Impact of State Ignition Interlock Laws on Alcohol-Involved Crash Deaths in the United States

Elinore J. Kaufman, MD, and Douglas J. Wiebe, PhD

Objectives. To investigate the impact on alcohol-involved crash deaths of universal ignition interlock requirements, which aim to prevent people convicted of driving under the influence of alcohol from driving while intoxicated.

Methods. We used data from the National Highway Traffic Safety Administration for 1999 to 2013. From 2004 to 2013, 18 states made interlocks mandatory for all drunk-driving convictions. We compared alcohol-involved crash deaths between 18 states with and 32 states without universal interlock requirements, accounting for state and year effects, and for clustering within states.

Results. Policy impact was apparent 3 years after implementation. The adjusted rate of alcohol-involved crash deaths was 4.7 (95% confidence interval [CI] = 4.0, 5.4) per 100 000 in states with the universal interlock requirement, compared with 5.5 (95% CI = 5.48, 5.53) in states without, an absolute reduction of 0.8 (95% CI = 0.1, 1.5) deaths per 100 000 per year.

Conclusions. Requiring ignition interlocks for all drunk-driving convictions was associated with 15% fewer alcohol-involved crash deaths, compared with states with less-stringent requirements. Interlocks are a life-saving technology that merit wider use. (*Am J Public Health.* 2016;106:865–871. doi:10.2105/AJPH.2016.303058)

Alcohol-involved motor vehicle crashes remain a significant cause of injury and death in the United States, accounting for 30% of crash fatalities, or approximately 11 000 deaths per year.[1] Although crashes and crash fatalities have been declining, no significant reduction has been seen in the proportion involving alcohol,[2] and societal costs of alcohol-involved crashes are nearly $60 billion per year.[3]

States and communities have used a variety of strategies to address this challenge, from public education campaigns and designated-driver programs to enhanced enforcement initiatives. The 21-year minimum legal drinking age has been credited with dramatically reducing young adult motor vehicle crash deaths.[4] Sobriety checkpoints, in which every passing driver is stopped and checked for alcohol, have shown some promise,[5,6] but raise Fourth Amendment concerns and are illegal in several states.[7] The main enforcement mechanism remains license suspension or revocation. Unfortunately, more than half of convicted drunk drivers continue to drive during a license suspension,[8–11] and crash rates are reduced by as little as 5% with these policies.[12] These policies are limited because they rely on intoxicated individuals to choose not to drive, and on police to identify impaired drivers.[13,14] License suspension also prevents compliant drivers from driving even when sober, impairing travel for work and daily activities.

Ignition interlock devices that use breath-analysis technology to prevent intoxicated drivers from taking the wheel offer several potential advantages to prevent the target risky behavior. Before starting the car, the driver must breathe into the device. If the driver's blood alcohol content (BAC) is above the programmed limit (usually 0.02 g/dL), the vehicle cannot start. Since the introduction of practical interlock technology in the 1990s, use has increased steadily. There were 300 000 interlock devices in use nationwide in 2010, up from 100 000 just 4 years before, but they are still only used in about 30% of drunk driving convictions.[15,16]

Interlocks have been shown to reduce drunk-driving recidivism by 50% to 90% while installed.[8,13,17–22] However, past research has focused on recidivist arrests. To our knowledge, no studies have reported injuries or deaths as outcomes, and only 3 studies have assessed the impact of interlocks on crashes.[14,15] Of these, a Swedish study found a decrease in crashes, but had very low absolute numbers of crashes in both interlock and control groups, making the findings difficult to interpret.[15,21] The other 2 studies found decreases in some types of crashes among interlocked drivers, but increases in others.[23,24] Interlock devices should prevent crashes by preventing intoxicated driving, and it has been estimated that installing ignition interlocks on all new vehicles could reduce drunk-driving fatalities by 85%,[14,18] but their effectiveness is not well established. Moreover, even if the devices themselves prevent crashes, challenges in implementation, enforcement, and monitoring could limit the impact of state interlock programs.[25]

Every state in the United States has some form of ignition interlock law, with varying requirements. Some use interlocks for repeat offenders, those with very high BACs, or those deemed appropriate at the

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discretion of a judge. Between 2004 and 2013, 18 states expanded this requirement to cover all drunk-driving convictions. Four more states joined in 2014 and 2015, and the Centers for Disease Control and Prevention recommends a universal interlock requirement for all states.[26] To our knowledge, this is the first national analysis of the impact of a universal interlock requirement on alcohol-involved crash deaths. We performed a 50-state difference-in-differences analysis to evaluate the impact of the universal interlock requirement on deaths from crashes involving an alcohol-impaired driver.

METHODS

We collected state policies from the Trust for America's Health and confirmed years of implementation with state legislative records and state highway offices.[7] We collected death rates from the National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS).[27] Because interlock devices are typically set to a low BAC threshold of 0.02%,[20] we defined alcohol-involved crash deaths as those in which at least 1 driver had a BAC level greater than zero. We drew population denominators from the US Census.[28]

We estimated the effect of the universal interlock requirement on alcohol-involved crash deaths by using a difference-in-differences analysis. In this analysis, we compared state rates of alcohol-involved crash deaths before and after policy adoption to the change over the same time period in states without the policy (both states that had not yet adopted the policy and states that never did). In this quasi-experimental design, each state that adopted the policy serves as its own pre–post control. We controlled for each state's fixed effects to account for all characteristics of a particular state that were stable over time. By using the states without the policy as an additional control, we simultaneously accounted for secular trends in alcohol-involved crash deaths, subtracting the change that occurred in states without the policy from the change we observed in states with the policy.[29,30] This technique is particularly appropriate, given that decreases in drunk driving and improvements in motor vehicle safety have led to decreased crash deaths across the country in the past decade.[31]

We used ordinary least squares (OLS) regression to analyze alcohol-involved crash death rates as the primary outcome, with standard errors adjusted for clustering at the state level across years.[32] The distribution of the outcome was slightly skewed, but residuals were normally distributed. A log transformation of the crash death rate outcome produced a kurtotic distribution. The OLS regression that used the log-transformed outcome, negative binomial regression, and generalized linear modeling all produced very similar effect sizes, but much narrower confidence intervals than OLS regression. We therefore present the results of the OLS regression, as it is both the simplest and the most conservative model.

The final regression model used presence or absence of the universal interlock requirement, by state and year, as the primary predictor. We generated coefficients to incorporate the fixed effects of each of the 50 states, and for each of the 15 years of the study period. We incorporated potentially relevant time-varying state characteristics into the model, including state highway speed limits, vehicle miles traveled, and traffic safety law changes. No state changed its minimum legal drinking age, motorcycle helmet law, or seatbelt law during the study period, but several states expanded child safety seat requirements and youth bicycle helmet requirements, and we included variables for these policies in the model. Because alcohol-involved crash deaths may not be evenly distributed through the population with respect to age, we assessed changes in age composition of treatment and control states over time.

To assess the degree of identification between universal and nonuniversal interlock states, we assessed the preadoption trends in both groups. Because universal interlock states implemented the policy in different years, we compared universal interlock states to never-adopting states from 1999 to 2004, before the first universal interlock requirement was implemented. To account for dissemination and enforcement time, we examined each year after policy adoption and incorporated a time lag into our final model. We assessed the impact of the policy on death rate from crashes not involving alcohol, and this served as a placebo test for the policy.[33] To rule out a related increase in other types of crashes involving interlocked drivers, we assessed differences in the overall motor vehicle crash rate. Given that FARS uses a multiple imputation procedure when actual BAC test results are unavailable,[27] this analysis also served to account for possible misattribution of alcohol-involved and noninvolved crashes. To further investigate possible misattribution, we performed a subgroup analysis limited to the 10 states that had actual test results for at least 50% of both surviving and nonsurviving drivers (as averaged over the period from 1999 to 2009, based on an NHTSA report).[34] We estimated lives saved by multiplying the relevant regression coefficient by the population exposed.

We conducted a sensitivity analysis to assess the potential impact of an unmeasured binary confounder, such as an additional motor vehicle safety policy or alcohol regulation. In this analysis, we generated a new binary variable and assigned it randomly to states that implemented the policy and those that did not, starting in a randomly chosen year in each state. We varied the prevalence of this new variable in states with and without the policy from 90% versus 10% to the reverse, in 8 cases with 500 simulations each. We incorporated this new variable into our regression model and assessed the mean coefficient and P value for the new variable, as well as for the interlock policy, with control for the new law.

We used the portmanteau test of white noise to assess for residual temporal autocorrelation after running our model.[35] Because both states' likelihood of adopting this policy and their rates of alcohol-involved crash deaths may be related to the behavior of neighboring states,[36] we also tested for residual spatial autocorrelation with Moran's I,[37] by using ArcGIS software (version 10.3.1, Environmental Systems Research Institute, Redlands, CA). We used Stata for all other analyses (version 14.0, StataCorp, College Station, TX).

RESULTS

Beginning with Washington in 2004, 18 states implemented a universal ignition

interlock requirement by 2013 (Illinois, Colorado, Alaska, New Mexico, Arkansas, Louisiana, Utah, Tennessee, New York, Oregon, Nebraska, Virginia, Arizona, Maine, Kansas, Hawaii, and Connecticut). States that adopted the universal interlock requirement during the study period were similar to those that did not with respect to demographics and the presence or absence of additional motor vehicle safety policies, as shown in Table 1. Universal interlock requirement states were more often located in the West, were less rural, and had people who drove fewer total miles on average than those without the policy, but none of these differences was statistically significant. There was no overt correlation with political orientation of the state: 10 of 18 universal interlock states versus 16 of 32 states without the policy voted Republican in the 2012 presidential election. When we compared census figures for 2000 and 2010, we found no significant difference between adopting and nonadopting states in change in population younger than 18 years, older than 65 years, or median age.

Nationwide, alcohol-involved crash death rates increased slightly from 6.1 per 100 000 per year in 1999 to 6.4 in 2001, and then decreased to 4.3 by 2013. Table 2 shows annual alcohol-involved crash death rates for states with and without the policy. The regression analyses found very small decreases in alcohol-involved crash death rates 1 and 2 years after interlock policy implementation. However, beginning in year 3, the average alcohol-involved crash death rate decreaased significantly compared with never-adopting and not-yet-adopting states. The effect appeared to plateau throughout the study period, through postadoption year 9, as shown in Figure 1. We therefore incorporated a 3-year time lag into our model.

After we controlled for year, state fixed effects, annual vehicle miles traveled in each state, and additional motor vehicle safety policy changes, universal interlock states had an adjusted alcohol-involved crash death rate of 4.7 (95% confidence interval [CI] = 4.0, 5.4) per 100 000 people, compared with 5.5 (95% CI = 5.48, 5.53) per 100 000 in states without the policy. This represents a 15% reduction in deaths, saving 0.8 (95% CI = 0.1, 1.5) lives per 100 000 population per year. There was no significant difference in the rate of death from crashes not involving alcohol. The adjusted rate of total motor

TABLE 1—State Demographics, Motor Vehicle Safety Policies and Politics by Presence or Absence of Universal Interlock Requirements: United States, 1999–2013

Variable	Nonimplementing States (n = 32)	Implementing States (n = 18)	*P*
State characteristics[a]			
Region, no. (%)			.16
Northeast	6 (18.8)	3 (16.7)	
Central	9 (28.1)	3 (16.7)	
Southeast	5 (15.6)	4 (22.2)	
West	5 (15.6)	8 (44.4)	
Total state population, mean	6 906 226	5 249 064	.22
Rural population, %	28.4	22.9	.10
White population, %	72.6	69.6	.26
Vehicle miles traveled, in billions, 2010 mean	66 729.7	46 018.1	.12
Maximum highway speed limit, mph, 2013 mean	69.4	68.9	.35
Age			
Change in percentage population aged < 18 y, 2000–2010	−1.8	−1.8	.73
Change in percentage population aged ≥ 65 y, 2000–2010	0.7	0.8	.46
Change in median age, 2000–2010, y	2.1	2.0	.53
Motor vehicle safety policies[a]			
Primary seatbelt enforcement, no. (%)	19 (59.4)	13 (72.2)	.36
Motorcycle helmet requirement, no. (%)	12 (37.5)	7 (38.9)	.92
Booster seat requirement for children aged < 8 y, no. (%)	20 (62.5)	12 (66.7)	.77
Bicycle helmet requirement for children, no. (%)	13 (40.6)	9 (50.0)	.52
Blood alcohol content limit reduced 0.1% to 0.08%, 1999–2013,[b] no. (%)	24 (75.0)	9 (50.0)	.07
Mean speed limit increase, mph, 1999–2013	0.8	1.7	.20
Political orientation			
Republican majority in 2012 presidential election, no. (%)	16 (50.0)	8 (44.4)	.71

[a]As of 2013, except as otherwise noted.
[b]Blood alcohol content limit was 0.08% throughout the study period in all other states.

TABLE 2—Unadjusted Mean Alcohol-Involved Crash Deaths per 100 000 Population Annually in All States, Nonimplementing States, and Implementing States Before and After Implementing the Universal Interlock Requirement: United States, 1999–2013

			Implementing States						
Year	All States, Mean (SD) Deaths (n = 50)	Nonimplementing States, Mean (SD) Deaths (n = 32)	Prepolicy, No. States	Prepolicy, Mean (SD) Deaths	Policy in Place, No. States	Policy in Place < 3 Years, Mean (SD) Deaths	Policy in Place ≥ 3 Years, No. States	Policy in Place ≥ 3 Years, Mean (SD) Deaths	P[a]
1999	6.1 (2.6)	6.4 (2.8)	18	5.6 (2.1)					.34
2000	6.3 (2.5)	6.5 (2.7)	18	6.0 (2.3)					.47
2001	6.4 (2.7)	6.6 (2.9)	18	5.8 (2.1)					.31
2002	6.2 (2.7)	6.6 (3.0)	18	5.7 (2.2)					.29
2003	6.2 (2.5)	6.5 (2.8)	18	5.6 (2.1)					.27
2004	5.9 (2.4)	6.1 (2.5)	17	5.6 (2.1)	1	3.6 (NA)			.52
2005	6.1 (2.6)	6.5 (2.9)	16	5.1 (1.9)	2	6.5 (2.9)			.20
2006	6.1 (2.7)	6.4 (2.9)	15	5.4 (2.2)	3	6.1 (2.7)			.52
2007	5.8 (2.6)	6.2 (2.8)	15	4.9 (1.5)	2	8.9 (1.8)	1	3.6 (NA)	.10
2008	5.1 (2.4)	5.4 (2.7)	13	4.2 (1.4)	3	5.7 (2.9)	2	4.6 (1.7)	.48
2009	4.8 (2.1)	5.1 (2.3)	12	3.8 (1.1)	4	5.7 (2.4)	2	4.9 (2.0)	.24
2010	4.4 (1.9)	4.7 (2.0)	11	3.5 (1.2)	4	3.7 (2.1)	3	5.0 (1.9)	.25
2011	4.2 (1.8)	4.5 (2.0)	6	3.4 (0.9)	7	3.6 (1.6)	5	4.1 (1.4)	.44
2012	4.4 (2.1)	4.8 (2.4)	2	5.0 (0.5)	10	3.2 (1.0)	6	4.1 (1.8)	.20
2013	4.3 (1.9)	4.6 (2.1)			11	3.5 (1.0)	7	4.0 (1.6)	.22

Note. NA = not applicable.

[a]*P* value from analysis of variance for the 4 subgroups of states presented.

vehicle crash deaths (both involving and not involving alcohol) was 1.1 lower in states with the requirement (95% CI = -0.2, 2.4; $P = .103$). Results were nearly identical in states with high rates of testing, and when we limited the outcome to crashes with drivers with BAC greater than 0.08. The final model had an r^2 of 0.89, with no significant residual spatial autocorrelation (Moran I = 0.02; $P = .17$) or temporal autocorrelation (portmanteau [Q] statistic = 7.4; $P = .19$). Regression results are summarized in Table 3.

We performed a sensitivity analysis of a hypothetical, binary confounder and varied the incidence in states that did and did not implement the law from 0.1 to 0.9. At all rates of prevalence in adopting and nonadopting states, the median coefficient for the universal interlock requirement was –0.79. The widest interquartile range was from –0.82 to –0.76, and occurred when the new law was 90% prevalent in universal interlock requirement states and 10% prevalent in states without the policy. The median coefficients generated for the new variable were small, ranging from –0.02 (interquartile range = –0.14, 0.12) to 0.03 (interquartile range = -0.18, 0.20). Introduction of the new variable caused the adjusted universal interlock requirement effect to be statistically nonsignificant in 222 of 4000 total simulations (5.6%).

As a check on whether preexisting, unobserved differences unrelated to the interlock could have accounted for the difference we observed on alcohol-impaired crash deaths, we compared pre-2004 trends in alcohol-involved crash deaths between states that later adopted the universal interlock requirement and those that did not, and found no difference in trends. Approximately 114 000 000 person-years were lived in universal interlock requirement states at least 3 years after policy implementation, yielding an estimated 915 (95% CI = 114, 1715) lives saved in universal interlock requirement states from 2007 to 2013.

DISCUSSION

In this nationwide study of a major drunk driving–prevention policy initiative, we found that requiring all drivers convicted of driving under the influence of alcohol to install an ignition interlock device was associated with a 15% reduction in the rate of alcohol-involved crash deaths. By preventing 0.8 deaths for every 100 000 people each year, this policy was comparable to airbags and the minimum legal drinking age (0.9 and 0.2 lives saved per 100 000 population, respectively).[4] This represents the effect of 1 specific policy initiative, in the setting of real-world compliance and enforcement, not necessarily the full potential of interlock devices.

The findings are evidence that by stopping intoxicated drivers from starting their cars, ignition interlocks can directly prevent drunk driving and the injuries and deaths it causes. Past studies have demonstrated the effectiveness of interlocks for preventing recidivist arrests,[13] but only 3 studies have assessed the impact on crashes, with only 1 showing a decrease.[15,21] Contrary to the 2 other studies that showed increases in some types of crashes,[23,25] we found that the decrease in alcohol-involved crashes was not

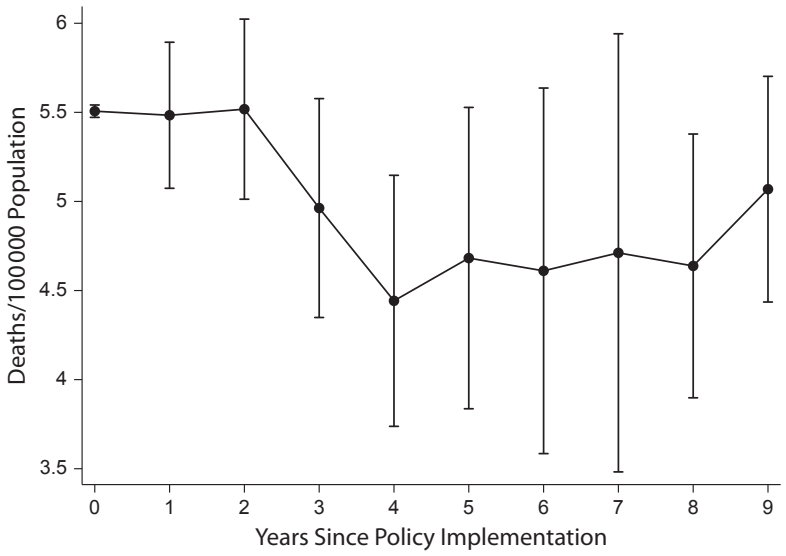

FIGURE 1—Effect of Time Since Universal Interlock Requirement Implementation by Adjusted Alcohol-Involved Crash Death Rate per 100 000 Population and Years After Policy Implementation: United States, 2004–2013

accompanied by any increase in crashes not involving alcohol.

As interlock laws vary among states, with most states offering or requiring interlock installation for repeat offenders,[7] the universal interlock requirement evaluated here is most likely to prevent alcohol-involved crash deaths caused by second-time drunk drivers, along with any deterrent effect. At least 25% of drunk drivers are recidivists, and recidivists are overrepresented in fatal crashes.[31] There are approximately 1.4 million drunk-driving arrests annually and 1 million convictions, but the NHTSA estimates that for each arrest, there are 88 previous instances of drunk driving.[38] Consistent with this narrow, but high-risk, target population, we identified a partial, but significant, decrease in alcohol-involved crash deaths in states that enacted this requirement when accounting for secular trends. Increasing use of ignition interlocks holds promise for direct prevention of fatal drunk-driving crashes.

Of 11 731 deaths in alcohol-involved motor vehicle crashes in 2010, Lund et al. estimated that 10 600 could have been prevented if all drivers had 0.0 BAC.[2] In the previous 3 years, 1310 of these drivers had a previous alcohol-impaired driving conviction, indicating that 785 of these deaths might have been prevented by a universal interlock requirement, compared with 143 deaths prevented by requiring interlock devices only for repeat convictions.[2] In light of the fact that the universal interlock requirement laws studied here covered only a portion of the US population, we believe our results are noteworthy.

Limitations

We recognize several limitations in our approach. Although state policies may have a major impact on populations throughout the state, we could not account for local laws that may be stricter than state requirements, or for additional features of interlock laws that vary among states. Several states made changes to interlock requirements, penalties, monitoring, and administration during the study period.[20] Likewise, enforcement may vary among states, and not all drivers required to install interlocks do so. In particular, many drivers are excluded by the costs of the devices,[23] and financial assistance programs as yet have limited reach.[20] Our findings therefore likely estimate the lower limit of the potential effect of the universal interlock requirement.

Because of the complex policy landscape at the state level, we cannot fully account for every state policy in the realms of road safety and alcohol. Our study design accounts for differences between states that did not change over the study period, but we cannot rule out the potential for another policy change, or another unmeasured confounder, to contribute to the differential reduction in deaths seen here. We included several major, evidence-based policies that changed during the study time period. Although there may well be others,[39] it is unlikely that the effect we are attributing to ignition interlock laws is entirely spurious. Among the additional policy variables tested, only the maximum highway speed limit had a relationship with alcohol-involved crash death rates that approached statistical significance, and including or excluding these policy variables had a minimal impact on the main result. The sensitivity analysis we performed to demonstrate the impact of an unmeasured, binary confounder, such as another relevant policy or collection of policies, also demonstrated minimal impact on the effect size and significance of our main result, indicating that our findings are relatively robust to unmeasured confounding.[40,41]

The FARS data are not complete with regard to BACs for every driver involved in a fatal crash, as not every driver is tested. To estimate rates of alcohol-involved and non–alcohol-involved crashes, FARS uses multiple imputation.[27] Over- or underestimation of the proportion of crashes involving alcohol could bias our effect size, and this might vary between states, as states test drivers at different rates. However, as we found a similar impact on the overall motor vehicle crash death rate, and a similar impact in states with high rates of testing, it is less likely that this limitation would have biased the direction of our results. Although our study design accounts for national trends affecting all states equally, regional trends prominent in one part of the country could have biased our results, although there was no residual spatial correlation after our analysis to indicate such a trend. Lastly, although

TABLE 3—Results of a Difference-in-Differences Analysis of Adjusted Rate of Total Motor Vehicle Crash Deaths (per 100 000 per Year) and the Implementation of Ignition Interlock Laws in 50 US States: 1999–2013

Variable	Rate Differences (95% CI)	P
Range of coefficients for 50 states	−2.2 to 6.6	
Years		
1999	(Ref)	
2000	0.2 (-0.2, 0.6)	.32
2001	0.3 (−0.1, 0.7)	.16
2002	0.2 (−0.2, 0.5)	.29
2003	0.1 (−0.3, 0.5)	.49
2004	−0.2 (−0.6, 0.2)	.41
2005	0.0 (−0.5, 0.5)	.96
2006	0.0 (−0.5, 0.5)	.92
2007	−0.2 (−0.8, 0.3)	.38
2008	−1.0 (−1.5, −0.5)	< .001
2009	−1.3 (−1.8, −0.7)	< .001
2010	−1.7 (−2.3, −1.1)	< .001
2011	−1.9 (−2.6, −1.3)	< .001
2012	−1.7 (−2.3, −1.0)	< .001
2013	−1.9 (−2.6, −1.2)	< .001
Policies		
Universal interlock requirement[a]	−0.8 (−1.5, −0.1)	.029
Blood alcohol content limit of 0.1% (vs 0.08%)	0.2 (−0.2, 0.5)	.35
Booster seat required for age < 8 y	0.2 (−0.1, 0.6)	.22
Primary seatbelt enforcement law	0.0 (−0.4, 0.4)	.22
Bicycle helmet required for age < 18 y	−0.4 (−1.2, 0.3)	.24
Maximum highway speed limit (per mph)	0.1 (0.0, 0.2)	.06
Vehicle miles traveled (per million)	0.0 (−2.1, 2.1)	> .99

Note. CI = confidence interval.
[a]Includes 3-year dissemination and enforcement lag.

states that have adopted the universal interlock requirement represent a variety of regions, demographics, and politics, we cannot guarantee that the results would be replicated in the remaining states that have not yet adopted the policy.

Although a comprehensive solution to the problem of alcohol-impaired driving would likely require both changing the alcohol culture in the United States to reduce binge drinking and increasing access to alternative transportation, interlock devices remain a promising approach to reducing drunk driving at the individual level. The full potential of this technology has not yet been reached. Since 2013, 4 additional states have started requiring interlocks for all alcohol-impaired driving convictions (Missouri, Delaware, Mississippi, and New Hampshire),[42] leaving 28 states with less-comprehensive policies. The public, even those who admit to having driven while intoxicated, are receptive to wider use of interlocks.[43] Carter et al. proposed incorporating interlocks into all newly manufactured US vehicles, estimating an 85% decrease in alcohol-involved crash deaths within 15 years.[14] Additional approaches to increasing interlock use could include incorporating interlocks for young drivers as part of graduated driver's licensing programs or creating a financial incentive for use via tax or insurance credits. Faster, less obtrusive interlock technologies are also in development, and could further facilitate wide adoption.[14] Requiring and funding interlock installation for all drunk-driving convictions is an important step toward optimal use of interlocks to prevent injuries and deaths.

Conclusions

Drunk driving remains a leading cause of injury death and a major public health problem. Requiring ignition interlock devices for all drivers convicted of drunk driving was associated with a 15% decrease in alcohol-involved motor vehicle crash death, saving approximately 915 lives so far. Our study provides support for continued expansion of interlock programs and innovation in the use of interlocks to reduce drunk-driving crash fatalities. AJPH

CONTRIBUTORS

E. J. Kaufman and D. J. Wiebe jointly designed the study. E. J. Kaufman was responsible for data collection and analysis and for drafting the article. Both authors contributed to critical review of the article.

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HUMAN PARTICIPANT PROTECTION

This study was deemed exempt from review by the University of Pennsylvania institutional review board.

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