

REVIEW

Open Access



# Clinical strategies for reducing firearm suicide

Rocco Pallin<sup>1,2\*</sup>  and Amy Barnhorst<sup>1,2</sup>

## Abstract

Suicide is complex, with psychiatric, cultural, and socioeconomic roots. Though mental illnesses like depression contribute to risk for suicide, access to lethal means such as firearms is considered a key risk factor for suicide, and half of suicides in the USA are by firearm. When a person at risk of suicide has access to firearms, clinicians have a range of options for intervention. Depending on the patient, the situation, and the access to firearms, counseling on storage practices, temporary transfer of firearms, or further intervention may be appropriate. In the USA, ownership of and access to firearms are common and discussing added risk of access to firearms for those at risk of suicide is not universally practiced. Given the burden of suicide (particularly by firearm) in the USA, the prevalence of firearm access, and the lethality of suicide attempts with firearms, we present the existing evidence on the burden of firearm suicide and what clinicians can do to reduce their patients' risk. Specifically, we review firearm ownership in the USA, firearm injury epidemiology, risk factors for firearm-related harm, and available interventions to reduce patients' risk of firearm injury and death.

**Keywords:** Firearm violence, Clinical interventions, Firearm storage, Firearm suicide, Prevention, Lethal means safety, Lethal means counseling

## Introduction

Suicide is a complex problem with psychiatric, socioeconomic and cultural roots and thus cannot be eliminated with one single solution. In light of high rates of firearm suicide in the USA, the high prevalence of household firearm ownership, and the importance of reducing access to the lethal means for suicide prevention, we review what is known about firearm ownership, firearm suicide epidemiology, and a range of clinical interventions available to better equip clinicians to reduce their patients' risk of firearm suicide (Wintemute et al. 2016; Pallin et al. 2019a). We then provide a clinical example to illustrate

the application of key points on clinician counseling to reduce access to firearms for suicidal persons.

## Background

Firearms are used in 5% of suicide attempts but account for half of suicide deaths because they are the most lethal means: 90% of suicide attempts with firearms result in death (compared to 53% for hanging USA) (Conner et al. 2019a). Further, the majority of suicide attempts are impulsive, with little time passing between the decision to attempt and the attempt itself (Owens et al. 2002). The odds of dying by suicide are more than 3 times higher for those with access to firearms compared to those without access (Anglemyer et al. 2014). Assessing a suicidal patient's firearm access and working with the patient, loved ones, and other trusted partners to reduce access during a period of heightened risk may help reduce the chance of fatality [(Mann and Michel 2016; Surgeon and General's Call to Action to Implement the National Strategy for Suicide Prevention 2012)]. When collaboration

\*Correspondence: [rspallin@ucdavis.edu](mailto:rspallin@ucdavis.edu)

<sup>2</sup> Department of Emergency Medicine, UC Davis School of Medicine, 2315 Stockton Blvd, Sacramento, CA, USA

Full list of author information is available at the end of the article

This article belongs to the Topical Collection: Gun violence epidemiology and prevention.



© The Author(s) 2021, corrected publication 2021. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

with the patient is not possible, emergency or involuntary interventions may be necessary. A basic understanding of who owns firearms and who dies by firearm suicide in the USA may help clinicians take informed and respectful steps towards lethal means reduction for suicidal patients.

### Firearm ownership in the USA

Firearm ownership is common in the USA: one in three households has a gun. Gun owners come from diverse backgrounds and geographic areas and have varied reasons for owning firearms (Azrael et al. 2017). There are between 300 and 400 million civilian-owned firearms in the USA (Azrael et al. 2017; Karp 2018). Although that roughly equates to an average of one firearm for every US adult, the distribution of firearms varies substantially, both demographically and geographically. An estimated 22% of American adults own firearms, and another 13% live in homes with firearms but are not owners themselves (Azrael et al. 2017). Firearm ownership has become more concentrated in recent decades: in 1994, 25% of Americans were firearm owners and collectively owned 192 million firearms, but now fewer Americans own firearms and each owner owns more firearms (Azrael et al. 2017). Just over half of the current civilian stock of firearms are long guns (i.e., shotguns or rifles) and 42% are handguns (i.e., pistols, revolvers, or other handguns) (Azrael et al. 2017).

In the USA, older, white males have the highest rates of firearm ownership. Owners disproportionately live in non-urban and southern regions of the USA (Azrael et al. 2017). Rates of firearm ownership among American veterans are higher than for the general public for both males and females. Nearly half of male veterans (47%) and one-quarter of female veterans own firearms, compared with 32% of males and 12% of females in the general population (Cleveland et al. 2017).

There is variation in the characteristics of firearm owners and ownership-related practices, including types of firearms owned, reasons for ownership, means of acquisition, and storage practices. About half (48%) of firearm owners own 1 or 2 firearms, but 8% of owners own 10 or more firearms (Azrael et al. 2017). In the USA, self-protection is most often cited as a major reason for firearm ownership: about two-thirds of owners say they own a firearm to protect themselves. Fewer report hunting (approximately 40%), sport shooting (approximately 30%), and other reasons (e.g., collections, inheritance, owning for work) (Azrael et al. 2017; Parker et al. 2017). These differences can and should inform suicide and injury prevention campaigns, safe firearm storage interventions, and targeted public health policy (Schleimer et al. 2019).

Firearm storage practices also vary widely, in part due to type(s) of firearm(s) owned and reasons for ownership. Nearly one-third of firearm owners report storing at least one gun loaded and unlocked—the least secure method of storage—and one-quarter report the most secure storage practice, i.e., keeping all guns locked up and unloaded (Berrigan et al. 2019). Despite widespread promotion of keeping guns locked up and unloaded in homes with children, an estimated 4.6 million children in the USA live in a home with at least one loaded and unlocked firearm (Azrael et al. 2018). Having a firearm in the home, regardless of storage method, increases household members risk of suicide and homicide (Anglemyer et al. 2014). Evidence suggests that keeping firearms loaded and not locked up is associated with increased risk of suicide, unintentional injury, and use of firearms by children in the home (Grossman et al. 2005; Conwell et al. 2002; Dahlberg et al. 2004; Hobbs 2018). Further studies on the association between firearm storage practices and injury outcomes among all populations are needed.

Keeping firearms unloaded and locked up so that they are inaccessible to those who should not have access has been endorsed broadly for prevention of firearm-related harm. Many firearm owners (58%) believe that having a firearm at home makes their home safer, despite evidence to the contrary (Anglemyer et al. 2014; Mauri et al. 2019; Campbell et al. 2003). Owners who believe a gun makes their home safer are more likely to store their firearms in the least secure manner (i.e., loaded and not locked up) (Mauri et al. 2019).

An estimated 1 million Americans become new gun owners every year, and research suggests a substantially larger increase during the COVID-19 pandemic (Wertz et al. 2018; Schleimer et al. 2020). Newer owners tend to be younger, live with younger children, identify as liberal, and more often report personal protection as their reason for acquiring a gun (Wertz et al. 2018). They may be less experienced in safe handling and storage practices. As both ownership and risk are dynamic, repeated assessment of risk for harm and of access to firearms when someone is at increased risk may be important for reducing injuries.

Firearms are readily available to Americans, whether or not they have them in their own home. The USA has 1.21 civilian-owned guns per capita, more than twice that of next-ranking Yemen (0.53 guns per capita). The USA number of guns per capita is six times the average rate of other OECD nations (Karp 2018). Regardless of whether they live in a home with them, many American adults have had exposure to firearms: 72% have shot gun(s), two-thirds have lived in homes with gun(s) at some point, and nearly half grew up in households with gun(s) (Parker et al. 2017).

### US firearm suicide epidemiology

Firearm suicide is a major public health issue in the USA. In 2019, 39,707 people in the USA died from firearms, 60% (23,941) of them from suicide (Centers for Disease Control and Prevention 2019). Suicide by any method was among the top eight causes of death for Americans 10–64 years of age and the second-leading cause for those ages 10–34 (Centers for Disease Control and Prevention 2019). In 2019, half of suicides nationwide involved firearms (Centers for Disease Control and Prevention 2019). Though public mass shootings receive much media and public attention, deaths from mass shootings account for less than 1% of all deaths from firearms (Centers for Disease Control and Prevention 2019; Follman et al. 2020).

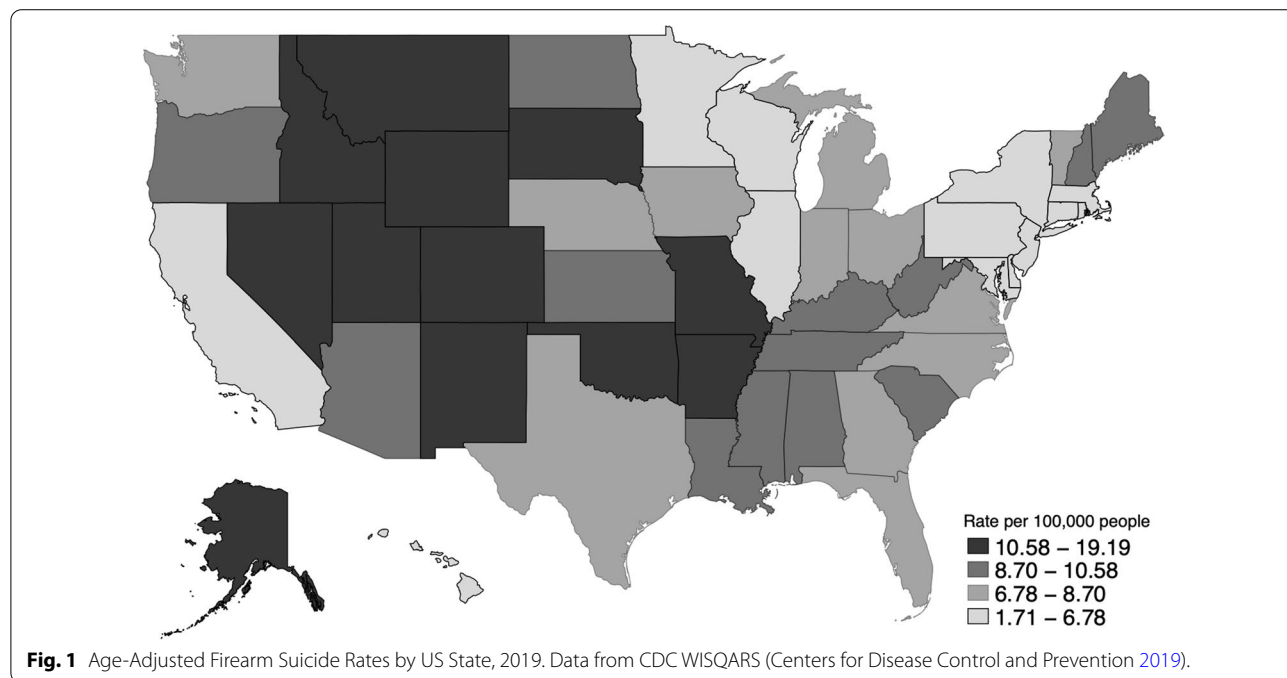
The U.S. population firearm suicide rate has increased 24% in the last two decades (Centers for Disease Control and Prevention 2019). Teen suicide rates have increased more than those for any other age group in the last decade, with especially increasing rates among Black teens (Centers for Disease Control and Prevention 2019; Coleman 2019; Lindsey et al. 2019). Experts expect a further increase in firearm suicide rates resulting from the COVID-19 pandemic and associated shelter-in-place and social distancing measures (including by increasing incidence and severity of suicide risk factors, such as mental health issues, substance use problems, increased loneliness, and personal and community economic stressors) (Gunnell et al. 2020).

Some demographic groups in the USA experience disproportionately high rates of firearm suicide, especially

middle-aged and older white men. The age-related increase in risk of firearm suicide for white males is particularly evident among those over age 70 (Centers for Disease Control and Prevention 2019). In contrast to white males, rates of firearm suicide for Black and Hispanic males peak around age 20 and then largely decrease with age. Rates of firearm suicide for white males exceed those for black and Hispanic males throughout the lifespan. The same is true for females: rates for whites exceed those for Black and Hispanic females throughout the lifespan. For the age group in which white females have the highest firearm suicide rate (ages 50 and 54), the male rate is nearly five times as high.

The USA has uniquely high rates of firearm suicide: eight times the aggregate rate of other high-income countries (Grinshteyn and Hemenway 2016). This is not because Americans are more suicidal; the US total suicide rate (suicides by all methods) is comparable to rates in other high-income countries. Just 5% of suicides in the countries of comparison were by firearm, and half of US suicides were by firearm. Research suggests that prevalence of firearms affects suicide rates and that in areas where more firearms are available, firearm suicide and total suicide rates are increased (Stroebe 2013; Miller et al. 2012, 2013).

US firearm suicide rates vary dramatically across states, ranging from 1.7 to 19.2 per 100,000 residents in New Jersey and Wyoming, respectively (Fig. 1). In rural areas, rates of firearm suicide rates far outpace those of firearm homicides. Suicide rates are especially high in the



intermountain states, the Ozarks, Appalachia, and Alaska (Centers for Disease Control and Prevention 2019).

According to emergency department data, over 85,000 non-fatal firearm injuries occur in the USA each year (Kaufman et al. 2021). These data suggest that half are unintentional injuries and the remainder are primarily assault-related (41%). 3% are from suicide attempt, as the vast majority of suicide attempts with firearms result in fatality (Kaufman et al. 2021). There is some concern, however, about the possibility of mis-classifications of intent in this data (specifically, over-classification of unintentional injuries and under-classification of assault-related injuries) (Barber et al. 2021).

People who are not firearm owners nor victims of firearm violence themselves also experience firearm-related harm. 44% of Americans know someone who has been shot (Parker et al. 2017). Research has found a link between youth exposure to firearm injury (suicide, assault, and mass shootings) and high rates of future injury and post-traumatic stress symptoms (for the FACTS Consortium et al. 2019). Other long-term physical, financial, social, and psychological effects of firearm injury and death exist for victims, families and friends, and communities (Hemenway and Nelson 2020).

### In clinical practice

The clinical approach for helping to reduce access to firearms for patients who are suicidal can be risk based, individualized, respectful, and rooted in the principles of harm reduction. The appropriate intervention will depend on the risk factors present, the level of risk, the person's ability to collaborate to reduce access, and the nature of the suicidal person's access to firearms (e.g., personal ownership vs. access to someone else's firearms).

### Risk factors for firearm suicide

Individual-level risk factors for firearm suicide include alcohol and substance misuse, dementia or other cognitive impairment, prior suicide attempt, chronic pain, and serious and poorly controlled mental illness (Conner et al. 2019a, 2014; Owens et al. 2002; Palmer et al. 2005; Blair-West et al. 1999; Goodwin 2003; Soloff 2000; Kaplan et al. 2013; Hooley et al. 2014; Mertens and Sorenson 2012; Günak et al. 2021; Serafini et al. 2016). As many as 10% of American adults self-report both patterns of impulsive, angry behaviors and access to firearms (Swanson et al. 2015a). Additionally, research has found a relationship between ownership and prevalence of risky drinking behaviors, such as binge drinking and of driving under the influence, and suggests that firearm owners who misuse alcohol may be at even greater risk of firearm violence or suicide (Wintemute 2011).

Risk of suicide for heavy alcohol consumers is as much as five times that of social drinkers (Harris and Barraclough 1997). Forty percent of patients who seek treatment for alcohol dependence report at least one prior suicide attempt (Pompili et al. 2010). A 2013 national study found that one-third of those who died by suicide tested positive for alcohol and that those who used firearms were more likely to be intoxicated at time of the act compared to those who used other, less lethal methods (Kaplan et al. 2013).

Firearm access poses risk for people with dementia: in the USA, 60% of persons with dementia live in a home with a firearm, and firearms are the most common means of suicide among persons with dementia (Spangenberg et al. 1999; Betz et al. 2018). Research has found that risk of suicide may be especially elevated in the period after an older adult receives a dementia or mild cognitive impairment diagnosis (Günak et al. 2021). Talking with caregivers of patients with dementia about the risk of firearms remains rare (Betz et al. 2020), and experts suggest that conversations about firearms and dementia should parallel those about driving and dementia (Polzer et al. 2020).

Mental illness also plays a substantial role in self-harm and suicide. Research suggests that depression, bipolar disorder, and other psychiatric conditions are associated with 45–90% of suicides by any means in the USA (Swanson et al. 2015b; Cavanagh et al. 2003; Cho et al. 2016). The range of estimates is wide because research variably uses data from pre-existing records or from psychological autopsies (which pose methodological challenges).

Veterans may be especially at risk of firearm suicide, as they have high rates of firearm ownership, may not store all firearms securely, and disproportionately experience suicidal thoughts compared to non-veterans (Simonetti et al. 2018; Veterans et al. 2016). Factors besides mental illness contribute to their risk. Among a large cohort of veteran suicide decedents, 45% had no mental health or substance use diagnosis, and those without such diagnosis were significantly more likely to die by firearm suicide than by other means (Simonetti et al. 2020). Efforts to raise awareness of risk, discuss the importance of suicide risk assessment regardless of the presence of a diagnosis, create guidance for acceptable counseling on reducing access to firearms for those at risk of self-harm, and increase access to mental health services are underway at the VA (Carroll et al. 2020), and additional work is needed to address firearm suicide specifically among veterans (Theis et al. 2021).

Regardless of demographic or individual risk factors, patients who make threats of suicide or who have suicidal ideation, including patients whose suicidal ideation may not be acute, but instead is intermittent, situational, or

chronic, are at increased risk of death if they have access to a firearm (Anglemyer et al. 2014; Miller et al. 2013; Studdert et al. 2020). Limited evidence suggests that adolescents who die by firearm suicide are significantly more likely to live in homes with firearms and that firearms used for adolescent suicides are most often owned by parents (Shah et al. 2000; Johnson et al. 2010). As access to a firearm increases the risk of suicide by more than three times, clinician evaluation of any suicidal patient should involve a careful assessment of their access to firearms (Anglemyer et al. 2014).

### **Risk identification and clinical intervention**

After a clinician has evaluated risk and determined that firearm access is clinically relevant, it is recommended they plan a tailored conversation about why firearm access is important and what can be done if the patient does have access (Pallin et al. 2019a; Wintemute 2017). When asking questions about firearms in the home, it is important to use neutral, non-judgmental language and relate the conversation clearly to the health and safety of the patient and others in the home (Pallin et al. 2019b). Using phrasing that normalizes talking about access to firearms and puts the conversation in the context of risk may be most effective. Experts suggest that assuming a patient at risk has a gun (rather than leading the conversation by asking about gun ownership directly) may help a clinician to make clear that they respect the patient's decision to own firearms (Barber et al. 2017), though evidence on best practices is lacking.

The clinician's overall goal should be to reduce access to firearms for the person at increased risk, usually by counseling on firearm storage practices or temporary transfers of firearms that render firearms inaccessible to those at risk. The principles of harm reduction apply here; the goal is not necessarily to stop the behavior but to mitigate the associated risks. Any steps in that direction are progress (Hawk et al. 2017). Knowing the types of firearms in the home and reasons for ownership may help clinicians make appropriate recommendations, but this knowledge is not necessary in order to counsel on firearm storage and reduce risk. Clinicians can present storage options that are amenable to owners of different types of firearms and those who own for different reasons without engaging in detailed discussions on reasons for ownership.

### **Considerations for conversations about firearm access**

A basic understanding of the different types of guns, the reasons for ownership and use, and various methods of storage will help clinicians have effective and collaborative conversations about reducing access to firearms to reduce suicide risk. Knowing who in the household owns the gun(s), to best understand who has

and makes decisions about firearm access and storage, may be helpful for recommending the most appropriate interventions.

When engaging in clinical counseling for firearm injury prevention, clinicians can consider that many Americans value firearm ownership and such ownership may be part of a patient's identity (Pallin et al. 2019b; Marino et al. 2016, 2018). Messaging should therefore acknowledge and respect the role firearms can play in people's identities and acknowledge that many firearm owners take firearm injury prevention, safety, and responsible firearm storage seriously (Pallin et al. 2019b; Barber et al. 2017). Conversations about firearm access may be perceived as political, but politics has no place in these conversations (Caine 2013). If politics comes up, the clinician should redirect the conversation to reinforce the shared goal of reducing access for those at risk. Research suggests that clinicians are not the most acceptable messengers of firearm storage information (Crifasi et al. 2018; Anestis et al. 2021).

Nonetheless, patients are generally receptive to provider-initiated conversations about firearms and clinicians are trained for and accustomed to having conversations with patients about safety and risks in the home. A majority of American adults find such conversations appropriate "in general," including 54% of firearm owners (Betz et al. 2016). Acceptability of these conversations may increase when a patient has access to a firearm and someone in the home is at increased risk of firearm injury, such as a person with suicidal ideation or a child or teen (Pallin et al. 2019c). Just 8% of American adults living in homes with firearms, however, have ever had a clinician initiate a conversation about firearms (Conner et al. 2020). Research suggests that veterans, who more often own firearms and more often have risk factors for suicide, are also supportive of health care interventions to reduce access to firearms in times of acute risk for self-harm (Valenstein et al. 2018).

Medical and mental health care providers are allowed to discuss firearms with patients; no state or federal statutes prevent these discussions when access to firearms is relevant to the health of the patient or to someone else (Wintemute et al. 2016). Although a 2011 Florida statute attempted to restrict provider conversations about firearms with patients unless the physician felt, in good faith, the conversation was relevant to someone's health, it was struck down in court in 2017 for restricting health care providers' First Amendment rights (Wintemute et al. 2016).

### **Lethal means safety**

Limiting access to lethal methods of attempt, including firearms, may be a promising intervention for preventing

suicide. There is evidence that population-level interventions that reduce suicidal individuals' access to the most lethal means of suicide reduces suicides (Barber and Miller 2014). Healthcare providers can play an important role in lethal means reduction. Suicidal crises can be difficult to predict and can become serious quickly. Research with survivors of suicide attempts suggests the decision to end one's life is often impulsive: as many as 70% of people who made near-lethal attempts made the decision to attempt in less than one hour, and 24% made the decision to attempt in less than five minutes (Simon et al. 2002). Though prior suicide attempt is a significant risk factor for future suicide, most survivors of suicide attempts do not go on to die by suicide (Owens et al. 2002). If a clinician can help get someone through the acute suicidal crisis and a lethal attempt can be prevented, a life may be saved.

For patients at risk, there is a range of lethal means safety for prevention of firearm suicide. Generally, this includes two counseling and two emergency clinical interventions: counseling on firearm storage, counseling on temporary firearm transfers, mental health holds, and extreme risk protection orders (ERPOs).

Evidence suggests that counseling on firearm storage can influence firearm storage practices (Rowhani-Rahbar et al. 2016). Secure storage that removes access to firearms for those at risk is critical for suicide prevention and in some cases may be accomplished by storing firearms unloaded and locked up using a locking device, such as a cable lock or gun safe.

Clinicians should consider, however, that reasons for ownership may affect willingness to store guns locked up and unloaded. For example, if a patient living with an at-risk person owns a gun for self-protection and feels the need to have immediate access, the recommendation that all firearms are stored unloaded, locked up, and separate from ammunition may be unacceptable. Taking a harm reduction approach, the clinician could recommend a solution that would allow quick access to the firearm but removes access to the person at risk, such as a biometric lockbox (e.g., one that uses fingerprint technology) that opens instantaneously and only for authorized persons. A collaborative approach that explores the options a patient finds acceptable may be most effective for reducing access for those at risk.

If a gun owner themselves is at increased risk, rather than someone in the home who does not personally own firearms (and therefore control how firearms are stored), reducing access to lethal means without removing firearms from the home is more difficult. In such cases, rather than promoting use of locking devices and keeping firearms unloaded, appropriate options may include changing codes or keys to storage devices and giving

access only to trusted family or friends and removing the firing pin(s) or otherwise disassembling the firearm(s) to render them temporarily unusable, increasing the time it would take to use them in a suicide attempt (Beidas et al. 2020).

Storing firearm(s) out of the home is the preferred method for reducing access to firearms for the duration of a crisis (Barber and Miller 2014). Options for voluntary, temporary firearm transfer vary locally and by state and may include temporarily transferring firearms to a trusted individual like a friend or family member living outside the at-risk person's household; storing firearms at a gun shop or range or with local law enforcement; or selling the firearm(s). Firearm owners or caregivers may prefer solutions that involve family members or gun shops/ranges over options for temporary storage than those involving law enforcement agencies (Polzer et al. 2021). When discussing temporary transfer, using the words "temporary" and "voluntary" may help. "Temporary" emphasizes that such transfers are not permanent and also serves as a reminder of the often temporary nature of suicidal crises; "voluntary" may help the patient retain a sense of agency (Pallin et al. 2019b). As with keeping firearms stored locked up and unloaded, consider that willingness to temporarily transfer firearms may be affected by the perception that doing so would make the home more vulnerable to outside threats (Simonetti et al. 2020). Clinicians should be prepared to discuss balancing risk-reducing storage strategies with perceived decreases in feelings of personal safety for patients who own firearms for self-protection.

Resources for patients and patients' families detailing options for storage outside the home exist but are inconsistently available. In a growing number of states, including Colorado, Maryland and Washington, researchers have developed Gun Storage Maps, where community members can find local options for voluntary, temporary firearm storage with retailers, ranges, and law enforcement agencies (Gun Storage Map 2019; Washington Firearm Safe Storage Map 2020). Creators of the Maryland map have published details on the process and barriers to creating such a tool (Bongiorno et al. 2020).

In some states, legal considerations for temporary transfers may warrant exploration. For example, in some places, temporary transfer of firearms is not permitted unless a background check is performed and the temporary recipient of the firearm is deemed legally able to possess firearms. These practices are in flux, however. For example, in California, strict temporary transfer policies were relaxed in January 2020 to allow immediate family members to temporarily receive and hold firearms without a background check if for the express purpose of prevention of self-harm, with some restrictions (Cal 2020).

Policy on criteria for returning firearms is lacking, especially issues of who decides when someone who has gone through a crisis should have firearms returned to them and who is liable should a bad outcome take place (Gibbons et al. 2020).

### Emergency intervention

In some situations, an involuntary mental health hold may be an appropriate intervention for patients at acute risk of suicide or violence. Most states allow a person who poses a danger to themselves or someone else to be detained involuntarily for the purpose of psychiatric evaluation. Depending on the state, such a hold can be initiated by law enforcement, mental health professionals, physicians or family members (Hedman et al. 2016). While these holds may be an effective way to remove a person from an acutely threatening or dangerous situation, they do not guarantee that the person will receive treatment that eventually reduces their risk, nor that they will result in a prohibition on purchasing or owning a firearm upon hold expiration or in the future. Federal law prohibits people who have been “committed to a mental institution” from firearm ownership, but that criterion is not met until the civil commitment hearing, which can happen up to a few weeks into a psychiatric hospitalization (Gun Control Act of 1968).

For people who are at risk of suicide or other violence but do not meet involuntary commitment criteria and are not willing to temporarily relinquish their firearms, a growing number of states are passing and implementing risk-based firearm removal laws such as extreme risk protection orders (ERPOs), commonly referred to as “red flag laws.” Generally, ERPOs provide an individualized tool for temporary removal of firearm(s) and prohibition on purchase for individuals who pose a risk to self or others but who have not committed an offense prohibiting them from possession or purchase and for whom other interventions for risk reduction have been exhausted or are not appropriate. In Connecticut, such a law has been shown to be effective for suicide prevention, with an estimated one suicide prevented for every 10–20 firearm removal actions (Kivisto and Phalen 2018; Swanson et al. 2017). In many states, law enforcement, family, and household members can petition for ERPOs. As of writing, 19 states and the District of Columbia have such emergency risk reduction policies.

In a few states (MD, CT, HI), clinicians can directly petition for ERPOs but elsewhere, a clinician may provide evidence of dangerousness to a petitioner. Experts have noted concerns about clinicians directly petitioning for ERPOs (Swanson et al. 2021). Nonetheless, ERPOs focus on risk and reducing access to lethal means, key

principles of healthcare and public health (Frattaroli and Sharfstein 2021) and clinician awareness of this tool may be useful. For example, clinicians are uniquely situated to identify patients at risk of self-harm. If a clinician is seeing a patient at acute risk for harm to self or others, the Health Insurance Portability and Accountability Act (HIPAA) permits disclosure of patient information when such disclosure is “necessary to prevent or lessen a serious and imminent threat to the health or safety of a person or the public” and “is to a person or persons reasonably able to prevent or lessen the threat” (Health Insurance Portability and Accountability Act 1996).

### A clinical example

With the following clinical example, we explore ways to help reduce an at-risk patient’s chance of attempting firearm suicide.

A 67-year-old man comes to his annual physical with his son. His son has become increasingly concerned about his father’s state of mind since his mother (the man’s wife) died 10 months ago. He has noticed his father’s drinking increases and that when he drinks, he seems to get more depressed.

The physician sees the father on his own and he admits that he has felt increasingly alone and isolated this past year. He is not a daily drinker, but he admits that, once a week or so, he has a few beers, often drinking more than he intends to. When he does drink, his depression gets worse, and sometimes he wonders if the world would be a better place without him. When he is not drinking, he denies ever feeling suicidal, but admits he has been pretty down, to the point that he doesn’t go out and see friends, or have the energy to do much. His children have recommended he seek counseling but he is reluctant. The physician talks with him about the possibility engaging in therapy and potential benefits. When the son comes back in at the end of the visit, he asks, “Did you tell her about your guns, dad?”

Access to firearms is clinically relevant in this case. Though the patient’s risk of suicide may only be moderate in the clinical encounter, the physician may be concerned that risk increases significantly when he is home drinking alone. Ideally, the patient would be willing to temporarily transfer his guns to a family member or friend for safekeeping—that person would hold on to the guns until his drinking was diminished and his grief and depression had subsided. If he were not willing to temporarily part with his guns, even separating the guns from the ammunition and locking them both, to create impediments to an impulsive firearm suicide attempt, may be a first step.

In this encounter, the patient does not appear to meet criteria for an involuntary intervention. If, however, he appeared to be at high enough risk of suicide that he

required inpatient mental health treatment and was unwilling to participate in such treatment voluntarily, a mental health hold may be an appropriate clinical option. Once a mental health hold was in place, if the patient were released from the hospital before the civil commitment hearing, he would likely return home with his depression better treated, but the other circumstances unchanged, and his guns where he left them.

If the level of risk of firearm suicide was extremely elevated and the patient was unwilling to collaborate to reduce access to firearms (i.e., attempts to work with the patient to temporarily transfer the guns or safely store the guns in a way that reduces his access have failed, and no other options are available or appropriate), an ERPO may be warranted. This would likely involve talking about the possibility of an ERPO with the patient's son or local law enforcement, either of whom could choose to act as petitioner for the order should they decide to proceed.

### Clinical takeaways

Firearm suicides can be reduced with risk evaluation and discussions about firearm access between clinicians and patients at risk. Considering the lethality of firearms in suicide attempts and establishing why firearms are clinically relevant once it is determined a patient is at risk of suicide are important when planning conversations about appropriate and acceptable methods to reduce access to lethal means and increase safety. Using a harm reduction approach, clinicians can have conversations about firearm access that are respectful, informed, and tailored to each patient's needs. Further intervention may be appropriate if a patient is at imminent risk and counseling on firearm storage or discussions about temporary firearm transfer do not result in sufficiently reduced firearm access for the at-risk person. Learning more about firearms themselves, methods to store them such that they are inaccessible to those at risk, local options for temporary transfers, and gun ownership may help clinicians be more successful in reducing firearm suicide.

### Abbreviations

ERPO: Extreme risk protection order; HIPAA: Health Insurance Portability and Accountability Act.

### Acknowledgements

None.

### Authors' information

Rocco Pallin, MPH, is the Director of Education of the BulletPoints Project at the University of California Firearm Violence Research Center. Ms. Pallin has studied injury prevention, firearm policy, and provider practice recommendations. She directed an innovative project for educating health care providers on clinical strategies for firearm-related harm and frequently presents to clinicians, researchers, legislators, and other stakeholders. Amy Barnhorst, MD, is the Director of the BulletPoints Project and the Vice Chair for Community Mental Health in the Department of Psychiatry and Behavioral Science at the

University of California, Davis. Dr. Barnhorst is an expert on mental illness and firearm laws. She focuses on the interface between firearm violence, suicide, and mental illness, and writes for *Psychology Today* and the *New York Times*. She also practices emergency and inpatient psychiatry.

### Authors' contributions

RP reviewed the literature on firearm suicide, risk factors, and clinical strategies for firearm injury prevention and drafted the manuscript. AB composed the sections on mental health risk factors and mental health clinician interventions, as well as the clinical example. Both authors edited the content to provide critical revision and read and approved the final manuscript.

### Funding

Funding for this work was provided by the University of California Firearm Violence Research Center at UC Davis, which is supported by the California State Legislature.

### Availability of data and materials

Not applicable.

### Declarations

### Ethics approval and consent to participate

Not applicable.

### Consent for publication

Not applicable.

### Competing interests

The authors declare that they have no competing interests.

### Author details

<sup>1</sup>University of California Firearm Violence Research Center at UC Davis, 2315 Stockton Blvd, Sacramento, CA, USA. <sup>2</sup>Department of Emergency Medicine, UC Davis School of Medicine, 2315 Stockton Blvd, Sacramento, CA, USA.

Received: 17 June 2021 Accepted: 10 September 2021

Published online: 04 October 2021

### References

- Anestis MD, Bond AE, Bryan AO, Bryan CJ. An examination of preferred messengers on firearm safety for suicide prevention. *Prev Med.* 2021;145:106452.
- Anglemeyer A, Horvath T, Rutherford G. The accessibility of firearms and risk for suicide and homicide victimization among household members: a systematic review and meta-analysis. *Ann Intern Med.* 2014;160(2):101–10.
- Azrael D, Hepburn L, Hemenway D, Miller M. The stock and flow of US Firearms: results from the 2015 National Firearms Survey. *RSF.* 2017;3(5):38–57.
- Azrael D, Cohen J, Salhi C, Miller M. Firearm storage in gun-owning households with children: results of a 2015 national survey. *J Urban Health.* 2018;95(3):295–304.
- Barber CW, Miller MJ. Reducing a suicidal person's access to lethal means of suicide: a research agenda. *Am J Prev Med.* 2014;47(3 Suppl 2):S264–72.
- Barber C, Frank E, Demicco R. Reducing suicides through partnerships between health professionals and gun owner groups—beyond Docs vs Glocks. *JAMA Intern Med.* 2017;177(1):5.
- Barber C, Goralnick E, Miller M. The problem with /CD -Coded firearm injuries. *JAMA Intern Med.* 2021;181(8):1132.
- Beidas RS, Rivara F, Rowhani-Rahbar A. Safe firearm storage: a call for research informed by firearm stakeholders. *Pediatrics.* 2020;146(5):e20200716.
- Berrigan J, Azrael D, Hemenway D, Miller M. Firearms training and storage practices among US gun owners: a nationally representative study. *Inj Prev.* 2019;25(Suppl 1):i31–8.
- Betz ME, Azrael D, Barber C, Miller M. Public opinion regarding whether speaking with patients about firearms is appropriate: results of a national survey. *Ann Intern Med.* 2016;165(8):543–50.



- Betz ME, McCourt AD, Vernick JS, Ranney ML, Maust DT, Wintemute GJ. Firearms and dementia: clinical considerations. *Ann Intern Med.* 2018;169(1):47.
- Betz ME, Azrael D, Johnson RL, Knoepke CE, Ranney ML, Wintemute GJ, et al. Views on firearm safety among caregivers of people with alzheimer disease and related dementias. *JAMA Netw Open.* 2020;3(7):e207756.
- Blair-West GW, Cantor CH, Mellso GW, Eyeson-Annan ML. Lifetime suicide risk in major depression: sex and age determinants. *J Affect Disord.* 1999;55(2-3):171-8.
- Bongiorno DM, Kramer EN, Booty MD, Crifasi CK. Development of an online map of safe gun storage sites in Maryland for suicide prevention. *Int Rev Psychiatry.* 2020;1-5.
- Caine ED. Forging an agenda for suicide prevention in the United States. *Am J Public Health.* 2013;103(5):822-9.
- Cal. Penal Code Jan 1, 2020. Available from: [https://leginfo.ca.gov/faces/codes\\_displaySection.xhtml?lawCode=PEN&sectionNum=27882](https://leginfo.ca.gov/faces/codes_displaySection.xhtml?lawCode=PEN&sectionNum=27882).
- Campbell JC, Webster D, Koziol-McLain J, Block C, Campbell D, Curry MA, et al. Risk factors for femicide in abusive relationships: results from a multisite case control study. *Am J Public Health.* 2003;93(7):1089-97.
- Carroll D, Kearney LK, Miller MA. Addressing suicide in the veteran population: engaging a public health approach. *Front Psychiatry.* 2020;11:569069.
- Cavanagh JTO, Carson AJ, Sharpe M, Lawrie SM. Psychological autopsy studies of suicide: a systematic review. *Psychol Med.* 2003;33(3):395-405.
- Centers for Disease Control and Prevention. Web-based Injury Statistics Query and Reporting System (WISQARS). 2019. Available from: <https://www.cdc.gov/injury/wisqars/index.html>
- Cho S-E, Na K-S, Cho S-J, Im J-S, Kang S-G. Geographical and temporal variations in the prevalence of mental disorders in suicide: systematic review and meta-analysis. *J Affect Disord.* 2016;190:704-13.
- Cleveland EC, Azrael D, Simonetti JA, Miller M. Firearm ownership among American veterans: findings from the 2015 National Firearm Survey. *Inj Epidemiol.* 2017;4(1):33.
- Coleman B. Ring the alarm: the crisis of Black youth suicide in America [Internet]. Emergency Taskforce on Black Youth Suicide and Mental Health; 2019 [cited 2021 Mar 23]. Available from: <https://www.stevfund.org/wp-content/uploads/2019/12/FULL-TASKFORCE-REPORT.pdf>
- Conner KR, Huguet N, Caetano R, Giesbrecht N, McFarland BH, Nolte KB, et al. Acute use of alcohol and methods of suicide in a US national sample. *Am J Public Health.* 2014;104(1):171-8.
- Conner A, Azrael D, Miller M. Suicide case-fatality rates in the United States, 2007 to 2014: a nationwide population-based study. *Ann Intern Med.* 2019;171(12):885.
- Conner A, Azrael D, Miller M. Firearm safety discussions between clinicians and U.S. adults living in households with firearms: results from a 2019 national survey. *Ann Intern Med.* 2020;M20-6314
- Conwell Y, Duberstein PR, Connor K, Eberly S, Cox C, Caine ED. Access to firearms and risk for suicide in middle-aged and older adults. *Am J Geriatr Psychiatry.* 2002;10(4):407-16.
- Crifasi CK, Doucette ML, McGinty EE, Webster DW, Barry CL. Storage practices of US gun owners in 2016. *Am J Public Health.* 2018;108(4):532-7.
- Dahlberg LL, Ikeda RM, Kresnow MJ. Guns in the home and risk of a violent death in the home: findings from a national study. *Am J Epidemiol.* 2004;160(10):929-36.
- Follman M, Aronsen G, Pan D. US mass shootings, 1982-2020: data from Mother Jones' investigation [Internet]. Mother Jones; 2020 Feb [cited 2020 Aug 5]. Available from: <https://www.motherjones.com/politics/2012/12/mass-shootings-mother-jones-full-data/>
- for the FACTS Consortium, Ranney M, Karb R, Ehrlich P, Bromwich K, Cunningham R, et al. What are the long-term consequences of youth exposure to firearm injury, and how do we prevent them? A scoping review. *J Behav Med.* 2019;42(4):724-40.
- Fratraro S, Sharfstein JM. Extreme risk protection orders—a tool for clinicians to prevent gun violence. *JAMA Health Forum.* 2021;2(4):e210948.
- Gibbons MJ, Fan MD, Rowhani-Rahbar A, Rivara FP. Legal liability for returning firearms to suicidal persons who voluntarily surrender them in 50 US states. *Am J Public Health.* 2020:e1-4.
- Goodwin FK. Suicide risk in bipolar disorder during treatment with lithium and divalproex. *JAMA.* 2003;290(11):1467.
- Grinshteyn E, Hemenway D. Violent death rates: the US compared with other high-income OECD countries, 2010. *Am J Med.* 2016;129(3):266-73.
- Grossman DC, Mueller BA, Riedy C, Dowd MD, Villaveces A, Prodzinski J, et al. Gun storage practices and risk of youth suicide and unintentional firearm injuries. *JAMA.* 2005;293(6):707-14.
- Gun Control Act of 1968, Pub. L. 90-618, 82 Stat. 1213, codified as amended at 18 U.S.C. §§921-931.
- Gun Storage Map [Internet]. Colorado Firearm Safety Coalition; 2019 [cited 2020 Apr 1]. Available from: <https://coloradofirearmsafetycoalition.org/gun-storage-map/>
- Günak MM, Barnes DE, Yaffe K, Li Y, Byers AL. Risk of suicide attempt in patients with recent diagnosis of mild cognitive impairment or dementia. *JAMA Psychiat.* 2021;78(6):659.
- Gunnell D, Appleby L, Arensman E, Hawton K, John A, Kapur N, et al. Suicide risk and prevention during the COVID-19 pandemic. *Lancet Psychiatry.* 2020;7(6):468-71.
- Harris EC, Barraclough B. Suicide as an outcome for mental disorders: a meta-analysis. *Br J Psychiatry.* 1997;170(3):205-28.
- Hawk M, Coulter RWS, Egan JE, Fisk S, Reuel Friedman M, Tula M, et al. Harm reduction principles for healthcare settings. *Harm Reduct J.* 2017;14(1):70.
- Hedman LC, Petrla J, Fisher WH, Swanson JW, Dingman DA, Burris S. State laws on emergency holds for mental health stabilization. *PS.* 2016;67(5):529-35.
- Hemenway D, Nelson E. The scope of the problem: gun violence in the USA. *Curr Trauma Rep.* 2020;6(1):29-35.
- Hobbs T. Guns at home: a problem lost in debate—killers in most mass school shootings used guns owned by family members, not bought. *Wall Street Journal* [Internet]. 2018 Apr 6 [cited 2018 Oct 2]; Available from: <https://www.wsj.com/articles/in-school-shootings-most-guns-come-from-home-1522920600>
- Hooley JM, Franklin JC, Nock MK. Chronic pain and suicide: understanding the association. *Curr Pain Headache Rep.* 2014;18(8):435.
- Johnson RM, Barber C, Azrael D, Clark DE, Hemenway D. Who are the owners of firearms used in adolescent suicides? *Suicide Life Threat Behav.* 2010;40(6):609-11.
- Kaplan MS, McFarland BH, Huguet N, Conner K, Caetano R, Giesbrecht N, et al. Acute alcohol intoxication and suicide: a gender-stratified analysis of the National Violent Death Reporting System. *Inj Prev.* 2013;19(1):38-43.
- Karp A. Estimating Global Civilian Held Firearms Numbers [Internet]. Small Arms Survey; 2018 Jun [cited 2020 Apr 15]. Available from: <http://www.smallarmssurvey.org/fileadmin/docs/T-Briefing-Papers/SAS-BP-Civilian-Firearms-Numbers.pdf>
- Kaufman EJ, Wiebe DJ, Xiong RA, Morrison CN, Seamon MJ, Delgado MK. Epidemiologic trends in fatal and nonfatal firearm injuries in the US, 2009-2017. *JAMA Intern Med.* 2021;181(2):237.
- Kivisto AJ, Phalen PL. Effects of risk-based firearm seizure laws in Connecticut and Indiana on suicide rates, 1981-2015. *Psychiatr Serv.* 2018;appips201700250.
- Lindsey MA, Sheftall AH, Xiao Y, Joe S. Trends of suicidal behaviors among high school students in the United States: 1991-2017. *Pediatrics.* 2019;144(5):e20191187.
- Mann JJ, Michel CA. Prevention of firearm suicide in the United States: what works and what is possible. *Am J Psychiatry.* 2016;173(10):969-79.
- Marino E, Wolsko C, Keys SG, Pennavaria L. A culture gap in the United States: implications for policy on limiting access to firearms for suicidal persons. *J Public Health Policy.* 2016;37(Suppl 1):110-21.
- Marino E, Wolsko C, Keys S, Wilcox H. Addressing the cultural challenges of firearm restriction in suicide prevention: a test of public health messaging to protect those at risk. *Arch Suicide Res.* 2018;22(3):394-404.
- Mauri AI, Wolfson JA, Azrael D, Miller M. Firearm storage practices and risk perceptions. *Am J Prev Med.* 2019;57(6):830-5.
- Mertens B, Sorenson SB. Current considerations about the elderly and firearms. *Am J Public Health.* 2012;102(3):396-400.
- Miller M, Azrael D, Barber C. Suicide mortality in the United States: the importance of attending to method in understanding population-level disparities in the burden of suicide. *Annu Rev Public Health.* 2012;33(1):393-408.
- Miller M, Barber C, White RA, Azrael D. Firearms and suicide in the United States: is risk independent of underlying suicidal behavior? *Am J Epidemiol.* 2013;178(6):946-55.
- Owens D, Horrocks J, House A. Fatal and non-fatal repetition of self-harm: systematic review. *Br J Psychiatry.* 2002;181(3):193-9.
- Pallin R, Spitzer SA, Ranney ML, Betz ME, Wintemute GJ. Preventing firearm-related death and injury. *Ann Intern Med.* 2019a;170(11):ITC81.

- Pallin R, Siry B, Azrael D, Knoepke CE, Matlock DD, Clement A, et al. "Hey, let me hold your guns for a while": a qualitative study of messaging for firearm suicide prevention. *Behav Sci Law*. 2019b;37(3):259–69.
- Pallin R, Charbonneau A, Wintemute GJ, Kravitz-Wirtz N. California public opinion on health professionals talking with patients about firearms. *Health Aff*. 2019c;38(10):1744–51.
- Palmer BA, Pankratz VS, Bostwick JM. The lifetime risk of suicide in schizophrenia: a reexamination. *Arch Gen Psychiatry*. 2005;62(3):247.
- Parker K, Horowitz J, Igielnik R, Oliphant B, Brown A. America's complex relationship with guns. Pew Research Center; 2017.
- Polzer ER, Nearing K, Knoepke CE, Matlock DD, Azrael D, Siry BJ, et al. "Safety in dementia": development of an online caregiver tool for firearm, driving, and home safety. *J Am Geriatr Soc*. 2020;68(9):2137–9.
- Polzer E, Nearing K, Knoepke CE, Matlock DD, McCourt A, Betz ME. Firearm access in dementia: legal and logistic challenges for caregivers. *Int Rev Psychiatry*. 2021;1–9.
- Pompili M, Serafini G, Innamorati M, Dominici G, Ferracuti S, Kotzialis GD, et al. Suicidal behavior and alcohol abuse. *IJERPH*. 2010;7(4):1392–431. Health Insurance Portability and Accountability Act. 1996.
- Rowhani-Rahbar A, Simonetti JA, Rivara FP. Effectiveness of interventions to promote safe firearm storage. *Epidemiol Rev*. 2016;38(1):111–24.
- Schleimer JP, Kravitz-Wirtz N, Pallin R, Charbonneau AK, Buggs SA, Wintemute GJ. Firearm ownership in California: a latent class analysis. *Inj Prev*. 2019;injuryprev–2019–043412.
- Schleimer JP, McCort CD, Pear VA, Shev A, Tomsich E, Asif-Sattar R, et al. Firearm purchasing and firearm violence in the first months of the coronavirus pandemic in the United States [Internet]. *Epidemiology*; 2020 Jul [cited 2020 Jul 21]. Available from: <https://doi.org/10.1101/2020.07.02.20145508>
- Serafini G, Calcagno P, Lester D, Girardi P, Amore M, Pompili M. Suicide risk in Alzheimer's disease: a systematic review. *CAR*. 2016;13(10):1083–99.
- Shah S, Hoffman RE, Wake L, Marine WM. Adolescent suicide and household access to firearms in Colorado: results of a case-control study. *J Adolesc Health*. 2000;26(3):157–63.
- Simon TR, Swann AC, Powell KE, Potter LB, Kresnow M, O'Carroll PW. Characteristics of impulsive suicide attempts and attempters. *Suicide Life Threat Behav*. 2002;32:49–59.
- Simonetti JA, Azrael D, Rowhani-Rahbar A, Miller M. 2018. Firearm storage practices among American veterans. *Am J Prev Med*. 2018.
- Simonetti JA, Dorsey Holliman B, Holiday R, Brenner LA, Monteith LL. Firearm-related experiences and perceptions among United States male veterans: a qualitative interview study. *PLoS ONE*. 2020;15(3):e0230135.
- Simonetti JA, Piegari R, Maynard C, Brenner LA, Mori A, Post EP, et al. Characteristics and injury mechanisms of veteran primary care suicide decedents with and without diagnosed mental illness. *J GEN INTERN MED* [Internet]. 2020 Mar 26 [cited 2020 Apr 8]; Available from: <https://doi.org/10.1007/s11606-020-05787-1>.
- Soloff PH. Characteristics of suicide attempts of patients with major depressive episode and borderline personality disorder: a comparative study. *Am J Psychiatry*. 2000;157(4):601–8.
- Spangenberg KB, Wagner MT, Hendrix S, Bachman DL. Firearm presence in households of patients with Alzheimer's disease and related dementias. *J Am Geriatr Soc*. 1999;47(10):1183–6.
- Stroebe W. Firearm possession and violent death: a critical review. *Aggress Violent Behav*. 2013;18(6):709–21.
- Studdert DM, Zhang Y, Swanson SA, Prince L, Rodden JA, Holsinger EE, et al. Handgun ownership and suicide in California. *N Engl J Med*. 2020;382(23):2220–9.
- Suicide Among Veterans and Other Americans 2001–2014 [Internet]. U.S. Department of Veterans Affairs, Office of Suicide Prevention; 2016 Aug. Available from: <https://www.mentalhealth.va.gov/docs/2016suicidedatareport.pdf>
- Swanson JW, Sampson NA, Petukhova MV, Zaslavsky AM, Appelbaum PS, Swartz MS, et al. Guns, impulsive angry behavior, and mental disorders: results from the national comorbidity survey replication (NCS-R): guns, impulsive angry behavior, and mental disorders. *Behav Sci Law*. 2015a;33(2–3):199–212.
- Swanson JW, McGinty EE, Fazel S, Mays VM. Mental illness and reduction of gun violence and suicide: bringing epidemiologic research to policy. *Ann Epidemiol*. 2015b;25(5):366–76.
- Swanson JW, Norko MA, Lin H-J, Frisman LK, Baranoski MV, Easter MM, et al. Implementation and effectiveness of Connecticut's risk-based gun removal law: does it prevent suicides? *Law Contemp Probl*. 2017;80(2):179–208.
- Swanson JW, Nestadt PS, Barnhorst AV, Frattaroli S. Risk-based temporary firearm removal orders: a new legal tool for clinicians. *Harv Rev Psychiatry*. 2021;29(1):6–9.
- The Surgeon General's Call to Action to Implement the National Strategy for Suicide Prevention [Internet]. U.S. Surgeon General & the National Action Alliance for Suicide Prevention; 2012 [cited 2021 Apr 21]. Available from: <https://www.hhs.gov/sites/default/files/sprc-call-to-action.pdf>
- Theis J, Hoops K, Booty M, Nestadt P, Crifasi C. Firearm suicide among veterans of the U.S. military: a systematic review. *Mil Med*. 2021;186(5–6):e525–36.
- Valenstein M, Walters H, Pfeiffer PN, Ganoczy D, Miller M, Fiorillo M, et al. Acceptability of potential interventions to increase firearm safety among patients in VA mental health treatment. *Gen Hosp Psychiatry*. 2018;55:77–83.
- Washington Firearm Safe Storage Map [Internet]. Harborview Injury Prevention & Research Center; 2020 [cited 2020 Apr 1]. Available from: <https://depts.washington.edu/hiprc/firearm-storage-wa/>
- Wertz J, Azrael D, Hemenway D, Sorenson S, Miller M. Differences between new and long-standing US gun owners: results from a national survey. *Am J Public Health*. 2018;108(7):871–7.
- Wintemute GJ. Association between firearm ownership, firearm-related risk and risk reduction behaviours and alcohol-related risk behaviours. *Inj Prev*. 2011;17(6):422–7.
- Wintemute GJ. What you can do to stop firearm violence. *Ann Intern Med*. 2017;167(12):886–7.
- Wintemute GJ, Betz ME, Ranney ML. Yes, you can: physicians, patients, and firearms. *Ann Intern Med*. 2016;165(3):205–13.

## Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more [biomedcentral.com/submissions](https://biomedcentral.com/submissions)

