A Preliminary Evaluation of the Swedish Ignition Interlock Programme and Recommended Further Steps

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Abstract
The Swedish alcohol ignition interlock programme for DWI offenders started as a pilot project in 1999. It is a volunteer programme, but differs in some respects from other programmes. It covers a period of two years, and includes very strict medical regulations entailing regular check-ups by a physician. Records from the five years prior to the DWI offence showed that the DWI offenders are generally in a high-risk category long before their offence. During the programme, alcohol consumption is monitored through the use of self-esteem questionnaires (AUDIT) and five different biological markers.

Our preliminary data shows a noticeable reduction in alcohol consumption amongst the participants, as determined through falling AUDIT scores and significantly decreased levels in the biological markers. It must, however, be noted that the number of participants is still very small (285 individuals) compared to other programmes. Up until now, no case of recidivism has been found during the programme, but it is still too early to draw any conclusions concerning the rate of recidivism after completion of the programme, as data is not yet available for analysis. Nevertheless, the preliminary results are so promising that the programme will be expanded to cover all of Sweden, as well as include all driving licence categories.

Introduction
From February 1999, DWI offenders in three of Sweden’s twenty-one counties were able to volunteer for a two-year alcohol ignition interlock pilot programme. In this programme, the interlock memory was checked every other month and medical check-ups using biological alcohol markers were conducted every third month. Participants had to verify a sober lifestyle during the second year to be permitted to continue.

Objectives
The aim of the pilot programme was to examine driver behaviour in connection with the alcohol ignition interlock and to study its effect from a recidivism and rehabilitation perspective. A further aim was to assess the potential of the interlock for reducing relapse frequency, and thereby benefit road safety. Moreover, a study was to be made of the specific effect of the alcohol ignition interlock compared to that achieved through driving licence revocation. Additionally, the rehabilitation potential through long-term follow-ups was to be examined.

Methods
The process evaluation involved a longitudinal monitoring of participants, with the main focus on any changes in life-style and drinking behaviour. This was determined through interviews, self-esteem questionnaires (AUDIT) and through the use of biological markers (the three liver enzymes GGT, ASAT and ALAT, the mean volume of the red blood corpuscles (MCV) and the carbohydrate-deficient transferrin (CDT)).
Two control groups were used, one comprising DWI offenders who had abstained from participating in the programme and who therefore had had their driving licence revoked (K2), and the other consisting of matching individuals from counties not taking part in the programme (K1).

The outcome evaluation involved a study of official accident statistics, the number of DWI offences, hospital discharge registers and sick leave registers. Data covering the five years prior to the DWI offence and onwards was collected.

**Results**

During the programme period under evaluation, 285 people had volunteered for the ignition interlock programme (as of December 2001). Eleven percent of these were women. Among the participants, 50% had been diagnosed as alcohol dependent and 10% as alcohol abusers. The remaining 40% had no diagnosis. The mean BAC level at the time of the DWI offence was 0.20% in the interlock group compared to 0.18% and 0.17% in the two control groups. In all, only 11% of the eligible DWI offenders in the three counties took part. Three percent of the applicants were rejected, the usual reason being simultaneous abuse of other drugs. Twenty percent were subsequently denied permission to continue, primarily because a sober lifestyle could not be verified during the second year of the programme, or due to repeated attempts to start their car while under the influence of alcohol. There were also some participants who decided to quit the programme of their own accord. In all, 60 people have now successfully completed the entire programme.

**Records** from the five years prior to the DWI offence showed that the accident rate (road accidents involving injury reported by the police) for the participants in the interlock and control groups was 4-5 times higher than for the average driver. Their records also showed a 10-20 times higher frequency of DWI offences. Ill-health statistics were also studied, whereby significant differences were found between the DWI offenders and the average Swede in the same age category: the DWI offenders, interlock participants as well as members of the control groups received hospital care (irrespective of medical diagnosis) much more frequently than the average Swede. A specific analysis of the statistics from the past five years on hospital care due to a road accident revealed that DWI offenders had been patients 3-4 times more often than the average Swede and that they were hospitalised a significantly greater number of days (Figure 1). They also reported in sick to work about twice as many days per year as compared to the average Swede.

![Figure 1](image-url). Hospital care due to road accidents during the five years prior to the DWI offence. Number of occasions and number of days at hospital per person and year in the interlock group, in the control group (K1) and in Sweden as a whole.
During the programme a noticeable change in alcohol habits among the participants was found, measured both through improved results from biological alcohol markers as well as through better results on the AUDIT questionnaire. The latter showed an impressive reduction in alcohol problems during the 2-year programme. Among men, the mean AUDIT score fell from 11 to 2. While 64% of the male interlock participants had an initial score of 8 or more (indicating potentially dangerous of harmful alcohol habits), only 6% had such a high score at the end of the programme (Figure 2). As a more objective measure of the alcohol consumption, five different biological markers were monitored during the two years of the programme. A noticeable change was observed through steadily diminishing values, which confirms the reduced alcohol consumption suggested by the AUDIT reports. Thus the mean level of the liver enzyme GT - having a specificity of around 75% regarding alcohol abuse – was reduced by about 40% during the programme (Figure 3). CDT, with the highest alcohol specificity (about 95%) was elevated for 17% of the participants at the start of the programme and for about 6% by the end (Figure 4). Any elevated CDT-levels during the second year of the programme indicated a relapse into alcohol abuse, which in turn meant being denied permission to continue in the programme.

![Figure 2. Percent of the participants in the interlock programme having risky or harmful alcohol habits according to AUDIT (> 8 scores) at each of the eight medical check-ups.](image)

![Figure 3. The mean values of the liver enzyme GT for the participants in the interlock programme at each of the eight medical check-ups (every third month from start). The GT-values are presented as a percent of the upper reference level.](image)
To summarize, there is reliable data showing significantly reduced alcohol consumption among the interlock participants during the programme period. A key question is, however, whether this has any impact on road safety. Preliminary data indicates an impressive effect on DWI recidivism. For the interlock group, this was reduced from the prior 4.6% per year to zero, while it remained high among those having their driving licence revoked (K2), which indicates a very high degree of illegal driving (Figure 5). Moreover, preliminary results suggest that the annual accident risk was reduced from 2.1% to about the same level as that of the average driver (0.4%) and to that of those whose licences had been revoked. However, the small number of accidents makes this data very uncertain.

As a spin-off effect, tangible changes were also found in the sickness figures for the interlock group compared to members of the control groups. During the programme, an increase of almost 60% in the number of sick days per year and person could be seen (Figure 6). In the two control groups however, the increase was significantly higher, about 170% and 120% respectively. These findings probably reflect the adverse effects of driving licence revocation on the work situation and probably also unchanged drinking habits. As far as hospital care...
In statistics, delayed registration procedures mean that data showing changes during the interlock programme is not yet available.

**Figure 6.** Days of sick leave per person and year (five years prior to and after the DWI offence). "After the DWI offence" only includes the period of participation in the interlock programme, and for the controls, the period while the driving licence was revoked. Only sick periods of more than two weeks duration are included.

**Discussion**

All data from the five years prior to the DWI offence clearly demonstrates that the DWI offenders are generally in a high-risk category long before their offence. They were thus found to have a 4-5 times higher accident rate than the average driver and also a significantly higher rate of hospitalisation and of reporting in sick. These findings corroborate the observation that 60% of the interlock group were diagnosed as alcohol dependent or as alcohol abusers. In this context it is worth mentioning that epidemiological surveys have shown similar results in the United States. Miller and Windle (1990) thus found that at least 70% of DWI offenders can be diagnosed by DSM-IV as alcohol abusers or alcohol dependent. Therefore it could be suggested that the Swedish observations regarding the previous records of DWI offenders would be very much the same in other countries as well.

The Swedish results, although preliminary, show that the ignition interlock programme has had a significant and positive effect. The DWI offenders have a significantly lower rate of recidivism while participating in the interlock programme than those who do not participate. In fact we have not yet observed any single case of recidivism among the participants. This is probably a result of the very strict regulations concerning regular medical check-ups and the necessity of a verified sober lifestyle during the second year in the programme. The advantage of these strict regulations is demonstrated by the noticeable changes in alcohol habits among the participants. Improvements are thus observed as significantly better AUDIT scores and decreasing values for all the different biological markers studied. In all, this clearly demonstrates significantly reduced alcohol consumption among the interlock participants. As a spin-off effect, tangible changes were also found in the sickness figures for the interlock group compared to the members of the control groups. These effects probably reflect both a decreased alcohol consumption and the benefit from an employment perspective of being able to keep one’s driving licence.

The disadvantage to the strict medical regulations is the fact that about twenty percent of those taking part are denied permission to continue in the programme, primarily because of a relapse or that they continue drinking to the extent that the biological markers are above normal levels. Once outside the programme these individuals are beyond control and probably
engage in a high degree of illegal driving. For instance, Griffin and deLaZerda (2000) estimated that as many as 75% of those drivers who have had their licences suspended in the United States continue to drive to some extent during the period of suspension. There is nothing that would contradict similar conditions occurring in Sweden. Several previous studies have shown similar beneficial effects in reducing DWI recidivism during the period of interlock use as has been found in the Swedish programme. (For a review, see ICADTS, 2001). However, these effects gradually dissipated, more or less, after the removal of the interlock device from the vehicle. One purpose of the Swedish interlock programme running for two years, and with strict medical regulations, was to achieve long-term rehabilitation. As yet, we do not have any follow-up data to examine the rate of recidivism of the 60 participants who have completed the entire programme.

**Conclusions and further steps**

Based on the very promising preliminary results, a recommendation that the pilot programme cover the entire country as well as all driving licence categories was presented to the Swedish Government. It appears that this recommendation has been accepted and will be effective as of the year 2003. The inclusion of truck, bus and taxi drivers in interlock programmes complies very well with the growing voluntary use of interlock devices in these types of vehicle in Sweden. It was also recommended that the interlock programme be prolonged for those participants who are unable to verify a sober life-style during the second year of the programme. This recommendation was not accepted, very unfortunately as these drivers are probably those who run the greatest risk of DWI recidivism.

**References**

