The *Guide to Community Preventive Services*: Systematic Reviews and Evidence-Based Recommendations for Community-Based Interventions to Reduce Alcohol-Impaired Driving

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**Abstract**
We conducted systematic reviews of the effectiveness of five community-based interventions to reduce alcohol-impaired driving for the *Guide to Community Preventive Services*. Results of the reviews were presented to the Task Force on Community Preventive Services (Task Force), a 15-member independent, nonfederal group with expertise in public health policy, behavioral and social sciences, and epidemiology. Based on these results, the Task Force made recommendations for implementing the interventions. This paper summarizes the findings of the systematic reviews and lists the recommendations issued by the Task Force. It is based on previously published papers in the American Journal of Preventive Medicine (1,2).

**Introduction**
Alcohol-impaired driving is a pervasive problem. Individual states and communities have implemented a broad range of strategies to reduce its occurrence. These systematic reviews were undertaken to assess the effectiveness of five such strategies: .08 blood alcohol concentration (BAC) laws; lower BAC laws for young or inexperienced drivers; minimum legal drinking age laws; sobriety checkpoints; and training for servers of alcoholic beverages. Because of space limitations, the citations for the papers reviewed are not included in this report. The reference list is contained in an American Journal of Preventive Medicine paper (1), which is available at [http://thecommunityguide.org/GUIDE/MVOI/pdf/alc_driving.pdf](http://thecommunityguide.org/GUIDE/MVOI/pdf/alc_driving.pdf).

**Methods**
The systematic reviews summarized in this paper were conducted for the *Guide to Community Preventive Services* (*Community Guide*) ([www.thecommunityguide.org](http://www.thecommunityguide.org)). Detailed methods have been described elsewhere (3,4). Briefly, we conducted a comprehensive search for peer-reviewed journal articles, technical reports, and Association for the Advancement of Automobile Medicine proceedings to screen for inclusion in the review. To be included, a study had to: (a) be primary research published in English before June 30, 2000; (b) provide data on at least one outcome
related to alcohol-impaired driving (e.g., single-vehicle nighttime crashes); and (c) meet minimum research quality criteria.

We often had to select from several possible effect measures. We established and consistently applied rules for identifying the outcome measure that most adequately reflected alcohol-related crashes and addressed potential confounding variables. When available, we selected effect measures that compared alcohol-related fatalities to non-alcohol-related fatalities (e.g., proportion of all fatal crashes involving drivers with BACs of ≥0.10 g/dL; ratio of single vehicle nighttime fatal crashes to multi-vehicle daytime fatal crashes) over the absolute number of alcohol-related fatalities. These effect measures help control for both the long-term downward trend in total fatal crashes and factors that influence the total number of crashes, such as weather, economic conditions, vehicle miles traveled, and safety characteristics of vehicle and highways (5). When available, we also selected effect measures that incorporated a concurrent comparison group such as drivers in adjacent states or drivers within the same state who were unaffected by the intervention. For these studies, results were reported in the form of the net change, reflecting the difference between the percent change for the intervention group and the comparison group. For studies using interrupted time series or other regression-based analyses, results were reported in terms of the percent change estimated from the model.

The primary outcomes assessed in this literature were fatal and nonfatal injuries resulting from alcohol-related motor vehicle crashes. Other outcomes included BACs of drivers at roadside surveys, and measured and estimated BACs of people leaving bars or other licensed establishments. In this report, we included a median effect measure for at least one outcome per intervention. For median effect measures based on seven or more studies, the interquartile range is reported; otherwise a simple range is reported.

Results

.08 BAC Laws
These laws establish the illegal BAC of 0.08 g/dL for drivers aged 21 years and older in the United States (lower BAC levels are established for drivers aged 20 and younger). The literature search identified nine studies of .08 BAC laws in the United States, all of which met the inclusion criteria. One study presented data in a form that could not be converted to our summary effect measure. Seven studies provided state-specific results, and the remaining study provided a summary result for the 16 states that enacted .08 BAC laws before January 1, 1998. The median post-law percent change in alcohol-related motor vehicle fatalities was -7% (interquartile range (IQR): -15%, -4%). Post-law follow-up times ranged from 1 to 14 years (median = 5).

Lower BAC Laws for Young or Inexperienced Drivers
Lower BAC laws for young or inexperienced drivers establish a lower illegal BAC for these drivers than for older or more experienced drivers. The literature search identified 14 studies of the effectiveness of these laws, of which six met the inclusion criteria. Four of the six studies were conducted in the United States, and the remaining two were conducted in Australia. Each of the six studies reported a post-law reduction in crashes. The three studies that examined fatal crash outcomes reported percent changes of -24%, -17%, and -9%. The two studies that examined fatal and nonfatal injury crashes reported percent changes of -17% and -3.8%. The
study that examined crashes in which the investigating police officer believed that the driver had been drinking alcohol reported a percent change of -11%. Post-law follow-up times for individual state laws ranged from less than 1 year to 15 years (median = 22 months).

**Minimum Legal Drinking Age Laws**

Minimum legal drinking age (MLDA) laws specify an age below which the purchase or public consumption of alcoholic beverages is illegal. Studies included in this review assessed the effect of raising or lowering the MLDA on motor vehicle crashes; most of the studies assessed the effect of changes in the MLDA from 18 to 21 years or vice versa. Thirty-three studies met the inclusion criteria. Twenty-seven of the included studies were conducted in the United States, four were conducted in Australia, one was conducted in the United States and Canada, and the remaining study was conducted in Canada. When the MLDA was raised, crashes likely to involve alcohol among the targeted age group declined by a median of 16% (IQR: -26%, -10%). When the MLDA was lowered, crashes likely to involve alcohol among the targeted age group increased by a median of 10% (IQR: 2%, 30%). The effects were consistent over follow-up times ranging from 7 to 108 months.

**Sobriety Checkpoints**

At sobriety checkpoints, law enforcement officers systematically stop drivers to assess their degree of alcohol impairment. The goal is to deter alcohol-impaired driving by increasing the perceived risk of arrest. There are two types of sobriety checkpoints. At random breath testing (RBT) checkpoints, all drivers are stopped and tested for blood alcohol levels. RBT checkpoints are common in Australia and several European countries. In the United States, selective breath testing (SBT) checkpoints are used. At these checkpoints, police must have a reason to suspect the driver has been drinking (i.e., probable cause) before testing blood alcohol levels (6).

Seventeen studies of the effectiveness of RBT checkpoints were identified, of which 12 met the inclusion criteria. Eleven of the studies were conducted in Australia, and the remaining study was conducted in France. For RBT checkpoints, the median percent changes were -22% (IQR: -35%, -14%) for fatal crashes and -16% (IQR: -20%, -11%) for fatal and nonfatal injury crashes. The two RBT checkpoint studies evaluating property damage crashes estimated decreases of 15% and 26%. A single study assessed the effect of RBT checkpoints on the observed incidence of drinking and driving. This study found that during an RBT checkpoint program, the proportion of drivers with any detectable BAC level decreased 13% and the proportion of drivers who were above the legal limit of 0.08 g/dL decreased 24% from prior levels.

Fifteen studies of the effectiveness of SBT checkpoints were identified, of which 11 met the inclusion criteria. Nine of the studies were conducted in the United States and two were conducted in Canada. One study presented data in a form that could not be converted to our summary effect measure. SBT checkpoints were associated with percent changes in fatal crashes of -20% and -26% in the two studies reporting this outcome. Median percent changes of -20% (IQR: -23%, -9%) were found for fatal and nonfatal injury crashes and -24% (IQR: -32%, -14%) for property damage crashes.

Aggregating across all crash types, median percent changes were -18% (IQR: -22%, -13%) for RBT checkpoints and -20% (IQR: -27%, -13%) for SBT checkpoints. Length of time from
initiation of the checkpoints through the follow-up period ranged from 1 to 120 months (median = 14 months) and was not related to the extent to which crashes decreased (r = -.14, p = .54).

**Intervention Training Programs for Servers of Alcoholic Beverages**

Server intervention training programs provide education and training to servers of alcoholic beverages with the goal of altering their serving practices to prevent patron intoxication and alcohol-impaired driving. These practices may include offering patrons food with drinks, delaying service to rapid drinkers, refusing service to intoxicated or underage patrons, and discouraging intoxicated patrons from driving. In the United States, there are currently no standards for server training programs, and their implementation varies widely in terms of the content covered, instructional time, and mode of delivery (e.g., face-to-face, videotaped) (7).

The literature search identified eight studies of the effectiveness of server training, five of which met the inclusion criteria. These studies suggest that server training programs can potentially affect server behaviors, the level of intoxication of the drinkers being served, and the number of traffic crashes. Both of the studies that evaluated server behaviors noted improvements following server training. Similarly, the three studies that evaluated intoxication among patrons or research assistants acting as patrons each found that the proportion of intoxicated drinkers declined following server training (median change = -33%; range -17%, -100%). Finally, one study evaluated the effect of a statewide 1-day mandatory server training program. Based on a time series analysis that adjusted for single-vehicle nighttime fatal crashes in other states, server training was associated with a net decrease of 23% in single-vehicle nighttime injury crashes.

Based on the findings from these five studies, the Task Force concluded that intensive, high-quality, face-to-face server training, when accompanied by strong and active management support, is effective in reducing the level of intoxication in patrons. Four of the studies, however, evaluated programs that were implemented on a limited scale, in a small number of drinking establishments. These training programs were relatively time-intensive (longer than 4 hours), involved face-to-face training, and covered a broad curriculum including specific intervention practices. This contrasts with training programs generally in use, which vary widely in intensity, mode of delivery, and content (7). Thus, the studies we reviewed may reflect the efficacy of server training under near-optimal conditions. It is not clear to what extent these findings might generalize to larger-scale community-wide programs, to programs with different training methods or content, or to programs that do not recruit well-motivated managers. Thus, further research is needed to determine if server intervention training programs that are delivered community-wide are effective at decreasing intoxication and, ultimately, alcohol-impaired driving.
Table: Task Force on Community Preventive Services recommendations for community-based interventions to reduce alcohol-impaired driving.

<table>
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<th>Interventions to Reduce Alcohol-Impaired Driving</th>
<th>Task Force Recommendation</th>
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<td>.08 blood alcohol concentration (BAC) laws</td>
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<tr>
<td>Lower BAC laws for younger drivers</td>
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</tr>
<tr>
<td>Minimum legal drinking age laws</td>
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<tr>
<td>Sobriety checkpoints</td>
<td>Strongly Recommended</td>
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<tr>
<td>Server intervention training programs (face-to-face instruction with management support)</td>
<td>Recommended</td>
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Discussion
Interventions to prevent alcohol-impaired driving are implemented within the social and legal context of a community. Although these reviews evaluate each intervention as an independent activity, effective prevention of impaired driving requires a comprehensive and systematic approach that addresses various individual and ecologic influences on drinking and driving behavior (8-10). These reviews can help decision makers identify and implement effective interventions that fit within an overall prevention strategy.

There is sufficient or strong evidence for the effectiveness of these five interventions to reduce alcohol-impaired driving. However, important issues related to optimizing their efficiency and effectiveness require further research.

General question
- What effects do community-based interventions to reduce alcohol-impaired driving have on social norms regarding drinking and driving?

Laws to reduce alcohol-impaired driving
- How do variations in enforcement levels influence the effectiveness of laws to reduce alcohol-impaired driving?
- What are the independent effects of publicity on the effectiveness of these laws?
- Does public compliance with new laws change over time?

Sobriety checkpoints
- Do passive alcohol sensors improve the deterrent effects of sobriety checkpoints?
- How do various configurations of sobriety checkpoints (e.g., intermittent blitzes vs. continuous, weekend nights vs. random time periods, number of officers per checkpoint) affect deterrence?
- What level of enforcement and publicity is needed to maintain effectiveness over time?
- Are sobriety checkpoints less effective if warning signs are posted that allow drivers to avoid the checkpoints?

Server intervention training
- Are server intervention training programs that are delivered community-wide effective at decreasing alcohol-impaired driving and alcohol-related crashes?
- What essential content areas should be included in all server intervention training programs?
• What effect does the method by which training is delivered (e.g., videotapes, lectures, role-playing) have on the effectiveness of server training programs?
• How do mandatory vs. voluntary server training programs differ with respect to: 1) management support for program goals; 2) level of participation in training programs; and 3) effectiveness in decreasing patron BACs and drinking and driving?
• What specific management policies and practices are necessary to get the maximum benefits from server intervention training?
• What is the long-term effect of server intervention training programs? Are “booster sessions” required to maintain effectiveness?
• What effect does server intervention training have on alcohol sales, overall revenues, and tips?

References


