

Review of Breath Alcohol Ignition Interlock Devices

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Review of Breath Alcohol Ignition Interlock Device Policies and Programs

Introduction

Driving under the influence of alcohol has been a persistent problem in the United States. According to the National Highway Traffic Safety Administration (NHTSA), total roadway fatalities in the U.S. increased from 40,716 in 1994 to an all-time high of 43,510 in 2005, an increase of nearly 6.5 percent. In recent years, however, great reductions have been seen in roadway fatalities. NHTSA data shows that in 2009, as compared to 2005, the total number of U.S. roadway fatalities had dropped by 22 percent to 33,808. Although this decline is significant, reductions in roadway fatalities related to alcohol have been somewhat less promising. Roadway fatalities in which alcohol was not a factor dropped from 27,423 in 2005 to 20,961 in 2009, a decrease of approximately 24 percent. In contrast, roadway fatalities in which a driver had a blood alcohol concentration over the legal limit of 0.08 dropped from 13,582 in 2005 to 10,839 in 2009, a decline of only about 20 percent (NHTSA, 2011).

Although the rates appear to be trending down, fatalities involving alcohol impaired drivers still make up over one-third of all traffic deaths. Current approaches to reducing alcohol impaired driving on U.S. roadways clearly need further improvement. One method of limiting alcohol impaired driving is to enact policies that reduce the likelihood of individuals convicted of operating while intoxicated (OWI) from repeating this behavior. Breath alcohol ignition interlock device (BAIID) programs have been shown to be effective in reducing subsequent OWI offences (Raub, Lucke, & Wark, 2003; Beck et al., 1999), but there are a number of potential pitfalls in program development and implementation. For example, such programs require considerable commitment from the offender, the judiciary, law enforcement, and the state in order to function as intended. Determining the most effective method for implementing the programs can be a challenge because there is a great deal of variability from state to state with regards to which offenders are eligible for the program, how long they are to be enrolled, how they exit the program, how they are monitored, and what alternative sanctions are available.

This report presents the results of a comprehensive examination of the history and effectiveness of BAIID devices and their implementation across the U.S. Along with a focused literature review, we consider the history, implementation, and outcomes of BAIID policies and programs.

Using the information gathered, we identify the most effective administrative and judicial program elements for an evidenced-based BAIID program in Iowa. Our recommendations are based on peer-reviewed scientific literature, web resources, and interviews with subject matter experts. The comprehensive literature review consists of 11 sections:

- a) History of BAIID devices
- b) Federal directives, incentives, and penalties related to state BAIID policies
- c) Effectiveness of BAIID policies
- d) Judicial review
- e) Administrative review of DOT policies
- f) Educational programs
- g) Challenges of BAIID program implementation
- h) Costs to users and states
- i) Societal benefits
- j) Previous legislative efforts in other states

History of BAIID Devices

The first BAIID sensors were based on semiconductor technology. In these devices, a metal-oxide semiconductor (MOS) sensor element is exposed to a headspace gas (breath), and changes in direct current voltage are measured and used to determine breath alcohol concentration. The MOS sensors were a breakthrough at the time because they were portable units, provided rapid results, used a process that did not depend on a chemical reaction, and provided a direct digital readout (Dubowski, 1976). Although the devices were capable of providing very precise results that were highly correlated with gas chromatography measurements in a lab setting, there were a number of drawbacks to the technology. For one, the calibration procedure required a temperature sensitive water bath method that could be tedious. In addition, the calibration of these instruments did not hold for an extended period of time, they were sensitive to altitude and temperature changes, and they reacted to substances other than alcohol.



The growth of fuel cell technology led to the development of more accurate and economical products, and more widespread adoption of BAID policies in the 1990s. Fuel cell sensors consist of two electrodes with a porous acid-electrolyte material between them. As the breath sample passes through the fuel cell, alcohol is oxidized, which results in the byproducts of acetic acid, protons, and electrons. Electrical current between the electrodes increases as more alcohol is oxidized, and protons combine with oxygen and electrons to form water. The unit's microprocessor then estimates the blood-alcohol concentration. Fuel cells have exhibited a number of advantages over semiconductors in that they are alcohol specific, they demonstrate calibration stability, and they tend to have a longer working life. In addition, the calibration of fuel cell units can be completed using a compressed dry air canister instead of a wet bath method.

In 1992, the NHTSA provided the first standards and guidance for state-level programs designed to limit the possibility of drivers bypassing the interlock device (NHTSA, 2010). These model specifications were updated in 2010 (Federal Register, 2010). All 50 states and the District of Columbia now have BAID provisions for multiple OWI offenders at minimum, and in recent years, the majority of U.S. states have begun to include first-time offenders in their programs as well. Figure 1 shows the 32 U.S. States whose BAID include mandatory provisions for first-time offenders (Insurance Institute for Highway Safety, 2011), and when these policies were adopted. Although these programs all include first offenders, it should be noted that there are still several differences between them. Among the most significant are program eligibility criteria. Some programs require all first offenders to have an interlock installed, while others include only those with high BAC.

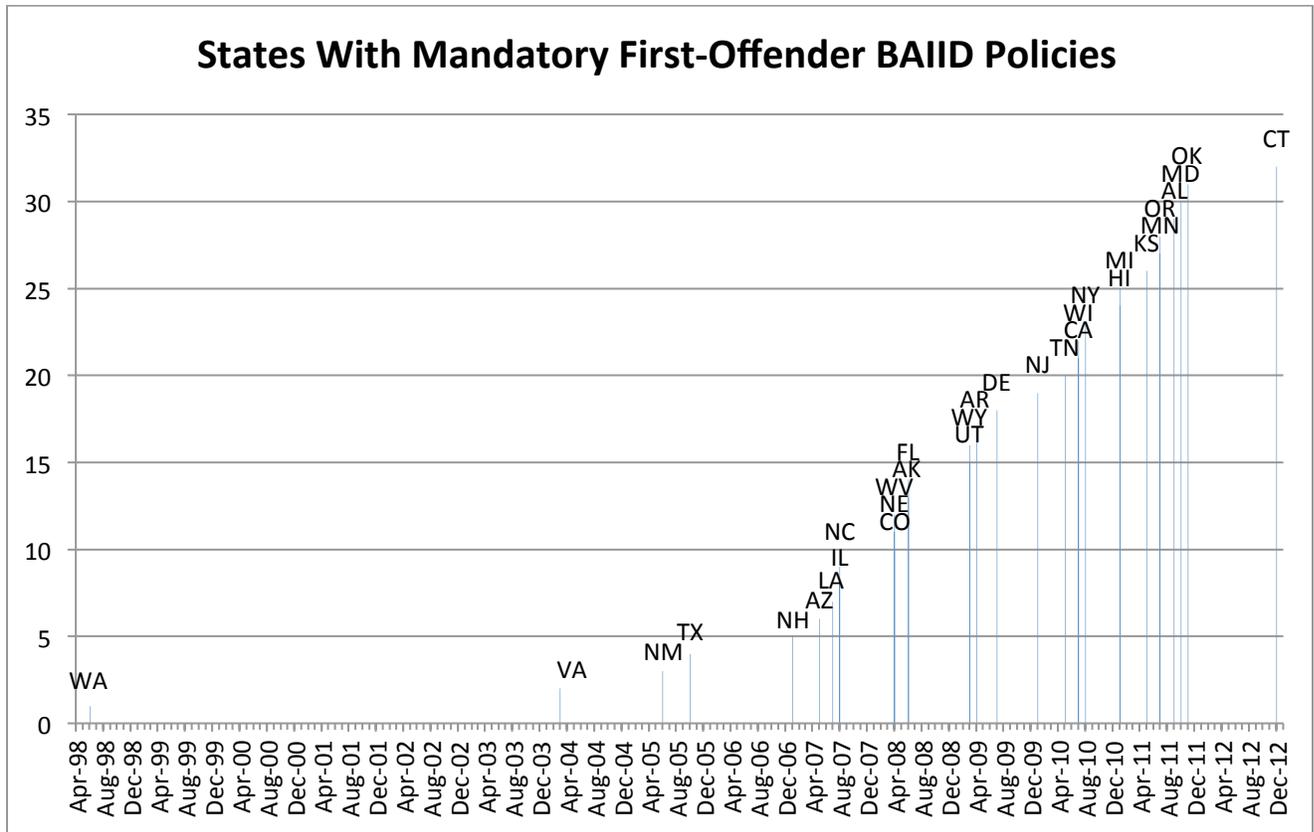


Figure 1. States with Mandatory First-Offender BAIID Policies

Although the data indicate that the number of first-offender programs has grown, the lack of consistency between state programs has made it difficult to determine which program elements provide the most effective balance between cost, public safety, and offender punishment and rehabilitation. Inconsistencies include the presence or absence of alternative sanctions for OWI offenders, offender eligibility, opinions of the judiciary and law enforcement, offender monitoring practices, how offenders exit the programs, and who holds administrative authority over program.

Federal directives, incentives, and penalties related to state IID policies

Current federal regulations indicate that states must: 1) require a 45-day hard license suspension for multiple OWI offenders, 2) have the offender undergo a substance abuse assessment, 3) immobilize or install an interlock on all vehicles owned or operated by the offender, and 4) require 30 days of community service or five days imprisonment for second offences.

Subsequent offences require 60 days of community service or 10 days imprisonment (United States Code, 2010). Legislation currently pending in the U.S. Senate (S. 273) would require states to have a policy in place for OWI offenders with more than one conviction to have BAIDs installed for a minimum of 180 days. States that do not comply would have federal aid withheld from their highway fund. Federal funding would be cut by one percent for failure to comply by 10/1/12, three percent by 10/1/13, and five percent by 10/1/14. If the state enacts legislation to comply within three years, the withheld funding would be released (United States Senate, 2011).

Effectiveness of BAID Policies

The scientific literature on BAID policy outcomes is directed primarily at secondary prevention efforts, where the device was installed after an offender had been convicted of an OWI. Only one randomized controlled trial was identified in this literature search. In a 1999 publication, Beck et al. randomly assigned 1,387 multiple OWI offenders in Maryland to intervention and control groups. The intervention group was allowed to drive only a vehicle equipped with an IID for 12 months and information was given on alcohol treatment and support programs. The control group was enrolled in Maryland's drinking and driving monitoring program, which required drivers to regularly report to meetings with a court-approved probation monitor. The monitor determined compliance with required treatment programs and if the individual was continuing to use drugs or alcohol. Failure to comply with this program resulted in suspension of driving privileges. The control group was allowed to drive with the restriction of no driving after consuming alcohol. Both groups were managed by the Motor Vehicle Administration (the Maryland state licensing agency) rather than by the courts. Results of this study showed that the intervention group was significantly less likely to have a repeat offence after one year (Relative Risk=0.36), but the difference was not significant at year two. The relative risk is a ratio of the likelihood of recidivism occurring in those exposed to an interlock device over the likelihood of recidivism occurring in the control group. The results of this study showed that any behavioral change created by the interlock device was not sustained after it was removed at 12 months (Beck et al., 1999).

New Mexico had three scientific studies appear in well respected peer review journals. Roth, Voas, and Marques published two studies in 2007 evaluating the effectiveness of the New

Mexico program. The first compared recidivism in a group of second- and third-time offenders who voluntarily installed BAIIDs to a group of offenders who went through a period of hard-license suspension only. The average time to interlock installation after conviction was 70 days, and the devices were in place for an average of 322 days. Roth et al. found that only 2.5 percent of the interlock users were arrested for a repeat OWI offence while the device was installed, whereas 8.1 percent of the controls were arrested for a repeat offence. After device removal however, recidivism rates were not statistically different. A Cox proportional hazard analysis revealed that more prior offences and higher BAC at time of arrest were significant predictors of recidivism (Roth, Voas, & Marques, 2007a). These findings suggest that a greater number of prior OWI offences and higher BAC level at time of arrest increases the likelihood of committing a subsequent offence. The second study looked at recidivism among first-time offenders using IIDs. During the interlock period, BAIID users were significantly less likely to recidivate than the controls (Hazard Ratio=0.39). The hazard ratio (HR) is a ratio of the chance of recidivism occurring in the interlock group during the study period, over the chance of recidivism occurring in the control group during the study period. Recidivism in the interlock user group was also observed to be lower during the post-interlock period (HR=0.82), but the difference was not statistically significant. Significant predictors of recidivism during both the interlock and post-interlock periods were gender, younger age, and high BAC at time of arrest (Roth, Voas, & Marques, 2007b).

In 2009, Roth, Voas, and Marques published findings from a Santa Fe County, New Mexico, pilot program in which offenders were given the option of installing BAIIDs or undergoing a period of house arrest. Offenders in the pilot program were compared to offenders in other counties with regards to their interlock installation rates. Seventy percent of the convicted drivers in Santa Fe County installed BAIIDs during the two year pilot program, while only 17 percent installed the devices in control counties. During the two years after the pilot program, interlock installation rates dropped by 18.8% in Santa Fe County.

Two studies have also been published on Midwestern interlock programs. In 2002, Voas et al. evaluated the effectiveness of a Hancock County, Indiana, program in which OWI offenders were offered interlocks or more stringent punishment, such as house arrest or jail time. Several control counties were selected that did not offer the more severe penalties. Even with the

deterrent of jail time, Hancock County was only successful in getting 62% of the offenders to install interlocks. This was still much higher, however, than the control counties, which had only 10 percent or less of their offenders participating. The results of this study showed that the Hancock County intervention significantly reduced recidivism. Younger age was also a significant predictor of recidivism. The second study evaluated an Illinois policy that allowed offenders to drive immediately after installing a BAIID without going through a period of hard license suspension. Most program participants had the device installed for one year. The comparison group was sampled from OWI offences that occurred during the three year pre-intervention period. After one year, the intervention group was found to have significantly reduced odds of committing a subsequent offence, with an odds ratio (OR) of 0.15. Since the odds ratio is less than one, the findings in this study indicate that offenders who were exposed to the interlock device were significantly less likely to recidivate (Raub, Lucke, & Wark, 2003).

Much of the available research on BAIID program effectiveness has been conducted on Canadian programs. The first study on Canadian programs was published in 1999 by Voas et al. This study consisted of a retrospective review of 32,892 OWI offender driving records in Alberta, Canada, between 1987 and 1996. Only 8.9 percent of these offenders had interlocks installed, with 94 percent of these being voluntary. The driving records revealed that first and second time offenders participating in the BAIID program were significantly less likely to recidivate than offenders not participating in the program after one year (OR=22.83 and 15.59 respectively). At two years, however, the odds of recidivism were nearly equal (Voas et al., 1999). Another 1999 study by Marques et al. examined two groups of interlock users in Alberta, Canada. In addition to the standard BAIID installation, the intervention group received educational support, case management service, and motivational therapy. Marques et al. found that being in the control group, having a high number of self-reported drinks per day, and having a high number of days in which alcohol was consumed were highly significant predictors of interlock test failures. Other significant predictors included living alone, more prior OWI convictions, and female gender. The descriptive analysis of recorder data revealed that the average length of BAIID installation was 8.2 months, average number of tests on days in which car was used was 12.8, and the average number of engine starts was 6.5. Not surprisingly, most positive tests occurred on Saturday and Sunday from 01:00 to 02:00 (Marques et al., 1999).

In 2001, Marques et al. again used BAIID recorder data and driver records to show that high numbers of prior OWI offences and interlock warnings and failures during the first five months of BAIID installation are strong predictors of recidivism. In 2003, Marques et al. used a sensitivity analysis on similar data to show that other strong predictors of recidivism include age (30-34 years), blue-collar employment, low income, multiple warnings or failed interlock tests, and high number of prior OWI convictions. Interlock recorder data was used again in a 2003 Marques, Voas, and Tippetts study, which found that elevated BAC tests and time of day in which failures occurred were strong predictors of recidivism. Finally, a 2003 study by Beirness et al. drew on data from driving records and interlocks to demonstrate that the number of prior OWI offences and interlock failures were strong predictors of repeat offences. Interestingly, mandatory participation in the BAIID program was not a significant predictor of recidivism during or after the program (Beirness et al., 2003).

A number of BAIID studies have been conducted in Sweden. Two focused on the evaluation of secondary prevention programs. The first study, published in 2003 by Bjerre, was a quasi-experiment with one intervention and two control groups. The intervention protocol consisted of a two-year voluntary program in which OWI offenders had BAIID devices installed in their vehicles, and were required to attend checkups with substance abuse professionals. Participants in the intervention were not subject to a period of hard license suspension, but the full cost of the program was paid by the offender. One of the control groups consisted of those offenders who did not elect to enter the intervention and the other control group contained offenders from counties that did not offer the intervention. The results indicated that none of the interlock users had a repeat OWI offence; meanwhile, 1.6 percent of control group one subjects and 2.9 percent of control group two subjects had a repeat offence (Bjerre, 2003). Another study by Bjerre (2008) examined the ability of the Swedish BAIID program to change drinking habits, as well as driving habits. Intervention and control groups had the same classifications as the 2003 study. The results again revealed that the intervention group had a larger reduction in recidivism than either of the control groups. In addition, baseline and follow-up self-assessments of alcohol habits (AUDIT) showed that the number of subjects with harmful alcohol consumption fell by 80 percent in the intervention group after one year, compared to only 31 percent in control group one (Bjerre & Thorsson, 2008).

The third Bjerre article on Swedish policies was a cross-sectional survey of 118 companies using BAIDs as a primary prevention intervention. The most commonly cited reasons for installing BAIDs included suspected alcohol use by employees, improved safety, and improved service and customer satisfaction. The employee response was surprisingly positive, with 82% of the businesses reporting positive employee reactions. The most frequently reported problems were technical in nature, including difficulty starting vehicles in the winter months and difficulty performing the breath alcohol tests in general. The major barriers to program implementation were reported to be cost and perceived hassle. Failed test rates were very low at only 1.92 fails per 1,000 tests overall. Early Sunday morning had higher fail rates than any other day or time (Bjerre & Kostella, 2008).

In conclusion, the evidence provided by this research shows that interlock devices consistently reduce recidivism while they are installed, for both first-time and multiple offenders. Recidivism rates for interlock users tend to rise, however, after the device is removed and are comparable to offenders who did not use interlocks. Other studies have shown that interlock data can be used to predict recidivism after device removal.

Future researchers and policy makers should consider using these data to extend interlock periods for offenders who consistently trigger the device. There is also a need for further research on mandatory BAID programs. Voluntary programs have been well-documented, but it is not known if participants in mandatory programs exhibit different outcomes. If a program gives the offender a choice between having an interlock installed or other sanctions such as hard license suspension or house arrest, the individuals choosing interlock devices may be predisposed to have different recidivism outcomes than those choosing the alternative sanctions. One of the features of individuals volunteering for new interventions is that they may have a reduced risk of reoffending, regardless of treatment status. By including all offenders, mandatory interlock programs should help us to understand the true effect of interlock devices on recidivism. First-offender programs are in need of further evaluation as well. As may be seen in Figure 1, most of the first-offender programs in the U.S. have only been implemented in the last two to three years. There has not been enough time to fully evaluate these programs.

Few published studies have attempted to examine the ability of BAIIDs to reduce crash rates, and those few have produced either inconclusive or unreliable results (Elder et al., 2011). The main problems encountered when attempting to study this issue are that interlock programs have historically been inconsistently implemented by the court system or have been voluntary for the offender. This can result in a small population of interlock users that may not be representative of the overall population of drunk drivers, making it difficult to evaluate the effect that BAIIDs have on alcohol related crash rates. This will be an area for future research as more states move toward mandatory interlock programs.

Judicial Review

A search using LexisNexis revealed eight cases from State Appellate or Supreme Courts that were directly related to BAIID policies or programs. In the 1996 case of *State of Arkansas v. John Wilcox* (325 ARK 429; 927 S.W. 2d 337), the State of Arkansas sought a review of the Circuit Court of Benton Co, AK, decision that prohibited a trial court from utilizing an ignition interlock device in sentencing the defendant for a first offence OWI. Mr. Wilcox pleaded guilty to first offence OWI, but before the sentencing hearing he petitioned the appellate court to prohibit the trial court from requiring him to install a BAIID. The appellate court found that the Arkansas interlock law violated the Equal Protection Clause, and issued a writ prohibiting the lower court from implementing the interlock statute. The State of Arkansas appealed this ruling and the circuit court found that the appellate court did not have the authority to issue the writ, thus reversing the decision. Furthermore, the circuit court stated that the Arkansas interlock law did not clearly infringe upon Mr. Wilcox's constitutional rights, so he would have to appeal the decision rather than seek out a writ from a higher court, which the court stated could only be used in extraordinary circumstances.

In the 1989 case of *State of Iowa v. Steven Richard West* (446 N.W. 2d 777), the defendant was labeled as a habitual offender by the District Court for Decatur County after receiving three OWI offences in six years. The habitual offender status meant that Mr. West was ineligible for a work permit. Mr. West installed a BAIID in his vehicle, and the district court then ordered the DOT to issue a work permit. The State appealed this ruling, and it was overturned by the Supreme Court

of Iowa. The Supreme Court's rationale was that the provision allowing habitual offenders to have work permits did not apply to alcohol related offences.

In the 2005 case of *Motor Vehicle Administration v. Steven W. Weller* (390 Md. 115; 887 A.2d 1042), an Administrative Law Judge suspended Mr. Weller's driving privileges for one year after he failed field sobriety tests and refused to take a chemical breath test following a traffic stop. Weller was observed crossing a set of double yellow lines by the field officer. The Circuit Court reversed the decision of the Administrative Law Judge, stating that the judge failed to consider the offender's employment (which required a great deal of travel), that Weller's only previous offence had occurred over eight years before, or that a BAIID was available as an alternative to hard license suspension. The Maryland Court of Appeals reversed this decision, ruling that the Circuit Court could not simply replace the Administrative Law Judge's opinion with its own.

In the 1999 case of *City of Lakewood v. Hartman* (86 Ohio St. 3d 275; 714 N.E. 2d 902), the trial court imposed the maximum sentence after Hartman received her fourth OWI. The sentence was suspended, however, on the condition that she installed a BAIID. An appellate court reversed this decision, stating that the trial court abused its power in ordering the BAIID to be installed as a condition for probation. On further appeal, the Ohio State Supreme Court overturned the appellate court's decision and stated that the trial court was reasonable in its assessment that Hartman needed the BAIID to help her rehabilitation and to protect public safety.

In the 1995 case of *Theodore D. Carl v. State of Oklahoma* (ex rel. Department of Public Safety, OK Civ App 147, 909 P.2d 1196), the Department of Public Safety revoked the offender's license for a period of one year after he was convicted of OWI. The Department also claimed that the trial court's initial decision was incorrect because they did not require Carl to install a BAIID to regain limited driving privileges. The defendant sought administrative review of this decision because his offence predated the statute. The trial court agreed with Carl, and allowed him limited driving capabilities without an interlock device. The appellate court, however, reversed the trial court's decision and stated that sentencing must comply with the current statute.

In the 2007 case of *James J. McGrory v. Commonwealth of Pennsylvania, Department of Transportation, Bureau of Driver Licensing* (591, Pa. 56; 915 A.2d 1155), the driver was convicted of his ninth OWI offence and was subsequently sentenced by a criminal trial court to time served. McGrory was not ordered by the court to install a BAIID, but the DOT suspended his license and required him to install a BAIID before issuing a temporary license. An intermediate appellate court held that even though the BAIID should be required by law, the DOT had no authority to enforce it since the trial court did not include it in McGrory's sentence. The Pennsylvania Supreme Court, however, overturned the intermediate court's decision with the rationale that the statute stated that offenders who were subject to the interlock law must apply for the device as a condition of having their driving privilege reinstated.

In the 2005 case of *John Harold Alexander v. Commonwealth of Pennsylvania, Department of Transportation, Bureau of Driver Licensing* (583 Pa. 592; 880 A.2d 552), the driver was convicted of three OWI offences, only one of which took place after the interlock law was enacted. The lower court decided that the two prior offences could not be counted toward the driver's habitual offender status, thus the interlock law could not be applied. The Commonwealth Court upheld this ruling on appeal, but the Pennsylvania Supreme Court then overturned the ruling. The Supreme Court stated that the law did not specify whether or not previous offences could be taken into account, but it would not be erroneous to use the previous convictions when determining recidivist status.

In the 2006 case *ex parte James Melvin Leverett*, (05-05-01557, Court of Appeals of Texas, Fifth District, Dallas), Leverett was convicted of OWI and given the following conditions for his bond: commit no offences, consume no alcoholic beverages, submit to breath or blood testing for alcohol as directed by law enforcement, and install a BAIID. Leverett disputed these conditions because he believed that they were irrelevant to the purpose of assuring his continued appearance. The court upheld the conditions and stated that they were reasonable and consistent with the Texas code. The court also stated that when balancing Leverett's interests with the interest of public safety, it was exceedingly important to ensure safety and enforce the penal code.

One important point to take away from these cases is that if interlocks are an option, rather than required by law, the views and opinions of the judges handling the case can play a major role in whether or not the devices are utilized when sentencing is handed down. In the *Maryland Motor Vehicle Administration v. Steven W. Weller* case, an offender who would have benefited from an interlock device rather than hard license suspension was not granted one, even on appeal, because the initial judge handling the case did not order it. Another issue revealed was the importance of well-written policies and laws. In the *John Harold Alexander v. Commonwealth of Pennsylvania* case, an interlock was not given to Mr. Alexander even though he was convicted of his third OWI offence. The rationale was that the Pennsylvania interlock law did not specify that offences prior to the law's implementation could be taken into account when determining repeat offender status. This issue could have been avoided with more thorough planning and a more clearly written law.

Administrative review of Iowa DOT policies

According to Iowa statutes, citizens with a driver's license are subject to blood, breath, and/or urine testing whenever law enforcement officers have reasonable suspicion that a driver is under the influence of drugs or alcohol. An OWI offence is based on a BAC of 0.08 or presence of a controlled substance. The offender's vehicle must be impounded or immobilized following conviction of two or more OWI offences. Reinstatement of normal driving privileges requires a \$200 civil penalty, completion of an education program for drinking drivers, proof of substance abuse evaluation, and proof of financial responsibility. Offenders with revoked licenses may be granted a temporary restricted license for reasons such as employment, healthcare, childcare, continuing education, substance abuse treatment, court-ordered community service, or probation or parole officer appointments (Iowa Department of Transportation, 2011).

| Offense | Revocation | Temporary Restricted License |
|--|----------------|------------------------------|
| <i>Administrative Penalties (with or without a court conviction)</i> | | |
| 1 st Offense BAC 0.10 or < | 180 days | Immediate |
| 1 st + BAC > 0.10 & < 0.15 | 180 days | Immediate + Interlock |
| 1 st + Accident | 180 days | After 30 days + Interlock |
| 1 st + BAC > 0.15 | 180 days | After 30 days + Interlock |
| 1 st + < Age 21 | 180 days | After 60 days |
| 1 st + < Age 18 | Age 18 or | Ineligible |
| 2 nd Revocation | 1 year w/BAC | After 45 days |
| 1 st time < Age 21 and BAC 0.02 – 0.08 | 60 days | Ineligible |
| 2 nd time + < Age 21 and BAC 0.02 – | 90 days | Ineligible |
| 1 st time < Age 21 and Refused test | 1 year | After 90 days w/guilty plea |
| 2 nd time + Age 21 and Refused test | 2 years | After 90 days |
| <i>Penalties if Convicted in Court (and not otherwise revoked administratively)</i> | | |
| Deferred BAC .10 or < | 90 days | Immediate |
| Deferred + BAC > 0.10 & < 0.15 | 90 days | Immediate + Interlock |
| Deferred + Accident | 90 days | After 30 days + Interlock |
| Deferred + < Age 21 | 90 days | 60 days |
| Deferred + refused test | 90 days | 90 days |
| 1 st + refused test /2nd refusal | 1 year/2 years | 90 days |
| If results in serious injury | Add 1 year | Same as Normal Offense |
| 3 rd Offense + | 6 years | After 1 year + Interlock |
| If results in death | 6 years | After 2 years |

Table 1. Current Iowa Penalties for OWI Offences

In March 2011, House File 422 (HF 422) was introduced into the Iowa State Legislature. The bill proposes a number of changes to Iowa’s BAIID laws. One major change would be the introduction of an ignition interlock license, which first-time OWI offenders could apply for on the effective date of their license revocation. If a reasonable suspicion chemical test is refused, the current law states that the offender is ineligible for an interlock license for 90 days. House File 422 would change this waiting period to 30 days. Significant changes would be made for second-time offenders. The fine would increase from \$1,850 to \$6,250, but \$4,375 could be waived if an interlock license were presented. If the offender refused a chemical test, their driver’s license would be revoked for three years instead of two, as stipulated in the current law.

Third-time offenders would be subject to a \$9,375 fine, with \$6,250 waived if an interlock license were to be presented. The current law states that the fine for third-time offenders could be as little as \$3,125 (The Iowa Legislature, 2011).

Had it gained approval, House File 422 would have required immediate interlock licenses for first or second time offenders. Third-time offenders could be eligible immediately after release from jail. The DOT would be required to certify that an interlock had been installed, and if the offender failed to comply, he or she would be guilty of contempt (HF 422). In the event that an offender were to be subject to license revocation but eligible for an interlock, then HF 422 specifies that the offender must be notified that he or she is eligible, that an application must be completed within 10 days, and if submitted, that the right to a hearing is waived. In order to have full driving privileges reinstated, HF 422 requires offenders to pay a \$200 civil penalty and provide proof of interlock installation and removal (The Iowa Legislature, 2011).

Educational Programs

The development of evidence-based training programs for law enforcement and the judiciary will be critical for the advancement of BAIID programs. The Traffic Injury Research Foundation (TIRF) offers online instruction materials designed to train law enforcement, prosecutors, judiciary, probation and parole officers, treatment and licensing personnel, and the public about BAIID devices and programs. The curriculum was developed by researchers, criminal justice organizations, treatment professionals, and licensing agencies. The training materials include written materials for instructors, summaries to create handouts, PowerPoint slides, instructional videos, glossaries, and reference materials. The subject matter includes international research findings, device technology, program implementation, legal concerns, and contact information for vendors and service providers (Traffic Injury Research Foundation, 2011). Other opportunities to disseminate information to stakeholders could come from conferences and symposia, including the annual Ignition Interlock Symposium and the Transportation Research Board (TRB) meetings.

Although the issue of improved educational programs was discussed frequently at the 12th Annual International Alcohol Interlock Symposium, there were few suggestions about how to make improvements. One speaker did state that prosecutors could be educated through the

Traffic Safety Resource Programs (TSRP) and judges through the judicial liaison programs (Talpins, 2011). Another presenter with a background in the California Highway Patrol pointed out that the education of field officers can be equally important, noting that few field officers received training and education on interlock devices.

Challenges of BAIID Program Implementation

Voas and Marques documented several challenges to BAIID program implementation in a 2003 publication. They identified a number of weaknesses in the way programs are managed.

Voluntary programs managed by the courts have exhibited low participation rates, possibly related to weak alternative punishments. Offenders often perceive the risk of apprehension while driving on a suspended license to be low, and so they choose to forgo interlock installation and the fees and hassle that go with it. Mandatory programs have exhibited participation problems as well. It can be difficult to enforce installation, especially when offenders choose not to reinstate their licenses. The cost of license reinstatement, increased insurance costs, and interlock costs are all disincentives for license reinstatement, and may cause the offender to simply continue driving without a license (Voas & Marques, 2003).

Other challenges and limitations were described in a 2010 report to the Minnesota Legislature. These included consistent processing of applications in a timely manner, lack of education about the program for offenders, and underutilization of data (Minnesota Department of Public Safety, 2010). The underutilization of data appears to be an important gap in many programs. Interlock devices can provide a great deal of information, but often the data is not regularly analyzed and policies may not be in place to ensure that interlock reports are viewed by program administrators. In essence, the data analysis plan needs to match the goals of the program, whether those include rehabilitating the offender or simply preventing individuals from starting the vehicle if they have consumed alcohol.

A number of other challenges were identified through our expert interviews. These revealed that both administrative and judicial programs have advantages and disadvantages. Judicial programs may not have the resources to fully monitor cases, but without court system involvement, the enforcement authority can be lost. In addition, achieving common practices among judges and courts is difficult. From an administrative perspective, the state licensing authority has the

advantage of being a centralized body that can issue sanctions to all eligible offenders more consistently. The extent of the sanctions available to the licensing authority is, however, typically limited to driving privileges. States such as New Mexico and Florida are gradually moving toward hybrid programs, which can operate under the authority of the courts while the licensing body manages vendor and offender compliance.

A consistent theme from the interviews was that program changes require extensive preparation. It is important to get as many stakeholders involved as possible when planning changes and writing legislation. The idea behind this recommendation was that different stakeholders will bring different ideas and perspectives to the table. For example, the licensing authority and court administrators could help determine if program entrance and exit guidelines and offender monitoring policies are feasible given the resources of the state. Legislators may be able to identify program elements that reduce the likelihood of legislation being adopted. It is possible that vendors could even assist in determining where service stations should be located and how data should be handled, depending on the goals of the program.

Public relations is also an important issue. According to one interviewee, some degree of outcry from both the public and the food and beverage industry may be inevitable when changing or revising such laws. Complaints may include the inconvenience of the device and the fairness of the program if all first-offenders are included. Although this particular expert did not elaborate, the issue of public relations should be taken into account if program changes are being considered. One creative suggestion from Illinois involved constructing a booth at the Illinois State Fair with BAIID equipment and program information before implementing the new policies.

Maintaining compliance of BAIID program participants can be a significant challenge. Most interlock devices currently in use have features that mitigate frequently observed bypass efforts, such as protected wiring, hum tone recognition, filtered air detection, blow abort, and rolling retests (Collier, Comeau, & Marples, 2003). Digital facial recognition is also available that can identify the individual performing each test. When the interlock data is collected, program administrators can then determine if the offender has been driving the vehicle and performing tests. Other issues such as offenders driving vehicles not equipped with interlock devices can be

difficult to manage. One method of dealing with this potential problem is to monitor the monthly mileage on the interlock equipped vehicle. If there is a significant drop in the mileage from one interlock service appointment to the next, the offender may be driving a different vehicle. Mileage estimations can be made based on home address and work to determine approximate commuting distances.

It has also been documented that offenders in New Mexico have been able to bypass interlock programs by simply telling judges that they do not own vehicles (Roth, Voas, & Marques, 2009). Checking vehicle registrations is one method of reducing this mode of non-compliance. If the offender has recently transferred a title, then he or she may be attempting to bypass the interlock program. It should be noted however, that no feasible combination of policies can completely mitigate non-compliance. It is important for program developers to involve all stakeholders in the planning stages, and choose methods that work efficiently with their available resources.

Indigence is an issue that frequently arises when discussing interlock policy changes. Opinions differ as to whether or not states should have to set aside funding for indigent offenders, but the general consensus is that provisions for the indigent probably need to be in place for interlock programs to be accepted. One interviewee stated that opinions differed during the planning stages of their state's program, but in the end, the legislature would not have passed the bill if it had not contained provisions for the indigent. The bigger issue is how indigence is determined. Through the interview process, we learned that having only the court determine indigence is probably not the best practice, due to the likelihood of inconsistency among judges and courts. In New York, offenders are required to complete a five-page financial disclosure form that includes the offender's income, assets, and all monthly expenditures (National Highway Traffic Safety Administration, 2011). Colorado determines indigence using federal poverty guidelines and looking at the offender's federal adjusted gross income on tax records from the Department of Revenue (Colorado Department of Revenue, Division of Motor Vehicles, 2011). South Carolina also uses a financial disclosure application along with federal poverty guidelines (South Carolina Department of Probation, Parole, and Pardon Services, 2009).

Vendor oversight was found to be a difficult issue to manage. While the goals of the state are to ensure public safety and rehabilitate the offender, the vendor has the additional priority of maintaining a profit. In order to ensure that the practices of private vendors remain consistent

with the goals of the state, there must be clear standards and consequences if expectations are not met. Random, unannounced inspections were identified as a best practice to ensure the integrity of the program. Issues to be covered during the inspections include ensuring that confidential data is secure, that the vendor's list of active vehicles matches the state's, that offender service appointments are scheduled at intervals as dictated by the program, and that proper training is being provided to service technicians. The Traffic Injury Research Foundation (TIRF) distributed a document at the recent 2011 Interlock Symposium that outlines the steps involved in developing a vendor oversight program. This document addresses the development of administrative rules, approval of vendors and devices, and ongoing delivery of devices and services (Traffic Injury Research Foundation, 2011).

In general, interviewees agreed that the State should receive all data that is collected by the interlock device, as opposed to having the private vendor provide reports. The best practice would be to have the interlock data dumped into a computer program that automatically analyzes it and generates reports. During the winter of 2011-2012, TIRF is scheduled to publish a document that outlines the critical steps involved in making the transition from a hard-copy system to an automated data reporting system.

Jurisdictional reciprocity was a challenge frequently mentioned at the 2011 Interlock Symposium, but few solutions were offered. One speaker from West Virginia described their relatively successful program for dealing with jurisdictional reciprocity. If an out-of-state resident commits a DUI offence and has mandatory interlock participation, the individual contacts the West Virginia DMV. The offender is then screened for eligibility and the application is processed in the same manner as for West Virginia residents. An approval letter is then sent to the offender containing program information and requirements, such as proof of interlock installation and an approved vendor list. After the West Virginia DMV verifies that the interlock has been installed, the offender's status in the Problem Driver Pointer System (PDPS) is changed from "not eligible" to "eligible," which allows the offender to obtain his or her resident interlock restricted license. The offender must then provide proof that they have obtained this license within 30 days or their status in PDPS reverts back to "not eligible." The offender is monitored by a West Virginia DMV-approved interlock service provider throughout the program. Finally, if

the offender meets all program requirements, their status in PDPS is changed to “eligible-not licensed,” and the driver may apply for a non-restricted license (Anderson, 2011a).

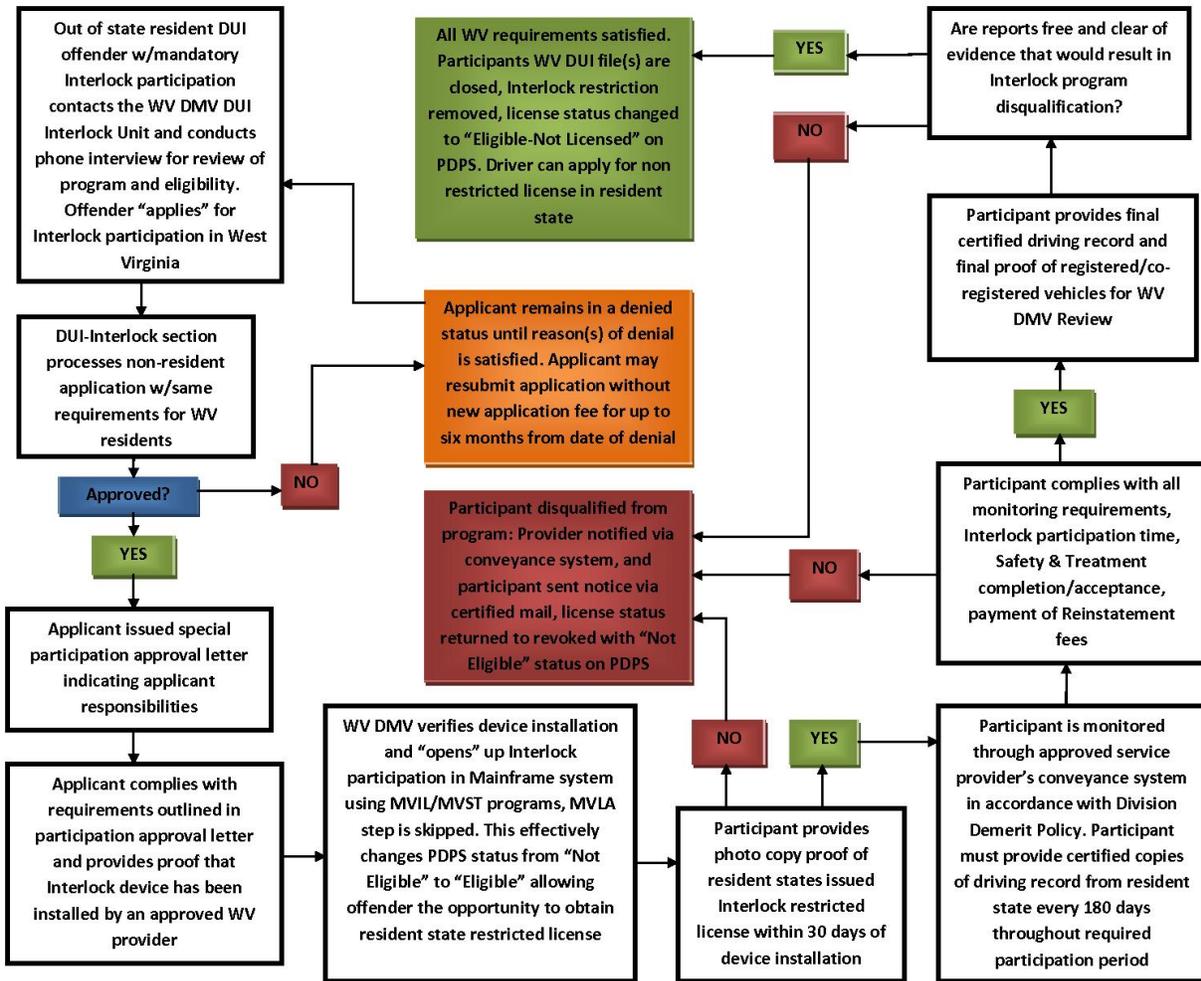


Figure 1. West Virginia Jurisdictional Reciprocity Model (Anderson, 2011b)

Costs to Users and States

Only one peer-reviewed article on BAID program costs was identified in this literature search. In a 2009 article, LaHausse and Fildes attempted to conduct a cost/benefit analysis to determine if the installation of interlock devices in all newly registered vehicles in Australia would be cost-effective. Their model included estimates of interlock effectiveness meaning its reliability and accuracy as well as probability estimates of an interlock-equipped vehicle being involved in a crash. Costs included the direct expense to consumers for device installation. Varying levels of

device effectiveness were used to calculate different cost/benefit ratios, and for all but the lowest likelihood of preventing an alcohol-related crash, the authors estimated that the intervention would be cost-effective (LaHousse & Fildes, 2009).

Direct program costs to the offender vary from state to state, but typically range from \$65 to \$90 per month. Installation of the device costs between \$100 and \$250. Administrative costs to the state depend on a number of factors, such as whether the program is mandatory or voluntary, if first-time or repeat offenders are eligible, how offenders are monitored, how often the devices must be serviced, and how interlock data is collected and maintained (National Highway Traffic Safety Administration, 2009). In contrast, the daily rate to house an inmate in an Iowa state prison facility is just over \$64, and jail-based substance abuse treatment programs in Iowa cost approximately \$30.19 per day (The Iowa Consortium for Substance Abuse Research and Evaluation, 2006).

Societal Benefits

The most commonly perceived societal benefit of BAIID programs is that they protect the public by keeping OWI offenders who have consumed alcohol off the road. According to the Iowa Governor's Traffic Safety Bureau, traffic fatalities are the leading cause of death among persons age 5-34 years of age. Twenty-three percent of these fatalities are alcohol-related, and 30 percent of Iowa's alcohol-related traffic fatalities from 2000-2009 were victims age 25 or younger. In 2008, 1,529 people were injured in alcohol-related crashes in Iowa (Iowa Governor's Traffic Safety Bureau, 2010). Effective BAIID programs represent one potential method of helping to control these injuries and fatalities. Such systems may be particularly important in a rural state such as Iowa that lacks widespread access to public transportation.

The results of a cross-sectional survey of Australian OWI offenders in 2009 revealed that 74 percent of the participants admitted to driving with suspended licenses. The authors stated that the participants resided in areas heavily dependent on personal transportation. Most of the offenders admitted that they began driving within two weeks of having their license revoked. Economic circumstances were the most commonly cited reason for driving while suspended. It should be noted that there were no policies in place that required interlock devices at the time of this study, but 77 percent of the participants thought they would be a good idea (Lenton,

Fetherston, & Cercarelli, 2009). Since this evidence suggests that convicted OWI offenders are likely to continue driving under suspended licenses, mandating interlock installation seems to make sense.

Protecting the public may not be the only societal benefit of interlock programs. Two Swedish studies in 2007 examined the effect of interlock devices on healthcare costs, sick leave, and drinking habits. Both studies compared offenders who voluntarily installed interlocks after their convictions with controls from Swedish counties in which the devices were not offered. The first study demonstrated that healthcare costs were 25% lower in the experimental group during the interlock program, and that audit scores were also lower, indicating that interlock users reported consuming less alcohol than the controls (Bjerre, Kostela, & Selen, 2007). The second study revealed that the control group used more sick leave and had higher disability costs than the interlock group (Bjerre et al., 2007). The evidence provided by these studies demonstrates that interlocks may contribute to helping OWI offenders continue to be productive members of society, something that prolonged hard license suspension may inhibit. The reduced alcohol consumption of interlock users is also important because this represents not only a societal benefit, but a possible therapeutic benefit to the user as well.

Previous Legislative Efforts in Other States

Little information is available regarding previous legislative efforts in other states. A 2011 presentation by Philip Salzberg, however, outlined some success achieved in Washington State and how their BAIID program has evolved. In 1987, ignition interlock devices were introduced and could be ordered at a judge's discretion. The laws changed in 1998 to require BAIIDs for first-time offenders with high BAC or test refusal. The BAIID program was placed under the control of the Department of Licensing in 2003. This department would notify offenders regarding the BAIID requirement upon receiving a conviction notice from the court. In 2004, the interlock requirement was expanded to include not only high BAC first-time offenders, but all convicted offenders (Salzberg, 2011).

Conclusions

It has been observed that most states have updated their programs to include ignition interlock requirements for first-time OWI offenders. Most of this activity has taken place in the last two to three years, indicating that this is now widely considered to be a best practice. Although more scientific evidence is needed to show that first-time offender programs are more effective than multiple offender programs, we do know that interlock devices reduce recidivism regardless of the number of offences. As one interviewee put it, the biggest risk difference is not between first-time and multiple offenders, but between non-offenders and first offenders. In addition, research has shown that hard license suspension has little effect on the driving habits of offenders over time. The installation of interlock devices represents a more effective behavioral modification tool by allowing the offender to drive while reducing the risk of recidivism. There is also a movement toward including rehabilitation in interlock programs. This was a topic of widespread discussion at the 12th Annual Interlock Symposium in September, 2011. More and more programs are seeing that interlocks by themselves are not a cure for drunk driving. Several presenters at the interlock symposium indicated that substance abuse evaluations should be included in interlock programs to help guide treatment.

General Program Recommendations

In order to maximize the effectiveness of interlock installation in the vehicles of offenders, it is important to have strong, well-defined program entrance criteria. Studies have shown that non-mandatory interlock programs with weak enforcement and weak alternative sanctions such as hard license suspensions have low participation rates (Roth, Marques, & Voas, 2009). In order to increase participation, it is important to consider more aggressive alternative sanctions such as house arrest, jail time, or vehicle impoundment. These additional sanctions could also be imposed if an interlock is ordered and the offender does not follow through with having the device installed. Whatever policies are in place, it is critical that they are followed and enforced by the DOT in order for them to be effective. Some researchers have also shown that programs should have a criterion-based exit protocol (Raub, Lucke, & Wark, 2003). For example, if an interlock program requires an offender to have the device installed for one year, it does not seem logical to remove the device if it has recorded violations while installed. Offenders should demonstrate a pattern of compliance in order to have the device removed.

It was generally agreed among the expert interviewees that indigent funding should be available to offenders. Experts also agreed however, that the court should not be the sole determiner of indigence. States such as New York, Colorado, and South Carolina use innovative methods of determining indigence, such as tax records and financial disclosure forms. Many stakeholders are sensitive to the issue of indigence. Legislators may be concerned about protecting their constituents from orders they cannot afford to fulfill, while professionals in the field might be concerned about installing as many interlocks as possible. Several experts and Interlock Symposium presenters indicated that it is important to involve as many stakeholders as possible when discussing this issue, planning other program changes, and writing legislation. Information from our interviews also suggests that it is important to consider strong public relations activities for both the general public and for businesses.

In order to maintain offender compliance, it is important to have clear, well-defined program eligibility requirements and penalties. Offender compliance was identified as an issue of concern during our expert interviews. It can be difficult to maintain a strong sense of cause and effect with offenders in regards to interlock violations and subsequent sanctions. If an offender commits a violation soon after a service appointment, the state may not be aware of the violation for at least 30-60 days. If the offender is subject to additional sanctions due to interlock violations, there may be some lag time between when the state is notified and when contact is made with the offender. Our interviewees indicated that interlock programs should have sanctions for repeated interlock violations, and that they also have a clear protocol in place for delivering them swiftly. This suggests that vendors should have data links with the DOTs so that reports can be reviewed promptly.

Vendor Oversight and Data Management

Other critical issues related to interlock program integrity include vendor oversight and data management. According to TIRF, the state must have clear policies and expectations related to vendor certification and practices. There must also be clear and timely sanctions if vendors fail to meet expectations. Random, unannounced inspections were identified as a method for ensuring vendor compliance. Inspections should help determine if the provider is meeting program requirements such as data security, proper technician training, and timely service scheduling. According to TIRF and our expert interviews, there is a growing movement toward electronic

data reporting. In addition, it was suggested that the state should receive all interlock data rather than select data on reports from vendors. If the state receives data dumped directly from the interlock devices, it can ensure that the integrity of the data is maintained and reports can be generated that fit with the objectives of the program. Additionally, a state in possession of all of the data can conduct further analysis at a later date, something that would be severely limited if state policies required the vendor to report only limited data. In Illinois, interlock data is dumped into a computer program, which then automatically analyzes it and generates reports. This method can greatly increase the efficiency of data reporting compared to traditional hard copy reporting policies. The TIRF is scheduled to publish a document providing guidance on transitioning to an automated data reporting system in late 2011 or early 2012.

Future Research

Several directions for future research have been identified through our review. There is little information available documenting past interlock program successes and failures. There is a need to survey more legislators and experts at the state level to better understand such successes and challenges not only during the program development stages, but after the program is implemented. Improved education was consistently brought up as an area of need, but little information is available regarding either past or current educational programs, or the specific areas that need to be enhanced. Improved education is needed for judges and prosecutors in the court system, the groups that hold administrative authority over the interlock program, law enforcement, and the public. More research is also needed on mandatory interlock programs. A movement toward mandatory programs has been occurring for the past two to three years, so research on these programs and how they differ from optional programs is still in its infancy.

Final Summary

While BAIIDs have been utilized in a number of states for nearly 20 years, there is great variability in how and when states implement such systems. As is frequently the case, states have individual issues in legislative and DOT culture. This lack of consistency makes generating a succinct set of recommendations and lessons learned a challenge. However, this review does provide a good starting point for the Iowa DOT to begin planning for a comprehensive IID program. Of particular significance in this review are the following conclusions:

1. Most states now include first-offenders in their programs, with many states adopting these policies within the last two to three years. While this technology has been around for some time, it is still maturing.
2. There are validated measures that predict the likelihood of recidivism, namely, the number of prior offences and level of intoxication at the time of arrest. These predictors should be considered when designing program eligibility criteria.
3. A criterion-based program exit was recommended by our panel of experts. While the interlock is installed, the number of interlock warnings and fails triggered by the offender is highly predictive of recidivism.
4. It is critical to design programs that allow the state to act swiftly after individuals become eligible for the program. Similarly, policies must allow the state to quickly respond to violations that are triggered in the interlock device after it is installed. Experts in the field have stated that program compliance is improved with efficient monitoring.
5. Electronic data collection and reporting is essential to maintain efficient interlock programs. Expert interviews revealed that electronic data management improves the ability to monitor offenders with interlock devices and to respond when violations are triggered. This means that vendors should be able to provide cellular data links to the DOT so that swift communication/action can be taken by the state when a driver fails a breath test. While systems do not necessarily include such rapid data reporting, Iowa has the ability to plan and push for such a requirement.

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