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(ICADTS)**

Alcohol Ignition Interlock Devices

I: Position Paper

The ICADTS Working Group on
Alcohol Interlocks

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1. Background

Interest in using a technological approach to preventing alcohol-impaired drivers from operating a vehicle was aroused in 1969 around the time that human beings first walked on the moon. Could such engineering talents be put into service for significant social problems? In attempt to answer this question, during the 1970s government and industry researchers examined a variety of ways to lock out the ignition of impaired drivers and thereby prevent a car's engine from starting. The initial approaches to screening out incapacitated drivers were based on driver reaction time and other performance measures. But due to a variety of testing problems, these approaches soon faded in favor of estimating driver blood alcohol content (BAC) through breath testing. The development of modern alcohol ignition interlocks were moved along by concurrent developments in alcohol sensing technology, advances in microprocessors, and through various legislative developments including alcohol per se laws. In 1986, California in the U.S.A. passed the first law that allowed for a pilot alcohol ignition interlock trial. Between then and 2001, alcohol interlock programs went through a period of growth, evolution and maturation in the U.S. and Canada. In the early years these programs were built more on the enthusiasm of legislators and advocates than on a firm foundation of effectiveness or efficacy research. Today, the evidence basis supporting the use of interlocks is much firmer even though some disappointments remain and many areas require further study and refinement. In the U.S.A. in 2001, most States (43 of the 50) have passed some sort of enabling legislation, and the U.S. federal government has provided for interlock programs as well. The criminal code of Canada has been amended to enable Provinces and Territories to institute interlock programs, and now half of the Canadian Provinces and Territories have, or are soon beginning, interlock programs. Sweden and some Australian States have small programs in progress or under development, and the European Union recently authorized a multi-nation feasibility study that convened a meeting at The Hague, Netherlands in June 2001. These developments constitute evidence that alcohol ignition interlock programs may be entering a period of rapid growth with many governments writing enabling legislation for interlock programs.

2. Objective

When a content area is summarized, the documents produced often consist of a scholarly review of the research literature that is then used as a basis for drawing conclusions and suggesting policy recommendations. This report reverses that usual sequence. It was the judgment of the committee producing this report that the rate at which new interlock laws and regulations are being written warranted first completing a position statement reflecting the views of research and program experts. For this reason, this document carries the subtitle "1: Position Paper" and is directed toward professionals with the responsibility to design, implement and enforce interlock policy. The objective of this paper is to summarize important features of ignition interlock programs and to suggest new ways to think about how program features might advance public safety beyond the current implementation models.

A critical review of the research literature is expected to be ready for publication in August 2002 and will carry a subtitle “2: Research Review.” It is possible to produce the policy document now, before the literature review, because the interlock studies community is small and communicates well. The number of well-documented research studies available, while growing, is still very limited. Those that have been completed are well known to the committee either through conference proceedings or the research literature. Consequently, this report does not comprehensively review the literature, but reflects the literature and draws attention to key issues that legislators, advocates, detractors, law enforcement, and government officials may find to be of value as they work to devise the most sensible programs and regulations.

3. Executive Summary

Breath alcohol ignition interlock devices, when embedded in a comprehensive monitoring and service program, lead to 40-95% reductions in the rate of repeat DWI¹ offenses of convicted DWI offenders. Reducing the DWI rate is an important indicator of a public safety impact because DWI is a strong predictor of crash risk involvement. While it may be a safe assumption that reduction in DWI will lead to fewer crashes, there has not yet been any study with sufficient statistical power to demonstrate a direct reduction in crash risk attributable to an interlock program. In the U.S. and Canada, which have the most interlocks in service, only a few percent of eligible offenders ever enter an interlock program, so interlocks have not yet made an important contribution to highway safety at the population level. This may change soon as many more states, provinces, and nations are writing interlock legislation. The purpose of this document is to point out issues worthy of consideration for those who influence policy.

Because of the manner in which interlocks are assigned to prior DWI offenders, the most dangerous repeat DWI offenders only rarely become eligible for an interlock and then only for a brief period of time. Research is called for that would evaluate the impact of lowering the threshold for entry into an interlock program and raising the threshold for exit from an interlock program. If such an approach were successful it could put more of the most dangerous repeat offenders under control of an interlock program and retain them until evidence is available documenting their readiness to drive without an external monitor. Two methods that could be used to provide evidence of readiness for full license reinstatement without an interlock are suggested. These include interlock device data logs that document the BAC test results over the preceding months, and the measurement of blood borne biological markers associated with alcohol dependence.

This document makes the following points.

1. The alcohol interlock device must be configured as part of a comprehensive program of monitoring, recording, and reporting in order to be considered complete. The device by itself is not sufficient.

¹ DWI – Driving While Impaired with alcohol is used throughout this document and should be understood to be the generic equivalent to abbreviations such as DUI, OUI, OWI, in relation to alcohol.

2. A central national authority should manage device certification and evaluate features of interlock programs that become part of the interlock standard requirements.
3. Interlock programs are most often used as a form of secondary prevention to prevent impaired driving by people identified as high-risk due to prior DWI offenses. These programs reduce recidivism by 40-95% as long as the interlock remains on the car. The period of interlock use does not lead to the adoption of enduring safer driving decisions in the longer term since the recidivism rate increases to control levels after the interlock is removed. Effort needs to be made to prevent the post-interlock increase in the rate of DWI offenses.
4. Interlock programs also hold some promise as a primary prevention strategy for improving highway safety such as when used by people who operate mass transportation or hazardous materials vehicles. Some individuals or fleet owners may elect to use interlocks to reduce risk exposure by proactively preventing alcohol impaired driving.
5. Not all drivers of interlock-equipped vehicles will be equally motivated to comply with the interlock restriction and monitoring authorities need to be attentive to these differences. The evidence base for interlock effectiveness in reducing DWI is strong but most studies to date have evaluated the effects of interlocks on offenders who are motivated to be compliant with the law. Most current interlock program effectiveness data are based on volunteer programs in which the driver installs the interlock to reduce the hard suspension time; court-ordered offenders may be less compliant.
6. The majority of convicted DWI offenders whose licenses are suspended choose to drive anyway, and since an alcohol interlock program can improve monitoring and prevent impaired driving, it is worth evaluating the public safety impact of an early post-conviction interlock requirement relative to simply suspending the driver's license.
7. If the tradition of long license suspension for DWI offenses were relaxed in favor of issuing restricted licenses that require an interlock device, it would be critically important to closely monitor the driving behavior of such high-risk drivers. But, public safety should be the highest priority for DWI control legislation.
8. Motor vehicle authorities and courts should give consideration to criterion-based removal of the interlock devices rather than to simply require that these devices be used for a pre-ordained period of time. Criteria for removing the device could be based on a combination of biomarkers and objective behavioral evidence that public risk exposure related to drinking-driving by an offender has been reduced.

9. In most interlock programs, the offender pays to cost of the program at approximately \$65 U.S./month equivalent. There is no evidence that the interlock is a serious cost-burden, but insurance carriers might be able to overcome any cost impact with an offsetting adjustment in insurance rates if data show evidence that DWI offenders driving with an interlock installed have lower overall crash risk.
10. It may be impractical to require that an interlock be installed on every vehicle owned by someone who will be required to use an interlock device. As an alternative the driver license of such drivers should be clearly marked showing that the driving privilege is exclusively contingent upon use of interlock vehicles.
11. In the future, the interlock will likely be an integral part of advanced driver recognition and control systems. In the meantime it is very easy for a driver to circumvent the interlock by using a different vehicle without the interlock. Accordingly, at the current stage of technological development, an offender's motivation for compliance with the interlock restriction is expected to be a factor in effectiveness. Brief motivational interventions delivered while drivers are captive in the interlock program may help improve motivation for making lasting behavior changes.

4. Introduction

In the past decade breath alcohol ignition interlock programs have been adopted as a part of a DWI control strategy in four developed nations and are under study in at least six more. The alcohol interlock requires that a vehicle operator provide a low alcohol or alcohol free breath sample before the ignition will unlock and allow the engine to start. In most cases DWI offenders pay the costs of alcohol interlock programs. From its conception more than 30 years ago, the current interest in interlocks has been built on knowledge gained from outcome studies and other developments in research, engineering and program delivery.

The ICADTS would like to contribute its collective research and programmatic expertise to help guide new interlock legislation and to improve existing interlock programs and policies. Members of the working group that produced this report believe their contribution is warranted because there are no authoritative sources of such information currently available in one place. By contrast, many members of the working group have been able to cite examples of interlock laws, administrative regulations, or court actions that are ill advised and often counterproductive.

Toward this end, this ICADTS working group report on interlocks summarizes areas of general agreement, introduces approaches being taken in different nations, and identifies potential problem areas. It also highlights promising new ways that ignition interlock programs could contribute to even greater improvements in highway safety. At the most general level, there is widespread agreement that good comprehensive interlock programs do reduce DWI while the devices are in place on the vehicles of DWI offenders.

The ICADTS Executive Board approved the establishment of the International Council on Alcohol, Drugs and Traffic Safety (ICADTS) Working Group on Alcohol Interlocks in January 2001. The plan for this current document was discussed at two initial meetings of the working group held in Washington DC also in January 2001. During the following six months successive drafts of this document circulated through e-mail while it underwent revisions to its current state. The main purpose of this document is to briefly review some of the key ignition interlock issues that have policy relevance. The report contains a number of recommendations to improve the effectiveness of interlock programs. Its intended audience is professionals generally familiar with one or more aspects of alcohol and road safety employed as government officials, researchers, policy makers, judges, law enforcement officials, insurance industry executives, educators, safety advocates, or clinicians.

The final section heading of this Position Paper on Alcohol Interlocks titled “Further Reading” is a sampling of literature relevant to the comments made here; it is not comprehensive but does identify most of the papers that have been published on interlock devices per se. Citations of this literature are made in the text when inclusion might help guide the reader to specific information.

Prior to the 16th International ICADTS Conference in Montreal August 4-9, 2002, the ICADTS Interlock Working Group intends to complete the second paper, a comprehensive annotated review of the breath alcohol ignition interlock research literature.

5. Necessary Features

There is strong sentiment among interlock experts on the ICADTS working group that the minimal necessary features of an alcohol ignition interlock program be understood as including:

- an alcohol ignition interlock device per se that can lock out the ignition when a specifiable level of alcohol is detected by the breath alcohol sensor,
- a method that lowers the likelihood that an unauthorized person will provide the breath sample such as: detection of a unique driver breath signature, a learned sequence of breath delivery (i.e., a hum code), and/or a requirement to retest the driver’s BAC one or more times after the vehicle has been running,
- an event log or recording system that tracks each BAC test and the time of the test,
- an interlock monitoring program that services, inspects, and calibrates the devices on a regular monthly or bimonthly basis and which has a reporting requirement linked to the authority of a sanctioning body (such as the motor vehicle authority or the court system), and
- visible evidence of the interlock restriction noted on the offender’s driver license.

This emphasis is taken because the physical device, the ignition locking hardware, should not be expected by itself to control alcohol-impaired driving among previously convicted DWI offenders. Without a comprehensive program that includes active monitoring,

reporting, and the threat of further sanctions, the interlock device is incomplete. In fact, when devices are installed on the vehicles of convicted DWI offenders, it would be irresponsible to not have an interlock-monitoring program in place.

The interlock program should, as a minimum, include some agency that on a monthly or bimonthly basis reviews summaries of the interlock data log file in order to examine how the interlock-equipped vehicle was used. There should be an active system of communication between the interlock service provider and the sanctioning authority regarding the interlock data records. Recent research evidence from Alberta, Canada has shown that the data record of BAC testing is a potent advance predictor of future DWI offenses after the interlock is removed (Marques et al., 2001).

Finally, when the court or the motor vehicle authority authorizes the interlock, the driver license should be clearly marked in some fashion so the restriction is evident to a law enforcement officer. This is important because driving a non-interlock car when an offender is required to use an interlock should be considered a violation as significant as driving while suspended (DWS).

6. Certification Of Interlock Devices

There is general agreement that despite the need to embed the interlock in a more comprehensive program, the physical interlock device does accomplish its originally intended purpose, with fuel-cell technology providing the best alcohol specificity and measurement stability. Guidelines published by the United States (U.S.) National Highway Traffic Safety Administration (NHTSA, 1992), known as the Model Specifications, were well suited to the understanding and technology then available. Those guidelines aptly described the minimally needed performance characteristics for non-specific semiconductor-type interlock devices used in mid-latitude climate zones. Today, the more alcohol-specific fuel-cell devices have begun to dominate the world markets. The NHTSA guidelines were also written to give states wide flexibility in designing interlock programs. Experience gained during the past ten years has now made it clear that the federal authority needs to play a more active role. With ten years of interlock experience in dozens of different jurisdictions, older guidelines are now overdue for public comment and revisions; the NHTSA guidelines specifically advocated periodic revision.

Subsequent to the issuance of the 1992 U.S. guidelines, some confusion in device certification arose in the U.S. that other nations can avoid. In those guidelines, the NHTSA chose to not manage device certification for interlocks as it had for other devices (i.e., evidential devices, alcohol screening device and calibrating units). One consequence of this has been some manufacturers shopping around for commercial laboratories, sometimes several laboratories, in order to gain certification documents to “prove” their equipment complies with the guidelines. In addition, there is evidence that some laboratories have certified a device without performing all of the required tests. To avoid potential problems related to non-standardization, there should be a single responsible authority, such as a federal government laboratory or a laboratory authorized

by the federal government, to assess the adequacy of all equipment that will be placed in service in that country.

In the early 1990s, the running (or rolling) retest requirement (additional BAC tests while the vehicle is operating) became an important addition to device certification requirements in both the U.S. and Alberta, Canada. These additional tests are widely believed capable of preventing several types of interlock circumvention attempts. Currently, the NHTSA guidelines advocate one running retest and the Alberta, Canada standard (Electronics Test Centre, 1992) requires multiple running retests. Neither the effectiveness of single nor multiple retests, nor the best frequency for retesting, have been formally evaluated. Certification requirements would benefit from periodic research to evaluate the necessity of the features advocated. Currently, the Alberta, Canada standard, written in 1992, is the most widely used guide to alcohol ignition interlock device certification.

7. The Interlock And Prevention Of Impaired Driving

In the United States, Canada, Sweden, and in pilot programs in Australia, interlocks are placed on the vehicles of DWI offenders under the order of a court, or through stipulation by a motor vehicle authority as part of a reinstatement requirement or a restricted driving license. Used in this way, interlock programs are targeted at proven high-risk operators. Applying a preventive countermeasure such as an interlock in this way is sometimes referred to as secondary prevention because it focuses on people who are most likely to place the public at risk with their drinking and driving. Most authorities currently using the interlock apply it to these high-risk populations.

In the aggregate, evidence spanning nearly ten years by 8 or more research groups in the U.S. and Canada point toward 40-95% reductions in recidivism while the interlock programs are in effect relative to DWI rates of matched groups of offenders who are simply suspended and should not be driving at all. These data are shown summarized in Figure 1 which has been adapted from Marques et al., (2000). Each bar pair shows the same group of drivers' recidivism rates during and after the interlock. The percent repeat DWI rate is calculated relative to a non-interlock contrast group whose recidivism rate is set at 100% for each study. The dark bar in each pair is the recidivism rate while the interlock is installed (relative to 100% for a non-interlock contrast group). The white bar is the recidivism rate of the same drivers after their interlock had been removed (again relative to a 100% rate of the non-interlock contrast group).

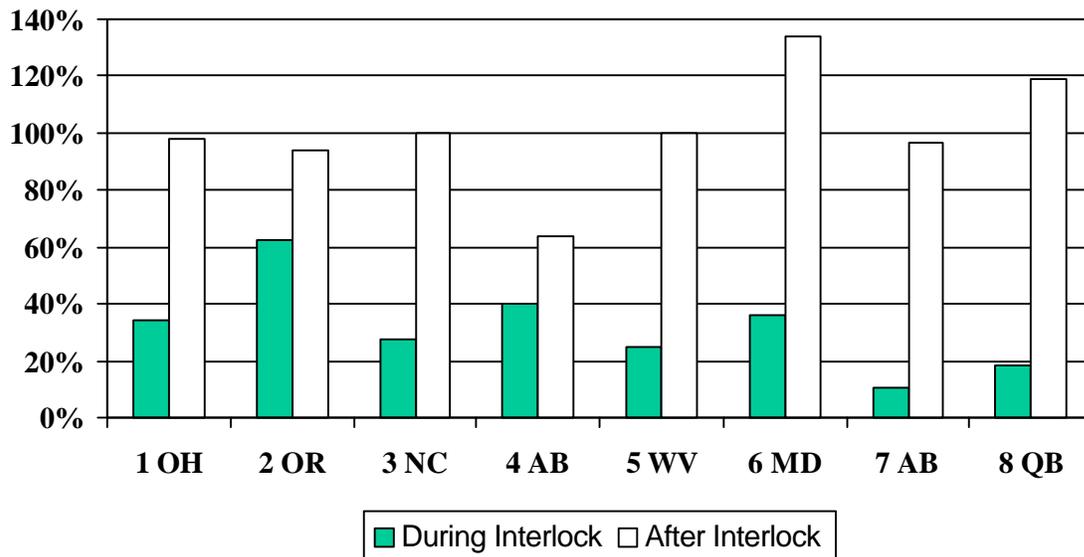


Figure 1: Eight studies that compared interlock recidivism rates (%) during the interlock (dark bars) and after the interlock (open bars) against recidivism for non-interlock contrast groups (set to 100%).

The different U.S and Canadian States and Provinces represented are: Ohio (OH: Eliot & Morse, 1993); Oregon (OR: Jones, 1993); North Carolina (NC: Popkin et al., 1988); Alberta_1 (AB: Weinrath, 1997); West Virginia (WV: Tippetts & Voas, 1998); Maryland (MD: Beck et al., 1999); Alberta_2 (AB: Voas et al., 1999); and Québec (QC: Vézina & Dussault, 2001).

In most cases the interlock programs run for about 6 to 18 months and have included a mix of first and multiple DWI offenders. As is clear from Figure 1 most research studies find that the effect of the interlock program to reduce DWI rates does not reach beyond the end of the program. The outcome studies represented in Figure 1 show that many people who avoided DWI arrests while the interlock was installed went back to their old ways after the program ended. Repeat offense rates by drivers after the interlock had been removed are similar to rates for those who never had an interlock and whose licenses were suspended. Nonetheless, when adding together the on-interlock and after-interlock DWI rates, the interlock programs still have a significant net advantage. It seems likely that the safety benefit of interlocks could be enhanced if the duration of interlock use is extended for high-risk offenders, but no experimental studies have yet been conducted to specifically evaluate the safety benefit of extending the required period of installation.

8. Interlocks As A Primary Prevention Approach

Interlocks have also been used as a primary prevention measure. Primary prevention in this context is a means of preventing alcohol impaired driving by individuals who have

not been pre-selected on the basis of prior DWI offenses; this type of program is still mostly unknown outside of Europe. It is one of the approaches used in Sweden and is justified by the high proportion of people who occasionally drive while alcohol impaired even though they may have never been convicted of DWI. For example, four different research groups in the U.S., using different methodologies, have estimated the prevalence of impaired driving at: 85 (Liu et al., 1997), 200 (Voas & Hause, 1987), 600 (Hingson, 1995) or 2000 (Borkenstein, 1975) impaired driving trips that go undetected and unpunished for each one that results in a DWI arrest; the low estimate is based on self-report. More people than just convicted DWI offenders operate vehicles while impaired by alcohol. The broad-based primary prevention approach adopted by Sweden for commercial operators (e.g., commercial truck drivers, and public transportation system operators) may improve public confidence in the commercial transportation system by using ignition interlocks to exclude alcohol-impaired operators.

When used with DWI offenders, interlocks are not a free pass to driving; they are intrusive. Each startup attempt requires a breath test and many programs require additional tests once the vehicle is running. With such inconvenience, it is unlikely that the alcohol interlock would be acceptable by the general public for use on all private vehicles as a primary prevention measure. In the past, the U.S. Congress imposed and then, due to public outcry about the inconveniences, was forced to rescind a law that required safety belt interlocks in private vehicles. For safety sensitive occupations, however, it is possible that alcohol interlocks could find initial political support as a primary prevention measure.

In Sweden, employees in safety sensitive occupations such as operators of buses, trucks or other public conveyances that present special risks to the public are increasingly required to use interlocks as a preventive measure. The Swedish approach might find some support in other nations. Support might be forthcoming from private industry if use of the devices were shown to reduce costs to insurers that could be passed on to payers; there may also be a potential safety payoff. Potential candidates are hazardous materials haulers, school bus drivers and other operators that transport the public whether by air, rail or highway. Private vehicle fleet owners and heavy equipment operators have reportedly considered this primary prevention approach in both North America and in Europe.

In another primary prevention approach, a few interlocks may be in service for non-offenders on a purely volunteer basis, such as being placed in cars by parents for their novice teen drivers. Combining inexperience with alcohol and with driving multiplies teen risk and the interlock precaution could reduce part of the risk exposure. This approach may become more generally attractive if inexpensive devices were developed that could be monitored by parents directly, or through a telephone data-link with a service company. Reducing costs may improve the acceptability of such an approach by parents. However, there is no programmatic information to suggest that this type of approach would be practical.

Interlocks have been used as a form of self-imposed restraint. Used in this way the interlock is a precaution similar in function to Antabuse (disulfiram) that can bring about unpleasant consequences when alcohol is used. Individuals who favor this approach want an external control on their own drink-driving impulsivity. Such instances have been documented in Maryland where ten offenders chose to continue participation in the interlock programs beyond the required period in order to assist them in avoiding further DWI arrests.

9. Motivation To Comply With An Interlock Program

While DWI offender sanctioning (i.e., secondary prevention) warrants the most attention to ensure that interlock users remain compliant with interlock programs, the observations in this document have some relevance for controlling the alcohol involved driving of anyone who is required by an external authority to use the interlock. The sanctioning authority making the requirement may be the probation department of a court, or a motor vehicle department but it could also be an employer, fleet owner, or parent. The alcohol ignition interlock will be an effective method of control only to the extent that someone monitors the interlock data record, examines the integrity of the wiring, and reports these findings to an authority that is willing to impose sanctions when misuse is found.

Among DWI offenders there are several different motivational circumstances for complying with an interlock program. Care should be taken to explicitly define the different motives operating because the success of interlock programs may vary with the incentives perceived by the interlock user. When used with offenders, we should recognize at least three motivational or incentive conditions that may affect program outcomes.

- A. A person may volunteer for an interlock as a means to more rapid license reinstatement when the law allows for this option. As part of an arrangement with the court or motor vehicle authority a person might choose to install an interlock so that he/she receives a shorter “hard” suspension period (i.e., so there is less time to endure in which no driving at all is permitted). In exchange for a shorter suspension period the offender agrees to drive for an additional, somewhat longer period with the interlock restriction. People who fall into this category usually place a high value on being able to drive while in possession of a valid and legal license. In this case the interlock is voluntary.
- B. A person may be ordered by the motor vehicle authority or the court to install an interlock device as a condition of relicensure, without which he/she cannot become eligible for a legal driver’s license. In this case, the extent of compliance with the restrictions of the interlock program may depend on the offender’s perceived value of a license and his/her willingness to risk driving without a license. Those more willing to ignore the legal boundaries may also be inclined to ignore the stipulation that only the interlock-equipped vehicle be driven. It is expected that this category of offender will have a lower motivation to abide by the interlock restrictions than will volunteer users. In this case the interlock is mandatory for relicensure.

C. A person convicted of DWI may be ordered by the court to install an interlock or suffer some restriction in freedom such as house arrest or jail. Programs of this type are relatively uncommon but have been implemented by at least one county court system in Hancock County, Indiana, USA. Interlocks are considerably less costly for the offender than electronic house arrest both in terms of personal freedom and money. In this case the interlock is mandatory for freedom.

These different conditions will likely require differing degrees of monitoring to assure compliance. While the voluntary condition (A above) has been the most widely studied, recent legislation in the U.S. (TEA-21 Restoration Act, Sec. 164) and Canada (new 2001 Ontario legislation) will lead to large numbers of offenders in the mandatory for relicensure condition (B above). Texas, with approximately 11 000 devices in service has approximately one-third of all interlocks in service in the U.S.; almost all are multiple offenders. About 30-40% of these interlocks are imposed as a condition of bail (before sentencing) and about half are imposed as a condition of probation. Imposing the interlock as a condition of bail creates a strong incentive.

The U.S. has more interlocks in use than any other nation, but still only about 2-3% of all DWI arrestees enter an interlock program even though, upon conviction, it becomes available as an option to a great many offenders. In the 43 states with interlock enabling legislation, the installation rate rarely exceeds about 10%. The exception is when the interlock is required in lieu of significant punishment (C above). Condition C has been documented to result in 62% of offenders installing interlock devices. After such a policy went into effect in Hancock County, Indiana, the entire county's DWI rates were reduced by 40% for first offenders and 22% for multiple offenders (Voas et al., 2001). Hancock County may be the only jurisdiction with such a strict interlock policy.

We need to better understand why more offenders do not volunteer to use interlocks when given the opportunity. One exception appears to be Québec, Canada, which has received very strong interest and enrollment in their voluntary interlock program, attracting 26% of all first time DWI offenders (Vézina & Dussault, 2001). The Québec government actively promotes the interlock program through direct personal correspondence with offenders, disseminates information through the mass media, and has installation facilities in large and small cities across the Province. Also concurrent with the interlock program, Québec introduced a vehicle impoundment program for those who drive while suspended. This may help make the interlock seem a more desirable alternative. The voluntary Québec program may be a model that other states and nations can learn from.

In some places, part of the problem with making an interlock appealing on a voluntary basis could be due to an imbalance in the perceived personal inconvenience to personal benefit ratio of the interlock. In the U.S. the number of people driving with a suspended license is regionally very high. California, with a sophisticated driver records tracking and reporting system allowing for detailed analysis, finds there are nearly 1 million suspended drivers compared to 21 million licensed drivers there. Under some circumstances, the perceived risk of being detected for driving while suspended (DWS)

may be so low that the interlock seems an unnecessary inconvenience to some eligible DWI offenders.

10. Should The Interlock Be Required Soon After Conviction for DWI?

In North American interlock programs for DWI offenders, a period of “hard suspension” time (no driving allowed at all) is usually required before someone becomes eligible for an interlock. In addition to its purpose as punishment, an objective of license suspension is to reduce the risk of future DWI offenses by keeping the offender off the road for a period of time. Adherence to the driving prohibition, however, is imperfect. Research has estimated that as many as 75% of suspended drivers in the U.S. continue to drive to some extent while suspended (Griffin & deLaZerda, 2000). A recent attempt to document the level of driving while suspended in Maryland yielded videotaped evidence that 27% of suspended DWI offenders actually reported to their probation officers while driving a vehicle (Rauch et al., 2001).

Because the best predictor of future behavior is past behavior, it is routinely found that those with more prior offenses are also the most likely future DWI offenders. Accordingly, the required suspension time typically increases with the number of prior DWI offenses. For example, it is common for someone with three prior DWI offenses to be required to remain free of further DWI offenses for three or more years before becoming eligible for an interlock device.

When (and if) the interlock is installed on vehicles of these high-risk drivers, it is usually installed for 6 to 12 months and rarely for more than about 24 months. Consequently over a five-year period, the interlock device may control a very high-risk offender for just a small portion of that time. Worse, the most dangerous offenders, those who were unable to avoid additional DWI offenses during the years of required clean suspension time, never achieve eligibility. In Alberta, Canada, where a hard suspension period of 6 months for first offenders and two years for second offenders was required prior to the installation of the interlock, the DWI offenders who had an additional offense during this waiting period eventually had 3+ times as many additional offenses over the next 3-5 years as did another group of offenders with clean records who chose not to go on the interlock program. This high-risk group also had 7+ times as many offenses as the offenders who were eligible and did select the interlock program (Voas et al., 1999). Requiring a period of hard suspension prior to interlock eligibility may contribute to our inability to place the interlocks onto the vehicles of the most persistent drinking drivers. In the Swedish interlock program the penalty for DWI is separated from the interlock so there is no required period of suspension prior to participation. Once an offender can gain medical clearance, he is permitted to enter the interlock program (Allo, 2000).

Since we know that many DWI offenders do not stop driving when their licenses are suspended or revoked, and because the interlock has the potential to protect the public from these high-risk drivers, research should be conducted to evaluate if there is a safety benefit from permitting interlock installation after a shortened suspension period.

Research evidence regularly shows that a high rate of repeat DWI offenses occurs in the period immediately following a prior DWI.

11. Implications: Suspension Or Interlock

The requirement of mandatory suspension time for DWI offenses was a hard-won victory of the safety community. License suspension is imperfect, but nonetheless has proven to be an effective method of controlling high-risk drivers because suspended drivers drive less often and probably more carefully when they do operate a vehicle.

Giving consideration to relaxation of the required suspension sanction should not be approached lightly. Victim advocacy groups (i.e., MADD, RID) have been exceptionally effective in advancing public and judicial awareness of the societal menace posed by impaired drivers. Mandatory suspension is one of their cornerstone issues and these groups are among the most persuasive advocates promoting findings from the safety research community. Nonetheless, safety policy has to remain a work in progress and cannot afford to become locked into an inflexible set of prescriptions. Principles that cannot evolve in the present are less suited for survival into the future. Interlocks were not an option when long suspension periods became a standard approach to DWI control.

For the offender types on whom there are data, there is strong effectiveness evidence for interlock programs. If evidence from those who have been studied can be generalized, it may be that earlier-rather-than-later installation may enhance public safety even further. An argument in favor of rapid initiation of interlock programs is the high rate of repeat offenses that follow closely after a conviction. But what if a minimum suspension of 6 months to several years is no longer required for DWI offenders? It is easy to imagine that relenting on the suspension tradition – even a little bit – will open a path that may confuse interlock restrictions and regular restricted or hardship licenses.

If an opportunity does become available to put DWI offenders on the interlock shortly after a DWI conviction, the safety community will need to watch these program changes with a single-minded focus – to be completely certain suspension is relaxed only if a properly implemented interlock program is begun. While many members of the interlock-working group think this is an idea worthy of consideration, data are not yet available to address that policy option. An early interlock installation must not be viewed as a reduction in punishment, but as a punishment that enhances public safety, even though driving is permitted. Possibly, requiring that the interlock be kept on the car for longer periods of time will enhance the public perception of it as punishment. As noted above, some of the highest risk drivers often never become eligible for an interlock due to their frequent repeat DWI offenses. A policy of imposing an interlock on the vehicle of these offenders through court order is worthy of an evaluation study. A random assignment study would allow an objective comparison of the relative public safety benefits of immediate hard suspension against immediate interlock. Currently no such comparative studies have been conducted.

12. Criterion-Based Interlock Removal Should Be Evaluated

Alcohol-impaired driving is a problem that exists at the boundary where society's institutions concerned with helping (medicine and public health), and punishing (law enforcement), have mutual interests to prevent behaviors that endanger oneself and society. Perhaps because the courts hear so many DWI cases, sentences for the offense are not often applied flexibly. By contrast, when health care is managed responsibly, patients are released from care when their health has returned, not when they have been in care for the typical length of time. In the criminal justice arena the length of the typical sentence for DWI is somewhat formula-driven and less often adjusted as a function of how well the driver's behavior has changed. This tradition has led to the current logic for sentencing offenders to an interlock device for a fixed or predetermined period of time with the remote possibility of extending the interlock time for bad behavior – or as is more typically done – dismissing someone from the interlock program for bad behavior (i.e., driving while impaired, attempted circumvention, repeated high BAC tests).

A public health focus on the drinking-driving problem suggests a different set of criteria be considered. According to this point of view, the decision to remove the interlock from the vehicle should be based on criteria that are consistent with evidence of less harmful alcohol use by the driver, or at the very least, evidence that alcohol has not been used while driving. Epidemiological surveys have shown that at least 70% of DWI offenders in the U.S. can be diagnosed by DSM-IV (standard psychiatric reference criteria) as alcohol abusers or alcohol dependent (Miller & Windle, 1990). This is approximately ten times the rate of alcohol abuse and dependence in the general U.S. population. In Sweden the proportions reported are roughly similar, 50% of their interlock using DWI population are diagnosed alcohol dependent and 30% alcohol abusers (Bjerre & Laurell, 2000). It is likely that these proportions will not differ much in other nations; the so-called hard-core or persistent drinking driver is familiar to most nations and the target of considerable international effort to control.

It is common to hear stories of repeat offenders with numerous prior DWI convictions who injure others while impaired and nonetheless in possession of valid driver licenses. Impaired driving is often hard to detect. Each DWI conviction is a minor victory for social order, so it seems foolish to turn loose high-risk drivers and give them unrestricted valid licenses. Rather than simply releasing DWI offenders to drive – and to often drive after drinking – a better way may be to require evidence that public risk exposure will not be increased prior to restoring driving privileges. The interlock can serve as a means to monitor DWI offenders over an extended period of time until evidence of considerably reduced risk demonstrated.

What trustworthy methods are available to use as criteria for screening prior DWI offenders to minimize the chance of impaired driving if they do not have an interlock restriction? Clinical interview and psychological assessments are often used, but these approaches are strengthened when more objective information is available. Evidence in Canada has recently shown that the record of BAC positive tests logged during the period

the interlock is installed is highly predictive of future repeat offenses (Marques et al., 2001). Those who have elevated BAC and more often fail to pass interlock breath tests are most apt to have repeat offenses in the future. The interlock record itself is an early indicator that the driver may not have separated drinking and driving. Those who repeatedly log positive BAC tests and intend to drive a car are not a safe risk for alcohol-free driving after the interlock is removed.

In some European nations, biological markers are already used as criteria in licensing decisions because they are known to be strongly associated with levels of prior alcohol consumption (Gilg et al., 2000). The markers include CDT (carbohydrate deficient transferrin), the liver enzyme gamma glutamyl transferase (GGT), mean red cell volume, along with several standard clinical indicators. The CDT protein in particular appears to be a good indicator of alcohol consumption such that heavy consumers of alcohol can have 5 or more times as much CDT as normal consumers. In a recent multinational study CDT was shown to have both high sensitivity (82%) and high specificity (97%) in the detection of frequent male heavy drinkers (Bjerre, 2001). In another biochemical approach, a linear discriminant function based on routine clinical chemistry has been shown highly predictive of alcohol dependency with sensitivity greater than 80% (Bean et al., 2001).

Used in conjunction with the behavioral measures available from the interlock record, one or more biomarkers could serve as indicators of driver fitness for interlock removal and full license reinstatement. Public risk exposure might be reduced if the required interlock duration became flexible and dependent on evidence of a driver's changed behavior. An agent of the court, such as the probation department, might be in the best position to play the role of monitoring agent. However implemented, putting the interlock on early and removing it when the evidence warrants is a very different approach to dealing with DWI offenders. These approaches make sense when the frame of reference shifts from one in which the interlock is viewed as a sanction placed on the offending individual toward one in which the interlock is viewed as a protective public safety shield. This can happen if the central concern is seen as future oriented public traffic safety rather than viewing the periods of suspension and interlock programs solely as punishments for a past offense.

13. Is Cost Of The Interlock Program A Legitimate Barrier for Some?

In North America the offender pays the cost of the interlock program. In U.S. dollars after an installation fee of approximately \$100-\$150, the interlock program costs approximately \$65/month for each program month. This cost of leasing an interlock from a program/service provider is sometimes cited as a reason why interlocks are not more widely used. If true, it would raise the concern that interlock programs favor wealthier offenders. But, there is an argument against this as well: alcohol has proven affordable to most offenders and its monthly cost very likely exceeds the monthly cost of an interlock program.

In the U.S., the courts have consistently ruled that the cost of an interlock is not an “excessive fine” as long as funds are available to assist the truly poor. Many interlock companies in North America maintain a pool of funds for indigent offenders, but few offenders take advantage of these interlock assistance funds. Data from Sweden show that even if offered with no costs and no suspension time, 40% of Swedish DWI offenders still claimed no interest in the interlock program (Bjerre & Laurell, 2000). If cost is a legitimate barrier in some cases, it could be rendered moot if insurance companies would adjust their rates based on current evidence that the interlock lowers DWI risk and by doing so lowers a major crash risk factor. However, no study has yet had adequate statistical power to demonstrate that alcohol interlocks reduce crash risk. A private insurance company in West Virginia in the U.S. offered a program to reduce rates if an interlock was installed, but then abandoned it when it did not prove popular among offenders. It is not clear if the program was well publicized and rejected, or just not well known. In Quebec, one insurance company offers a 100% waiver of the DWI premium surcharge that would apply if first offenders participate in an interlock program for one year. If cost is an issue, more insurers could play an important role if they were willing to evaluate whether a risk offset produced by the interlock could be reflected in an insurance cost offset that defrays the monthly cost of the interlock.

14. How Many Interlocks For Each Driver?

If someone owns two or more cars should he or she be required to install an interlock on each one, and if so what is the limit? Different states and nations address this problem differently. The most common solution is to require that the interlock user drive only cars equipped with interlock devices and leave the question about the number of cars for the individual to decide upon. The act of driving a non-interlock vehicle when a license is restricted to interlock vehicles would have to be regarded no differently from driving while suspended.

A convincing resolution of the problem of preventing or detecting unauthorized driving may need to await the emergence of “smart cars” and/or electronic driver licenses (Goldberg, 1995). A smart license could contain a coded interlock stipulation that would not allow the car to run without an interlock test. A system like that would allow program monitors to separate out the data records of offenders who drive the interlock car from innocent family members who also need to use the vehicle. However, developments such as these that would prevent unauthorized driving are still well off into the future.

In the meantime, a clearly marked driver license with visible evidence of an interlock restriction would help law enforcement officers to identify the people who should only be driving a car with a properly functioning interlock.

15. Looking Forward To The Marriage Of Interlocks And Smart Cars

The current generation of interlock technology has the most accurate and specific mobile alcohol sensors (fuel-cells), includes requirements for running retests (retesting BAC one or more times while the engine is running), has data recorders (to log vehicle use, BAC test levels and retest compliance), tamper detection circuitry (to preclude hot wiring or bypassing the interlock device), and various methods of individual driver recognition systems (such as coded blow sequences). They may soon have individualized breath signatures, or other biometric-based recognition systems. Despite all these technological advances, the largest and still unbridgeable problem with the interlock is the relative ease with which an interlock-stipulated offender can drive a non-interlock equipped car.

Consequently the driver's intention or motivation to comply with the interlock program is still very much an important factor. The technology to change behavior, while advancing apace, is still rudimentary but remains an essential part of the equation. More effort is warranted to use the occasion of the interlock service visits to intervene with these captive populations with approaches such as brief intervention, pragmatic counseling, and motivational interviewing (Marques et al., 1995; Marques et al., 2000). The use of an interlock will focus the attention of DWI offenders on their decisions to drink and drive; it is an important opportunity to try to motivate personal change. When clients are ready to begin taking steps toward self-change, referral links to regular treatment intervention programs should be available.

The future will likely bring the convergence of many forms of intelligent vehicle systems and the alcohol interlock. Among these may be cars that are pre-wired to accept plug-compatible interlock devices, cars that require magnetic/electronic driver licenses for starting the engine, magnetic stripes on licenses that can be coded to require an interlock device, interlock devices smart enough to know the identity of the driver through breath signatures, and advanced court monitoring procedures that uplink BAC or other performance data in real time. There are concepts under development collectively known as "telematics" that can use existing mobile telephones to send vehicle information to a remote monitor. Linking telematics to interlocks could permit automated transfer of real-time data in order to report running retest failures, perform remote calibration, or transfer data logs and vehicle location information. These developments will bring with them new debates about the costs and benefits of public security and personal privacy. In whatever direction the technology matures, it is likely that the interlock will be a part of an advanced driver control system. As this future unfolds, and as interlock information and experience accumulate, documents such as this one will need to be periodically updated.

16. Further Reading

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