

MORTALITY AMONG RECENT PURCHASERS OF HANDGUNS

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ABSTRACT

Background There continues to be considerable controversy over whether ownership of a handgun increases or decreases the risk of violent death.

Methods We conducted a population-based cohort study to compare mortality among 238,292 persons who purchased a handgun in California in 1991 with that in the general adult population of the state. The observation period began with the date of handgun purchase (15 days after the purchase application) and ended on December 31, 1996. The standardized mortality ratio (the ratio of the number of deaths observed among handgun purchasers to the number expected on the basis of age- and sex-specific rates among adults in California) was the principal outcome measure.

Results In the first year after the purchase of a handgun, suicide was the leading cause of death among handgun purchasers, accounting for 24.5 percent of all deaths and 51.9 percent of deaths among women 21 to 44 years old. The increased risk of suicide by any method among handgun purchasers (standardized mortality ratio, 4.31) was attributable entirely to an excess risk of suicide with a firearm (standardized mortality ratio, 7.12). In the first week after the purchase of a handgun, the rate of suicide by means of firearms among purchasers (644 per 100,000 person-years) was 57 times as high as the adjusted rate in the general population. Mortality from all causes during the first year after the purchase of a handgun was greater than expected for women (standardized mortality ratio, 1.09), and the entire increase was attributable to the excess number of suicides by means of a firearm. As compared with the general population, handgun purchasers remained at increased risk for suicide by firearm over the study period of up to six years, and the excess risk among women in this cohort (standardized mortality ratio, 15.50) remained greater than that among men (standardized mortality ratio, 3.23). The risk of death by homicide with a firearm was elevated among women (standardized mortality ratio at one year, 2.20; at six years, 2.01) but low among men (standardized mortality ratio at one year, 0.84; at six years, 0.79).

Conclusions The purchase of a handgun is associated with a substantial increase in the risk of suicide by firearm and by any method. The increase in the risk of suicide by firearm is apparent within a week after the purchase of a handgun and persists for at least six years. (N Engl J Med 1999;341:1583-9.)

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HANDGUN ownership is common in the United States; 16 to 19 percent of the population (26 to 30 percent of men and 7 to 8 percent of women) own a handgun.¹⁻³ Handguns are acquired more frequently for self-defense than for all other reasons combined.³ The wisdom of keeping a firearm for protection remains a subject of active debate. Estimates of the frequency with which firearms are used for self-defense range from fewer than 100,000 to 2.5 million instances per year.^{4,5} Defensive use of firearms is not rare; the true frequency is probably between 200,000 and 500,000 instances annually.⁶

Nevertheless, access to handguns may actually increase the risk of violent death. The presence of a handgun in the home has been associated with an increased risk of suicide by means of a firearm among adults in general,^{7,8} women,⁹ and adolescents¹⁰ and has also been associated with an increased risk of homicide.^{8,9,11} These data were gathered in case-control studies that were geographically limited. Only one study related the risk of death to personal ownership of handguns.⁸ Another case-control study, conducted in New Zealand, where handgun ownership is tightly regulated, found no association between access to firearms and the overall risk of suicide among men.¹²

We report the results of a large, population-based cohort study of the risk of death among persons who have recently purchased a handgun. Our study population comprised the 238,292 persons who purchased handguns from licensed firearm dealers in California in 1991. We compared the mortality in this group with that in the general adult population of California from 1991 through 1996 to determine whether recent purchasers of handguns were at increased risk for death by suicide or homicide, whether by means of a firearm or another method, or were at increased risk for death by other causes.

METHODS

A roster of all persons who purchased handguns from licensed firearm dealers in California in 1991 was provided by the California

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Department of Justice. Records included each purchaser's full name, date of birth, address, and date of application for handgun purchase.

California law required completion of an application for handgun purchase, followed by a 15-day waiting period, during which time criminal records were searched for offenses disqualifying the applicant from purchase and a search was conducted for records of mental illness or incapacity as determined by a court. Felons, persons under 21 years of age, and certain others are prohibited from purchasing handguns under long-standing federal and state statutes. A 1991 California law also prohibited persons with convictions for common violent misdemeanors (such as simple assault and brandishing a firearm) from purchasing firearms.

Information on deaths from 1991 through 1996 was obtained from the state's automated mortality file (the Death Statistical Master File). Tentative matches between handgun purchasers and persons listed in the mortality file were made according to last name and date of birth. Data with respect to other variables were then compared to confirm a tentative match.

The sex of handgun purchasers was not supplied by the California Department of Justice but was determined for 98.5 percent of handgun purchasers by comparing their names with sex-specific frequency tabulations of first and middle names for persons who died in California from 1989 through 1996 (derived from the mortality file) or who were born in the United States or Canada in 1994 or 1995.¹³ Data on race or ethnic background were not available.

The observation period with respect to mortality among handgun purchasers began 15 days after the date of the purchase application (the first day after the required waiting period, referred to as the day of purchase for purposes of this study) and ended on December 31, 1996. Results were calculated for the first year after handgun purchase and for the entire period of observation. Since purchases occurred throughout 1991, first-year results were determined by making comparisons with average annual statewide mortality rates for 1991 and 1992 combined.

The risk of death was calculated in terms of the standardized mortality ratios, with adjustment for age, sex, or both, with the general adult population of the state as the reference group. Mortality rates for the general population were calculated by dividing the average annual number of deaths during a given period by the population at the midpoint of that period, as estimated by extrapolation from the 1990 census¹⁴ to the projected population of the state in 2000.¹⁵ Since we examined data for an entire population, confidence intervals were not calculated.

Crude rates of suicide by means of firearms among handgun purchasers were calculated as the number of deaths by this means during a given period, divided by the number of person-years at risk during that period; rates for periods of less than one year were annualized. For comparison, rates for the adult population of the state were calculated as described above, with adjustment for age and sex.

RESULTS

As compared with the general adult population, the 238,292 purchasers of handguns in California in 1991 included a far greater proportion of men (Table 1). Nearly half (49.2 percent) of the handgun purchasers (but only 36.4 percent of the state population) were 34 years old or younger; in contrast, just 3.5 percent of handgun purchasers (but 15.0 percent of the state population) were 65 years old or older.

Suicide by any method was the leading cause of death among handgun purchasers in the first year after handgun purchase; it accounted for 24.5 percent of all deaths in this cohort (Table 2). Suicide by means of a firearm (188 of 857 deaths) ranked second among all causes of death, after heart disease (207 deaths) and ahead of cancer (160 deaths). Among all

TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF THE 238,292 PERSONS WHO PURCHASED HANDGUNS IN CALIFORNIA IN 1991 AND OF ALL ADULTS IN CALIFORNIA IN 1991.*

CHARACTERISTIC	HANDGUN PURCHASERS	ADULTS IN CALIFORNIA
	percent	
Sex		
Male	88.0	49.1
Female	12.0	50.9
Age (yr)		
21-24	15.8	9.5
25-34	33.4	26.9
35-44	24.9	22.9
45-54	15.2	14.9
55-64	7.1	10.9
65-74	2.9	8.9
≥75	0.6	6.1

*Because of rounding, percentages do not always sum to 100.

TABLE 2. ONE-YEAR MORTALITY FROM SUICIDE AMONG PERSONS WHO PURCHASED HANDGUNS IN CALIFORNIA IN 1991 AS COMPARED WITH THE AVERAGE ANNUAL MORTALITY FROM SUICIDE AMONG ALL ADULTS IN CALIFORNIA IN 1991 AND 1992.*

VARIABLE	HANDGUN PURCHASERS	ADULTS IN CALIFORNIA
	percent (no./total no.)	
Suicides by firearm (in relation to all suicides)		
Men	91.1 (164/180)	58.7 (1577/2686)
Women	80.0 (24/30)	29.7 (245/826)
Total	89.5 (188/210)	51.9 (1822/3512)
Suicides by firearm (in relation to all deaths)		
Men	21.0 (164/780)	1.4 (1577/109,432)
Women	31.2 (24/77)	0.2 (245/99,187)
Total	21.9 (188/857)	0.9 (1822/208,619)
Suicides (in relation to all deaths)		
Men	23.1 (180/780)	2.5 (2686/109,432)
Women	39.0 (30/77)	0.8 (826/99,187)
Total	24.5 (210/857)	1.7 (3512/208,619)

*Since handgun purchases occurred throughout 1991, first-year comparisons were made to average annual statewide mortality for 1991 and 1992 combined.

adults in California in 1991 and 1992, suicide ranked ninth among all causes of death and accounted for 1.7 percent of all deaths. There were, on average, 1822 suicides by firearms annually in California during 1991 and 1992, of which 10.3 percent were committed by persons who had purchased handguns in 1991. The percentage of all suicides that were committed with firearms and the percentage of all deaths that were suicides, whether committed with firearms

or by any method, were substantially higher among persons who had recently purchased a handgun than in the adult population of the state (Table 2).

Suicide by means of a firearm accounted for 31.2 percent of all deaths during the first year among women who purchased handguns, as compared with only 0.2 percent of all deaths among all women in California in 1991 and 1992. Women 21 to 44 years old made up 75.4 percent of all women who purchased handguns. Among these younger women, more than half of those who died during the first year (51.9 percent) had committed suicide, and 37.0 percent had committed suicide with use of a firearm. Among all women 21 to 44 years old in California in 1991 and 1992, 6.5 percent of those who died had committed suicide, and 2.8 percent had committed suicide with a firearm.

Information about the type of firearm was available for 116 (61.7 percent) of all suicides by firearm among persons who had purchased handguns within the preceding year; handguns had been used in 114 (98.3 percent) of these suicides. The type of firearm was available for 2401 (65.9 percent) of all 3643 suicides by firearm among adults in California in 1991 and 1992; of these suicides, 1750 (72.9 percent) involved handguns.

After adjustment for age and sex, handgun purchasers, as compared with the general adult population during the same period, were at substantially greater risk for suicide in the first year after a handgun purchase (standardized mortality ratio, 4.31), and the increase was attributable entirely to the substantial excess mortality from suicide by firearm (standardized mortality ratio, 7.12) (Table 3). Women who purchased handguns were at particularly high risk for suicide with a firearm (standardized mortality ratio, 38.71). The excess risk of suicide by any method and of suicide by firearm declined slightly for all purchasers until the age of 44, rose thereafter, and was highest for those 75 years old or older.

The rate of suicide by firearm among handgun purchasers was greatest immediately after the purchase and declined thereafter (Fig. 1). Two purchasers committed suicide by means of a firearm during the 15-day waiting period, before the observation period began, and 48 did so during the first 2 weeks after the waiting period ended. The rate for the first week after purchase was 644 per 100,000 person-years, 57 times as high as the adjusted statewide rate (11.3 per 100,000 persons per year). Of all handgun purchasers who committed suicide by firearm during the six-year observation period, 25.0 percent of women and 13.7 percent of men did so within a month after buying their handguns.

Forty-two purchasers of a handgun were murdered in the first year after their purchase; firearms were involved in 40 (95 percent) of these cases. Homicide by means of a firearm accounted for 4.7 percent

TABLE 3. STANDARDIZED MORTALITY RATIOS FOR SUICIDE AND HOMICIDE AMONG HANDGUN PURCHASERS IN THE FIRST YEAR AFTER HANDGUN PURCHASE IN 1991, AS COMPARED WITH AVERAGE ANNUAL MORTALITY FROM SUICIDE AND HOMICIDE AMONG ALL ADULTS IN CALIFORNIA IN 1991 AND 1992.*

CHARACTERISTIC	SUICIDE			HOMICIDE		
	ALL METHODS	FIRE-ARMS	OTHER METHODS	ALL METHODS	FIRE-ARMS	OTHER METHODS
Total†	4.31	7.12	0.99	0.70	0.87	0.14
Sex‡						
Male	3.85	6.36	0.76	0.66	0.84	0.07
Female	16.13	38.71	4.84	1.83	2.20	1.41
Age (yr)§						
21-24	3.98	6.16	0.84	0.70	0.81	0.00
25-34	3.76	6.58	0.81	0.65	0.83	0.00
35-44	3.45	5.98	1.11	0.42	0.62	0.00
45-54	4.21	6.82	1.09	0.87	1.08	0.55
55-64	5.07	7.84	0.63	2.19	2.60	1.67
65-74	7.76	9.36	3.28	4.76	10.53	0.00
≥75	15.00	20.83	0.00	0.00	0.00	0.00

*Since handgun purchases occurred throughout 1991, first-year comparisons were made to average annual statewide mortality for 1991 and 1992 combined.

†Values have been adjusted for age and sex.

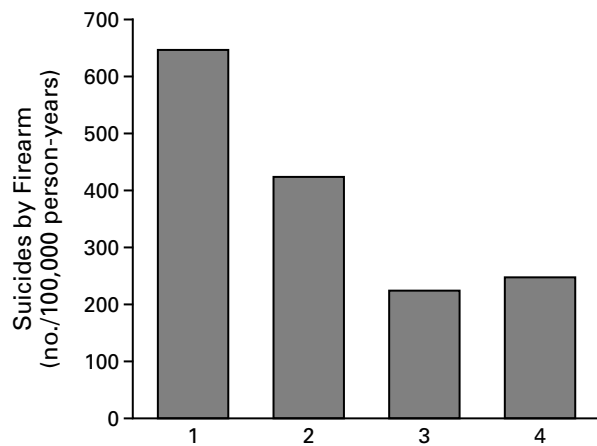
‡Values have been adjusted for age.

§Values have been adjusted for sex.

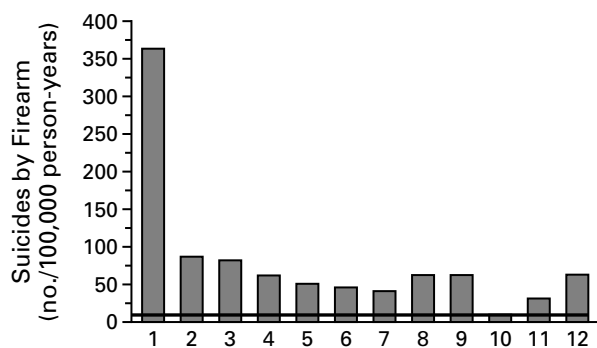
of all deaths in this cohort. In the state as a whole during 1991 and 1992, firearms were involved in 70.5 percent of homicides, and homicide by firearm accounted for 1.2 percent of all deaths. After adjustment for age, homicide by firearm accounted for fewer deaths than expected among male handgun purchasers (standardized mortality ratio, 0.84) but more deaths than expected among women (standardized mortality ratio, 2.20) (Table 3).

Among men who purchased a handgun, there were fewer deaths than expected from heart disease (standardized mortality ratio, 0.78), cancer (0.67), unintentional injury (0.67), and all causes (0.73) in the first year after the purchase of a handgun. Mortality from all causes among women was greater than expected (standardized mortality ratio, 1.09), though there were fewer deaths than expected from heart disease (standardized mortality ratio, 0.78), cancer (0.47), and unintentional injury (0.46). For women 21 to 44 years of age, the standardized mortality ratio for death from all causes was 1.53. In both cases, the entire increase in the risk of death from all causes could be accounted for by the excess number of deaths from suicide by firearm.

The rate of suicide by firearm among handgun purchasers remained greater than the rate in the general population throughout follow-up (Fig. 2). Standardized mortality ratios for suicide by all methods and for suicide by firearm were lower than those for the first year after purchase but remained high; those for



A



B

Figure 1. Rates of Suicide by Firearm in the First Four Weeks (Panel A) and the First Year (Panel B) after Purchase among Persons Who Purchased Handguns in California in 1991.

The horizontal line in Panel B indicates the age- and sex-adjusted average annual rate of suicide by firearm in California in 1991 and 1992 (11.3 per 100,000 persons per year).

homicide were little changed (Table 4). Women who purchased a handgun remained at high risk for both suicide by means of a firearm (standardized mortality ratio, 15.50) and death by homicide with a firearm (standardized mortality ratio, 2.01).

Men remained at decreased risk of death from causes other than suicide or homicide and from all causes combined (standardized mortality ratio, 0.69). Mortality from all causes was no longer increased for women overall (standardized mortality ratio, 0.94), but it remained greater than expected for women 21 to 44 years old (standardized mortality ratio, 1.43); 71.4 percent of this increase was attributable to excess deaths from suicide and homicide, and 49.6 percent was attributable specifically to suicide by firearm.

DISCUSSION

The purchase of a handgun is associated with substantial changes in the risk of violent death. Among

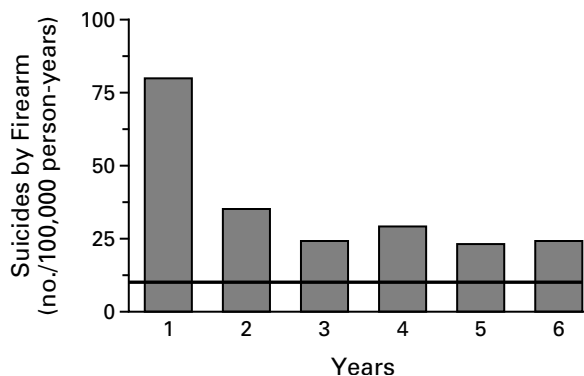


Figure 2. Rates of Suicide by Firearm during the Six Years after Purchase among Persons Who Purchased Handguns in California in 1991.

The horizontal line indicates the age- and sex-adjusted average annual rate of suicide by firearm in California in 1991 through 1996 (10.7 per 100,000 persons per year).

TABLE 4. STANDARDIZED MORTALITY RATIOS FOR SUICIDE AND HOMICIDE AMONG HANDGUN PURCHASERS DURING UP TO SIX YEARS' OBSERVATION AFTER PURCHASE IN 1991 (1991 THROUGH 1996), AS COMPARED WITH AVERAGE MORTALITY FROM SUICIDE AND HOMICIDE AMONG ALL ADULTS IN CALIFORNIA IN 1991 THROUGH 1996.

CHARACTERISTIC	SUICIDE			HOMICIDE		
	ALL METHODS	FIRE ARMS	OTHER METHODS	ALL METHODS	FIRE ARMS	OTHER METHODS
Total*	2.16	3.50	0.66	0.67	0.81	0.22
Sex†						
Male	1.98	3.23	0.56	0.64	0.79	0.18
Female	6.83	15.50	2.54	1.55	2.01	0.97
Age (yr)‡						
21-24	2.53	3.97	0.67	0.68	0.78	0.00
25-34	1.69	2.75	0.66	0.60	0.70	0.20
35-44	1.89	3.28	0.73	0.62	0.80	0.22
45-54	2.01	3.34	0.54	0.88	1.22	0.32
55-64	2.71	4.00	0.47	1.10	1.70	0.29
65-74	3.70	4.58	1.32	1.68	2.70	0.78
≥75	5.49	7.33	0.51	0.00	0.00	0.00

*Values have been adjusted for age and sex.

†Values have been adjusted for age.

‡Values have been adjusted for sex.

people who purchased a handgun in California in 1991, suicide was the leading cause of death in the first year after the purchase; suicide specifically with a firearm ranked second, after heart disease. The rate of suicide by firearm among handgun purchasers during the first week in which they could have had possession of their handguns, at 644 per 100,000 person-years, was similar to rates of suicide by all methods combined among male veterans who had been hospitalized for affective disorders (695 per 100,000 per-

sons per year) or schizophrenia (456 per 100,000 persons per year).¹⁶

The increased risk of death associated with the purchase of a handgun resulted specifically from an increased risk of violent death; there were fewer deaths than expected from other causes among both men and women who purchased handguns. This finding is most likely due to an affluent-gun-buyer effect. The prevalence of handgun ownership rises with socioeconomic status,³ and increasing socioeconomic status is associated with a lower risk of death from most causes.¹⁷ Persons who in any year spend as much as \$600 to purchase handguns are even more likely than other handgun owners to be of higher socioeconomic status than the general population. The risk of suicide generally decreases as socioeconomic status increases, however,¹⁸⁻²⁰ suggesting that adjustment for socioeconomic status might reveal the increase in the risk of suicide after a handgun purchase to be even larger than we report here.

Two distinct explanations may be proposed for the increased risk of suicide by firearm among recent purchasers of handguns. The near absence of suicides by firearm during the waiting period and the marked increase in the first month after the end of the waiting period suggest that some purchasers owned no other firearms and bought handguns with the intention of killing themselves. Most suicides by firearm occurred after a longer period of ownership, however. In these cases, preexisting access to a handgun may have added to other newly arising risk factors. This possibility would be consistent with the finding that fewer than 10 percent of persons who committed or attempted suicide with a firearm acquired the firearm for that purpose.²¹⁻²³

Some suicides that occurred soon after purchase may have been planned by persons with terminal illnesses so as to avoid further suffering. Our data suggest that this circumstance was not common, however. If it were, some persons who initiated such plans would probably not have completed them, and an increase in early deaths from cancer and heart disease, which we did not observe, would have resulted. On the contrary, studies of survivors suggest that suicide by means of a firearm usually occurs impulsively; alcohol use and conflict with an intimate partner are often involved.^{21,23,24}

Our finding that the risk of death from homicide was lower among male purchasers of handguns than among men in the general population appears to conflict with findings in previous studies.^{8,11} Differences in study populations may be responsible. The previous studies were based on current ownership of firearms, whereas we focused on the recent legal purchase of handguns. The presumably high socioeconomic status of our study population relative to that of the general population would lessen the risk of homicide^{25,26}; the previous studies sought to mini-

mize differences in socioeconomic status. The handgun purchasers in our cohort also passed a background check; none had a conviction for any felony or violent misdemeanor or were known to have been judged mentally ill or to be addicted to controlled substances. The absence of such potential risk factors for death by homicide means that our estimates may be subject to a "good boy" bias.²⁷ Finally, in the previous studies, the risk of death by homicide for persons in households with firearms was compared with the risk for persons in households without firearms. We compared this risk among recent purchasers of handguns with that in a general population in which the prevalence of handgun ownership may have been 25 percent after adjustment for sex.^{2,3} If any access to handguns increases the risk of death by homicide,^{8,11} then our estimate of the relative risk of death by homicide among recent handgun purchasers is artifactually low.

The findings for women are striking and suggest an additional, sex-specific link between handgun purchase and violent death. Women are at greater risk for death by homicide committed by an intimate partner with a firearm than by a stranger with all methods combined.²⁸ Homicide committed by an intimate partner accounts for the increased risk among women of death by homicide when there is a firearm in the home.^{9,11} It may be that many women purchase handguns for protection against violence from an intimate partner and that these handguns are used by the partners against them or are at any rate not protective. Women in abusive relationships are also at increased risk for suicide.^{9,21,29}

How might suicide among purchasers of handguns be prevented? Focusing efforts on a population at high risk does not substantially reduce rates of suicide.³⁰⁻³² As noted in one report, "there is no single, readily identifiable, high-risk population that constitutes a sizeable proportion of overall suicides and yet represents a small, easily targeted group."³⁰ In our study, handgun purchasers accounted for only 10.3 percent of those who committed suicide by firearm statewide in the year after their handgun purchases and accounted for a smaller proportion thereafter. A screening test for handgun purchasers with a sensitivity and specificity of 99 percent for identifying the 188 persons who committed suicide by means of a firearm within a year would have had a positive predictive value of only 7.2 percent, generating 12.8 false positive results for every true positive.

Reducing access to firearms within an entire population can prevent suicides by firearm.³⁰⁻³⁷ Rates of suicide by firearm correlate very closely, both geographically and temporally, with measures of the availability of firearms.^{33,38-40} In cross-sectional studies, stricter controls on access to firearms have been found to be associated with lower rates of suicide by firearm.^{33,40,41} In New York City, where handgun own-

ership has been strictly regulated since the early 20th century, rates of suicide by firearm are very low; rates of suicide by other methods vary directly with the availability of those methods.⁴²

More direct evidence comes from time-series studies. A near-ban on the sale and possession of handguns in Washington, D.C., was associated with a rapid and specific 25 percent decrease in the rate of suicide by firearm.⁴³ Substantial decreases in suicides by firearm were reported in Queensland³⁴ and Tasmania,³⁶ Australia, and in Ontario, Canada,³⁵ after waiting periods of 21 to 28 days and other restrictions on access to firearms were adopted, although in Queensland there was an increase in suicide by other methods. Tasmania's 21-day waiting period resulted in a 51 percent decrease in the proportion of suicides involving firearms that were committed with recently acquired firearms.³⁶

Our findings are subject to several limitations. Results may be different in states where demographic features of the population, the base-line prevalence of firearm ownership, or public policy differs from that in California. New York and New Jersey enforce long waiting periods for the purchase of a handgun, and the very high rates of suicide that we observed in the period immediately after purchase may not occur in those states. Conversely, rates of suicide by firearm soon after purchase may be still higher in the 23 states that, because they have no stronger state law, are subject to the Brady Handgun Violence Prevention Act, where waiting periods for most purchases of firearms from licensed dealers were replaced by the National Instant Check System in November 1998.⁴⁴

Policy differences at the state level also affect eligibility to purchase firearms. Few states deny firearms to persons with previous convictions for violent misdemeanors. Since a history of violence or aggression is a risk factor for both suicide^{7,9,18,19,45} and homicide,^{9,11,46} the risk of violent death associated with recent purchase of a handgun may be higher in most states than we observed in California.

It should be emphasized that we did not compare the risk of death between people who owned firearms and people who did not. If firearm ownership is a risk factor for violent death,^{7-9,11} we have underestimated the risk of both suicide and homicide associated with the purchase of a handgun by a person who did not previously own a firearm.

We cannot determine the extent to which increases or decreases in the risk of violent death are attributable specifically to the purchase of a handgun, since we lack information about other risk factors. In addition to a history of violence, alcohol and drug abuse and psychiatric disorders are risk factors for both suicide and homicide.^{16,46-48} An increased risk of suicide by firearm might be due to an increased prevalence of these risk factors among handgun purchasers, and not due to the handgun purchase itself. On the other

hand, such risk factors may be less common among persons who have recently passed a background check than they are in the general population; this difference might account for the lower risk of death by homicide among men who have recently purchased a handgun than among men in the general population.

We do not know whether the handguns purchased by persons in our study cohort were actually involved in the deaths we analyzed. However, the percentages of firearm-related suicides and homicides that involved handguns were much higher among handgun purchasers than in the state as a whole.

In 1997, suicide by firearm accounted for 54.2 percent of all deaths by firearm nationwide; firearms were used in 62.0 percent of suicides among men and 39.3 percent among women.⁴⁹ Suicide by firearm may be most effectively prevented by reducing overall access to firearms. (Unfortunately, however, reduction in access to the means to commit suicide is not among the interventions included in the 1999 *Surgeon General's Call to Action to Prevent Suicide*.⁵⁰) Rates of death by both suicide and homicide among handgun purchasers might also be reduced by prohibiting those with risk factors such as a history of violence or alcohol and drug abuse from purchasing handguns.

A substantial percentage of persons who commit suicide seek medical attention shortly before death.³⁰ Clinicians need to identify persons who are at acute risk for suicide and to intervene appropriately.^{30,51} A patient's declaration of intent to purchase a handgun may also be an indication to determine whether other risk factors for violent death are present.

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