The sound of my grandmother’s trembling voice lingers from that winter morning, almost 40 years ago now, when she called with awful news. My beautiful cousin Kristin had come home from college for the holidays and killed herself with a shotgun.

Kristin was a decade my junior, a homecoming princess and a talented pianist with a mischievous smile and whimsical sense of humor. To me, she was like a little sister. But for reasons unknown, persistent feelings of sadness and despair crept in and took root in her mind. Five days before Christmas, Uncle Jim found her beside the garage. She had left a note saying she wanted to be with God.

I was a new faculty member in a psychiatry department at the time, embarking on a career in which I would spend decades researching ways to prevent death and injury from guns. That spring, Uncle Jim and Aunt Helen drove halfway across the country to visit me; we sat on the couch together and flipped through a photo album of Kristin. Aunt Helen asked me what could have saved their youngest child. I suggested Kristin had succumbed to a fatal illness; it was no one’s fault.

Today I would give a different answer. I would say Kristin died from a preventable injury with a firearm. I would add that a law prohibiting her access to a gun might have kept Kristin alive.

Extreme risk protection order (ERPO) laws, also known as red flag laws, provide a civil court process designed to prevent firearm injuries by temporarily disarming individuals who pose an imminent risk of harm to themselves or others. An ERPO also prohibits a person from purchasing or possessing a firearm while the order is in effect, typically for up to a year. ERPO laws are now being implemented in 21 states and the District of Columbia and have become a central component of a bipartisan strategy to reduce the toll of gun deaths.1-3

Yet within academia, as the article by Miller et al4 makes clear, questions persist: Do ERPOs actually save lives? If so, how many ERPOs does it take to save 1 life? Answering these queries together with empirical evidence is important both from the perspective of preventing gun violence and protecting gun rights.

A widely cited statistic from our group’s research studies5,6 of suicide deaths among ERPO respondents in Connecticut and Indiana is that for every 10 to 20 ERPOs issued, 1 suicide was averted; in medical research parlance, this is the number needed to treat (NNT). Miller and colleagues4 deconstruct and recalculate our NNT on the basis of an alternative estimate of the probability that a gun owner who attempts suicide will use a gun rather than some other method of self-harm. The new estimate derives from these authors’ analysis of suicide deaths among a large number of registered handgun owners in California. They conclude that a more accurate estimate of the NNT is 22. How should we think about this new estimate, and what does it mean for the existing widespread acceptance of our group’s previous approximation?

Somewhat paradoxically, the NNT is a statistical measure of treatment effectiveness that counts people who did not benefit from the intervention, or would not have needed it in the first place. But what about the real people an ERPO might have saved, people like my cousin Kristin?

With the clarity of excruciating hindsight, it seems obvious that Kristin’s ability to acquire a firearm was a decisive factor in her death. Kristin’s family never had guns. At age 18 years, she was too young to purchase a handgun—the legal minimum age was 21 years—so the gun dealer sold her a shotgun instead. Kristin had not kept secret her feelings of hopelessness; she had an appointment to see a psychiatrist on the day she died. If there had been an ERPO law in effect, and if a concerned family member had requested an ERPO in time, Kristin could have been denied a firearm at the point
of sale. Had she gone home and swallowed pills from the medicine cabinet instead, she would very likely have survived.

Still, gun rights also matter, so the question arises: How do we know when someone poses enough danger to justify deploying police authority to remove their firearms? Risk means uncertainty, by definition, and risk assessment will always be an imperfect predictor of rare adverse events such as suicide; the significant risk factors all apply to many more people who will not die from suicide than who will. Thus, for every hypothetical death averted by an ERPO, there will always be some ERPO respondents who would not actually have harmed themselves, or anyone else, had they been left (literally) to their own devices. We just do not know who they are in advance.

Issuing an ERPO to someone at risk of suicide implies a prediction that without an ERPO there is an unacceptably high chance that they will die of suicide. However, because such an outcome is catastrophic, what counts as an unacceptably high chance of it happening might not be very high at all, in absolute terms. We would surely ignore a 10% chance of a thunderstorm in the weather forecast, but what about a 10% chance of dying? Probably not. A person with 1 in 10 chances of dying by suicide in the coming year has a risk more than 700 times higher than the average person in the US. Still, they have 9 in 10 chances of surviving.

A hypothetical quantity of false-positives in a counterfactual suicide prediction is inherent in an ERPO issued for a suicide concern, and is essentially what the NNT conveys, but what is considered to be a high or low NNT involves human judgment. It depends on a subjective valuation or utility of the outcome at stake, combined with the treatment’s profile of adverse effects. If a treatment simply does not work for some number of people, or they would not have needed it, but the treatment is otherwise benign and of low cost, a high NNT might be quite acceptable. Vaccinations at the population level, for example, have high NNTs; many people must be vaccinated to ensure that the 1 person exposed to a virus will be protected. But what about a treatment for cancer that will benefit only a small proportion of patients with cancer, and also produces extremely uncomfortable adverse effects in every person who undergoes the treatment? In that case, the NNT must be quite low for such a treatment to be recommended.

Should the NNT for ERPOs be considered more analogous to vaccinations or chemotherapy? That might depend on where you are standing. Public health–minded advocates for gun violence prevention might think it is more like vaccination. In their view, the goal might be to get as many qualifying ERPOs out there as possible, which will help ensure that people who are most likely to do something harmful with a gun do not have one, while also reducing the overall number of guns in the community. On the other side, ERPOs face opposition from gun rights advocates determined to stop other states from enacting these laws and to thwart their broad implementation in states that have them. The opponents’ ostensible concern is that ERPOs could infringe on the freedom of too many firearm owners in the community who care deeply about guns, are not actually dangerous, and have no prior gun-disqualifying legal record. The higher the NNT for ERPOs, the more salient these concerns become.

It is important to recognize that there is no one precise and generalizable NNT for ERPOs. Indeed, the NNT is likely to vary from place to place owing to local contextual factors. Miller and colleagues4 use data from handgun owners in California, a state with some of the strictest gun laws of any state. Could these gun owners be a selected population, not entirely representative of gun owners in other states?

Miller and colleagues4 focus their critique on a key input to our NNT estimate: the hypothetical probability that a male gun owner who attempts suicide will choose a firearm as his method of self-injury, rather than some other available method. Our group5,6 estimated this probability using a state-level ecological regression of the estimated proportion of adult male suicide attempts using guns on the probability of gun ownership for any adult in a given state. Miller’s group estimated the probability more directly by an alternative method. They applied case fatality rates to suicide death records of a large number of handgun owners in California to extrapolate a distribution of suicide attempts by different means and thus calculate the probability that gun owners who attempted
suicide used a gun in their attempt. The advantage of this method is the size of the dataset and reasonable certainty that the data pertain to gun owners.

The assumed probability in question is central to the logic of how an ERPO works to prevent suicide. Suicide attempts with firearms are, in general, far more likely to result in death than attempts with other methods. For this reason, a legal intervention that removes firearms from persons at risk of suicide will have a greater benefit in proportion to how likely it is that a gun would have been used in suicide attempts, absent the intervention. Stated differently, removing a firearm from a person who attempts suicide has no effect at all if the person would always have chosen to try a drug overdose, whether or not the gun was taken away.

Miller and colleagues' argument with our group's analysis is rendered less consequential by the fact that ERPO effectiveness cannot be expressed in a single generalizable NNT that is objectively right or wrong; it is inherently not the sort of thing that we can say was underestimated by one study and accurately captured by another study with a different method. Rather, the precision and effectiveness of any ERPO policy's application to any local population at risk—that is, the question of who gets an ERPO in the first instance, why, and with what result—is likely to vary considerably across states and local jurisdictions. Beyond the risk-correlated mix of characteristics of ERPO respondents in one place or another, and the elastic proportion of orders issued for threats against others vs self, other external influences could affect the NNT. Important factors—ERPO covariates—would include the restrictiveness of complementary state gun laws, the targeting priorities of local ERPO champions, the ambient supply of guns on secondary and illegal markets, and cultural attitudes about guns and suicide. Regional ERPO practice may also change and evolve over time. Said differently, the ERPO NNT is not one thing, but may vary with the parameters of ERPO programs as they are being implemented in the real world.

Our Connecticut study first presented an empirically derived estimate of an NNT equal to 20, a number remarkably close to Miller and colleagues' updated estimate of an NNT equal to 22. However, we then observed that this initial estimate depends on the questionable assumption that ERPO respondents, had they not been dispossessed of their guns, would be no more likely than other male gun owners to use a gun as a suicide method. We questioned the validity of this assumption because ERPO respondents are a selected population who, by definition, concentrate risk for suicide or homicide by firearm; that is why a court decided to take their guns away. Given this uncertainty, we offered a way of considering a potential range of NNTs as a function of a given proportion of male gun suicides that involve guns: "Rather than speculating on this, we calculated the mathematical relationship between the expected proportion of gun use in suicides in a given target population, and the corresponding number of gun seizures that would be needed to avert a single suicide in that population."

We present a graph with a curve showing the relationship between the assumed probability that a male gun owner who attempts suicide would use a gun and the resulting NNT for ERPO. We explain that the NNT could be higher or lower in different populations, depending on the proportion of suicide attempts that involve guns: "If the law is applied to a population at risk in which guns are used very rarely as a method of suicide, it may be necessary to conduct a great many gun removals in order to prevent a single suicide. However, when the law is applied to a population at high risk of using guns in any suicide attempts, it may take far fewer gun removal cases to prevent one suicide."

At a lakeside family reunion many years after my cousin Kristin's death, I watched purple balloons ascend into the sky in her memory. I was reminded that the whole point of building evidence for gun violence prevention policies is to save real people from dying: people with families and friends and promising futures. In the end, it seems important not to bury this point in a didactic discussion of alternative probability inputs to counterfactual models.

Of course, in a nation where private gun ownership is commonplace, culturally entrenched, and constitutionally protected, feasible solutions to gun violence hang in the balance of risk and rights. However, whether the beam straightens at 10 or 20 or 22 temporary gun removals seems less consequential than the 1 human life spared and the loved ones not devastated. Furthermore, in a
country where more than 20,000 people every year die of suicide with firearms, it is impossible to ignore that what is too late for Kristin could save many today, sparing other families the agony that Helen and Jim endured for all of their remaining days.

REFERENCES


