

Feasibility of alcolock implementation in EU drink-driving policies

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D-2001-18

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Presentation at the European Commission, 4 December 2001, Brussels

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Leidschendam, 2001
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Report documentation

Title: Feasibility of alcolock implementation in EU drink-driving policies
Subtitle: Presentation at the European Commission, 4 December 2001, Brussels
Author: René Mathijssen (ed.)
Project number SWOV: 69.916
Project code client: Contract No. ITREN-E/2000 2 SI2.260382 SWOV
Client: This project was funded by the European Commission

Keywords: Breath test, ignition, prevention, immobilization (veh), drunkenness, safety, policy, EU.

Contents of the project: An alcolock is a breath testing device connected to the ignition system of a motor vehicle. It prevents an operator from starting the vehicle if the breath alcohol concentration exceeds a predetermined threshold or fail level.
From November 2000 until September 2001, a consortium of European road safety research institutes conducted a study of the feasibility of alcolock implementation in drink-driving policies of EU countries. This report contains a presentation of this study, held at the European Commission, 4 December 2001.

Number of pages: 17 + 5 p.
Price: € 8,75
Published by: SWOV, Leidschendam, 2001

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1. Introduction

In 1970, the United States Department of Transportation started a programme to develop alcolocks. An alcolock is a breath testing device connected to the ignition system of a motor vehicle. It prevents an operator from starting the vehicle if the breath alcohol concentration (BrAC) exceeds a predetermined threshold or fail level. More official and precise names for an alcolock are 'alcohol ignition interlock' or 'breath alcohol ignition interlock device' (BAIID). The use of alcolocks is embedded in a program of monitoring and servicing, sometimes complemented with medical and/or psychological interventions.

In 1986, the first alcolock programme started in California. In 2001, most American states, large parts of Canada and Australia, and Sweden had legislation that allows alcolock installation in the vehicles of DWI (driving while intoxicated) offenders.

From 1 November 2000 until 1 September 2001, a consortium of European road safety research institutes conducted a study of the feasibility of alcolock implementation in drink-driving policies of EU countries.

In more detail, the goals of the study were:

- to investigate the effects of alcolock use on drink-driving and road safety;
- to identify target groups for alcolock programme participation;
- to make an inventory of the requirements alcolock devices and programmes should meet;
- to design an EU field trial;
- to identify EU countries which are willing and able to introduce alcolock programmes.

Partners in the research consortium were SWOV (The Netherlands; project co-ordinator), BAST (Germany), DTF (Denmark) and VTT (Finland).

A great help was a recent publication by the Canadian Traffic Injury Research Foundation (TIRF): "Best practices for alcohol interlock programmes" (Beirness, 2001).

2. The effects of alcolock programmes on drink-driving and road safety

Over the last 15 years several American and Canadian alcolock programmes for DWI offenders have been evaluated. Despite huge differences among the programmes, the target groups and the accompanying evaluation studies, study results indicate that alcolocks effectively prevent drink-driving during the period of alcolock installation. Most studies, however, give proof of methodological inadequacies which make the results less conclusive. In only one study, in Maryland, multiple DWI offenders were randomly assigned to the experimental or the control group. Preliminary results indicated that, within the first year of alcolock programme participation, DWI recidivism was reduced by about 65% (Beck et al., 1999).

According to most studies, after alcolock removal from the vehicle recidivism rates appeared to increase again. No residual effect in preventing impaired driving could be observed. An exception is preliminary data from an alcolock programme in Quebec, which started in 1997. The study design was that of a before-during-after comparison. No control group was included in the study. During the period of alcolock installation, the DWI recidivism rate dropped by more than 90%. In a six-month period following removal of the alcolock, the recidivism rate did not increase. Furthermore, traffic offence and crash figures showed a significant decrease during both the alcolock and after-periods (Dussault & Gendreau, 2000).

Preliminary results from a study in Calgary and Edmonton (Alberta, Canada) suggest that the incorporation of rehabilitation ('harm-reducing intervention') in the alcolock programme has positive effects on recidivism rates after the alcolock period. This finding, however, was not statistically significant. The rehabilitation programme was designed to educate and raise awareness among participants of the need to plan and re-evaluate their vehicle use whenever alcohol consumption was likely to occur. The participants met with a case manager every time the alcolock needed servicing.

Furthermore, statistical analysis showed that programme participants with high failure rates during the alcolock period were 2-3 times more likely to commit a re-offence after the alcolock period. This result suggests that participants with high failure rates should be required to have an interlock for an extended period (Marques et al., 2000).

The promising results of the American and Canadian evaluation studies justify a large-scale field trial in one or more EU countries.

3. Target groups for an EU alcolock field trial

In the United States, Canada and Australia, target groups of alcolock programmes were first offenders with very high alcohol concentrations, second offenders and multiple offenders. In Sweden, target groups also include professional drivers, teachers and pupils of driving schools, and alcohol-dependent drivers.

Due to a great variety in sanctions for driving under the influence of alcohol in the various EU countries, it is not feasible to define one or more target groups for an EU field trial in terms of offender types, like first, second or multiple offenders. A definition in terms of imposed sanctions for DWI seems to be more appropriate. In that case, the definition of target groups could be related to the sanctions of license suspension (imposed by the court) and/or mandatory rehabilitation/driver improvement courses (imposed by the licensing authority).

Participation of alcohol-dependent drivers does not seem possible without a change in legislation in the participating countries.

Possible target groups for commercial alcolock programmes are tour operators, (local) bus companies, dangerous goods or heavy freight transport companies, taxi companies, or driving schools. The actual use of the alcolocks by the drivers involved should, of course, be compulsory.

The greater the drink-driving problems of the target group are, the greater the beneficial effects on road safety can be. Therefore, DWI offenders seem to be the most appropriate target group for an EU field trial.

4. EU alcolock programme requirements

4.1. Technical requirements

The alcolock device will have to meet certain technical requirements. Technical standards have been defined in the USA, Canada and Australia. These standards relate to reliability, accuracy, circumvention and tampering, and electromagnetic interference with the vehicle and vice versa. The most recent and most demanding standards are the Alberta standards, which also apply in Sweden.

In order to minimize the risk of false positive readings, alcolocks with an electrochemical sensor (fuel cell) are recommended. Key features to prevent circumvention or tampering are: sealed wiring, human breath recognition systems, the inclusion of a data recorder, and random running re-tests.

Ideally, technical requirements should be uniform for all EU countries. Furthermore, they should meet the highest possible technical standards, these for the moment being the Alberta standards. But, on the other hand, very high standards may cause lack of competition between manufacturers, thus increasing the cost of the devices. To date, only one device meets the Alberta standards. The cost of an alcolock may strongly influence a DWI offender's willingness to participate in an alcolock programme. So, in order to stimulate competition, it might be sensible to allow some variation of the technical requirements between EU countries, depending on their topographical and climatic conditions. It does not seem necessary for all EU countries that the devices function accurately up to a height of 3,500 metres or within a temperature range of -45 to +85° C.

Not all technical requirements, however, are covered by existing standards. In the literature on alcolocks nothing was found, for instance, on the subject of an emergency bypass switch. Whether alcolocks should be provided with such a device, depends on the risk of false positive readings and other kinds of malfunction. During preliminary testing by one of the consortium partners, the connector of the detachable sample head broke down, preventing the car from getting started. Therefore, it seems advisable to install an emergency bypass switch in the vehicles involved in an EU field trial, and to evaluate legitimate and illegitimate use. Bypassing the alcolock should be considered to be a programme violation, except when the driver can prove force majeure. The bypass switch should allow for single-use, resulting in a compulsory visit to the service provider within a few days. Otherwise, the car should be immobilized.

A primary safety criterion that alcolocks will have to meet, is that running re-tests can be performed without visual distraction and/or unintended manoeuvring. This implies, among other things, the following technical requirements:

- The sample head has to be mounted in such a way that it can be used and replaced without the driver having to take his eyes off the road or to change his position behind the steering wheel.

- The request for a running re-test and the sampling procedure should only be accompanied by unambiguous auditive signals, and should not interfere with the driving task.

In addition to these requirements, training of all alcolock users in real traffic or in a simulator is recommended.

4.2. Implementation procedures

An important item is the setting of a BrAC threshold (fail level) for alcolocks. The main goal of an alcolock programme should be that participants learn to separate drinking from driving. For that reason, a BrAC threshold of 0.00 mg/l would be preferable. On the other hand, the breath testing device may produce small positive test results, even if a person has not drunk alcoholic beverages, e.g. when a person has been eating bread shortly before the test. Slight positive test results may also occur if a driver has some 'mouth alcohol' due to having used a 'fresh-breath' spray or having eaten a bonbon containing a very small amount of alcohol. And, finally, slight positive readings may occur without a clear cause. So, for practical reasons and for the sake of legal security, a BrAC-threshold of 0.10 mg/l is recommended. Depending on the national legislation of EU countries, this threshold equals a blood alcohol concentration (BAC) varying from 0.21 to 0.23 g/l.

Alcolock programme participation can be administered under criminal law (by the courts) or under administrative law (by the licensing authority). Participants should be monitored regularly, and simultaneously the data from the alcolock data recorder should be reviewed. Monitoring and enforcing a DWI offender's compliance with the alcolock programme requirements demands close co-operation between programme providers, the police and the programme administrative authority (probation or licensing authority).

It is recommended that DWI offenders pay at least part of the cost of alcolock programme participation in order to get a motivated participant group. On the other hand, too high costs may be a barrier for eligible DWI offenders to participate.

4.3. Legal requirements and existing provisions in EU countries

A survey of legal requirements and provisions for alcolock programmes was conducted in eleven European countries. Although, apparently, legal aspects had not yet been thoroughly investigated by the respondents, the following essentials could be derived from the survey results:

- Alcolock programmes can be integrated in existing sanctions for DWI. They can, for instance, substitute license suspension or shorten the suspension period, or they can be implemented as an accompanying measure as part of rehabilitation/driver improvement courses.
- Alcolock programmes can be introduced as a general preventive measure (for all volunteering drivers, for various categories of professional drivers, etc.) or as a specific preventive measure (for DWI offenders).
- Alcolock programmes for DWI offenders should, at least partly, be financed by the participants.
- Some respondents suggested a zero BrAC threshold (fail level).

- Mandatory alcolock programmes are assumed to require changes in legislation, especially in traffic law.
- The predominant opinion of the respondents is that alcolock programmes constitute an effective tool in preventing drink-driving, and a good alternative for license suspension.

5. Design of an EU alcolock field trial for DWI offenders

5.1. Target groups

The definition of target groups can be related to the sanctions of license suspension (imposed by the court) and/or mandatory rehabilitation/driver improvement courses (imposed by the licensing authority).

Under *criminal law*, the following DWI offenders might be target groups for alcolock use:

- DWI offenders who, if the sanction of mandatory alcolock programme participation did not exist, would have only a period of probationary license suspension imposed by the court. For these offenders, the mandatory alcolock use would mean an aggravation of the sanction, which in most EU countries would probably require an amendment of the law.
- DWI offenders who, if the sanction of mandatory alcolock programme participation did not exist, would have a period of hard license suspension imposed by the court. For these offenders, the mandatory alcolock use would mean an alternative sanction: (part of) the hard license suspension period is replaced by a probationary license suspension period, combined with mandatory alcolock use. If the court leaves the choice between hard suspension or participation in an alcolock programme to the discretion of the offenders, the programme is quasi-voluntary. Participation rates will then probably be (much) lower than in the case of fully mandatory participation. At least in some EU countries, participation in an alcolock programme can be imposed without an amendment of the law.

Under *administrative law*, mandatory alcolock use might be imposed on all drivers who have to follow a rehabilitation/driver improvement course as a condition for license re-instatement. For these drivers, too, the mandatory alcolock use would mean an aggravation of the sanction. In which countries this would require an amendment of the law, has not become very clear from the inventory of legal requirements and possibilities, probably reflecting the fact that these have not yet been considered in detail.

5.2. Most desirable versus most realistic target group

The most desirable target group is constituted by drivers who have to follow a rehabilitation course, since the effectiveness of alcolock use will probably be enhanced, if it is combined with rehabilitation. Furthermore, the effectiveness of rehabilitation courses will probably also increase, by combining them with an alcolock programme. There seem to be some major practical problems, though. Some of the drivers who have to follow a rehabilitation course, may have had a period of hard suspension and/or a period of mandatory alcolock use imposed by the court, which might interfere with alcolock use as part of a rehabilitation course.

The most realistic target group for an EU alcolock experiment is probably that of DWI offenders who have had a period of mandatory alcolock use imposed by the courts, as an alternative for a period of hard license

suspension. If these drivers also have to follow a rehabilitation course (and in some EU countries this will be the case for nearly the entire group), it is recommendable to find ways of combining the two.

In order to stimulate alcolock programme participation by DWI offenders, it is recommended to avoid a preceding *standard* hard suspension period. Firstly, because the offender's financial position might deteriorate dramatically as a result of hard suspension; for commercial drivers it can even constitute grounds for dismissal. And secondly, because a suspended DWI offender might still drive a car and perceive a very low risk of apprehension. In both instances, the cost of alcolock use might exceed the perceived benefit. This may especially be important, if an offender is given the choice between a period of hard suspension or entering an alcolock programme. Therefore, preceding hard suspension periods should preferably be restricted to very serious DWI cases.

5.3. Duration of an experimental alcolock programme

The period of alcolock use to be imposed by the court, might be linked to the period of probationary license suspension that it is combined with, for instance:

- As an alternative for 3 months of hard suspension: 6 months of probationary suspension in combination with 18 months of alcolock use.
- As an alternative for 6 months of hard suspension: 9 months of probationary suspension in combination with 21 months of alcolock use.
- As an alternative for 9 months of hard suspension: 12 months of probationary suspension in combination with 24 months of alcolock use.
- As an alternative for 12 months of hard suspension: 3 months of hard suspension + 12 months of probationary suspension in combination with 24 months of alcolock use.

The prolonged periods of probationary license suspension in the case of alcolock programme participation might give in to objections from some EU countries against replacing or mitigating the existing sanction of hard license suspension.

If alcolock programmes become an integrated part of rehabilitation courses under administrative law, they can probably be better tailored to individual participants. Also, pre-conviction programme participation would be possible. A practical problem, however, would occur if, in a later stage, the court imposed a period of hard suspension.

5.4. Evaluation of an EU alcolock experiment

The design of an experimental alcolock programme for DWI offenders should be aimed at evaluating the effects on DWI recidivism and, if possible, accident rates. Based on the results of the latter evaluation, a cost-effectiveness analysis could be made.

The experimental group might consist of DWI offenders who have had an alcolock programme imposed or offered by the courts, as an alternative for hard license suspension. An important advantage of taking this entire group instead of the subgroup that is actually participating in an alcolock programme, is that the problem of self-selection is avoided.

The control group should then consist of DWI offenders who have had a hard suspension period imposed. Random assignment to experimental or control groups would be ideal, but is probably not feasible since it would create a high degree of legal inequality between equal offenders. If random assignment is not possible, the control group might be found in an area where the alternative of alcolock programme participation is not available. In that case, it is important that the control group comes under the same (national) jurisdiction as the experimental group. Otherwise, both groups may very possibly not be comparable with respect to the severity of their drink-driving offences and their risk of repeat drink-driving. Furthermore, the risk of apprehension for DWI should be more or less identical for both groups. This so-called 'post-test-only design with equivalent groups' is probably feasible, since the inequality between DWI offenders in the experimental and control area is not of a legal but of a physical nature (namely depending on the availability of an alcolock programme). The design could be strengthened by including a pre-test period. This is possible by collecting data on DWI offences and accident involvement over a period preceding alcolock programme participation or license suspension.

In order to get convincing results for both policy makers and the general public, the experimental group should contain at least 500 actual alcolock programme participants; the control group might contain approximately 1,000 DWI offenders who have had a period of hard license suspension imposed. From a statistical viewpoint, this sample size allows a recidivism reduction of approximately 30% in the experimental group, when compared to the control group, to be significant at a 95% probability level.

Recidivism rates should be compared both during and after treatment in order to assess the long-term effects, preferably by means of survival analysis. This kind of analysis makes it possible to account for competing hazards, like hospitalisation, death or imprisonment of the drivers involved.

If the experimental group consisted of DWI offenders who are following a mandatory rehabilitation course with integrated alcolock programme, the control group would consist of DWI offenders who are only following a mandatory rehabilitation course. On this design the same conditions with respect to comparability of the two groups are applicable as in the design for DWI offenders who have had an alcolock programme imposed or offered by the courts.

5.5. Duration of an EU alcolock experiment

The duration of an EU experiment with alcolock use by DWI offenders would be approximately 4½ years:

- inclusion period: ½ year;
- experimental period: 2 years;
- post-experimental period: 1 year;
- data collection, analysis and reporting: 1 year.

If a rehabilitation course is integrated in the alcolock programme, extension of the post-experimental period with one year may be interesting. That is, if the reduction of recidivism during programme participation was significant. In that case, reporting might be split into two parts: after 3½ years on the

effect during programme participation, and after 5½ years on the effect after programme participation and alcolock removal from the vehicle.

6. Feasibility of an EU alcolock experiment

In order to identify countries which are interested in conducting a field trial, the research consortium organized a survey among road safety experts of various EU countries, as well as an international workshop on alcolocks. Representatives of Belgium, France, the United Kingdom, the Netherlands, Spain and Finland expressed their interest in conducting an alcolock field trial, some of them not necessarily in an EU context. Most countries, however, were not yet aware of the details of the required legal, practical and financial arrangements.

Due to the great variety in sanctions for driving under the influence of alcohol in the various EU countries it would be an advantage if an experiment could be conducted both in a country with relatively light DWI sanctions (target group of relatively severe offenders) and in one with relatively severe sanctions (target group of relatively light offenders). A significant reduction of DWI recidivism among severe offenders, however, will be more beneficial for road safety than a reduction among light offenders.

The research consortium of the feasibility study recommends that the European Commission appoints a follow-up co-ordinator to whom trial proposals and grant applications can be submitted. In the consortium's final report, a list of proposed minimum standards for an EU field trial has been included.

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Appendix

Slides of the presentation

Feasibility of alcolock implementation in EU policies

SWOV (co-ordinator), BAST,DTF,VTT

Objectives of the study

- effects on road safety
- identification of target groups
- requirements for devices and programmes
- design of a field trial
- identification of interested countries

Effects

- reduction of recidivism (65%) during program
- effects disappear after removal
- extended effects when combined with rehabilitation programs

Target groups

- alternative for license suspension
- integration in rehabilitation program
- for alcohol dependent drivers: legislation changes needed
- professional drivers
- Conclusion: most safety benefits for DWI-offenders

Technical requirements

- uniform in all EU countries (ideal)
- meet highest standards: Alberta standards (ideal)
- allow some variation to stimulate competition
- add to Alberta standards:
 - emergency by pass
 - avoid distraction from driving task
 - training of users

Implementation procedures

- set trial level at 0.10 mg/l BrAC (0.21-0.23 g/l BAC)
- DWI-offenders pay (part) of the costs
- integration in existing sanctions possible

Field trial

- Target groups
 - alternative for hard license suspension
 - integration in rehabilitation program
- Duration
 - proportional to length of license suspension
 - depending on monitoring results

Design Evaluation

- post-test only with equivalent experimental and control groups
- if possible: pre-test
- 500 alcohol lock drivers (experimental group)
- power: 30% reduction recidivism
- survival analysis for long-term effect
- results after 4,5 - 5,5 years

Cost-effectiveness

- Dutch situation:
 - 3000 drivers in alcolock program: € 2.25 million
 - annual number of lives saved 2.5 -5
 - benefit of 1 life saved: € 1-4.5 million
 - benefit of alcolocks: € 2.5 - 22.5 million
 - a 30 % reduction of recidivism makes scheme cost-effective

Feasibility experiment in EU?

- Interested countries
 - UK, France, Belgium, the Netherlands
 - why an international evaluation study ?
 - How to organise it?
 - the role of the EU?