

Evaluation of a Community-Based Handgun Safe-Storage Campaign

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ABSTRACT. *Objective.* Safe storage of firearms has been recommended as a means of preventing gun-related pediatric injuries, yet few interventions have led to significant improvements in storage practices. This study examined a multifaceted community education campaign to promote safe handgun storage and the campaign's impact on firearm locking and loading practices in households with children.

Methods. Beginning in 1997, a safe-storage campaign consisting of television and radio announcements, educational materials, billboards, and discount coupons for lock boxes was conducted in King County, Washington. The campaign evaluation used a quasi-experimental design and compared the intervention site with 9 control counties outside Washington State and west of the Mississippi River. Cross-sectional, random-digit-dial telephone surveys of handgun-owning households with children were conducted in all study counties both before the intervention in 1996 ($n = 302$) and again in 2001 ($n = 255$). The main analyses assessed whether greater improvements in household firearm-storage practices occurred between 1996 and 2001 in the intervention, compared with the control, counties. Primary outcomes were based on up to 3 handguns per household and included (1) all stored with trigger locks, lock boxes, or gun safes (formal locking devices), (2) all stored in lock boxes or gun safes, (3) any stored loaded, (4) any stored loaded without a formal locking device, and (5) any stored loaded and not in a lock box or gun safe. Data were also collected on up to 1 long gun per household; long-gun outcomes included (1) stored with a trigger lock or gun safe and (2) stored loaded.

Results. Overall, handguns and long guns were generally more likely to be stored locked and less likely to be loaded in 2001 compared with 1996, with these trends seeming to be more consistent in the intervention county. Even so, more than one quarter of households with children and handguns in 2001 failed to store all of their handguns with a formal locking device, and up to 8% continued to possess at least 1 loaded handgun that was not stored with a formal device. The majority of households that stored their handguns with formal devices used lock boxes or gun safes. Storage of handguns in lock

boxes or gun safes became more common in both the intervention (adjusted odds ratio [aOR]: 1.71; 95% confidence interval [CI]: 1.03–2.84) and control households (aOR: 1.66; 95% CI: 1.01–2.72) between 1996 and 2001. None of the other measured changes reached statistical significance, such as storing any household handgun loaded (aOR: 0.71; 95% CI: 0.35–1.42 [intervention]; aOR: 1.08; 95% CI: 0.58–2.00 [control]) or keeping any household handgun loaded and not stored in a lock box or gun safe (aOR: 0.59; 95% CI: 0.22–1.55 [intervention]; aOR: 0.67; 95% CI: 0.30–1.49 [control]). Moreover, the intervention county did not experience significantly greater overall improvements in household storage practices for handguns or long guns than did control counties.

Conclusions. In both the intervention and control counties, households were more likely to lock all handguns in 2001 compared with 1996. After accounting for temporal trends, this educational campaign, combined with economic incentives to purchase lock boxes, did not seem to significantly change safe storage practices in households with handguns and children. Even if the campaign did result in small improvements in firearm safe storage, simultaneous national and state-specific gun-safety activities or legislative efforts may have drawn increasing attention to gun-related issues in the control counties, thereby making it more difficult to identify effects of our specific handgun storage intervention. *Pediatrics* 2005;115:e654–e661. URL: www.pediatrics.org/cgi/doi/10.1542/peds.2004-1625; *firearms, program evaluation, injury prevention and control, community health education, health promotion.*

ABBREVIATIONS. CAP, Child Access Prevention; OR, odds ratio; CI, confidence interval.

Youth death rates from firearm injuries have declined steadily in the United States since 1993,^{1,2} yet in 2001, 2937 fatalities to persons ≤19 years of age remained attributable to firearms, accounting for 10% of all US firearm-related deaths.² At least 4 nonfatal gunshot wounds are treated in emergency departments for every fatal firearm injury in children and young adults.^{2,3}

Attempts to prevent firearm injuries by altering storage methods may have broader support than efforts to remove firearms from households.^{4–9} The elevated risks of homicide and suicide associated with household availability or purchase of firearms^{10–17} seem to be strongest for handguns and when guns are stored loaded or unlocked.^{13,14,17} Unintentional pediatric shootings and youth suicides frequently occur in homes of the victim, family, or friends and often involve unsupervised play with or

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use of accessible, loaded guns owned by adults and stored at their residences.^{17–21} State Child Access Prevention (CAP) laws instituting criminal penalties if a child gains access to improperly stored firearms have been associated with reductions in children's unintentional shooting deaths.^{22,23}

More than one third of US households possess firearms.^{24–27} Approximately half of homes with guns and children have a handgun present.²⁵ Firearm ownership is not consistently associated with the presence or absence of children in the household,^{25,28–32} but households with children generally follow safer storage practices.^{24,25,29,31–35} Even so, ~6% to 14% of households with children and firearms report storing at least 1 gun both unlocked and loaded.^{24–26,33,34,36–39} Another one to two thirds of such households keep at least 1 gun either loaded or unlocked.^{24,25,37,39}

With few exceptions,⁴⁰ safety counseling sessions with health care providers and formal firearm training programs have typically failed to demonstrate significant decreases in gun ownership or increases in safe storage practices.^{26,27,30,31,34,35,41–44} Targeted community events can be resource intensive^{45,46} and may primarily reach self-selected volunteers who are already interested in changing their firearm-related behaviors.⁴⁵ We report on a broad-based, multifaceted public education campaign to promote safe handgun storage in King County, Washington, and evaluate the campaign's impact on lock box use and other specific storage practices in handgun-owning households with children.

METHODS

Safe-Storage Campaign

In 1997, a coalition was assembled in King County, Washington, to promote safe handgun storage by raising public awareness through community education and by providing economic incentives to purchase storage devices. King County includes almost 30% of the state population and encompasses the metropolitan areas of Seattle and Bellevue.⁴⁷ Participants included representatives from the Harborview Injury Prevention and Research Center; law enforcement agencies; state, county, and community health care and mental health organizations; individual medical providers; school districts; religious organizations; gun shops; and sporting goods stores. Earlier focus groups with gun owners had identified the need to promote a storage method that could prevent unauthorized access but would still allow quick firearm access. Campaign materials therefore emphasized securing handguns instead of attempting to alter ownership or loading practices, and many specifically promoted lock box use for handguns.

Lock boxes were emphasized because they best met the criteria of providing safety and quick access at a reasonable cost. Lock boxes can be attached to permanent surfaces to prevent theft; models with push button locks, including those available with the campaign coupon, allow more rapid access than do trigger locks, padlocks, or combination locks. Trigger locks are inexpensive, but firearms remain accessible to unauthorized users and, in some instances, may still be discharged when the lock is attached. Gun safes can also be used to store long guns but are much more expensive than lock boxes.

The campaign centered on the slogan, "Buy a Box for Your Gun, Not Your Kid." Educational materials bearing the slogan were often accompanied by a picture of an empty child-sized coffin (Fig 1) or an unlocked cabinet containing a handgun. The slogan and graphics were chosen specifically to target households with children and frame safe gun storage as a child injury prevention issue. During the first wave of activities, from February to August 1997, a public service announcement was aired regularly on television, and posters, brochures, fact sheets, and coupons

were disseminated to physicians, clinics, nursing organizations, churches, schools, Parent-Teacher Associations, and law enforcement offices. The public service announcement emphasized that use of lock boxes could save children's lives and prevent youth suicide without slowing gun owners who need quick access to their firearms. Written educational materials further stated that children are curious, that teaching them not to touch guns is insufficient to prevent them from discovering and handling firearms, and that parents should ask about the gun storage practices of family and friends in addition to using lock boxes for handguns and trigger locks for long guns in their own homes. Fact sheets summarized county, state, and national statistics on gun-related unintentional deaths, injuries, and suicides among youths; reported estimated prevalences of firearm ownership and storage practices; and listed local lock box retailers. To create an incentive for obtaining lock boxes, \$10 coupons were provided toward the purchase of \$80 Cannon lock boxes stocked by a major regional department store chain. A toll-free telephone hotline was instituted to receive ongoing requests from the public and community organizations for mailed safe-storage information and coupons. Lock box use and the coupons were promoted by the Seattle Police Department's Community Policing Division and neighborhood activists during Block Watch meetings and school-based outreach programs and were publicized in police newsletters that were distributed in the community.

In late 1998, activities to promote safe storage of firearms in King and adjacent counties were assumed by the Lok-It-Up Campaign (www.lokitup.org), a coalition of medical centers, state and local health departments, and the Harborview Injury Prevention and Research Center. The original slogan and coffin image were used in a billboard campaign, brochures, and radio spots, but coalition partners also developed new campaign materials to promote a wider range of handgun locking devices and target multiple audiences. Brochures and posters that were designed after conducting focus groups with male handgun owners included images of a lock box, trigger lock, chamber lock, and personalized lock alongside text describing the purpose, advantages, disadvantages, and cost of each device. Brightly colored brochures, posters, and busboards with pictures of children and the slogan, "Healthy Kids Are: Cute, Capable, and Curious. Avoid a Tragedy. Lock Up All Guns" were developed to appeal to parents and others who work with children. In 2000–2001, the campaign transitioned from the \$10 lock box-specific coupons to coupons offering 10% to 15% discounts on most firearm locking devices sold by ~20 retail partners in King County. Other coalition activities included circulating interactive handgun safe-storage displays to concealed pistol license renewal locations and community fairs; incorporating age-appropriate gun storage information into newsletters sent to the families of every 2-, 3.5-, and 5-year-old born in Washington State; ongoing dissemination of updated written educational materials; and continued publicity and staffing of the telephone hotline. Coalition activities that focus on provider, parent, and community education and distribution of locking device coupons are ongoing.

Evaluation Overview

The campaign evaluation used a quasi-experimental design with a single intervention site, King County, Washington. Nine control counties closest in population size to King County were selected from among counties that are outside Washington State, are west of the Mississippi River, and had no state CAP laws in 1996: Bernalillo, New Mexico; Pima, Arizona; Anchorage, Alaska; Denver, Colorado; Multnomah, Oregon; Douglas, Nebraska; Jackson, Missouri; Oklahoma, Oklahoma; and Sedgwick, Kansas. In 1996, before campaign safe-storage activities, and again in 2001, independent cross-sectional random-digit-dial telephone surveys were conducted in all 10 counties by a professional survey research firm. All study procedures were reviewed and approved by the University of Washington Human Subjects Division.

Survey Sample

A household was eligible for the surveys when the respondent spoke English; there was at least 1 child who was <18 years old; there was a telephone in the household; and at least 1 pistol, revolver, or other handgun was kept in or around the home, including in a garage or an outdoor storage area. Households in which the respondent did not know or refused information on the

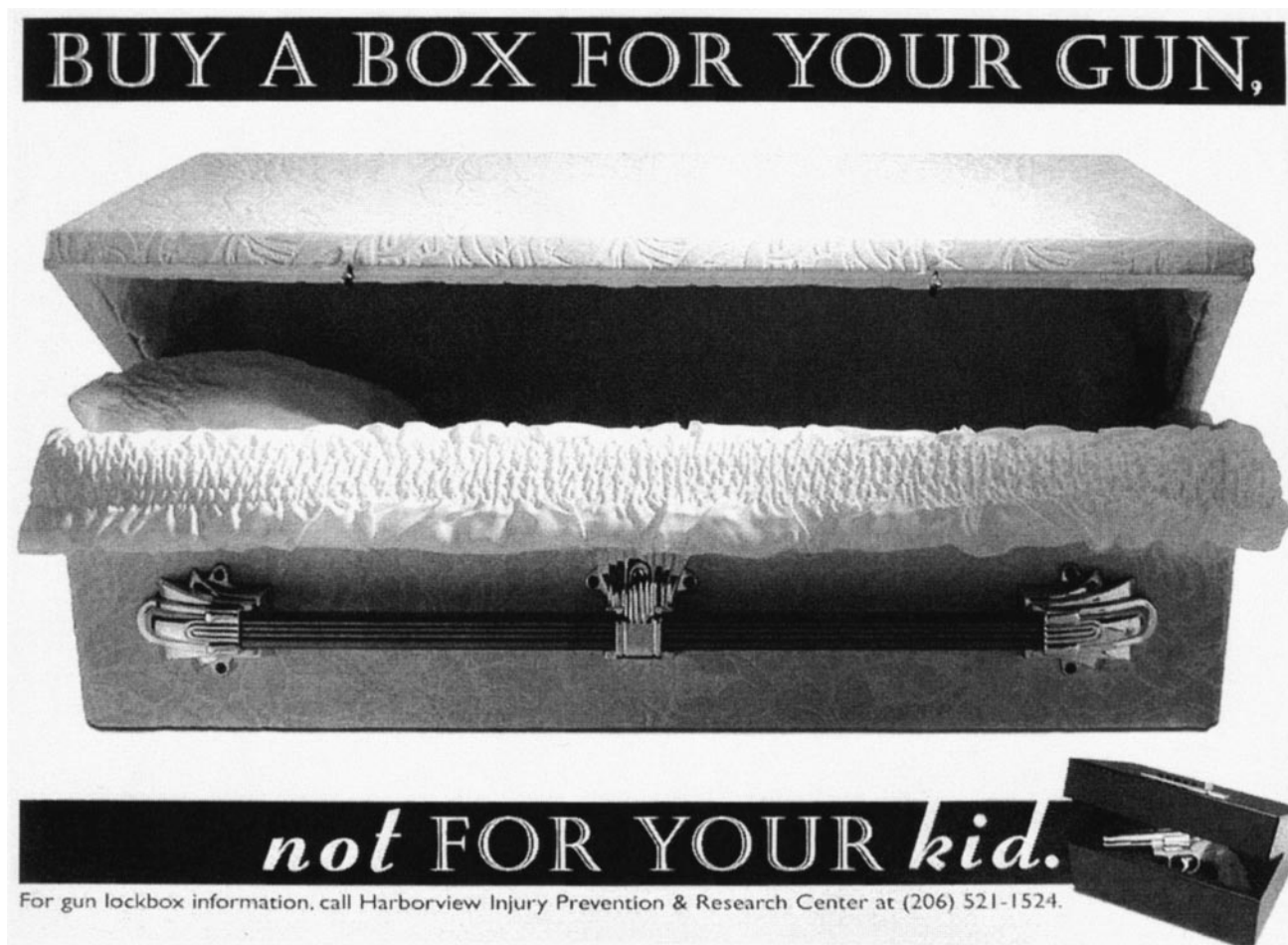


Fig 1. Example of a safe-storage campaign poster.

presence or the number of handguns in the home were not included.

Survey Content and Storage Outcomes

Surveys included questions on demographic characteristics, the number of household handguns and long guns, and common child injury prevention practices (eg, the use of bicycle helmets) so that firearm questions were framed as just 1 of several child and adolescent household safety concerns. We ascertained the use of formal locking devices (trigger locks, lock boxes, or gun safes), storage in locked closets or drawers, and loading status for each of up to 3 individual handguns per household. Gun-safe use was assessed only for handguns that were not secured in lock boxes; storage in locked closets or drawers was asked only of guns that were not stored in lock boxes or gun safes. Except for storage in lock boxes, similar information was gathered on up to 1 long gun per household. Respondents with multiple firearms chose the handguns on which to provide specific storage data, but those with >1 long gun were asked to report on the one most recently used or the newest. General storage data were gathered on additional handguns in households that owned >3.

For analysis, each handgun was classified according to use of any formal locking device and storage in lock boxes or gun safes. On the basis of the combined storage practices of up to 3 handguns per home, households were classified further as to whether all of these handguns were stored with formal locking devices or specifically in lock boxes or gun safes and whether any were stored loaded, with or without locking devices. Lock boxes and gun safes were combined in the household assessments because of concern that respondents often conflated these 2 storage methods.

Statistical Analysis

Demographics, ownership, and storage practices in intervention and control counties were summarized using univariate sta-

tistics stratified by intervention status and study year. Within-group comparisons of storage practices across study years estimated storage changes that took place in each group between 1996 and 2001. These temporal patterns were termed "interyear changes." Adjusted interyear changes were calculated using random-effects logistic regression techniques, clustering on county to account for potential correlation in storage practices by respondent households from the same county. Results are presented as odds ratios (ORs) and 95% confidence intervals (CIs). A multiplicative interaction term between intervention status and study year then was included in the regression models. The *P* value associated with this interaction term represented the statistical significance of the safe-storage campaign intervention effect.

Indicator variables for number of handguns (1, 2, and ≥ 3) and number of long guns (1 and ≥ 2) were included in all regression models for handgun- and long-gun-storage outcomes, respectively. Gender of respondent, children's age categories (presence of child 0-4, 5-12, or 13-17 years old), age of youngest child, number of children, and long-gun ownership (for handgun-related outcomes) were investigated as potential confounders and effect modifiers. Confounding was assessed on the basis of the magnitude of change in the OR after adjustment, whereas determination of effect modification was based on the *P* value associated with 3-way interaction terms between study year, intervention status, and the potentially modifying variable. Sensitivity analyses in which control counties were removed 1 at a time were conducted but did not appreciably change the results. Statistical analyses were conducted using Stata software, version 7.⁴⁸

RESULTS

During the 1996 survey, 23 922 telephone numbers were attempted; 15 295 were working residential numbers, and live contact was made with 11 422

households. Respondents refused to participate or provide sufficiently detailed handgun information to qualify in 1451 households (13% of those contacted), whereas 9669 (85%) were not eligible (76% of these had no children, and 19% had children but no handguns). In 2001, 26 078 numbers were attempted; 16 081 were residential, and contact was made with 11 771 households. Respondents in 2258 (19%) households refused participation or adequate screening information, whereas 9258 (79%) were ineligible (75% had no children, and 17% had children but no handguns). In total, surveys were completed in 151 intervention and 151 control county households in 1996 and in 127 intervention and 128 control county homes in 2001.

The majority of survey respondents were female (Table 1). Half to two thirds of the households included at least one 5- to 12-year-old child, and children in each of the other age categories were present in ~30% to 40% of the households. Between survey years, the average number of handguns per household decreased slightly in both intervention (from 1.95 to 1.78) and control (from 2.37 to 2.20) counties.

In both years, lock boxes were a slightly more common method of storing individual handguns in the intervention county than were trigger locks (Table 2). In 2001, another 21% to 24% of handguns that were not stored in lock boxes were reportedly kept in gun safes. Compared with 1996, intervention county respondents in 2001 reported more frequent use of all individual locking devices. Trends toward safer storage patterns in control counties were generally less consistent.

Safe storage of all household firearms may be most important in efforts to decrease risk for adverse firearm-related events. Prevalence of safer storage practices (increased locking and decreased loading) for all household handguns (up to 3 per household) increased between 1996 and 2001 in the intervention county, with improvements less marked in control counties (Table 2). In both intervention and control counties, three quarters of households that were surveyed in 2001 reported securing all of their handguns with trigger locks, lock boxes, or gun safes; the majority used 1 or both of the last 2 devices. Still, almost

half of households with at least 1 loaded handgun failed to store the loaded handgun(s) in lock boxes or gun safes.

After adjustment for gender of respondent, children's age categories, number of household handguns, and long-gun ownership, the odds of using lock boxes or gun safes on all of up to 3 handguns were significantly increased in 2001 compared with 1996 in both intervention (OR: 1.71; 95% CI: 1.03–2.84) and control (OR: 1.66; 95% CI: 1.01–2.72) households (Table 3). None of the other changes in household storage practices between 1996 and 2001 approached statistical significance. There were no statistically significant differences in the interyear ORs between the intervention and control counties.

In exploratory subgroup analyses, children's ages did not significantly modify intervention effects. Intervention effects on use of formal locking devices for all handguns in the household (up to 3) did seem to vary by number of reported handguns (interaction $P = .04$ for use of any locking device; $P = .07$ for use of lock boxes or gun safes; data not shown). For both of these outcomes, the intervention effects were strongest in households with at least 3 handguns. Odds of storing handguns in lock boxes or gun safes increased 233% between 1996 and 2001 in intervention county households that reported ≥ 3 handguns (OR: 3.33; 95% CI: 0.92–12.04) compared with a 39% decrease in such households in control counties (OR: 0.61; 95% CI: 0.20–1.85), resulting in a significant intervention effect for this subgroup ($P = .04$). Results were similar for use of any handgun locking device in households with ≥ 3 handguns (intervention effect $P = .02$). There were no significant intervention effects in households that reported 1 or 2 handguns.

With respect to long guns, ownership and number owned increased in these handgun-owning study households in both intervention and control counties between 1996 and 2001 (Table 1). The average number of long guns in long-gun-owning households was higher in control than in intervention counties in both study years. Trigger locks and gun safes that secured long guns were less common in the intervention county in 1996 than in control counties (Ta-

TABLE 1. Characteristics of Telephone Survey Respondents From Handgun-Owning Households With Children in Intervention and Control Counties

	Intervention County		Control Counties	
	1996 (<i>n</i> = 151)	2001 (<i>n</i> = 127)	1996 (<i>n</i> = 151)	2001 (<i>n</i> = 128)
Female respondents, %	60.3	63.8	55.6	57.0
No. of children, mean (SD)	1.81 (0.84)	2.06 (1.04)	1.82 (0.97)	2.07 (1.19)
Households with child of age, %*				
0–4 y	39.1	33.9	37.7	39.1
5–12 y	53.6	63.0	64.9	64.1
13–17 y	41.7	41.7	30.5	35.9
No. of handguns, mean (SD)	1.95 (1.63)	1.78 (1.65)	2.37 (4.15)	2.20 (2.77)
No. of handguns, range	1–10	1–12	1–35	1–20
Owned long gun(s), %	49.0	54.8	46.3	61.9
No. of long guns, mean (SD)†	2.74 (2.57)	3.34 (7.46)	4.08 (5.99)	4.19 (6.81)
No. of long guns, range†	1–15	1–60	1–40	1–40

* Percentages across age ranges within single survey years add up to >100% because >1 child lived in some households.

† Restricted to households that possess long guns.

TABLE 2. Firearm-Storage Practices in Handgun-Owning Households With Children

	Intervention County		Control Counties	
	1996 (<i>n</i> = 151) (%)	2001 (<i>n</i> = 127) (%)	1996 (<i>n</i> = 151) (%)	2001 (<i>n</i> = 128) (%)
Individual handgun*				
Trigger lock used	37.2	43.4	48.5	44.4
Lock box used	44.8	53.2	45.3	48.8
Gun safe used†	14.8 (<i>n</i> = 87)	24.1 (<i>n</i> = 60)	12.2 (<i>n</i> = 84)	21.2 (<i>n</i> = 66)
Locked closet/drawer‡	38.2 (<i>n</i> = 75)	43.2 (<i>n</i> = 46)	33.3 (<i>n</i> = 74)	23.1 (<i>n</i> = 52)
Household handguns§				
All stored with a device	65.8	74.8	69.0	73.6
All stored in lock box or gun safe	50.4	62.9	46.2	57.6
Any stored loaded	20.0	13.3	19.6	20.6
Any loaded without device	6.8	3.5	7.8	7.5
Any loaded without lock box or gun safe	10.2	5.9	13.2	9.8
Long gun¶				
Trigger lock	29.2	35.3	37.5	36.6
Gun safe	24.3	36.8	41.2	44.7
Trigger lock or gun safe	41.3	56.7	60.9	63.4
Loaded	2.8	1.4	5.9	4.0
Loaded without trigger lock or gun safe	1.6	0.0	3.1	2.8

* First respondent-selected handgun per household.

† Ascertained only for handguns that were not stored in lock boxes.

‡ Ascertained only for handguns that were not stored in lock boxes or gun safes.

§ Storage of up to 3 respondent-selected handguns within each household.

|| Any device: trigger lock, lock box, or gun safe.

¶ One long gun per household; restricted to households that possess long guns: 72 in intervention county in 1996 and 69 in 2001, and 68 in control counties in 1996 and 78 in 2001.

TABLE 3. Relative Changes in Firearm-Storage Practices in Handgun-Owning Households With Children, Between 1996 and 2001

	Interyear OR (95% CI)* Comparing 2001 With 1996		<i>P</i> Value†
	Intervention County	Control Counties	
Household handguns‡			
All stored with a device§	1.50 (0.83–2.68)	1.33 (0.75–2.36)	.78
All stored in lock box or gun safe	1.71 (1.03–2.84)	1.66 (1.01–2.72)	.93
Any stored loaded	0.71 (0.35–1.42)	1.08 (0.58–2.00)	.38
Any loaded without device§	0.54 (0.15–1.88)	0.90 (0.33–2.42)	.53
Any loaded without lock box or gun safe	0.59 (0.22–1.55)	0.67 (0.30–1.49)	.84
Long gun			
Ownership	1.36 (0.82–2.25)	2.02 (1.21–3.36)	.27
Trigger lock or gun safe	1.59 (0.72–3.50)	0.78 (0.35–1.72)	.21
Loaded	0.24 (0.02–3.21)	0.59 (0.10–3.49)	.57

* Handgun analyses are adjusted for gender of respondent, children's age categories, number of handguns (1, 2, or ≥3), and long-gun ownership. Long-gun analyses are adjusted for gender of respondent, children's age categories, age of youngest child, number of children, number of handguns, and number of long guns (except long-gun-ownership analysis) (1 or ≥2).

† Statistically evaluates the intervention effect by comparing interyear changes (ORs) between intervention and control counties.

‡ Storage of up to 3 respondent-selected handguns within each household.

§ Any device: trigger lock, lock box, or gun safe.

|| One long gun per household; restricted to households that possess long guns.

ble 2). Safe storage practices became more common in the intervention county between 1996 and 2001; of households that had both handguns and long guns, those who stored their long guns with trigger locks or in gun safes increased from 41% to 57%. Practices changed only slightly in control counties. Loaded long guns were uncommon in all counties and became more so by 2001. However, except for the increase in ownership in control counties, none of these long-gun interyear changes achieved statistical significance (Table 3). Moreover, the magnitude of the interyear changes in long-gun storage practices in

the intervention county did not differ significantly from those in control counties.

DISCUSSION

To evaluate our handgun storage community education campaign, we sought to determine whether greater improvements in household storage practices had taken place between 1996 and 2001 in the intervention region of King County, Washington, than in nonintervention control counties. No statistically significant overall intervention effects on locking or loading practices were observed for household hand-

guns or long guns. Even if the campaign resulted in small improvements in firearm storage, the limited number of intervention and control communities may have reduced our ability to detect statistically significant effects. Campaign activities in King County were also limited and intermittent as a result of funding restrictions, with the most concentrated activity in 1997. We focused on whether households stored all handguns safely because the repeated cross-sectional survey design limited our ability to examine incremental improvements in storage practices.

The King County safe-storage campaign most directly promoted lock boxes by featuring them in ads, slogans, and coupons. We ultimately focused on combined lock box and gun-safe use as the primary outcome of interest because of concerns around how respondents failed to distinguish between these 2 methods. However, elements of the campaign, particularly in later years, were also intended to increase general recognition of the need to store firearms safely; improvements in trigger lock use, locked closet storage, or loading status therefore were possible as well. In the intervention county, use of all firearm locking devices increased and the practice of keeping guns loaded became less common between study years, yet data from control counties suggested that use of handgun locking devices, particularly lock boxes and gun safes, may also have been increasing more broadly. The changes in storage patterns between study years may also have been attributable to chance, as they rarely reached statistical significance. Trigger locks and lock boxes both were common methods of locking handguns, but more than one quarter of study households failed to lock all handguns (up to 3) with a trigger lock, lock box, or gun safe. Guns that are both unlocked and loaded are thought to pose the greatest risk for unauthorized use or injuries. Three to 8% of households with children and handguns kept at least 1 handgun stored in this manner.

In a finding that was not hypothesized a priori, intervention effects on use of any formal locking device and use of lock boxes or gun safes were greater in households that reported more handguns. Chance is a potential explanation. Alternatively, willingness to change storage practices or level of interest in firearms may vary by number of household handguns, perhaps as a result of different reasons for owning firearms. Firearms, particularly handguns, are often owned for self-protection, and those that are possessed for self-protection are more likely to be stored loaded and/or unlocked than are those that are owned for recreational purposes, such as hunting or sport shooting.^{26,27,30,32,34,36–38,49} If households with fewer handguns were motivated to a greater degree by the desire for protection, then we might expect less willingness to reduce firearm accessibility by using storage devices and less effect of safe-storage campaign messages in these households. More handguns may also be a proxy for more training or long-term experience with firearms. Additional studies would be needed to determine whether our exploratory finding that safe-storage campaigns may

have greater effects on households with more handguns is replicable.

We report a higher prevalence of safe firearm locking practices than those found in a multicenter study of pediatric clinics, in which 49% of handguns and 38% of rifles were locked.^{36,37} The results are not directly comparable to those from studies that combine firearm types and consider all household guns, including 2 national random surveys in which 45% to 60% of households with firearms kept all guns locked.^{25,35} Loaded firearms have previously been reported in up to one third of households with guns, with the prevalence varying by study population, firearm type, and presence of children in the household.^{25,26,34–36} Between 6% and 14% of households with children and firearms have been reported to store at least 1 firearm both loaded and unlocked.^{24–26,33,34,36–39}

Previous studies have rarely investigated the use of specific locking mechanisms. Schuster et al²⁵ reported that 38% of US households with children and firearms had trigger locks on at least 1 firearm, whereas 13% had 1 or more firearms taken apart. Attention to specific firearm locking methods is important when assessing acceptance or consistent utilization of different storage practices, identifying storage trends, and evaluating safe-storage interventions. Storage methods also differ in the degrees to which the firearms remain accessible to unauthorized people or are vulnerable to theft; these factors may have implications for whether or to what extent storage has an impact on unintentional injuries, suicide, or crime-related injuries.

Several study limitations may have reduced our ability to detect significant effects of the King County campaign or led to underestimates of the prevalence of unsafe storage practices. Successful dissemination of written educational materials to individuals in the community via health centers, law enforcement offices, stores, or other organizations depended on the materials being displayed or circulated adequately by these partner groups. We were also unable to ascertain what proportion of the distributed coupons were used to purchase lock boxes or other storage devices or whether purchased devices were put into regular use. Even with the coupon discount, the cost of lock boxes may have been prohibitive for some individuals.

During our study, several control counties or major cities within them undertook their own gun-safety activities, including gun lock distribution events, targeted education programs, gun turn-ins, and media campaigns. National efforts drawing attention to firearm storage included the ASK Campaign, the National Shooting Sports Foundation's Project HomeSafe, and an Ad Council campaign. Legislative efforts and school shooting tragedies have drawn attention to the risks associated with unauthorized firearm access. No state in our study passed a CAP law or began requiring that locking devices be sold with firearms during the study years, but the introduction of legislation in several control locations generated publicity. Current Kansas state law can be used to prosecute child firearm access

cases, and city CAP ordinances exist in Wichita, Kansas, and Denver, Colorado.

Our study did not ascertain methods of ammunition storage. In a national survey of homes with children and firearms, 4% of households reported keeping ammunition with unlocked and unloaded firearms in addition to the 9% with unlocked and loaded firearms.²⁵ More than 30% of gun-owning households kept unlocked ammunition in 2 clinic-based studies.^{37,50}

Self-reports of firearm ownership and storage practices were also used instead of direct observation. Recall difficulties, social desirability bias, lack of knowledge, or ambiguities about personal versus household ownership could lead to reporting errors. Administrative data used to validate questions about firearm ownership suggest that false-negative responses are relatively uncommon.^{51,52} Wives and nonowners, though, have been shown to underreport household firearm ownership and number of household guns compared with husbands and firearm owners.^{26,53} Nonowners and nonusers may also be much less likely to report that a household gun was stored loaded or unlocked and loaded.^{26,54} Our study did not preferentially select specific household respondents on the basis of their personal ownership or use of handgun, but we adjusted for gender of respondent to reduce the impact of reporting errors on our intervention analyses.

Last, details were collected on the locking and loading status of up to 3 individual handguns and 1 long gun per household to balance completeness of information against cost and participant burden. Additional firearms could be stored unsafely even if household firearms on which details were reported were locked and unloaded. Only 10% of the handgun-owning households sampled owned >3 handguns, although 64% of households with long guns possessed >1 long gun. We note that storage methods that were used on the first 3 handguns within households seemed similar.

Promotion of gun storage techniques can supplement gun design modifications and legislative efforts to reduce children's access to firearms, yet few medical practitioner-led counseling efforts have resulted in significant improvements in storage practices.^{40–43} The degree to which parents consider physicians to be an acceptable and knowledgeable source of firearm-related advice is unclear.^{9,50} Execution and evaluation of community-based safe-storage interventions are also proving to be methodologically challenging and costly.⁴⁴ A previous community intervention was limited by its use of volunteer participants and lack of a control group in which to measure nonintervention storage practice changes during follow-up.⁴⁵ Evaluation of our educational campaign did not show a significant overall impact on handgun storage patterns. Future community-wide efforts to promote safe storage should consider more intensive or focused campaigns^{45,46} and should make efforts to identify control communities in which few activities that are similar to those that compose the intervention are expected to be initiated during the study period. Campaign evaluations

should investigate whether intervention effects differ by reason for ownership or the number of handguns within households. Insight into associations between storage patterns or specific locking mechanisms and the risk for childhood injuries may also help to target community education efforts.

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