Which Behavioral Interventions are Most Cost-Effective in Reducing Drunk Driving?

Interactive Calculator Helps State Decisionmakers Assess Cost-Effectiveness of Interventions for Driving While Intoxicated

POLICYMAKERS have known for decades that consuming alcohol before driving can be a recipe for ruin. In 2013, for example, approximately 31 percent of all motor vehicle–related fatalities involved drivers with blood alcohol concentrations (BACs) at or above the legal limit of 0.08. For many people, a BAC of 0.08 equals just two or three drinks over the course of an hour. These two or three drinks could be enough to seriously impair vision, hearing, reaction time, and attention.

What has been unclear is how to best allocate funds to reduce the problem of drunk driving. Many interventions are available to lawmakers, ranging from sobriety checkpoints where law enforcement officers check random drivers for intoxication to alcohol ignition interlocks in individual cars. But given limited budgets, how can policymakers know which available policies would reduce the most drunk driving–related deaths for their implementation dollars?

An interactive online calculator, designed by RAND Corporation researchers with funding and technical support from the Centers for Disease Control and Prevention (CDC)'s National Center for Injury Prevention and Control and the Robert Wood Johnson Foundation and hosted by the CDC, can help decisionmakers measure the cost-effectiveness of several driving while intoxicated (DWI) intervention policies that are not in widespread use. The Motor Vehicle Prioritizing Interventions and Cost Calculator for States (MV PICCS) is designed around a critical policy concept: *Individual states have different safety intervention needs*. Drunk driving is a larger problem in some states than it is in others, so states would benefit from different types of policies. For example, the percentage of crash deaths attributed to drunk driving is 19 percent in Iowa and 48 percent in North Dakota. Because drunk driving causes almost half the traffic fatalities in North Dakota, this state would likely want to focus on implementing stronger drunk driving policies more than states where the proportion of drunk driving fatalities is low. MV PICCS gives users the ability to understand the impact that different intervention policies might have in a state, then calculate the costs of implementing each intervention. The tool also allows the user to see how many lives could be saved and injuries prevented from implementing different interventions.

In this research brief, we demonstrate how the data underlying MV PICCS can be used to show the value of implementing drunk driving policies nationally and which interventions might be the most cost-effective from a national perspective. You can explore cost-effective solutions for your own state by using MV PICCS at www.cdc.gov/motorvehiclesafety/calculator.

Which Drunk Driving Interventions Work Best Overall?

Numerous interventions are available to policymakers. For this exercise, we focus on five related to drunk driving that have proven effective; most have been adopted in fewer than half the states in the United States. (Note: MV PICCS considers six DWI interventions in its analysis. We omit one of the interventions, saturation patrols, from this short analysis because it was difficult to ascertain where this intervention is already in place.) The five are:

- **Alcohol ignition interlock:** a device that prevents a vehicle from starting until the driver has blown into a tube to prove sobriety
- **Sobriety checkpoint:** a place where a team of police officers stops cars to check whether drivers are intoxicated
- **License plate impoundment:** requirement that a driver convicted of DWI surrender the license plate of his or her vehicle
- **Limits on DWI diversion and plea agreements:** rules that prevent DWI arrestees from diverting cases or pleading out of charges
- **Vehicle impoundment:** confiscation of a DWI offender's vehicle for a period of time, after which the offender either reclaims or surrenders his or her vehicle.

Cost-Effectiveness Ratio: How Much Does It Cost to Save a Life?

MV PICCS uses cost-effectiveness to compare interventions. For every intervention, the tool contains two pieces of information: the effect of implementing the intervention and how much implementation would cost the state. The effect is the value, expressed in dollar terms, of the expected lives saved and injuries

Key Findings

- Different states have different needs when it comes to drunk driving interventions.
- A new tool, Motor Vehicle Prioritizing Interventions and Cost Calculator for States, can help decisionmakers measure the cost-effectiveness, for different states, of intervention policies to reduce driving while intoxicated.

avoided thanks to the intervention.* The costs are the costs to the state associated with implementation. These costs include such things as police time, time for department of motor vehicles (DMV) staff, and additional equipment. The ratio of effect to cost is the cost-effectiveness ratio: The higher the ratio, the more cost-effective the intervention. The cost-effectiveness ratio in this case is the monetized value of the lives saved and injuries prevented relative to how much the intervention would cost a state.

Implementing All Drunk Driving Policies in All States Is Effective but Expensive

If all five DWI interventions were implemented in states that do not currently have them, the United States would see 1,182 lives saved annually. The annual cost would be about \$764 million, and the monetized value would be \$2.7 billion. The cost-effectiveness ratio of this approach is 3.53, meaning that, on the whole, society gets \$3.53 of benefit for every \$1 spent by the state to implement the interventions. Although this is a positive cost-effectiveness ratio, other ways of reducing drunk driving might be even more cost-effective. To determine this, we need to look for specific interventions with higher cost-effectiveness ratios.

Why State-Specific Analysis Is Needed

The same intervention can have different cost-effectiveness ratios in different states. This is due to differences across states in effects and costs. The effects of implementing an intervention depend on the distribution of crash causes (the proportion of crash deaths caused by DWI varies from state to state) and the value of saving a life or avoiding an injury. The costs

* This is a typical way of measuring the benefit of any policy whose goal is to save lives or reduce harm. The value of saving one life is based on such things as medical costs, lost wages, and emergency services. The project documentation explains how we calculated these costs. See Jeanne Ringel, Johanna Zmud, Kathryn Connor, David Powell, Brian Chow, Liisa Ecola, Christina Panis, and Gregory Jones, *Project Report and User Guide*, Atlanta, Ga.: Centers for Disease Control and Prevention, October 2014. As of March 16, 2015: <http://www.cdc.gov/motorvehiclesafety/calculator/doc/index.html>

“Is there a way to increase the overall cost-effectiveness ratio? Yes, by implementing specific interventions in specific states.”

depend on the cost to implement an intervention, which varies from state to state because of differences in such items as wages paid to state employees, population, and size. Costs also vary based on the assumed number of offenders in each state (that is, costs to implement a drunk driving intervention are based on the number of offenders).

If we want to find the most cost-effective interventions, we need to look at the cost-effectiveness of *each* intervention in *each* state, then rank them. We do not want to include in the analysis those interventions that are already in use. There are 255 possible intervention-state combinations (51 states times five interventions); if we exclude those that are already in use, we end up with 119.

The figure on the next page shows these 119 combinations in declining order of their cost-effectiveness ratios.

Each blue dot represents one combination. In general, because a policy with a cost-effectiveness ratio less than 1 has costs outweighing benefits, policymakers would avoid those policies. If they want to maximize the safety gains from the dollars allocated for traffic safety, policymakers should start with the combinations with the highest cost-effectiveness ratios.

The figure shows that the cost-effectiveness ratio curve declines rapidly because only a handful of combinations have very high cost-effectiveness ratios. In 10 cases, the cost-effectiveness ratios exceed 100. In 24 cases, the ratios are less than 1. Although there is nothing particularly significant about a cost-effectiveness ratio of 100, if policymakers start

Cost-Effectiveness Ratios for 119 Drunk Driving Intervention-State Combinations

by implementing those 10 policies, they will do a better job of maximizing the impact of traffic safety spending.

Of the 10 combinations (policy implemented in a particular state) with the highest cost-effectiveness ratios, five are license plate impoundment and five are alcohol interlocks. These rank high in cost-effectiveness terms because they are sanctions that take place after arrest and thus do not impose additional costs to the police or court system. Also, offenders are required to purchase the interlocks, which means the cost to the state is low.

The total cost of implementing these 10 cases is \$2.1 million, and they would save 170 lives. That works out to a collective cost-effectiveness ratio of 167.

Table 1 compares the costs and effects of implementing these 10 combinations with the highest cost-effectiveness ratio and all 119 combinations.

State-Specific Analysis in Action

This exercise was designed to show that states vary in the costs and effects of each combination, and interventions that might be highly cost-effective in one state might be less so in another. If budgets

Table 1. Comparison of Costs and Effectiveness of Implementing 10 Combinations of Interventions to Prevent or Reduce Driving While Intoxicated

Cost or Benefit	All 119 Instances	10 Combinations with the Highest Cost-Effectiveness Ratios
Total lives saved	1,182	170
Total monetized value	\$2.7 billion	\$344 million
Total cost	\$764 million	\$2.1 million
Total cost-effectiveness ratio	3.5	167

These 10 combinations cost only 0.3 percent of the total cost of implementing all 119 combinations, but they would save 14 percent of all the lives that these particular DWI interventions could save and provide 13 percent of the monetized benefit possible.

are limited, the most cost-effective way to reduce DWI deaths and injuries is to select the most cost-effectiveness interventions regardless of state. Table 2 shows the 10 most cost-effective combinations. The data show the number of lives possibly saved and the benefit of saving these lives in terms of dollars, the cost of implementing the policy, and, finally, the *cost-effectiveness ratio*—the number of lives saved

and injuries prevented relative to how much the intervention would cost a state. Of course, the tool cannot tell decisionmakers whether they should implement a particular DWI policy. The information provided by the tool can guide decisionmakers in figuring out which policies stand to save the most lives and how much policies would cost the state and taxpayers.

Table 2. Ten Intervention Implementations with Cost-Effectiveness Ratios Higher Than 100

State	Intervention	Lives Saved	Cost (\$)	Benefit (\$)	Cost-Effectiveness Ratio
Ohio	Alcohol interlocks	23	123,000	47,953,000	390
Kentucky	Alcohol interlocks	23	115,000	43,618,000	379
Alabama	License plate impoundment	21	118,000	41,205,000	348
Indiana	Alcohol interlocks	10	119,000	20,194,000	170
Iowa	Alcohol interlocks	10	118,000	19,755,000	167
Louisiana	License plate impoundment	13	172,000	26,037,000	152
Mississippi	Alcohol interlocks	7	108,000	12,741,000	118
Oklahoma	License plate impoundment	14	254,000	28,541,000	112
Tennessee	License plate impoundment	21	378,000	41,976,000	111
Florida	License plate impoundment	28	562,000	64,485,000	111
Total	Total	170	2,067,000	344,506,000	167

NOTE: Costs are rounded to the nearest \$1,000.

Detailed information on the source of cost and benefit estimates, as well as the criteria for selecting interventions, is available in the full project report.

MV PICCS brings together in one place a wealth of information on the costs and effects of 14 motor vehicle safety interventions. Users can change a variety of parameters: the state, the interventions to analyze, the type of analysis (looking at each intervention individually or using “portfolio analysis” to account for related interventions), and the use of fines and fees to offset costs. A built-in sensitivity analysis tool allows changes to the percentage reduction in injuries and deaths, the estimated monetary value of saving a life, and the total cost per intervention.

www.cdc.gov/Motorvehiclesafety/calculator

This brief describes work done in RAND Health and RAND Justice, Infrastructure, and Environment documented in *Using Cost-Effectiveness Analysis to Prioritize Spending on Traffic Safety*, by Liisa Ecola, Benjamin Batorsky, and Jeanne S. Ringel, RR-1224-RWJ (available at www.rand.org/t/RR1224), 2015; and *Motor Vehicle Prioritizing Interventions and Cost Calculator for States (MV PICCS)*, by Jeanne S. Ringel, Johanna Zmud, Kathryn Connor, David Powell, Brian G. Chow, Liisa Ecola, Christina Panis, Gregory S. Jones, TL-144-CDC (available at www.rand.org/t/TL144), 2015. To view this brief online, visit www.rand.org/t/RB9826. The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors.

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