirin group. Furthermore, any new therapy must be compared with the currently best available therapy, which was not done in this study.² Therefore, the generalizability of these findings is of potential concern.

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To the Editor The Different Antiplatelet Therapy Strategy After Coronary Artery Bypass Graft Surgery (DACAB) trial provides needed insight into the utility of dual antiplatelet therapy (DAPT) with ticagrelor as the second agent in patients undergoing CABG.¹ The current American Heart Association and American College of Cardiology (AHA/ACC) guideline is based on limited evidence and restricted to resumption of DAPT in patients who present with acute coronary syndrome. Consequently, intersurgeon variability in DAPT use is high with a relatively low rate of DAPT use.²

Several trial characteristics deserve attention in evaluating the clinical applicability of the findings.