# Beyond Legislative Lethal Means Restriction Approaches to Suicide Prevention

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Access to lethal means during a suicidal crisis is strongly linked to suicide, although which lethal means represents the highest risk in any particular case depends on specific cultural and contextual factors. For example, pesticide ingestion is estimated to account for approximately 30 percent of suicides globally and historically accounted for up to 80 percent of suicides in certain rural areas of southeast Asia. In other locations where natural and manmade points of elevation are readily accessible, jumping suicides tend to be highly concentrated in particular suicide "hot-spots." As passenger car ownership increased, some countries observed corresponding increases in the number of suicides by carbon monoxide poisoning.

Accordingly, suicide prevention strategies that emphasize restricting access to lethal means need to be responsive to local, contextually driven risk factors. For example, Sri Lanka's ban on several pesticides known to have the highest suicide case fatality rates (paraquat, dimethoate, and fenthion) is estimated to have resulted in a 21 percent decrease in suicide mortality between 2011 and 2015.<sup>6</sup> Similarly, the development of secure, centralized pesticide storage facilities in India has shown promise as a means of averting suicide.<sup>7</sup> In areas where jumping suicides are

more common, meta-analytic results show that interventions focused on establishing barriers and nets are associated with a 28 percent net decrease in annual jumping suicides.<sup>4</sup> Consistent with these findings, evidence shows decreased suicide rates following the development of methods to reduce carbon monoxide via the introduction of catalytic converters (8) and conversions from coal to natural gas.<sup>8,9</sup>

#### Firearms and Suicide in the United States

There are an estimated 393 million firearms in circulation in the United States, with approximately four in ten Americans living in a household with at least one firearm. 10-12 Suicidal crises among firearm owners or those with ready access to firearms are uniquely prevalent in the United States. Firearms have the highest suicide case fatality rate relative to other commonly used means in the United States, with the odds of death in a suicide attempt by firearm 2.6 times greater than with suffocation, the second most lethal method.<sup>13</sup> In 2019, 50 percent of the 47,511 suicides in the United States were by firearm and 60 percent of all firearm deaths were attributed to suicide. 14 Thus, lethal means restriction approaches to suicide prevention in the United States inherently require a focus on firearms because of their combination of lethality and widespread availability.

Constitutional rights to firearm ownership in the United States preclude sweeping bans, although the courts have indicated that these rights are not absolute.<sup>15</sup> Further, because a vast majority

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of firearm owners will never present a substantial risk, sweeping bans may also be an inefficient means of suicide prevention. For example, consider that the 23,941 firearm suicides in 2019 were distributed across a population of approximately 131.8 million individuals who lived in homes with a firearm (i.e., 40% of the U.S. population of 329.5 million). This corresponds to an annual firearm suicide rate of less than two hundredths of one percent. Although these numbers reflect approximations based on various assumptions, it is clear that any legislated lethal means restriction strategy that seeks to minimize firearm seizures while having an appreciable impact on suicide must be narrowly targeted at those who are highest risk.

# **Firearm Restriction Approaches**

Restricting access to firearms through therapeutic or legislated processes has consistently been linked to reduced suicide. For example, Mann et al.'s review of 49 studies examining firearm restriction approaches to suicide prevention found that 98 percent of these interventions were superior to the control condition and that such interventions were scalable. 16 Based on their review, these authors concluded that means restriction approaches, including firearm restriction, were among the four best options considered in their review for preventing suicide. Other supported options included education programs for primary care physicians, education programs for high school students, and predischarge education and follow-up contact surrounding hospital discharge for psychiatric patients following suicidal crisis.

Several naturalistic studies outside of the United States have examined the effects on suicide of a variety of legislative changes that effectively restricted firearm ownership. For example, Switzerland's 2003 Army XXI reform reduced the size of their army from about 400,000 to 200,000 personnel, resulting in a significant decrease nationwide in the availability of firearms, particularly among young men. In the following years, firearm suicide rates decreased by 2.64 per 100,000 among men ages 18 to 43. Although a partial substitution effect was detected (i.e., other means replaced firearms), the reform was found to be associated with a net decrease in suicides.<sup>17</sup> In the 10 years following New Zealand's Amendment to the Arms Act, which imposed more restrictive firearm laws, researchers found that firearm suicide rates decreased significantly among youth and adults.<sup>18</sup> Similarly, following the introduction of more restrictive firearm legislation in the European Union in 1997, firearm suicide (and homicide) rates decreased in Austria. 19 Based on these findings, Kapusta et al. concluded, "Restrictive firearm legislation should be an integral part of national suicide prevention programs in countries with high firearm suicide rates" (Ref. 19, p 253). Given public opinion data in the United States showing high levels of support for a range of firearm restriction policies among gun owners and nongun owners, one might expect such an approach to suicide reduction to be highly feasible. 20,21 But legislative enthusiasm for firearm policy in the United States is frequently much more subdued, and it has been suggested that partisan gerrymandering might contribute to the disconnect between voters and their elected representatives on questions of firearm policy.<sup>22</sup>

## **Extreme Risk Protection Order Laws**

Until recently, there were few legal mechanisms to remove firearms already in the possession of individuals deemed to present a danger to themselves. Extreme risk protection order (ERPO) laws (also known as red flag laws, gun violence restraining orders, and risk-based firearm seizure laws) are a notable exception in that they provide noncriminalizing mechanisms for time-limited firearm seizures from individuals judged to present a serious risk to themselves or others. Although critics have argued against the constitutionality of ERPO laws, generally unsuccessfully, the legal balancing act of curtailing individual rights in the interest of preventing imminent danger is nothing new. 23,24 For example, all states allow for the civil commitment of individuals judged to be dangerous as a result of mental disorder, upholding the constitutionality of limiting individuals' liberty interests so long as adequate procedural protections exist.<sup>25</sup> In addition to over a dozen states enacting ERPO legislation in recent years, public opinion polling suggests that such laws may be attaining increased levels of public approval. For example, although such policies were supported by only 52.5 percent of respondents in a 2013 public opinion survey, a 2017 survey showed a nearly 20percentage point increase in support.<sup>20,26</sup>

Although ERPO legislation has tended to garner lawmakers' interest in the wake of high-profile mass shootings, such as the legislative momentum seen in Florida and other states following the tragedy at Parkland High School, data show that, in practice, approximately two-thirds of all ERPO seizures are motivated by concerns regarding suicidality.<sup>27,28</sup> Recent data from Washington State and Oregon, both of which enacted ERPO laws in the past five years, show similar trends to those observed in earlier adopting states. In Washington, of the 237 ERPOs filed during the first two and a half years of implementation, 28.3 percent were related to concerns about harm to self, 36.3 percent regarding harm to others, and 35.4 percent harm to both. 29 Similar proportions have been observed in King County, Washington.<sup>30</sup> In the first 15 months following the enactment of Oregon's ERPO law, 73 percent of respondents had a history of suicidality.<sup>31</sup> In the first year of Colorado's law, which enacted ERPO legislation in 2020, most petitions that were filed were premised on risk of harm to others. Data suggest that petitions related to risk of suicide might be granted at higher rates; of the 49 ERPO petitions that were granted, 29 were based on threats toward self only or both self and others.<sup>32</sup>

Given that ERPO laws have thus functioned primarily as legislated lethal means restriction strategies for suicidal individuals, it is perhaps unsurprising that the strongest evidence available regarding the effects of these laws has focused on suicide outcomes. For example, Kivisto and Phalen's synthetic control study estimated that Indiana's ERPO law resulted in a 7.5 percent reduction in firearm suicide in Indiana and a 13.7 percent reduction in Connecticut.<sup>33</sup> Swanson et al.'s studies of the effects of ERPO legislation also supported decreased firearm suicide among individuals subject to firearm seizures in Connecticut and Indiana. 34,35 Notably, these authors estimated that one firearm suicide was averted for every 10.6 seizures that occurred in Connecticut<sup>34</sup> In Indiana, the number of ERPO seizures estimated to result in one averted suicide was 10.1.<sup>35</sup>

## **ERPO Laws as Suicide Prevention Tools**

The implications of data showing that one suicide might be averted for every ten or eleven firearm seizures carried out under ERPO statutes present something of a sociopolitical Rorschach test. Whether one suicide averted for every ten or so firearm seizures is acceptable, in what Swanson *et al.* describe as the "balance between risk and rights," is open to debate (Ref. 34. p 206). Setting aside these implications,

which should continue to be weighed by policy-makers, such findings raise the related question of how well these legislated interventions appear to perform relative to other psychiatric approaches to suicide prevention. As arguably one of the more widely disseminated lethal means restriction interventions to reduce suicidal individuals' access to firearms in the United States, we might consider whether one suicide averted for every ten "treated" individuals compares favorably to currently available pharmacologic and psychosocial interventions for suicide prevention.

## **Number Needed to Treat to Prevent Suicide**

To contextualize findings suggesting that one suicide might be averted for every 10 or 11 ERPO seizures against the broader suicide prevention literature, one might consider estimates of the number needed to treat (NNT) for widely disseminated pharmacological and psychosocial interventions. As an estimate of the number of individuals who would need to be treated to prevent one negative outcome (e.g., suicide), the NNT metric might be seen as particularly informative to questions regarding the balance of anticipated benefits to individuals exposed to various interventions. Although there is a substantial literature examining the effectiveness of a range of approaches to suicide prevention, only a relatively small portion of this work provides evidence regarding completed suicide. Most typically, suicidal ideation, planning, nonfatal attempts, and suicide-related hospitalization events serve as study outcomes. This is due in part to the fact that completed suicide is a low base rate event, which renders these other, more frequent markers of suicidality more amenable to study with modest sample sizes. As a result, however, many interventions that specifically target suicidal behavior are supported by clinical trials that are underpowered to detect completed suicide and frequently have no suicides in any study arm (e.g., Dialectical Behavior Therapy).<sup>36</sup>

Meta-analytic results are varied regarding the effectiveness of pharmacologic interventions for suicide prevention. In a meta-analysis of randomized controlled trials comparing lithium to placebo, Cipriani *et al.* found that lithium treatment was associated with significant reductions in suicide.<sup>37</sup> Applying the formula NNT =  $(1 + (\text{control event rate} \times (\text{OR-1})))/((1-\text{control event rate}) \times \text{control event rate} \times (\text{OR-1}))$  to the data reported, these

results suggest that one suicide might be expected to be averted for every 46 patients treated with lithium. In a more recent meta-analysis of RCTs of lithium versus control, however, lithium was not found to be significantly associated with fewer suicides, nor were any other pharmacologic approaches.<sup>38</sup> If one were to estimate an NNT based on data reported by Riblet *et al.*, at least 67 people would be expected to receive lithium treatment for every suicide it potentially prevented.<sup>38</sup>

Estimates of the effectiveness of psychosocial interventions on suicide prevention are similarly variable. In a nationwide Danish cohort study of individuals who had engaged in deliberate self-harm, Erlangsen et al. estimated that 188 individuals would need to receive psychosocial intervention to prevent one suicide over a 20-year follow-up.<sup>39</sup> Psychosocial interventions in this study ranged from 8 to 10 sessions with a social worker and focused on suicide prevention, although there was no specific treatment protocol, and clinicians implemented a broad range of therapeutic approaches (e.g., cognitive, psychodynamic, systemic, dialectical behavior). In a metaanalysis of RCTs, it was estimated that one suicide might be averted for every 80 individuals who received cognitive behavioral therapy for suicide prevention and that the WHO's Brief Intervention and Contact (BIC) model might prevent one suicide for every 52 individuals treated. 38 Notably, with the exception of suicide prevention focused CBT, Riblet et al. concluded that there is no evidence that other forms of psychotherapy reduce the risk of suicide. Similarly, they found no evidence supporting higherlevel care interventions, such as partial hospital programs, or somatic therapies, such as electroconvulsive therapy. Although these null findings may in part reflect an artifact of studying low base rate outcomes rather than treatment ineffectiveness, this study nonetheless highlights the limitations of the current evidence for psychosocial interventions aimed at reducing suicide. There exists some support, however, for nonpsychotherapy forms of psychosocial intervention. For instance, in a nonpsychotherapy emergency department (ED) intervention for pediatric patients with suicide-related presentations, Newton et al. estimated that between 32 and 98 individuals would need to be treated with a combined ED-based and post-ED transition intervention to avert one suicide.<sup>40</sup>

In the context of data regarding common pharmacologic and psychosocial interventions, which suggest that, at a minimum, dozens of individuals would need to be treated to avert a single suicide, Swanson *et al.*'s estimates that one suicide might be averted for every 10 or 11 ERPO seizures warrant reflection. <sup>34,35</sup> If we take seriously the possibility that legislated means restriction policies might offer a particularly effective means of suicide prevention, one possibly more efficient than common pharmacologic and psychosocial interventions, we might consider how to build on this recognition in our efforts to address the problem of suicide.

# **Beyond Legislated Lethal Means Restriction**

Through the lens of the lethal means restriction framework, the risk for suicide is premised on the combination of suicidal intent and some means of carrying out this intent. Whereas pharmacologic and psychosocial approaches almost invariably aim to address the former (and corresponding symptoms), means restriction approaches emphasize the latter part of this equation. In the conceptualization of ERPO laws as legislated lethal means restriction interventions, the data reviewed support these laws as one tool that might be particularly effective within the pantheon of suicide prevention strategies.

To the extent that the association between ERPO laws and suicide is explained by restricting suicidal individuals' access to the most lethal means, these data might also be seen to lend peripheral support for firearm means restriction approaches more generally. In particular, various nonlegalistic clinical strategies for reducing suicidal individuals' access to firearms have been examined in recent years and show considerable promise.<sup>41</sup> For example, a recent RCT found that young adults at risk for suicide who received a firearm safety planning intervention reported greater levels of intent to follow firearm safety guidelines. 42 In their review of clinic- and community-based interventions aimed at promoting safe firearm storage practices, Rowhani-Rahbar et al. found support for psychosocial interventions that included safe storage counseling, particularly for interventions that also involved the provision of firearm safety devices. 43 As an example of such interventions, in a recent RCT examining the effectiveness of a brief (i.e., 10 to 15 minutes on average) motivational interviewing-based lethal means counseling intervention with members of the Mississippi National Guard, Anestis et al. randomized participants to receive lethal means counseling only, lethal means counseling plus the provision of safety locks, safety locks only, or health and stress counseling (an active attention control) plus safety locks. 44 Results showed that lethal means counseling and the provision of safety locks resulted in sustained behavioral changes regarding safe firearm storage relative to those in the control condition at six-month follow-up.

Although research has yet to examine the effectiveness of lethal means counseling on reducing suicide, similar to limitations seen in much of the suicide prevention literature, a growing body of evidence supports these interventions in improving clinical endpoints associated with suicide risk. Strengths of these approaches include the potential for widespread dissemination and implementation by health care workers on the frontlines treating suicidal individuals given that research shows that safe storage can be promoted through counseling inter-ventions taking as little as 10 to 15 minutes. 44 Further, as clinicians gain exposure to lethal means counseling approaches, it is anticipated that this will be accompanied by an increased appreciation that "means matter" and that intervening with suicidal individuals necessitates considerations of firearm ownership and access. These developments are important because, as described by Barber and Miller, restricting suicidal individuals' access to firearms "will usually be accomplished not by fiat or other legislative initiative but rather by appealing to individual decision. . . to temporarily store household firearms away from home or otherwise making household firearms inaccessible to the at-risk person until they have recovered" (Ref. 1, p S264).

## **Conclusion**

Restricting suicidal individuals' access to firearms is essential in the United States where firearms, which are unique in the combination of lethality and widespread availability, account for approximately half of all suicides. Although not typically conceived of as a suicide prevention tool by policymakers, ERPO laws have functioned primarily as legislated firearm restriction policies in their implementation, most commonly targeting suicidal individuals. Further, data suggest that these laws are effective, with estimates suggesting that one suicide might be averted for every 10 or 11 firearm seizures carried out under ERPO statutes. Relative to other common pharmacologic and psychosocial approaches to suicide prevention,

ERPO laws may be uniquely efficient, likely due to their effectiveness in narrowly directing firearm seizures toward individuals who present an extremely high risk of suicide. <sup>29,31,34</sup>

Although there is currently no research comparing outcomes associated with different states' variations on ERPO laws that might elucidate key factors essential for suicide prevention, there are at least three plausible mechanisms likely contributing to the positive outcomes observed in states with these laws. First, ERPO statutes codify a process that facilitates lethal means restrictions among individuals at extremely high risk. 29,31,34 Through the development of enforceable procedures for evaluating dangerousness that are inherently tied to considerations of firearm ownership, ERPO laws integrate considerations of dangerousness and lethal means in important ways that might inform clinical approaches to reducing suicide. Second, ERPO laws appear to increase the likelihood that dangerous respondents will access the public mental health system, leading to treatment that might not otherwise have been provided.<sup>34</sup> Third, although future research will be necessary to evaluate this phenomenon, the author has heard anecdotal accounts that ERPO laws are being used informally as a means of leveraging individuals to have friends or family take their firearms during a crisis, with the threat of formal firearm seizure proceedings motivating compliance. In essence, these anecdotal reports suggest the possibility that ERPO laws are being used to create something of a coerced social norming approach whereby individuals close to the respondent are recognized as bearing some responsibility for ensuring safety by securing firearms through the duration of the crisis. Of course, anecdotes are not data, and future research should examine these sorts of implementation questions that may differ somewhat from the letter of the law.

Building on the knowledge gained from ERPO laws regarding their role in the pantheon of suicide prevention tools, the promotion of nonlegalistic means restriction approaches appears desirable, including more widespread dissemination of firearm safety counseling strategies and the development of social norming approaches that promote a shared sense of responsibility for keeping firearms away from family and friends in crisis. Although ERPO laws will continue to play an important role where other, less coercive

interventions have failed, it is hoped that this commentary also promotes interest among psychiatrists in nonlegalistic firearm means restriction approaches to suicide prevention.

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