

Restricting Access to Methods of Suicide

Rationale and Evaluation of this Approach to Suicide Prevention

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Abstract. Restriction of access to means for suicidal behavior, especially dangerous methods, is a key element in most national suicide prevention strategies. In this paper the rationale for this is discussed, including the fact that suicidal impulses are often brief, that availability of a method may influence both the occurrence and outcome of a suicidal act, and that if a favored means becomes less available it does not always result in substitution by another method. Examples of evidence for the effectiveness of restricting availability of suicidal methods on subsequent suicidal behavior are presented, plus the supporting findings from studies of long-term survivors of serious suicide attempts in which only a minority have gone on to die in subsequent suicide attempts. Finally, factors likely to determine the effectiveness of modifying access to means for suicide are considered, together with the main elements that need to be addressed in evaluation.

Keywords: methods of suicide, restriction of access, firearms, gas, paracetamol, evaluation

Introduction

Restricting access to methods that might be used for suicidal acts is a key element in national suicide prevention strategies (e.g., Department of Health, 2002; US Department of Health and Human Services, 2001; United Nations 1996). Why is this? There are several reasons. In this paper the rationale for this approach is reviewed, including evidence supporting it, the principles of where it is likely to be effective are discussed, and approaches to evaluation of this approach are explored.

Rationale

Suicidal behavior can result from many factors, including, for example, psychiatric disorder (especially depression and substance abuse), psychological characteristics such as aggression and impulsivity, life events and problems, exposure to role models in a person's family and social environment and in the media, and genetic and biological factors (Hawton and van Heeringen, 2000). However, at the point at which a person feels hopeless and potentially suicidal, access to specific methods for suicidal behavior can be crucial. Indeed, this may be the key factor that influences translation of suicidal thoughts into an actual suicidal

act. Most importantly, the nature of the method that is available may have a vital influence on the outcome, particularly where an act is impulsive – then the person engaging in suicidal behavior is likely to use the means most easily available to them. If the method has a high risk of being fatal (e.g., use of firearms, self-poisoning with pesticides) then there is a strong risk that the act will result in death, whereas if the method is less likely to be lethal (e.g., certain psychotropic agents) then the act is more likely to result in survival (Eddleston et al., 2005).

Other factors will also influence choice of method. For example, males generally favor more violent methods (e.g., guns or hanging) whereas females tend to favor less violent methods (e.g., overdoses of medication). This pattern, however, will also be influenced by availability. For example, males will often have greater access to certain violent means, whereas females tend to have more access to medication. Also environmental factors will be relevant, such as living in rural areas, where pesticides may, for example, be readily available, or in cities, where there are more likely to be, for example, tall buildings that may be used for jumping (Lin & Lu, 2006). Furthermore, where a method is readily available to members of a society then that method is likely to be seen as more acceptable as a means of suicide. This would apply to firearms in the USA, although availability may not be the sole explanation.

In order to appreciate the potential impact of reducing availability of the means of suicide it is important to be

aware of the concept of periods of suicide risk. For most people who become suicidal the period of real risk is relatively brief, lasting in some individuals for even just a few minutes or a few hours. In others it may last days, but rarely longer. This is very important in understanding the role of altering the availability of methods in prevention, in that if access to a dangerous means of suicide is restricted at times of risk then survival until the end of these periods is more likely.

The nature of psychological processes that may underlie suicidal acts are also relevant to the discussion of the role of availability of means for suicidal behavior. Although not extensively studied, survivors of near-lethal suicide attempts can be a valuable source of such information. De Moore, Plew, Bray, and Snars (1994) conducted such a study in Australia when they investigated 33 mostly young survivors of self-inflicted firearm injuries admitted to a general hospital after surviving their acts. Few of them had major psychiatric disorders, the most common diagnosis being adjustment disorder (i.e., a major stress response to life events or circumstances). Nearly a third abused alcohol. The most frequent reason given by the individuals for the suicide attempts was interpersonal conflict with a partner or family member. There was often a background of longer-term problems. Most of the patients had shared their suicidal ideas with others before their attempts, but only in the period just before the shooting. Thus, there was not usually evidence of long-term suicidal ideas. The actual shooting was relatively impulsive in the vast majority of cases. Most importantly, in all cases firearms were readily available in the home, and availability was usually the reason given for the choice of this method for the act. Thus, an impulsive response to an acute interpersonal crisis and availability of a firearm in the household were key features leading to suicidal acts by shooting. There was a similar finding in an American study of 30 patients treated in a trauma center for life-threatening self-inflicted gunshot wounds (Peterson, Peterson, O'Shanick, & Swann, 1995). Presumably, if a gun had not been available at least some of the individuals in these studies would have made suicide attempts by another method, but these may have been potentially less lethal. Indeed, the psychological characteristics of the self-harming behavior in the samples in these two studies were very similar to those of people who take overdoses in the UK (Hawton & Catalan 1987), in whom the case fatality rate is relatively low (e.g., Gunnell et al., 1997).

There are, however, several important questions to address in considering why restricting access to dangerous means of suicidal behavior is important. The first is whether availability of specific methods of suicidal behavior affects suicide rates. A second question is whether prevention of suicide during periods of risk is effective in the long term, or whether people simply find some other way of committing suicide. Finally, there is the question of whether there is evidence that deliberately restricting availability of a dangerous means of suicide is effective, first, in reducing the use of that method for suicide, and, second, in terms of affecting overall suicide rates.

Does Availability of Method Affect Suicide Rates?

Probably the most convincing example of the effect that availability of a dangerous method of suicide can have on overall suicide rates, and the potential impact of change in the method's availability comes from the UK. This was when the domestic gas supply underwent a gradual change from toxic coal gas to nontoxic natural (North Sea) gas during the late 1950s through the early 1970s. This followed a period of increasing suicide rates after the Second World War. Natural gas was introduced region by region. Kreitman (1976) estimated the mean percentage of carbon monoxide, the toxic agent in coal gas, in the UK throughout this period. The decrease in the carbon monoxide content began in 1958. At the beginning of the period of change-over, suicide by carbon monoxide poisoning (usually by a person putting their head in a gas oven) was the most common method of suicide in the UK, with just under half of all suicides being by this method. As the carbon monoxide content of gas supplies decreased there was a steady reduction in suicide deaths involving carbon monoxide in England and Wales. The decrease paralleled the reduction in carbon monoxide content of gas supplies. While there was a small increase in other methods, the overall net effect was a very large reduction in suicide rates in both genders; the overall suicide rate decreasing by a third. A similar pattern was observed in Scotland. Thus, the loss of many thousands of lives through suicide appears to have been prevented by this single measure.

The coal-gas story strongly suggests that availability of a dangerous method of suicide influences risk of completed suicide. What other evidence is there for this? Here are two examples of studies relating to firearms, in both of which a case-control design was used. In the first study, Brent and colleagues (1991) investigated three groups of individuals. The first group was a consecutive series of 47 adolescent suicides from Western Pennsylvania, 69% of whom had used firearms in their fatal acts. The second group included 47 suicide attempters admitted to psychiatric units, matched for sex and age and also race and country of origin with the members of the first group. None of the individuals in the second group had used guns in their attempts. The third group also consisted of psychiatric inpatients, but these were individuals who had reported never having had suicidal ideas. Similar matching criteria were used in the selection of this group. Within the group of 47 suicides the use of a firearm for suicide was highly correlated with the presence of a firearm in the home. Thus, where firearms were available in the home 29 out of 34 (85.3%) individuals used guns for suicide, whereas in those where a firearm was not available in the home only 1 out of 13 (7.7%) used a firearm for suicide.

Brent and colleagues compared those who died by suicide with each of the two control groups separately regarding firearm availability in the home. Among those dying

by suicide, a firearm was available in the household in 72.3% of cases compared with just 37.0% of the suicide attempters (odds ratio = 4.5, 95% CI 1.9–10.8). Among the control psychiatric inpatients 38.3% had a firearm available in the home (suicides vs. controls: odds ratio = 4.2, 1.8–10.0). These differences were even more marked for handgun availability in households, with 55.3% of suicides having a handgun available in the home compared with 19.6% of the suicide attempters (odds ratio = 5.1, 2.0–12.9) and 17.0% of controls (odds ratio = 6.0, 2.3–15.6). There were some differences between the suicides and the attempters in terms of the proportions with a diagnosis of depression and also the degree of suicidal intent involved in the suicidal act based on scores on the circumstances section of the Beck Suicidal Intent Scale (Beck, Schuyler, & Herman, 1974). Brent and colleagues, therefore, repeated their comparisons regarding presence of firearms in the home after controlling for these two factors. The difference in availability of firearms between the suicides and the attempters was still significant (odds ratio = 2.1, 1.2–3.6). A diagnosis of conduct disorder was somewhat more frequent in the psychiatric controls than in the group of suicides so the analysis regarding firearm availability in the home was repeated controlling for this factor. Again, a significant difference remained (odds ratio = 2.2, 1.4–3.5). The authors of this study concluded that availability of guns in the home appeared to increase the risk of suicide among adolescents.

In the second study, Kellermann and colleagues (1992) also used a case-control design. They compared 438 people who died by suicide in their homes with control individuals from the general population in Shelby County, Tennessee, and King County, Washington. The controls were matched with the suicides for gender, race, and age. After controlling for various other factors that differed between the two groups (living alone, psychotropic medication, having been arrested, substance abuse, and not graduating from high school), those dying by suicide significantly more often had firearms in the home (adjusted odds ratio = 4.8, 2.7–8.5). In their report the authors concluded: "... ready availability of firearms appears to be associated with an increased risk of suicide in the home ... People who own firearms should carefully weigh the reasons for keeping a gun in the home against the possibility that it might someday be used in a suicide."

Is Prevention of Suicide During Periods of Risk Effective in the Long Term?

A crucial question about restricting availability of methods of suicide is whether prevention of suicide during a period of acute risk helps to prevent suicide in the long term, or whether it makes no difference in that a person will seek out and find an effective method in due course (as people sceptical of

suicide prevention efforts might suggest). As noted above in relation to the coal-gas story in the UK, there was little evidence of an immediate compensatory increase in the use of other methods of suicide following the reduction in suicides by carbon monoxide poisoning. Two specific examples will be provided that provide strong evidence that survival of acute periods of risk is effective. These come from follow-up studies of survivors of serious suicide attempts involving methods that result in death for most people who use them.

O'Donnell, Arthur, & Farmer (1994) studied people who jumped in front of underground (subway) trains in London and survived. Surprisingly, a substantial proportion of individuals do survive what is clearly a method with apparent high risk of fatality. This is because there is a fairly deep well between the rails and also because the electric rail has been placed furthest from the platform. However, all surviving jumpers report believing with certainty that jumping would kill them. O'Donnell and colleagues studied a consecutive series of 94 individuals who survived jumping in front of underground trains during the 3-year period 1977–1979. They followed each of them up for at least 10 years and found that seven had died by suicide and two from probable suicide. Therefore, nine out of the 94 persons died by (likely) suicide, a suicide rate of 9.6%. Three of these died by again jumping under subway trains. All the suicides and probable suicides occurred in the first 3 years and 7 months of the follow-up period. There was no evidence of increased risk beyond this time.

The second example comes from a follow-up study of 515 people who were restrained from jumping from the Golden Gate Bridge in San Francisco between 1937 and 1971 (Seiden, 1978). Jumping from the bridge is nearly always fatal. During a follow-up period with a median of 26.7 years, only 25, or 4.9%, of the would-be jumpers died by suicide. Eight of these died by jumping from a bridge, all but one from the Golden Gate Bridge. These suicides usually occurred soon after the episodes in which jumping was prevented. In a comparison group of suicide attempters admitted to San Francisco General Hospital in 1956–1957 who were followed up for 15 years, the suicide rate was 7.1%. Thus, persons who came close to suicide by jumping from the Golden Gate Bridge had a relatively low long-term suicide rate.

It, therefore, appears that the majority of individuals who survive an extremely serious suicide attempt do not go on to die by suicide. Also, such individuals do not necessarily turn to another method.

Factors Likely to Determine Whether Modifying Access to Means for Suicide Will Be Effective

Several factors are likely to influence the effectiveness of a new policy of restriction. One is the popularity of the method

that is targeted. Clearly the more popular the method the more substantial might be the effect in terms of overall rates of suicidal behavior, as illustrated by the coal gas story. Another factor concerns the danger of the method, with restriction of access to more dangerous methods of suicide (e.g., firearms, pesticides, carbon monoxide) likely to have a greater effect on rates of death by suicide than changed availability of less dangerous methods. A further factor concerns the characteristics of the individuals and their behavior involved in use of a particular method. Where acts are characterized by impulsivity and use of a method available in the household then success of a strategy is more likely. A fourth factor is the extent to which the strategy can be implemented. A fifth factor is likely to be the availability of similar methods that might appeal to those who would have used the targeted method. Interestingly, some time after the success of the coal gas story there was subsequently a gradual increase in deaths by carbon monoxide self-poisoning from car exhausts, a trend that was then reversed with the introduction of catalytic converters (Kendell, 1998; Amos, Appleby, & Kieman, 2001). Finally, the success of a scheme will depend on its being maintained.

Evaluation of Schemes for Changing Access to Methods of Suicide

It is crucial to carefully evaluate any strategy in which change in access to a method of suicidal behavior is introduced. The following are principles that should be applied in the evaluation:

1. The baseline period for which data are obtained before the change in access should be quite long, preferably several years. This will provide greater sensitivity to detecting change and also help identify underlying trends that will need to be taken into account in any analyses.
2. The period of postchange evaluation should also be quite long, say at least 2 or 3 years. Shorter periods may not enable a change in rate of suicide to be detected.
3. The implementation of the strategy should be assessed, i.e., the extent to which it is being applied and maintained.
4. The evaluation should include examining data on:
 - a. Suicidal behavior with the method that is being targeted; and
 - b. Use of other methods of suicidal behavior. This preferably includes both fatal and nonfatal acts. This will allow not only the impact of the strategy on the specifically targeted method to be assessed, but also whether there is a substitution of method (and perhaps a less dangerous one).
5. In the statistical analyses, account should be taken of underlying trends, both in overall suicide rates prior to the initiative and in use of specific methods of suicidal behavior.

The following is a description of the background, rationale, implementation, and evaluation of a specific example of changing access to means, namely analgesics used for self-poisoning. Between the 1970s and 1990s, rates of both fatal and nonfatal self-poisoning with analgesics sold over the counter, especially paracetamol (acetaminophen), increased dramatically in the UK. By the mid-1990s, between 35% and 50% of all overdose presentations to general hospitals involved paracetamol (Bialas et al., 1996; Hawton, Fagg, Simkin, Bale, & Bond, 1997), the majority being in very young people. Approximately 220–250 deaths were the result of paracetamol poisoning, mainly the result of liver necrosis (O'Grady, 1999). Interviews with patients who had taken nonfatal paracetamol overdoses showed that many had used this method of overdose because of the ready availability of the medication in the household, most acting on impulse (Hawton et al., 1995). Interestingly, many patients thought (incorrectly) they would become unconscious as an immediate result of the overdose. Several potential approaches to prevention were considered (Hawton, 2002). Reduction in pack sizes, with strict enforcement of the maximum amount of tablets that could be bought per purchase, was chosen as the primary approach, with additional changes to warnings on packs about the danger of overdose. These changes were introduced as legislation in September 1998. The legislation included aspirin as well as paracetamol because of concerns about possible substitution by aspirin overdose, which is also dangerous.

During the first year following the legislation there were significant changes in sales data, showing that pack size had been reduced and for paracetamol this had been compensated for by increased numbers of packs being bought. The net effect of this would have been that reduced amounts would have been available in households most of the time (Hawton, 2002). There were significant reductions in large overdoses of both paracetamol and aspirin, markedly fewer liver transplants caused by paracetamol overdose, and, most importantly, a sizeable reduction in deaths from both paracetamol and aspirin overdoses (Hawton et al., 2001). Further evaluation of the impact of the legislation has shown that these changes have largely persisted, and with only limited evidence of substitution of methods involving another over-the-counter analgesic, ibuprofen, but without this itself causing deaths (Hawton et al., 2004).

The impact of this measure has clearly been substantial. It has been estimated that it may have resulted in the prevention of approximately 200 deaths from analgesic poisoning during the 3 years after the legislation was introduced (Hawton et al., 2004).

Conclusions

Acute suicide risk is generally brief. Suicidal behavior, including actual suicides as well as attempts, is often impulsive. Most survivors of potentially lethal suicide attempts

do not appear to have a very high long-term risk of suicide. There is clear evidence that availability of method influences method choice for suicide. Also changes in the availability of popular methods of suicide, as shown in the change from coal gas to natural gas in the UK, can have substantial effects on suicides rates.

Another implication of the evidence presented in this contribution is that it is essential that access to dangerous methods of suicidal behavior is an integral part of clinical assessment of depressed or suicidal individuals. Dangerous methods should, as far as possible, be removed from the homes of those at risk. There should also be a public education policy regarding the risks associated with having dangerous methods of suicide available in the home. Such a policy should, however, be designed with care, particularly with regard to the potentially negative impact that the provision of such information can have on those who are already suicidal. Finally, serious efforts should be made to substantially reduce the availability of specific methods of suicide, especially from households.

It is quite clear that tackling availability of specific methods of suicide in individual countries must be an important element in national suicide prevention strategies. While not addressing the underlying causes of suicide, it is a policy that may have significant impact on overall suicide rates.

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